10. Relation matrix: preliminaries. We now turn to the relation matrix constructed from a given chronological list. We will employ the notation from Item 2.

By means of the frequency histograms of related names in Items 2–9, we verified the hypothesis about the existence of duplicates in a chronological list, and determined the values of typical shifts among them, but did not find exactly which parts of the list were duplicates. Recall that, in accordance with the concept of a fibered chronicle, two parts of a list are regarded as duplicates if they contain fibers repeating each other [11], [12], [21].

We now turn to the card-deck problem. We call two parts of the final deck F *duplicates* if they contain cards numbered identically or similarly before shuffling the original deck. Thus, parts Δ_1 and Δ_2 of F are regarded to be duplicates if they contain the subsets $A \subset \Delta_1$ and $B \subset \Delta_2$ such that the cards from A and B were originally among the copies of the same sufficiently small, connected piece Δ of the original deck. Note that Δ_1 and Δ_2 may contain no identical cards at all, since it is possible that $A \cap B = \varnothing$. However, in shuffling incompletely, there must be copies of Δ, distributed in F with certain cards from A and B not far from each other, which means, in the case where Δ_1 and Δ_2 contain fragments resulting from the common inverse image of Δ, that the probability increases of two cards from Δ_1 and Δ_2, respectively, being close somewhere in F. This fact can be used for making the concept of "similarity" of pieces in F more precise, and for introducing a relation measure for them on the basis of the quantity of such card interaction.

We now carry out a detailed investigation into long chronological lists. Let there be a list X which may contain errors, omissions and/or duplicates. We denote by Y an unknown original list on which X is based. Thus, Y is an imaginary list containing complete data of a certain sort (say, about the names of rulers) for a long historical time interval T_Y. Let T_Y be described by a number of chroniclers, each making his own short list Z for the contemporary events. Denote by $\{Z_i\}$ the set of these, forming a certain covering of Y, assumed to be sufficiently dense (with large multiplicity), and containing somehow dispersed and, possibly, erroneous pieces, with each of the Z_i mentioning neither all the ruler's names nor all of the personages; besides, errors and gaps could occur in rewriting and compiling, which we will assume, for simplicity, to be intrinsic to Z_i from the beginning.

In creating chronology in its contemporary form, the result was a certain new gluing of Z_i, and the known list X obtained. Consider two intervals Δ_1 and Δ_2 in X. Let us try to determine whether or not there is a pair Z_i, Z_j in X, which would be related to one period in Y, and glued to Δ_1 and Δ_2, respectively. As in the example with the cards, we conclude that if there is such a pair, then the probability increases that the names from Δ_1 and Δ_2 will be close somewhere in X, on account of a third, "gluing" chronicle Z_s (see the detailed mathematical treatment in [316]).

11. Principal definitions. Assumptions about the structure of a correct chronological text. For now, we neglect the partition of a list into chapters. In contrast to the problem of determining the shift values, to construct the relation matrix, the time scale was not used in the list. After constructing the matrix, we again make use of it in the analysis of the results.

To define the concepts of *piece* of a list and *proximity* in a list, we introduce the