

## The Relationship between Multiplexity and Academic Productivity in Six Fields of Science and Engineering

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### Abstract

Multiplexity refers to the exchange of multiple resources within one strong tie (Ibarra, 1993; Brass, 1998). For instance, advice relationships that are also collaborative are multiplex ties. Multiplex relationships are associated with high trust and reliability since both actors have had the opportunity to interact and get to know each other in a variety of contexts (Ibarra, 1995). Typically, multiplex relations are also strong relations. A multiplex tie has additional layers, dimensions, or relational contents (Galaskiewicz and Wasserman, 1993). For example, a multiplex tie may involve a combination of collaborative, advice, administrative or social interactions between two people. Ties between pairs of individuals that include more distinct types of relationships are said to be more multiplex.

The expansion of relationships in ways that incorporate additional distinct activities occurs over time in a process of social exchange (Cook and Emerson, 1978). Through repeated interactions, the ego and alter learn about each other's trustworthiness. Over time, ego and alter gain confidence in each other, they gradually increase the scope of their relationship. Both ego and alter are able to use the trustworthiness that is observed in one realm of interaction as a proxy for anticipated trustworthiness in another realm of interaction. When high levels of trust prevail, ego and alter may find it easier to restrict themselves to search within their tie, instead of scanning the network more broadly (McEvily et al, 2003).

There is a need to understand how certain network relationship characteristics assist or impede productivity in an academic context. Uzzi (1996) suggests that embedded ties are also multiplex. While multiplex relationships are characterized by trust and tacit information transfer between egos and alter, such relationships may also insulate both the parties involved from gaining access to new and diverse information that lie outside of their relationship. Going by this logic, we might expect that actors who have fewer multiplex relationships are exposed to less diverse, novel, and non-redundant contacts. Additionally, research shows that exposure to novel information spurs learning and the development of internal capabilities that may enhance performance (McEvily and Zaheer, 1999). Also, Uzzi (1996) argues that trusted and embedded relationships increase

performance only up to a threshold, beyond which there is a decrease. Over time, the isomorphic processes of strong multiplex ties can decrease diversity of information and increase inertia so that change is difficult for both the ego and the alter in a multiplex relationship. Ultimately, even though multiplex relationships benefit from greater interaction and synergy, they may become insulated from novel information.

This paper seeks to understand the effects of multiplexity on publication productivity of academic scientists in science and engineering fields. The primary research question is to what extent does multiplex ties and other relationship variables such as strength and length of relationship determine publication productivity by academic scientists. The paper develops a model of publication productivity built on a framework that integrates scientific and technical human capital and relationship characteristics of social network. Based on the literature, we hypothesize an inverted “U” shaped relationship between multiplexity and productivity such that moderate level of multiplexity result in higher production than either low or high multiplexity. Data for this paper come from an NSF sponsored national survey of academic scientists in six fields of science and engineering that collects both ego-centric network data as well as productivity, background, and demographic information. Methods employed in this paper include multivariate regression analysis. Findings promise to improve our ability to predict publication productivity of scientists as well as our understanding of the theoretical relationship between multiplexity and productivity more generally.

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