10. Probability-theoretic Investigations on Inheritance. XVI$_3$. Further Discussions on Interchange of Infants

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(Comm. by T. FURUHATA, M.J.A., Jan. 12, 1953)

6. An intermediate problem

The discussions in the previous sections have based upon a pair consisting of mother and an apparent child as the unit of consideration, while those in the preceding chapter concerned a triple consisting of parents and an apparent child. We shall now discuss a problem of detecting the interchange of infants which is situated in an intermediate position.

Let now *a triple consisting of a child and its parents and a pair consisting of a child and its mother* be given under a suspicion of interchange of infants. We then consider the probability of an event that the decision is possible under a supposition of actual interchange; cf. the remark stated at the end of §1 and also at the beginning of §6 in XV. The basic tools of attack on the present problem have been made ready.

In conformity to (5.2) of XV, let us designate by $G_0(ij, hk)$ the probability of an event that the detection of interchange is possible within a triple alone which consists of a mother A_{ij}, a father A_{hk} and an apparent child. Since now a mother-child combination is presented instead of a mating-child combination, the second quantity in (5.2) of XV is here to be replaced by the quantity

$$\Psi_*(ij,\ hk) \tag{6.1}$$

representing the *probability of an event that the detection becomes possible only by taking the mother-child combination into account.* The probability of an event that such a triple is presented and the detection is possible against a pair consisting of a mother and an apparent child, is thus given by the sum

$$\mathfrak{G}(ij, hk) = G_0(ij, hk) + \Psi_*(ij, hk). \tag{6.2}$$

Concerning the first term of the second member in (6.2), we have discoursed fully in the preceding chapter. The second term $\Psi_*(ij, hk)$ possesses an analogous structure as $\Phi(ij, hk)$. In fact, according to the present situation, we have only to replace the φ's contained in the latter by the corresponding ψ's. We thus obtain the following expressions: