

# Discovering Perceptions of Personal Social Networks through Diagrams

Lixiu Yu<sup>1</sup>, Jeffrey V. Nickerson<sup>1</sup>, and Barbara Tversky<sup>2</sup>

<sup>1</sup> Stevens Institute of Technology, Hoboken, NJ

<sup>2</sup> Teachers College, Columbia University, New York, NY

lyu3@stevens.edu, jnickerson@stevens.edu, btversky@stanford.edu

**Abstract.** By examining diagrams created by study participants, we can gain insight into their perceptions of their personal social networks. In this study, we found that participants made use of both position and distance to differentiate the roles of those in their networks and express intimacy. This work has implication for both the elicitation and visualization of social networks.

**Keywords:** Diagram understanding, personal social networks.

## 1 Introduction and Methods

Abstract diagrams such as networks are interesting to study for several reasons. Although abstract diagrams contain a minimum of depictive information, they take advantage of spatial reasoning processes that verbal, descriptive representations do not normally afford. Observers can follow the lines from node to node to assess relationships, temporal, social, causal, or more. Normally, these relations are not in and of themselves spatial, but rather metaphorically spatial, a mapping to diagrammatic space that even preschoolers can do [1].

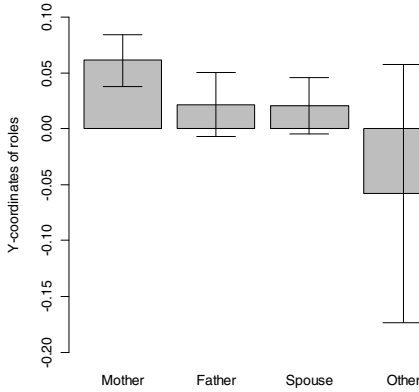
People add to diagrams inessential spatial information, even metaphoric spatial information. In a set of studies, students in classes in design of information systems were asked to sketch their designs of the interrelationships of the components, computers, cell phones, satellites, trucks, buildings, and the like [2]. All that is needed is labeled boxes and lines in arbitrary locations. Nevertheless, students used location and proximity in the space of the page to convey inessential information.

Including relevant, even if inessential information, may help users express, understand, and make inferences from diagrams. The inessential information that people add to their diagrams serves another role, not for the producers and users of diagrams, but for researchers. That information can reveal how people think about the concepts and relations conveyed in the diagrams. An especially interesting context for using diagrammatic productions to reveal thought is social network diagrams. A variety of social relationships, notably agency (e. g., [3]), are thought of in spatial terms. In particular, more power is mapped to higher and greater agency is mapped leftwards in languages that are read from left to right. Will people use spatial location and distance in social networks to express more than simple connections?

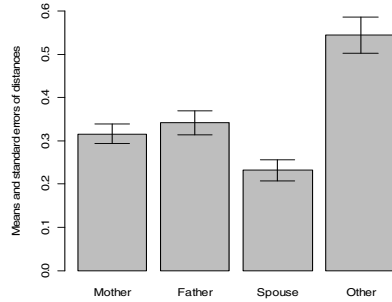
In the research to be reported, respondents are asked to produce social networks or to select appropriate networks. Because position and proximity in space are heavy



are significantly shorter than those of the other roles to the ego ( $p < 0.01$ ). One participant explained this: “My graph is more like concentric circles, where the farther you get away from the center (Me), the less intimate my friends are”. Distance, at least for this participant, is a reflection of intimacy.



**Fig. 2.** Means and standard errors of the y coordinates of roles, after recentering



**Fig. 3.** Means and standard errors of distances between ego and alter by role

Abstract diagrams convey the intended information clearly without the clutter and distraction of unnecessary information. But people think concretely, so that including unnecessary but meaningful information may support reasoning. That this might be so is indicated by previous findings as well as those reported here. When people produce diagrams, they often spontaneously include meaningful information not specifically requested. Previous research showed that students go to the trouble of drawing pictures of various concrete objects and beings even when there is nothing in the instructions or the task to suggest doing that [2]. The current research extends those findings by showing that people also spontaneously include quite abstract information, information about intimacy, generation, and power, in their diagrammatic productions of social networks.

**Acknowledgments.** Portions of this research were supported by grants from National Science Foundation IIS-0725223, IIS-0855995, and REC-0440103, the Stanford Regional Visualization and Analysis Center, and Office of Naval Research N00014-PP-1-O649, N000140110717, and N000140210534.

## References

1. Tversky, B., Kugelmass, S., Winter, A.: Cross-cultural and developmental trends in graphic productions. *Cognitive Psychology* 23, 515–557 (1991)
2. Nickerson, J.V., Corter, J.E., Tversky, B., Zahner, D., Rho, Y.: The Spatial Nature of Thought: Understanding information systems design through diagrams. In: *Proceedings of the International Conference on Information Systems* (2008)
3. Chatterjee, A.: Language and space: Some interactions. *Trends in Cognitive Science* 5, 55–61 (2001)