Innateness Explanations Handout

1. A gene g for metric phenotype p is a map from environments to values of p.

2. If o's metric phenotypes are $p_1, \ldots, p_n$, its genotype G maps an environment e to $\langle p_1(e), \ldots, p_n(e) \rangle$. $\pi_i \bullet G$ maps environments to values of p_i, where $\pi_i(x_1, \ldots, x_i) = x_i$ projects ith coordinates. $\pi_i \bullet G$ is a gene g_i for phenotype p_i.

3. p is ontogenetically fixed if each genotype $g_i(e)$ for p is constant over the environments in which the organism o can reach maturity: $dg_i(e)/de = 0$ at all e.

4. p is *strongly* ontogenetically fixed iff there is only one g for p, and $dg(e)/de = 0$.

5. p is almost fixed if $dg(e)/de \approx 0$.

6. "p is innate in the ensemble of environments $\boldsymbol{E}$" iff "p is [strongly] fixed in $\boldsymbol{E}$."

7. p is "genetic" (also) means: environment causally explains little or none of the difference Δp in phenotypic expressions of p.

8. A difference $\Delta p(A, B)$ between A and B is attributable to their genes iff $\sim[\Delta p(A, B) = g(e_A) - g(e_B)]$.

9. Calling a difference genetic often means: $\Delta p(A, B) = g_A(e) - g_B(e)$, e the environment shared by A and B.

10. Partitioning of individual phenotypes into genetic and environmental components: A man is obese "because of my genes" when he outweighs members of the reference group who eat as much and exercise no more than he does.

11. Δp is wholly genetic in origin, without reference to environments or individuals, may mean: Δp is due to genes in all environments: for all A, B and e, $p(A) - p(B) = g_A(e) - g_B(e)$, although $g_A(e)$ and $g_B(e)$ may vary with e

12. $\Delta p(A, B)$ is due entirely to genes may mean A and B would differ by Δp in any common environment; or that $\Delta p(A, B)$ would have the same sign in any shared environment; or that $\Delta p(A, B)$ would be non-null in any shared environment.

13. That $\Delta p(A, B)$ is due entirely to genes might mean that $\Delta p(A, B)$ would be constant, have the same sign, or exist in any pair of environments;

14. The paradigm innateness explanation is the explanation of a difference $\Delta p(A, B)$ in an ontogenetically fixed trait p as the expression of distinct genotypes g_A and g_B for p in a common environment e.

15. Let the expressions of g_A and g_B vary with e; A and B differ with respect of p because of a genetic difference without reference to that variation. Explaining $\Delta p(A, B)$ as $g_A(e) - g_B(e)$ is consistent with there being e' in which $g_A(e') < g_B(e')$, and environments e' and e'' with respect which $g_A(e')$ and $g_B(e'')$ stand in numerical relation whatever.

16. Let g_A and g_B fix their expressions at p_A and p_B throughout $\boldsymbol{E_A}$ and $\boldsymbol{E_B}$. Let A be in an environment in $\boldsymbol{E_A}$ and B in one an environments in $\boldsymbol{E_B}$. Phenotypic values p_A and p_B, and thus $p_A - p_B$ may be genetic in origin despite ignorance about the values of g_A and g_B elsewhere. g_A and g_B may vary in unknown ways over environments, but $\Delta p(A, B)$ be explainable as $g_A(e) - g_B(e)$