(decomposition of the list into a duplicate system), but only its precision. The nonnormed relation $l_0(u_i, u_j)$ is inconvenient because it does not take into account sharp differences in the multiplicities of the names from $I$, which are characteristic in the examples in question. Meanwhile, a pair of frequent names should naturally be more often at a close distance in $X$ than a pair of rarer ones. To eliminate the names multiplicity influence on their relation, we introduce the following definition.

*Definition* 6. Let two names $u_i$, $u_j \in I$ be in a list $X$ with multiplicities $k_i$ and $k_j$, respectively. We call the number

$$l(u_i, u_j) = \begin{cases} l_0(u_i, u_j)/(k_i \times k_j) & (i \neq j), \\ l_0(u_i, u_j)/(k_i(k_i - 1)) & (i = j,\ k_i > 1), \end{cases}$$

the relation of a (normed) pair of the names $u_i$ and $u_j$.

By definition, we put $l(a_r, a_s) = l(u(a_r), u(a_s))$ for $a_r$, $a_s \in X$. We chose the norming procedure in Definition 6, so assuming that for the given name set $I = \{u_1, \ldots, u_m\}$ with multiplicities $k_1, k_2, \ldots, k_m$ all permutations in the correct list $X$ may be equally probable. In other words, the names in the chronologically correct list may be distributed at random, and the knowledge of only the name set with multiplicities does not supply any information regarding the particulars of their position in the list. The relation of two names in $X$ may be a random variable with mean not depending on the choice of a name pair. This (general) mean will be called mean with respect to the matrix. This assumption is confirmed indirectly by the coincidence of the correct lists with a theoretically general mean $\alpha$ calculated by formula (3) (see below), with the empirical mean with respect to the matrix, whereas for the lists with duplicates, as had to be expected, the mean relation with the matrix is slightly greater than $\alpha$. Note that the said assumption does not influence the qualitative form of the results. In particular, the basic features of the essential matrix are also preserved in using the relation's nonnormed values.

Denote the relation name mean with respect to commutations by

$$\alpha = Ml(u_i, u_j) = Ml_0(u_i, u_j)/c(k_i, k_j) \tag{3}$$

for any pair $(i, j)$, except the case where $i = j$ and $u_i$ is a unique name in the list (we do not consider such pairs). We also assume, regarding $X$, that the multiplicity of any name in it is much less than its length $|X| = N$.

Fix the length $p$, $p \ll N$, of the relating neighbourhood. We then calculate that, with the said assumptions, the mean nonnormed relation $l_0(u_i, u_j)$ of the pair of names $u_i$ and $u_j$ with multiplicities $k_i$ and $k_j$, respectively, is proportional to

$$c(k_i, k_j) = \begin{cases} k_i k_j & (i \neq j), \\ k_i(k_i - 1) & (i = j). \end{cases} \tag{4}$$

By definition, we put

$$c(a_r, a_s) = c(k_i, k_j), \quad u(a_r) = u_i, \quad u(a_s) = u_j,$$

for $a_r$, $a_s \in X$. Here, we discuss the calculation of the mean $Ml_0(u_i, u_j)$ for the case $i \neq j$. We can represent the scheme of equally likely permutations of names in $X$ as the result of consecutively placing $N$ names in $N$ positions in the list, each name occupying one of the remaining data places with the same probability. Meanwhile, their turn to be placed can be chosen arbitrarily but not randomly. We will assume, before placing $k_j$ copies of a name $u_j$, that all $k_i$ of the copies of $u_i$ have already been placed. By assumption, $k_i$, $k_j$, $p \ll N$; therefore we will neglect the number of cases where two copies of $u_i$ turned out to be nearby at a distance less than $p$ in the list $X$, compared with the total number of methods of placing $k_i$. We now represent the placing of the $k_j$ the copies of $u_j$ as a