PHIL 3334 Homework Four Answer Guide

1) PREAMBLE: In Chapter 1, Harden displays a graph showing the differences in rate of college completion between individuals in the highest and lowest quartiles of family income and between those in the highest and lowest quartiles of a polygenic index score. Later in chapter 4 she says that polygenic scores "typically capture between 10-15% of the variation in out in outcomes like years of schooling, performance on standardized academic tests, or intelligence test scores." Harden claims that family income is an accident of birth beyond the child's control and "A society characterized by equality of opportunity is one in which these accidents of birth do not determine a person's fate in life." She then frames her book in part as an argument that our genes are also due to luck – the genetic lottery – and so we should think of our genetic endowments as morally relevant as well for understanding social inequality as well.

-- After reading the first four chapters hopefully you understand enough about polygenic scores to think about this comparison. Is Harden right that our genetic endowments are relevantly like other accidents? Is she right that this means that we as a society should try to give help to people that need help in order to ensure equal opportunity?

For the first part of this answer, we were looking for you to make a brief argument for why (or why not) genetic endowments are like other accidents. If you agreed with Harden, you could say something like this: yes, genetic endowments are relevantly like other accidents because, just as with family income, our genetic endowments are not up to us, and depending on what our genetic endowments include, we might very well suffer various harms because of them, as in the case of children born into impoverished families. Any kind of argument along these lines was acceptable. I do not recall anyone rejecting Harden here, as it is a much harder argument to make, but one could claim something like this: no, Harden is wrong because our genetic endowments are not an accident, since we could not have had any other genetic profile and still be us.

For the second part, we needed an argument either for or against Harden's thesis that equal opportunity requires that people with "unlucky" genetic profiles deserve assistance. A pro argument could go like this: yes, the genetic lottery imposes a moral requirement on us to help those who are unlucky because otherwise they would be subject to various harms (e.g., low quality of life) that they do not deserve since their genetic profiles are the result of factors outside of their control. The key here was to pinpoint the moral principle that we should help those who are harmed on account of things out of their control. The FEMA analogy here makes this quite clear. FEMA exists to address harms to persons (or their property) due to factors outside of their control (e.g., natural disasters).

A con argument, however, could have proceeded like this: no, even if Harden is right about the genetic lottery, she is wrong about "unlucky" persons needing help because this results in a slippery slope where we end up forcing artificial equality onto society or end up placing onerous demands on society to address bad genetic luck. This kind of slippery slope argument might work, but there is a concern that Harden's position only requires morally significant harms to be addressed. My being too short to play in the NBA, for example, is not

2) In Chapter 7 of Elliott Sober's *The Philosophy of Biology* he uses an example of 'speaking Finnish' vs. 'speaking Korean' to show that there is a fundamental problem with a correlation based definition of what it takes to be a gene for a trait.

2a) Explain his example.
2b) In chapter 2 of *The Genetic Lottery*, Harden mentions the problem of "population stratification" and uses the example of chopstick use. Explain her example. What if we did a full GWAS study with the phenotype of chopstick use. What do you expect we would find? Is this the same problem that Sober is pointing out or are there important differences in the two cases? Now think about the cases of polygenic scores for college graduation and wealth. Do you think these cases will inherit the same problems? (If so, why do we do these studies at all?) Or if not, what is different about these cases?

A con argument might go like this: no, these cases are different because there are plausible explanations for the high correlations, explanations that are absent in the Finnish-Korean and chopsticks examples. That is, there is a common genetic cause behind these scores; perhaps it's related to IQ. In the chopsticks and Finnish-Korean examples, there was only one plausible explanation for the correlation, namely, the environment. But college graduation or one's wealth is plausibly not purely an environmentally caused phenotype. It could very well be caused by genes for intelligence or some other trait. The point here is that you would have to acknowledge that there is some kind of disanalogy. In any case, if your argument was clear and you showed competence with GWAS studies you will have received full credit for (2b).

3) In chapter 3 of *The Genetic Lottery*, Harden introduces an idea that she calls a cookbook-wide-association-study or CWAS. She suggests different possible ways you might try to measure customer satisfaction (such as Yelp reviews). Imagine you had the time and money to do all of the relevant studies like this. Do you think any of them would provide you with any useful information about how cooking ingredients are contributing to customer satisfaction? Would this information be helpful if you were trying to predict if a new proposed recipe would taste good or contribute to a restaurant getting good reviews?

Now compare CWAS to GWAS. Do you think that GWAS studies are telling us anything useful? What are the relevant differences? (Or if you think there aren't any, why does Harden seem to think they are different?)

For the first half, we wanted a clear explanation as to why (or why not) CWAS studies would be useful. It seems clear that they have some predictive utility, in the absence of any other information, so if you denied that we would have wanted some clear reasons why that isn't the case. Perhaps it is still useless because we wouldn't necessarily have local Yelp reviews, only ones from other regions. Or maybe it doesn't tell us anything other than that customers are unreasonable or something like that. Or perhaps Yelp scores are not useful for cuisines that are not represented in a particular area.

For the second half, we wanted a clear argument as to why the CWAS analogy holds or why it does not. This did require some competence with the basic idea behind GWAS studies. It was also important for you to at least indirectly acknowledge how the analogy works. That is, the yelp scores are the phenotypes and the ingredients are the SNPs.

Beyond that, we wanted clear arguments as to why they are similar or dissimilar. One thing you could point out is CWAS studies say nothing about the quantities of the ingredients. For example, salt would be a popular choice, but too little or too much might result in unsatisfied customers. This is perhaps unlike a GWAS study where we can predict the effects of having a certain number of SNPs. Or tastes in our region might be different from the region we gathered the Yelp scores from. So if a CWAS conducted in Maine shows that clam is correlated with higher yelp scores, then that CWAS is only useful in Maine and not in Lubbock or someone where else. This seems to hold of GWAS studies as well, and some of you pointed this out, which gives us reason to doubt their informativeness. There are several points at which the analogy can be pressured and several points where it seems to

hold. We wanted to see you clearly identify these points and draw your conclusions from them. If you did this well, you will have received full points.