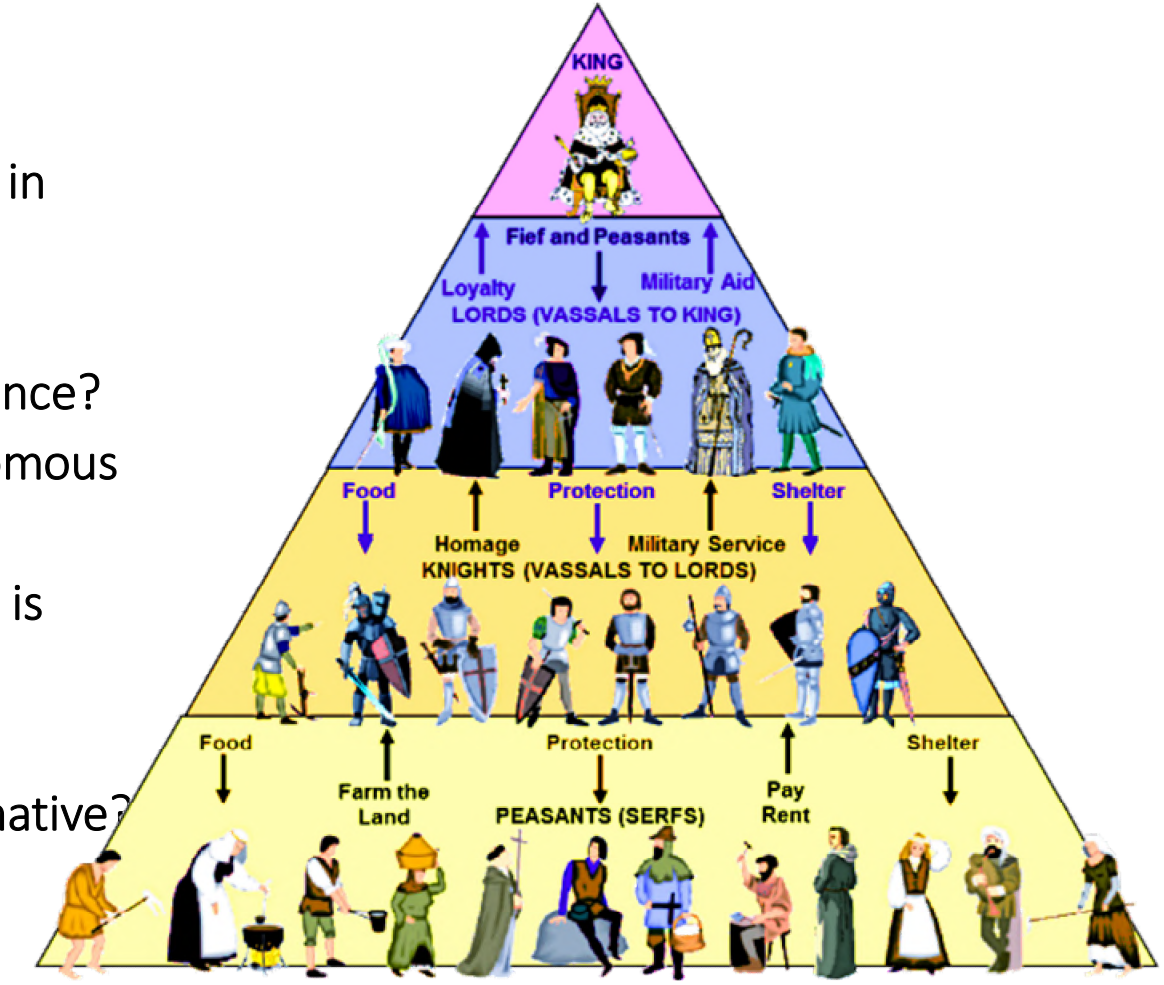
Hegemony and inequality in global science:
Problems of the centre-periphery model

Simon Marginson and Xin Xu 16 Feb 2021

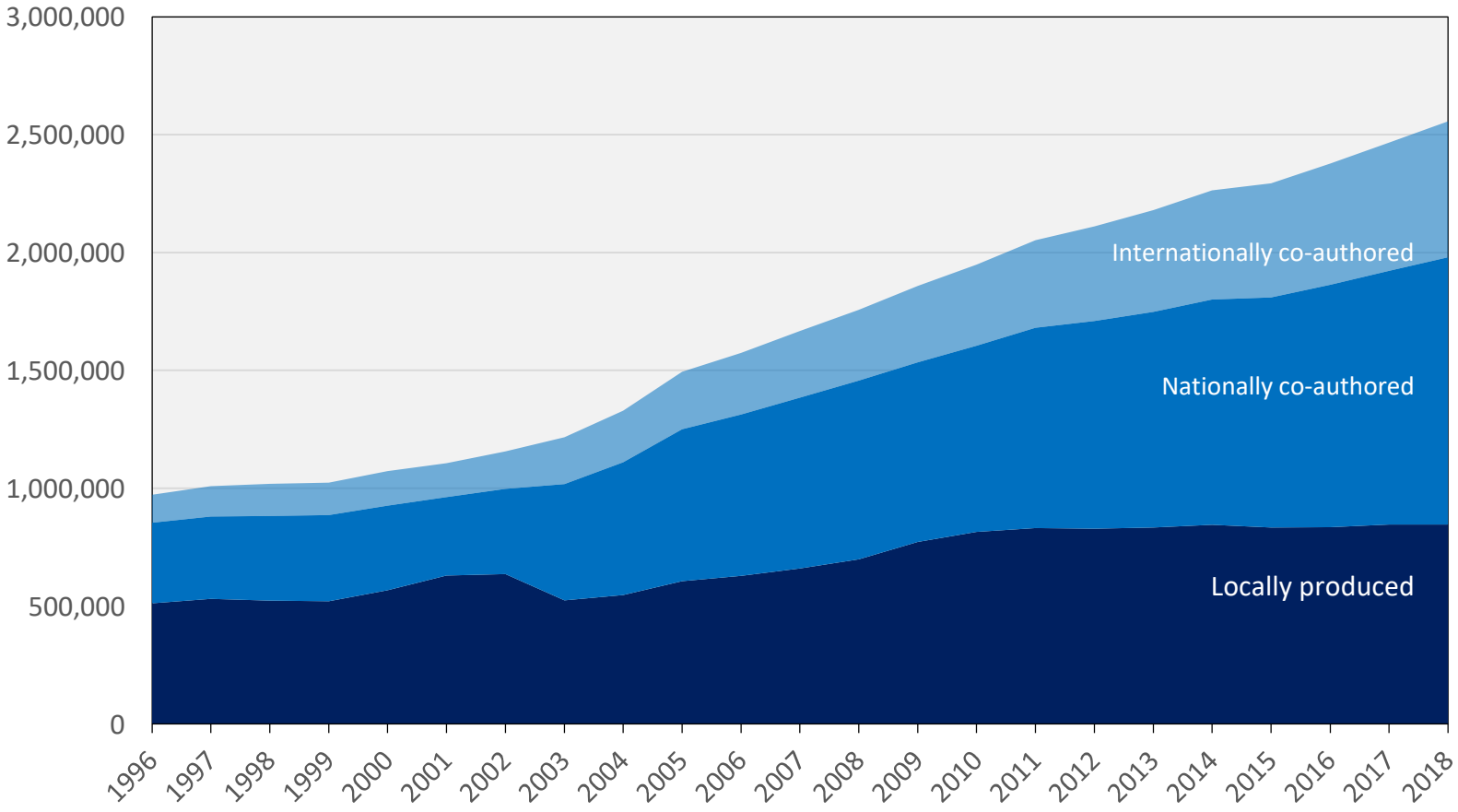
Hegemony and inequality in global science

What are the relations of power in global science?

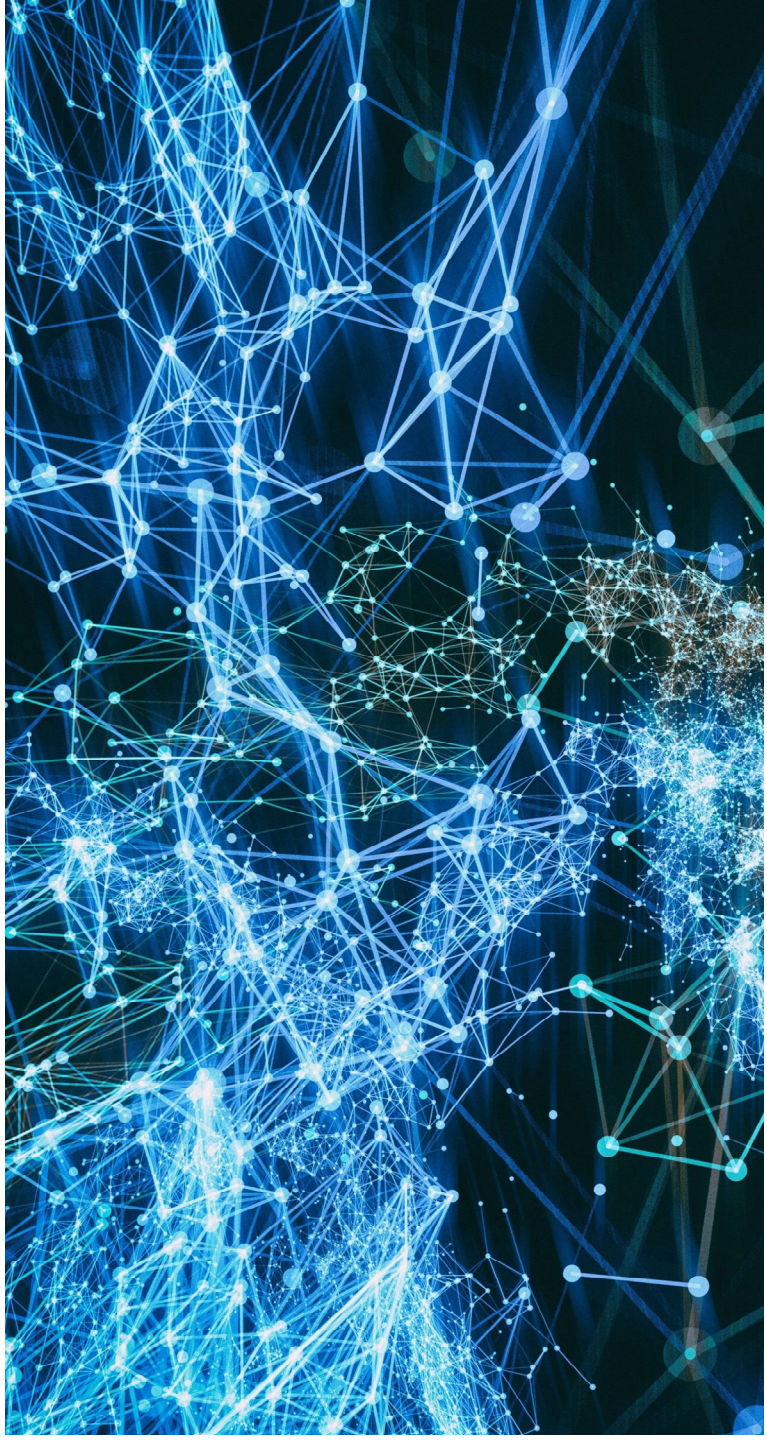
- Are particular national systems or scientists dominant in global science?
- If there is a hierarchy how does it work?
- Is there room for ‘new kids on the block’ in global science?
- Who sets the agenda and the rules that shape autonomous disciplinary collaboration in global science?
- What kind of knowledge is admitted, what knowledge is excluded?
- Is the centre-periphery model a good explanation of relations of power in global science? Is there an alternative?



Rapid growth in science papers and in networked collaboration, world: 1996-2018



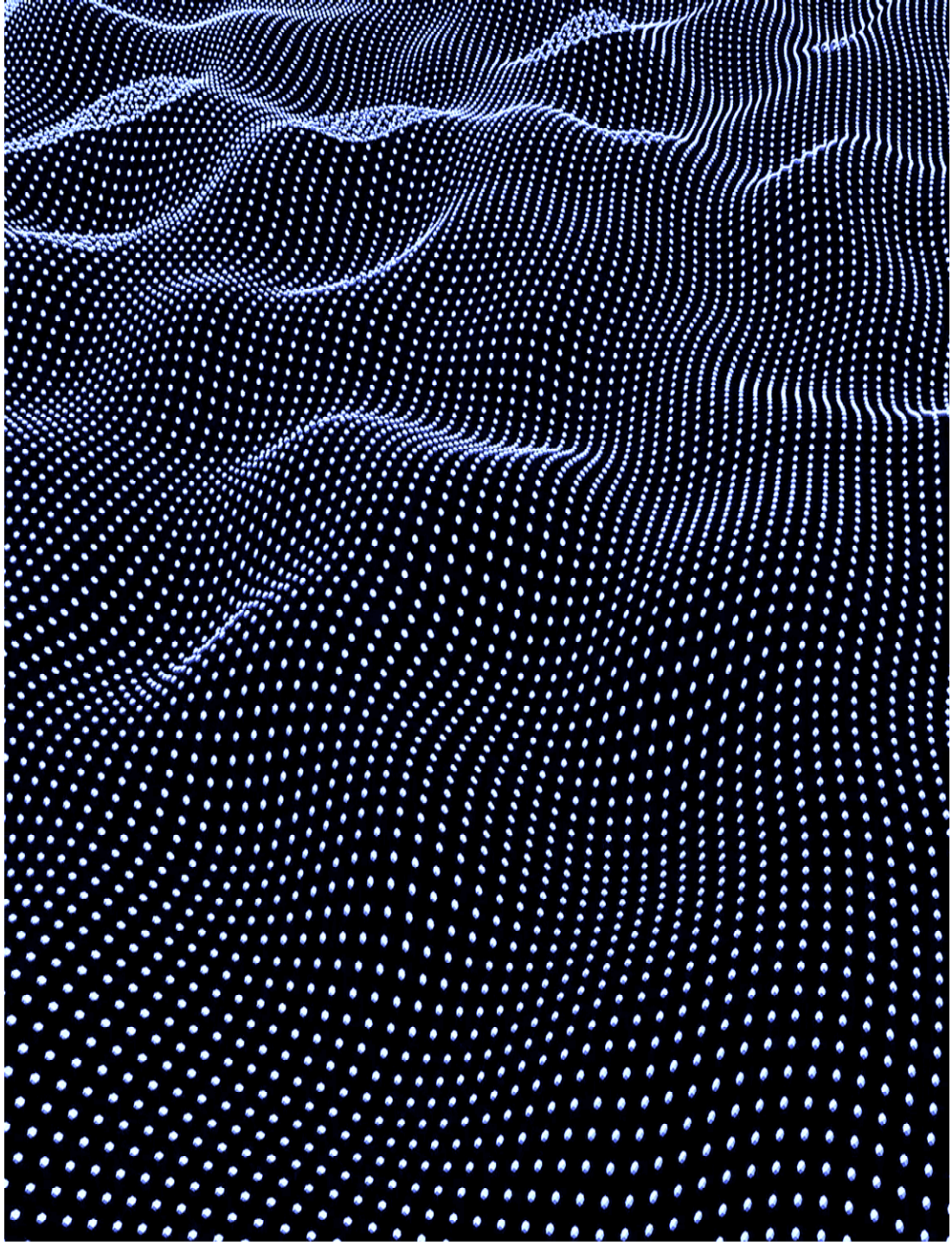
US National Science Board data from Scopus



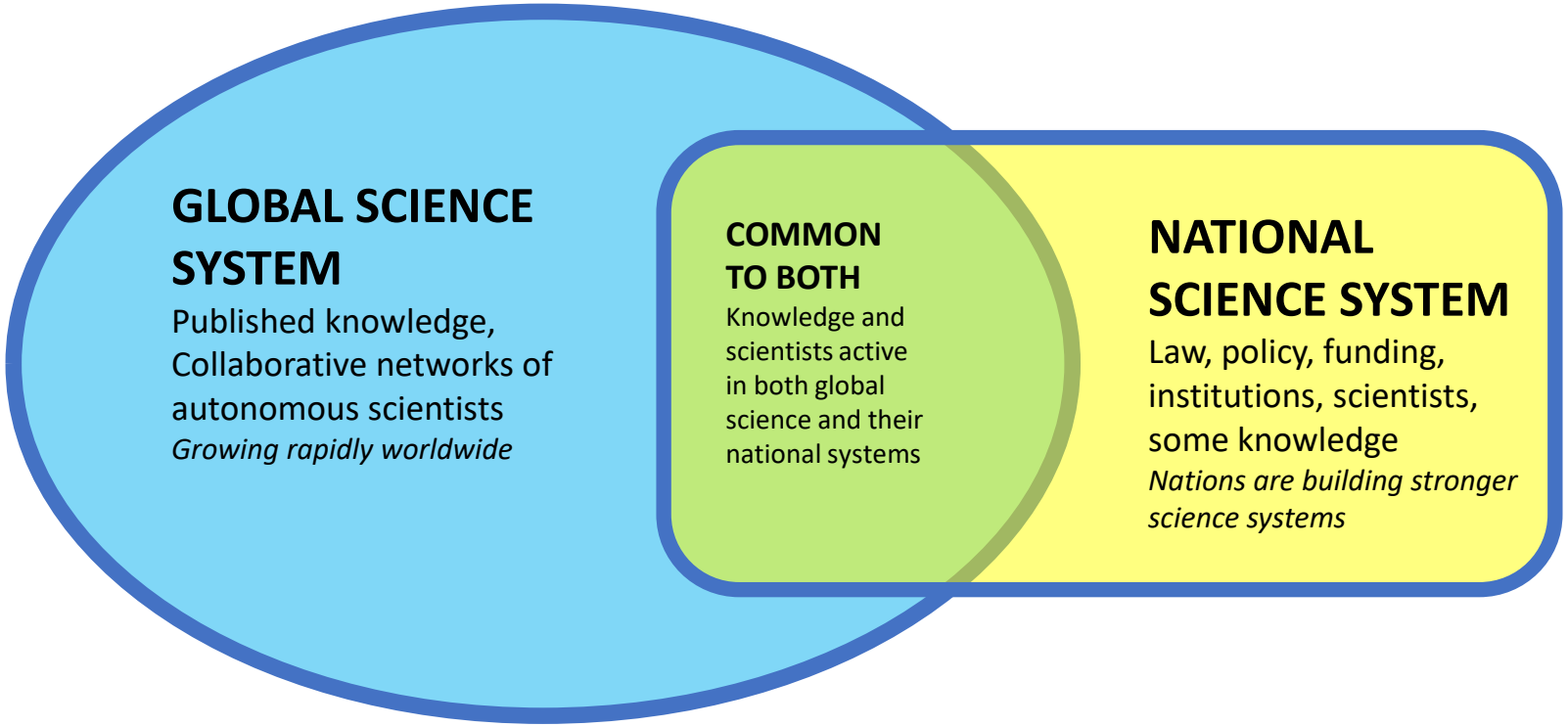
Empirical tendencies

Since the start of the internet in 1990 the global science system has spread in dynamic fashion

- *Growth:* Rapid increases in many countries in R&D spending and growth of published science papers at 5 per cent a year since the year 2000
- *Diversification:* Science no longer an oligopoly of North America, Europe and Japan. Spread of national science capacity to many more countries
- *Networked cooperation:* Rapid growth of co-authorship in science at both global and national levels
- *Pluralisation:* Widening of group of leading science countries, rise of China and a range (though US science remains very strong and globally central)
- *Global integration:* Increase in the role of the global science system vis a vis national science systems – some researchers argue that the global science system has become the primary driver of science



Relations between the global science system and national science systems

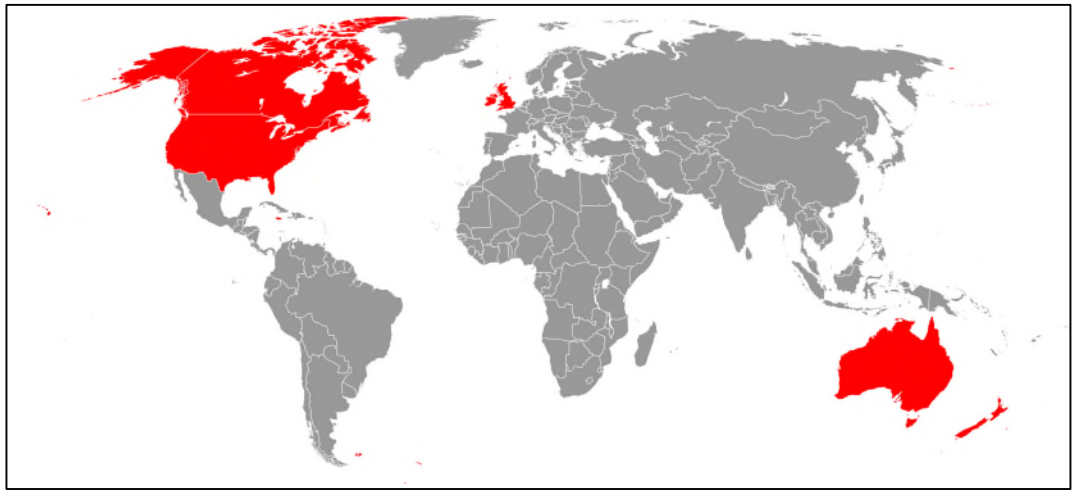


Inequality and homogeneity in global science

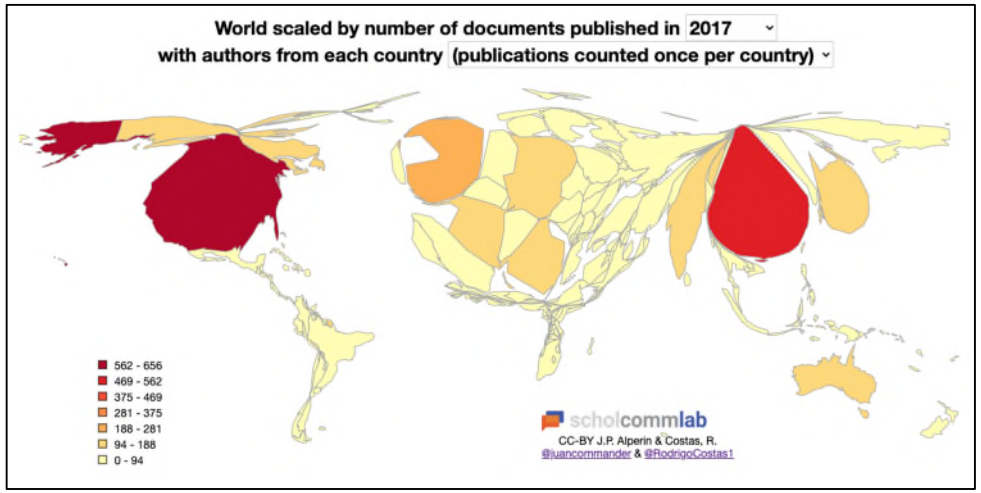
- The networked global science space is characterised with structural inequalities and cultural homogeneity
- Two forms of inequality in global science
  - The exclusion of the vast bulk of knowledge in languages other than English
  - The expectation that universal global knowledge is framed by Anglo-European and primarily Anglo-American cultural norms

Dominance of Anglo-American language and culture in global publishing

Countries where over 50% of people are English first language speakers



Global landscape of scientific publications in English language



Inequality and homogeneity in global science

- The exclusion of the vast bulk of knowledge in languages other than English
    - Citation: Publications in the English language are more likely to be and more often cited
    - Translation: Almost half of all scholarly translations are from English to other languages, while only six per cent are from other languages to English
    - Language barriers: Researchers who don't speak English as their first language must become bi-lingual to participate fully in global science; while their English-speaking counterparts can move freely between the local-national and the global without same barriers.

- *Example: The coverage of Web of Sciences (WOS) and Scopus in terms of languages*

Databases	Total number of journals	Ratio of English-medium journals	Ratio of Chinese-medium journals
Ulrich's Directory	158,344	**68.65%**	**9.07%**
Web of Science	21,419	**89%** in Science Citation Index Expanded (English only) **90%** in Social Sciences Citation Index (English only)	**≈0%** in SCIE (17 Chinese only, 2 Chinese + others) 0% in SSCI
Scopus	38,589	**88%** (English only, or English + others)	**1.6%** (415 Chinese Only, and 45 Chinese + others)

Data sources: Journal lists of the above databases, updated on 21 January 2021.

Cultural homogeneity in global science

- Euro-American (primarily Anglo-American) organizations control the processes of knowledge formation, circulation and codification.
  - Top publishers and indices are all based in Europe and the US
  - The US still leads strongly in editors, reviewers and reviews, despite the growing diversity of authors from emerging countries
  - The global rules of intellectual property and disciplinary conventions are Western/ Anglo-Europeans
- The homogeneity of language, norms and knowledge is powerfully advanced by the leading Anglo-American universities and reproduced by the autonomous professional habits of scientists
- 'Internationalization' acting as a double-edged sword, for local/national agendas could be reworked for Anglo-American templates and displaced by 'global' topics
- The multi-polarisation of global science mean that China, South Korea, India and others have become better at doing Anglo-European science, as bench-marked against Anglo-American criteria; In codified science, Non Anglo-American and emerging systems and persons exercise their agency only on someone else's terms
- The Euro-American centrism and hierarchy in global science draw trenchant critiques from non-English speaking and post-colonial countries, advocating for the advancement of subaltern agency

Shanghai Jiaotong ARWU Ranking
Top 10 countries, 2020

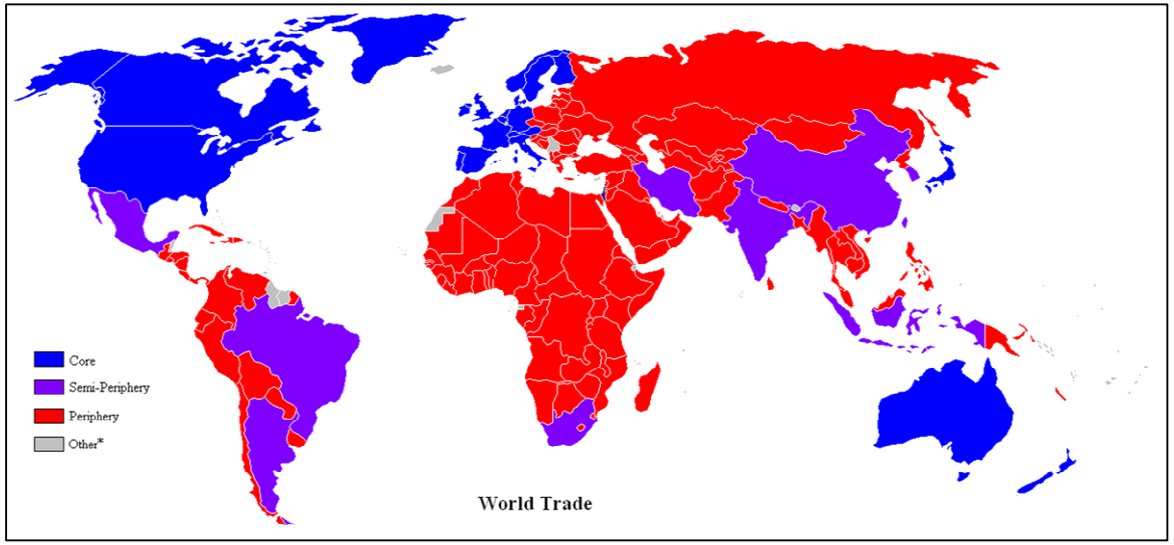
	Top 100 universities	Top 500 universities
United States	45	137
United Kingdom	8	36
Australia	7	23
China (mainland)	6	71
France	5	17
Switzerland	5	8
Germany	4	30
Canada	4	19
Netherlands	4	12
Japan	3	14

World-systems theory and the centre-periphery model

- All nations are incorporated into an expanding Euro-American world-system grounded in the capitalist ‘world-economy’
- World-system is based on a three-way division of labor between countries (1) world ‘centre’ in US, parts of Western Europe, perhaps Japan, with strong states; (2) nations on ‘periphery’ where states are endemically weak or non-existent, controlled by foreign capital; and (3) nations of the intermediate ‘semi-periphery’, China, Korea, Russia, Australia other Europe, etc
- Countries in the periphery and the intermediate semi-periphery are locked into position. It is very difficult to move from one category to another, because there is a zero-sum contest over a limited ‘world-surplus’
- Individual nations do not have autonomy: ‘There is no such thing as “national development”’ (Wallerstein, 1974, p. 390).
- The world level solely consists of nation-states. There are no autonomous global relations that crisscross and combine nations, so an autonomous global science system as such is impossible

Problems of the centre-periphery model in science studies

- The centre-periphery distinction is often referenced in studies of science, including social science, and higher education, for example work by Leydesdorff, Chinchilla-Rodriguez, Olechnicka and colleagues, others
- Centre-periphery is consistent with a Eurocentric worldview. Wallerstein's three-tiered system fits with the operating pragmatics of research in which Stanford or Oxford sit at the centre. But Wallerstein's inevitably Euro-centric world is also agreed by those who, unlike him, welcome Euro-American domination, bask in the alleged cultural superiority of the world centre, and see capitalism as not just inevitable but desirable
- Olechnicka and colleagues see the emerging science countries as condemned to permanent subordination. 'In the case of science … new ideas are generated predominantly in the center and then imitated in the periphery.' Individual countries can rarely break 'the vicious cycle of lasting peripheralization'. Olechnicka and colleagues are not able to explain the rise of China and the new middle countries in science. They are also unable to explain the rapid growth of global science and of "periphery-to-periphery" networking



The centre-periphery model in science studies

- The singular world-economic structure of world-systems theory negates: (1) the autonomy of global relations, (2) the autonomy and agency of nations and persons, and (3) the potency of context and culture
- The centre-periphery model --
  - Does not usefully explain rapid growth of scientific papers and networked collaboration, and the element of 'flatness' in scientific networks that enables the building of scientific initiatives in new and developing science countries
  - Does not explain explosive and simultaneous growth of science in many countries on the named 'periphery' and 'semi-periphery'
  - Does not explain the rapid development of links between countries in the 'periphery'
  - Does not explain the rise of China and East Asia in science, and India which is now the third largest producer of science after China and US
  - Cannot adequately explain the motivations of scientists, who have values in common
  - Nations are not locked in by Euro-American power, the scientists and their agency are also not wholly contained by nations. Centre-periphery theory gives all power to neo-imperialism and underestimates the different agencies of both emerging nations, and scientists themselves

Is the autonomy of global science part of the problem or part of the solution? BOTH it seems

- World systems theory is an economically determinist theory: culture, knowledge and science are shaped and limited by the economic base. The economic base is seen as inevitably Euro-American centric, and primarily American controlled, as long as capitalism exists. History has already shown that neither assumption is correct
- First, new relations of power have developed in global political economy, with the rise of the East, and of East-South relations, the strengthening of a range of middle countries and former periphery countries, and the growing post-colonial and decolonial momentum
- Second, global science is not entirely shaped by either political economy or neo-imperial power. It has autonomy. This is hopeful in one way, because it means that greater diversity is possible in science and in what we recognize as global knowledge. But the autonomy of science is currently sustaining a global order in science that is more Anglo-American dominated – in terms of language, procedures, topics, agendas - than is the global political economy

A more useful framework

- Context matters. Science is not the same in every discipline in every country at every time. One size does not fit all. A nuanced case by case understanding of science is essential
- At any time the global network, national science systems, institutions producing science, and individuals/research groups, can all have agency
- *Hegemony* offers a more comprehensive, flexible and supple explanation of power and inequality in science than does center-periphery. It more directly specifies domination/subordination, and there is less closure.
- In Antonio Gramsci 'hegemony' refers to control by managing consent and participation, including language and cultural mechanisms. Steven Lukes discusses 'the mobilization of bias' and control over institutional processes and agendas. Imanol Ordorika refers to 'the process of shaping and incorporating perceptions, cognitions and preferences into a dominant ideology'.
- Institutions play a key role in the exercise and expression of hegemony, in general and in higher education. They sustain agencies and processes (for example journal hierarchies and topic selection) which calibrate value in science on the basis of the dominant order, grounded in the leading countries and universities

The ecology of knowledges

- Globalization fosters both cultural homogenization and heterogenization. At present global science fosters homogenisation and downplays recognition of difference
- The next step in the globalization of science is to move from cultural homogeneity centred on the old world order to something like unity-in-diversity - to work not with a stratified knowledge system, but one that recognizes and respects the fuller corpus of languages, theories, concepts and methods
- The ontology of a more diverse approach to global science: ‘pluriversity’, ‘pluriversal’ knowledge, ‘ecology of knowledges’ (Santos, 2007)
- Multilingual publishing and translations in global science, e.g. Helsinki Initiative on Multilingualism in Scholarly Communication
- Multiculturalism in global science: the pluralisation and mutual respect of multiple epistemologies, languages, research agenda, research paradigms and beyond


Photo credit: Derry Moroney Photography

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