

ACQUAINTANCE NETWORKS BETWEEN RACIAL GROUPS: APPLICATION OF THE SMALL WORLD METHOD¹

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White "starter" persons in Los Angeles were asked to generate acquaintance chains to white and Negro target persons in New York, using the "small world method." The mean number of intermediaries between starters and target persons was similar to that found in earlier studies, approximately five to six, and this remained constant over differences in race of the target person. The number of completed chains was two and one-half times as great for white targets as for Negro targets. Explanations to account for the results are discussed.

The *small world*, a phrase long current in our language, but first employed in the social sciences by Kochen and Pool (1958), refers to the fact that individuals are linked through bonds of kinship and acquaintance into complex communication networks. A network may possess great geographic extent and involve millions of persons, but the number of intermediaries needed to link any persons within the network is small. Milgram (1967), introducing an experimental approach to the problem, demonstrated that from five to six intermediaries will, on the average, suffice to link any 2 Americans drawn from a national population of 200 million. In the present study small world methods are applied to examining ties of acquaintance between racial groups.

Milgram (1967, 1969) and Travers and Milgram (1969) have defined the small world problem as follows:

The simplest way of formulating the small world problem is "What is the probability that any two people, selected arbitrarily from a large population, such as that of the United States, will know each other?" A more interesting formulation, however, takes account of the fact that, while persons *a* and *z* may not know each other directly, they may share one or more mutual acquaintances; that is, there may exist a set of individuals, *B*, (consisting of individuals $b_1, b_2 \dots b_n$) who know both *a* and *z* and thus link them to one another. More generally, *a* and *z* may be connected not by any single common ac-

quaintance, but by a series of such intermediaries, *a-b-c- . . . y-z*, i.e., *a* knows *b* (and no one else in the chain); *b* knows *a* and in addition knows *c*, *c* in turn knows *d*, etc. [Travers & Milgram, 1969, pp. 425-426].

The only example of mathematical treatment dealing directly with the small world problem is the model provided by Ithiel Pool and Manfred Kochen (undated). Pool and Kochen assumed a population of *N* individuals, each of whom knows, on the average, *n* others in the population. They attempted to calculate P_k , the probability that two persons chosen randomly from the group can be linked by a chain of *k* intermediaries. Their model does not take account of social structure. Instead of allowing acquaintance nets to define the boundaries of functioning social groups, Pool and Kochen had, for the purposes of their model, to conceive of society as being partitioned into a number of hypothetical groups, each with identical populations. They were then able to devise a way to predict chain lengths within and between such hypothesized groups.

The small world method consists of presenting each of the persons in a "starting population" with the description of a given "target person"—his name, address, occupation, and other selected information. The task of a starter is to advance a booklet toward the target person by sending the booklet to any personal acquaintance whom he considers more likely than himself to know the target. Each person in turn advances the booklet in this manner until the chain reaches the target. In this way we are presented with acquaint-

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tance chains between persons of specific characteristics chosen according to the particular research interest.

The first experimental studies (Milgram, 1967) showed (a) that the technique worked and that chains could be completed between widely separated points (e.g., Nebraska and Boston) and (b) that the chains could be characterized by certain recurrent features. In a study involving starters in Nebraska with a Boston stockbroker serving as the target person, 21% of all chains eventually reached the target, with an average of 5.5 intermediate persons in the chain connecting starter with target. The shortest chains were completed with only 2 intermediate persons, while the longest included 10 persons. The chains had two predominant paths to the target, either by way of his occupational setting or by way of his residential setting. The former route, that is, occupational contacts, proved the more efficient (i.e., short-chained) of the two. There was also a distinct "funneling" or "common pathways" phenomenon, a decrease in the number of different persons who were involved in the chains as they approached the target. The target person appeared to be surrounded by 3 key persons whom the chains would reach first before being completed to the target.

The goal of the present study was to see what happens to acquaintanceship chains as they are impinged upon by social structure. Specifically, the writers wished to examine the success and character of chains begun in a white population and directed toward Negro targets. Could such chains be completed? Would they be longer than corresponding chains with white targets? Where and when would the chain cross the racial barrier? Who would be the "gatekeepers" responsible for transmitting chains across racial lines? It was anticipated that there might be a two-stage process involved in the completion of chains to Negro targets. The chain might first need to gain access to Negro networks via gatekeepers, then travel within the Negro community, until contact with the target was made. The authors wished to determine how vulnerable Negro-target chains would be to the difficulties of these two stages, thus identifying possible racial factors in acquaintanceship networks.

TABLE 1
TARGET DESCRIPTION

Target	Occupation	Age	Income
Negro			
1	Physician	36	\$6,400
2	Research technician	26	5,600
3	Policeman	38	8,400
4	Nursing assistant	39	6,000
5	Post office clerk	55	6,300
6	Funeral director	44	10,000
7	Post office clerk	45	6,400
8	Company president	44	25,000
9	Machinist	38	9,000
White			
1	Company director	31	25,000
2	Shipping manager	43	6,000
3	Opera stage director	29	11,500
4	Research technician	41	9,000
5	Bakery manager	51	10,000
6	Youth director	49	9,000
7	Campus policeman	58	4,300
8	Medical technician	54	6,800
9	Photo offset work	40	6,400

METHOD

Eighteen persons,³ living in New York City, were selected as target persons from a larger number of persons who had responded to a mail solicitation for targets. All the targets were males. Half of them were white and half Negro, and they represented a wide variety of occupational types. The single attribute separating the two groups was race; otherwise the two groups were matched on age, income, education, occupational status, and number of organizational memberships. A diversity of occupations was obtained in the selection of targets—for example, factory worker, postal clerk, physician, bakery manager, patrolman, and company president. They ranged in age from 26 to 55, in income from \$4,300 to \$25,000, and in education from tenth grade to MD and MA degrees. Table 1 lists this information for each target person.

Each of these persons served as the target for 30 chains; thus 270 chains were directed at white targets, and 270 chains were directed at Negro targets. To start these chains, 540 white persons⁴ were re-

³ Two targets were eliminated when it was discovered that one of the Negro targets was in fact white. To maintain a balanced design, this target as well as an equivalent white target was dropped from the analysis.

⁴ Included in the starting population were nine Negroes; the recruitment procedure could not discriminate against the inclusion of Negroes and still be successful. Exclusion versus inclusion of the Negro-starter chains had no effect on the data analysis, and these chains are included except where noted. All of these chains were incomplete with three directed toward white targets and six directed toward Negro targets.

TABLE 2
COMPLETION VERSUS INCOMPLETION OF CHAINS AS A FUNCTION OF TARGET RACE

Chain success	White target chains		Negro target chains		All chains	
	No. chains	% chains	No. chains	% chains	No. chains	% chains
All chains ^a						
Complete	88	33	35	13	123	22
Incomplete	182	67	235	87	417	78
Starting chains ^b						
Complete	88	39	35	15	123	27
Incomplete	140	61	195	85	335	73

^a Chi-square analysis of the Target-Race × Chain-Success contingency table for all chains showed a significant association ($\chi^2 = 29.58, df = 1, p < .001$).

^b Excludes chains not begun by initial participants. Chi-square analysis of the Target-Race × Chain-Success contingency table for starting chains only showed a significant association ($\chi^2 = 31.82, df = 1, p < .001$).

crucited from Los Angeles by a mail solicitation procedure. Each person who volunteered as a starter received a target booklet, the key tool in the small world method, which contained a description of the target and instructions for advancing the booklet toward the target.⁵ The booklet, passport-style, described the target person by giving his name, address, occupation, business address, and organizational memberships. The target person's race was not given and was only inferable to the degree that a person was familiar with New York City street addresses as located in predominantly Negro areas. The recipient of the booklet was instructed to take three essential steps: (a) add his name to the booklet roster, which allowed each person to know who had served in the chain, thus preventing any looping or backtracking in the chain; (b) mail the booklet to a personal acquaintance who was more likely than the recipient to know the target person; (c) mail back to the project one of the business reply cards included with the booklet; the card asked the recipients to indicate their own name, address, occupation, age, sex, and race, and the same information for the person to whom they were sending the booklet. In addition, they were asked the nature of their relationship with the next booklet recipient (friend, relative, acquaintance, etc.) and why that person was chosen. Each participant received a report of the study, a certificate of appreciation, and postage reimbursement.

With this technique it was possible to follow the progression of the booklet no matter what its eventual fate. The basic data were completion versus noncompletion, and chain length, but it was also possible to determine the social characteristics of each of the chain members, even those who stopped the chain by failing to send the booklet on.

RESULTS

Of the 540 chains originating in Los Angeles, 123, or 22%, eventually reached their

⁵ The experimental document, in slightly modified form, is reproduced in full in Milgram, 1969, pp. 110-111.

New York targets. This completion rate was comparable to earlier studies, even though the geographic distances involved in the separate studies were quite different. But when the chains were broken down into white-target chains and Negro-target chains, a substantial difference appeared in completion rates (see Table 2). While 88 of the 270 white-target chains (33%) got through to the target, only 35 (13%) of the Negro-target chains were successful. Thus a "driven" acquaintanceship chain, starting in a white population, was two and one-half times as likely to reach a given target person if that person was white rather than Negro. Chains were often defeated by uncooperative starters who failed to start the chains. Excluding these nonstarting chains, the overall completion rose to 27%, while the discrepancy between Negro and white targets remained proportionately the same—15% of starting Negro-target chains were completed versus 39% of the corresponding white-target chains.

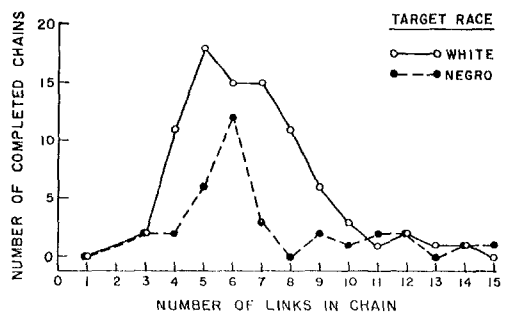


FIG. 1. Distribution of chain lengths for completed chains.

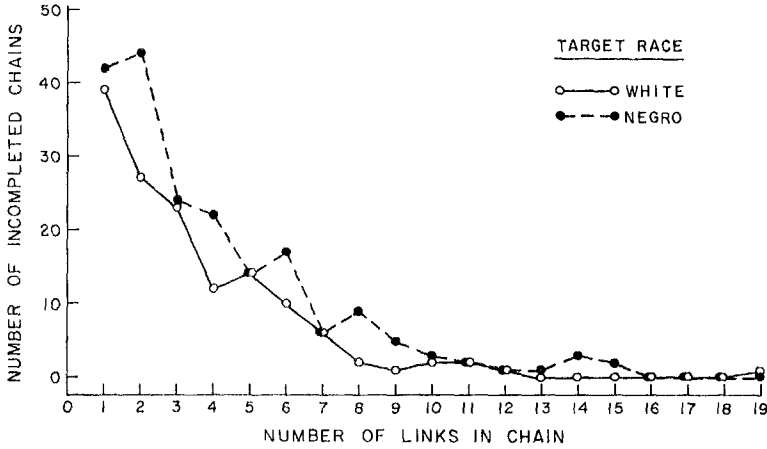


Fig. 2. Distribution of chain lengths for incompleting chains excluding non-starting chains.

Mean chain length was surprisingly consistent with the earlier studies, and while the completed Negro-target chains were slightly longer than white-target chains, the difference was not significant. The completed white-target chains were characterized by a mean of 5.5 intermediaries; for Negro-target chains

that were completed, a mean of 5.9 intermediaries. The distribution of chain lengths is shown in Figure 1. The chains varied in length from two instances involving 1 intermediary (i.e., the starter and target had an acquaintance in common) to a chain with 14 intermediaries. Incomplete chains progressed as far as 19 removes from the starter before ending, but in general, incomplete chain mortality occurred early—over 30% of incomplete chains stopped by the third remove (i.e., the third booklet recipient after the starter), while only 10% persisted beyond the seventh remove. Figure 2 shows the dropout pattern for the incomplete chains.

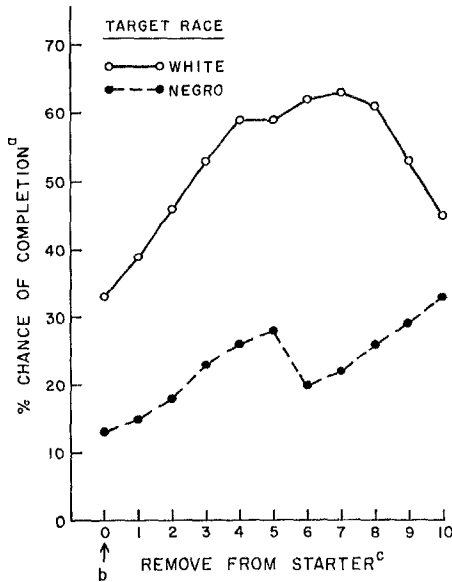


Fig. 3. Probability of chain completion at each remove. (a. Percent figure is ratio between total completions made beyond a given remove and total chains at remove which are sent to next remove; b. 0 signifies the initiator of the chain; c. data given only for removes where $n \geq 10$ or more.)

It is possible to get a clearer picture of the varying fates of white-target versus Negro-target chains by examining their probabilities of success across removes. A chance-of-completion ratio was computed for each remove, which represents the probability that a chain persisting to a given remove will be completed (i.e., it is the ratio between the number of completions made beyond a given remove and the total number of chains advanced beyond the given remove—see Figure 3). It can be seen that both ratios increased across removes with a gradual drop-off in the white-target curve. At all removes, the white-target chains exhibited a much greater chance of completion than the Negro-target chains.

Convergence effects, the funneling of chains through a limited number of “sociometric

stars" in contact with the target, were evident in the case of 9 of the 18 targets. Funneling was more common for whites (occurring in the case of 7 targets) than for Negroes (occurring in the case of 2 targets). Four targets, 2 white and 2 Negro, had nearly twice as many completions as the number of persons who served as final intermediaries in their chains. The most extreme example of convergence is illustrated in Figure 4, which shows the final links of a white-target's 11 chain completions funneled through 2 individuals. An additional terminal effect was the status-descent of the chain, regardless of target race, as final contact was made with the target. The target typically occupied a lower status than that of the person who forged the final link—for example, of all instances of chain completion, 27% involved cases of professional status targets, while the final contact person was of professional status in 62% of these instances.

One of the more interesting facets of the data concerns those instances where acquaintanceship ties crossed racial lines in Negro-target chains. The gatekeepers, white senders and Negro recipients who served as points of contact and acquaintanceship, in both races were predominately males of professional status (see Table 3). Managers, officials, and sales-clerical personnel were also represented, while lower- and working-class gatekeepers were almost nonexistent. White gatekeepers

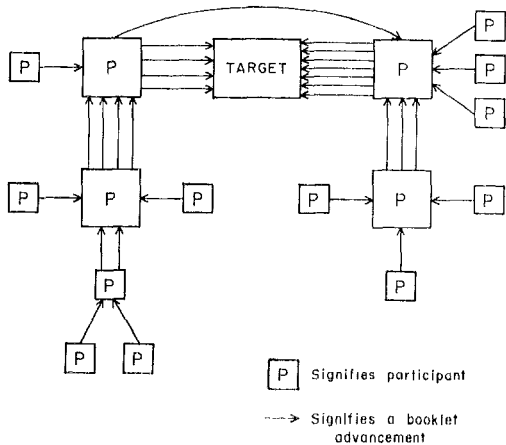


FIG. 4. A case of convergence of 11 chain completions on a white target.

TABLE 3
CHARACTERISTICS OF GATEKEEPERS

Characteristic	Complete chains	Incomplete chains	All chains
White senders ^a			
Sex			
Male	86%	78%	81%
Female	14%	22%	19%
Age: mean yr.	44.4	44.3	44.3
Status (head of family)			
Professional	65%	51%	57%
Managerial	6%	28%	19%
Sales, clerical	13%	16%	15%
Service workers	10%	2%	5%
Other	6%	2%	4%
Negro recipients ^b			
Sex			
Male	77%	80%	80%
Female	23%	20%	20%
Age: mean yr.	42.0	43.6	43.3
Status (head of family)			
Professional	55%	61%	60%
Managerial	18%	11%	13%
Sales, clerical	18%	19%	19%
Service workers	9%	6%	6%
Other	—	3%	2%

^a White participants who send booklets on to Negroes in Negro-target chains.
^b Negro participants who receive booklets from whites in Negro-target chains.

most typically termed the Negro recipient to whom they sent the booklet a friend or acquaintance (71%), less often a business or work friend (23%). The most common reason given for choosing the next recipient in a white to Negro exchange was the recipient's occupational similarity with the target (43%).

Some of the white-to-Negro acquaintanceship links occurred in chains that were eventually successful in reaching the Negro target, while other crossovers occurred in chains that ultimately failed to reach the target. A few differences between these types of links are of some interest. Forty-two percent of eventually successful white gatekeepers were professional service people (doctors and lawyers predominated), while this category comprised only 9% of the eventually unsuccessful white gatekeepers, who had a greater preponderance of managers and officials. In the nature of relationship data, the biggest differences occurred with reference to the *friend* and *role reciprocal* categories. Compared with eventually unsuccessful white gatekeepers, those eventually successful defined the relationship with the

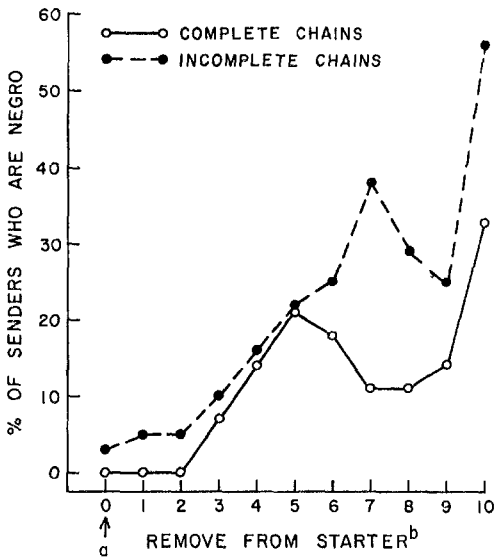


FIG. 5. Negro participation in Negro-target chains. (a. 0 signifies the initiator of the chain; b. data given only for the removes where $n = 10$ or more.)

Negro as friend with much less frequency (25% versus 51%) and as role reciprocal (e.g., employers-employees, doctor-patient) with much greater frequency (14% versus 0%). In stating why the (Negro) recipient was chosen to receive the booklet, eventually successful whites gave far greater prominence to occupational similarity with target as a reason than did those eventually unsuccessful (63% versus 38%). This pattern of difference is best summarized by suggesting that eventually successful white gatekeepers were linked to the Negro recipient by greater professional impersonality than those who participated in crossovers where the chain resulted in eventual failure.

Examination of the 35 completions made with Negro targets suggests some of the factors instrumental in the success of these chains. In 23 out of these 35 chains, the first Negro to appear in the chain was the target. Of the remaining 12, in 7 cases the first Negro entering the chain was the final contact with the target, leaving only 5 instances, 14% of the successful completions, where the chain "traveled" between Negroes prior to contact with the target. Thus acquaintanceship chains that were successful in reaching the Negro target typically remained white until that point

where the target became clearly located and the white-to-Negro crossover occurred.

Indeed, there is indirect evidence that this strategy was more successful than one which involved a greater participation of Negroes as the chain progressed. The proportion of persons moving the booklet along that were Negro remained similar across removes between successful versus unsuccessful chains until the fifth remove. At this point, the curves diverged, with eventually successful chains being characterized by a decreased participation of Negroes in the chains while the proportion of Negroes was increasing in those chains that eventually failed to be completed. (See Figure 5.) Thus in addition to being the most common means whereby Negro targets were located, the chaining of white acquaintances until the target was within striking distance was the most successful means of effecting completion.

Data on incomplete Negro-target chains are crucial to the understanding of the low rate of contact between white starters and Negro targets. Of the 187 chains that failed to reach their Negro targets, 148, or 79%, stopped with white terminals. Even if one were to consider as completed those Negro-target chains that had made contact with a Negro but were still short of the target himself, the Negro completion rate still would not match that obtained with white targets. Thus, Negro-target chains either succeeded in making contact via an essentially white acquaintanceship network, or else were exhausted within the white community without ever making a first contact with Negro networks.

DISCUSSION

It was conjectured that Negro-target chains would have to hurdle two barriers beyond that set for white-target chains: passage across racial lines, via gatekeepers, and passage within the Negro community. What in fact occurred was that nearly 80% of the incompleting Negro-target chains never crossed the racial barrier. Thus a large number of potential channels of communication emanating from the Negro target through to his Negro acquaintances to the white world were not utilized.

A review of the fundamental features of the situation will help clarify the outcome.

1. It has already been determined that the chain lengths for black and white targets do not differ in any important way. This is another way of saying that regardless of the race of the targets, the chains run themselves down over a fixed number of removes. Unless the target is reached in this number of removes, he will not be reached at all, because of the exhaustion of the chain (see Figure 3). Thus the *efficiency* with which the target is reached is what chiefly determines the number of completions. Each choice in forwarding the document can be efficient in so far as it reduces the number of steps to the target by the greatest possible amount, rather than leaving the number of steps unchanged or increased.

2. Each person has a range of acquaintances who comprise a distribution of distances from the target. The process of reaching the target consists of scanning one's total range of acquaintances and selecting the one who is most likely to advance the document to the target. *The larger and more varied the pool of acquaintances a participant can draw on, the greater the opportunity of choosing an efficient link. The typical white participant has but a handful of Negro acquaintances.* Therefore, (a) his opportunities for being selective in choosing an efficient Negro link are sharply reduced, and (b) his chances of personally knowing a Negro target person are correspondingly diminished.

3. A deficient knowledge of Negro social structure also interferes with efficient choices. The white participant probably has greater familiarity with white communication structure than Negro communication structures, with which he has had only minimal contact. In addition, the institutional and occupational settings which absorb significant portions of the Negro population may be largely unfamiliar to the white subject. This knowledge of the target's institutional and occupational setting is particularly important in the location of the target, since it appeared to be heavily utilized as the chain neared the target. One of the most striking patterns in the data was the status descent of the chain at the last link, between the final contact and

the target. This would indicate the operation of a search strategy of moving the booklet toward persons who had maximum "surveillance" of some domain that included the target person. This would of necessity involve persons of relatively high status—those persons in a position of authority or responsibility in some institutional, business, or professional setting who had the greatest accessibility to all parts of the setting of which the target person, by virtue of his occupational or affiliative attributes, was a part. Such a strategy appears reasonable, in that advancing the booklet to persons lower in the status hierarchy of the target's setting is likely to be a less efficient means of reaching the target, even if the lower status contact is a peer of the target, in that lower status peers may be separated by physical and institutional barriers, and passage between peers is often possible only through higher-status intermediaries, who have better coverage of the *total* setting or institution. We may then conceive of chain completion as a process of advancing the booklet toward the networks and persons that have surveillance over the occupational and affiliative domain in which the particular target is located. The poor knowledge whites may have of the occupational and institutional settings of Negroes would serve as a clear hindrance to the utilization of this technique by whites attempting to locate Negro targets.

4. A final factor may have concerned the participants' uncertainty of the race of the target person. There was no explicit racial identification in the experimental materials. This may have affected the outcomes in several ways. First, it may never have occurred to some white participants to move the document toward Negro neighborhoods or social circles. Second, they may have thereby failed to exploit whatever potentially efficient Negro acquaintances they may have had. To clear up this question it is desirable to undertake an additional study in which the target person's race is clearly indicated.

A number of possible alternative explanations for the low completion of Negro chains were not supported by the data. A lower appeal of Negro targets could have produced diminished efforts in advancing the booklet toward such targets, yet the cooperation rate

in the original starter group was virtually identical between those who had white targets and those who had Negro ones. In addition, there was equal persistence toward the two types of targets, as evidenced by the chain length of incomplete chains, which showed in fact a nonsignificant tendency toward greater persistence in the case of Negro chains (a mean of 3.95 intermediaries) than white chains (3.43 intermediaries).

There was some evidence of lower cooperation from Negro participants than from white. Eighty-two percent of all whites in unsuccessful Negro-target chains cooperated in advancing the chain, while 72% of the Negro participants did so. While Negroes constituted 14% of all participants in the incomplete Negro-target chains, they constituted 21% of all the terminals. Yet, Negro participation in Negro chains was simply not great enough for their lower cooperation rate to have any substantial effect on the overall completion rate. As was pointed out earlier, tallying Negro chains as complete if contact was made with any Negro still falls short of closing the gap between white and Negro completion rates.

The importance of target race in determining the success of acquaintance chains points to the need for recognizing the role of social structure in our model of the small world. Friendship networks are not laid down in a random fashion, but reflect the social cleavages and divisions that characterize our society. The demonstrated utility of the small world method in depicting the attributes and determinants of acquaintance chains recommends its continued use in the investigation of social networks.

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