MODERATOR COMMENTS

TECHNOLOGY: THE ROLE OF NETWORK STRUCTURES

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The literature in entrepreneurship, along with the literature in technology evolution, organizational sociology, and business strategy, has been greatly influenced and informed by the analysis of the network of relationships among actors. Network structures and actors setting within them matter. Within entrepreneurship, they have been shown to matter for a wide range of consequences, such as patenting activity and indicators of technological progress, and for the likelihood and the valuation of initial public offerings. These are important and interesting sets of findings. However, Rosenkopf and Schilling and Stuart and Sorenson wish to take us a step further, to perhaps what could be termed a post-consequence analysis of network structures.

In different respects, both articles push us not to be satisfied with powerful statistical results that point to the nonrandom nature of network relations and social ties among actors, and the economic consequences of these ties. The authors want us to explore and question the underlying meaning of such results. As Rosenkopf and Schilling argue, there is tremendous variability in network structures across industry settings. They point the way and provide initial findings toward a contingency theory of network structures. How do factors such as technological uncertainty and the modularity of underlying technologies influence the observed pattern of network relationships? Their empirical analysis also provides an important finding regarding the equivocality of some of the fundamental measures that characterize network structures. Not all small worlds are created equal. Technical measures of path length and clustering can differ substantially for networks with similar *small worldness*.

While Rosenkopf and Schilling offer a contingency analysis of alternative network structures-a structural approach as it were—Stuart and Sorenson push us, in their search for meaning of network structures and their implications, to consider the micro-foundations of firms' positions within social structures. The vast majority of analyses of networks and their consequences take their structure as given-a social fact from which scholars can derive implications of interest. However, as Stuart and Sorenson suggest, this (implicit) assumption is likely to be especially problematic in the context of entrepreneurial ventures. Entrepreneurs are not passive actors. They engage in the world, in their immediate social context, animated by possibilities and desires. That is not to say that all their social relations are driven by an instrumental logic (what Stuart and Sorenson note would comprise-in Burt's felicitous turn of phrase—a social flatulence). However, by the same token, their set of social relations is not likely to be random and, indeed, is likely to be reflective, to some degree, of their personal attributes. People who like to wake up at 6 a.m. and



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ride a bicycle with other like-minded souls from the flatlands of the San Francisco Peninsula over Skyline Boulevard and the coastal mountains to the Pacific Ocean have a bundle of traits, love of refined technical equipment, boundless energy and drive, gender composition, and the need for group affiliation that differ from larger population baselines.

Thus, even the most innocuous social grouping may reflect a sorting in effect of individual-level heterogeneity. Some of these factors that lead to sorting in may be irrelevant to one's likely success as an entrepreneur (and can serve as possible candidates for instrumental variables), while other factors that lead to group affiliation may also be directly tied to entrepreneurial outcomes. Regardless of the bases of group membership, group affiliation and social structures may, in turn, have real economic consequences: exposure to new promising technologies, connection to individuals who can help in the acquisition of resources necessary to pursue an entrepreneurial venture, and so on. However, to truly understand the meaning and role of network ties per se, we need, as Stuart and Sorenson point out, to unpack these different effects.

Network analysis, as a methodological approach, has been one of the great success stories in the last two decades. In large part, this reflects the importance of these sorts of ties, particularly in a period of rapid and uncertain technological change. It also, in part, reflects the empirical attractiveness of network analysis with respect to the measurability of the phenomena, at least relative to intraorganizational processes. However, as these two articles prod us. the next generation of network analysis, particularly in the context of entrepreneurial activity, should raise its sights beyond statements of existence and impact. Per Stuart and Sorenson, understanding the endogeneity of networks is of particular import in the entrepreneurial context, and relatedly, per Rosenkopf and Schilling, understanding the boundary conditions and underlying logic of alternative network structures are central agendas for the next generation of work on network analysis. The following two articles move us forward on these agendas and are likely to stimulate others to build upon and follow these efforts.

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