**Text S5: Asymmetry produced by an imprinted genetic variant.**

We make the simplifying assumption that only the maternally-inherited copy is expressed, and denote the relative risk for a maternally inherited copy as *I*. Again we consider the grandmother’s relative risk except that now for the parent-of-origin model. As with maternal effects, one calculates , the genotype distribution among maternal grandmothers of an affected child, by post-multiplying , the genotype distribution among mothers of an affected child, by the matrix , thus . For ,

(Table S3). A similar calculation, , applies to paternal grandmothers; however, is the HWE distribution, (Table S3). Under the assumption that *I* is the same in both sexes, the grandfather’s relative risk, will be the same as the grandmother’s relative risk.