PSYCHOMETRIKA—VOL. 18, NO. 1
MARCH, 1953

A NEW STATUS INDEX DERIVED FROM SOCIOMETRIC ANALYSIS*

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For the purpose of evaluating status in a manner free from the deficiencies of popularity contest procedures, this paper presents a new method of computation which takes into account *who* chooses as well as *how many* choose. It is necessary to introduce, in this connection, the concept of attenuation in influence transmitted through intermediaries.

Introduction

For a considerable time, most serious investigators of inter-personal and inter-group relations have been dissatisfied with the ordinary indices of "status," of the popularity contest type. In the sociometric field, for example, Jennings (1) says, "... it cannot be premised from the present research that greater desirability *per se* attaches to a high [conventional computation] choice-status as contrasted with a low choice-status in any sociogroup without reference to its milieu and functioning." However, in the absence of better methods for determining status, only two alternatives have been open to the investigator. He has been forced either to accept the popularity index as valid, at least to first approximation, or to make near-anthropological study of a social group in order to pick out the *real* leaders, i.e., the individuals of genuinely high status.

The purpose of this paper is to suggest a new method of computing status, taking into account not only the number of direct "votes" received by each individual but, also, the status of each individual who chooses the first, the status of each who chooses these in turn, etc. Thus, the proposed new index allows for *who* chooses as well as how many choose.

For the present discussion, an operational definition of status is assumed, status being defined by the question asked of the members of the group. The same device, then, may be used to study influence, transmission of information, etc.

The New Status Index

To exhibit the results of the "balloting," we shall use the matrix representation for sociometric data as given by Forsyth and Katz (2). An example for a group of six persons appears below. In this example, A chooses only

*This work was done under the sponsorship of the Office of Naval Research.

F, B chooses C and F, C chooses B, D, and F, and so on. The principal diagonal elements, by convention, are zeroes. The question asked could be, "Which people in this group really know what is going on?"

Chooser	Chosen					
	A	B	C	D	E	F
A	0	0	0	0	0	1
B	0	0	1	0	0	1
C	0	1	0	1	0	1
D	1	0	0	0	1	0
E	0	0	0	1	0	1
F	1	0	0	1	0	0
Totals	2	1	1	3	1	4

In the Forsyth and Katz formulation, the 6×6 array above is referred to as the choice matrix, C, with element c_{ij} = response of individual i to individual j. Further, as pointed out by Festinger (3) for matrices whose elements are 0 or 1, powers of C have as elements the numbers of chains of corresponding lengths going from i through intermediaries to j. Thus, $C^2 = (c_{ij}^{(2)})$, where $c_{ij}^{(2)} = \sum_k c_{ik}\, c_{kj}$; each component, $c_{ik}\, c_{kj}$, of $c_{ij}^{(2)}$ is equal to one if and only if i chooses k and k chooses j, i.e., there is a chain of length two from i to j. Higher powers of C have similar interpretations.

The column sums of C give the numbers of direct choices* made by members of the group to the individual corresponding to each column. Also, the column sums of C^2 give the numbers of two-step choices from the group to individuals; column sums of C^3, numbers of three-step choices, etc. An index of the type we seek, then, may be constructed by adding to the direct choices all of the two-step, three-step, etc., choices, using appropriate weights to allow for the lower effectiveness of longer chains. In order to construct appropriate weights, we introduce the concept of "attenuation" in a link of a chain.

It is necessary to make some assumptions regarding the effective functioning of an existing link. The first assumption we make is common to all sociometric work, namely, that our information is accurate and that, hence, certain links between individuals exist; and where our information indicates no link, there is no communication, influence, or whatever else we measure. Secondly, we assume that each link independently has the same probability of being effective. This assumption, obviously, is no more true than is the previous one; however, it seems to be at least a reasonable first approximation to the true situation. Thus, we conceive a constant a, depending on the group and the context of the particular investigation, which

*In the sequel, it is assumed that C is a matrix of 0's and 1's.