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Recent Advancements, Developments and Applications of Personal Network Analysis

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We are pleased to introduce recent advancements in personal network analysis and applications in this special issue of the International Review of Social Research – IRSR. The idea of this special issue yielded in the summer of 2015, during the 8th edition of the Summer Course on personal networks given by the Universitat Autònoma de Barcelona (specifically, the egolab-GRAFO research team at the Department of Social and Cultural Anthropology, UAB). That idea very soon turned into an invitation to international scholars to submit original papers focused on either a fully personal research design or on a design combining personal network analysis with other approaches (e.g. mixed research methods). In addition, we encouraged authors from all disciplines and fields to submit both theoretically and methodologically oriented papers, as long as they employ a personal network analysis approach. In the end, a bouquet of ten papers was kept for publication. Equally eclectic and complementary, these papers are related under the personal network analysis umbrella.

In what follows, our foreword continues with two interrelated sections. First, we provide a glance on the field of personal network studies, which targets a wide general public less familiarized with structurally analytic approaches (for a detailed view on structural thinking underpinning social network analysis (SNA), see Borgatti et al. 2014; Wellman, 1988). And, second, we briefly introduce each of the ten papers comprising this special issue.

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A glance on the field of personal network analysis

The study of social networks has heavily intensified during the last decades, with a persistent spread not only in the social sciences, but also in totally different disciplines such as physics, epidemiology or biology (Borgatti and Halgin, 2011; Scott, 2011). In contrast to standard social science methods that tend to focus on individual attributes as explanatory variables of outcomes at the individual or group level, SNA focuses on the *relationships* among actors as explanatory variables. The field of SNA has commonly been divided into two main approaches: *whole network (sociocentric)* and *personal network (egocentric)* approaches. The *standard* social networks, according to Wasserman and Faust (1994), are whole networks. Basically, these standard networks display the relational configurations of actors within bounded groups such as organizations, school classes or prisons, wherein each actor could be in principle related to every other group member. In order to analyze whole networks, researchers may focus their attention on the properties of the entire network (the network level), or on the structural positions of each individual actor in the network (the node level). A meso-level analysis (the study of different network elements such as dyads, triads, clusters, components etc.) is also possible.

Egocentric networks display the unbonded set of relationships surrounding a focal actor, or, more typically, the sets of relationships that surround each of a sample of focal actors. The focal actors are commonly referred to as *ego* and, the persons to whom ego is connected are referred to as *alters*.

Sociocentric and egocentric approaches are in fact two faces of the same coin; they are different but complementary. If we would think of the network of all relationships existing between all citizens of the world, we can easily see that sociocentric and egocentric approaches are two ways of sampling from the larger underlying network. As Everett and Borgatti (2005) discuss, egocentric network designs focus on the neighborhoods of the first

order of a set of actors within the larger network; that is, egocentric networks include, besides ego, all other network members who are directly related to ego, as well as the relations that these people have among each other. In theory, higher order neighborhoods could also be investigated in egocentric research. For instance, 2-step neighborhoods are composed of all the relationships defined by a path length of two from the focal node (i.e. relationships involving all the actors adjacent to the ego and all alters adjacent to ego's alters). However, a study on higher order neighborhoods are practically more difficult to realize, which is why egocentric studies tend to focus on first-order neighborhoods only.

From a conceptual point of view is important to distinguish between egocentric networks and egonetworks. Ego-network data is typically extracted from already existing whole networks (Crossley et al., 2015) while egocentric networks refer to the unbounded links of a set of egos, i.e. not limited to a specific whole network. Specialized software packages such as UCINET and E-NET (Borgatti et al., 2002; Borgatti, 2006) have ego-network options to be applied for this purpose. On the other hand, ego-networks can be combined into whole networks if specific sampling designs are used that allow researchers to connect the networks (e.g., Lu, 2013; Mouw and Verdery, 2012).

Commonly, the terms *egocentric networks* and *personal networks* are used in an interchangeable fashion. The term personal network analysis is typically reserved for those studies where researchers focus on ensembles of social relationships surrounding an ego, *in all social settings in which ego is embedded* (e.g., family, work, neighborhood, etc.). In a sense, then, personal networks are a subset of the more ample concept of egocentric networks.

In order to generate personal networks, the most frequently used method is to elicit them directly from the egos (McCarty, 2002). To do so, various research designs can be developed, in accordance with the study object and goals. The first step in any study is to draw a sample of subjects (or egos in this case). If a network survey is to be held, a representative, randomly drawn sample may be preferred. If a qualitative study is to be held, the selection of cases may be guided by different principles. Second, researchers should decide about the interview mode, which can be face-to-face, by phone, or self-administered by mail or online. Then, a structured questionnaire or semi-structured interview guide should be designed. Commonly, the questionnaire includes both typical social science data (characteristics of the respondents) and data concerning the personal network of the respondent. For the latter, researchers first need to delineate the network,

which often entails asking respondents to give a list of names of people who satisfy a certain definition of a social relationship, in line with the study object. Depending on the specific definition (e.g., “people you hang out with”, or “people who could lend you 500 Euros”), the resulting networks can be smaller or larger, denser or less dense, more or less homogeneous et cetera. Once a list of names has been obtained from each respondent, data are collected about the attributes of each network member (these variables are called “name interpreters”, that allow researchers to study network composition) and about the relationships among the network members (“name interconnectors”, that allow researchers to study the network structure) (Halgin and Borgatti, 2012; Borgatti, Everett and Johnson, 2013).

One possible way to address the work conducted in the field is to look at either the antecedents or the consequences of personal networks (Borgatti and Foster, 2003; Brass et al., 2004 used a similar avenue in addressing the general literature on SNA). Specifically, from one perspective, there are the studies examining the impact of personal networks on individual and social outcomes. This line of research builds on the assumption that personal networks are drivers, factors or antecedents for a wide range of phenomena such as: cardiovascular disease and suicides (Kawachi et al., 1996), spread of infectious disease (e.g., Klovdahl et al., 1994), health (Smith and Christakis, 2008), health information search (Song and Chang, 2012), mortality rates (Berkman and Syme, 1979), spread of obesity (Christakis and Fowler, 2007), spread of happiness (Fowler and Christakis, 2008), social capital creation (e.g., Burt, 1995, 2000; Coleman, 1988), finding a job and decreasing information costs (Granovetter, 1973, 1974), fast promotion in public organizations (Shipilov et al., 2014), job seeker's earnings (Krug, 2012), wage income (Bian et al., 2015), occupational success (e.g., Flap and Boxman, 2001), individual performance in workplaces (e.g., Marineau et al., 2015), status attainment (e.g., Flap and de Graaf, 1986; Lin, 1999), Facebook usage patterns (Brooks et al., 2014; Park et al., 2012), levels of mobile communication (Miritello et al., 2013), individual mobility patterns (Kowald et al., 2013), the risk of relapse among individuals treated for drug use (Panebianco et al., 2016), the well-being of visually impaired and blind adolescents (Kef et al., 2000), social support (e.g., Antonucci and Akiyama, 1987; Antonucci et al., 1998; Bilecen, 2012), ethnic identity (Lubbers, Molina and McCarty, 2007), success or failure of collective action and diffusion of innovation (Valente, 1995, 1996), participatory governance of fishing resources (Maya-Jariego et al., 2016), mobilization of citizens to protest in repressive

settings (Opp and Gern, 1993), small and medium-sized enterprises' international market venturing (Eberhard and Craig, 2013), etc.

From another perspective, a substantial body of literature assumes personal networks as being dependent variables. Under this line of research, numerous antecedents have received attention, such as: societal characteristics (e.g., Grossetti, 2007; David et al., 2016; McPherson et al., 2006), social contexts or social circles (e.g., Mollenhorst et al., 2008a, 2008b, 2014; Grossetti, 2005), life events (e.g., Bidart and Lavenu, 2005; Degenne and Lebeaux, 2005; Rozer et al., 2015), ascribed individual attributes (e.g., gender, nationality, personality) and achieved characteristics (e.g., education, employment, income, mobility patterns, trauma symptomatology) (e.g., Bastani, 2007; Van Tubergen et al., 2016; Vanbrabant et al., 2012; Min et al., 2014; Kalish and Robins, 2006; Maya-Jariego and Holgado, 2015; Luken and Tranmer, 2010).

As research into personal networks has emerged, in parallel, research has been devoted to the improvement of methodology for collecting, analyzing and visualizing networks. For illustrative purposes, on this path, we can mention the development of sophisticated software for data collection, such as software for participatory network drawing (e.g., Vennmaker; Kronenwett and Schonhuth, 2011), touch-optimized frameworks for data collection such as Network Canvas (cf. Hogan et al., 2016) and apps for smartphones and tablets that offer the possibility to collect longitudinal personal network data, such as the Social Capital Companion (SCC) (Lerner et al., 2014). These types of software improve the quality of the data that are collected. A second stream concerns research to improve the validity and reliability of different modes of data collection (e.g., Marin, 2004; Hsieh, 2015), and to reduce errors (Almquist, 2012; Brewer, 2000) or respondent burden (McCarty et al., 2007). This type of research is essential in order to improve the quality of network studies. Third, R-packages have been developed for the analysis of ego-network data, such as *egonet* (Sciandra et al., 2015) and *egonetR* (<https://github.com/tilltnet/egonetR>). Also, statistical methods are being employed and developed for the use of multilevel modeling for analyzing personal networks (Snijders et al., 1995; van Duijn et al., 1999), the use of longitudinal analysis of personal networks (Comulada et al., 2012; Fowler and Christakis, 2008; Lubbers et al., 2010; Min et al., 2013; O'Malley et al., 2012) or the use of mixed methods (Dominguez and Hollstein, 2014). Fifth, specific methods have been developed to estimate the size and structure of the wider personal networks (e.g., Killworth

et al., 1998; Maltiel et al., 2015; DiPrete et al., 2011); an interesting area for further research. Most research tends to focus on core networks or relatively small networks, but characteristics of larger sociability patterns are quite unknown. Sixth, personal networks have been used as a tool for understanding the size of hidden populations and for proposing new methods of sampling (Heckathorn, 1997, 2011; Wejnert, 2010; Mouw and Verdery, 2012). Other areas that can be mentioned are predicting personal network size from contact diaries (Yen et al., 2016), the estimation of network structure via random sampling of ego-networks (Siciliano et al., 2012), methods for deriving inductive typologies of egocentric networks (Giannella and Fischer, 2016), and the use of personal networks to operationalize the concept of a transnational social field (Molina et al., 2012; Herz and Oliver, 2014; Herz, 2015).

As shown above, personal network literature displays increased variety, bundling multiple research streams. Our purpose of this introduction is not to extensively review the body of research publications in the field, but simply to contour the luxuriant landscape comprising assorted perspectives, approaches and topics. This strategy might help potential readers to better position the papers of this special issue within the general sceneries.

The papers of this special issue

Roughly, the ten papers included in this special issue can be classified using at least two general criteria: (i.) the study of the antecedents and consequences of personal networks; (ii.) the methodological framework: quantitative, qualitative or mixed methods oriented research tools. We will briefly present the papers, using as a reference a mix of the two criteria. Consequently, we will randomly start with the presentation of the quantitatively oriented papers and continue with the qualitatively and mixed-methods research oriented ones.

The special issue opens with the paper authored by Gerald Mollenhorst, Marijtje van Duijn, Jens Rydgren and Christofer Edling (i.e. *Triadic Closure in Core Networks: Disentangling the Effects of Social Distance, National Origin Similarity and Shared Contexts*). This paper continues previous investigations reported by Mollenhorst et al. (2008a, 2008b, 2011, and 2014) and evaluates the different conditions affecting the formation of personal relationships. The authors analyzed core networks of three groups of Swedes, born in 1990: native Swedes ($n = 1,382$), first- and second-generation immigrants from Iran ($n = 632$) and former Yugoslavia ($n = 928$). Specifically, the core networks were elicited by asking each respondent to name

up to five core network alters and network structure was derived by asking whether each pair of alters (dyad) knows each other (triadic closure). The results of their analysis show that shared social contexts were a dominant and a more important condition for the triadic closure compared to social distance and similarity in national origin. In their conclusion, the authors indicate that the consequences of the closed triads comprising alters with different national origin remain open to further research, and that ethnic brokerage in personal networks needs more investigation.

Next in line, we find the research paper authored by Wesley Shrum, Antony Palackal, Dan-Bright S. Dzorubo, Paul Mbatia, Mark Schafer, Paige Miller and Heather Rackin (i.e. *Network Decline in the Internet Era: Evidence from Ghana, Kenya, and India, 1994-2010*). The paper examines the impact of the Internet on the size of personal networks. Relational and composition empirical data, elicited from scientists, educators and researchers in Ghana, Kenya and State of Kerala (India), were collected, at four points in time (1994, 2000, 2005 and 2010), and explored. The authors provide evidence that extended personal networks experienced a dramatic decline during the initial diffusion of new communication technologies (the Internet), followed by a partial recovery. Specifically, friendship, information and scientific exchange ties have followed an irregular trace: a steep decline and different-sized rates of recovery. Shrum et al. report the results while emphasizing that the decline in friendship ties was an unanticipated finding.

The special issue continues with the paper authored by Lauren B. Frank, Sheila T. Murphy and Sandra Ball-Rokeach (i.e. *Personal Network Analysis and Health among Latinas*). The authors look at the interpersonal influence on health decision-making, following the research line reported by Frank (2015) and Moran et al (2016). Particularly, the authors describe the composition of Latinas' personal networks for women's health issues and examine the association between personal networks and a particular health outcome, Pap test status. Personal network data, collected from 1,632 Latina women, aged between 21 and 50, who have not previously been diagnosed with cervical cancer or another reproductive cancer, were analyzed. Logistic regression analysis was performed to test for the statistical associations with Pap test status. Age, education, insurance status, encouragements to get a Pap test, descriptive norms and patient autonomy were controlled variables within the regression models. Results suggest it may prove beneficial to incorporate family members and friends when advising patients on cervical cancer prevention. According to the authors, future research should examine whether the

personal network associations are as pronounced in other racial and ethnic groups and for other health outcomes.

In another paper (i.e. *Investigating Social Support Patterns of Single Mothers from a Social Networks Perspective*), Rosaria Lumino, Giancarlo Ragozini and Maria Prosperina Vitale examine the mobilization of social support resources, in the context of the personal networks of 35 single mothers, from Naples (southern Italy). Multiple regression models were employed to explain network size and effective size, while multiple correspondence analysis was applied to explore the ego-alter ties and detect data structures. Authors show that family members and friends are the main support source for the Napolitan single mothers. Also, the authors provided evidence that family support received by the single mothers is often exchanged for higher investments in domestic tasks and in-kind services; which, according to the authors, increases the risk of single mothers to be entrapped in hardship. Due to research limitations (e.g. the sample size, the lack of qualitative information and the nature of the applied methods), authors are cautious with the generalization of the results.

Luisa Barthauer, Daniel Spurk and Simone Kauffeld, in their study (i.e. *Women's Social Capital in Academia: A Personal Network Analysis*), analyzed a special type of ego-networks, the development networks, previously shown to be beneficial for career success and advancement. Specifically, they examined the impact of development networks on academic career, from a gender perspective. Looking at a sample of 594 ego-networks of PhD and postdoctoral candidates, embedded in German universities and research institutes, the authors calculated several descriptive statistics (density, degree, and brokerage) and performed ANCOVA for gender-oriented group comparisons. Results indicate that female researchers have larger development networks and higher brokerage potential, while male researchers appear to be embedded in denser networks. According to the authors, these findings are relevant for better understanding the link between network structure and career outcomes in the German higher education system. Furthermore, the study provides valuable insights for understanding why females are less present in German academia. By this paper, the authors complement prior research reported by Spurk et al. (2015a, 2015b).

Javier Esparcia and J. Javier Serrano, in their paper (i.e. *Analyzing Social Networks in Rural Development: A Gender Approach*), examine the participation of women in the implementation of rural development programs of the European Union; namely, the local action groups (LAGs) of LEADER programs (i.e. European Union initiatives to

support rural development projects to regenerate rural areas). The authors built their research on the observation that women, traditionally, have held marginal positions in economic life, social activities and local political representation. A sample of 30 key actors involved in the implementation of local development programs in the county of Rincon de Ademuz (Valencia, Spain) was analyzed from a gender perspective. Both social network and personal network analysis approaches were deployed, on a longitudinal avenue, for assessing whether through time (from mid 90s till present) women's participation in LAGs improved. Specifically, they examined whether women increased their centrality in the implementation networks of local development programs, as an effect of EU institutional incentives. Serrano and Esparcia provide evidence that, in the local implementation networks, women became more central, during 1996 – 2006. However, their increased prominence faded away after 2006, due to the changes in the architecture of the EU programs. These results contribute to the body of literature aiming at understanding the consequences of LEADER programs implementation in Spain (Esparcia and Escribano, 2014; Esparcia et al., 2016).

The special issue continues with three papers engaging mixed-methods research designs in their investigations. In the first of these three papers (i.e. *Diffusion of Islam in the United States: Comparative Personal Conversion Social Networks*), Erin Şakin examined the impact of personal networks on the diffusion of religion in society. Particularly, he investigated whether the conversion to Islam diffuses through weak or strong ties with Muslims. The analysis was conducted in the United States of America, on the personal networks of 30 persons converted to Islam (18 living in Michigan and the rest in Kentucky). Erin Şakin argues that diffusion of the Islam occurs through both weak and strong social ties depending on the presence of an Islamic community in the physical proximity. Namely, Islam is more likely to diffuse through weak ties in urban areas where a Muslim community exists, and through strong ties in other places.

Next, Başak Bilecen presents a paper focused on the migrants' transnational practices and the personal network resource flows (i.e. *A Personal Network Approach in Mixed-Methods Design to Investigate Transnational Social Protection*). Particularly, the author aimed to show how mixed-methods research designs and personal network analysis contribute to the study of migrants' strategies of transnational social protection. For this purpose, empirical data were collected through semi-structured interviews with Turkish labor migrants and asylum seekers in Germany and with their significant

others in Turkey. Also, protective ties were further investigated after the personal networks of 100 migrants had been statistically analyzed. Among other things, the paper provides evidence that protective relationships seem more balanced within networks where information and care are exchanged than where financial resources are exchanged. Moreover, it is reported that migrants from Turkey have a large number of significant others in their personal networks who live outside Germany. The paper by Başak Bilecen continues the author's work on this topic, cf. Bilecen (2015a, 2015b).

Andreas Klärner, Sylvia Keim and Holger von der Lippe aimed to contribute to the knowledge of social network changes and dynamics in the life course by applying a longitudinal mixed-methods approach to the family formation processes of young adults in East and West Germany (Keim et al., 2013). In particular, their paper (i.e. *Social Network Dynamics in The Course of Family Formation: Results from A Mixed-Methods Longitudinal Study*) investigated the relationship between various biographical transitions during young adulthood and the structure of social networks. Specifically, the authors investigated changes in the size and composition of the personal networks of young adults. And observed that these were associated with family formation or expansion and other biographical transitions. Through the use of qualitative interviews, empirical data were collected at two moments in time: 2004 – 2006 and 2011. In the first survey period, the personal networks of 98 young adults from Rostock and Lubeck (Germany) were analyzed. In the second survey period, the authors reinterviewed 29 of the initial 98 participants. Klärner et al. show that biographical transitions (e.g. relationship status, relocations, and job changes) have a larger impact on the composition than on the size of the personal networks. In addition, the authors suggest that the personal networks of young adults are quite dynamic over short periods of time (a few years).

The special issue closes with a methodological paper about qualitative network methods. In her publication (i.e. *Eliciting Data on Social Relationships: The Use of Hand-Drawn Network Maps in Tracing The Perception of Digitally Mediated Social Ties*), Cornelia Reyes analyzes the suitability of hand-drawn network maps for eliciting data, in the context of online social networking platforms. The paper is built on the observation that digitally mediated social ties (e.g. Facebook, Twitter etc.) are difficult to recall or verbalize using up to date standardized techniques (e.g. name generators). As an alternative, the author introduces a completely unstructured data elicitation technique (i.e. an arts-based research technique) focused on freestyle network visualizations popular in clinical and

developmental psychology. Professionals from creative industries (photography and fine art) were invited to test the arts-based technique. Firstly, personal network maps were created in a traditional manner (through the use of the name generator practice). Secondly, the participants were asked to identify possible structural constraints entailed by the standard procedure of data collecting. Thirdly, freestyle hand-drawn visualizations of the same personal networks were produced. Results suggest that, compared to the practice of the name generators, the arts-based research technique provides in-depth information concerning the digitally mediated social ties (in terms of their relevance and of the social context meaning). Nevertheless, Cornelia Reyes stresses at least two important limitations. First, the professional background of the respondents might have generated specific biases in applying the unstructured procedure. Second, the arts-based research technique does not have a wide application, appearing to be suitable only for digitally mediated relationships.

In sum the papers included in this special issue emphasize manifold research directions, different approaches and topic diversity. As illustrated, some of the publications focused on investigating the impact of different antecedents on personal networks (i.e. the rise of Internet or individuals' biographical transitions), or explored new methodological tools for the elicitation of data in the context of digitally mediated social ties. Others explored the effects of personal networks on health decision-making, diffusion of religion, career success, single mothers' support, and migrants' transnational practices. The assortment manifested by the contents of this special issue is consonant with the general profile of the field of personal network analysis.

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