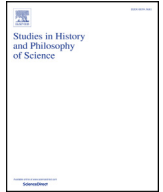




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# Experiential and cosmopolitan knowledge: The transcontinental field practices of the U.S. Bureau of Biological Survey<sup>☆</sup>

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## ABSTRACT

Before many of the global environmental knowledge producing networks and technologies emerged later in the twentieth century, another spatially extended form of field science was implemented at a continental scale by the U.S. Bureau of Biological Survey, revealing similar tensions and dynamics. Specimens and observations from across continental spaces were integrated through railroad-based transportation and communications networks in order to map distributions of birds and mammals and delineate “life zones” stretching across the continent. At the same time that field zoologists of the Biological Survey produced this cosmopolitan scientific knowledge, they also developed an intimate, experiential knowledge of many of the places where they traveled. By following the travels of Biological Survey field parties, especially the agency’s long-time chief field naturalist Vernon Bailey, during the late nineteenth and early twentieth centuries when the railroad was dominant, this paper traces the interconnections between the two ways of knowing in the Biological Survey’s practice. However, the integration of these different forms of knowledge was ultimately partial and incomplete, as seen through the Survey’s daily practices such as food consumption, the seasonality of survey field practice, and limitations on what types of knowledge were incorporated from lay network collaborators and field assistants.

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## 1. Introduction

One of the most readily apparent losses when moving from the local to the global is a robust sense of human experience in the world. As a concept typically rooted in direct sensory perception of the environment, “experience” seems difficult to transform into something global, except as the relatively superficial experience of travel as transitory sightseeing or a series of fleeting encounters with interconnected places whose imposed sameness belies their physical distance (think of airports or hotel conference rooms, for example). Yet it is worthwhile to think about how environmental scientists have attempted to face the challenge of “experiencing” the natural world beyond the local, as they have constructed technologies for sensing and measuring the environment, such as global satellite imagery, along with conceptual tools that link together disparate places into a coherent, integrated whole. This work has proceeded not only at the fully global scale, but at other intermediate regional scales, such as across single continents or

oceans, which themselves are vastly beyond the realm of ordinary local experience. And, undeniably, such technologies and conceptual tools have made it possible to envision, or even apprehend, the environment at larger scales, through direct encounters with representations such as charts, maps, and photographs.

Nevertheless, the question remains whether the movement in environmental experience from the local toward the increasingly global—whatever its evident successes—may still encounter serious obstacles and limitations, which have prevented the experience of global environments from ever being as robust as local experience. In this paper, I will develop a case study that predates the most impressive examples of global environmental science from the mid-twentieth century onwards: the U.S. Biological Survey operating on the continental scale during the railroad era of the late nineteenth and early twentieth centuries. By focusing on a regional and continental scale during an earlier period, we can see many of the same tensions, dynamics, and challenges that would later be revealed at an even more global scale.

As a plausible best-case scenario for experiencing *trans*-local environments, consider the work of Vernon Bailey (1864–1942), the Survey’s chief field naturalist from 1890 to 1933, an impressive figure who arguably did more than anyone else to “know” the

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natural world of the entire North American continent, especially its western half. Yet, as I shall argue, even his impressive and unusual achievements in large-scale environmental perception were ultimately limited in their reach. In the course of exploring the individual and collective environmental experience that could be generated through the Biological Survey, I will also bring in other examples from the field sciences in the interior West during the railroad era to illustrate points of interest, where especially suggestive evidence is available. I will emphasize the distinct, complementary, and irreplaceable role of experiential knowledge possessed by those who know places firsthand, which could not (ultimately) ever be subsumed by the knowledge of scientists operating at larger scales.<sup>1</sup> The limitations of scaling up the knowledge of experience were generated not only by the impossibility of rendering much of that knowledge in a systematic form that could circulate more widely, but also by the (necessary?) erasure of many aspects of human experience in scientific publications and the difficulty of fully encompassing the temporal element of place-based knowledge.

## 2. “Experience” in the history of science

To be sure, the word “experience” raises complex issues for the history of science, and it presents translational challenges between English and other languages.<sup>2</sup> Among historians of science, Peter Dear (1995, pp. 4, 6) has played a generative role in scholarly discussions about “experience,” particularly for the early modern period in Europe. For Dear, an older, Aristotelian sense of “experience” as “*how things happen in nature*”—as the “ordinary course of nature”—was displaced during the seventeenth century by experimental science focused on “*how something had happened on a particular occasion*.” Experimentation could then produce “a historical account of a specific event that acts as a warrant for the truth of a universal knowledge-claim.”<sup>3</sup> Dear (1987, p. 134) has also argued that experiment itself was less pivotal than “the emergence of discrete experience as the primary empirical component of natural philosophy,” thus highlighting the centrality of the shifting meaning of “experience” to the history of science. However, once we recognize that “experience” in the Aristotelian sense, as generating knowledge of how things happen normally in the ordinary course of nature, persists in the everyday experiences of people who live and work in particular places, “experiential knowledge” can be a useful category of analysis for later historical periods too. Such knowledge may be contrasted with the

experimental forms of knowledge production that were taking hold among more distinguished philosophers from the late seventeenth century onwards.

This shift was especially associated with English natural philosophy, and scholars have charted how the French thought about these matters differently (Dear, 1990; Licoppe, 1996). Linguistically, of course, the French usage of “experiment” and “experience” (either as the verb, *expérimenter*, or as the noun, *expérience*) were typically overlapping. German speakers also lack an exact equivalent to the English empirical and bodily-oriented “experience,” although, as linguist Anna Wierzbicka (2010, pp. 84, 85) points out, they have two distinct words of their own: *Erfahrung*, which “emphasizes knowledge gathered or obtained over time from many situations that one has been in (usually when doing something) and reflected upon,” and *Erlebnis*, which “refers to a special event in a person’s life that is linked at the time with some emotion and is remembered later.” It is a worthwhile and illuminating project to trace these shifting and divergent meanings of “experience” in different languages, and this instability should provoke some caution, but at the same time we can use these other languages to enrich the meaning of “experiential knowledge” as a crucial analytical term for the history of science.

Thus, in thinking about the analytical term “experiential knowledge,” while French offers a caution that there will always be some blending of these different forms of knowledge, the German *Erfahrung* can help distinguish and clarify the epistemic aspect of “experience” as generative of knowledge (Wierzbicka, 2010, p. 84). explication is useful here:

- a. someone did many things at many times
- b. many things happened to this someone at many times because of it
- c. this someone thought about these things for some time
- d. because of this, this someone knows many things about things of some kinds

This is not a bad synopsis of what many writers and speakers mean by “experiential knowledge,” although the English version of the word would likely place more emphasis on the bodily and sensory aspects of experience. Moreover, the emphasis on the particularity of experience as the foundation for knowledge production since the early modern period is closely bound up with the history of the modern fact, or “datum of experience, as distinguished from the conclusions that may be based upon it.”<sup>4</sup> As Lorraine Daston (1996) has argued, the earliest modern facts were “strange facts,” even if from the eighteenth century onward the concept broadened considerably to cover a much wider range of ordinary and banal particularities.

Other historians have identified key transformations in the role or nature of experience that preceded the rise of experimental practice. These included shifts in England, as well as other parts of western Europe, and in both domestic European and distant colonial contexts. In sixteenth-century England, for example, Eric Ash (2004, p. 213) has argued that “the very notion of expertise was in flux throughout the century, shifting from an emphasis on personal experience to the possession of a more theoretical kind of knowledge and skill.” This earlier diminution in the role of experience in the constitution of expertise reminds us that the seventeenth and eighteenth century changes in more elite philosophy were taking place in a social context where experiential knowledge might be marginalized by new forms of higher-status knowledge. In the case

<sup>1</sup> The most common word that is used to refer to what I am calling “experiential” knowledge is “local” knowledge, which is a term that I sometimes use when it seems appropriate. However, for analytical purposes, I am preferring “experiential” in order to avoid presuming that the knowledge of experience must always be strictly local, as well as to emphasize that this type of knowledge is not just a smaller scale level of data that can be aggregated into global scientific knowledge—rather, it often adds something complementary and independently valuable. Some other frequently used terms that are similar to “experiential,” and which often overlap with it in meaning and also identify this type of knowledge to varying degrees, include: “vernacular” (Coen, 2012; Coen, 2013, p. 11; Pandora, 2001; Smith, 2004; Tilley, 2010; Valencius, 2013, p. 177), “indigenous” (Cooper, 2007), and “folk” (Fan, 2004, p. 143).

<sup>2</sup> Recently David Wootton (2015, pp. 312–313, 347), has thrown down the gauntlet to mainstream historians of science, in a bold challenge to prevailing historiographical interpretations across a wide range of key concepts in the history of science, including “experience,” among many others, all in service of a larger effort to reinstate the novelty of the “scientific revolution” and to define its parameters more exactly. While his strenuous effort to distinguish his own interpretation positions it in a way that is probably too sharply overdrawn, it is nevertheless and bracing and illuminating overview, especially of the key linguistic shifts in the word “experience”.

<sup>3</sup> See also Dear, 1985; Dear, 1991; and Dear, 2006.

<sup>4</sup> Oxford English Dictionary definition cited in Daston, 1988, p. 466. See also Shapiro, 2000; Fontes da Costa, 2002; and Fontes da Costa, 2009.

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