

Philosophy 3334: Philosophy of Biology
Fall 2023
Homework 6

Answers should be uploaded into Blackboard before 11:59pm on Sunday, Dec 3.

PREAMBLE: Imagine that we do a very large GWAS study and a gene has been identified that is 50 times more prevalent in obese individuals than non-obese individuals. Not everyone who has this gene is obese and some people have the gene and are not obese. Nevertheless, there is strong correlation.

1) Is this enough information to conclude that yes, this is a gene for obesity? What about the claim that this gene *causes* obesity? (Say whether you think this is the same question or two different questions). If you think this is not enough information, what additional information would you need to know?

2) Here are three different hypothetical stories about what might be happening.

2a) In story one, it turns out that this gene affects how the body metabolizes food and creates body fat. So someone with this variant of the gene who has the exact same diet as someone with a different variant will end up with more body fat.

2b) In story two, it turns out that people with this variant of the gene do not feel satiated as quickly when they eat. In other words, they are hungrier more often. So as a matter of fact, when we compare the total amount of calories they consume, they simply eat more on average than people with a different variant of the gene. It is of course possible for them to simply eat less (meaning eat the same amount as other people), but they would be hungry all the time and this is very difficult and very unpleasant. But if they did, they would be at a more normal weight.

2c) In story three, it turns out that people with this variant of the gene have a taste for calorie dense foods like sugary drinks and desserts. These foods just taste especially good to them. It is not particularly difficult to avoid these foods and if they just have water instead of soda for example, they feel perfectly fine and their body reacts normally. However, as a matter of fact, people with this variant of the gene just tend to drink much more soda and eat more desserts than other people. But if they ate the same diets as other people, they would have the same rates of obesity as others.

NOW: Write about genetic and environmental causation in the context of these three stories. In each of the three cases, explain how these genes would contribute to the overall calculation of H^2 . Are the genes part of the genetic causes of obesity if we follow the logic of the heritability studies? It should help you to think about twin studies in these cases. Is the answer the same in all three cases or are there any

important differences? Do you think that these genes really are causing obesity in these cases?

You could answer these questions by discussing the three cases separately (or in two groups) or you could write one 'overall' discussion; but if you do that, make sure to talk about any relevant differences between the cases.

3) Briefly describe how realistic you think different aspects of these stories are. Which parts of the preamble and the three possible stories are consistent with what you know (or believe) about obesity and which are not? For this part you will not be graded on how accurate your answer is, but just whether you actually answer the question.