

Analysing inter-state communication dynamics and roles in the networks of the International Institute of Intellectual Cooperation

Alessio Cardillo (@acardillo.bsky.social)

Department of condensed matter physics and UBICS – University of Barcelona, Barcelona (Spain)

The Connected Past 2025 – Coimbra (Portugal)

Thursday, September 18th 2025



UNIVERSITAT DE
BARCELONA



Acknowledgments

**Javier
Borge Holthoefer**



**Diana
Roig Sanz**



**Albert
Solé Ribalta**



**Elisabet
Carbó Catalan**



**Rubén
Rodríguez Casañ**



R&I

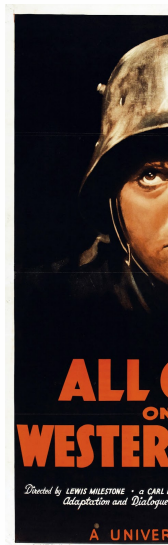
IN3

Internet
Interdisciplinary
Institute

Once upon a time . . .



Once upon a time . . .



THE NEW YORK TIMES WEDNESDAY, DECEMBER 23, 1914

Supporters of a League of Nations

ALGERIA, ARGENTINA, AUSTRALIA, AUSTRIA, BELGIUM, BRAZIL, CANADA, CUBA, DENMARK, DOMINICAN REPUBLIC, ECUADOR, ESTONIA, FINLAND, FRANCE, GERMANY, GREECE, HUNGARY, ITALY, JAPAN, KOREA, KUWAIT, LITHUANIA, LUXEMBOURG, MEXICO, MONTENEGRO, NETHERLANDS, NORWAY, PANAMA, PARAGUAY, PERU, POLAND, PORTUGAL, ROMANIA, RUSSIA, SERBIA, SLOVAKIA, SPAIN, SWEDEN, SWITZERLAND, SYRIA, THAILAND, TURKEY, U.S.A., U.K., URUGUAY, VENEZUELA, YUGOSLAVIA.

Supporters of a League of Nations

ALGERIA, ARGENTINA, AUSTRALIA, AUSTRIA, BELGIUM, BRAZIL, CANADA, CUBA, DENMARK, DOMINICAN REPUBLIC, ECUADOR, ESTONIA, FINLAND, FRANCE, GERMANY, GREECE, HUNGARY, ITALY, JAPAN, KOREA, KUWAIT, LITHUANIA, LUXEMBOURG, MEXICO, MONTENEGRO, NETHERLANDS, NORWAY, PANAMA, PARAGUAY, PERU, POLAND, PORTUGAL, ROMANIA, RUSSIA, SERBIA, SLOVAKIA, SPAIN, SWEDEN, SWITZERLAND, SYRIA, THAILAND, TURKEY, U.S.A., U.K., URUGUAY, VENEZUELA, YUGOSLAVIA.

Victory Democracy Peace
Make them secure by a

LEAGUE OF NATIONS

Christmas this year dawns on a world groping from war toward peace. The world hopes and prays that peace may be established on justice and safeguarded against future wars. ¶ The army of occupation that sleeps till the Judgement Day in the graves of France will have fought and died in vain unless such a **PEACE** is framed. ¶ Our Soldiers and Sailors, returning from **VICTORY**, will have fought and suffered in vain if that **VICTORY** is not made secure. ¶ All the peoples of the free nations will have given in vain billions of their wealth and millions of their own flesh and blood if **DEMOCRACY** is not established forever.

The only Practical Way

THE LEAGUE OF NATIONS is necessary to do the work that the world cannot do alone. Victory and Peace have brought a multitude of new problems—

The New Nations: We propose to carry out of the Old World a dozen new Nations based upon the principle of self-determination. Can we make the world safe for Democracy if we create these new nations and then leave them to their fate? **A LEAGUE OF NATIONS** will be needed to guide and protect them.

Common Colonies: Germany has gained her colonies for the colored races. Can we make the world safe for Democracy if we leave the fate of these colonies, handed together in a **LEAGUE OF NATIONS**.

Economic Questions: We are now and have to new materials are key of the international situation that can be handled only by a **LEAGUE OF NATIONS**.

It will be possible for the Peace Congress to reach this point in the future. It will be possible for the nations of the world to reach this point in the future. It will be possible for the nations of the world to reach this point in the future.

Victory Perilous

It is a great mistake to suppose that the world is now safe. The world is now more perilous than ever. The world is now more perilous than ever. The world is now more perilous than ever.

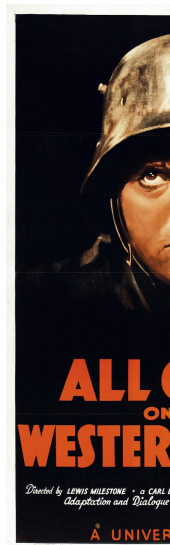
League to Enforce Peace

First National Conference, 1915, at The Hague, The Netherlands. The League of Nations was born.

Your Christmas Resolution

Let us resolve to support the League of Nations. Let us resolve to support the League of Nations. Let us resolve to support the League of Nations.

Once upon a time . . .



THE NEW YORK TIMES, WEDNESDAY, DECEMBER 25, 1930

Supporters of a League of Nations

Victory Democracy Peace
Make them secure by a
LEAGUE OF NATIONS

Christmas this year dawns on a world groping from war toward peace. The year is established on justice and safeguarded against future wars. The army of peace is in the hands of France will have fought and died in vain unless such an organization is established. Sailors, returning from VICTORY, will have fought and suffered in vain if all the peoples of the free nations will have given in vain billions of their wealth and DEMOCRACY is not established forever.

The only Practical Way

These things which the whole world knows for days be printed only by the creation, right at the heart of France, by the current purpose of giving to the world the best of all that France has to offer. The League of Nations is the only way to secure the peace of the world. It is the only way to secure the peace of the world. It is the only way to secure the peace of the world.

History Program

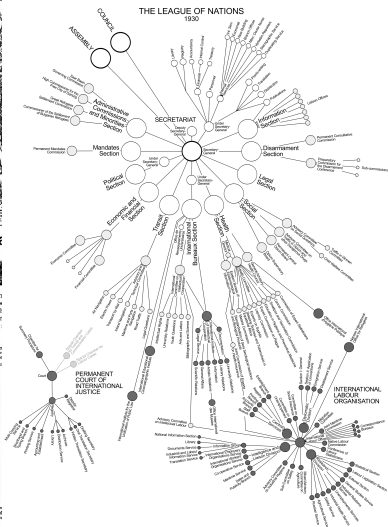
At the heart of the League of Nations is the history program. It is the only way to secure the peace of the world. It is the only way to secure the peace of the world. It is the only way to secure the peace of the world.

Permanent Court of International Justice

The League of Nations is the only way to secure the peace of the world. It is the only way to secure the peace of the world. It is the only way to secure the peace of the world.

International Labour Organisation

The League of Nations is the only way to secure the peace of the world. It is the only way to secure the peace of the world. It is the only way to secure the peace of the world.

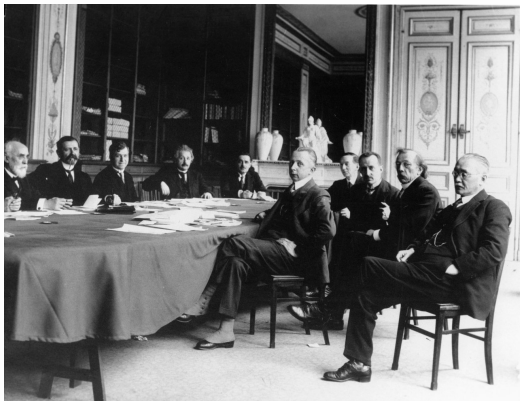


• https://en.wikipedia.org/wiki/League_of_Nations

Once upon a time . . .

International Committee on Intellectual Cooperation (ICIC)

- Founded in 1922.
- Based in Geneva.
- Advisory organization of the League of Nations.



• <https://unesco.libguides.com/IICI>

Once upon a time . . .

International Committee on Intellectual Cooperation (ICIC)

- Founded in 1922.
- Based in Geneva.
- Advisory organization of the League of Nations.



• <https://unesco.libguides.com/IICI>

Once upon a time . . .

International Committee on Intellectual Cooperation (ICIC)

- Founded in 1922.
- Based in Geneva.
- Advisory organization of the League of Nations.

International Institute of Intellectual Cooperation (IIIC)

- Founded in 1926.
- Based in Paris.
- Created to support the work ICIC as an **executive branch**.
- Ancestor of UNESCO.

Once upon a time . . .

International Committee on Intellectual Cooperation (ICIC)

- Founded in 1922.
- Based in Geneva.
- Advisory organization of the League of Nations.

International Institute of Intellectual Cooperation (IIIC)

- Founded in 1926.
- Based in Paris.
- Created to support the work ICIC as an **executive branch**.
- Ancestor of UNESCO.





What was the **role** played by countries in the web of global intellectual cooperation?

The data: UNESCO's archives

The data: UNESCO's archives

The screenshot shows the UNESCO Archives Atom Catalogue website. The header is blue with the UNESCO logo on the left, the title "UNESCO Archives Atom Catalogue" in the center, and the motto "Building peace in the minds of men and women" on the right. Below the header is a navigation bar with a "Browse" dropdown, a search bar labeled "Search UNESCO Archives", and icons for a link, social media, and a user profile, followed by a "Log In" button. The main content area is divided into two columns. The left column has a box labeled "UNESCO Archives" and a "Quick search" section with a "Search hierarchy" input field. The right column displays the "Archive Group AG 1 - International Institute of Intellectual Co-operation". It shows a hierarchical tree structure with the following items: "[Archive Group] AG 1 - International Institute of Intellectual Co-operation, 1921-1954", "[Fonds] IICI - International Institute of Intellectual Co-operation fonds, 1921-1954", "[Series] IICI Correspondence Files, 1923-1949", and four subseries: "[Subseries] A - Correspondance relative aux Commissions nationales, Délégués d'Etats et Affaires générales de la Di...", "[Subseries] B - Correspondance relative aux relations diverses entre pays, 1925-1946", "[Subseries] C - Correspondance relative aux questions des relations universitaires, début de la Conférence perman...", and "[Subseries] DD - Correspondance relative aux questions scientifiques, Bibliothèques et Congrès bibliothécaires, Bibliog...". At the bottom of the main content area, there is a link icon and the text "Other languages available".

UNESCO Archives Atom Catalogue

United Nations Educational, Scientific and Cultural Organization

Browse Search UNESCO Archives

Building peace in the minds of men and women

UNESCO Archives

Quick search

Search hierarchy

Archive Group AG 1 - International Institute of Intellectual Co-operation

- [Archive Group] AG 1 - International Institute of Intellectual Co-operation, 1921-1954
 - [Fonds] IICI - International Institute of Intellectual Co-operation fonds, 1921-1954
 - [Series] IICI Correspondence Files, 1923-1949
 - [Subseries] A - Correspondance relative aux Commissions nationales, Délégués d'Etats et Affaires générales de la Di...
 - [Subseries] B - Correspondance relative aux relations diverses entre pays, 1925-1946
 - [Subseries] C - Correspondance relative aux questions des relations universitaires, début de la Conférence perman...
 - [Subseries] D - Correspondance relative aux questions scientifiques, Bibliothèques et Congrès bibliothécaires, Bibliog...
 - [Subseries] DD - Correspondance de la Section des Sciences historiques et sociales, 1924-1940

Other languages available

<https://atom.archives.unesco.org/iiic>

The data: UNESCO's archives

Subseries A - Correspondance relative aux Commissions nationales, Délégués d'Etats et Affaires générales de la Direction

- [Archive Group] AG 1 - International Institute of Intellectual Co-operation, 1921-1954
 - [Fonds] IICI - International Institute of Intellectual Co-operation fonds, 1921-1954
 - [Series] IICI Correspondence Files, 1923-1949
 - [Subseries] A - Correspondance relative aux Commissions nationales, Délégués d'Etats et Affaires générales de la Di...
 - [Subseries] B - Correspondance relative aux relations diverses entre pays, 1925-1946
 - [Subseries] C - Correspondance relative aux questions des relations universitaires, début de la Conférence perman...
 - [Subseries] D - Correspondance relative aux questions scientifiques, Bibliothèques et Congrès bibliothécaires, Bibliog...
 - [Subseries] DD - Correspondance de la Section des Sciences historiques et sociales, 1924-1940

Note 1

Scanned documents of two folders of the IIC's archive:

Folder A: *internal affairs*

Folder F: *artistic/literary matters*

The data: UNESCO's archives



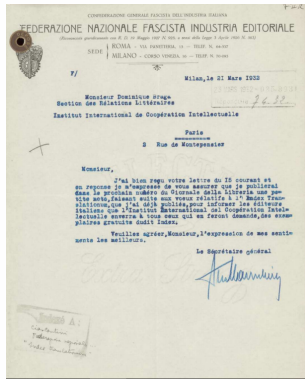
The data: UNESCO's archives



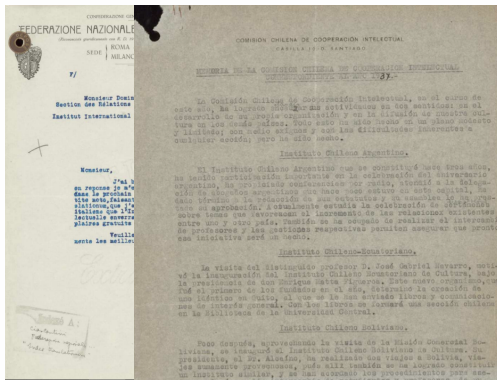
Note

Of the 59,820 documents available in Folder A, we extracted 4,265 typewritten letters with an **origin** and a **destination** locations.

The data: UNESCO's archives



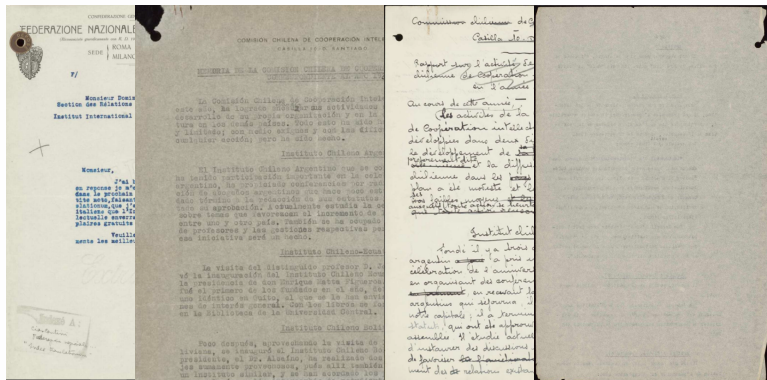
The data: UNESCO's archives



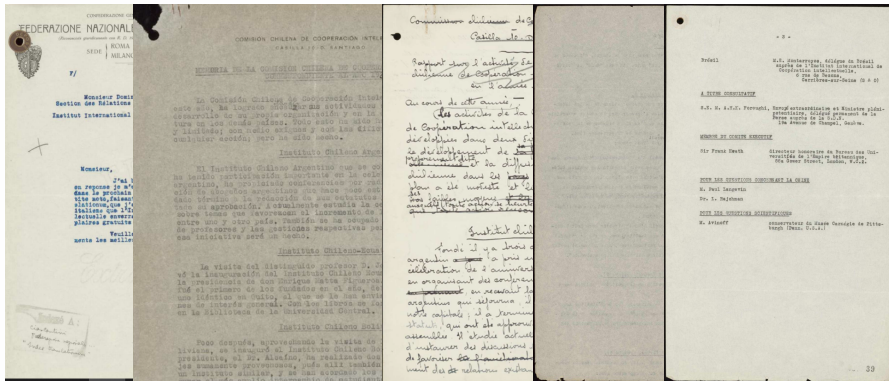
3/8



The data: UNESCO's archives



The data: UNESCO's archives



The data: UNESCO's archives

58/23007/5894

Genève, le 24 Janvier 1939.

Monsieur le Ministre,

J'ai l'honneur de vous communiquer ci-joint le rapport et la résolution (document C.51.1939.XII) adoptés par le Conseil de la Société des Nations le 18 Janvier 1939 (104e session), concernant la composition de la Commission internationale de coopération intellectuelle.

Comme vous le constaterez, le Conseil a décidé de prolonger, pour une nouvelle période de trois ans, votre mandat de membre de la Commission internationale de coopération intellectuelle.

Votre nouveau mandat prendra fin le 31 décembre 1941.

Je vous serais reconnaissant de vouloir bien me faire savoir si vous êtes en mesure d'accepter le renouvellement de votre mandat.

Veuillez agréer, Monsieur le Ministre, les assurances de ma haute considération.

Le SECRÉTAIRE GÉNÉRAL :

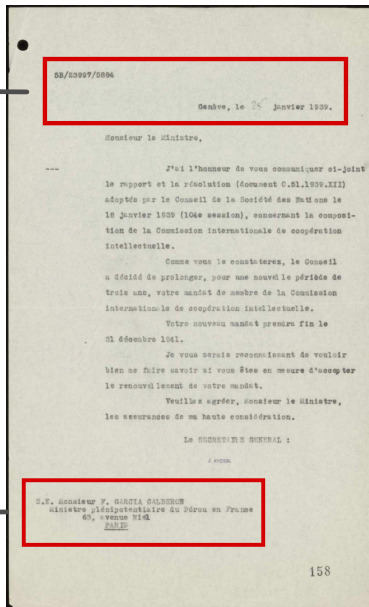
J. ARON

S.E. Monsieur F. GARCIA CALDERON
Ministre plénipotentiaire du Pérou en France
65, Avenue Rich
PARIS

The data: UNESCO's archives

Origin
Country
(Switzerland)

Destination
Country
(France)



The data: UNESCO's archives

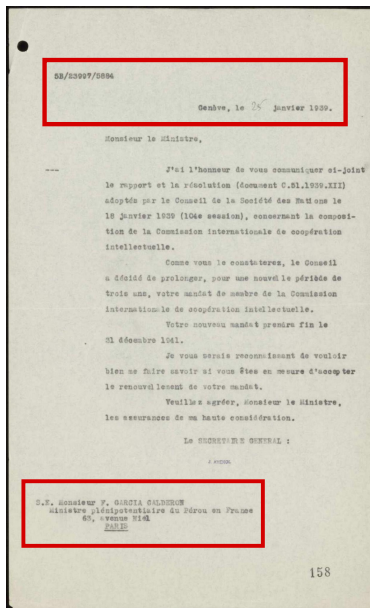
Switzerland



$$w_{ij} = 1$$



France



Method: Network cartography in a nutshell

Method: Network cartography in a nutshell

- A technique to **assign roles to nodes** by studying their connectivity pattern.

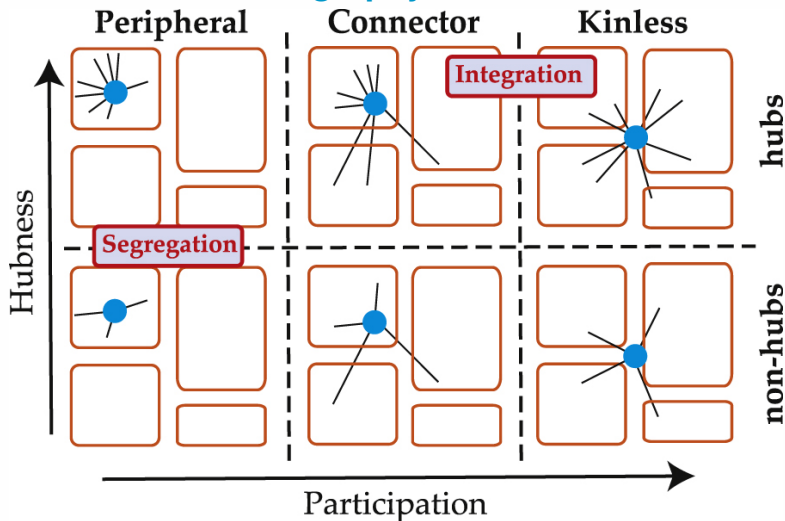
- R. Guimerá, and L. A. N. Amaral, “*Functional cartography of complex metabolic networks*”. Nature, **433**, 895, (2005). DOI: [10.1038/nature03288](https://doi.org/10.1038/nature03288)

Method: Network cartography in a nutshell

- A technique to **assign roles to nodes** by studying their connectivity pattern.
- **It requires a partition of the network into groups** (*i.e.*, the results *depend* on the partitioning criterion).

• R. Guimerá, and L. A. N. Amaral, “*Functional cartography of complex metabolic networks*”. Nature, **433**, 895, (2005). DOI: 10.1038/nature03288

Method: Network cartography in a nutshell



- F. Klimm, et al. "Individual node's contribution to the mesoscale of complex networks". New Journal of Physics, **16**, 125006, (2014). DOI: 10.1088/1367-2630/16/12/125006

Method: Network cartography in a nutshell



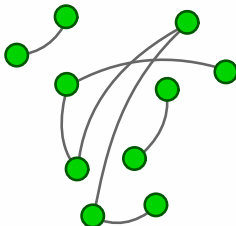
Results

Results

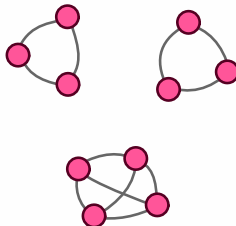
Modularity

$$Q = \frac{1}{2E} \sum_{i,j=1}^N \left[a_{i,j} - \frac{k_i k_j}{2E} \right] \delta(g(i), g(j))$$

$$Q \approx 0$$



$$Q \simeq 1$$



Results

Results

N_{comms}	15
Q	0.242

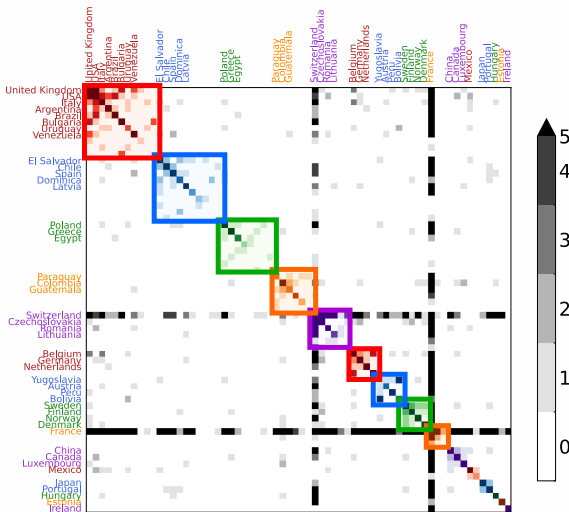
- V. A. Traag, et al. “From Louvain to Leiden: guaranteeing well-connected communities”. Sci. Rep., **9**, 5233, (2019). DOI: [10.1038/s41598-019-41695-z](https://doi.org/10.1038/s41598-019-41695-z)

Results

N_{comms}
 Q

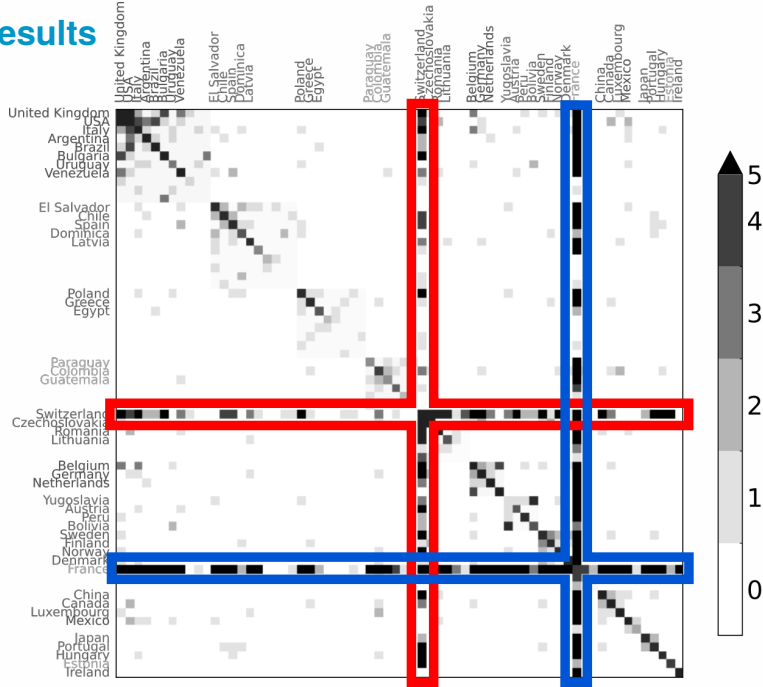
15

0.242

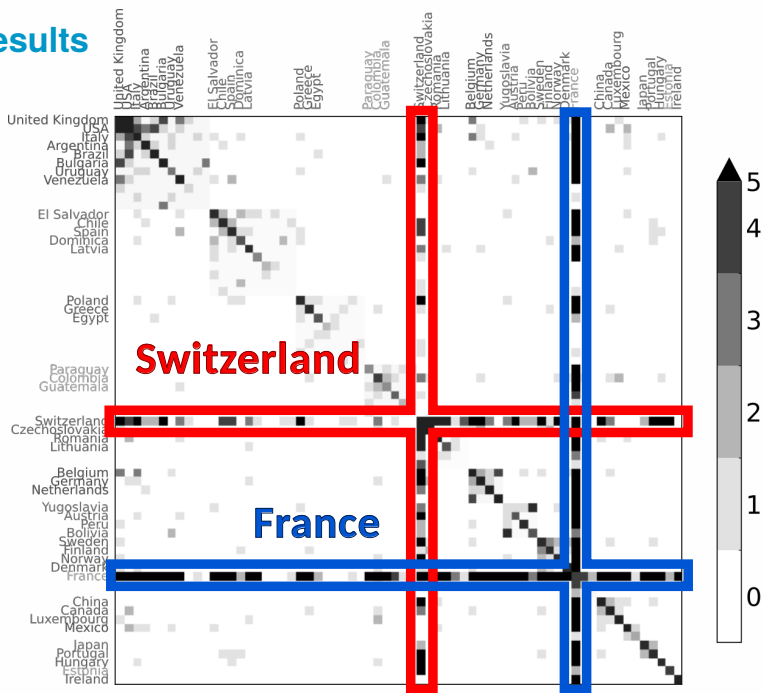


• V. A. Traag, et al. "From Louvain to Leiden: guaranteeing well-connected communities". Sci. Rep., 9, 5233, (2019). DOI: 10.1038/s41598-019-41695-z

Results



Results



Was there intellectual cooperation
beyond that *with* (and *between*)
France and Switzerland?

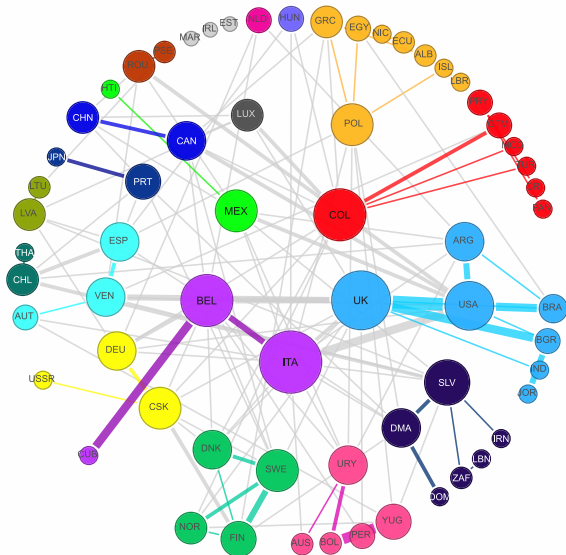
Results

N_{comms}

21

Q

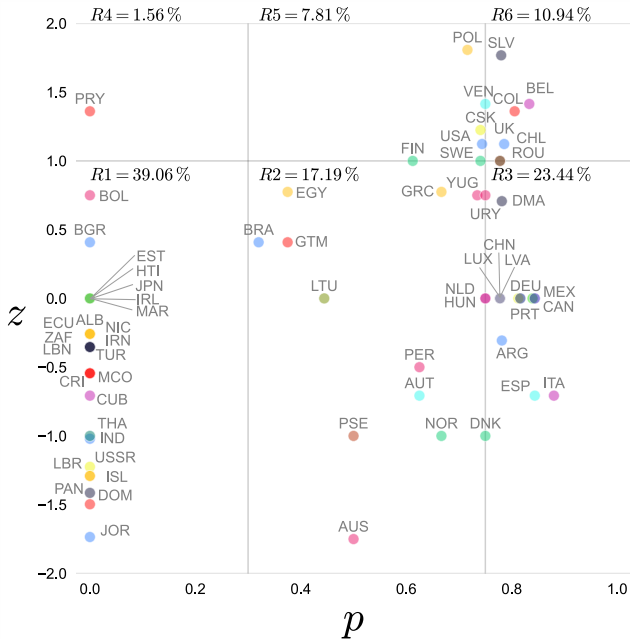
0.787



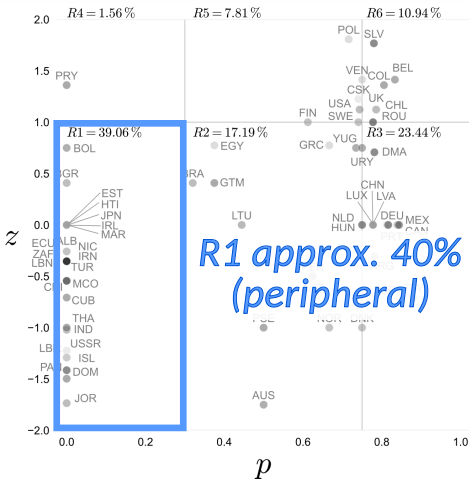
• R. Rodríguez-Casañ *et al.*, Hum. Soc. Sci. Commun. **11**, 1408 (2024).

DOI: 10.1057/s41599-024-03829-1

Results



Results



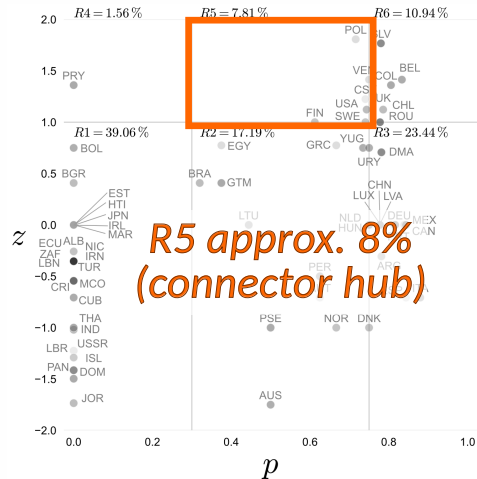
R1

Estonia, Iceland, Monaco, **USSR**, Ireland, Bulgaria, Albania, Turkey, Morocco, Nicaragua, Cuba, Panama, Costa Rica, Haiti, Ecuador, Bolivia, Dominican Republic, Iran, Jordan, Lebanon, South Africa, Liberia, **India**, **Japan**, Thailand.

• R. Rodríguez-Casañ *et al.*, Hum. Soc. Sci. Commun. **11**, 1408 (2024).

DOI: 10.1057/s41599-024-03829-1

Results



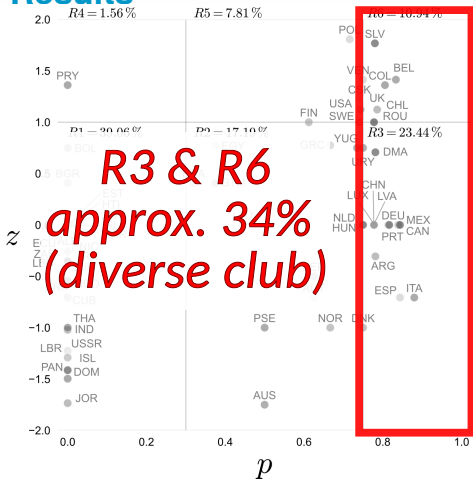
R5

**United States of America,
Sweden, Finland, Czechoslovakia,
Poland.**

• R. Rodríguez-Casañ *et al.*, Hum. Soc. Sci. Commun. **11**, 1408 (2024).

DOI: 10.1057/s41599-024-03829-1

Results



R6

Belgium, United Kingdom,
Romania, Chile, **Colombia,**
El Salvador, Venezuela.

R3

Italy, Spain, Portugal, Germany,
Hungary, Netherlands,
Luxembourg, **Denmark,** Latvia,
China, Canada, Mexico,
Argentina, Uruguay, Dominica.

- R. Rodríguez-Casañ *et al.*, Hum. Soc. Sci. Commun. **11**, 1408 (2024).

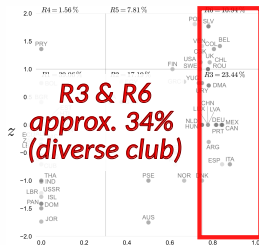
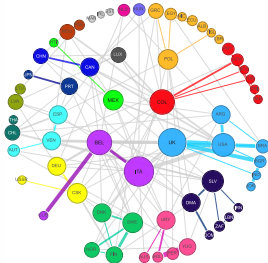
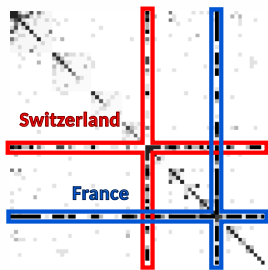
DOI: 10.1057/s41599-024-03829-1

- M. A. Bertolero, *et al.* “The diverse club.” Nat. Comms. **8**, 1277, (2017).

DOI: 10.1038/s41467-017-01189-w

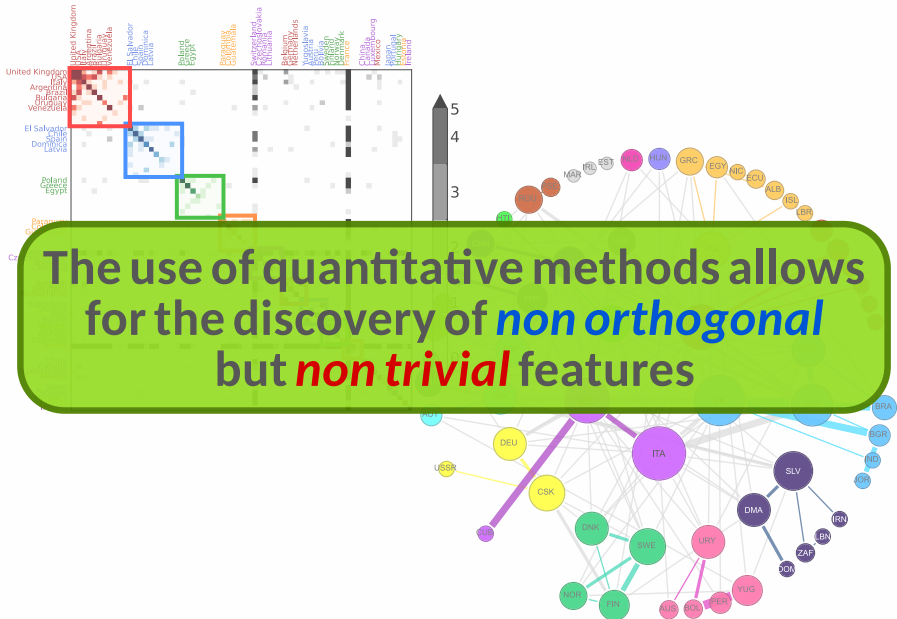
Conclusions

Take Home Messages



The suppression of the two *main broadcasters* unveils an intricate web of relationships between countries, whose structure and roles *challenge the established Eurocentric vision* about the global history of intellectual cooperation.

Take Home Messages



Take Home Messages



All that glitters is not gold: we have to deal with **biased**, **unstructured**, **incomplete**, and **noisy** data.



Commissaire d'Union de Coopération Internationale
Cahiers de la Coopération
Rapport sur l'activité de la Commission
d'Union de Coopération Internationale
en 1938
Quelques de ces années
Les activités de la Commission d'Union
de Coopération Internationale se sont
développées dans deux directions principales:
la de développement de la coopération
internationale et la diffusion de la culture
internationale dans les différents pays.
Il y a eu une volonté de créer une
organisation internationale qui puisse
servir de lien entre les différents
peuples et nations.
Institut de la Coopération
En 1938, il y a eu dans tous les instituts de la
coopération internationale une grande activité
en organisant des conférences internationales
et en recevant la délégation d'experts
argentins qui se réunissaient à Paris.
Il y a eu de temps en temps
des conférences de la Commission de la
coopération internationale pour discuter des
questions de coopération internationale et
pour discuter des relations entre les différents
peuples et nations.

BOLETIN TITIKAKA
CIRCULACION CONTINENTAL
Al servicio de José Carlos Mariátegui: Uniformidad Ideológica de Mariátegui
Por Víctor M. Díaz

A TITIKAKA
A. TITIKAKA, Director de la Coopération Internationale
et de la Culture Internationale, 11, rue de la Paix, Paris.
BOLETIN TITIKAKA
CIRCULACION CONTINENTAL
Al servicio de José Carlos Mariátegui: Uniformidad Ideológica de Mariátegui
Por Víctor M. Díaz

Acknowledgments II



Paper
DOI: 10.1057/s41599-024-03829-1

Open Dataset
DOI: 10.34810/data985



Interactive Dashboard
https://global-ls.github.io/int_cooperation-dataviz/

Acknowledgments II



European Research Council
Established by the European Commission

ERC-2018-STG
ID: 803860



RYC2023-044587-I

@ alessio.cardillo@ub.edu

 <https://cardillo.web.bifi.es/>

 @acardillo.bsky.social

The shameless plug



May 4-8 Zaragoza (Spain)



@CompleNet

@complenet.bsky.social

Conference Chairs:

- Jesús Gómez-Gardeñes
Universidad de Zaragoza, Spain
- David Soriano-Paños
Universitat Rovira i Virgili, Spain

Program Chairs:

- Carmen Cabrera
University of Liverpool, UK
- Alessio Cardillo
Universitat de Barcelona, Spain



<https://complenet.weeblysite.com/>



**Universidad
Zaragoza**

Extra content

Cartography

within module degree κ

$$\kappa_i = \sum_j a_{ij} \delta_{c_i, c_j}$$

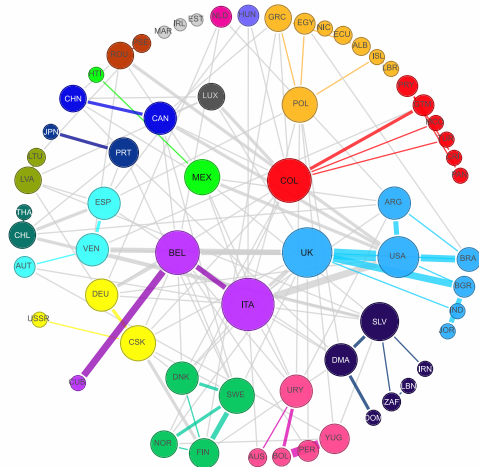
hubness z

$$z_i = \frac{\kappa_i - \overline{\kappa_{c_i}}}{\sigma_{\kappa_{c_i}}}$$

Participation coefficient p

$$p_i = 1 - \sum_j^{N_c} \left(\frac{\kappa_i(c_j)}{k_i} \right)^2$$

IIIC – partition into groups (Folder A)



C1 **Poland**, Greece, Albania, Nicaragua, Ecuador, Iceland, Egypt, and Liberia.

C2 **United Kingdom**, **United States of America**, **Argentina**, Brazil, Bulgaria, India, and Jordan.

C3 **Colombia**, **Paraguay**, **Guatemala**, Monaco, Turkey, **Costa Rica**, and **Panama**.

C6 Sweden, Denmark, Norway, and Finland.

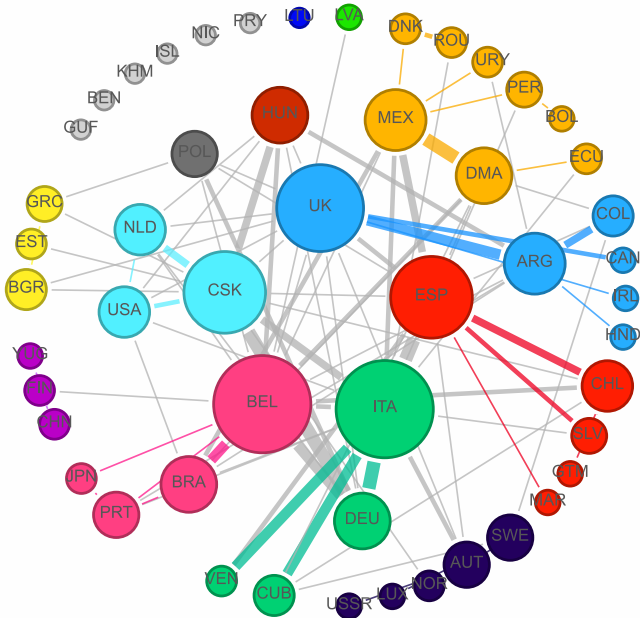
C7 Spain, Austria, and Venezuela.

C8 Germany, Czechoslovakia, and USSR.

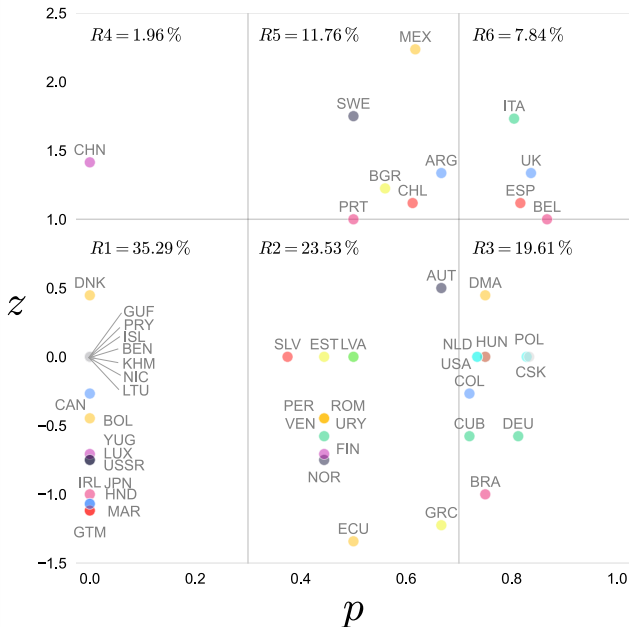
C9 **Belgium**, **Italy**, and Cuba.

Others All other countries.

IIIC – partition into groups & cartography (Folder F)



IIIC – partition into groups & cartography (Folder F)



IIIC – Historical grouping

Group's name	Countries
EU western and USA	France, United Kingdom, Switzerland, Germany, Italy, Belgium, The Netherlands, Spain, and United States of America
EU central countries	Austria, Czechoslovakia, Hungary, and Poland
EU eastern countries	Albania, Bulgaria, Greece, Yugoslavia, and Romania
Baltic countries	Estonia, Latvia, and Lithuania
Nordic countries	Denmark, Finland, Norway, Iceland, and Sweden
Latin countries	Portugal, Argentina, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Chile, Dominican Republic, Ecuador, Dominica, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, Paraguay, El Salvador, Uruguay, and Venezuela
UK's Dominions	Australia, Canada, India, South Africa, and Ireland
Colonies	Egypt, Benin, French Guiana, Haiti, Turkey, Lebanon, Jordan, Morocco, and Palestine
Eastern countries	China, Japan, Cambodia, and Thailand
Middle East	Iran
Other countries	Luxembourg, Monaco, Liberia, and USSR

Bibliography



B. K. Fosdick, D. B. Larremore, J. Nishimura, and J. Ugander, “*Configuring random graph models with fixed degree sequences.*” SIAM Review, **60** 315–355, (2018). DOI: [10.1137/16M1087175](https://doi.org/10.1137/16M1087175)



J.-J. Renoliet, *L’UNESCO oubliée. La Société des Nations et la coopération intellectuelle (1919–1946)*. (Publications de la Sorbonne, Paris, 1999).



R. Guimerá, and L. A. N. Amaral, “*Functional cartography of complex metabolic networks*”. Nature, **433**, 895–900, (2005). DOI:[10.1038/nature03288](https://doi.org/10.1038/nature03288)



F. Klimm, J. Borge-Holthoefer, N. Wessel, J. Kurths, and G. Gorka Zamora-López. “*Individual node’s contribution to the mesoscale of complex networks*”. New Journal of Physics, **16**, 125006, (2014). DOI:[10.1088/1367-2630/16/12/125006](https://doi.org/10.1088/1367-2630/16/12/125006)



V. A. Traag, L. Waltman, and N. J. van Eck, “*From Louvain to Leiden: guaranteeing well-connected communities*”. Sci. Rep., **9**, 5233, (2019). DOI:[10.1038/s41598-019-41695-z](https://doi.org/10.1038/s41598-019-41695-z)



M. Girvan, and M. E. J. Newman, “*Community structure in social and biological networks.*” Proc. Nat. Acad. Sci. USA, **99**, 7821, (2002). DOI:10.1073/pnas.122653799



A. Barrat, M. Barthélemy, R. Pastor-Satorras, and A. Vespignani, “*The architecture of complex weighted networks.*” Proc. Nat. Acad. Sci. USA, **101**, 3747, (2004). DOI: 10.1073/pnas.0400087101



S. Fortunato, and M. E. J. Newman, “*20 years of network community detection.*” Nat. Phys., **18**, 848, (2022). DOI:10.1038/s41567-022-01716-7



S. Fortunato, & D. Hric, “*Community detection in networks: A user guide.*” Phys. Rep., **659**, 1–44, (2016). DOI:10.1016/j.physrep.2016.09.002



R. Rodríguez-Casañ, E. Carbó-Catalan, A. Solé-Ribalta, D. Roig-Sanz, J. Borge-Holthoefer, and A. Cardillo, “*Analysing inter-state communication dynamics and roles in the networks of the International Institute of Intellectual Cooperation.*” Hum. Soc. Sci. Comms. **11**, 1408 (2024). DOI: 10.1057/s41599-024-03829-1