

ENCYCLOPÉDIE OU *DICIONNAIRE* RAISONNÉ  
DES SCIENCES, DES ARTS ET DES MÉTIERS

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ALTERNATION

**PERMUTATION**, is said sometimes in order to express *the change of order* which one can give to many things or to many persons, in the successive placement of them, the one before the other, or the one after the other. Thus three letters *a, b, c*, can incur an alternation in six different ways; *abc, acb, bac, bca, cba, cab*.

The *permutation* is one of the different kinds of combinations. See **Combinaison**. Here is the rule. In order to find all the possible *permutations* of a number of given things, for example of five things, (as of five letters, of five persons, &c.) take all the numbers from unity to five, & multiply them successively the one by the other, 1 by 2, then by 3, then by 4, then by 5, the product 120 will be the number of *permutations* sought.

The reason for this practice is very simple. Take for example two letters *a & b*, it is evident that there are only two possible *permutations*, *ab, ba*; take a third letter *c*, it is evident that this third letter can be arranged in three different ways in each of the two preceding permutations; namely, either at the head, or in the middle, or at the end. There are therefore for three letters two times three permutations or six. Take a fourth letter, it can likewise occupy four different places in each of the six permutations of three letters, this which makes six times 4 or 24; likewise five letters will make twenty-four times 5 or 120, & thus consecutively. (*M. d'Alembert*)

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