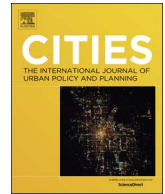




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The role of distance in online social networks: A case study of urban residents in Nanjing, China

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ABSTRACT

Highly advanced information and communication technologies have reshaped the common ways urban residents interact with each other. With the widespread use of online social networking websites, research interest in the evolving spatial concepts (such as distance) in new digital age has grown exponentially. Data collected by Sina microbloggers from adult residents in Nanjing, China reveal that urban residents not only are more likely to build relationships with local and acquaintance users but also to interact with them more frequently. In other words, spatial and relational distances that play important roles in traditional Chinese social networks also exist in contemporary online social networks. Furthermore, our regression analysis reveals how the roles of spatial and relational distances in the online social networks of urban residents relate to the context of urban transformation in contemporary China. The findings contribute to a more in-depth understanding of the effects of informatisation and urban transformation on the social networks of urban residents.

1. Introduction

Engaging in interpersonal interactions, whether in the present, the past or the future, is fundamental to human life, because although not everyone has a full-time job, every human being lives in a social network (Loo, 2012; Sgroi, 2008). Cities, being ‘melting pots’, have enjoyed the advantage of providing urban residents platforms to build multiple social networks and thereby develop interaction opportunities (Glaeser, 2011). Spatial and relational distances¹ have long been known to heavily influence the formation and development of urban residents' social networks before the Internet (Mok & Wellman, 2007; Sgroi, 2008; Wellman & Leighton, 1979). However, the key roles of spatial and relational distances in social networks have been increasingly challenged by the rapid development of information and communication technologies (ICTs), which have attracted substantial attention from urban scholars in the West (e.g., Cairncross, 2001; Mok, Wellman, & Carrasco, 2010; Thulin & Vilhelmson, 2005).

Nowadays, there are many electronic communication modes, including (mobile) phone calls, instant message services, emails and, more recently, popular online social networking websites (OSNs). Given their low cost, these electronic communication modes are expected to

influence the relationship between spatial and relational distances and people's social networks (Cairncross, 2001). Despite the large and growing evidence of the role of spatial and relational distances in telephone and email communications (e.g., Carrasco, Miller, & Wellman, 2008; Mok et al., 2010; Mok & Wellman, 2007; Thulin & Vilhelmson, 2005; Tillema, Dijst, & Schwanen, 2010), our knowledge of interpersonal interactions in OSNs (such as Twitter, Facebook and LiveJournal in Western countries and Weibo in China) remains inadequate, especially considering their global popularity (Huang & Sun, 2014; Takhteyev, Gruzd, & Wellman, 2012; Zhen, Wang, & Chen, 2016). Unlike telephone and email services, OSNs are regarded as cheap, participative, interactive, open and transparent (Dekker, Engbersen, & Faber, 2016; Huang & Sun, 2014; Kaplan & Haenlein, 2010); they present convenient ways to interact with others both locally and globally. Moreover, OSNs have provided new opportunities for maintaining and extending interpersonal interactions among both acquaintances and strangers² more easily. However, the ties formed through OSNs appear much weaker than those formed in the real world (Huang & Sun, 2014; Takhteyev et al., 2012) and may therefore shape the ways users interact with each other differently. Hence, it is reasonable to question the roles of spatial and relational distances in interpersonal

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¹ Relational distance refers to the difference in the somewhat close and loose ties for different relationships, such as immediate/extended kin, friends, neighbours and strangers. In this study, we examine the relational distance between the relationship of acquaintances and strangers in the real world.

² In Twitter and Weibo, a user can choose to follow another without the latter's permission.

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interactions in these virtual social networks.

Urban scholars have devoted considerable attention to investigating the effects of urban transformation on social relations in the real world (e.g., Fischer, 1982; Forrest & Yip, 2007; Hofferth & Iceland, 1998; Kearns & Forrest, 2000; Zhang, Wu, Zhong, Zeng, & Wang, 2017). Various studies point out that residential environment have a substantial impact on the daily social interactions of urban residents (Amin & Thrift, 2002; Fischer, 1982; Sharmeen, Arentze, & Timmermans, 2014; Wang, Zhang, & Wu, 2016; Whyte & Parish, 1985). However, very few studies have focused on the impacts of urban transformation on the interpersonal interactions of urban residents in virtual networks such as OSNs. The limited research studies on this topic were based on the developed countries where informatisation followed urbanisation. As a developing country undergoing rapid informatisation and urbanisation simultaneously (Loo & Wang, 2017a; Wu, 2015), China represents a natural ‘laboratory’ ideal for studying the impacts of urban transformation on the OSNs of urban residents. Specifically, this study examines how the roles of spatial and relational distances in urban residents’ OSNs relate to the context of urban transformation in contemporary China. It contributes to a better understanding of the effects of ICTs on social networks in the broader context of urban transformation. Given the widespread adoption of OSNs by urban residents, an empirical study on the interpersonal interactions of urban residents in OSNs should also offer insights into the effects of informatisation and urban transformation on the social networks of urban residents.

This study utilises data on the interpersonal interactions of adult Nanjing residents on the Sina Weibo platform, the most popular OSNs in China, to explore the roles of spatial and relational distances in OSNs. In particular, we examine the virtual ties between the urban residents and local/non-local users and acquaintance/stranger users on Sina Weibo. The differences among the relationships/interaction frequencies between locals and non-local users illustrate the role of spatial distance, while the differences between acquaintance and stranger users illustrate the role of relational distance. The following research questions are considered in this study: (a) Do spatial and relational distances matter in the online social networks of urban residents? If so, how? (b) How do socioeconomic conditions and levels of Internet use experience influence the roles of spatial and relational distances in the virtual interpersonal interactions of urban residents? Finally, (c) how have the roles of spatial and relational distances in urban residents’ interpersonal interactions been mediated in the context of urban transformation?

2. Literature review

Social contacts have benefited from spatial proximity because frequent face-to-face contacts among spatially dispersed ties were naturally hindered by spatial distance. Urban residents traditionally have more face-to-face communications with locals and acquaintances than with non-locals and strangers (Glaeser, 2011). Advancements in transportation have promoted interpersonal interactions across cities and increased opportunities to communicate with strangers; however, these communications were limited by the speed and cost of travel (Mok et al., 2010). A 1978 survey conducted in Toronto identified a marked drop in the frequency of face-to-face contacts at about 5 miles and a steady decrease at greater distances (Mok & Wellman, 2007).

The advancement of ICTs has triggered a heated debate over the impacts of new technology on the social networks of urban residents in the real world (Dekker et al., 2016; Huang & Sun, 2014; Mok et al., 2010; Sgroi, 2008). Despite the proclamations of ‘the death of distance’ (Cairncross, 2001), a large and growing collection of empirical evidence has revealed that electronic communication modes, such as telephone and emails, also tend to decline with longer spatial and relational distances, though not as sharply as that for face-to-face contacts (e.g., Carrasco et al., 2008; Kellerman, 2016; Loo, 2012; Mok et al., 2010; Tillema et al., 2010). A recent survey in Toronto has found that people tend to make more telephone calls to others within 100 miles,

and the frequency of e-mail communication also gradually drops over longer distances (Mok et al., 2010). A similar phenomenon has also been identified in the Netherlands (Tillema et al., 2010) and Sweden (Thulin & Vilhelmson, 2005). The friction sensitivity of telephone and email correspondence to spatial distance could be explained by the somewhat strong social ties in these communication modes. Generally, people prefer to store the phone numbers of their acquaintances, and people who have more face-to-face interactions are more likely to make telephone calls (Thulin & Vilhelmson, 2005; Tillema et al., 2010). Some studies have also explored the effects of relational distance on email communications. A study on urban youth in Sweden has found that people tend to communicate via email more with members they already know in real life (Thulin & Vilhelmson, 2005). For OSNs, the relationship between users tend to be much weaker than that among people making telephone calls or having regular email communications (Dekker et al., 2016; Huang & Sun, 2014; Kaplan & Haenlein, 2010). Hence, the role of distance can also be very different in the virtual social networks of OSNs than other online social networks or in the real world. As Thulin and Vilhelmson (2005) suggest, OSNs offer numerous opportunities for people to have new cyberfriends they have never met face-to-face. Besides, OSNs, as a media-rich way of communications, present important platforms for users to share and exchange information regarding specialised interests in areas such as sports, arts, politics and economy (Dekker et al., 2016; Zhen et al., 2016). However, these online relationships formed in OSNs may remain entirely virtual, with no physical interactions among users in the real world (Thulin & Vilhelmson, 2005).

Yet, it is also true that the online relationships of OSNs users may come directly from their social networks in the real world, with a group of users located in the same physical space and sharing the same social network (Kellerman, 2016; Loo, 2012; Sharmeen et al., 2014). Using the geographical location information in user profiles, some studies suggest that OSNs users (e.g., those on Twitter and LiveJournal) tend to build more relationships with other users within a shorter spatial distance in the real world, indicating that spatial distance still matters (e.g., Liben-Nowell, Novak, Kumar, Raghavan, & Tomkins, 2005; Takhteyev et al., 2012). As geographers, we understand that the evolving role of ICTs and their impacts on the interpersonal interactions of OSNs users may not be the same in different contexts (Thulin & Vilhelmson, 2005; Wang et al., 2013). Hence, whether findings based on a Western context can be generalised to China should be verified, as the latter has experienced rapid informatisation and urbanisation simultaneously in the past two decades (Loo & Wang, 2017a). In addition, there are many research gaps, including the role played by spatial distance among residents of different segments. Previous studies have suggested that the differences in online activity experience of individuals with different socioeconomic characteristics could be substantial (Kellerman, 2016; Loo, 2012). Furthermore, urban residents in the same city may use OSNs differently (Thulin & Vilhelmson, 2005; Tillema et al., 2010). With more time spent online, these people may reduce the time spent with others physically (Huang & Sun, 2014; Thulin & Vilhelmson, 2005). In this case, urban residents who spent more time in OSNs may have less interactions with locals and acquaintances. Besides, few studies have examined relational distance in OSNs (Laniado, Volkovich, Scellato, Mascolo, & Kaltenbrunner, 2017; Wang et al., 2013). Based on this understanding, the following hypothesis is developed:

H1. Spatial and relational distances still matter in the social networks of urban residents in OSNs. However, the roles of such distances vary among individuals of different socioeconomic (such as gender, age and education) and Internet use experience characteristics.

Moreover, recent research on the e-working and e-shopping behaviours of urban residents indicates that these e-activity behaviours may be historically and spatially contingent (Dijst, Farag, & Schwanen, 2008; Loo & Wang, 2017b; Ren & Kwan, 2009). However, very little has

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