Annotated Bibliography

Barad, K. M. (2007). *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning.* **Durham: Duke University Press.**

Barad introduces agential realism, the perspective that scientists slice the intra-activity of the world at the moment of observation. This "slicing," which Barad terms a „Bohrian cut," creates agential separability — an observer as distinct from the observed — which allows the "observed" to be unambiguously communicated to and reproduced by other scientists via Porter's quantization as a technology of distance. (1995) The agential realist perspective implies a sort of objectivity that is dependent on our choices as agents in the world rather than inherently independent of them.

Becker, H. S. (1998). *Tricks of the trade: How to think about your research while you're doing it.* **Chicago: University of Chicago Press.**

A grab-bag of heuristics from an influential social science researcher that includes the "machine trick," which asks "if I wanted precisely the result I see before me, what machine would I design in order to produce it?" as a means to draw out the forces at play in a scene. I see this "trick of the trade" as a variant on the geneaological approach described by Saukko and which helped me understand how Bower's paper on the history of scientific objectivism could be rephrased for engineers to understand.

Bower, B. (1998). Objective Visions: Historians track the rise and times of scientific objectivity. *Science News, 154*(23), 360.

As the title implies, Bower's paper traces the geneaology of the predominant paradigm of objectivity in the sciences, a form of objectivity that privileges what "experts" deem valid about the world. Becker's "machine" trick (1998) and Saukko's section on geneaology as a cultural studies approach (2003) helped me situate Bower into this paper's web.

Cavallaro, D. (2001). *Critical and cultural theory thematic variations.* **London; New Brunswick, NJ: Athlone Press.**

This general overview of Crticial and Cultural Theories provided the paper's epigraph, but otherwise does not explicitly focus on objectivity. However, it provide some useful mental tools for uncovering and teasing apart one's assumptions about objectivity.

Gibson, James J. (1977) Chapter 3: The Theory of Affordances. In R. Shaw & J. Bransford (Eds.), *Perceiving, acting, and knowing : Toward an ecological psychology* **(pp. 67–82). Minnesota: Halsted Press Division, Wiley.**

This chapter was the first use of the word "affordance," a term coined by Gibson to refer to the properties of an object that allowed an actor to act upon them; for instance, a chair *affords* sitting down to an able-bodied person who fits upon it. Affordances cut across

the subjective/objective boundary by taking into account both physical characteristics and those of the actor. Gibson's discussion of how humans shape the affordances of things for their convenience foreshadow's Porter's (1995) depiction of the historical forces that rendered scientific objectivity so convenient, as well as Barad's (2007) depiction of scientists as slicing reality in order to generate convenient affordances for themselves.

Guba, E. G., & Lincoln, Y. S. (2005). Chapter 8: Paradigmatic controversies, contradictions, and emerging confluences. In N.K. Denzin & Y.S. Lincoln (Eds.) *The Sage Handbook of Qualitative Research* **(3rd ed., pp. 191–216). London: Sage.**

Part of the massive Sage Handbook of Qualitative Research, this chapter briefly outlines several major paradigms of qualitative research. The dominant (and often unstated) paradigm in STEM research is positivism; most STEM education researchers have STEM backgrounds and unconsciously fall into a post-posivist paradigm out of habit. I have used Lincoln & Guba's description of post-positivism in this paper.

Harding, S. (1993). Rethinking standpoint epistemology: What is strong objectivity? In L. Alcoff & E. Potter (Eds.), *Feminist Epistemologies* **(pp 49–82). New York: Routledge.**

Harding expands on standpoint epistemology, mentioned earlier in Nielsen's 1991 introduction to a book on feminist research methods. She argues that starting with a variety of marginalized voices leads to "stronger objectivity" and a reflexive awareness of how our positionality inevitably affects our research.

Lather, P. (2006). Paradigm proliferation as a good thing to think with: teaching research in education as a wild profusion. *International Journal of Qualitative Studies in Education, 19*(1), 35–57.

This paper exhorts learners of qualitative research methods to situate themselves reflexively within the tensions that span the field rather than immediately resolving them. Treatments of objectivity are one such source of tension; Lather points out that the subjective-objective binary is an oversimplification and that the objectivity debate is and never will be settled. To illustrate the point, Lather presents several threads in the ongoing debate, including strong objectivity, standpoint epistemology, and other works by Harding, Spivak, Melville, and Haraway (some of which are used in this paper).

Morozov, E. (2013). *To save everything, click here: the folly of technological solutionism.* **Jackson, TN: PublicAffairs.**

This book is an example of what it looks like when the anti-objectivism mindset is spun into a mass-marketable metanarrative. It does introduce a useful term: "technological solutionism," an action paradigm that is a "trust in numbers" (Porter, 1995) taken to the extreme. "Technological solutionism" could be the makings of a brilliant parody. Instead, Morozov argues that technological solutionism is a rampant problem in modern society,

the book falls apart; his depiction is so caricatured and rife with ad-hominem attacks that it's apparent he's setting up a strawman to demonize.

Nielsen, J. M. (1991). Introduction. In J.M. Nielsen (Ed.) *Feminist Research Methods: Exemplary Readings in the Social Sciences* **(pp. 1–32). Boulder: Westview Press.**

Nielsen introduces standpoint epistemology, the idea that less privileged groups may "see more" of the world because they must hold both their own worldview and that of the dominant group. Harding's 1993 paper is a further elucidation of this idea. Nielsen also illuminates the notion of what "counts" as research as a set of socially constructed boundaries; I see her words here as an early ancestor to Barad's agential realism (2007) and would include both papers in an updated version of Bower's 1998 history of objectivism in the sciences.

Porter, T. M. (1995). *Trust in Numbers: the pursuit of objectivity in science and public life.* **Princeton, NJ: Princeton University Press.**

Porter presents quantification (numbers, graphs, formulas, etc) as a long-distance communication technology. He traces its development as a response to the expansion of scientific and techncical communities into scientific and technical *societies*, where personal trust networks could no longer validate decisions across the entire society with sufficient reach and speed. When read in parallel to Bower's paper (1998), we see that numbers as a form of validation currency were shaped to privilege some forms of "expertise" over others, leading to the situation standpoint epistemologists critique and deconstruct. (Nielsen, 1991)

Saukko, P. (2003). *Doing research in cultural studies: an introduction to classical and new methodological approaches.* **London ; Thousand Oaks, Calif: SAGE.**

Saukko's book presents a variety of methods for cultural studies research, including the geneaological approach that helped me understand Bower's paper.