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Stability of Typologies Produced on the Basis of Repeated Measurement with the Role Relationship and the Name Generator Approach

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Abstract

In measuring ego-centered social networks, two general approaches can be distinguished. A very simple way to evaluate membership in a social network is to ask an ordinary survey question where response categories are types of relationships (e.g., partner, parents, children, friends, etc.). This approach (usually called the role relation(ship) approach) is very appealing as it saves time and money. However, information obtained by this approach is very limited.

Most often, when evaluating ego-centered networks, the name generator approach is used. The list of egos (respondents) is obtained in the first step. In the second step, existing ties are identified - all alters with whom the focal ego has some sort of relationship. When all ties have been identified, the contents and the characteristics of ties are assessed. In most cases the characteristics of the alters are also measured. The name generator approach yields more data and is also of higher quality. However, it is time and money consuming, and it requires either considerable effort from respondents, when it is applied in self-administered mode, or complex coordination between interviewer and respondent, when it is applied in personal interviews (e.g., Kogovšek et al., 2002).

In a series of studies (e.g., Hlebec and Kogovšek, 2005; Kogovšek and Hlebec, 2005; Kogovšek and Hlebec, 2008), network composition was estimated using both approaches. Test-retest and split-ballot experiments on convenience samples of respondents were used to assess the stability of network composition. Findings show that, with some caution, the two approaches are comparable. In the present paper this line of research is taken a step further. Typologies of social support networks are produced by hierarchical clustering on the basis of network composition, estimated by both approaches. Overall stability of typologies as well as stability of clustering of individual respondents is studied by means of simple descriptive analyses and by discriminant analysis. The results show that the overall stability of typologies is relatively high – two to three cluster groups

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are obtained in each analysis. However, the typologies seem to be more stable in one experimental group. Also the stability of clustering for individual respondents seems quite high as 73% to 85% of respondents were correctly classified. Incorrectly classified respondents were also studied, but their characteristics may well reflect the specific characteristics of the sampling procedure rather than some other systematic factor.

1 Introduction

Social networks can be defined and measured in many different ways. One way to study a person's social network is to ask about the most important people in his/her life. In research terms that is usually called the affective approach, and a well-known and commonly used example can be found in Antonucci (1986). Another way would be to ask (or the data might already be collected in electronic form, such as e-mail messages) about a person's more or less frequent contacts with other people – that is the interaction approach (e.g., Bernard et al., 1982). We can also ask with whom people exchange different things or services (the so-called exchange approach; examples can be found in McCallister and Fischer, 1978; Burt, 1984, van der Poel, 1993). Compared to these approaches, one quite simple way to go about measuring one's social network would be to locate network members according to the roles they have in the network, i.e. the role relation(ship) approach (e.g., International Social Survey Programme 1987 and 2001). Some of these approaches are frequently combined with the name generator approach for eliciting the names of network members, for instance exchanges of social support (e.g., Burt, 1984; McCallister and Fischer, 1987) or measuring networks of important people (e.g., Antonucci, 1986).

All approaches have specific advantages and disadvantages, and each may be useful and appropriate for specific research purposes. For instance, some of these approaches were compared from the methodological point of view within *The Groningen Social Network, Support and Health Study* (van Groenou et al., 1990; van Sonderen et al., 1990), where the exchange and affective (adapted from Kahn and Antonucci, 1980) approaches in combination with name generators and the role relation approach were used.

Among other results, Van Sonderen et al. (1990) found that the exchange and affective approaches compared to the role relation approach elicited the most siblings and parents and almost all partners and children. The exchange approach is more likely to elicit mothers-in-law, and fathers-in-law and neighbors and co-workers with whom the respondent is in frequent contact. With the exchange approach, as compared to the affective approach, there is a greater probability of eliciting the most important role relations, but both are equally good at eliciting relations that last a long time. All partners and most children and parents were obtained by both approaches, whereas other role relations are elicited mostly by the exchange approach. Van Groenou et al. (1990) studied test-retest reliability on

the same data. If the researcher is interested in a relatively large network with different types of role relations, the exchange approach seems to be the most suitable. The affective approach reliably elicits close kin, but less so other types of relationships. The role relation approach obtains specific parts of the network, but these measures very reliably.

In this paper we focus on comparing the name generator and the role relation approach. The main advantage of the name generator approach is that it usually produces detailed information on concrete network members and the characteristics of ties with them. Therefore, relatively accurate estimates of network characteristics, such as network composition, are also possible. On the other hand, such network data collection may be quite burdensome for the respondents, especially in the case of rather large networks, owing to the free recall format for eliciting the names, if done in a self-administered mode (e.g., see Lozar et al., 2004) or complex coordination between interviewer and respondent, when it is applied in personal interviews (e.g., Kogovšek et al., 2002). Collecting a larger amount of such data may therefore be quite expensive and time consuming, which is especially undesirable in the case of larger studies, of which network data form only one part. As well, it may be quite a sensitive operation, since at least some respondents may be reluctant to give the names of actual persons and provide very personal data about them or about relationships with them (which is our actual experience in collecting this kind of data).

In contrast, the role relation approach, where network members are represented only as role relationships and, typically, only the first two important persons are obtained and that with the help of a showcard with a list of possible role relations, is cheaper, simpler to administer and less burdensome for respondents. On the other hand, owing to the specific response format, less precise information on network members is obtained, and estimation of different network characteristics is therefore limited. With the role relation approach, unique identification of persons is possible only for "unique" role relationships, such as the partner. With other role relationships, multiple actual persons cannot be distinguished (e.g., friends, children, siblings). If we regard each possible role relation functionally, this approach poses no particular limitation. However, estimation of the network composition, a frequent practice in social network analysis, is limited, since we do not possess information about the number of children, siblings and so on. Thus, the proportion of different types of relationships (e.g., whether the personal network is primarily kin- or friend-oriented) cannot be estimated directly (Kogovšek and Hlebec, 2008). Additionally, as our experience shows, people may feel limited by being required to make only two choices, or when some network members are interchangeable and hold an equal position in the respondent's network. For instance, a respondent might report asking a partner and any of his/her children (the one most available in a certain situation) for a specific kind of help, but is forced to choose just one because of the response format. Some solve this problem by naming a different child on different network eliciting questions.

The name generator and role relation approaches were also methodologically compared in a series of studies by Hlebec and Kogovšek (Hlebec and Kogovšek, 2005; Kogovšek and Hlebec, 2008). Some of the findings were as follows:

- Limitation to the first named person in the role relation approach gives similar estimates of network composition measures as the name generator approach. However, the percentage of partners in the network in the role relation approach is overestimated, which could be explained by respondents' tendency to name the partner as the first alter.
- Network size in the role relation approach tends to be underestimated.
- The Pearson correlation coefficients between social composition indicators measured by both approaches show a relatively high correspondence, with the exception of network size.
- There are greater differences between the approaches with only one choice taken into account.
- The differences are greater for the most important relationships,
- There seems to be no systematic effect of the method order.
- The results are similar whether we study the whole network together or different support subnetworks separately.

The research problem we want to deal with in this paper is whether network composition indicators, estimated by different measurement approaches (in this case the role relation and the name generator approach), are robust enough to produce similar results in further, "secondary" analyses. In this case, we are testing whether we would obtain comparable typologies, i.e. groups of people with similar types of social support networks, which is a common type of initial, descriptive analysis in the field of social network analysis.

2 Research design and data

In the study, a simple 2-group split-ballot experimental design with control for method order effect was used, as shown in Table 1.

Table 1: Design of the study.

	N	Wave 1	Wave 2
Group 1	120	Name generator	Role relation
Group 2	112	Role relation	Name generator

Data were collected on a quota sample of 232 respondents in two waves by students in the Social Network Analysis course at the Faculty of Social Sciences in Ljubljana in October and November 2006. Each student interviewed him/herself

and five additional respondents of his own choosing. The quotas were designated so that half the respondents had to be male and half female and within these two groups, one in each of the three age groups (20-29, 30-49 and 50+ years of age). The interval between the two measurement waves was two weeks.

Three types of social support were measured with six network generators:

1. Some tasks in the apartment or in the garden a person cannot do by him/herself. It may happen that you need someone to hold the ladder for you or help you move the furniture. Whom would you ask for help? (instrumental support)
2. Say you have the flu and have to lie down for a few days. You would need help with various household tasks, such as shopping and similar. Whom would you ask for help? (instrumental support)
3. Now imagine you needed to borrow a larger sum of money. Whom would you ask for help? (instrumental support)
4. Say you have problems in the relationship with your husband/wife/partner which you cannot solve on your own. Whom would you ask for help? Even if you are not married and do not have a partner, try to answer, what you would do in such a case. (emotional support)
5. What about the case when you felt a little blue or depressed and would like to talk to someone about it. Whom would you ask for help? (emotional support)
6. Say you needed an advice with regard to an important life decison, for instance getting a job or moving to another place. Whom would you ask for help? (informational support)

In the case of the name generator approach, a respondent could name as many persons as he/she wanted. Additionally, information on the type of relationship was collected for each named person. The respondent could chose among the following possibilities: husband/wife/partner, mother, father, daughter, son, sister, brother, other relative from my family, other relative from my partner's family, good friend, neighbor, co-worker and other). In the role relation approach, respondents were asked for the two most important support providers (whom they would ask for help as the first and whom as the second). They answered with the help of showcards, where types of role relationships were provided. Standard role relation types were provided for all network generators: husband/wife/partner, mother, father, daughter, son, sister, brother, other relative from my family, other relative from my partner's family, good friend, neighbor, co-worker, other and nobody. Several additional specific role relation types were provided only for specific network generators as appropriate for a specific type of social support: someone from a social institution, someone whom you would pay for help, godfather/godmother, employer, state (state savings program), bank, private loan provider, priest, family medical doctor, psychologist or other professional advisor, self-help group and lawyer. In the analyses, the role relation types of both

approaches were pooled into the following types: partner, mother, father, daughter, son, sister, brother, other relative from my family, other relative from my partner's family, good friend, neighbor, co-worker and other.

3 Method

In the first step of our analysis we used hierarchical clustering to produce typologies. We clustered on the basis of network composition indicators (percentages of partner, kin, friends etc. in the network)[3]. Clustering was done by the Ward method, and Euclidean distance was used as a measure of dissimilarity. Six typologies were produced:

- separately for each experimental group of respondents and
- separately for the name generator approach, the role relation with only first named support provider and the role relation with both support providers.

The name generator was considered as the baseline of comparison, since it contains more detailed data on the respondent's support network, which can therefore be considered as a closer representation of his/her "true" network.

In the second step we analyzed the stability of the typologies obtained. First we considered the overall stability of typologies and later the stability of clustering for individual respondents. A brief analysis of falsely classified respondents is presented as well. These results are presented in the next section.

4 Results

In this section, firstly, the overall stability of typologies is presented by simple descriptive statistics, and secondly, the stability of clustering in the case of individual respondents is studied by discriminant analysis. Finally, the demographic composition of falsely classified respondents in discriminant analyses is shown.

4.1 Overall stability

In Table 2 the overall stability of the typologies is presented. In columns, results for each experimental group of respondents is presented separately. In rows, clusters are shown, separately for each measurement approach, the name generator approach (name generator, cluster groups 1, 2, and 3), the role relation approach

[3] For role relation network composition estimation, see Kogovšek and Hlebec, 2008.

with one support provider (role relation 1, cluster groups 1, 2, and 3) and the role relation with both support providers (role relation 2, cluster groups 1, 2, and 3). In the Table percentages of the three strongest types of support providers are shown.[4] The number of respondents clustered in each group is also presented.[5]

Table 2: Typologies of networks, by experimental groups.

	Exper. group 1	N	Exper. group 2	N
Cluster group 1	Friends (47%)	46	/	/
Name generator	Mother (12%)			
	Father (11%)			
Cluster group 2	Friends (18%)	74	Friends (18%)	81
Name generator	Partner (16%)		Partner (17%)	
	Daughter (15%)		Daughter (14%)	
Cluster group 3	/	/	Friends (31%)	31
Name generator			Mother (19%)	
			Partner (15%)	
Cluster group 1	Mother (35%)	29	/	/
Role relation 1	Friends (32%)			
	Father (17%)			
Cluster group 2	Partner (30%)	49	Partner (74%)	50
Role relation 1 choice	Friends (15%)		Friends (7%)	
	Daughter (12%)		Daughter (4%)	
Cluster group 3	Partner (69%)	42	Partner (29%)	62
Role relation 1	Friends (16%)		Mother (20%)	
	Mother (6%)		Friends (17%)	
Cluster group 1	/	/	/	/
Role relation 2				
Cluster group 2	Partner (28%)	53	Partner (29%)	61
Role relation 2	Son (13%)		Friends (16%)	
	Friends (12%)		Daughter (15%)	
Cluster group 3	Friends (29%)	67	Partner (28%)	51
Role relation 2	Partner (20%)		Mother (22%)	
	Mother (18%)		Friends (16%)	

In the table it can be seen that there is some very general stability of the typologies. Three different types of cluster groups are obtained in different combinations:

[4] The demographic structure of the groups is also discussed, although these data are left out of the table for reasons of economy.

[5] In each cluster analysis, the number of groups was chosen on the basis of a dendrogram (it was "cut" where the distances among groups were the greatest). In Table 2 it can be seen that certain cluster groups are "missing". For instance, it can be seen that with the name generator approach, there is no cluster group 3 in experimental group 1, but this cluster appears in experimental group 2. On the other hand, cluster group 1 is "missing" in experimental group 2, but is present in experimental group 1. So in both cases a 2-cluster group was obtained, but these cluster groups differ to some extent between the experimental groups.

- Cluster group 1 support network basically consists of friends and parents as the main support providers. This is mainly a young group of respondents (average age, depending on typology, ranges between 26 and 29); they are single or have a boy/girlfriend.
- Cluster group 2 support network consists of friends, partner and daughter. These are mainly older (average age, depending on typology, ranges between 43 and 51), married respondents.
- Cluster group 3 support network consists of partner, friends and mother. In age (average age, depending on typology, ranges between 30 and 41); they fall somewhere in between the first two cluster groups.

Comparing typologies together, it can be seen that agreement is relatively high, as could be logically expected, among the ones produced by the role relation approach. In a very general sense, there is also some degree of agreement between the name generator approach and both role relation approaches. The closest overall agreement between the two approaches seems to be in the second experimental group; although the percentages of each type of relationship tend to vary, two cluster groups (cluster group 2 – partner, friends and daughter and cluster group 3 – partner, mother, friends) are obtained in all three cases.

4.2 Stability of individual respondents

Stability of clustering in the case of individual respondents was tested by discriminant analysis. Cluster membership on the basis of the name generator approach was used as a grouping variable. The explanatory variables were the network composition indicators (i.e. percentages of partner, mother, father etc.; see also end of Section 2). In other words, we tried to test whether respondents would cluster into the name generator clusters on the basis of role relation network composition. Four separate discriminant analyses were done:

- separately for each experimental group and
- separately for role relation with one and two support providers.

Results were quite good and consistent over all four discriminant analyses (an example in Table 3; tables of the other three discriminant analyses appear in the Appendix). In all cases, from 73% to 85% of respondents were correctly classified.

We were also interested in which respondents were falsely classified (Table 4). In the majority of cases these tended to be male, younger, living as married or having a boy/girlfriend, to have secondary education and to possess support network basically consisting of friends and mother. We suspect such demographic composition at least to some degree comes from the bias in the sample – one in six

respondents belongs to the group of our students, who interviwed themselves (in addition to five other respondents).

Table 3: First discriminant analysis, experim. group 1, role relation – one provider (%).

	Predicted membership	
Original membership	1 – friends, parents	2 – friends, daughter, partner
1 – friends, parents	78.3	21.7
2– friends, daughter, partner	29.7	70.3

73.3% of original grouped cases correctly classified.
Wilks λ=.68, χ^2=42.54 (p<.01), Canonical correlation=.56

Table 4: Characteristics of falsely classified respondents.

	Discrim. a. 1	Discrim. a. 2	Discrim. a. 3	Discrim. a. 4
Gender	More women	More men	More men	More men
Age	Younger	Younger	Younger	Younger
Marit.status	More living as married or have boy/girlfriend	More living as married or have boy/girlfriend	More living as married or have boy/girlfriend	More living as married or single or have boy/girlfriend
Education	More higher education		More second. education	More second. education
Network	More friends, mother		More friends, mother	More friends, mother

5 Discussion and conclusions

In summarizing the results of the present study we can conclude the following:

- Despite two very different measurement approaches (name generator and role relation), the network composition indicators seem to be quite robust in further analyses and to produce relatively similar results, in this case typologies of social support networks. In this particular case, depending on the experimental group, the measurement approach and the number of support providers considered we obtained two to three clusters, divided on the basis of age and gender:
    a) younger respondents (in some cases forming two groups), single or having a boy/girlfriend, whose support network consisted of parents and friends, sometimes also a partner, and
    b) older respondents, typically married, whose support network typically consisted of friends, daughter and partner.

- There seems to be a fairly successful classification into name generator clusters on the basis of role relation network composition, since about ¾ or more respondents were correctly classified.
- Falsely classified respondents tend to be from the younger population.

At least some of our results (e.g., falsely classified respondents) can be attributed to the convenience sample, which tends to be biased toward the younger student population. This could be tested by a similar experiment on a general population. Another possibility for further work could involve a similar test for the stability of typologies on network data collected by different data collection modes, such as telephone vs. face-to-face mode (e.g., Kogovšek et al., 2002; Kogovšek and Ferligoj, 2005) or telephone vs. web mode (Kogovšek, 2006).

In this experiment the focus was on comparison of the two network measurement approaches, and method order was used only as a control variable. However, it seems that the stability of typologies is larger in experimental group 2 than in experimental group 1. We do not believe that memory effects played a major role in this case, since the interval between the two measurements was relatively large (see, for instance, van Meurs and Saris, 1990). In the future these effects could be studied more thoroughly and systematically, for instance with an MTMM design, where groups with the same method in both measurements could be included.

Since we were using a rather new approach (at least to the best of our knowledge) to assessment of social network measurement quality, it is difficult to establish clear-cut standards of comparison. (In)stability of cluster solutions may be a result of factors other than measurement quality alone. For instance, cluster membership with a smaller number of clusters is easier to predict than with a larger number of clusters. We might also try to test the stability of solutions by using other clustering methods. A similar point applies to the interpretation of classification agreement in discriminant analysis. Another possible standard of comparison, besides the one used in the paper, could be the percentage of correctly classified individuals in an analysis, where the name generator composition indicators would be used to predict name generator clusters. The problem with this approach is that the same data would be used to build the classification, estimate the model and make the predictions. Another possibility would be to have a third experimental group in which data would be collected by the name generator approach in both waves. The first wave data could then be used in cluster analysis and the second wave data as explanatory variables in discriminant analysis. All these possibilities could form fruitful bases for future research.

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Appendix: Results of discriminant analyses

Table 5: Second discriminant analysis, experimental group 1, role relation - both providers (%).

	Predicted membership	
Original membership	1 – friends, parents	2 – friends, daughter, partner
1 – friends, parents	89.1	10.9
2 – friends, daughter, partner	24.3	75.7

80.8% of original grouped cases correctly classified.
Wilks λ=.57, χ^2=62.26 (p<.01), Canonical correlation=.65

Table 6: Third discriminant analysis, experimental group 2, role relation - one provider (%)

	Predicted membership	
Original membership	1 – friends, parents	2 – friends, daughter, partner
1 – friends, parents	79.0	21.0
2 – friends, daughter, partner	35.5	64.5

75.0% of original grouped cases correctly classified.
Wilks λ=.76, χ^2=29.25 (p<.01), Canonical correlation=.50

Table 7: Fourth discriminant analysis, experimental group 2, role relation - both providers (%)

	Predicted membership	
Original membership	1 – friends, parents	2 – friends, daughter, partner
1 – friends, parents	84,0	16,0
2 – friends, daughter, partner	12,9	87,1

84,8% of original grouped cases correctly classified.
Wilks λ=.60, χ^2 =53.53 (p<.01), Canonical correlation=.63