Marin, Alexandra and Keith Hampton. 2007. Simplifying the Personal Network Name Generator: An Alternative to Traditional Multiple and Single Name Generators. Field Methods 19:163-193.
The final definitive version of this article is available at http://online.sagepub.com/

Simplifying the Personal Network Name Generator Alternatives to Traditional Multiple and Single Name Generators[1]

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For researchers interested in the study of personal networks, measures of network composition are often obtained through the use of name generators and name interpreters. However, the cost of administering a survey with multiple name generators, in terms of time and respondent motivation, is often prohibitive. Researchers seeking to minimize respondent burden routinely turn to time saving measures, such as the use of a single name generator (i.e. the "important matters" generator used in the General Social Survey (GSS)). We argue that the limitations of this approach are often understated. In the study of social support, multiple name generators are required to ensure that researchers sample from the full definition of support. Putting aside issues of construct validity, we compared measures of network composition and structure obtained from stand alone generators to measures obtained from a six-item multiple name generator. We found that although some single generators provided passable estimates for some measures, all single generators failed to provide reliable estimates across a broad spectrum of network measures, including key variables such as size and density. In an attempt to improve the reliability of network measures, beyond what could be obtained through single generator alternatives, and while still reducing respondent burden, we evaluated two alternative methods; 1) the MMG, the two most robust name generators from our first analysis and a full set of name interpreters, and 2) the MGRI, a series of multiple name generators with name interpreters administered to a random subset of alters. In comparison to single name generators, both the MMG and the MGRI provided measures that were more strongly correlated with the full name generator model. In addition, the MGRI maintained the validity of the full generator approach, provided a perfect measure of network size.

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[1]This work was supported by the National Science Foundation (SES-0219538) and the American Sociological Association's Fund for the Advancement of the Discipline. We have benefitted from the advice and support of the following people and organizations to who we extend our greatest appreciation: Russell Bernard, Peter DeWan, Christine Fleming, David Gibson, Bernie Hogan, Peter Marsden, Paromita Sanyal, Barry Wellman, the Department of Urban Studies and Planning at MIT, the Department of Sociology at Harvard University, the Saguaro Seminar and the Taubman Center for State and Local Government at the John F. Kennedy School of Government at Harvard University, and four very helpful anonymous reviewers. Previous versions of this paper were presented at the meetings of the American Sociological Association (2003) and the International Sunbelt Social Network Conference (2005).

Introduction

In the study of personal networks (ego-networks) the *name generator* has become the standard method to enumerate networks and delineate network characteristics and structure. First introduced in the 1960s (see Laumann 1966), name generators are administered through surveys or interviews. Participants are given one or a series of questions that elicit a list of network alters, such as those people with whom they discuss important matters (Burt 1984), or the people with whom they chat or visit (Campbell and Lee 1991). Once a list of names has been produced, participants are presented with a series of *name interpreters*: followup questions that gather information on the demographic characteristics of each alter, the relationship between ego and alter, and the relationships between alters. The data collected through name generators and interpreters provide individual profiles of respondents' personal network members that can be aggregated into measures of network composition and structure, such as average tie strength, mean alter characteristics, communication activity, network range and density.

While name generators are a standard technique, they are not without their problems. The most basic decisions researchers face in choosing to adopt name generators – deciding when they are appropriate and selecting the number and wording of questions – are the most difficult. This paper's audience is anyone who is considering adopting name generators or anyone analyzing data generated through name generators. Our aim is to: 1) provide a brief overview of the personal network literature with a focus on the role name generators have played in the delineation of networks, 2) provide guidance as to the reliability and validity of the name generator approach within the study of personal networks, 3) empirically address the reliability of network measures obtained through single name generators (most notably the stand alone name generator used in the General Social Survey (GSS)) in comparison to multiple generator surveys, and 4) test two alternative approaches to the administration of name generators that reduce respondent burden, but provide greater reliability and validity than can be achieved through single name generators.

Personal Networks

A personal network is a social network from the standpoint of the ego; a view of the network as perceived by the individual at its center (Wellman 1999: 19). When defined broadly, a personal network encompasses all ties to alters with whom an ego has had some social contact over the course of his lifespan. Conceptually, this includes strong ties as well as the weak social ties discussed by Granovetter (1973). When defined more narrowly, a personal network can refer to a smaller subset of ties: those who are in frequent contact, the most active social ties, those who are socially "close," those with whom an ego exchanges social support, or those who fill a specific role (e.g. friend, neighbor, colleague).

There are a number of ways to determine the composition of a personal network. Methods vary by research question; from those that attempt to capture a large, broad sample of both weak and strong ties, to those that capture a smaller and narrower subset of ties. Killworth, Johnson, Bernard, Shelley and McCarty (1990) have estimated that the average person in the United States has 1700 ± 400 personal network members. Few, if any methods actually attempt to collect network measures on each alter in such a global network. The reverse small world (RSW) method enumerates the largest and broadest sample of alters, generating a list of 250-300 active network members (Killworth and Bernard 1978; Killworth, Bernard and McCarty 1984). However, in practice it is exceptionally burdensome and time consuming to administer the RSW, even if only basic measures of network composition and limited structural data are collected (Bernard, Shelley and Killworth 1997). For most research it is impractical to enumerate a sample of network members as large as can be obtained with the RSW. However, there are other methods of sampling from personal networks, such as the first-name cueing method (McCarty et. al. 1997; Brewer 1997) which has been used in an attempt draw small representative samples of alters from personal networks.

Limited measures of network composition can also be obtained using methods like the position (Lin and Dumin 1986) and resource generators (Snijders 1999). However, the position and resource generators focus on individual social capital and produce measures limited to network diversity and range. Position and resource generators do not enumerate individual alters nor can they generate more elaborate network measures (Lin, Fu, and Hsung 2001; Erickson 2001; Van der Gaag and Snijders 2005). Beyond attempts to measure the global size of a personal network, attempts at representatively sampling from the global network, and measures of network composition that are focused on very specific measures (such as access to resources), there are a broad range of researchers whose interests in personal networks focus on a subset of the personal network: such as ties to people with specific roles (Campbell and Lee 1991; Hampton and Wellman 2003), daily contacts or frequent interactions (Fu 2005), or ties that are socially close or provide various forms of social support (Wellman and Wortley 1990). It is these researchers, who focus on what are generally non-representative subsets of the personal network, who tend to employ name generators.

Name Generators

The study of personal networks can be divided into four approaches: the *role-relation approach*, *the interaction approach*, the *affective approach*, and *the exchange approach* (Milardo 1988; van der Poel 1993). The role-relational approach is primarily concerned with the influence or role of ties in a specific social domain, such as with neighbors, friends, or kin. The interaction approach aims to identify those ties with whom an actor is in contact over a specified period of time. The affective approach deals with the affective value of a tie, such as those whose opinions are "especially significant" or those to whom an ego feels "close" (Wellman 1979). The exchange approach focuses on the exchange of supportive content between ego and alters (McAllister and Fischer 1978). All four approaches deal with subsets of the full personal network and are theoretically valid and appropriate for different research questions. Although it is common for name generators to be used within all four approaches, name generators are often misused. The adoption of any research method should be guided by the desire to minimize concerns regarding reliability and validity. Name generators on a whole are often less reliable measures of network phenomenon than available alternatives. When name generators are appropriate, individual generators also vary in the reliability of the measures they produce, and the validity of the constructs they purport to measure.

Name generators such as, "With whom have you interacted over the last week, month, or year?" (Milardo 1988: 29) are used in the study of "daily interactions" or routine interaction networks. Yet, in most circumstances the interaction approach is perhaps least suited for the adoption of name generators. There are questions about both the validity and reliability of what the interaction approach measures. In particular, there is little correlation between routine contacts and those ties that people tend to evaluate as most important (Marsden and Campbell 1984), and there are questions about the stability of network measures within the interaction approach. Test-retests of the same participants from even one day to the next can produce significant variation in the alters with whom an ego interacts (of course, this may be a good thing if day-to-day or setting-to-setting variation is the focus of the research). In absence of the information generated by time diaries (Michelson and Tepperman 2003), it is unclear how setting, daily tasks, and daily stresses influence daily contacts. In addition, numerous studies question the validity of interaction data when respondents report on contact over an extended period of time or over a "typical day" (Bernard, Killworth, Kronenfeld, and Sailer 1984; Ver Ploeg, Altonji, Bradburn, DaVanzo, Nordhaus, and Samaniego 2000). With the possible exception of personal network studies of interactions within bounded groups or organizations, researchers with a clear interest in "daily contacts" and routine interactions may be better served by passing over name generators for diaries, or other procedures where respondents report on interactions shortly after they occur (Ver Ploeg et al 2000).

Name generators within the role-relation approach are particularly susceptible to problems of reliability. Some of the most common relational categories included within role-relation name generators are interpreted differently across populations. In particular, Burt (1983) demonstrated that the construct of "friends" is interpreted differently across socioeconomic groups. A similar problem is encountered with name generators used within the affective approach. Generators that elicit alters by focusing on the subjective value of a tie, such as those who are "especially significant" or "close," risk problems with interpretation across populations. Still, this limitation aside, the concept of "closeness," as ambiguous as it may be, best represents the construct of "strong ties," and in turn the affective approach does have particular value for those interested in studying strong tie networks (Marsden and Campbell 1984; van Sonderen et. al. 1990). Despite the advantage of a recognizable theoretical framework, and because of problems with representative reliability, name generators under both the role-relation and affective approach are rarely ideal.

Unlike the interaction, role-relation, and affective approaches, the criteria for defining a subset of network ties in the exchange approach does not rely on time frames or ambiguous terms like "friend" or "especially close." The exchange approach argues that those people who provide regular supportive interactions are an important subset of a personal network (McCallister and Fischer 1978). By focusing on the exchange of support, the standards for inclusion and exclusion of ties are more clearly defined (Milardo 1988: 27). For example, generators such as, "who do you rely on for help with everyday tasks?" or "from whom could you borrow a large sum of money?" deal with supportive exchanges that have specific criteria. These generators have strong face validity and are less likely to be interpreted differently across respondents (but see Bailey and Marsden 1999, Bearman and Parigi 2004). By focusing on instances of supportive exchange, this approach also has the advantage of a clearly defined universe of social ties from which to sample. However, even within the exchange approach, decisions about specific wording and the choice of how many generator to include in a survey shape the validity and reliability of the name generator approach.

Shortcuts

We argue that the exchange approach provides a clear theoretical framework for the use of name generators and minimizes issues of reliability and validity in comparison to other approaches. Yet name generators and corresponding interpreters are often viewed as particularly time consuming and complicated to administer. In particular, the use of multiple generators can be costly in terms of interview time and respondent motivation. In response, researchers have introduced a number of practices to reduce the time required to administer name generators. For example, researchers have placed limits on the number of alters recorded in response to generators (Marsden 1990); generators have been worded so that they apply to limited time frames, such as alters with whom an ego has exchanged support in the last year or six months (Burt 1984); and multiple name generators have been replaced by a single name generator, such as with the "important matters" generator used in the General Social Survey (GSS). We are particularly concerned with the practice of replacing multiple name generators with a single name generator.

While the single generator approach has the advantage of reducing interview time, we believe that the limitations of this approach have been understated. Most significantly, the use of a single name generator does not address the full definition of social support. While for some research it may be theoretically interesting to sample from a limited area of support, such as the study of "core" discussion networks (Marsden 1987), for many others the focus lies more broadly on the relationship between the composition or structure of personal support networks and substantive outcomes, such as socioeconomic status, job attainment or another network characteristic. While some define the components of social support more broadly than others, the concept generally includes emotional aid, instrumental aid, and companionship (van der Poel 1993; Wellman and Wortley 1990). The temptation is to generalize from the limited domain of a single, stand alone name generator, such as the generator from the GSS "Looking back over the last 6 months – who are the people with whom you discussed matters important to you?", to personal support networks more broadly. Succumbing to this temptation undermines the construct validity of a multidimensional definition of support and assumes that a single name generator elicits alters that are representative of the full personal support network. If single name generators do not reliably predict the full support network, their use undermines the validity of the research in which they are used.

In the remainder of this paper we test whether single name generators reliably predict the properties of multi-dimensional support networks. In an attempt to improve the reliability of network measures, beyond what could be obtained through single generator alternatives, we also evaluate two alternative name generator methods that reduce respondent burden: a modified multiple generator (MMG), and the multiple generator random interpreter (MGRI).

Methods

Data

Network data for this paper was collected as part of the E-neighbors project, an investigation into how information and communication technologies are integrated into the social networks of middle-class residents in four Boston area neighborhoods. Two sites, each consisting of just over 200 homes, were located in the Boston suburb of Lexington. Located less than two miles apart, both neighborhoods consisted of low-density, single-family, detached homes. The third site, a 23 story, 174-unit apartment building, was the product of 1960s urban renewal and is located on the site of Boston's former West End (Gans 1962). The fourth site, located in the suburb of Quincy, is a 101-unit, medium-density, gated, multifamily condominium development.

In the spring of 2002 all households in the four field sites were hand delivered an information package. Each package contained a letter from the principal investigator, a university coffee mug, and a stamped return postcard. On the back of the return postcard residents were asked to print the name of each member of their household who was interested in receiving a survey (18 years of age or older). A total of 487 surveys were mailed to eligible participants, each survey included a stamped return envelope and a $20 gift certificate for a local grocery chain. After two reminder letters, 69% of those who received surveys returned a completed questionnaire. The precise size of the population of editable participants remains unknown[2]. However, based on U.S. Census tract data on dwelling counts and the noninstitutionalized population over the age of 18, and a modest vacancy rate in each neighborhood,

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[2]For example, estimates based on the 2000 U.S. Census suggest a population size for the apartment building of 267 adults. However, a local Boston census for 2001 records 356 individuals over the age of 18. A reverse telephone directory lists 188 names, and when combined with the roster from the local census, 442 unique names were produced. A letter sent to each of the 442 names resulted in 75 letters returned by the USPS as undeliverable. Informal interviews with the property manager and residents suggest that the resulting list of 367 names was exaggerated. This provides an editable population estimate of 267-367 adults. Each of the other thee field sites has similar inconsistencies.

we estimate that 27% of eligible participants returned a completed survey[3]. This calculation likely underestimates the actual response rate as it does not take into account variation in the population distribution within census tracts (which encompass, but do not align with the boundaries of our neighborhoods) and over estimates our success in identifying and contacting all eligible participants. There are unusual challenges inherent in trying to recruit participation from residents of a small geographic area and the successful involvement of over one quarter of the eligible population seems like at least a modest success. The randomness of the sample is unknown, however, we assume that considerable homogeneity exists within neighborhoods and this in turn reduces concerns about the representativeness of the sample. However, this data is used here in an attempt to draw conclusions about how the same sample would be presented using different survey methodologies, we do not draw conclusions about the representativeness of the sample in terms of the neighborhoods they are drawn from or the population at large."

The project survey contained questions on time-use, the use of media and technology, organizational and political involvement, and personal and neighborhood networks. The personal network section included a series of six name generators, corresponding interpreters, and an adjacency matrix. Mail surveys were used over personal interviews as a means to contain survey costs. In addition, while the literature on survey administration tends to favor in-person and telephone interviews over mail surveys, there is evidence to suggest that name generators are susceptible to interviewer effects (Marsden 2003); mail surveys may be a preferred method of administering name generators.[4] Given the complexity of multiple name generators, there was the possibility that instrument error would replace interviewer error in self-administered surveys. However, U.S. Census data indicated that all four field sites were contained within areas of above average educational attainment (a majority with at least a college degree), this suggested that the extra complexity of the survey instrument would not be as significant a problem as it might have been if administered to another population. Pretests with a population of similar educational attainment revealed no evidence that the complexity of the self-administered survey introduced errors.

The six name generators used in this survey were based on wording developed by van der Poel (1993), the GSS (Burt 1984), the East York Studies (Wellman 1979; Wellman and Wortley 1990), and the Northern California Communities Study (Fischer 1982). The generators were amended to reduce length, ease understanding, and eliminate the use of time-frames:[5]

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[3]Total number of completed surveys (335) divided by the total estimated eligible population. Estimated eligible population = 1.2 adults / unit [apartment] x (178 units x 0.95 occupancy) + 1.6 adults / unit [gated] x (101 units x 0.97 occupancy) + 2.1 adults / home [suburbs] x (435 units x 0.99 occupancy).

[4] The use of computer assisted personal interviewing (CAPI) was considered and rejected as an alternative to mail surveys. Past experience with CAPI suggested that multiple name generators were particularly difficult to administer over the Internet, or through other computer assisted methods such as disk-by-mail surveys (Hampton 1999). The focus of the E-neighbors project also had a substantive interest in administering the questionnaire to participants who did not own or use a home computer.

[5] Name generators often instruct respondents to list the names of alters who have provided support *only during a restricted period of time.* For example, from the GSS: "Looking back over the last 6 months – who are the people with whom you discussed matters important to you?" Time frames are presumed to reduce the number of alters a respondent lists and to increase respondent accuracy (Campbell and Lee 1991: 205). While successful at reducing the

1. From time to time, most people discuss important matters with other people. Who are the people with whom you discuss matters important to you?
2. Who from outside your home has recently helped you with tasks around the home, such as painting, moving furniture, cooking, cleaning or major or minor repairs?
3. Suppose you need to borrow some small thing like a tool or a cup of sugar, from who outside your household would you ask to borrow it?
4. If you need to borrow a large sum of money, say $1000, whom would you ask for help?
5. Who are the people you really enjoy socializing with?
6. Please list anyone who is especially close to you who you have not listed in one of the previous questions.

Five of the six name generators used in the survey were exchange-based (McCallister and Fischer 1978), and were selected to represent a broad, multidimensional view of social support that included emotional support, companionship, and instrumental aid in the form of support with large services, small services, and financial aid (Veiel 1985; Cohen and Wills 1985; Fischer 1982; Wellman and Wortley's 1990).

A name generator usually associated with the affective approach, but used here as part of the exchange-approach, was used as a final name eliciting question. An affective generator was included for two reasons. Firstly, it was assumed that "strong ties" are encapsulated within support networks and that these ties play an important role; they provide people with the most social support of all kinds (Wellman and Wortley's 1990). Eliciting "anyone else" with whom respondents were "especially close" was a catch-all to enumerate additional strong ties that were not provided in response to the first five questions. Ordering the affective generator as the final name electing question was done to take advantage of the context effect of the exchange-based generators and reduce the problem of respondents interpreting closeness differently (Bailey and Marsden 1999, Bearman and Parigi 2004). Secondly, the "anyone else" criteria was used to overcome the limitations of restricting the number of alters participants could list in response to each of the previous five generators. Respondents were instructed that they could give the same names for more than one question (first name and last initial), but that they could list only six alters for each name generator. This limit was designed to reduce respondent burden in the most extreme cases, while still allowing most respondents to list most alters that came to mind. Previous studies have found that less than 3 percent of respondents listed more than 6 alters in response to the GSS and similar generators (Marsden 1987: 130; Fischer 1982; Burt 1984: 313). By providing the sixth generator of "anyone else," respondents had the opportunity to list important alters that otherwise would have been omitted as a result of the survey's design.

Standard name interpreters were administered for each alter, including demographic characteristics, frequency of communication between alters and ego, and information on the relationship between alters. The average network consisted of 13.3 alters with a minimum of 1 and a maximum of 34. Ten percent of respondents had six or fewer network members. Respondents listed an average of 4.8 discussion partners, 1.3 alters who helped with small household tasks, 2.8 alters from whom they could borrow small items, 2.2 alters from whom they could borrow money, 5.0 alters with whom they enjoyed

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number of alters enumerated, the use of time frames omits alters by excluding *potentially supportive* relations that have not participated in recent interactions. This may introduce a bias, where those participants who have experienced a recent crisis or are undergoing significant life course events list more alters than those who have an equivalent support network, but have not experienced a recent need to activate those ties. By focusing on only recent supportive exchanges, and not the potential for supportive exchange, time frames limit the analysis of support to "stress-buffering" effects, while ignoring the "main-effect" of personal relationships on well-being (Cohen and Wills 1985; van der Poel 1993: 52).

socializing, and 2.5 others who were especially close. Respondents could name the same alter in response to multiple generators and many chose to do so.

Comparing Approaches – Single Generators, Multiple Generators, and the MGRI

Measures of network composition include: *demographic composition* (e.g. mean age and education), *role relationships* (e.g. proportion kin), *ego-alter characteristics* (e.g. mean closeness), *network activity* (e.g. frequency of communication), and *network properties* (size and density). To compare measures of composition generated through the use of a multiple name generator to measures obtained through the use of single name generators, we calculated measures for 1) the complete list of alters provided in response to all six name generators – the baseline full multiple generator model, and 2) the same measures for each of the five exchange-based generators – the single, stand alone generator comparisons. Measures for the five single generators were calculated based on only those alters elicited in response to the individual name generator. In this way, measures for each of the five generators recreated as closely as possible the data that would have been produced by administering that one name generator to the same sample of respondents.[6] No network measures were calculated for the final name generator, which asked respondents to list anyone especially close not listed in response to one of the previous questions, as this name generator would not be meaningful if used in isolation from the others. Bivariate correlations were calculated between network measures for individual generators and measures based on the combined six generator data[7]. This analysis puts aside the question of whether single generators are valid measures of multidimensional support, and focuses on the extent to which single generator methods are reliable in that they predict multiple generator measures.[8] As a final step, we compared the results obtained through the full multiple name generator and through the individual name generators to two alternatives 1) a modified multiple generator (MMG) consisting of the two most reliable generators as determined by the first analysis, and 2) a multiple generator random interpreter survey (MGRI), consisting of the full set of multiple name generators with interpreters administered to a random subset of alters.

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[6] Participants were instructed that they could list the same name in response to more than one generator. We do not assume or believe that participants withheld names listed in response to a previous generator from subsequent generators. In fact, 95% of respondents did list at least one alter more than once, and 31% of alters were listed in response to more than one generator.

[7] This method of assessing reliability requires the assumption that the six-generator measures are correlated 1.0 with the true scores for respondents' networks (Carmines and Zeller 1979).

[8] The alters used in calculating the single name generator measures were subsets of the alters used in calculating the more complete measures. Therefore, the correlations generated are necessarily higher than they would be if they were based on two independent non-overlapping sets of samples. Because of this overlap, the assumption of independence is not met and statistical significance cannot be calculated. While non-parametric methods could be used to estimate significance, we choose not to do so here because these tests are not relevant for our purpose. Such tests would determine if the correlations were significantly higher than expected by chance. However, the question asked here is not "are the correlations higher than chance?" but, "do the correlations indicate that the more limited measures are reliable enough to be employed as substitutes for the multiple generator measures?"

Findings

Testing the Single Name Generator Approach

Demographic Composition

Through the use of name interpreters, participants provided demographic information on each alter in their support network. This information was summarized into the following variables:

- mean and standard deviation of alters' ages
- proportion of alters who were female
- alters' mean number of children
- mean education (as both categorical and continuous measures), the standard deviation of alters' years of education, and the range of alters' years of education
- the number and proportion of alters who were economically better off, worse off, and similarly situated.
- proportion of alters who were single, married, divorced, separated, or widowed
- proportion of alters with each employment status.

[TABLE 1]

The ability of individual name generators to predict demographic composition varied widely across generators and network measures (Table 1). The higher the bivariate correlation the more reliable the single name generator for that measure of composition. With the exception of measures of variability (i.e., the standard deviations of age and education and the range of education levels), name generators tended to be internally consistent in their ability to predict different dimensions of demographic composition. That is, individual generators were consistently good or consistently poor when compared to the results obtained from the full multiple name generator. The generators for "discussion" and "socializing" had the highest mean correlations across network measures, correlating with the full model at .711 and .736 respectively. On the other end of the spectrum, measures based on alters who "helped respondents with small household tasks," and those alters from who they could "borrow a large sum of money," had the lowest correlations across almost all summary measures. The "helped" and "money" generators had mean correlations across demographic measures of .409 and .434 respectively, making them the least reliable generators for measuring demographic composition.

Role Relationships

Participants selected from a list of eleven options, role relationships that described their tie with each alter in their network: met on the internet, spouse, parent, child, sibling, other relatives, friends, neighbors, coworkers, acquaintances, or common member of a club or organization. Respondents could select as many options as were applicable for each alter. Table 2 contains bivariate correlations of individual generators to the multiple generator for summary statistics based on the number and proportion of alters in each relationship.

[TABLE 2]

No single name generator reliably and consistently predicted the number of people in each role relationship. Indeed, this is by design, specific name generators were designed to elicit network members who provided specialized types of support, and many relationships are known to specialize in the types of support they provide. For example, there are few people from whom you could ask to borrow a large sum of money other than your parents, and neighbors are particularly good at providing services, such as borrowing a cup of sugar (Wellman and Wortley 1990). As with measures of demographic composition, generators for discussion and socializing best predicted the number and proportion of alters in each role. The generators for aid with small services, "helped around the home" and "borrowed a cup of sugar," were the least reliable.

Ego-Alter Characteristics

Tie characteristics include the respondent's reported closeness to the alter (not at all close, somewhat close, very close), the number of years the respondent had known the alter, the distance between the respondent's home and the alter's, and the number of role relationships that the respondent and alter shared. Correlations of tie measures from each stand alone generator to those from the combined generators are shown in Table 3. Once again, the generators for discussion and socializing were the best single generator predictors, with average correlations across all measures of .720 and .750. However, there were some surprising inconsistencies within generators. Most notably, even though the average correlation for the discussion generator was quite high, the correlation for the measure of closeness was very low, .529. Despite its popularity, including its use in the GSS, the low correlation between the discussion generator's measure of closeness and that of the multiple name generator suggests that it may be unsuitable as a stand alone generator for network studies in which tie strength is a theoretically important variable.

[TABLE 3]

Network Activity

Participants provided self-reported data on how many times in the past month they had communicated with each alter by telephone, cell phone, postal mail, email, instant messenger, and in-person.[9] Based on these data we calculated three measures of network activity for each method of communication:

- mean number of contacts per alter
- total number of contacts
- proportion of alters contacted

Keeping with the established pattern, the discussion and socializing networks were most consistent with the results obtained from the multiple generator for the mean, total, and proportion of alters that respondents had contact with for each method of communication (Table 4). The discussion network was particularly strongly correlated with the total and mean number of communications for each alter.

[TABLE 4]

Network Properties

Consistent with van der Poel's (1993) findings, we found that in comparison to the multiple name generator, no single generator provided a reliable estimate of network size (Table 5). The strongest correlation between a single generator's measure of size and that of the multiple generator was obtained using the socializing question, with a correlation of .628. We also tested the reliability of logged network size, since many researchers may use a transformed variable to model non-linear associations. Reliability of the logged size peaked at only .693, also with the socializing generator.

[TABLE 5]

On the final page of the personal network portion of the survey, each respondent completed an adjacency matrix. Participants labeled the rows of the matrix with alter's names, each row was pre-numbered, as was each column. Respondents were asked to go through their list of name and place an

[9] Respondents were asked to count each communication with an alter as one communication regardless of its length. For example, seeing someone in person all day counted as only one in-person communication. While recognizing that respondents typically have a difficult time providing accurate reports of their interactions with alters over extended time periods (Bernard, Killworth, Kronenfeld, and Sailer 1984), pre-tests of the survey found generally low frequency of communication between ego and alter for many types of communication. It was felt that self-reported data over a shorter period of time would not be substantively useful for the purposes of the E-neighbors study.

"X" in a cell if a pair of alters knew one another (for our purposes this may best be considered as the perceived presence or absence of a tie). For example, if alter number "2" knew alter number "3," the participant placed an "X" in the corresponding cell of the matrix.[10] To generate measures of network density as they would have been obtained through the use of single name generators, we calculated the density measure using only those ties between pairs of alters who were *both* named in response to the single name generator in question. Comparing these single generator measures, to the density measure obtained by the multiple generator, we found that the socializing network, with a correlation of .737, provided the most reliable measure of networks density.

Is There a Single Generator Solution?
Using the multiple name generator as a baseline, the single name generators for "discuss important matters" and "enjoy socializing with" produced consistently more reliable estimates of network composition than the stand alone generators for "helped with tasks around the home," "borrow some small thing," and "borrow a large sum of money." It was not surprising that most single generators did not approach the reliability of the full multiple generator. Social support is a multidimensional concept and a valid measure of support should require generators that tap different dimension of support. What was surprising is that there were any stand alone generators that approximated measures obtained through a multiple generator survey. Composite network measures based on alters elicited from the generators for "discuss" and "socializing" correlated moderately to strongly for many network measures used to describe alters' demographic characteristics, the relationship between ego and alter, network activity, and density. Still, while it was surprising that one of these two generators often produced reliable estimates, neither generator provided consistently reliable estimates for all measures of network composition. For measures of role relationship, different dimensions of support were clearly provided by alters in specific role relationships, and no one generator served as a consistent predictor across roles.

Alternatives: A Modified Multiple Generator and the MGRI
While we have shown that researchers can obtain somewhat reliable estimates of most network characteristics by using either the "discuss" or "socializing" generators, we found that neither of these generators produced reliable results across all measures. Researchers interested in a broad array of network measures would appear to have little choice but to administer a lengthy multiple generator survey. However, we offer two alternatives that may produce outcomes across most network measures that produce measures consistent with the multiple generator approach while placing a lesser burden on respondents:

1) A modified multiple generator (MMG) that includes only the "discuss" and "socializing" generators.
2) A multiple generator random interpreter (MGRI), which involves administering a full battery

[10] The use of an adjacency matrix as part of a personal network survey is an enormous respondent burden in and of itself, and is particularly difficult to administer as part of a self-administered questionnaire (McCarty 2002). Recognizing the extra burden and complexity for respondents, the matrix was placed at the end of the personal network survey. A visual matrix of potential pairs was used in place of an alternative method, such as having participants list each pair of alters and evaluate the presence of a tie. This method was used with the belief that it would be less taxing, less repetitive and potentially more appealing to participants. However, it is possible that the complexity of the question makes it less reliable than would be ideal, and that less motivated participants took less care in completing the matrix than they would have if they had been forced to address each possible pare in a long list of pairs. For a related discussion, see McCarty and Govindaramanujam (2005) for a comparison of two computer-assisted adjacency matrix interviews, one using a visualization and another a pair-by-pair series of questions.

of name generators, and thus maintains the validity of the multiple generator approach, but with name interpreters administered to only a random sample of alters.[11] We suggest that the time required to administer multiple name generators is marginal compared to the effort and burden of completing a large number of name interpreters.

To simulate the data for the MGRI, as if researchers administered name interpreters on a random sample of alters, we began with the full set of alters generated by the traditional multiple name generator and randomly selected 6 alters from each respondent's network. Since respondents were limited to six names per name generator, a sample of 6 or fewer provided a level of respondent burden directly comparable to the single name generator option. For the ten percent of respondents whose networks contained 6 or fewer alters, all alters were selected. To simulate the MMG we selected those alters who were elicited in response to one or both of the "discuss" and "socializing" generators. For each respondent, we calculated measures of network composition based on the alters included in the MGRI and the MMG and correlated these measures to those of the baseline full generator approach.

Demographic Composition

All measures of demographic composition produced by the MMG and MGRI correlated more strongly with the full generator model than any stand alone generator (Table 1). The MMG and the MGRI are almost matched in the strength of their correlations to the full generator model. Of the 25 measures we tested, the MMG came out on top 13 times, while the MGRI came out on top for 12. In those situations where one outperformed the other, the difference tended to be marginal. As with measures based on single name generators, measures of dispersion from the MGRI and MMG tended to be less reliable than estimates of means. Across all demographic variables, the MGRI had an average correlation of .805 and the MMG had an average correlation of .827, reasonable improvements on the correlation of .711 for the stand alone discussion generator and .736 for the socializing generator.

While it was not surprising that the combined discuss / socializing generators outperformed their stand alone counterparts, there were also some indications that the random selection of alters offered through the MGRI may have been a better stand in for the full generator model than the MMG when dealing with measures of variability. The most dramatic improvements in correlations were for those variables that measured variation and range rather than means. It was with these same variables that the MGRI systematically outperformed the MMG. For example, looking at the standard deviation of ties' ages, compared to the stand alone discussion generator, the MMG correlation was higher by .131 while the MGRI was higher by .207. Compared to the socializing network, the MMG correlation was higher by .226 while the MGRI was higher by .302. Similar patterns could be found for both the standard deviation of alters' education and the range of education.

Role Relationships

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[11] The random selection of alters would be simple to implement in the field. In-person or computer-assisted interviews could use a random number generator, self administered surveys could use a random number table, dice, or a set of cards included with the survey. Methods of alter selection based on the order in which alters are named, such as selecting the first *X* number of alters listed for each generator, should be avoided. Research on order effects in name generators has consistently shown that the order in which alters correlated with substantively important variables such as the strength of tie between ego and alter and the alter's relationship to other alters. (Brewer and Yang 1994, Brewer 1995, Brewer and Webster 1999, Brewer et. al. 1999, Bond and Sedikides 1988). Network measures calculated based on alter selected for the sequence in which they are mentioned would consequently be unreliable.

The MMG and MGRI both performed well relative to stand alone generators when used to measure the number of alters in specific role relationships (Table 2). MGRI measures had a higher mean correlation (.707) than those based on discussion (.681) or socializing (.615) and the MMG had a moderately higher mean correlation (.777) than the MGRI. For six of the 11 role relational variables the MMG did as well as either the discussion or socializing generators and provided more reliable measures than the MGRI for the number of alters in a particular role. For example, the discussion network provided a better measure than the MGRI of the number of siblings in the network, the socializing network was more reliable than the MGRI in predicting the number of friends, and as would be expected the MMG consistently provided better measures than an independent discuss or socializing generator. In particular, the MMG provided stronger correlations to the full generator model when the type of alters in a network were rare, and likely to be listed in response to these questions such as the number of spouses or the number of alters met on the Internet.

A comparison between single name generators, the MMG and the MGRI in terms of the proportion of ties within each role relationship clearly favored the MGRI. With the exception of proportion of alters met on the Internet, measures based on randomly selected alters were consistently more reliable than those based on stand alone versions of the discussion or socializing generators, and moderately better or near equal correlations to the MMG. The particularly strong correlation between the full generator and the MMG for proportion of alters met on the Internet exists because of the very strong disproportionate likelihood that alters met online (a very rare alter in support networks) are only recalled in response to the discussion generator, with an added boost to the correlation from the occasional Internet alter in the socializing network.

Ego-Alter Characteristics

All six variables that we used to measure respondents' relationships to alters experienced considerable improvements in reliability when the MGRI or MMG were used in place of a single name generator (Table 3). For most of these measures he MGRI provided slightly more reliable or near equal correlations to the MMG. Mean closeness demonstrated a particularly dramatic improvement, especially for the MGRI (.898) when compared to correlations of .529 and .694 for stand alone discussion and socializing generators. For ego-alter characteristics, the alternative methods offered a clear improvement in reliability in comparison to available alternatives.

Network Activity

The stand alone name generator for discuss, and to a slightly lesser extent the stand alone generator for socializing both provided strong correlations for measures of network activity. It was not a surprise that the MMG also proved to be very reliable in generating measures of network activity. Compared to the MGRI, the stand alone discussion generator was more reliable for about half of the measures of mean communication, including phone, instant messaging and in-person contact, and almost all measures of total communications. For every measure of network communication, the MMG provided stronger correlations to the full model than did any stand alone generator. The MMG usually provided moderately stronger, and on a small number of measures much stronger correlations to what was obtained through the MGRI.

Network Properties

Since the MGRI involved the administration of a full set of name generators, it was identical to the full generator model for measures of network size. While the MMG and the stand alone socializing generator provided reasonable approximations of network size, they were far inferior to the full data provided by the MGRI. The measure of density generated through the use of the two alternative methods was superior to any single generators, with the MMG providing estimates that were moderately more reliable than those provided by the MGRI.

Discussion

The use of a series of name generators and interpreters, while the ideal way to conduct a personal network survey within the exchange approach, can be taxing on respondent's time and motivation. We argued that traditional attempts to reduce the burden of administering name generators, by substituting a single name generator for multiple generators, undermine the validity of the exchange approach. We argued that no single generator adequately taps the multidimensional concept of social support and that measures of network composition from a single generator do not adequately represent measures obtained through multiple generators. We tested this hypothesis by comparing network measures obtained by five independent generators to a six-item multiple generator. We also tested two alternative methods aimed at reducing respondent burden.

As stand alone generators, two of the most widely used generators – "who are the people with whom you discuss matters important to you" and "who are the people you really enjoy socializing with" – provided network measures that often correlated moderately to strongly with measures based on the full multiple generator model that described the demographic characteristics of alters, the relationship between ego and alter, network activity, and network density. When combined into a modified multiple generator (MMG), that consisted of only those two generators, they provided even stronger correlations with the full multiple generator model across many measures of network composition. A second alternative to stand alone generators, the multiple generator random interpreter (MGRI) was also shown to provide strong correlations on measures of network composition to the full multiple generator model.

We were surprised by the relatively strong performance of the stand alone discussion and socializing generators. One possible explanation, as to why the stand alone discussion and socializing generators performed as well as they did, may have been that they simply enumerated a large proportion of the personal network. Since different generators are designed to elicit alters from different domains of the support network it makes sense that some domains would be more encompassing than others. Participants placed a mean of 40% of their alters in the discussion network and 41% in the socializing network, a much higher proportion of alters than the other single generators: money lending (17%), helping (10%), and sugar borrowing (22%). This may also explain why the MGRI, which included a mean of 50% of each respondent's alters and the complete network for 10% of respondents, and the MMG, which included a mean of 60.8% of respondent's alters and the complete network for 7.3% of respondents, also produced measures that were highly correlated to the multiple generator. These methods may have been more reliable simply because they included a greater proportion of alters.

To test the size explanation, we compared measures from single name generators and the MGRI to measures based on alters that *were not* included when each measure was calculated. For example, we compared the average tie strength of members of the discussion network to the average tie strength of alters not in the discussion network. In doing this we compared one part of the network to the other part, rather than one part to the whole, as we did in our earlier analyses.[12] We found that the stand alone

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[12] This approach required us to drop from each analysis any respondents who listed all alters in response to the included name generators (2 respondents each for helping, sugar-lending, and money-lending, 3 for socializing, and 7 for discussion and 33 for the MMG). We also exclude from the MGRI analyses the 35 respondents whose network sizes 6 or smaller and whose entire networks were therefore sampled by the MGRI. As expected, when we no longer use part/whole correlations, correlations drop dramatically across all measures and all name generators.

discussion and socializing generators did not owe their advantage to their large number of alters, correlations to the full generator model continued to exceed those of other single name generators. However, the MGRI did owe much of its success to size. This is not surprising, since 92% of MGRI networks contained the maximum of six alters, compared to only 56% of discussion networks and 52% of socializing networks. Similarly, the MMG clearly owed its high reliability to the larger number of included alters. With the MMG only half of respondents had the number of name interpreters reduced by more than 5 alters (from the mean of 13.3) and only one third had networks of size 6 or fewer. The mean number of alters included in the MMG was 7.5. These findings make obvious intuitive sense as well, as a sampling method the MGRI and MMG should demonstrate greater reliability the more alters that are sampled from the full personal network.

One explanation as to why the stand alone discussion and socializing generators and by extension the MMG were so reliable relates to the type of measures we focused on and the type of alters the stand alone generators tended to enumerate. The variables that we compared across generators were of three types: *sum of alter-level variables* (such as total number of telephone communications), *means of alter-level variables* (such as mean tie strength), and the *proportion of alters in a given category* (such as proportion female). Single generators often had an advantage when used to measure the number of alters in a role relationship or the total numbers of communications. A relatively small number of alters accounted for much of the variation when alter-level variables were totaled. These same alters were most likely to be elicited in response to specific name generators and these specific generators provided more reliable estimates than the sampling achieved through the MGRI. As a result, single name generators and the MMG correlated more strongly with the full multiple generator for measures based on the *sum of alter-level variables*. While sum of alter-level variables are of potential interest, we believe that most variables of substantive interest to personal network researchers tend to be *means of alter-level variables* and measures based on the *proportion of alters in a category*. These latter two types of measures tended to be well measured by both the MGRI and the MMG.

The variable for total number of communications by telephone is an example of a measure that was more reliable with a stand alone name generator and the MMG than with the MGRI. Each respondent had alters with whom they spoke more frequently and alters with whom they spoke less frequently. The lower end of this variable was constrained, as it could not fall below zero. All respondents' low-phone alters had scores that clustered around zero, these respondents contributed little or nothing to the sum and therefore did not account for much variation at the network level. However, there was no upper bound to the number of telephone communications respondents could have in a month. Variation in communication totals was driven by how often each respondent had contact with *the alters they spoke to most often*. These variables were most reliably measured when high frequency (of communication) alters were included in the analysis. High communication alters were most likely to be elicited by the discussion and socializing generators, and the random, broad sampling of the MGRI sometimes overlooked these alters. As a result, the narrow focus of the single generator approach served as an advantage when predicting frequency of communication.

The number of alters in different role relationships was another example of where the narrow focus of a single name generator lead to higher correlations with the full multiple generator than what was achieved through the MGRI, and in more limited cases the MMG. The money borrowing generator predicted the number of parents with a reliability of .801, and the sugar borrowing network predicted the number of neighbors with a reliability of .833. In each case the specific generator captured almost all the alters that contributed to variation in the parent and neighbor categories. The broad random sampling of the MGRI tended to miss the small number of parent alters, but in our example did pick up a reasonable number of neighbors. Since the MMG focused on discussion and socializing networks it was not strongly correlated with either number of neighbors or number of parents.[13]

If a researcher is unwilling or unable to accept the problems of administering multiple name generators and a complete set of name interpreters, they face difficult choices in selecting an alternative method to reduce respondent burden. You cannot have it all, strong content validity, a broad set of reliable personal network measures, and a simple, short, easy to administer personal network survey. There are short cuts, under the right circumstances single generators, the MMG and the MGRI can provide reasonable alternatives. The adoption of a particular approach must be based on the context of a specific project and a careful consideration of which network properties are of interest. No single stand alone name generator provides a broad spectrum of network measures comparable to those obtained through a multiple generator survey. Yet, there are examples of when a single generator may be a reasonable substitute for a multiple generator approach. For example, if the focus is on frequency of network communication, there are no reliable alternatives to asking respondents for those alters with whom they “discuss important matters.” When a more extensive set of network measures are desired, the MMG and the MGRI generally provide measures of network composition that are comparable to those obtained through a multiple generator approach. If there are reasons specific to the research design that specify an interest in the sum of alter-level variables, then the MMG is likely the best choice, otherwise the MGRI provides measures that are more strongly related to the ideal of a full multiple generator survey. Also, the MGRI maintains the construct validity of the full model, where as the MMG does not. In addition, it is clear that the simple and often theoretically important measures of network closeness, density and size are best measured through the MGRI or a full multiple generator. In choosing between the MGRI and the MMG there is also a choice between the respondent burden of a full set of name generates and a small number of name interpreters, or a small number of name generators and a more extensive set of name interpreters. We found with the MMG that only half of respondents had the total number of name interpreters administered reduced by more than 5, to us this suggest that under circumstances where reducing respondent burden is paramount the MGRI provides the best alternative to the full name generator model. The MGRI maximizes content validity, reduces respondent burden, and provides a reliable spectrum of network measures. The MMG while producing many reliable measures is not as strong in its construct validity or its reduction of respondent burden.

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[13] It is worth noting that the two role relation methods that are not measured well by any single name generator. The number of “children” and the number of “other relatives” are those alters that were most likely to appear in response to the sixth “anyone else” name generator. Twenty-four percent of children and 35% of other relatives were mentioned in response to the name generator that asked respondents for other especially close members of their network who they had not yet mentioned. None of the single generators studied here measured these variables reliably because they did not include many of the alters who drove variation in those variables; that is, they did not elicit the listing of children or other relatives. However, the MGRI, which did draw alters from this sixth name generator, performed better in the case of children, and quite well in case of “other relatives.”

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Table 1 - Demographic Composition: Bivariate Correlations of Individual Generators and the MGRI to a Multiple Name Generator.

	Discuss [1]	Helped	Money	Social	Sugar	MMG	MGRI
Mean Age	.855(294)	.371(160)	.420(246)	.879(292)	.668(257)	0.929(297)	.924(301)
Proportion Female	.692(294)	.401(161)	.392(246)	.707(292)	.590(262)	0.812(297)	.809(301)
Std. Dev. of Age	.556(281)	.164(97)	.225(167)	.461(280)	.385(202)	0.687(291)	.763(298)
Mean No. of Children	.787(293)	.520 (159)	.377(244)	.806(291)	.552(262)	0.884(297)	.841(301)
Mean Edu. Category	.821(293)	.462(156)	.508(246)	.830(292)	.633(256)	0.887(297)	.892(301)
Mean Edu. Years	.816(293)	.464(156)	.539(245)	.829(292)	.636(256)	0.882(297)	.725(301)
Std. Dev. of Edu Years	.623(280)	.256(96)	.382(167)	.574(280)	.388(198)	0.717(291)	.786(296)
Range of Edu. Years	.511(293)	.252(156)	.295(245)	.551(292)	.374(256)	0.657(287)	.717(301)
Number of Alters							
Economically Better Off	.752(299)	.509(171)	.584(251)	.758(296)	.594(273)	0.822(301)	.729(305)
Economically the Same	.701(299)	.432(171)	.526(251)	.736(296)	.598(273)	0.844(301)	.714(299)
Economically Worse Off	.695(299)	.454(171)	.437(251)	.717(296)	.605(273)	0.819(301)	.775(305)
Mean	*0.716*	*0.465*	*0.516*	*0.737*	*0.599*	*0.828*	*0.739*
Proportion of Alters							
Economically Better Off	.694(299)	.559(171)	.587(251)	.826(296)	.645(273)	0.899(301)	.901(305)
Economically the Same	.759(299)	.526(171)	.528(251)	.816(296)	.651(273)	0.884(301)	.889(305)
Economically Worse Off	.694(299)	.473(171)	.528(251)	.761(296)	.554(273)	0.840(301)	.849(305)
Mean	*0.716*	*0.519*	*0.548*	*0.801*	*0.617*	*0.874*	*0.880*
Employment Status							
Proportion Full-Time	.714(299)	.379(171)	.314(251)	.745(296)	.519(273)	0.834(301)	.856(305)
Proportion Part-Time	.641(299)	.351(171)	.292(251)	.667(296)	.544(273)	0.759(301)	.737(305)
Proportion Students	.884(299)	.384(171)	.525(251)	.863(296)	.768(273)	0.926(301)	.895(305)
Proportion Retired	.727(299)	.367(171)	.366(251)	.754(296)	.505(273)	0.858(301)	.879(305)
Proportion Homemakers	.584(299)	.283(171)	.381(251)	.698(296)	.598(273)	0.721(301)	.833(305)
Proportion Unemployed	.662(299)	.512(.171)	.266(251)	.721(296)	.277(273)	0.791(301)	.645(305)
Mean	*0.702*	*0.379*	*0.357*	*0.741*	*0.535*	*0.815*	*0.808*
Marital Status							
Proportion Married	.783(299)	.517(171)	.499(251)	.780(296)	.660(273)	0.862(301)	.873(305)
Proportion Single	.802(299)	.503(171)	.273(251)	.808(296)	.673(273)	0.881(301)	.887(305)
Proportion Divorced	.707(299)	.464(171)	.559(251)	.652(296)	.281(273)	0.825(301)	.744(305)
Proportion Separated	.655(299)	.401(171)	.717(251)	.793(296)	.235(273)	0.853(301)	.723(305)
Proportion Widowed	.660(299)	.230(171)	.327(251)	.659(296)	.479(273)	0.811(301)	.728(305)
Mean	*0.721*	*0.423*	*0.475*	*0.738*	*0.466*		*0.791*
Mean Correlations [2]	*0.711*	*0.409*	*0.434*	*0.736*	*0.536*	*0.827*	*0.805*

[1] Numbers in parentheses are N for each correlation.

[2] Mean correlations across all variables.

[3] Adjusted mean: The mean of the correlations from each of the first eight variables, the combined mean for number of alters in each economic category; the combined mean for the proportion of alters in each economic category; the combined mean for the categories of employment status, and the combined mean for the categories of marital statuses.

Table 2 - Role Relationships: Bivariate Correlations of Individual Generators and the MGRI to a Multiple Name Generator.

	Discuss [1]	Helped	Money	Social	Sugar	MMG	MGRI
Number of Alters							
Met on Internet	.757(293)	.411(159)	.706(245)	.526(291)	.420(261)	0.901(296)	.453(299)
Spouse	.693(294)	.208(159)	.663(245)	.726(291)	.678(261)	0.909(297)	.699(300)
Parent	.723(294)	.539(159)	.801(245)	.314(291)	.350(261)	0.722(297)	.726(300)
Child	.616(294)	.443(160)	.572(246)	.404(291)	.223(263)	0.645(297)	.655(300)
Siblings	.733(294)	.335(159)	.512(246)	.516(291)	.234(261)	0.783(297)	.648(300)
Other Relatives	.502(294)	.487(159)	.501(245)	.562(291)	.340(261)	0.662(297)	.810(300)
Friends	.680(293)	.519(159)	.442(245)	.786(291)	.622(261)	0.834(296)	.731(299)
Neighbors	.548(293)	.535(159)	.417(245)	.677(291)	.833(261)	0.661(296)	.801(299)
Coworkers	.732(293)	.387(159)	.369(245)	.738(291)	.408(261)	0.871(296)	.731(299)
Acquaintances	.742(293)	.756(159)	.725(245)	.739(291)	.596(261)	0.753(296)	.816(299)
Club Members	.759(293)	.475(159)	.491(245)	.781(291)	.512(261)	0.806(296)	.714(299)
Mean	*0.680*	*0.463*	*0.564*	*0.615*	*0.474*	*0.777*	*0.708*
Proportion of Alters							
Met on Internet	.855(293)	.313(159)	.620(245)	.526(291)	.779(281)	0.937(296)	.809(299)
Spouse	.577(294)	.197(159)	.446(245)	.705(291)	.708(261)	0.763(297)	.864(300)
Parent	.716(294)	.414(159)	.657(245)	.310(291)	.339(261)	0.762(297)	.787(300)
Child	.651(294)	.393(159)	.571(245)	.595(291)	.218(263)	0.757(297)	.777(300)
Siblings	.668(294)	.476(159)	.576(245)	.544(291)	.285(261)	0.743(297)	.769(300)
Other Relatives	.555(294)	.505(159)	.411(245)	.639(291)	.364(261)	0.705(297)	.841(300)
Friends	.740(293)	.497(159)	.524(245)	.765(291)	.585(261)	0.873(296)	.879(300)
Neighbors	.607(293)	.560(159)	.474(245)	.715(291)	.625(261)	0.736(296)	.902(299)
Coworkers	.803(293)	.408(159)	.494(245)	.760(291)	.531(261)	0.890(296)	.877(299)
Acquaintances	.766(293)	.585(159)	.646(245)	.760(291)	.635(261)	0.774(296)	.910(299)
Club Members	.800(293)	.532(159)	.533(245)	.848(291)	.469(261)	0.889(296)	.887(299)
Mean	*0.703*	*0.444*	*0.541*	*0.652*	*0.503*	*0.803*	*0.846*

[1] Numbers in parentheses are N for each correlation.

Table 3 - Ego-Alter Relationships: Bivariate Correlations of Individual Generators and the MGRI to a Multiple Name Generator.

	Discuss [1]	Helped	Money	Social	Sugar	MMG	MGRI
Mean Closeness	.529(292)	.489(160)	.298(244)	.694(290)	.656(261)	0.766(295)	.898(299)
Mean Yrs. Known	.767(293)	.407(161)	.514(244)	.816(291)	.697(267)	0.884(296)	.904(299)
Mean Distance by Category	.794(292)	.426(159)	.520(244)	.785(291)	.285(260)	0.873 (296)	.877(299)
Mean Distance in Miles	.793(292)	.427(157)	.639(244)	.773(291)	.222(260)	0.880 (296)	.880(300)
Mean Ln(Distance in Miles)	.698(292)	.432(157)	.492(244)	.679(291)	.354(260)	0.815 (296)	.849(300)
Mean No. of Relationships	.738(299)	.603(171)	.573(251)	.750(296)	.592(273)	0.899 (301)	.896(305)
Mean	*0.720*	*0.464*	*0.506*	*0.750*	*0.468*	*0.853*	*0.884*

[1] Numbers in parentheses are N for each correlation.

Table 4 - Network Activity: Bivariate Correlations of Individual Generators and the MGRI to a Multiple Name Generator.

	Discuss [1]	Helped	Money	Social	Sugar	MMG	MGRI
Mean Contacts Per Alter							
Telephone	.759(289)	.561(158)	.553(240)	.743(287)	.409(258)	.902(292)	.809(296)
Cell Phone	.900(289)	.863(158)	.678(240)	.919(287)	.756(256)	.951(292)	.857(296)
Postal Mail	.829(290)	.481(158)	.673(240)	.762(287)	.278(258)	.894(293)	.905(296)
Email	.858(290)	.615(158)	.612(240)	.845(287)	.682(258)	.924(292)	.902(296)
Instant Message	.957(290)	.522(158)	.410(240)	.902(287)	.766(258)	.976(293)	.914(296)
Face-to-Face	.888(291)	.303(158)	.524(241)	.580(288)	.302(259)	.941(294)	.795(298)
Mean	*0.865*	*0.558*	*0.575*	*0.792*	*0.532*	*0.931*	*0.864*
Total Communications							
Telephone	.875(289)	.428(158)	.544(240)	.665(287)	.428(258)	.919(292)	.654(296)
Cell Phone	.944(289)	.949(158)	.635(240)	.966(287)	.856(258)	.987(292)	.704(296)
Postal Mail	.861(290)	.3266(158)	.691(240)	.751(287)	.289(258)	.910(293)	.889(296)
Email	.843(290)	.504(158)	.483(240)	.761(287)	.614(258)	.901(292)	.811(296)
Instant Message	.940(290)	.425(158)	.567(240)	.916(287)	.716(258)	.963(293)	.897(296)
Face-to-Face	.909(291)	.305(158)	.570(241)	.459(288)	.300(259)	.941(294)	.831(298)
Mean	*0.895*	*0.490*	*0.582*	*0.753*	*0.534*	*0.937*	*0.798*
Proportion Communications							
Telephone	.720(290)	.593(159)	.527(241)	.764(288)	.571(259)	.871(292)	.882(297)
Cell Phone	.861(290)	.693(159)	.715(241)	.870(288)	.588(259)	.943(293)	.925(297)
Postal Mail	.846(291)	.339(159)	.670(241)	.807(288)	.160(259)	.906(293)	.902(297)
Email	.884(291)	.580(159)	.667(241)	.881(288)	.599(259)	.935(293)	.921(297)
Instant Message	.920(291)	.632(159)	.674(241)	.885(288)	.727(259)	.962(293)	.945(297)
Face-to-Face	.695(292)	.405(159)	.538(241)	.793(289)	.474(260)	.878(294)	.903(298)
Mean	*0.821*	*0.540*	*0.632*	*0.833*	*0.520*	*0.916*	*0.913*

[1] Numbers in parentheses are N for each correlation.

Table 5 - Network Properties: Bivariate Correlations of Individual Generators and the MGRI to a Multiple Name Generator.

	Discuss [1]	Helped	Money	Social	Sugar	MMG	MGRI[2]
Size	.566(299)	.431(171)	.444(251)	.628(296)	.519(273)	.681(301)	1.000(302)
ln(Size)	.564(299)	.424(171)	.437(251)	.693(296)	.459(273)	.708(301)	1.000(302)
Density	.698(283)	.515(102)	.682(170)	.737(282)	.532(203)	.858(295)	.822(302)
Mean	*0.609*	*0.457*	*0.521*	*0.686*	*0.503*	*0.749*	*0.941*

[1] Numbers in parentheses are N for each correlation.

[2] The MGRI uses the same network size estimates as the multiple name generator method.