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Measuring Personal Networks with Surveys

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Abstract

Like in other fields of inquiry in the social sciences, in social network research the most frequently used measurement method is the survey. Compared with other measurement objects such as networks of opinions, attitudes or values, measurement is more complex and thus often more challenging. Measurement typically occurs in two main phases. First, network units are measured (generated). Second, the relationships among the units and other unit characteristics (e.g. demographic properties) are determined, while some specific questions arise as to whether whole or egocentric (personal) networks are to be measured. In this paper, we limit ourselves to measuring personal networks, especially when compared with different methods for generating networks. There are five basic approaches to generating a personal network: name generator, role generator, event generator, positional generator, and contextual generator. Each is associated with particular research goals, costs (financial, time, respondent burden), advantages, and limitations. Moreover, the complexity and specifics of generating networks mean one must consider the characteristics of data collection modes (e.g. face-to-face, telephone, web). In this sense, we will present the advantages and limits of various methods of generating personal networks, evaluate them critically and comparatively, and illustrate them with often used examples.

1 Introduction

The most common measurement instrument in the social sciences is the survey. Social networks can be generated in several different ways, from automatically or human-generated electronic networks (e.g., networks on the Internet, e-archive networks such as the Slovenian bibliographical network of authors and publications etc.) through to networks arising through surveys (e.g. large international surveys like the International Social Survey Programme – ISSP, the Survey of Health, Ageing and Retirement in Europe – SHARE, the European Quality of Life Survey – EQLS or Gender and Generations Programme – GGP), or even networks created by qualitative methods such as interviews or participant observation. At least in the social sciences, the most common method of generating social networks is the survey. This brings with it all the well-known issues and challenges of measuring theoretical concepts with a survey (e.g. memory recall problems,

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understanding question wording, and others when seeking to measure attitudes, opinions, values etc.), together with some measurement issues that are quite specific to social networks. In several ways, measuring social networks is more complex and challenging than measuring attitudes or opinions:

- There are usually two measurement phases – the first, generating the network and, the second, measuring the relationships among the units and their characteristics (characteristics of both the units and the connections among the units).
- Two types of network can be measured – personal (egocentered) and whole (complete).[3]
- The data collection mode (e.g., face-to-face, telephone, web) determines several specific requirements.

This paper aims to present and critically discuss different ways of generating personal networks using surveys, their strengths and limitations, while comparing them regarding the different data collection modes relied on in survey research. The purpose of the paper is to comprehensively overview measurement issues and possible remedies for measurement errors associated with survey network measurement. Its added value is entailed in summarizing and contrasting earlier research with recent advances in social network research. We constrain ourselves to personal (egocentered) networks although it is noted that, with minor adaptations, the characteristics can also be generalized to whole networks.

2 Methods of Generating Personal Networks in Surveys

One can say there are five basic methods for generating a personal network - we may call them network generators - they are survey questions used to obtain the units in a person's personal network: name generator, role generator, positional generator, event generator, and contextual generator. There is also a sixth method - visual generator - which, due to its specifics and potential for use given the ubiquity of modern information communication technologies, we decided to consider separately even though it "only" uses the other methods (usually the name generator method) in a new way.

2.1 Name Generator

A network is generated using a name generator by asking for the actual names of persons (for anonymity reasons, usually the initials or name and starting letter of the family name). Depending on the aims, scope and often also the time and funding available to a research project, the name generator can be single or multiple. The subject of the study determines the content of the name generator(s) (it is frequently social support). One example is Burt's well-known and often used name generator (1984):

[3] A personal network consists of the focal ego (respondent) and their relationships with his or her network members (e.g. friends, relatives, coworkers), whereas a whole network consists of a group of people and the relationships among them (e.g., a school class).

> From time to time, most people discuss important personal matters with other people. Looking back over the last six months – that would be back to last August – who are the people with whom you discussed an important personal matter? Please just tell me their first names or initials.[4]

The biggest advantage of this type of network generator is the complex, accurate, representative and comprehensive measured network that emerges in terms of its size and properties. Indeed, some research shows that the dispersion of roles tends to be somewhat larger than, for instance, with the role generator (e.g., Hlebec and Kogovšek, 2011). The questions are also content-wise more specific and thus less ambiguous. On the other hand, it has several limitations. The specifics of question wording may lead to lower comparability with other studies. The content of the name generators may not be relevant for all respondents, potentially creating more missing data while its cost, i.e. time and respondent/interviewer (if there is one), burden is relatively demanding. Costs rise if a multiple name generator is involved. Another challenge is the burden placed on respondents who have large personal networks. The more names that are produced in the first stage, the more the questions about those people which follow in the second stage (Burt, 1984; Ruan, 1998). Limiting the number of named persons may sometimes be a solution, yet earlier research (Holland and Leinhard, 1973) indicates problems with the representativeness of such named networks. It is argued is that a limitation on the number of names that can be listed always produces a biased measured network. Possible advantages of name limitation are a lower respondent burden, reduced costs and fewer redundant names (e.g., Merluzzi and Burt, 2013). Actual data from several countries as well as experimental data from the Generations and Gender study reveal that being limited to five names in different support situations is adequate (Dykstra et al., 2016).

With some types of social support, name limitation does not pose a large problem (Hlebec and Kogovšek, 2005b). Nevertheless, one must be careful with constraints on the network size or the number of support providers (Hlebec and Kogovšek, 2013). It appears that if the limitation on the number of listed names reflects the genuine size of personal networks, the bias tends to be smaller. The procedure proposed is to estimate the actual size of a specific network type in a pilot study, then limit the number of names in the main field work using a combination of statistical rules (e.g., mean or median value plus standard deviation). There are also weaknesses when it comes to survey administration. If a self-administered survey is involved, the possibility of errors when entering names is quite big. For instance, Vehovar et al. (2008) found up to 13 % of non-valid entries, mostly collective nouns, such as "friends", "family" and similar. Further, interviewer presence may introduce a relatively large interviewer effect. For instance, Eagle and Proeschold-Bell (2015) discovered systematic patterns among interviewers concerning respondents naming fewer than 5, exactly 5 or more than 5 network members with Burt's name generator. Network properties (e.g., size, density) might largely depend on the content of the name generator(s) (Campbell and Lee, 1991, Bernard et al., 1990). The effect of name-generator ordering has also been shown (e.g., Ruan, 1998, Burt, 1997). Since they collect people's actual names, the biggest problem facing all name-generating methods is the perception of anonymity. It is possible that public discussions of the new European data protection regulation (GDPR) and greater awareness of personal data protection might

[4]If fewer than five names are given, the interviewer is instructed to probe with Anyone else?

strengthen this view. The final fact is that information about network members is provided by proxy respondents, i.e., the ego, not the network members themselves, provides the information on the network members. This raises doubt in the accuracy or precision of the information about the network members. Indications based on whole-network research show that recall of network members increases with closeness, frequency, duration and recency of contacts between the respondent and her/his network members (Sudman 1985, 1988).

2.2 Role Generator

The role generator method creates a personal network by asking respondents about their social roles (e.g., mother, sibling, friend, coworker, expert) that provide them with social support (see Appendix 1). Like with the name generator, we can have a single or multiple role generator and the content of the study determines its content (e.g., social support). But the difference is that the respondent does not name actual persons (usually from memory), but chooses people from a predefined list of roles. The list of roles can be short or long and this, as shown later, has some methodological and substantive consequences. Research shows the role generator typically gives predominantly family-oriented personal networks, especially with a long list of possible roles where the family sector is usually more elaborated (instead of just one "family" category, there are multiple, more specific roles such as mother, father, daughter, son, brother, sister etc.), thus encouraging the respondent into naming more family members (e.g., Hlebec et al., 2012b, Hlebec and Kogovšek, 2013).

This network generator has several advantages. It is relatively cost-effective (time, burden on respondent /interviewer). There is less burden also because this is usually the only network question that is asked. Namely, there are no additional questions about the characteristics of the ties or network members. There are potentially fewer errors as answers given in advance, often with the help of a card. While there is perhaps a smaller problem with anonymity since no actual names of network members are provided, less detailed and complex information on the network emerges. Only the roles of the network members are obtained, but it is impossible to distinguish the majority of roles held by different individuals (e.g., we often have several friends, siblings, coworkers etc. in the network). Limiting the set of possible roles on the list introduces the issue of the representativeness of the named networks.

2.3 Positional Generator

Individual social capital is measured with the positional generator by providing the ties of the respondent to persons holding specific social positions (e.g., a bank manager) or in possession of specific goods or skills (e.g., having a larger quantity of stock or knowing how to repair a computer) (see Appendix 2). There are many conceptualizations of social capital, with e.g. Bourdieu's or Putnam's being perhaps the best known), but the main idea builds on the assumption that an individual's access to different material or non-material resources possessed by persons in his/her personal network gives this individual a competitive advantage in different life situations.

Its principal advantage is that it is one of the rare ways available to measure social capital systematically and quantitatively. Yet, it also encounters some limitations. The measurement is quite demanding because there are in fact two questions in one (whether the respondent knows a certain kind of a person, and in what kind of relationship are they in with that person). The situations (relevant positions, occupations, skills, resources) are usually quite culturally specific, thus challenging the researchers to properly adapt the measurement instrument to country-specific circumstances, and limiting international comparisons. There is also the question of how to capture the majority of relevant situations, which should be as diverse as possible. The relevance of individual items (e.g. occupations) may be very particular with regard to the studied population (e.g., the young, elderly, employed etc.), research goals and social context and historical time, therefore the selection of items must be made very carefully (some items may cause white noise in the data) (Hällsten et al., 2015).

2.4 Event Generator

An event generator is actually a special case of a role generator whereby the respondents are asked about the roles of persons they ask for help in case of typical life events (e.g., wedding, birth of a child, death of a loved one etc.) (see Appendix 3). Again, the list of roles can be either short or long. Research shows a relatively diverse list of alters[5] (a diverse network composition) is obtained using this network generator (e.g. Hlebec et al., 2009).

Being a variant of the role generator, this network generator's advantages and limits are similar to those of the former; yet, it also comes with its some of its own specifics. On one hand, a very detailed definition of a certain life situation may produce a more representative measurement of a personal network. However, this may also be a limitation given that a very narrow definition of life situation limits the generalizability to other situations, although this may not be such a problem if this corresponds well with our research questions. Another limitation may be that some life events may not be relevant (yet) for a (large) share of respondents. This problem may be resolved by asking them about these events, with this then raising another issue concerning the mixing of actual and hypothetical situations since some research shows there are differences in actual (enacted) and hypothetical social support (e.g., Dunkel-Schetter and Bennett, 1990, Sarason et al., 1990). Life events and the surrounding contexts may also be very culturally specific, which may incur a problem of cross-cultural comparability.

2.5 Visual Generator

Given that in some basic sense the concept of social networks is visual in itself, it is not surprising that some network generators rely on this as their basic principle, the more so with proliferation of the Internet where such generators are intuitively very attractive. This explains why we decided to present this kind of a network generator in its own special section, even if it is not different from the others in its other characteristics - usually, the

[5]Network members are often also called alters as opposed to survey respondent, who is called the (focal) ego.

visual network generator is a version of a standard non-visual one (e.g. a traditional name generator).

Although versions on paper existed even before, the best known and probably most often used is the network generator by Kahn and Antonucci (1980) (see Appendix 4). An online example is the GENSI network generator by Stark and Krosnick (2017) (`https://www.tobiasstark.nl/GENSI`), which in fact is a name generator made on an online platform. Of course, combinations with other types of network generators are possible. Visual generators tend to generate a network mostly on the principle of closeness since this is how people generally have their network members stored in their memory.[6]

Network structure was established by presenting a set of three concentric circles with a smaller circle in the center in which the word "you" was written (Antonucci, 1986). The respondent was told the three circles should be thought of as including "people who are important in your life right now" but who are not equally close. Respondents were then asked to think about "people to whom you feel so close that it is hard to imagine life without them." Such persons were entered in the innermost circle of the network diagram. The same procedure was followed for the next circle, described as including "people to whom you may not feel quite that close but who are still very important to you," and for the outer circle, described as including "people whom you haven't already mentioned but who are close enough and important enough in your life that they should be placed in your personal network."

Advantages are that the method of generating a network is intuitively close to respondents (as it is consistent with the cognitive structure of their networks) and they tend to like it more than other ways of generating networks (Stark and Krosnick, 2017).

Although the research so far shows no obvious disadvantages of such a network generator, some research reveals some aspects of the method may indicate potential limitations worth further testing. For instance, it takes approximately the same amount of time to fill in a visual generator and at least some indicators of network compositions are the same as from a non-visual one. Compared to non-visual methods, there are some differences in the network size (if there is no limit on the number of named persons) and certain network properties (e.g., composition, density, intensity of ties). Qualitative methods of inquiry show that respondents tend to think differently while responding to a visual compared to a non-visual network generator (Lippe von der and Gamper, 2017). With a visual generator, respondents tended to think about the network carefully before starting to fill in the names (compiling them in groups such as "family" and "others"), whereas with the non-visual method they did not mentally construct their network in advance, but filled in the names more spontaneously. This difference in naming strategies led to a slight difference in the family vs. non-family proportion. Also, when measuring ties among alters, for a large number of these connections designating them can become quite complicated. Another possible drawback might concern respondents less skilled with computer technology (e.g., older people), although no studies have yet confirmed this.

[6]Some research shows that strong ties tend to be more salient (more quickly accessible) in memory and thus named first (Verbrugge, 1977, 1979, Burt, 1986, D. Brewer, 1993, 1995, Brewer and Yang, 1994).

3 Results of Empirical Studies

In this section, we present and discuss studies that tested specific methodological considerations using measurement instruments in personal network research.

3.1 Conceptual Differences

Research shows that network generators, i.e., name generators and role generators, are sensitive to question wording, with the latter often actually reflecting differences in theoretical concepts (e.g. of social support, social capital etc.). As mentioned, differences emerge in a measured social network if we ask about the actual or hypothetical support network. With actual support, we measure the social network within a specific time frame (e.g. six months) while with hypothetical support we obtain information on potential support ties or stable patterns of support ties. Time frames usually produce networks that are smaller in size (Campbell and Lee, 1991). Straits (2000) found differences in measured networks owing to different question wordings for the Burt name generator; namely, specific alternatives with and without explicitly mentioning negative interactions. On the other hand, Kogovšek and Hlebec (2005) established few differences (percentage of women and other kin) between actual (in the last six months) and usual discussion partners. It also seems the question wording effect somewhat depends on the type of support. Hlebec and Kogovšek (2005a) determined no large differences in hypothetical vs. actual support for the first two providers of support when it comes to discussion partners (the Burt name generator), financial support, support in the case of sadness or depression, and advice regarding a major life change). On the other hand, material support, support in the case of illness (second provider) and discussing problems with one's partner (both providers) showed differences. It seems that when the number of possible support providers is generally larger and support providers are then often interchangeable, the hypothetical and actual support providers differ. The length of question wording in the web data collection mode affects the network size, composition and some other network properties (Lozar Manfreda et al., 2004).

With the positional generator, different occupations contribute quite differently to the explained variance of social capital. For several occupations, contributions to social capital also vary across outcome criteria such as social background, quality of the network members, unemployment risk, and contacts per day. The measure of social capital is very sensitive to the inclusion of the right occupations in the position generator (e.g. medical doctors, engineers, financial managers) which seem pivotal and cannot be omitted. Still other occupations seem to produce only measurement error (e.g., mechanic, computer technician) and are best omitted from the measure of social capital. A certain occupation's positive or negative contribution may also depend on the studied content, i.e. the population (e.g., a more general or a more specific population like youngsters), the specific social context, and time under scrutiny (e.g. a highly developed postindustrial or mainly rural society) (Hällsten et al., 2015).

3.2 Limitations on the Number of Network Members

Respondents most probably employ different naming strategies when faced with a limitation on the number of alters as opposed to a free choice. Information in the generator question itself may be an element on which a respondent relies in forming their response (Sudman, Bradburn and Schwartz, 1996). Indeed, placing an upper limit on the number of named alters may create differences in network size, structure, and composition (Holland and Leinhardt, 1973) and such limits are therefore usually not advisable, as also stated by van der Poel (1993b). Limitations may affect the network size and reliability of measurement (e.g. Campbell and Lee, 1991; van Groenou et al., 1990). Yet it must also be said that with name generators an indirect limitation of five persons does not seem to produce large differences in network properties such as network composition, at least in the Burt name generator, which typically produces small-sized networks (e.g. Hlebec and Kogovšek, 2005b; Kogovšek and Hlebec, 2005). However, there is a notable interviewer effect (Eagle and Proeschold-Bell, 2015). Kogovšek et al. (2010) find such a limitation is not necessarily a considerable problem, although it seems to at least partly depend on the type of social support and possibly the upper limitation number itself. Some degree of limit on the number of alters is advisable when collecting data by a web survey since the larger the number of alters that are named, the bigger the respondent burden, leading to a higher drop-out rate especially in web surveys (Lozar Manfreda et al., 2004).

3.3 Single- or Multiple-Network Generators

Some studies establish differences in measured networks regarding whether we use single- or multiple-name generators (e.g. Hoffmeyer-Zlotnik, 1990; van der Poel, 1993a, Ruan, 1998). As expected, a single-name generator produces smaller networks (Burt, 1997, Ruan, 1998) and tends to elicit the closest network members (van der Poel, 1993a). People tend to turn to different people for various types of social support, with some network members often seeming to "specialize" in a single type of support (e.g. Fischer, 1982; Wellman and Wortley, 1990). Accordingly, multiple-name generators usually capture a more diverse set of network members. On the other hand, apart from a larger respondent/interviewer burden and the cost entailed by multiple-name generators, a problem of the question-order effect may occur, leading to assimilation and contrast effects (e.g., Burt, 1997; Ruan, 1998). Some evidence (e.g., Yousefi-Nooraie et al., 2017) indicates a later position of the name generator tends to lead to fewer persons being named or stating not knowing anyone, and that this pattern may also be moderated by willingness to answer (respondent motivation) and question sensitivity. Multiple name generators may be redundant. Certain empirical research (e.g., van der Poel, 1993a) shows that we obtain almost no more new names after three to five name generators. On the other hand, for specific populations and research purposes more name generators might be needed. For instance, using a convenience sample of physicians involved in quality improvement, Burt et al. (2012) found the respondents tended to have very different social network types (e.g. organized around only one important person performing multiple roles or very different ones), thus requiring five to eight name generators to obtain a valid set of relevant network ties.

3.4 Content of Network Generators

The content (e.g. type of social support) of network generators affects the network size and density, the properties of ties (e.g., closeness, frequency of contact, duration of relationship) and variability of educational and age composition, but not the network composition generally (by gender, age and education) (e.g. Milardo, 1989, van der Poel, 1993a). Some name generators whose content may encourage the naming of geographically and/or emotionally close alters are able to produce denser networks (Campbell and Lee, 1991, Bernard et al., 1990).

3.5 Data Collection Method

A comparison of the telephone and web data collection methods with name generators points to differences in network size and composition.[7] The web method seems on average to produce larger networks (and also a larger standard deviation for average network size) than the telephone method (e.g. Eagle and Proeschold-Bell, 2015). Web collection seems associated with somewhat lower reliability (but not validity) compared to data collection by telephone (Kogovšek, 2006). There is also evidence (e.g. Matzat and Snijders, 2010) of data being lower in quality in contrast to face-to-face data collection (higher drop-outs, more missing data) along with some differences in the network properties (e.g. higher density and lower network size for web collection).

Still, the reliability of measurement is largely the same when we compare telephone and face-to-face data collection, or at least the differences are not clear-cut (Kogovšek et al., 2002; Kogovšek and Ferligoj, 2005). The test-retest reliability of telephone data collection and the stability of measurement between the two methods does not show large differences in network composition and tie properties (e.g. duration of ties, age, importance and emotional closeness of alters, frequency of contact, geographical proximity) (Hlebec and Kogovšek, 2005b). Yet the telephone method seems to produce a more valid measurement than the face-to-face method (Kogovšek et al., 2002; Kogovšek and Ferligoj, 2005).

When collecting data by a web survey, special care must be taken with the graphic form of the question (number of frames available for entering names) as that may have quite a large effect on the network size – the greater the number of boxes provided for entering names, the larger the network size (Lozar Manfreda et al., 2004; Vehovar et al., 2008). Moreover, the heaping of names at 5 or 10 names was observed when 5 or 10 boxes were provided. The percentage of non-valid responses (e.g. general categories, such as "family" or "friends" instead of people's actual names) also seemed to depend on the response format, the lowest being for the 10-box and the highest for the 1-box format. Yet, the drop-out rate seems to fall the lower number of boxes provided (an indirect effect of the respondent burden). There were no statistically significant differences according to a different number of name boxes however when network composition and frequency of contact were considered (Vehovar et al., 2008).

[7] Eagle and Proeschold-Bell (2015) however find no large and no significant differences in kin and non-kin percentages.

3.6 Comparability and data quality

A comparison of network generators shows the highest data quality (within a particular MTMM model defined as the product of reliability and validity) is accomplished by the name generator, followed by the role generator and the event generator (Hlebec et al., 2012a).

In general, we may add that at least as far as network composition is concerned the name generator and role generator approaches are relatively comparable, whereas the event generator produces quite different results (Hlebec and Kogovšek, 2013; Hlebec et al., 2012a). The response choices – a long or a short list of roles – also seem to importantly affect the network composition (Hlebec and Kogovšek, 2011, 2013; Hlebec et al., 2012b), indicating that researchers must consider the length and contents of response categories when using role, event, and position generators. There are also differences in the type of social support. It seems that comparability with network composition is relatively high with instrumental support, which is often provided by interchangeable but not necessarily very close providers. On the other hand, bigger differences are seen with emotional, informational, and work support (Hlebec and Kogovšek, 2011).

A comparison of the Antonucci visual name generator and the event-related generator reveals quite large differences in network composition. The variability of support providers was larger in the event-related generator. To a considerable extent, this may be explained by the initial Antonucci name generating method which encourages a preference for close ties, which are used in the next step for assessing different support functions (Hlebec et al., 2009).

4 Discussion and Conclusions

Having reviewed the state-of-the-art in the area of generating personal networks, we can now perhaps conclude by sorting factors into two groups – one whose effects are largely already firmly established and the other for which the results are still inconclusive.

Factors whose effects seem fairly well established include:

1. The use of single- or multiple-network generators, where the latter usually produce more diverse networks (Hoffmeyer-Zlotnik, 1990; van der Poel, 1993a). However, the key guideline here should always be one's particular research goals. If more thorough information on respondents' networks is required, multiple-name generators must be used.

   Still, since we must always consider survey costs and respondent burden it seems reasonable to introduce an upper limit of three to five network generators because empirical evidence suggests that after that almost no new names are obtained (e.g., van der Poel, 1993a). If we are unsure of the suitability of the upper limit, this can always be tested in a pilot study.

2. The data collection mode also seems to consistently affect different network properties and data quality (e.g. Eagle and Proeschold-Bell, 2015, Kogovšek, 2006), although the latter also partly depends on the type of quality indicators in use.

However, since such studies are still very rare in the field of network data, further systematic experiments to test these effects are needed.

3. Using a short vs. long list of roles in the role generator also consistently shows differences in network composition with a tendency of obtaining a bigger percentage of family when a long list in which family roles are usually more elaborated is used (e.g. Hlebec and Kogovšek, 2011, 2013; Hlebec et al., 2012b). Given that a longer list of roles probably also poses a greater burden on the respondent and is more time-consuming, we should consider if such detailed information is truly needed to meet our research goals or whether we expect to ultimately pool all the family roles together anyway.

4. Given that visual methods are an intuitive way of collecting network data, well aligned with respondents' mental structures and their preference for these methods using a visual method seems the preferred way for collecting them (e.g. Lippe von der and Gamper, 2017). Yet, the possible challenges brought by these methods (e.g. the population (especially in the web mode), the detail of data, and diversity of network that is needed to satisfy the research goals) should also be carefully considered beforehand.

The effects that are not well established and indicate the need for new studies are:

1. Question wording, where differences appear when measuring actual versus hypothetical social support with the time frame being an important feature in the former, but not in the latter (e.g. Campbell and Lee, 1991). However, when comparing these two, differences in measured networks seem to also be mediated by type of social support (differences shown for material support, support in the case of illness and discussing problems with one's partner, but not for the discussion partners (the Burt name generator), financial support, support in the case of sadness or depression and advice) and the number of providers considered (the first, the second or both) (Hlebec and Kogovšek, 2005a). Differences also tend to depend on the length of the wording (in the web mode) (Lozar Manfreda et al., 2004) and specifics in the content of the name generator (e.g., occupations in the position generator, specific network delineation criteria, such as "important matters" or "significant people" and in(ex-)cluding negative ties) (e.g. Straits, 2000, Hällsten et al., 2015). Here we can also probably include the event generator itself, which precisely due to the specific wording (concrete events) seems to produce quite different networks from the other generators.

2. Introducing a limitation on the number of alters in some cases showed differences in different network properties, such as size, structure and composition, even reliability of measurement (e.g. Holland and Leinhardt, 1973, van der Poel, 1993b, Campbell and Lee, 1991, van Groenou et al., 1990). Yet, more recent studies show this factor might also be mediated by other factors such as type of social support, the interviewer, the upper limit itself and data collection mode (for instance, the web) (e.g. Eagle and Proeschold-Bell, 2015, Kogovšek et al., 2010, Lozar Manfreda et al., 2004).

As indicated by our review of methodological issues in the measurement of personal networks, some issues have been explored by empirical research, while others remain open for consideration in empirical validations. In particular, we would like to call attention to the question wording of personal network generators linked to different data collection modes. Quite possibly, specific issues arise from the web data collection mode (or other types of self-administration modes) that rely on visual prompts as opposed to measurement instruments that rely on non-visual survey formats.

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