

Visualizing Multilevel Networks for the Analysis of Superposed Levels of Collective Agency

Emmanuel Lazega*

Sciences Po Paris, IUF Centre de Sociologie des Organisations, France.

*E-mail: emmanuel.lazega@sciencespo.fr

Abstract

This picture, produced by Julien Brailly et al. (2016) and David Schoch (2020), visualizes multilevel networks of individuals and organizations.

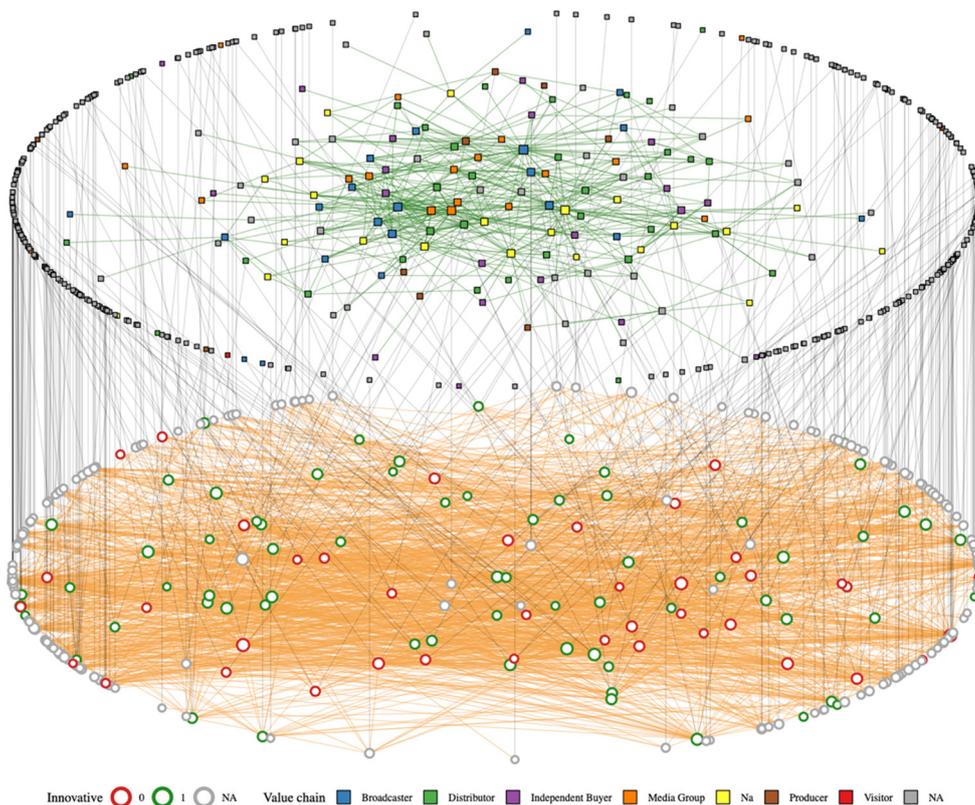
Keywords

Multilevel networks, image.

The upper level

This is the inter-organizational network in which the ties are economic relationships (business deals) signed at time t between companies (the nodes). The pattern represents a core-periphery structure. In the

core, the more central companies (the Majors of this industry and a few other of smaller companies that managed to sign a contract with the Majors) drive the economic action (contracting). The periphery is composed of many small companies (the nodes on the outer upper circle) that did not sign any contract



that year and thus find themselves isolated, as if they were watching the action from a balcony.

The lower level

This is the inter-individual level in which the ties are informal discussion and personal information gathering at time $t-1$ between these individuals. The high density of this lower, inter-individual network represents the fact that members of competing companies talk to each other actively.

Vertical ties

These ties between nodes from the lower level and nodes at the upper level are affiliation ties of each individual in their organizations.

The empirical setting

This multilevel network was measured in the largest trade fair for television programs in Eastern Europe. In this trade fair, nodes at the upper level are companies and institutions of the global and regional television industry. They sell, buy, distribute programs, and regulate the industry. Color codes at this upper level represent the organizations composing the value chain in 2012, for example broadcasters in blue, distributors in green, independent buyers in purple, media groups in yellow, producers in brown. Nodes at the Lower level are mainly individual sales representatives, sellers and buyers of TV programs meeting at this trade fair to keep abreast of new films, series and game shows, to observe market trends and evolutions, and to discuss contracts in 2011. Sellers mainly from the USA and Western Europe come to pitch and sell their audiovisual products to regional and local buyers such as the broadcasting companies (television channels for example). The density of this inter-individual network represents the “buzz” network between these sales representatives in this trade fair, emphasizing the crucial role of cooperation among interdependent competitors (Lazega and Mounier, 2002; Lazega et al., 2008; Lazega, 2020) as a multilevel phenomenon. For a substantive explanation of this graph, see Brailly (2016).

Sociological interpretation

From an economic sociology perspective, such patterns facilitate the study of multilevel, multiplex and multisided overlaps across levels, to provide a new

perspective on markets as multilevel networks. In these multilevel networks, a relationship between two firms creates a context that facilitates the creation or maintenance of relationships between their employees, and the other way around: interpersonal relationships between sales representatives contribute to the formation of inter-organizational, contracting ties (Bathelt and Glückler, 2003; Berends et al., 2011). In this context, social relationships are not only behind the deals, they are also around them. In other words, social relationships are not only between buyers and sellers, but also among buyers and among sellers. As a result, such relationships need to be contextualized in their relational neighborhood. For example, imagine the following hypothetical scenario: seller A can give an opportunity to seller B concerning a buyer C such as “C is looking for products you have.” Seller A gives this opportunity to seller B only because they are “friends” and they have known each other for a long time, expecting direct reciprocity. This opportunity is relevant because seller A’s company has already closed a deal with buyer C’s company and so seller A is aware of buyer C’s needs and bargaining behavior. This situation leads to the creation of a new relationship between seller B and buyer C in the form of a meeting to discuss a potential deal. This complex pattern helps redefine the nature of markets (Brailly et al., 2016) as multilevel, socially organized settings.

In this specific setting, a limited number of very large companies dominate the market with smaller companies gravitating around this core, suggesting an oligopolistic structure that economists call “oligopoly with fringes.” Trade fairs as field-configuring events contribute to the reproduction of this oligopolistic, multilevel and cooperative structure. In the sociology of culture, it helps understand, from a neo-structural perspective, the mechanisms underlying contemporary globalization and uniformization of culture (Brailly et al., 2016; Favre et al., 2016).

Methodological foundations and extensions

For a general perspective on multilevel networks in the social sciences, see Snijders (2016). Multilevel blockmodels and stochastic blockmodels for such data are available in Žiberna (2014), Barbillon et al. (2016) and Chabert-Liddell et al. (2019). For multilevel ERGMs associated with this data format, see Wang et al. (2013). For multilevel ERGMs analyzing this dataset, see Brailly (2016) Brailly et al. (2016) and Favre et al. (2016). For more methods using multilevel

network analyses, see various chapters in Lazega and Snijders (2016), Lomi et al. (2016), Koskinen et al. (2017), Tranmer et al. (2017).

References

Barbillon, P., Donnet, S., Lazega, E. and Bar-Hen, A. 2016. Stochastic block-models for multiplex networks: an application to a multilevel network of researchers. *Journal of the Royal Statistical Society: Series A (Statistics in Society)* 180: 295–314.

Bathelt, H. and Glückler, J. 2003. Toward a relational economic geography. *Journal of Economic Geography* 3: 117–144.

Berends, H., Van Burg, E. and van Raaij, E. M. 2011. Contacts and contracts: crosslevel network dynamics in the development of an aircraft material. *Organization Science* 22: 940–960.

Brailly, J. 2016. Dynamics of networks in trade fairs—a multilevel relational approach to the cooperation among competitors. *Journal of Economic Geography* 16: 1279–1301.

Brailly, J., Favre, G., Chatellet, J. and Lazega, E. 2016. Embeddedness as a multilevel problem: a case study in economic sociology. *Social Networks* 44: 319–333.

Chabert-Liddell, S. C., Barbillon, P., Donnet, S. and Lazega, E. 2019. A stochastic block model for multilevel networks: application to the sociology of organisations. arXiv preprint arXiv:1910.10512 (accessed December 29, 2020).

Favre, G., Brailly, J., Chatellet, J. and Lazega, E. 2016. “Inter-organizational network influence on long term and short term inter-individual relationships: the case of a trade fair for TV programs distribution in sub-Saharan Africa”, In Lazega, E. and Snijders, T. A. B. (Eds), *Multilevel Network Analysis for the Social Sciences* Springer, Dordrecht.

Koskinen, J., Broccatelli, C., Wang, P. and Robins, G. 2017. “Bayesian analysis of ERG models for

multilevel, multiplex, and multilayered networks with sampled or missing data”, *Convegno della Società Italiana di Statistica* Springer, Cham, pp. 105–117.

Lazega, E. 2020. *Bureaucracy, Collegiality and Social Change: Redefining Organizations with Multilevel Relational Infrastructures* Edward Elgar Publishing, Cheltenham.

Lazega, E. and Mounier, L. 2002. “Interdependent entrepreneurs and the social discipline of their cooperation: The research program of structural economic sociology for a society of organizations”, In Favereau, O. and Lazega, E. (Eds), *Conventions and Structures in Economic Organization: Markets, Networks, and Hierarchies* Edward Elgar Publishing, Cheltenham, pp. 147–199.

Lazega, E. and Snijders, T. A. B. 2016. “The multiple flavours of multilevel issues for networks”, In Lazega, E. and Snijders, T. A. B. *Multilevel Network Analysis for the Social Sciences* Springer, Cham, pp. 15–46.

Lazega, E., Jourda, M. -T., Mounier, L. and Stofer, R. 2008. Catching up with big fish in the big pond? Multi-level network analysis through linked design. *Social Networks* 30: 159–176.

Lomi, A. Robins, G. and Tranmer, M. 2016. “Introduction to multilevel social networks”, *Social Networks*, 100: 266–268.

Schoch, D. 2020. Visualizing multilevel networks with graphlayouts, available at: <http://blog.schochastics.net/post/visualizing-multilevel-networks-with-graphlayouts/> (accessed December 29, 2020).

Tranmer, M. Pallotti, F. and Lomi, A. 2016. “The embeddedness of organizational performance: multiple membership multiple classification models for the analysis of multilevel networks”, *Social Networks*, 44: 269–280.

Wang, P., Robins, G. L., Pattison, P. E. and Lazega, E. 2013. Exponential random graph models for multi-level networks. *Social Networks* 35: 96–115.

Žiberna, A. 2014. Blockmodeling of multilevel networks. *Social Networks* 39: 46–61.