It would be of interest to know in what fraction of all the possible cases one motion is able to get a simple majority against each of the others as \( n \) and \( m \) vary, and in what fraction the majorities are cyclical. Had we been able to do so, we would have calculated the figures for Fig. 49 giving these fractions (and also for the case in which the members may be indifferent as between various motions); but we have been unable to derive the general series which would enable us to make the calculations for the table and have entered only a few figures in the cells.

If the general series could be derived it would almost certainly show that for a committee with a given number of members, the proportion of cases in which there is no majority decision increases rapidly with an increase in the number of motions. (See also pp. 173–4 below.)

CHAPTER VIII

WHEN THE ORDINARY COMMITTEE PROCEDURE IS IN USE THE MEMBERS' SCALES OF VALUATION MAY BE INCOMPLETE

Description of the usual procedure. Nearly all committees whose members meet together in a room to put forward proposals and vote on them follow the procedure (\( \alpha \)), defined above on p. 21, and we will therefore examine this case somewhat more closely.

In this procedure a proposal, known as the original motion, is put forward on some topic. If a second proposal, known as an amendment to the original motion, is put forward, the original motion and the amendment will be placed against each other in a vote after discussion, the amendment being taken first. The survivor of this vote (either the original motion or the amendment) is known as the 'substantive motion', and members are then free to propose further amendments. There may be a sequence of amendments put forward, followed by a sequence of votes.

In our definition of procedure (\( \alpha \)), we spoke of motions and made no use of the terms original motion, substantive motion or amendment.
The conditions required for our theory to apply. A misconception that should be guarded against is that the type of theory given above will not apply to the ordinary committee procedure because, it is (wrongly) supposed, it assumes the motions to be put forward before the voting begins. The theory, it will be found, applies even though the motions are put forward one after another in time, and even though the third motion is not put forward until after one of the first two motions has been eliminated in a vote, and so on.

What our theory does assume in dealing with the ordinary committee procedure is that the preference curves of all members of the committee can be represented by straight-line schedules (or the alternative two-dimensional diagrams), and this presupposes both that the valuations of each member of the committee are transitive and that he values each motion in relation to every other.

Now it may be that these assumptions are not fulfilled, because the motions are in fact put forward one after another, and all of the earlier motions, except one, are eliminated before the next motion is put forward. At the end of the process some motions will have met in a vote while others have not. When the motion $a_h$, say, is placed against the motion $a_k$, each member of the committee is challenged by the vote to carry out an evaluation of $a_h$ in relation to $a_k$, and we may take it that the one stands in relation to the other in some definite order of preference or indifference, on his scale. If, on the other hand, the motions $a_h$ and $a_i$, say, never meet in a vote, no challenge is made to evaluate the one in relation to the other. The member may in fact carry out such an evaluation or he may not. The assumption made by the schedules we have drawn, however, is that he does carry out an evaluation as between every such pair of motions.

Elaborating the conditions under which our theory will not apply. We here examine some of the possibilities.

(i) If a single motion, $a_1$ say, comes before a committee, the vote to accept or reject it is equivalent to putting it against $a_0$, and each member will carry out an evaluation of $a_1$ in relation to $a_0$. The relative positions of the two motions on his scale of preferences will be determinate and the theory applies.

(ii) If two motions $a_1$ and $a_2$ are put forward, they will be placed against each other in a vote, and whichever wins, $a_1$ say, will be put against $a_0$. This necessitates that each member should evaluate