The two books focus on the divide between black and white in the United States from the perspective of white American liberals. They do not discuss the question of race in regard to other minorities in the United States, such as American Indians, Jews, or Asians. The two authors share a predilection for Boas's cultural anthropology, assessing research according to its social desirability and accepting socially desirable results uncritically even if they appear scientifically invalid.

In their focus on eugenics as explanation for modern racism, both authors, in short, overlook the fact that eugenics as a social movement or an applied science had a far wider scope and that many eugenicists were not racists. In Europe, eugenics remained a heterogeneous enterprise with right- and left-wing participants.

In addition, the authors ignore the fact that most racism was not eugenic. The Nazi movement, for example, was strongly influenced by the *völkisch* ideology that, in the wake of the philosopher Johann Gottlieb Fichte and other nineteenth-century writers, promoted the idea of the *Volk* (people) as an organic unity; they did not base their virulent anti-Semitism and racism on any scientific concept. Sussman's claim that Nazi racism was the "logical extension" of American eugenics completely disregards history.

Race is real for many people, such as members of the Black Panther movement and medical scientists dealing with individual drug responses. Despite what Sussman insinuates, the statement of difference alone does not mean racism. Nobody would reject the notion of race, or difference, for example, in jury selections. Science can help us understand certain phenomena of difference, suggest realistic remedies for improvements, and be instrumental in correcting misleading popular notions concerning races. But as science did not invent racism or ethnocentrism, it will not be able to abolish it.

Yudell and Sussman highlight the century-long willfulness of social and natural scientists in bestowing scientific respectability on the political-social concept of the inferiority or superiority of human ethnic groups or races. This not only supported grave social injustices but also contributed to the most outrageous crimes in the name of race. For their comprehensive views on this history in the United States, these two books—despite their problematic judgments—are recommended to historians of science and a general audience.

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Amit Hagar. *Discrete or Continuous? The Quest for Fundamental Length in Modern Physics*. xi + 267 pp., figs., bibl., index. Cambridge: Cambridge University Press, 2014. £60 (cloth).

For the readers of this journal, the most important information concerning this book is probably the following: this is philosophy of science, and the "sole purpose" of the historical account it contains "is to harness the history of physics for the sake of extracting philosophical and methodological morals" (p. 6). What then are these morals? The book provides an argument for the viability of a discrete description of physical space based on the introduction of a fundamental length. Amit Hagar makes the quest mentioned in the book's subtitle his own, sometimes with surprising pathos (stating, e.g., that "the battle for spatial discreteness cannot be won easily" [p. 207]). The book's main line of argument is that any *a priori* argument against discrete space fails and that the question of the existence of a fundamental length is an empirical (still undecided) question.

The types of arguments being rebutted are manifold. Chapter 2 deals with mathematical arguments, both for and against discreteness of space. Hagar's rebuttal of these arguments is interesting: he cites

little-known instances of physicists' mathematical resourcefulness in making models of (discrete or continuous) space work, models that would seem to be ruled out by more simpleminded mathematical or logical considerations. Essential for this strategy is the author's conviction that "elegance and convenience need not be taken seriously as criteria for deciding the contingent character of physical space" (p. 21), making any arbitrarily complicated mathematical construction a valid counterargument. Chapter 3 focuses on philosophical arguments, though not arguments against discrete space *per se* but, rather, against a philosophical standpoint of finitist, digital metaphysics, which might motivate a belief in discrete space. Hagar demonstrates that such a position is indeed consistent, while at the same time managing to avoid problematic notions of infinity and to take account of the intrinsically limited resolution of any measurement.

After these more abstract considerations, the historical part of the book begins. Chapter 4 deals with the early history of quantum field theory, the difficulties encountered with infinite results, and their ultimate resolution through the development of renormalization in the late 1940s. The success of renormalization methods made obsolete several attempts during the preceding decades to solve the difficulties of quantum field theory by introducing a fundamental length. The success of renormalization is then viewed by Hagar as both a historical and a physical argument against discreteness, which he consequently also attempts to rebut.

Here the limits of Hagar's use of history as a handmaiden to philosophy show: Hagar overestimates the sophistication of the attempts to introduce a fundamental length in the 1930s and 1940s, viewing them as a real alternative to the renormalization program, even though they were not able to reproduce the latter's successful empirical predictions. This is partly due to his strongly presentist reading of the work of some rather obscure proponents of a fundamental length, most notably Gleb Wataghin. On these less-known works the book offers some novel historical insights, going beyond the existing secondary literature, while still leaving a lot to be done. On page 110, H. P. Robertson's rejection of Wataghin's submission to the *Physical Review* is mentioned, but the author did not track down Robertson's referee report. In it, Robertson characterizes Wataghin's paper as "vague rubbish" (H. P. Robertson Papers, Caltech, Folder 7.12). Hagar prefers to characterize Wataghin's work as "cryptic" (p. 111) and goes on to connect it with current work on a quantum theory of gravity.

Quantum gravity is then the focus of the second half of the book. Chapter 5 gives an overview of the early history of the search for quantum gravity, again also highlighting some interesting less-known contributions. The tension between quantum theory and general relativity is identified as the strongest indication for the existence of a fundamental length in nature. Hagar then goes on to argue, in Chapter 6, that a dynamical origin for this fundamental length in a quantum theory of gravity does not imply that space-time is "emergent," as many physicists like to claim. Rather, some element of the quantum theory of gravity still needs to be identified with a pretheoretic notion of length in order to fulfill its operational role. This discussion is combined with a discussion of the correspondence between Albert Einstein and W. F. G. Swann. This is an interesting historical study; the connection to the philosophical point being made is, however, somewhat tenuous, relying on a specific reading of Einstein's (again) "cryptic" (p. 153) remarks. The final chapters then deal with the notion of fundamental length in contemporary quantum gravity research and the (dismal) possibilities for empirically verifying the existence of a fundamental length.

In summary, *Discrete or Continuous?* offers many interesting insights into the history and philosophy of discrete models of space but is hardly the synthetic conceptual history of such models that historians of science reading it might have expected.

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