Mutuality

A dyad is mutual if both the tie from i to j and the tie from j to i are present. Assessing mutuality begins with a dyad census for each village. Each of the (n × (n-1))/2 dyads in the network is assigned to one of three types: mutual (household i has a tie to household j and household j has a tie to i), asymmetric (either i has a tie to j or j has a tie to i, but not both) or null (neither the i to j tie nor the j to i tie is present). These are often labeled M, A, and N. The dyad census gives the frequencies of these types. Two indices of mutuality were calculated. The first is the index of mutuality, ρ_{kp}, suggested by Katz and Powell (1955). This index focuses on the probability of a mutual choice between two actors: Prob(a chooses b and b chooses a) as the product of two probabilities: Prob(a chooses b) × Prob(b chooses a | a chooses b). The second half of this product can be thought of as consisting of two parts: the Prob(b chooses a) and a fraction of the *a priori* probability that b does not choose a (Katz and Powell page 405; Wasserman and Faust 1994 page 517). This fraction is 0 if there is no tendency toward mutuality and 1 if there is a perfect tendency toward mutuality. The index ρ_{kp} is interpreted as this fraction. The index is a linear function of the number of mutuals in the network. There are two versions of ρ_{kp}. The first assumes that all actors make the same number of choices; a fixed choice design. The second, and the one used here, allows different numbers of choices; a free choice design. The index can be negative, a possibly undesirable feature. A negative value is interpreted as a tendency away from mutuality, sometimes referred to as antireciprocation.

The second way to summarize the tendency for mutuality compares the observed number of mutuals (from the dyad census) to the number expected if choices were made at random. Katz and Wilson (1956) give formulas for the mean and variance of the number of mutuals. The observed number of mutuals is then compared to the expected number and a z-score is calculated. Since the shape of the distribution of the number of mutuals is unknown (see Wasserman and Faust 1994 and Snijders 1991) we use this as a rough indicator of the direction and extent to which the observed number of mutuals differs from expected.

References

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