

## Analyzing and Visualizing the Complexity and Multidimensionality of an Historical Network

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The purpose of this contribution is to contribute to the reflection on the use of multilayer network analysis<sup>1</sup> in the humanities. It is based on a case study on the structuration of scientific and cultural coordination in the inter-war period within the League of Nations (International Committee on Intellectual Cooperation).<sup>2</sup> It consists in developing a quantitative and structural analysis jointly mobilizing mathematical theories, computer sciences and archival questioning, and is also a way of questioning the relationship between historical research and digital technologies. Without however making these technical developments an end in itself, the contribution of such methods of social network analysis and visualization makes it possible to multiply the perspectives, to play with the scales and to allow the navigation between a global overview of the structure (here, an international organization) and an approach closer to the individuals.

Created in 1921, the International Committee on Intellectual Cooperation (ICIC) is a committee bringing together leading scientists such as Henri Bergson, Albert Einstein, Marie Skłodowska-Curie and Hendrik Lorentz. The rise and bureaucratization of this organization during the 1920s is accompanied by a rapid increase of the number of documents produced and received as well as a complexification of information flows. This research proposes to analyze the activity and the ability of the ICIC to create link through a fine indexing of its correspondence archives. By mapping this circulation in a network composed of more than 3.000 individuals involved in intellectual cooperation during its early years (1919-1927, approx. 30.000 documents),<sup>3</sup> this method reveals the main organizational trends while highlighting the situation of actors that are so far little studied in this context.

This exploratory “datafication” of the archives of the League of Nations leads us to reconsider and recontextualize the personal commitment of the individuals who made up the ICIC. Thus, the development of visualization methods that allows a comparison between different layers (the official institutional framework of the international organizations of this time and the structuring of information exchanges at an individual scale) helps to highlight the discrepancy from a hierarchical level to another. More generally, this research develops a framework for coding, analyzing and interpreting such metadata networks in history.<sup>4</sup>

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<sup>1</sup> The creation of a general model for multilayer networks in these disciplines is currently under discussion, see KNUDSEN Soren, AERTS Jan, ARCHAMBAULT Daniel et al., « Unifying the Framework of Multi-Layer Network and Visual Analytics », *Visual Analytics of Multilayer Networks Across Disciplines (Dagstuhl Reports)* 9 (2), 2019, pp. 19-23. based on KIVELÄ Mikko, ARENAS Alex, BARTHELEMY Marc et al., « Multilayer networks », *Journal of Complex Networks* 2 (3), 01.09.2014, pp. 203-271.

<sup>2</sup> This research comes from a recently defended thesis: GRANDJEAN Martin, *Les réseaux de la coopération intellectuelle. La Société des Nations comme actrice des échanges scientifiques et culturels dans l'entre-deux-guerres*, Lausanne, Université de Lausanne, 2018. 600 p. <https://halshs.archives-ouvertes.fr/tel-01853903>.

<sup>3</sup> Complete data available in GRANDJEAN Martin, « The Network of Intellectual Cooperation », *Data Set*, 2018. <https://github.com/grandjeanmartin/intellectual-cooperation> (DOI 10.5281/zenodo.1257288).

<sup>4</sup> A typology of the different ways of formalizing networks is developed in GRANDJEAN Martin, « Analisi e visualizzazioni delle reti in storia. L'esempio della cooperazione intellettuale della Società delle Nazioni », *Memoria e Ricerca* 55 (2), 2017, pp. 371-393 (DOI 10.14647/87204).