

# Materializing Systemic Racism, Materializing Health Disparities

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The purpose of cultural competence education for medical professionals is to ensure respectful care and reduce health disparities. Yet as Berger and Miller show, the cultural competence framework is dated, confused, and self-defeating. They argue that the framework ignores the primary driver of health disparities—systemic racism—and is apt to exacerbate rather than mitigate bias and ethnocentrism. They propose replacing cultural competence with a framework that attends to two *social* aspects of structural inequality: health and social policy, and institutional-system activity; and two *psychological* aspects of structural inequality: the clinical encounter, and the epistemic.

We agree with the structural approach. To that end, we think it would be fruitful to include attention to *physical* contributors to structural inequality, namely the *material artifacts* used in medicine. Devices, tools, and technologies can materialize biases, perpetuate oppression, and contribute to health disparities. Granted, not everything that interests philosophers can be squeezed into medical education. Nevertheless, there are compelling reasons for including the study of material artifacts in education designed to reduce health disparities. First, devices and tools often carry forward biases from the past, and keep biases hidden from plain sight. Second, by studying these artifacts, future clinicians can begin to see themselves as part of a larger sociotechnical system. Finally, as medicine becomes increasingly tech-laden, it's important for clinicians to see how material artifacts (including algorithms) connect *individuals* to *structures*. This will help to undermine oversimplified narratives according to which objective tools and technologies can correct for the bias and subjectivity of flawed human beings.

How do medical devices carry forward biases from the past and materialize systemic racism? We consider two examples. Spirometers, which measure lung functioning, often have race correction built into their hardware or software. The standard of care is to correct for the fact that Black patients are thought to have lower baseline lung capacity on average. But how many clinicians know the science behind whether these correction factors are justified, or the full story of how they came to be? On historian Lundy Braun's (2014) telling, race correction in spirometry can be traced to 18th century notions of white supremacy, racial hierarchy, and racial essentialism. Most of the designers and users of these instruments had no racist intentions, but they relied on reference values from poorly controlled studies and then contributed to further confusion by using spirometry in new studies with

poorly defined racial groupings. Racial ideology intersected in complex ways with other social forces, including government scientists' use of spirometry to deny workers' compensation to coal miners with lung disease. As with the more well-known case of race correction in kidney function testing (eGFR), efforts to eliminate or improve race correction in spirometry will raise trade-offs between the harms of underdiagnosis and overdiagnosis. These trade-offs should not be confronted in a vacuum, but rather contextualized against the messy social history of these devices.

The social history of the pulse oximeter is shorter and less complicated, but equally scandalous. Some models of these devices systematically overestimate oxygen saturation in darker-skinned patients, to a degree that could affect decision-making. Many light-based technologies display such biases—automatic soap dispensers are one notorious example. Fingertip pulse oximeters were initially calibrated on all-white or mostly-white research subjects; their skin color bias has been known for decades and was confirmed recently in hospital data comparing pulse oximetry to arterial blood gas results in a large cohort (Sjoding et al. 2020). Anthropologist Amy Moran-Thomas (2020) brought this story to a wide audience in the middle of the COVID-19 pandemic, when many patients were using pulse oximeters at home. She found that clinicians either hadn't been taught about the biases or weren't sure what to make of them; manufacturers had gone decades without being forced to correct the design flaw.

Spirometers and oximeters materialize systemic racism. They are what Shenyi Liao and Bryce Huebner call “oppressive things”. They are not *merely* or *accidentally* biased, but biased in a way that's *congruent with oppression*. Their biases (1) go in the same direction as racial oppression, (2) are causally embedded in an oppressive system, and (3) are both the downstream consequences of past oppression and the upstream antecedents of future oppression (Liao & Huebner, in press). To appreciate the nature and extent of how systemic racism was materialized in these devices requires attending to some of the details of their history, as well as the broader story of racial categorization in medicine (Roberts 2011). For this reason, we think history is an essential component of interdisciplinary education aimed at addressing systemic racism (Fausto-Sterling 2016, Hammonds & Reverby 2019).

And as we argue elsewhere, the fascinating thing about these two examples is that in one case the problem can be traced to the presence of race-norming, and in the other, to the absence of race-norming (Liao & Carbonell, n.d.). Because of this, no quick technical solution is likely to be forthcoming (cf. Kadambi 2021). Simple de-biasing will not solve the problem if the underlying cause is oppressive social structures. Future clinicians should be educated about biased devices, but also about oppression more generally. And while Berger & Miller focus on systemic racism, it should be noted that material artifacts can be biased along multiple, intersecting axes of social difference and oppression—not only race, but gender, class, ability, etc.

Berger & Miller suggest reforms at four levels: *macro* (health and social policy), *mezzo* (institutional-system activity), *micro* (the clinical encounter), and *epistemic* (manuscript p. 12). They place race-norming for kidney and lung function at the “mezzo” level, and urge medical educators to “cease conflating race with

genetic ancestry” (13). We propose using particular oppressive medical tools as case studies for illustrating how all four levels connect to form a single structure. Not only can biases and beliefs get embedded in material objects, but those objects also shape our thoughts and behaviors. According to embodied and embedded views of cognitive science, cognition isn’t something that just happens in our brains, but is something we *do* with our bodies and is embedded in the physical and social worlds. As Liao and Huebner put it, “racist things play an essential role in the ecology of racial oppression by shaping racialized thoughts and actions and racialized interactions and institutions” (p. 3). Things can shape thoughts and institutions, and thoughts and institutions can shape things, in cyclical patterns.

For example, without intending it, oximeter designers left traces of a racially biased worldview—that white bodies are the norm—in the device. The device then carries that bias, covertly, to future users, who think *with* the device, allowing it to shape their intuitions, decisions, habits, practices, expectations, and norms. The device is ultimately implicated in all four of Berger & Miller’s levels: it measures a vital sign that is used to make inferences in clinical decision-making (epistemic); it corroborates or casts doubt on the patient’s report of their breathing difficulties (the clinical encounter); it standardizes and quantifies information to allow communication among clinicians and comparison across patients, potentially feeding into policy decisions regarding patient care more generally (institutional-system activity); and it can be used to deny patient benefits they are entitled to, such as Medicare reimbursement for home oxygen (health and social policy).

Case studies of materialized oppression would be a good way to get future clinicians thinking about their role as one moving part in this multi-level, complex system. As new generations bring a social justice mindset to clinical practice, one danger is that physical tools get regarded as objective, ahistorical, neutral technologies that need only to be mastered, rather than interrogated. An even bigger danger is that the data from such tools gets regarded as necessarily less biased than the subjective judgment of individual patients or clinicians. Reality is more complicated, and medical education should reflect this complexity.

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