When Computational Power Meets Diplomacy: Training a New Generation of Scientists in Diplomacy and Diplomats in Science

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Abstract: *The increase of computer power and the development of new algorithms is currently pushing the scientific investigation to new frontiers. This is particularly promising in the field of diplomacy where the complexification of international relations calls for new approaches to understand how humanity can collectively address contemporary global challenges. The University of Geneva in collaboration with ETH Zurich are launching a new Geneva based Laboratory for science diplomacy that will enrich an ecosystem needed to support broad transformations in our understanding of the ways we manage our interactions. An important goal will be to build a new education curriculum at the interface between science and diplomacy.*

1. Introduction

The process of globalization has ushered in a complexification of international relations characterized by powershifts, a proliferation of actors working across national boundaries, increasing interdependence as well as intricate and sometimes confusing dynamics of integration and fragmentation. Humanity has achieved an unprecedented state of development but, with a population of 7.9 billion and fast-growing demand for natural resources, it is facing unprecedented challenges of sustainability. The scale and magnitude of our common challenges require broad societal transformations. Overall, responsibilities to address global challenges continue to be exerted primarily at the country and sectoral levels, but forces and dynamics within globalization shape a world order at the transnational and intersectoral levels.

While the COVID-19 pandemic has further highlighted the need for international collaboration to prevent, react to, and recover from a crisis that has disrupted the life of many, we examine in this commentary how science and diplomacy provide the foundation for new forms of collaboration to address global challenges. As science is a complex self-organizing network in constant co-evolution with societal needs, we argue that fostering the capacities for collaboration requires unprecedented effort from the science community. First, we briefly introduce the evolution of international relations and diplomacy in the 21st century. Second, we present recent developments in computational social sciences. This leads us to consider the emerging field of computational diplomacy. Finally, we discuss the implication of sci-

ence in diplomacy on education, arguing that the development of more interactions between the natural and social sciences have the potential to transform our knowledge system.

2. Evolution of international relations and diplomacy in the 21st century

For a long time, international relations have been considered through the prism of the action of states, as the principal unit of analysis. At the end of the 20th century, several of the core hypotheses of classical international relations scholarship were eroded. First, it was recognized that states are often not unitary actors, as classical international relations theory pretends, but complex regimes constituted of many interacting parts. Second, the emergence of new actors questioned the role of states as the proper units to meaningfully understand the capacity to produce and implement policies to answer global issues. By considering the international system as a complex adaptive system, the focus has moved from interstate diplomacy to the governance of interactions, i.e., how multiple stakeholders use multiple channels to manage their relationship (Torfing and Ansell 2016).

Against the evolution of international relations, diplomacy has become much more than negotiations between diplomats. The main functions of diplomacy cover communication, intelligence gathering, image management, and foreign policy implementation (Kerr and Wiseman 2017). The emergence of new communication channels such as social media has been integrated within the diplomacy toolbox by states and other relevant international stakeholders. Furthermore, global actors such as states, international organizations (IOs), and non-governmental organisations (NGOs) are increasingly using the capacity of computing power to further their policy agendas.

3. The development of computational social science

Development in computer power has been harnessed to study social phenomena. Since the 1980s, computational approaches have been used to understand problems of cooperation (Axelrod 1997). However, the field of computational social science has developed in several fields including political science (Brady 2019) and international relations (Ünver 2019). The collection, curation, and analysis of data about social phenomena increasingly rely on the use of quantitative analytical tools, mapping, modelling, simulations, artificial intelligence, and network analysis. The growing availability of primary material such as texts and speech in a digitalized form allows for the texts to be mined using classical search functions and tools, and natural language processing (Miner, Elder IV et al. 2012).

Alongside the development of computational social sciences, computational diplomacy is an emerging field that focuses on the management of international relations in a globalised and interdependent world. Computational diplomacy uses advances in computing power to understand the complexity of how governance is exerted. Relevant issues include (1) the rapid evolution of the diplomatic landscape including its actors and venues, (2) the role of networks of stakeholders in shaping global policy agenda, (3) the use of new tools for communication and analysis in the pursuit of foreign policy, and 4) the driving forces and obstacles to the provision of global public goods. The study of policy and governance networks should allow for better understanding of the emergence of certain non-linear phenomena and their systemic repercussions. Ultimately, it can help understand the multiple ways power is exerted. The shift in worldview, away from a state centric model, has a huge transformative potential for the study of international relations. Our understanding of international relations may come *"to be redefined when the full extent of digital age potentiality will be understood and exploitable, thanks to communication tools, new algorithms and computing power."* (Grech, Chopard et al. Forthcoming).

4. Science in/for Diplomacy and diplomacy for science in the 21st century

Diplomacy and science have traditionally been considered as far apart. However, our growing understanding of the challenges that we are facing underlines the relevance of closer relationship and interactions between science and policy (Lord and Turekian 2007, Simon, Kuhlmann et al. 2019). Indeed, critical linkages are now apparent when it comes to address the most pressing global challenges. Scientific knowledge has been the mainstay for the development of modern societies, underpinning progress, growth, and prosperity in many parts of the world (Wernli and Darbellay 2016). The constant quest for scientific and technological progress has come to define our knowledge societies. At the same time, diplomacy has been the main tool to avoid conflict and promote global collaboration. Addressing our contemporary complex challenges requires a closer collaboration between science and diplomacy.

Science diplomacy is not new. For example, cooperation on health issues was at the basis of many international developments at the end of the 19th century, such as the International Sanitary Conferences (e.g. Fidler 2001). Some states have also used medical diplomacy as a foreign policy instrument (Feinsilver 2010). Ministries of foreign affairs recognised the importance of collaboration to address global health chal-

lenges as a "pressing foreign policy issue" (Ministers of Foreign Affairs of Brazil, France, Indonesia, Norway, Senegal, South Africa, and Thailand 2007). The early 21st century has further witnessed an expansion and diversification of the practice of science diplomacy. A 2010 report distinguished between three types of practice (American Association for the Advancement of Science and The Royal Society 2010). (1) Science diplomacy consists of using science to inform foreign policy objectives, (2) diplomacy for science seeks to facilitate international science cooperation, and finally, (3) science for diplomacy aims to harness the potential of science to improve collaboration in international relations.

The relation between science and diplomacy even goes further. Disciplines have developed as the science of the "parts" based on the fundamental assumption that knowing the parts (methodological reductionism) is sufficient to understand reality. The progressive specialisation of knowledge in the 20th century has created islands of knowledge in a sea of uncertainty. Interdisciplinary and transdisciplinary research seek to strengthen the collaboration between disciplines to produce new knowledge that none of the disciplines would be able to achieve by itself. As noted by a report from the League of European Research-Intensive Universities (LERU), *"cross-fertilization has to be built upon disciplinary strengths and that excellence in interdisciplinarity depends, to a large extent, on the depth of research and teaching conducted in individual disciplines."* (Wernli and Darbellay 2016). Fostering the conditions for the communication between disciplines bears semblance to the diplomatic processes as interdisciplinary collaboration requires skills, such as being able to develop a common language or problem framing, that are typically developed in diplomacy. Understanding interdisciplinary research as a form of diplomacy provides a new way to advance the production of knowledge.

5. Moving the agenda forward

As a historical locus of international relations and a unique crossroad in global governance, Geneva has a distinctive role to play in contributing to these goals. Not only is it the home of many international organisations, permanent missions, and a myriad of private actors, but it also has a very important concentration of brainpower, thanks to the diversity of expertise present in the city. Indeed, Geneva has unparalleled advantage as a place in which to research problems of global collective action and design solutions for the future. The University of Geneva is ideally situated within this international environment, but it is the full academic and scientific ecosystem in Switzerland that makes Geneva and Switzerland an ideal place for the advent of science diplomacy.

In education, academic institutions are accountable for equipping young people with the knowledge and skillset needed to address the unprecedented challenges of the 21st century. Given the magnitude and interconnectedness of contemporary global challenges, it is essential that education programmes provide students with a systemic worldview. As recently stated by LERU, *"approaches to learning that help students relate knowledge from different sources and disciplines are needed to foster both resilience and sustainability."* (Wernli 2021). Building a new curriculum at the interface between science and diplomacy should combine learning approaches of problem-based learning, simulation, and transversal courses. In addition to knowledge transfer, sufficient time should be dedicated to the mastering of technological and social skills. Ultimately, the goal should be to develop a "global system science".

6. Conclusion

The increase of computer power and the development of new algorithms are currently pushing the possibilities of scientific investigation to new frontiers. Innovative techniques such as artificial intelligence, machine learning, numerical simulations, optimization, and high-performance computing allow researchers to explore quantitatively new types of problems, out of reach without these new tools. This is particularly promising in the field of diplomacy where the unprecedented global challenges that humanity is facing require new modes of collaboration. International organisations and other global actors have the responsibility to tackle those global challenges. However, academic institutions, as the mainstay of the production and transmission of scientific knowledge, also have an important responsibility. Innovation in global governance should be supported by new approaches to knowledge production that help design the tools and mind-set to sustain human civilisation and its supporting environment. Synthesising vast amounts of evidence requires a multilateral approach to knowledge creation at the interface between the social and natural sciences. The University of Geneva in collaboration with ETH Zurich are launching a new Geneva based Laboratory for science diplomacy that will enrich an ecosystem needed to support broad transformations in the ways we collectively manage our interactions. ∎

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