Philosophy 3334 Fall 2023
Reading questions #13
Due Thu, Nov 9

1) Read Harden chapter 6. Endnote 11 will also be helpful (in general you should always read them). Harden gives several reasons why heritability estimates from twin studies might not actually reflect the true value of heritability of a trait in a population. Here are things that matter:

> 1) How similar the environments of identical twins raised together are relative to how similar the environments of fraternal twins raised together are.
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> 2) How similar the environments of identical twins raised apart are (adoption) vs. two random individuals in the population.
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> 3)How genetically similar fraternal siblings are.

For each of these three cases, describe what researchers typically assume in order to do their study, describe why this might be wrong, and say whether if their assumptions are wrong whether this means that the true value of heritability is actually higher or lower.

NOTE: It should really help you to look back at Sober's "Separating Nature and Nurture." He carefully goes through what the mathematical assumptions in twin studies are and even puts asterisks by the controversial assumptions in the derivation.

2) After reading the chapter, come up with a question that you want answered or a topic that you would like to be discussed. This could be something that the chapters forced you think about or it could be something that you thought was particularly confusing in the chapters.

1) This is known as the 'shared environment assumption'. Technically, we assume Ve(mono) = Ve(diz). This is probably false. – discussion of this is problem #5 on your homework 5.

2) We assume Ve(mono-raised-apart) = Ve(everyone). This is likely false because for one thing, it has the same problem that the shared environment assumption has. But in addition, the fact that these are children who are adopted leads to another similarity as parents who adopt tend to be more similar than average – high SES, stable home, sometimes relatives of the child, etc. If the environments of these twins are more similar to each other on average than two random environments, then some of the similarities in phenotype can be explained environmentally rather than genetically. So h^2 is being overestimated. Mathematically, looking at Sober's derivation, if Ve(mono-raised-apart) < Ve(everyone) then in (11) Vp should be

greater. So in 12, Vp is greater. So in (13) Vg is lower so in (14) Ve is actually greater. So if Ve is actually greater than we calculated, then $Vg/Ve = h^2$ will be less than we calculated.

3) In this case we are assuming that Vg(diz) = ½ Vg(everyone). However, siblings are likely even more similar to each other than this because this calculation assumes that their parents are random. But assortative mating means that parents tend to be more genetically similar to each other than random people and so therefore their children inherited that added similarity. So really, Vg(diz) < ½ Vg(everyone). If this is true, there is a smaller genetic difference between identical and fraternal twins than normally assumed and that difference causes all of the phenotypic differences [if we are assuming that Ve(mono) = Ve(diz)]. So actually, the genetic differences that do exist matter MORE so h^2 is being underestimated. Mathematically, following Sober, if Vg(diz) < ½ Vg(everyone) then in (22) Vg should actually be greater and in (23) Ve should actually be less. If Vg is greater, than $Vg/Vp = h^2$ is greater.