

A Designer's Guide to Anti-Oppressive Human Measurements

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1 About this guide

This guide is for anyone who designs apps, tools, technologies, or other things that involve measurements of humans, for use either on oneself or others. In this guide, you'll learn about the (oppressive) history of measurement practices and how you, the designer, can design to resist measurement's problematic history.

2 A Short History of Oppressive Measurement

When one thinks of measurements, one might first think of rulers in science class. It can be hard to imagine that something as simple and "objective" as a ruler could possibly oppress anyone. Unfortunately, even a seemingly objective measurement like a ruler is not as objective as one might think. Coupled with use by humans (who, in reality, are also not objective as one would like to think), seemingly objective measurements can lead to decidedly subjective and even oppressive outcomes.

Anthropometric measurements (measurements of a person's size, form, and functional

capacities [1]) have been used for centuries as evidence that women and non-white individuals are inferior to white men [2, 3]. For example, Stepan writes that:

From the study of race came the association between inferiority and the ape. The facial angle, a measure of hierarchy in nature obtained by comparing the protrusion of the jaws in apes and man, was widely used in analogical science once it was shown that by this measure Negroes appeared to be closer to apes than the white race [4].

Society presupposed the inferiority of non-white races, and scientists, consciously or unconsciously, found evidence that supported this hypothesis.

Little effort was made by scientists to examine their data for potential confounding factors. For example, studies of cranial capacity in white men and white women showed that white men had higher cranial capacities [2]. This finding was used to argue that white men were more intelligent than white women. However, when controlling for body size (women tend to be smaller than men), this difference evaporates. Even if such a difference were to exist, there was (and is still) no evidence that cranial capacity even had a relationship with intelligence at all. Society and individual scientists' biases impacted "knowledge" production in a way that furthered systematic injustice and justified oppression of women and non-whites.

Reading the above example, one might argue that so long as one is careful to consider possible confounding factors in one's data (such as normalizing cranial capacity by body size), measurement is now in the clear. Certainly the measurements themselves are free of bias! Unfortunately, human measurement bias is even more nefarious; there is evidence that suggests that even raw data can be influenced by bias.

In *The Mismeasure of Man*, Stephen Jay Gould re-analyzes empiricist Samuel George Morton's cranial capacity data that was used to show differences in cranial capacities between

racers (with whites having the highest capacities) [3]. Gould shows that Morton made a variety of errors in his analysis, none likely intentional, but virtually all in favor of the white superiority hypothesis.

One example of errors in Morton's analyses was the discrepancies in the use of mustard seed and lead shot to measure cranial capacity. Mustard seeds do not pack well as they are lighter than lead shot and more variable in size. This leads to significant variability with different packing densities for subsequent measurements. Lead shot, on the other hand, is heavier and of more consistent size. Morton first measured the skulls with mustard seed, and moved to lead shot when he realized the mustard seed was too variable. Gould examined the differences between the cranial capacities measured by each method and found that while all skulls were found to have higher cranial capacity with lead compared with seed, there was a discrepancy in the relative increases: remeasured African skulls saw an increase in 5.4 cubic inches of cranial capacity on average, whereas Caucasians only saw the average cranial capacity increase by 1.8 cubic inches. This suggests that Morton must have subconsciously packed the mustard seeds more rigorously for Caucasian skulls or less rigorously for non-Caucasian skulls.

Measuring skulls to infer intelligence might seem dated, but the issues with measurement described above still cause problems today. Modern examples of design and measurement bias that act in oppressive ways in modern times include (but are certainly not limited to) the calibration of film with white models [6], the use of average male crash dummies in airbag testing (until 2012, see e.g. [7]), and the prevalence of medical recommendations based on predominantly male populations [8].

3 Designing Anti-Oppressive Measurements

A brief history of oppressive measurement was reviewed in the previous section. In this section, we will discuss what to do to minimize oppression and maximize anti-oppression in measurement. What can we as designers do? Here are a few key steps:

1. Research and acknowledge the biases and limitations of your intended measurement
2. Research and acknowledge the biases and limitations of you as designer
3. Examine your intended design's impact

3.1 Acknowledging biases in measurement

Technology and measurements aren't neutral. What are some ways that biases could be present in your measurement? Have you tested the measurement with a diverse population of individuals? Age, gender, sex, socioeconomic status, race, ability, medical conditions, genetics and more could potentially impact your measurement. Consider the mechanism of your measurement and try to brainstorm how your measurement might be biased when testing with different individuals. How might you redesign or rethink your measurement and protocol to minimize the effects of these biases?

3.2 Acknowledge your own biases

Like many socially conscious designers, you might think that you don't have biases. Unfortunately, most people have implicit biases that can affect their decision making and behavior at a subconscious level. This happens because of the society we are raised in, not because you are a bad person.

There are several steps you can take to acknowledge your own biases. Consider your place in society, privilege, and your political views. How might these affect your ability to design

and/or perform measurements? Consider taking an implicit bias test. If you are white, read or review “White Privilege: Unpacking the Invisible Knapsack” by Peggy McIntosh (see e.g. [5]). Search online and learn about people and cultures different from yours. How might you redesign or rethink your measurement and protocol to minimize the effects of these biases?

3.3 Examine your design’s impact

Now that you’ve examined potential biases in your measurement and in yourself, you can move forward to examining your design’s impact with both potential measurement biases and your own biases in mind. What is the purpose of the measurements you intended to make? Who will be measured, and why? What will these measurements enable, and how might these measurements influence existing power structures? Will these measurements work to maintain existing hierarchies, break them down, or both? It can be easy to get discouraged, but remember try to do your best.

4 Takeaways

In this guide, you’ve learned about the oppressive history of measurement, how to reflect on your desired measurement, and how to reflect on your own biases. This can be very challenging, but is essential for performing anti-oppressive measurements. Your measurements and data can impact people in ways that you may or may not have intended and you won’t be able to know exactly how before hand. That’s okay. It is important to review this document frequently during the design process and after. Don’t let reflection be a one time thing; integrate new information and feedback as you receive it.

References

- [1] <http://www.cdc.gov/niosh/topics/anthropometry/>
- [2] Nancy Leys Stepan, "Race and Gender: The Role of Analogy in Science." *Isis* 77, no. 2 (1986): 261-277.
- [3] Stephen Jay Gould, *The Mismeasure of Man*, WW Norton & Company, 1996, Chapter Two
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- [5] <http://ted.coe.wayne.edu/ele3600/mcintosh.html>
- [6] <http://priceconomics.com/how-photography-was-optimized-for-white-skin/>
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