The Mathematical Imagination
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NOTES

INTRODUCTION

1. See Juola and Ramsay’s introduction to mathematics for humanists, *Six Septembers*.
2. Winterhalter, “Morbid Fascination with the Death of the Humanities.” For a contrasting view, which upholds the mutual dependence of the humanities and STEM disciplines, see, for example, Koblitz, “Why STEM Majors Need the Humanities.”
3. Allington, Brouillette, and Columbia, “Neoliberal Tools (and Archives).”
5. As Hitler took power in 1933, the Nazis implemented regulations barring Jews from holding government positions (*Ämter*), which included professorships at the university. He was thus prohibited from lecturing and publishing in Germany, see Smith, *Husserl*, 24–25.
7. These are the words of Husserl’s introduction to the speech’s publication in *Philosophia* (“Die Krisis der europäischen Wissenschaften und die transzendentale Phänomenologie. Eine Einleitung in die phänomenologische Philosophie,” 77). Quoted in *Crisis of European Sciences*, 3.
9. Although historical relativism has a deeper conceptual history, the term *crisis of historicism* originates with the publication of Ernst Troeltsch’s “The Crisis of Historicism” (1922) and Troeltsch, *Der Historismus und seine Probleme*. In his essay “The Crisis of Science” (“Die Wissenschaftskrise,” 1923),
Kracauer interprets Troeltsch in tandem with Max Weber as contributing attempts to wrest historical analysis from relativism as a means of countering rising discontent with science in contemporary youth culture; see Kracauer, *Werke*, 5.1:596 and 600. See also Beiser, *German Historicist Tradition*, 23–26.


11. The famous example of such results is the “Weierstraß function,” which is continuous but not nowhere differentiable. Hahn, “The Crisis in Intuition,” 82–83. Klaus Volkert interprets the conflict over intuition as a driving force in the history of modern mathematics, see *Die Krise der Anschauung*.


15. Ibid., 6.


17. Husserl, *Crisis of European Sciences*, 23; italics in the original.

18. Ibid., 48–49 and 52.

19. Adorno grew up in a Jewish household in Frankfurt am Main, taking as his pen name his Catholic mother’s Corsican family name and retaining the trace of his father’s (“Wiesengrund”) as the middle initial. Indeed, the relationships among the Frankfurt School, the origins of critical theory, and Jewishness (in particular, a European form of Jewishness) is a topic in need of further exploration, but which ultimately lies beyond the scope of this study. See Jacobs, *Frankfurt School, Jewish Lives, and Antisemitism*; Allen, *End of Progress*.


23. Ibid., 3:58.

24. The preface to the first two editions of the text (1944 and 1947) as well as that of the “new edition” (1969) make clear the historical connection that Horkheimer and Adorno have in mind.

26. These influences have been canonical since the publication of the first studies on the Frankfurt School, such as Jay’s watershed work, *Dialectical Imagination*, chap. 3. Feenberg focuses on the influence of Marx and Lukács; see *Philosophy of Praxis*, chap. 7. See also Susan Buck-Morss’s discussion of Adorno and psychoanalysis and his productive disputes with Walter Benjamin in *Origin of Negative Dialectics*, chap. 1 and 9–10. Likewise, Habermas locates in *Dialectic of Enlightenment* a conversation with Nietzsche’s notion of the limits of rationality that models a “critique of ideology’s totalizing self-overcoming,” see Habermas, “Entwinement of Myth and Enlightenment,” 107.

27. See the examples in Gamwell, *Mathematics and Art*, x.


29. Rabinbach, *In the Shadow of Catastrophe*, 27. Part of the “new Jewish ethos” of messianism as examined by Rabinbach was conditioned by the rare “opportunity,” as Paul North calls it, that arose in Central Europe as the meaning of the category “Jew” began to erode; North explores this opportunity in the work of Franz Kafka, a figure much discussed among the thinkers investigated here, North, *Yield*, 1–2. The sense of freedom in chaos runs throughout the historiography of the interwar period; see Weitz, *Weimar Germany*, chaps. 3 and 5.

30. See the A preface for Kant’s definition of “critique” (*Kritik*), Kant, *Critique of Pure Reason*, Ax–Axii.


32. Thanks to the work of Peter Fenves, we have started to take account of mathematics in the work of Walter Benjamin; see Fenves, *Arresting Language*, chap. 6 and Fenves, *Messianic Reduction*, chaps. 4 and 5. In accounts of the history of critical theory focused on Horkheimer and Adorno, mathematics often appears in reference to their criticism of logical positivism and Edmund Husserl’s phenomenology; see Jay, *Dialectical Imagination*, 62; Wheatland, *Frankfurt School in Exile*, 104; and Buck-Morss, *Origin of Negative Dialectics*, 105. It also surfaces as a symbol of “formal rational disciplines” next to the natural sciences in discussions of reification and instrumental reason, to which I return in chapter 1; see Feenberg, *Philosophy of Praxis*, 78–79.


34. Ibid., 255.


37. Maimon was responding to the analysis of infinitesimal calculus (and the concept of the infinite) written by Lazarus Bendavid (a German Jew and Maimon’s intermittent patron) and published in 1789 as *Versuch einer logischen Auseinandersetzung des Mathematischen Unendlichen; Essay on Transcendental Philosophy*, 152–153.


41. Although Cohen did not remark on this affinity with Maimon, his contemporaries did; see Kuntze, *Die Philosophie Salomon Maimons*, 339; and Bergmann, “Maimon und Cohen,” 548. On Cohen’s reception of Maimon, see Poma, *Critical Philosophy of Hermann Cohen*, 279n10; and Albrecht, “[H]eute gerade nicht mehr aktuell,” 54–55.


43. Ibid., 6:33.

44. Ibid., 6:84–89. Cohen draws on Kant’s notion of the infinite judgment in *Critique of Pure Reason*, A72–73/B97–98.


46. This tendency is perhaps most prominent in regard to Rosenzweig’s *Star of Redemption*; as Amos Funkenstein writes: “Rosenzweig did not make up his mind whether the ‘formal’ language (symbols) with which” he speaks about the ideas of God, World, and Self, “is mathematics or is only like mathematics. But of course it could only be the latter.” See Funkenstein, *Perceptions of Jewish History*, 283 and 289. Peter Gordon makes a similar point in “Science, Finitude, and Infinity,” 39–51. For an insightful and contrasting view, see Smith, “Infinitesimal as Theological Principle,” 563. I will return to this debate in chapter 3.
47. Blumenberg, Paradigms for a Metaphorology, 5.


49. On the experience of German-Jewish intellectuals and World War I, see Brenner, Renaissance of Jewish Culture in Weimar Germany, 31–35; and Mosès, Angel of History, 11.

50. As in Scholem’s 1964 essay “Against the Myth of the German-Jewish Dialogue.” See also Hess, Germans, Jews and the Claims of Modernity, 10–11.

51. Theology entered the secondary literature through Benjamin’s theses “On the Concept of History” (Benjamin, Gesammelte Schriften, 1:694) and Adorno’s Minima Moralia; see Jay, Dialectical Imagination, 199–201, 277–279; and Buck-Morss, Origin of Negative Dialectics, 94–95, 168–173. On the origins of the theological-messianic impulse in Benjamin, see Rabinbach, In the Shadow of Catastrophe, chap. 1; and Tiedemann, “Historical Materialism or Political Messianism?”

52. On the link between aesthetics and redemption in Adorno and Benjamin, see Buck-Morss, Origin of Negative Dialectics, chap. 8; Brunkhorst, Adorno and Critical Theory, chap. 4; Wolin, Walter Benjamin: An Aesthetic of Redemption; Wellmer, “Truth, Semblance, Reconciliation”; and Hohendahl, Fleeting Promise of Art.


55. Pollock, Franz Rosenzweig.

I. THE TROUBLE WITH LOGICAL POSITIVISM

1. For the full breadth of the dispute between critical theory and logical positivism in both the 1930s and the 1960s, see Hans-Joachim Dahms, Positivismusstreit; O’Neill and Uebel, “Horkheimer and Neurath.” The dispute has been part of the history and internal debates of the Frankfurt School since the late 1960s; see Wellmer, Critical Theory of Society, 9–18; and Jay, Dialectical Imagination, 61–63.

2. Horkheimer’s letter to Adorno from February 22, 1937, leaves little doubt that academic resources were part of his criticism: “In the end, this magic,” namely, logical positivism, “is all about academic positions and endowed professorships [ordentliche Lehrstühle],” Briefe und Briefwechsel, 4:1:294. The members of the Vienna Circle, Dahms explains, had no better chances in exile than the Frankfurt School, Dahms, Positivismusstreit, 141–142.


6. Horkheimer had been in conversation especially with Neurath over a planned collaboration; on this fascinating prehistory to the debate, see Dahms, *Positivismusstreit*; O’Neill and Uebel, “Horkheimer and Neurath.”


8. Carnap, “Die alte und die neue Logik,” 16; Neurath, “Wissenschaftliche Weltaufassung,” 306. I cite from the English translation contained in Neurath’s *Empiricism and Sociology* (1973), see also Hahn, Neurath, and Carnap, *Wissenschaftliche Weltaufassung*. The authors even cite Vienna as fertile political “ground” for their worldview: “In the second half of the nineteenth century, liberalism was long the dominant political current. Its world of ideas stems from the enlightenment [sic], from empiricism, utilitarianism and the free trade movement of England,” 301.

9. The logical positivists had just as much reason to fear the rise of Fascism as the Frankfurt School. On the one hand, the Vienna Circle as well as logical positivism was coded in interwar Vienna as “Jewish,” see Silverman, *Becoming Austrians*, 60–64. On the other hand, as noted by A. J. Ayer as well as Dahms, members of the circle such as Neurath were politically active on the Left, and Neurath was convicted in the Bavarian revolutions of 1919; see Dahms, *Positivismusstreit*, 38; Ayer, “Editor’s Introduction,” 7. On their paths of exile, see Dahms, “Emigration of the Vienna Circle.”


13. Ibid., 307.

15. Instrumental reason forms one of the canonical charges against mathematics in the historiography of critical theory. “The critique of the positivist understanding of science,” Habermas writes of *Dialectic of Enlightenment*, is heightened “to the totalized reproach that the sciences themselves have been absorbed by instrumental reason” (“Entwinement of Myth and Enlightenment,” 111). Thomas Wheatland sees Horkheimer’s confrontation with the Vienna Circle as anticipatory of the later critique of “instrumental rationality” (*Frankfurt School in Exile*, 118).

16. Andrew Feenberg, for instance, argues that the Frankfurt School draws on Lukács’s *History and Class Consciousness* (and Emil Lask) in interpreting mathematics (and the natural sciences) in terms of the reification of intellectual forms. For Lukács, mathematics, as Feenberg puts it, fails to take account of the “purely contingent or ‘factual’ [sic] objects to which they refer” (*Philosophy of Praxis*, 78 and 102–103). Parallel to reification, mathematical calculation (*Berechenbarkeit*) enters critical theory, as in Hauke Brunkhorst’s intellectual history of Adorno, through Weber’s thesis on “domination through calculation” (*Adorno and Critical Theory*, 41); Dubiel, *Theory and Politics*, 91. Indeed, Adorno extends the criticism of mathematics to the “reification of logic,” which runs parallel to the commodity form, in Martin Jay’s words, in his work on Husserl, see Jay, *Dialectical Imagination*, 69. See also Buck-Morss, *Origin of Negative Dialectics*, 11; and Wiggershaus, *Frankfurt School*, 533.


24. Mathematical logicians from Leibniz to Wittgenstein, for instance, form one of the groups of thinkers that the logical positivists cite as their intellectual influences in *The Scientific Conception of the World* (along with Feuerbach and Marx in the category of “hedonism and positivist sociology”); Neurath, “Wissenschaftliche Weltanschauung,” 304 and 309–310. The interest in mathematical logic stems from Carnap; see his 1929 *Abriss der Logistik*.

25. The intensity and circulation of Scholem and Benjamin’s work on mathematics bears noting. The two became friends around July 1915, in part,
over discussion of mathematics, see Scholem, Tagebücher, 1:134. According to Tiedemann and Schweppenhäuser, Benjamin’s return to the subject of mathematics and Russell’s paradox occurred between the middle of 1916 and the middle of 1917 (Benjamin, Gesammelte Schriften, 6:639–640). That November, Scholem held his Referat on mathematical logic and, subsequently, Benjamin asked Scholem repeatedly to see the Referat—as far as I can tell, to no avail. See Benjamin, Gesammelte Briefe, 1:404, 407, and 418.

26. On the relationship between mathematics and Benjamin’s theory of language see Fenves, Arresting Language, 115–125. See also Fenves, Messianic Reduction, 117 and 122–124.

27. Russell formulated his paradox in set-theoretical terms, the details of which would divert too far from our analysis of mathematics and critical theory. Briefly, Russell’s paradox follows from the idea of a class with the defining predicate that the members of this class do not predicate themselves. The contradiction arises when we ask if this defining predicate predicates itself and, thus, if it belongs to the class it predicates or not. If it does predicate itself, then it belongs to the class it predicates, meaning, by the definition of the class, that it does not predicate itself, which is a contradiction; if it does not predicate itself (i.e., it is not among the predicates in the class that it predicates), then it does belong to the class it predicates. See Russell’s definition in Principles of Mathematics, 80; see also Russell’s discussion in ibid., chap. 10. For a more detailed account of Benjamin’s encounter with Russell’s paradox and its consequences, see Fenves, Messianic Reduction, 125–130.


29. I will return to this essay in chapter 2. See also Buck-Morss, Origin of Negative Dialectics, 88–90.


32. Benjamin, Gesammelte Schriften, 1:207.

33. Adorno’s lecture borrows at multiple points from Benjamin’s Origin of the German Tragic Drama, not only as we see in terms of mathematics but also regarding the notion of the “intentionless” nature of reality; see Eiland and Jennings, Walter Benjamin, 359; and Fenves, Messianic Reduction, 1.

34. This text was Adorno’s Antrittsvorlesung, the public lecture given when Adorno received the venia legendi at the University of Frankfurt. In it, Adorno contextualizes his philosophical proposal amidst contemporary reactions to the realization of philosophy’s inability at comprehending the totality of the real after idealism. On Heidegger, see A 6.
35. Adorno and Horkheimer, *Briefe und Briefwechsel*, 4.1:239–242. Adorno’s letter makes these points in reference to Russell’s paradox, which, as Dahms notes, he likely took from Benjamin; see Dahms, *Positivismusstreit*, 89n218. Adorno and Benjamin’s proposed solutions are similar: both claim the paradox arises when Russell assigns “meaning” to a meaningless sentence like “this sentence is false,” instead of recognizing it as “complexes fixed in words and sounds” (Benjamin, *Gesammelte Schriften*, 6:10) or “a mere complex of words” (Adorno and Horkheimer, *Briefe und Briefwechsel*, 4.1:241). Adorno’s likely adaptation does away with Benjamin’s terminology, such as predicable, focusing more on the notion of the “word” as a unit of meaning rather than “sign” (*Zeichen*).


38. Ibid., 4.1:294.

39. Ibid., 4.1:279. As Wiggershaus claims, the idea of “bringing” something “to language” (“etwas zum Sprechen bringen”) is a leitmotif throughout Adorno’s philosophy; see Wiggershaus, *Wittgenstein und Adorno*, 123.


41. See A 11:16–22, here 18–19.

42. See the contributions of Eva Geulen and Andrew Hewitt in Fisher and Hohendahl, eds., *Critical Theory: Current State and Future Prospects*.


44. The Odysseus scene has become a standard interpretation of *Dialectic of Enlightenment*; see Jay, *Dialectical Imagination*, 263–266.

45. Adorno and Horkheimer, *Briefe und Briefwechsel*, 4.1:244.

46. Carnap, *Unity of Science*, 32. Both Wittgenstein and Ernst Mach developed similar ideas of basic, scientific statements; Wittgenstein calls his “elementary proposition” (*Elementarsatz*). Wittgenstein, *Tractatus Logico-Philosophicus*, 42. Mach’s were part of his “atomistic positivism,” as Carnap calls it (47).


49. Carnap, *Unity of Science*, 32. The logical positivists, especially Neurath and Carnap, debated the interpretation of the concept and function of protocol sentences (as Uebel shows), the nuance of which is lost in Horkheimer and Adorno’s interpretation. See Uebel, *Empiricism at the Crossroads*; Carnap, “Über Protokollsätze”; and Neurath, “Protokollsätze.”


51. See, for instance, Jay, *Dialectical Imagination*, 54 and chaps. 3 and 6.


57. Horkheimer’s phrase “der Rest ist Schweigen” matches August Wilhelm Schegel’s translation of *Hamlet*, first published in 1798 as William Shakespeare, *Shakespeare’s dramatische Werke*, 361. I would like to thank Jocelyn Holland for pointing out this connection.


59. See, for instance, discussions by later critical theorists, such as in Habermas, *Theory of Communicative Action*, 1:366–399; Benhabib, *Critique, Norm, and Utopia*, chap. 5.


61. Here I cite from Horkheimer, *Eclipse of Reason*, 7, 14, and 16. On the expansion of Horkheimer’s critique to include American pragmatism, see Wheatland, *Frankfurt School in Exile*, chap. 3.

62. Horkheimer, *Eclipse of Reason*, 16. Horkheimer later argues, “positivism is philosophical technocracy. It specifies as the prerequisite for membership in the councils of society an exclusive faith in mathematics” (41). A more detailed examination of the relationship between mathematics and technology to the notions of technocracy and “the administered world” is beyond the scope of this study (A 3:10).


64. Feenberg, *Philosophy of Praxis*, 216. Feenberg has taken major steps toward reincorporating technology into the critical project, arguing that the reactionary political stance associated with technologies lies less “in technol-
ogy per se but in the antidemocratic values that govern technological development” (*Critical Theory of Technology*, 3).


69. The logical positivists’ exclusion of unverifiable and nonmathematical statements from knowledge hit a common nerve for those interested in other fields of study—such as history, language, and society. Horkheimer “must have felt especially attacked,” Dahms thinks, “when the Positivists seemed to have dismissed his theory of a better society as not only false but also—as suspected metaphysics—senseless” (*Positivismusstreit*, 139).

70. Lukács, *History and Class Consciousness*, 110–149.

71. Ibid., 117; see also Feenberg, *Philosophy of Praxis*, 79.


74. Ibid., 4.1:294.

75. Lukács points as well to “the rejection of every ‘metaphysics’” in the “antinomies of bourgeois thought” as a “renunciation” explicit in the work of Ernst Mach and Henri Poincaré, among others. Lukács, *History and Class Consciousness*, 120.


79. See the title essay in Habermas, “Modernity: An Unfinished Project.”


82. Ibid., 136 and 138.

83. On the return to the philosophy of science in critical theory, see Honneth, *Pathologies of Reason*, 168–171.

84. See, for instance, Horkheimer, *Critique of Instrumental Reason*.


87. Marcuse, *One-Dimensional Man*, 143–144. Marcuse was aware of the work of the logical positivists as recorded in his review of the *International Encyclopedia of Unified Science* in the 1930s. The review criticizes the notions of

88. Marcuse, One-Dimensional Man, 143.
89. See part 2 of Dahms, Positivismusstreit, chaps. 4 and 5.
90. Here the target is, again, “Carnap.” Adorno’s introduction to the volume also repeats the claim that, “resting on the authority of science,” the positivists “wish to liquidate philosophy” (liquidieren möchten); recall that Adorno’s Antrittsvorlesung used the same expression three decades earlier, A 8.1:285 and, in 1931, A 1:331.
91. Honneth, Pathologies of Reason, 168; capitalization modified in translation.
92. Habermas, Knowledge and Human Interests, 308.
93. Ibid., 68.
95. Although Adorno’s first letter to Scholem invokes the concept of the “expressionless” (das Ausdrucklose), which is related to his and Benjamin’s work on mathematics (see chapter 2), their correspondence focuses in the main on reconstructing the legacy of Benjamin. See Adorno and Scholem, “Der liebe Gott wohnt im Detail,” Briefwechsel 1939–1969, 11. See also Weissberg, Über Haschisch und Kabbala.

2. THE PHILOSOPHY OF MATHEMATICS

3. On Scholem and exile, see Engel, Gershom Scholem, 26–61. On World War I, see also Biale, Gershom Scholem: Kabbalab and Counter-History, 16–22; and Mosès, Angel of History, 12–13.
5. On the Enlightenment politics of Jewish emancipation, see Hess, Germans, Jews and the Claims of Modernity, especially 28–32. On Judaism in Scholem’s household, see Scholem, Von Berlin nach Jerusalem, 10–11. As Scholem writes: “One sees that with us nothing is left of a Jewish family. After 75 years!! Hopefully it will be different with me one day” (S 1:11 and 158). Important in this context is also Scholem’s position on what he saw as the contradictory nature of the German-Jewish experience as self-deceit; see Scholem, “With Gershom Scholem,” 1–7; and “On the Social Psychology of the Jews in Germany: 1900–1933,” 18–19.
6. Scholem’s criticism of his father was returned in kind; as he recalls his father’s disapproval of his interest: “My son the gentleman engages in nothing but unprofitable pursuits. My son the gentleman is interested in mathematics, pure mathematics. I ask my son the gentleman: What do you want? As a Jew, you have no chance of a university career. You cannot get an important position. Become an engineer and go to a technical college, then you can do as much math in your free time as you like. But no, my son the gentleman does not want to become an engineer, he wants only pure mathematics. My son the gentleman is interested in Jewishness [Jüdischkeit]. So, I say to my son the gentleman: Please, become a rabbi, then you can have all the Jewishness you want. No, my son the gentleman in no way wants to be a rabbi. Unprofitable pursuits” (Von Berlin nach Jerusalem, 71). Scholem’s anarchism has been a salient feature of both his critical and popular reception; see Engel, Gershom Scholem, 55–61; Biale, Gershom Scholem, 5–6; and Prochnik, Stranger in a Strange Land, 20.

7. See, for instance, Jay, “Politics of Translation”; Benjamin, Rosenzweig’s Bible; and Engel, Gershom Scholem.


9. Scholem writes: “Like all their spiritual kin among Christians or Moslems [sic], the Jewish mystics cannot, of course, escape from the fact that the relations between mystical contemplation and the basic facts of human life and thought is highly paradoxical. . . . How is it possible to give lingual expression to mystical knowledge, which by its very nature is related to a sphere where speech and expression are excluded? How is it possible to paraphrase adequately in mere words the most intimate act of all, the contact of the individual with the divine?” (Major Trends in Jewish Mysticism, 14–15). That redemption (real or in language) is foreclosed by the same conditions that would realize it likewise constitutes the paradox that ends Scholem’s essay “The Messianic Idea in Judaism,” 34–35.

10. Weber, Benjamin’s -abilities, 5–6. On the significance of the concept of tradition in Scholem, see Alter, Necessary Angels; and Schwebel, “Tradition in Ruins.”

11. Scholem, “Zehn unhistorische Sätze,” 264. If Scholem’s narratives of Jewish mysticism reflected his biography, as Amir Engel shows, then the metaphysics expressed in this passage and afforded by mathematics was also “one of the narratives, indeed stories” into which Scholem “molded the vast literature of Jewish mystical lore” (Gershom Scholem, 18).

12. See Mehrten’s categorization of mathematics around the turn of the century into a “modern” movement (Hilbert, Zermelo, Cantor) and a
counter-modern movement (Klein, Poincaré, etc.) in *Moderne, Sprache, Mathematik*, 108–186. On the key mathematical-historical studies that discuss the “Grundlagenkrise,” see Mehrtens, *Moderne, Sprache, Mathematik*. See also Grattan-Guinness, *Search for Mathematical Roots*; and Thiel, *Grundlagenkrise und Grundlagenstreit*.


16. Voss, *Über das Wesen der Mathematik*, 2. Nernst and Schönflies write in *Einführung in die mathematische Behandlung der Naturwissenschaften*, v: “In general, one can say that a natural-scientific discipline turns ever more frequently to the methods of higher mathematics for the expansion and deepening of results won from direct observation, the more further advancements are made in the theoretical handling of immediate experimental results."

17. As Scholem concisely puts it in early 1917, a divine council had been held in his honor to determine his fate, spurning him onto intellectual greatness: “Because of this, the concept of the science, which alone deserves to be named the introduction to the Torah, was revealed to me, the introduction to the teaching of order or the teaching of the spiritual order of things” (S 1:468. Although there are many potential translations of “die Lehre” (e.g., “doctrine,” “instruction”), I chose “the teachings” in order to retain its semantic proximity to the Hebrew word *Torah*.

18. Kracauer, *Werke*, 5.1:591–601. See Glatzer, who writes of Rosenzweig: “A Western European intellectual, he was a proud heir of the nineteenth century. This was the bourgeois world of faith in progress, a faith assured by the steady development of science; the evolution of man and of society appeared inevitable” (*Franz Rosenzweig*, xi). Cf. Mendes-Flohr and Reinharz, “From Relativism to Religious Faith.” Recently, Pollock has challenged the long-held belief that Rosenzweig underwent a conversion from a scientific to a religious world view during the course of his famed 1913 *Leipziger Nachtgespräch* with Eugen Rosenstock by emphasizing Rosenzweig’s early encounters with the philosophy of Marcion of Sinope; see Pollock, *Franz Rosenzweig’s Conversions*, especially 47–50.


21. As Scholem notes in his autobiography, by the time he arrived in Munich, he was planning to write a dissertation on the “linguistic philosophy of the Kabbalah,” see Scholem, *Von Berlin nach Jerusalem*, 141. In the 1960s, he completed the project as “The Name of God and the Linguistic Theory of the Kabbalah”; see *Judaica* 3:7–70. See also Wolosky, “Gershom Scholem’s Linguistic Theory,” 165; and Weidner, *Gershom Scholem*, 174–196.

22. On November 11, 1916, Benjamin writes to Scholem: “a week ago, I started a letter to you that encompassed eighteen pages. It was an attempt to answer in context the not small number of questions that you put before me.” In his memoirs, Scholem claims he first raised questions “about the relationship between mathematics and language” in a letter to Benjamin before November, 1916; see *Walter Benjamin*, 48. Scholem’s correspondence with Werner Kraft reveals that before departing to Switzerland, Benjamin entrusted his draft response to Scholem along with other manuscripts and letters to Kraft, which the latter reports having read in an unpublished letter; see Kraft to Scholem, July 18, 1917, Gershom Scholem Archive, National Library of Israel. Both Scholem’s pre-November 1916 letter to Benjamin on mathematics and language and Benjamin’s eighteen-page response have been lost. Benjamin’s collected works contain notes on the relationship between language and mathematics, entitled “Notes continuing the work on language.” Benjamin, *Gesammelte Schriften*, 7:785–790. See also Fenves, *Messianic Reduction*, 277n13.


25. Ibid., 6:11. Compare with Fenves’s interpretation, which links Benjamin’s concepts of “proper” and “improper” meaning to his theories of language and time; see Fenves, *Messianic Reduction*, 125–130.

26. The terms *structure* and *construction* (as in *Aufbau*) permeate the work of the logical positivists; see, for example, Carnap’s *Habilitation* thesis, *The Logical Structure of the World*. As Peter Galison shows, metaphors of construction facilitated collaborations between the positivists and the Bauhaus; see Galison, “Aufbau/Bauhaus.”


30. Ibid., B15.

31. For the legacy of these issues, see Friedman, *Parting of the Ways*.
32. See the works collected in Benacerraf and Putnam, *Philosophy of Mathematics*.

33. Scholem’s work on Novalis deserves closer attention beyond what can be paid in this study. He first comes into contact with Novalis’s aphorisms on mathematics in September 1915 (S 1:153) in an 1837 edition, published by Ludwig Tieck and Friedrich Schlegel, of *Novalis Schriften*, 2:145–149. Yet Scholem’s usage of the phrase “Mathematik der Mathematik” is curious, because it does not appear in this specific edition, while it appears in later collections of Novalis’s fragments. Indeed, it is a crucial part of Novalis combination of mathematics and poetry based on the idea of exponentiation (*potenzieren*); see Novalis, *Schriften*, 3:245 and 168. For more on Novalis’s use of mathematics, see Bomski, *Die Mathematik im Denken und Dichten von Novalis*.


35. Ibid., 9, 17 and 50.

36. At first sight, it is tempting to jump at the potential similarities between mathematics, as proposed here and Kabbalah; according to one of Scholem’s more contentious contemporaries, Oskar Goldberg, the Pentateuch can be understood as a “system of numbers” unfolding out of basic numbers (*Grundzahlen*) corresponding to the letters of the name of God.

37. An unpublished diary entry from August 1, 1915 (omitted in S 1:140) expands Scholem’s reflections on the synthetic-analytic nature of mathematical judgments. In the omitted portion of the entry, as Julia Ng describes in detail, Scholem definitively rejects the idea that mathematics contains synthetic judgments by examining the cases of definitions, axioms, and postulates, see Ng, “‘+1’: Scholem and the Paradoxes of the Infinite,” 201–202. See Gershom Scholem’s Diaries, 29. For Hilbert, for instance, axioms were the “definitions [of the basic concepts of a scientific system],” see Voss, *Über das Wesen der Mathematik*, 106–107.


41. Ibid., A727/B755 and A730/B758.

42. Ibid., A731/B759.

43. Diary entry by Scholem, August 1, 1915, in Gershom Scholem’s Diaries, 29. In the original: “eine willkürliche Namengebung. Das Ding, das nur einmal zwischen 2 Punkten da ist, nennen wir—gleich ob es existiert oder nicht—wir nennen es erst einmal gerade Linie.”

44. Russell and Whitehead, *Principia Mathematica*, 2. Frege, *Begriffsschrift*, x. As Uwe Dathe points out, Scholem most likely only attended the first of
Frege’s lectures in Jena in April 1917; see Dathe, “Jena—Eine Episode aus Gershom Scholems Leben,” 78.

45. The analogy between pure thought and infinitesimal calculus becomes evident in Cohen’s sections on the “logic of origin,” in Werke, 6:31–38 and 121–144. A discussion of a metaphors of analogy can be found in the next chapter.

46. Other commentators translate Scholem’s word *Gleichnis* here as “metaphor” (Barouch) and “image” or “semblance” (Ng); see Barouch, “Lamenting Language Itself,” 6; and Ng, “‘+1’: Scholem and the Paradoxes of the Infinite,” 200–201. I have chosen “analogy” because it not only renders legible Scholem’s link to and distinction from Rosenzweig’s metaphors of analogy but also more closely matches the mathematical connotation of equation (*Gleichnis*) with the Greek root *analogia*, meaning proportion.

47. See Aristotle, *Categories*, 86–88. In his discussion of the infinite judgment, Cohen discusses the privative *a-* in relation to the in-finite (that lacking finitude), which Rosenzweig uses to move from the nothing to the something, see Cohen, Werke, 6:84–89; see also Pollock, *Franz Rosenzweig*, 152–153.

48. The non-Jewish traditions such as Platonism and Gnosticism will provide a fundamental and, for critics such as Moshe Idel, problematic historical source in Scholem’s account of Jewish mysticism. Idel discusses the Gnostic origins of the Kabbalah and criticism of Scholem, whose positing of the origins of Kabbalah in “non-Jewish intellectual universes” represents to Idel a more sophisticated version of *Wissenschaft des Judentums*; see Idel, *Kabbalah*, 30–32, here 30.

49. For a definition of mathematical Platonism, see Field, *Realism, Mathematics, and Modality*, 1.

50. Here Scholem takes issue with Voss’s summary of Dedekind’s view on the origin of numbers; see Voss, *Über das Wesen der Mathematik*, 31n3. As Dedekind writes: “My main answer to the question raised in the title of this book: numbers are the free creation of the human mind [freie Schöpfungen des menschlichen Geistes], they serve as a medium to grasp more easily and precisely the differentness of things” (*Was sind und was sollen die Zahlen*, iii). In an entry omitted from publication, Scholem mentions receiving *Was sind und was sollen die Zahlen* in tandem with Lotze’s *Logik* in October 1917; see diary entry by Scholem, October 17, 1917, in Gershom Scholem’s Diaries, 59.


52. Blumenberg, *Paradigms for a Metaphorology*, 3; see also 14.
53. Scholem quotes here form the first edition of Logic of Pure Knowledge on page 199 (Cohen, Werke, 6). See also S 1:261.

54. On the potential criticism of Cohen’s use of infinitesimal calculus, see my discussion in chapter 3 as well as Funkenstein, Perceptions of Jewish History, 289–290.

55. Scholem’s discussion of the interrelations between mathematics and mysticism pervade his journals. See his comments on Novalis (S 1:265 and Scholem, Briefe, 1:94–95); on Buber’s Daniel (1913) and Steiner (S 1:371); and Scholem’s epistolary criticism of Goldberg (Benjamin, Gesammelte Schriften, 1:233–239), also discussed in Voigts, Oskar Goldberg, 118–122.


57. See, for instance, S 1:360, 410, and 422.

58. Tradition has long been a critical concept in work on Scholem, see Alter, Necessary Angels. Other interpretations of Scholem’s concept of tradition have focused on the dynamic interaction of orality and writing in the work of Franz Joseph Molitor, Philosophie der Geschichte, 6. See also Mertens, Dark Images, Secret Hints, 80–96; and Jacobson, Metaphysics of the Profane, 114–122.


60. For a general history of the development of logical calculus, mathematical logic, and modern formal logic, see Peckhaus, Logik, 200–214.


62. The French mathematician Louis Couturat introduced the term logistique in a talk held in 1905, favoring it over “symbolic logic” and “algebra of logic”; see Grattan-Guinness, Search for Mathematical Roots, 367. Scholem notes (S 2:109) that the term logical calculus (Logikkalkül) is the antiquated term used by Lotze, Logik, 256.

63. For the intellectual conflicts among Scholem, Bauch, and Lotze, see Dathe, “Jena—Eine Episode aus Gershom Scholems Leben,” 74–75. See also Bauch, “Lotzes Logik.”

64. Scholem, “Bezieht sich die reine Logik . . . ,” 1.

65. After holding the Referat, Scholem records his frustration with its in-class reception in his diary: “Held my Referat this morning. Bauch was indifferent, discussion worthless. Everything was silent [alles schwieg]” (diary entry by Scholem, November 10, 1917, in Gershom Scholem’s Diaries, 32).

66. For the myriad other uses of symbols and theorization of symbolism in Scholem’s intellectual career, see Idel, Old Worlds, New Mirrors, 83–108.

68. As the character Biba explains toward the novel’s semi-utopian end: “The communication of thoughts is much easier to produce through books and other written signs [Schriftzeichen]. If we surface-beings already know the fixed transmission of thoughts, another totally different type of understandable written signs may be commonly used among stars” (Scheerbart, Lesabéndio, 5:472). See also Julia Ng’s work on Scholem’s studies in astronomy with Wilhelm Förster, Ng, “+1: Scholem and the Paradoxes of the Infinite,” 198–200.

69. Scholem to Lissauer, October 20, 1916, in Gershom Scholem Archive, 2. See also S 1:439.

70. Scholem writes: “Even in this ecstatic frame of mind, the Jewish mystic almost invariably retains a sense of the distance between the Creator and His creature. The latter is joined to the former, and the point where the two meet is of the greatest interest to the mystic, but he does not regard it as constituting anything so extravagant as identity of Creator and creature,” (Major Trends in Jewish Mysticism, 122–123). See Idel’s revisionist reading of Scholem’s denial of the “extreme form of unio mystica” in Studies in Ecstatic Kabbalah, 3–4.

71. As Amir Engel points out, the idea of silence developed conceptually for Scholem as a rhetorical antidote against Buber’s vocabulary of the youth movement, which emphasized chatter, experience, and action; see Engel, Gershom Scholem, 60. The origins of Scholem’s notion of “schweigen” relate to his conversations with Benjamin and the latter’s rejection of Buber’s link of language and action; see Benjamin, Gesammelte Briefe, 1:326–327. In late 1916 and early 1917, Scholem employs “silence” to de-instrumentalize the learning of Hebrew in the Zionist youth movement as a vehicle of “national renaissance” (S 1:431). As Scholem responded in his diary to the criticism of a fellow member of the Blau-Weiss youth organization (Hans Oppenheim), who believed that language was one of the most important means of nationalization: “One learns Hebrew in order to be silent in Hebrew, then it is in order” (S 1:474 and here 2:15). Cf. Oppenheim, “Eine Kritik des Blau-Weiß,” 12. Moreover, including schweigen in “the teaching” constituted Scholem’s attempt to include Kraft’s ambivalent response to his proclamation of interest in mathematics and Judaism during the early stages of their correspondence; see Scholem, Briefe an Werner Kraft, 40.


73. For an extended interpretation of the spatial metaphor of “border,” see Ferber, “A Language of the Border,” 176–185. Border or limit (Grenze) is a key mathematical concept in calculus and analytic geometry.
77. I have tried to render in English the rhythm of Scholem’s translation in German as well as retain some of the syntactic oddities of his German translation.
78. Ferber astutely emphasizes the sonic nature of Scholem’s lamentations citing a wealth of evidence from his diaries; see Ferber, “A Language of the Border,” 176–185. Scholem writes, for instance, “lament can be contained in music, indeed in the acoustic sphere, but really without words [wortlos]” (S 2:139).
79. Benjamin’s letter from March 30, 1918 cites “some basic lacunae and vagaries” in Scholem’s theory of lament, claiming Scholem’s translations “took no inspiration from the German language” (*Gesammelte Briefe*, 1:443–144). In contrast, Benjamin’s own essay “The Task of the Translator” (1921) upholds Hölderlin’s as a model (*Urbild*) of translation into the German. Of note is how the text warns that, even as a translator such as Hölderlin opens the doors of language, they may “slam shut and enclose the translator in silence [ins Schweigen schließen]” (*Gesammelte Schriften*, 4:21). On Benjamin and Scholem’s theories of translation and their co-influences see Weber, *Benjamin’s Abilities*, chaps. 5 and 6; Sauter, “Hebrew, Jewishness, and Love”; Eiland and Jennings, *Walter Benjamin*, 157–160; and Schwebel, “Tradition in Ruins.”
83. Foucault, *Archaeology of Knowledge*, 6. Here I cite Foucault in order to emphasize the similarity between the theory of history implied by negative mathematics and those developed by the poststructuralists.
86. Scholem, *Briefe*, 1:89.
88. Scholem was aware of these developments: “it is really a thoroughly metaphysical statement, that time would, so to say, be a line; maybe it is a
cycloid or something else, that on many points has in fact no direction (where there are no tangents)” (S 1:390). See Scholem, Walter Benjamin, 45. A note in Scholem’s handwriting contains the Weierstraß equation, preserved in his notebook from Knopp’s 1915–1916 differential equations course; see Fenves, Messianic Reduction, 274n20; See also Scholem, “Notebook to Knopp’s Lectures on Differential Equations,” vol. 1.

89. On Weierstraß’s “monster” function, see Fenves, Messianic Reduction, 111 and 240–241.

3. infinitesimal calculus

1. See, for instance, the philosophical “tools” in Baggini and Fosl, Philosopher’s Toolkit. As Leif Weatherby demonstrates, the concept of the tool, organ, and organon played a major role in the metaphysics of the German Romantics around 1800. On the philosophical history of the term, see Weatherby, Transplanting the Metaphysical Organ, 1–7.


4. Interpretations of Rosenzweig’s use of mathematics have often focused only on its role in The Star of Redemption. Most often, mathematics provides the means of generating the “something” from the “nothing”; see Pollock, Franz Rosenzweig, 150–152; and Gibbs, Correlations in Rosenzweig and Levinas, 36 and 48. Dana Hollander adds that the infinitesimal provides Rosenzweig with a way of conceiving of Jewish election; see Hollander, Exemplarity and Chosenness, 27–39. Perhaps most revealing about the relatively marginal attention that mathematics has received in Rosenzweig scholarship is the fact that his use of mathematics has been described dismissively as an “allegory,” “analogy,” or a “metaphor”; see, respectively Gordon, Rosenzweig and Heidegger, 39–51; Gordon, “Science, Finitude, and Infinity,” 44–46; and Funkenstein, Perceptions of Jewish History, 288–290.

5. See Rosenzweig’s paradigmatic formulation: after the war, “a field of ruins marks the place where the [German] empire once stood” (Hegel und der Staat, 17–18). See also Susman, “Der Exodus aus der Philosophie.” Adorno cites the dissolution of the totality of philosophical systems in his Antrittsvorlesung as
forcing the question of the “actuality of philosophy” (*Gesammelte Schriften*, 1:325–327).


7. See R 1.1:132–138, as well as Pollock, *Franz Rosenzweig’s Conversions*, chap. 2. See also Glatzer, *Franz Rosenzweig*. Benjamin Pollock offers more compelling accounts of both the origins and implications of Rosenzweig’s *Star of Redemption* and his near-conversion following the all-night conversation in 1913 among Rosenzweig, Eugen Rosenstock, and Rudolf Ehrenberg. See Pollock, *Franz Rosenzweig’s Conversions*; and *Franz Rosenzweig*.


14. On German Idealism, see the work of Frederick Beiser, for example, *Fate of Reason*. On Rosenzweig’s studies of German Idealism, see Pollock, *Franz Rosenzweig*.

15. On the history of reforms in mathematical pedagogy in Germany, see Pyenson, *Neohumanism*, chap. 6; Schubring, “Pure and Applied Mathematics in Divergent Institutional Settings in Germany.” It may seem odd to speak of “modernity” in terms of infinitesimal calculus around 1900; indeed, historians
of mathematics such as Herbert Mehrtens have more readily associated “modernity” in mathematics with an emphasis on symbolic rigor and logical consistency as advocated by Karl Weierstraße and David Hilbert and a “counter-modernity” with the characteristics of intuitiveness and utility. See Mehrtens, *Moderne*, chaps. 2 and 3.

16. On the cultural history of geometry as a model of logical order, see Alexander, *Infinitesimal*. See also Spinoza’s *Ethics* (1677), whose subtitle reads “ordine geometrico demonstrare [demonstrated in geometrical order].”

17. Pyenson, *Neohumanism*, 13. Schubring adds that “in line with the neohumanist values at these universities [in Prussia], particularly in the philosophical faculties, mathematics became established as a ‘pure’ science, as ‘pure mathematics.’ Because teaching at Gymansien was initiated as a scientific profession with a high standard of training in order to ensure the social status of teachers, and because mathematics teachers also represented and practiced the new scientism, their activity encouraged the spread of the ethos of pure mathematics” (*Conflicts*, 484).


19. Here I summarize the debate between Klein and the German-Jewish mathematician (and Thomas Mann’s father-in-law) Alfred Pringsheim that arose in 1898 over the method of introducing students to infinitesimal calculus. Quoted in Bergmann, “Mathematics in Culture,” 194–195.

20. Rosenzweig will return to the term “organ”/“organon” as a metaphor for mathematics in his discussion of Hermann Cohen in *The Star of Redemption*, see Cohen’s references to the infinitesimal as “organon” in *Werke*, 5:4 and 133. Cohen also uses the terms “instrument” (ibid., 6:32) and “tool” (7) to refer to the infinitely small. The Romantic poet, Novalis, also refers to mathematics as an “organ,” meaning the objectification of the understanding in the context of the greater project that Leif Weatherby calls Romantic organology; see Weatherby, *Transplanting the Metaphysical Organ*, 215.

21. Abstraction, purity, and detachment were the metaphors in which geometry had been valued in neohumanistic education, see Pyenson, *Neohumanism*, 5 and 13. They are also the terms in which geometry came to be devalued later in the nineteenth century; in the words of Baumeister, “long before Darwin’s theory ruled the descriptive natural sciences, modern geometry had broken with the rigidity [Starrheit], that is, the immutability of Euclid’s
figures and found . . . the royal road [den Königsweg] to geometry, of which Euclid did not know” (Handbuch der Erziehungs- und Unterrichtslehre für höhere Schulen, 72). The essay “Volksschule and Reichsschule,” cites as its source Nernst and Schönflies, *Einführung in die mathematische Behandlung der Naturwissenschaften*; see R 3:392 and Waszek, Rosenzweigs Bibliothek, 113.


23. Rosenzweig misidentifies the dialogue in “Volksschule and Reichsschule” as Plato’s *Theaetetus* (R 3:389). Cf. Plato, *Meno and Other Dialogues*, 114–123. Chamberlain also cites the example of *Meno* in his lecture on Plato; the slave demonstrates how “one can understand geometry, without having learned it” (*Immanuel Kant*, 515). Likewise, Mendelsohn mentions the *Meno* example in “On the Evidence in Metaphysical Sciences,” 258 (see chapter 1).

24. Susman, “Der Exodus aus der Philosophie.” Ironically, it is precisely the round-about idealistic and systematic nature of Rosenzweig’s work that Kracauer remarks on when discussing *The Star of Redemption* in a letter to Löwenthal: “Rosenzweig’s book is significant, clearly systematic drivel that kills Idealism for us, only to reestablish it after the fact” (*In steter Freundschaft*, 44).

25. In his *Grundlage der gesamten Wissenschaftslehre* (1794/1795), Fichte takes the principle of identity (“A is A” or “A = A”) to be the “perfectly certain and established” foundation of thought. Here Fichte argues that this proposition would be impossible if there were not a subject (“I am”) to think it; see Fichte, *Science of Knowledge*, 94–102. “A = A” also symbolized in the philosophy of mathematics the idea that all mathematical knowledge is in essence analytic—that is, can be derived from the simple tautology, A = A (see chapter 2).


29. Rosenzweig’s letters to his parents make clear that Rosenzweig has in mind his experience in geometry while a student at the Gymnasium with “Herr Prof. Hebel”; see Rosenzweig, *Feldpostbriefe*, 304 and 403.


31. Scholars have tended to cast the stakes of Rosenzweig’s 1913 near conversion in terms of a battle between “faith” and “science”/“reason,” which, it would seem, would have particular bearing on this analysis; see, for instance, Glatzer, *Franz Rosenzweig*, xi. As Pollock suggests, at stake for Rosenzweig in the confrontation with Rosenstock was less “faith” and much more “the moral or spiritual status of the world” and the relationship between self and a redeemable or irredeemable world (*Franz Rosenzweig’s Conversions*, 3).
32. On the diverse and interdisciplinary influences on Rosenzweig’s thought, see the contributions in Brasser, *Rosenzweig als Leser, Kontextuelle Kommentare zum “Stern der Erlösung.”*

33. As Rosenzweig explains at the outset of the paragraph in which the analogy is contained: “At this point I realize that, as I want to continue writing, everything that I now would have to write to you is, for me, inexpressible [unaussprechbar] to you,” (R 1.1:283).

34. I cite here from Newton’s text, translated by Gerhard Kowalewski, that Rosenzweig requested his mother send to him while in Macedonia in October 1916; see *Feldpostbriefe*, 273n288. See also Newton, *Newton’s Abhandlung*, 4. Further evidence that Rosenzweig had this book in mind is that, despite the terminological difference between Leibniz and Newton, Kowalewski’s commentary employs the term “differential quotient” to explicate the ratio between fluxions; see ibid., 4n3.

35. Ibid., 3. On Leibniz’s belief in the existence of infinitesimals, see Leibniz, “Letter to Varignon,” 543–546; and the contributions in Goldenbaum and Jesseph, *Infinitesimal Differences.*

36. Figure 3.3 reprinted from Newton, *Newton’s Abhandlung*, 4.

37. Newton writes: “Determining the fluents from the fluxions is a difficult problem; the initial step of the solution is equivalent to the quadrature of the curve” (ibid., 7).


40. As Rosenzweig writes to his parents (R 1.1:271) and Rudolf Ehrenberg (321).

41. Rosenzweig admits, already in 1905, that he will have to put on “blinders” to Chamberlain’s idea of race, if he hopes to cultivate himself (R 1.1:18 and 40). Even the idea of movement, life, and dynamism, which Rosenzweig draws on from Chamberlain, is the element of European culture for the latter, which must be protected against “bestial barbarism” of the East (Russian and Asia) and South (Africa). See Chamberlain, *Immanuel Kant*, 701. For more on Chamberlain, see Field, *Evangelist of Race.*

42. Chamberlain, *Immanuel Kant*, 702. As Anja Lobenstein-Reichmann explains, these terms circulated much more broadly as markers for the rising bourgeoisie; see Lobenstein-Reichmann, *Houston Stewart Chamberlain*, 247–249, here 249.


44. Here Rosenzweig refers to the collection of Aquinas’s texts published by Engelbert Krebs in 1912 as Aquinas, *Texte zum Gottesbeweis*; see R 1.1:273.
45. Interestingly, the material form of this passage embodies the link among belief, subjectivity, and motion, belonging to a set of theological and philosophical notes, a “Paralipomena,” that Rosenzweig wrote on postcards while stationed in Macedonia and sent home to Kassel. As Rosenzweig wrote to his mother: “Now and then I will write letters addressed to ‘Dr. Rosenzweig, c/o Counselor of Commerce Rosenzweig Terasse 1.’ These contain only scientific notes and you are not allowed to open them. Rather, keep them safe, best with extra numbering, so that I have them all together later” (R 1.1:184).

46. As elucidated in book 3 of Aristotle, Physics, 57. Thomas Aquinas, who Rosenzweig credited with his rediscovery of infinitesimal calculus, defines motion as “to move another is nothing other than to bring something from potentiality to actuality.” Since things are in motion and cannot set themselves in motion, there must be an actuality that originally set them into motion, which Thomas takes as proof of God. See Summa Theologicae in Aquinas, Basic Works, 53. This section is reproduced in Krebs’s selection Aquinas, Texte zum Gottesbeweis, 53–54.

47. On the different types of motion in Aristotle and their origins, see On the Heavens, esp. bk. 1, chap. 2. See also Aristotle, Physics, chap. 8, esp. 229.


49. Here, Aristotle’s arguments responded to the Atomists, see book 6 of Aristotle, Physics, 138–152; see also Aquinas, Commentary on Aristoteles’s Physics, 388–390.


51. Aristotle, Physics, 161–162. Zeno’s paradoxes are fourfold, including the paradox of Achilles and the tortoise.

52. Kant, Critique of Pure Reason, A169–170/B211. Translation modified to fit Rosenzweig’s terminology. On Kant’s reference to Newton, see Friedman, Kant and the Exact Sciences, 74–75.

53. I cite here only in part from the schema of numbers, which also include “infinitesimal numbers,” that Rosenzweig’s 1918 letter proposes. See Mosès, Angel of History, 52–55.

54. December 16, 1921, cited in Belke and Renz, Marbacher Magazin, 47:36.

55. As Shlomo Pines argues, Rosenzweig’s distasteful dismissal of Islam was based primarily on his reading of Hegel and Hegel’s account of progress in Islam; see R 2:251–254 and Pines, “Der Islam im ‘Stern der Erlösung.’” On the tenuousness of Rosenzweig’s argument regarding Islam as well as the histories of Greece, China, and India, see Gibbs, Correlations in Rosenzweig and Levinas, 113–117.
56. As Adorno writes regarding The Star of Redemption: “I wouldn’t understand it even if I were to understand it. Nonetheless, I want to read the book, because it gets at the most important things”; quoted in Kracauer and Löwenthal, In steter Freundschaft, 44–45.


58. On Rosenzweig and Cohen, see Batnitzky, Idolatry and Representation, 17–18 and 29.

59. Ibid., 29.

60. Rosenzweig is explicit about the link between Chamberlain and Cohen, claiming that his use of mathematics is “indirectly Marburg’ian” in reference to the “Marburg School” founded by Cohen. (R 1.1:321). Likewise, he even describes Chamberlain as an “orthodox Cohen’ian,” who “burns what Cohen burns (i.e., Aristotle, Thomas, Hegel, Schopenhauer) and worships what Cohen worships (i.e., Plato, Leibniz, Schiller)” (456).


62. Cohen, Werke, 6:28. On Cohen’s “logic of origin,” see ibid., 6:31–38; on the “judgment of origin,” see ibid. 84–89. For Kant, the infinite differs from the negative judgment, which takes the form “x is not A,” and as Paul Guyer explains, “merely denies a predicate of the concept of the object.” The infinite judgment takes the form “x is non-A” and “asserts ‘non-A’ of its subject.” It “leaves open an infinite range of predicates for x, but implies that some predicate applies to it” (Kant, 76).


64. Ibid., 6:125.

65. See ibid., 6:135 and 35.


67. Pollock, Franz Rosenzweig, 1 and 12.

68. See Hegel, Science of Logic, 59. Cohen employs the concept of the “relative” nothing in contrast to general “non-being,” see Cohen, Werke, 6:93–94. See also Gibbs, Correlations in Rosenzweig and Levinas, 49–51.

69. Terminologically, Rosenzweig draws here on Abel, Über den Gegensinn der Urworte. See Rosenzweig, Die “Gritli”-Briefe, 253. Freud draws on Abel as well in Totem and Taboo (1913); Jacques Derrida also makes use of Abel in his discussion of “undecidability” in Dissemination, 220.

70. For Rosenzweig’s derivation of “God’s freedom,” see R 2:32: “God’s freedom is a violent no par excellence.” On “God’s vitality,” see ibid., 34.

71. See Gibb’s depiction of Rosenzweig’s grammar in Correlations in Rosenzweig and Levinas, 67.

73. For Cohen, after Newton, “the point means something different, something more positive” (Werke, 6:129).


75. See Benjamin, Gesammelte Schriften, 2.1:694. For Horkheimer, Cohen’s equation of an “eternal logos” with “the snippet of the world presented to the scholar, which becomes ever more expressible in the form of differential quotients” is the “false self-consciousness of the bourgeois scholar in the liberal era” (Gesammelte Schriften, 4:171–172).

76. The concept of Bewährung, usually translated as “confirmation” or “verification,” also plays a role in Max Weber’s The Protestant Ethic and the Spirit of Capitalism (1905) and in Weber’s essay “Die protestantischen Sekten und der Geist des Kapitalismus,” 234–235. In Rosenzweig, verification has often been interpreted along the lines of martyrdom; as Martin Kavka writes: “Martyrdom, and perhaps only martyrdom, is what verifies the truth of one’s belief” (“Verification (Bewährung) in Franz Rosenzweig,” 176); see also Batnitzky, Idolatry and Representation, 44.

77. At least semantically, Rosenzweig’s idea of “verification” anticipates Carnap’s “Truth and Verification” (“Wahrheit und Bewährung,” 1936). For both Rosenzweig and Carnap, knowledge demands empirical “verification.” Not only Carnap but also Hans Reichenbach and Karl Popper employ the term verification to signify how a theory can be empirically “verified” (or “corroborated” in Popper’s case) as true. See, for instance, Popper, Logik der Forschung, vol. 3, chap. 10. Adorno’s description of Reichenbach’s theory of verification (Bewährung) from the Paris Congress of the Unity of Science, mentioned in chapter 1, comes uncannily close to Rosenzweig’s; see Adorno and Horkheimer, Briefe und Briefwechsel, 4.1:570.

78. Rosenzweig to Kracauer, May 25, 1923, published in Baumann, “Drei Briefe,” 174–175. A few sentences later, Rosenzweig explains: “Now, critical for your ‘state of mind’ is if you realize how what I just explained to you is not a form of subjectivism, but rather, on the contrary, it is the path upon which the ideal of objectivity can really be universally realized—an ideal that was always proposed by the old [logic] (old being Aristotle as well as Kant), but really only strictly enforced for one narrow region, basically only for ‘mathematics’ [das ‘Mathematische’],” 175. On the relationship between Rosenzweig and Kracauer, see also Handelman, “The Forgotten Conversation.”

79. See, for instance, Frege, Foundations of Arithmetic, 1: “After deserting for a time the old Euclidean standards of rigour, mathematics is now returning to them, and even making efforts to go beyond them. . . . Proof [Beweis] is now demanded of many things that formerly passed as self-evident.”
80. Rosenzweig writes to Rosenstock in 1925: “You thus see: in the Lehrhaus, I’ve already let the Star shine” (R 1.2:1027). Rosenzweig’s work at the Lehrhaus was not only central to postwar constructions of German-Jewish identity but also, for Glatzer, an extension of Rosenzweig’s work begun already in “Volksschule and Reichsschule”; see Glatzer, “Frankfort Lehrhaus,” 155.

81. Dimock, Through Other Continents, 75–76 and 87.

4. GEOMETRY


3. See, for instance, Adorno’s depiction in “The Curious Realist” (“Der wunderliche Realist,” 1964), here Gesammelte Schriften, 11:387. Histories of critical theory often take note of Kracauer’s early influence on Adorno; see, for example, Brunkhorst, Adorno and Critical Theory, 21–23. Indeed, Kracauer’s relationship with Adorno redefines the limits of intellectual friendships; see von Moltke, “Teddie and Friedel.” More recently, Kracauer has been increasingly recognized for his significant contributions to the development of film theory as well as his position in the postwar intellectual milieu in the United States; see von Moltke, Curious Humanist; and Hansen, Cinema and Experience, especially pt. 4. Regarding Kracauer’s reception, see the contributions from Miriam Hansen, Gertrud Koch, and Heide Schlüpmann to the special issue of New German Critique, no. 54 (2011); and Gemünden and Moltke, “Introduction: Kracauer’s Legacies.” On Kracauer’s biography, see Belke and Renz, Marbacher Magazin; Gilloch, Siegfried Kracauer; and Später, Siegfried Kracauer. On Kracauer and the intellectual experience of the Weimar Republic, see Craver, Reluctant Skeptic; and Schröter, “Weltzerfall und Rekonstruktion.”

4. Here I follow a point made by Johannes von Moltke and Gerd Gemünden: “[Kracauer’s] cultural critique [was] distinct, on the one hand, from cultural criticism, which would exhaust itself in the attentive treatment of individual objects; and on the other hand, from cultural theory, which would join philosophy in its construction of overarching concepts for defining the very notion of culture itself” (“Introduction: Kracauer’s Legacies,” 3).

5. See, for instance, von Moltke, Curious Humanist, 124; and Huyssen, Miniature Metropolis, 130–135.

6. Hansen, Cinema and Experience, 6. Kracauer makes his early enthusiasm for Lukács’s historical narrative clear in his review of Theory of the Novel
Notes to pages 147–149.

1. Kracauer, Werke, 5.1:282–288. See also Sociology as Science (Werke, 1:12). The idea of the disjointedness of thought from the material world runs throughout Kracauer's career. For example, in History: The Last Things Before the Last (1969): “Human affairs” he writes, “transcend the dimension of natural forces and causally determined patterns,” assuring that any approach to history or sociology “which claims to be scientific in a stricter sense of the word will sooner or later come across unsurmountable [sic] obstacles” (29).

7. This humanist politics and the hope to create a society based on human needs and through the participation of human actors runs from Kracauer’s Weimar writings to his later work on film and history; for a detailed discussion of these politics, see von Moltke, Curious Humanist.


9. The earliest work on Horkheimer and Adorno’s critical theory—for instance, by Jay and Buck-Morss—points out the significance of aesthetic mediation in, especially, Adorno’s thought. See Jay, Dialectical Imagination, chap. 6; and Buck-Morss, Origin of Negative Dialectics, chap. 8. For current perspectives on the state of Adorno’s aesthetic project, see Hohendahl, Fleeting Promise of Art.

10. Kant invokes a similar distinction in the name “the transcendental aesthetic,” whose designation of space and time as pure forms of intuition Kracauer invokes in Sociology as Science; see Kant, Critique of Pure Reason, A21/ B35–36.


12. This sense of an observer and recorder of modernity marks much of Kracauer’s early work. On Kracauer’s early engagements with the cinema, see, for instance, Hansen, Cinema and Experience, 3–39. For an examination of the interplay of Kracauer’s theory of modernity with philosophy and literature, see Mülder-Bach, Siegfried Kracauer, esp. 19–55. The feeling of being an “outsider” both to the Frankfurt School and the modern society that he sought to analyze permeates both Kracauer’s work as well as its reception, perhaps most legible in the notion of “extra-territoriality”; see Kracauer, History; Koch, “Not Yet Accepted Anywhere,” 95; and Jay, “Extraterritorial Life of Siegfried Kracauer,” 153.

13. Husserl, Ideas, 140.

14. When Kracauer started his studies at the Technische Hochschule in Darmstadt in the summer semester of 1907, he took “Darstellende Geometrie” with Reinhold Müller (Belke and Renz, Marbacher Magazin, 47:7). After transferring to Berlin, Kracauer took “Darstellende Geometrie” with Erich...
Salkowski in the winter semester 1907/1908. In October 1907, Kracauer notes in his journal: “In the afternoon, I had descriptive geometry. How insufferable these things are to me!” quoted in ibid., 11.


17. Kracauer is explicit about his use of Husserl’s *Ideen zu einer reinen Phänomenologie*. The title of *Sociology as Science* refers to Husserl’s 1911 essay “Philosophy as Strict Science” (“Philosophie als strenge Wissenschaft”).

18. Euclid, *Thirteen Books of Euclid’s Elements*, 1:221–240. Aristotle provides a sharper definition of axioms: in contrast to a postulate, which is not necessarily true in itself, an axiom is convincing in itself and serves as, “that which must be grasped if any knowledge is to be acquired” (*Posterior Analytics*, 33 and 7). On the varying use of the terms *axioms* and *postulate* in Aristotle and Euclid, see Merzbach and Boyer, *History of Mathematics*, 94–96.


20. Simmel, *Philosophy of Money*, 114. Kracauer’s critique of Simmel’s thought in “Georg Simmel” (1919) upholds the “unconditional validity” of the “laws of logic, the mathematical axioms,” summarizing Simmel’s position on the geometric axioms: “differently organized beings would have surely come to different dogmas” (K 9.2:237).


22. See Hilbert, “Axiomatisches Denken.”

23. For Kracauer, see K 1:47, 48, 46, and 39. Husserl uses the term “mathematical manifold” (*Ideas*, 140). Kracauer may have taken the image of the “truncated cone” from Husserl, who mentions it in his discussion of “mathematical manifold.” This terminology reappears in Husserl, *Crisis of European Sciences and Transcendental Phenomenology*, 45.


26. See Euclid, *Thirteen Books of Euclid’s Elements*, 1:221, 223, and 314–315. “Common notion 2” posits that equals added to equals are equals; proposition 29 states that “a straight line falling on parallel straight lines makes the alternate angles equal to one another, the exterior angle equal to the interior and opposite angle, and the interior angles on the same side equal to two right angles.” In turn, the proof for proposition 29 draws exclusively on propositions 13 and 15, common notions 1 and 2, and postulate 5 (ibid., 1:311–312).

28. Mülder-Bach, Siegfried Kracauer, 35.
29. Lukács makes a similar argument in History and Class Consciousness (see 110–121), which was published a year after Sociology as Science (see chapter 1). Hansen also notes the performative dimension in Benjamin’s writing; see Hansen, Cinema and Experience, 89.
30. Adorno, Gesammelte Schriften, 7:393.
32. Kracauer and Löwenthal, In steter Freundschaft, 49.
33. Beyond his early friendships with Adorno and Benjamin, Kracauer’s interest in film and his aphoristic style also influenced the members of the Frankfurt School. See Gemünden and Moltke, “Introduction: Kracauer’s Legacies,” 6; and Koch, Siegfried Kracauer, 37–38.
35. Projection serves as a salient philosophical metaphor for thinkers such as Freud, indicating the process by which beliefs and anxieties become manifest in a form other than their own. Where an individual suppresses, distorts, and becomes conscious of an “internal perception,” as Freud writes in the case of Daniel Paul Schreber, “in the form of an external perception” (Standard Edition, 12:65–66).
37. Salkowski, Grundzüge der darstellenden Geometrie, 1. As much as projection is a practical and heuristic technique meant for professionals not specializing in mathematics, the presence of this form of geometry in Kracauer’s intellectual project has the reform movements in mathematical pedagogy to thank as does the presence of infinitesimal calculus in Rosenzweig’s work.
38. Figure 4.1 reprinted from ibid., 6.
39. See the descriptions of Ginster’s work in the office of Herr Valentin and especially his design of a military cemetery (K 7:62–69 and 111–115). See also Gilloch, Siegfried Kracauer, 6 and 60.
40. Kracauer and Löwenthal, In steter Freundschaft, 49.
41. Kracauer’s reference to the term projection has often been interpreted in terms of Simmel; as Mülder-Bach writes “Kracauer makes recourse” through the term projection “to the concept that Georg Simmel introduced into sociology”; see Mülder-Bach, “Nachbemerkung” (K 1:380n20).
42. Kracauer’s term “Projektionslehre” matches the technical term that serves as the title of textbooks such as Schudeiský, Projektionslehre, 1–2.
43. Kracauer to Susman, January 11, 1920. As David Frisby notes, the original title of the first chapter in the *The Detective Novel* was “The Transformation of Spheres” (*Sphärentransformation*), not just “Spheres”; see Frisby, “Zwischen den Sphären,” 40.

44. See Mülder-Bach, *Siegfried Kracauer*, 38–45.


46. Parallel projections project an object from an infinitely distant point, preserving distance in projection; cavalier, in contrast, distorts distance in the projected image. See Salkowski, *Grundzüge der darstellenden Geometrie*, sec. 1.

47. On the social ramifications of the Mercator projection, see Monmonier, *Rhumb Lines and Map Wars*, chap. 2.

48. Figure 4.2 reprinted from Salkowski, *Grundzüge der darstellenden Geometrie*, 2.

49. There is always a loss of a dimension with projection; see Salkowski, *Grundzüge der darstellenden Geometrie*, 1.


51. See the descriptions in K 1:130, 133, 135, and 138.

52. As in *Sociology as Science*, *The Detective Novel* draws on Kant’s use of the term *aesthetic* as the point of interplay between experience and cognition mediated by space and time. Kant, *Critique of Pure Reason*, A21/B35–36.

53. Kracauer mentions these ideas to Löwenthal in letters from October 1923 and March 1922, respectively; see Kracauer and Löwenthal, *In steter Freundschaft*, 38 and 49. He references a “metaphysics of film” (die noch ungeschriebene Metaphysik des Films) in a review of the film *Die närrische Wette des Lord Aldini* (1923; K 6.1:43).


56. The shift from the fall-and-Decline narrative of modernity to a dynamic narrative of history as change and as changeable, which accompanies his readings of Marx in the early 1920s, characterizes the reception of his early work, see Mülder-Bach, *Siegfried Kracauer*, 64.
57. See chapter 1 for an analysis of Lukács’s work on mathematics and its influence on critical theory.
58. Lukács, History and Class Consciousness, 83.
59. Ibid., 88 and 105; translation modified.
60. Ibid., 92.
61. For a detailed discussion of the ideological and artistic implications of the Tiller Girls, see Hewitt, Social Choreography, 177–213. Kracauer reviewed a number of such dance revues, not just the Tiller Girls; see “Die Revuen” (K 5.2:313–317), “Revue Confetti” (366–368), “Revue Nr. 1 der Wintersaison” (488–489), and “Das Berliner Metropoltheater im Schumanntheater” (542–544).
62. Gertrud Koch astutely emphasizes theological undercurrents of the term mass, which stems from the Hebrew mazza (“matzoh,” unleavened bread); see Siegfried Kracauer, 26.
63. Scholarship on Kracauer has not been wont to point out the similarities between “The Mass Ornament” and Dialectic of Enlightenment; see Mülder-Bach, Siegfried Kracauer, 66; and Levin, “Introduction,” 19. Von Moltke shows how the methodology of Kracauer’s first book on film, From Caligari to Hitler, also resurfaces in Dialectic of Enlightenment; see von Moltke, Curious Humanist, 256n57.
64. Lukács, History and Class Consciousness, 139.
65. In 1925, Kracauer published the essay “Die Bibel auf Deutsch” which criticized a new translation project of the Hebrew Bible, Die Schrift, started by Rosenzweig and Buber in the 1920s and completed by Buber in the 1960s. See Jay, “Politics of Translation.”
66. von Moltke, Curious Humanist, 137. On Kracauer’s “double-edged” attitude toward distraction, see North, Problem of Distraction, 158–162.
69. See Cesàro, Vorlesungen über natürliche Geometrie, esp. 1–21; Boyer, History of Analytic Geometry, 229–230. I have been unable to find archival evidence linking Kracauer and Cesàro; moreover, Cesàro’s term “intrinseca” differs from the sense of “natural” (naturale in Italian) used by Kracauer and Descartes.
70. Heinz Brüggemann makes the connection between Kracauer’s term and Descartes’s Optics; see Brüggemann, Das andere Fenster, 282. For a detailed explication of Descartes’s theory of perception, and the position of “géométrie naturelle,” see Kutschmann, Der Naturwissenschaftler und sein Körper, 224–255.
71. Descartes, Discourse on Method, 106.
72. Ibid., 111.
73. Ibid., 106.
74. See ibid., 66–67.
75. Hansen, “With Skin and Hair,” 447.
76. Descartes, Discourse on Method, 104.
77. Brüggemann writes: “Descartes gets rid of the old idea of the interlinkage of the human with the world; but he also makes possible the first steps toward a new, intellectually sovereign relationship between world and human,” (Das andere Fenster, 282–283); Kutschmann, Der Naturwissenschafter und sein Körper, 250–251. On Kant’s “Copernican revolution,” see Guyer, Kant, 51–140.
78. The Marseille texts stem from trips Kracauer took to the city in 1926 with Lili Kracauer to visit Walter Benjamin; see Kracauer and Benjamin, Briefe an Siegfried Kracauer, 33 and 44. See also Brüggemann, Das andere Fenster, 280 and 298n10. What Kracauer refers to as the “Place de l’Observance” could refer to what is today La Vieille Charité, which is flanked by Rue de l’Observance and was named Place de l’Observance before a hospital was constructed there in the seventeenth century; Marseille à la fin de l’Ancien Régime, 82.
79. Huyssen, Miniature Metropolis, 18 and 135.
80. As Benjamin describes it, Poe’s short story is an “x-ray of a detective novel”; in it, an unnamed narrator follows an “unknown man who manages to walk through London in such a way that he always remains in the middle of the crowd.” Benjamin, Gesammelte Schriften, 1.2:550. See also Poe, Selected Tales, 84–91.
82. According to von Moltke, Kracauer’s “curious humanism” was a nonanthropocentric vision of the world arranged around the subjectivity of the spectator; see von Moltke, Curious Humanist, 181–182.
83. Huyssen bases his reading of “The Quadrangle” on its noteworthy opening sentence: “Whoever the place finds did not seek it”; see Huyssen, Miniature Metropolis, 132–133. See also K 1:206–209.
84. Levin, Siegfried Kracauer, 165–185. See also Stalder, Siegfried Kracauer, 79–81.
85. See Benjamin, Gesammelte Schriften, 1.1:610.
86. Kraus, Schriften, 4:185 and 189.
87. Scholars have often noted the dialectical insuperability of form and content in the writings of the Frankfurt School, especially those of Adorno. See, for instance, Weber, “Translating the Untranslatable,” 11.

**CONCLUSION**

1. Liu, “Where Is Cultural Criticism in the Digital Humanities?”
3. See J. H. Plumb, *Crisis in the Humanities*. In 2010 and again in 2013, periodicals such as the Atlantic, the *New York Times*, and the *Wall Street Journal* published articles describing how, even at elite intuitions, the humanities are “attracting fewer undergraduates amid concerns about the degree’s value in a rapidly changing job market,” Levitz and Belkin, “Humanities Fall from Favor.” See also Lewin, “As Interest Fades in the Humanities, Colleges Worry”; and Greteman, “It’s the End of the Humanities as We Know It.” Others have taken to defending the humanities as a place for innovation essential to STEM disciplines; see, for example, Edelstein, “How Is Innovation Taught?”
4. The origins of “humanities computing” are widely attributed to the work of an Italian priest, Roberto Busa, who in 1949 began using computers to make an *index verborum* for the works of Thomas Aquinas. See Hockey, “History of Humanities Computing.” 4. On new German media theory and the digital, see Kittler, “Computeranalphabetismus” and “Es gibt keine Software.” See also Koepnick and McGlothlin, *After the Digital Divide?*
5. On practices and debates in the digital humanities, see Burdick et al., *Digital_Humanities*; Schreibman, Siemens, and Unsworth, *New Companion to Digital Humanities*; and Gold and Klein, *Debates in the Digital Humanities 2016*.
6. Here I refer to the phrase of Rita Raley quoted in Kirschenbaum, “What Is ‘Digital Humanities’?,” 47–48. For Kirschenbaum, as a “discursive construction” the term *digital humanities* only slightly resembles the “material conduct” of humanists who employ digital tools; he lists the “terrible things” detractors have said about digital humanities (50).
7. On the similarities and differences of these computational approaches to culture, see Moretti, *Distant Reading*; Jockers, *Macroanalysis*; and Piper, “There Will Be Numbers.” On the lack of diverse voices in these approaches,


11. As these responses point out, Kirsch’s criticism, most prominently, mischaracterizes the debates over the definition of the digital humanities, obscures women’s voices in the field, and misrepresents the digital humanities’ own grasp of their place in the history of technology and interpretation. See, for instance, the reply of Burdick et al., “Immense Promise of the Digital Humanities.” For other responses, see Sample, “Difficult Thinking about the Digital Humanities,” 510; and Cordell, “On Ignoring Encoding.”


14. Moretti, *Graphs, Maps, Trees*, 1. Suspicious of criticism’s purported “distance” to its cultural object, scholars in cultural analytics such as Andrew Piper argue that qualities such as Moretti’s particular notion of “distance” (for example, “reductiveness,” “scale,” and “generality”) can “serve as the very conditions of enabling arguments to circulate more widely and, potentially, to create social change”; see Piper, “There Will Be Numbers.”


17. Allington, Brouillette, and Golumbia, “Neoliberal Tools (and Archives).”


20. See “Omeka,” which is developed by the Roy Rosenzweig Center for History and New Media at George Mason University and the Corporation for Digital Scholarship. Minimal Computing is a working group at GO::DH (Global Outlook::Digital Humanities), which is a Special Interest Group of the Alliance of Digital Humanities Organisations (ADHO). See Gil and Ortega, “Global Outlook”; and Gil, “User, the Learner and the Machines We Make.”

21. See, most distinctively, the language and ideas employed in Schnapp, “Digital Humanities Manifesto 2.0.”

22. Burdick et al., Digital Humanities, vii. See also Erlin, “Digital Humanities Masterplots.”

23. Burdick et al., Digital Humanities, 122.

24. On the digital humanities’ links to business and science, see ibid., 12, 18, 42. For criticism of the alignment of the digital humanities, the corporate university, and the sciences see Allington, Brouillette, and Columbia, “Neoliberal Tools (and Archives)”; Allington “Managerial Humanities” (including the discussion in the comments); and Brennan, “Digital-Humanities Bust,” in which the digital humanities’ links with science and the corporatization of the university serve as “the obvious culprits” for all the “digital-humanities excitement.”

25. Allington, Brouillette, and Columbia, “Neoliberal Tools (and Archives).”

26. Ibid.

27. Ibid. David Golumbia makes a similar point in The Cultural Logic of Computation, 3. As Chad Wellmon points out, humanists have been in the business of collecting and evaluating data since the late nineteenth century; see Wellmon, “Loyal Workers and Distinguished Scholars.”


29. Horkheimer, Gesammelte Schriften, 4:140.

30. Berry, Critical Theory and the Digital, 19. I agree with Berry that we find an argument similar to Horkheimer and Adorno in not only Allington, Brouillette, and Columbia’s “Neoliberal Tools (and Archives)” but also Golumbia’s Cultural Logic of Computation—neither of which mention Dialectic of Enlightenment.


32. I would like to thank Laura Portwood-Stacer for pointing out the resonances of Kracauer’s position here with Patricia Hill Collins’s concept of the “outsider-within” (see Black Feminist Thought, 10–11) and W. E. B. Du Bois’s concept of “double-consciousness” (see Souls of Black Folk, 5–6).

34. Posner, “What’s Next,” 35. One example of such a project would be Minimal Computing, mentioned earlier. It promotes accessibility by developing computational and digital infrastructures that do “not overburden the systems and bandwidth available to our colleagues around the world”; Gil and Ortega, “Global Outlooks in Digital Humanities,” 31.


37. Scholars have charted theses “futures” of critical theory. For instance, Peter Uwe Hohendahl traces the past discourse of rationality from the first through second generations of critical theory; see Hohendahl, “From the Eclipse of Reason,” 18–26, and other contributions in Fischer and Hohendahl, *Critical Theory*. Another future for the project of critical theory lies in “constitutive negativity” as a “practice of meaning destruction and renewal”; see Bernstein, *Recovering Ethical Life*, 234.