Science diplomacy. On several basic notions and key questions

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Abstract

«Science diplomacy» appeared some ten years ago in the vocabulary of international relations but it still remains poorly known, a frequent mistake being to confuse it with international scientific cooperation. Drawing on examples taken from history and from the present nature of international relations, this text can be read as a general introduction to science diplomacy, which belongs to the field of public policies and covers various practices. We identify these from the main objectives pursued by the states that engage in science diplomacy: attraction, cooperation, influence.

1. Introduction[1]

Science diplomacy refers to the particular area of international relations in which the interests of science and those of foreign policy intersect. The first scholarly definition of the term «science diplomacy» was devised only about ten years ago. In 2010, the Royal Society and the American Association for the Advancement of Science (AAAS) published a seminal report from a meeting titled *New frontiers in science diplomacy* (Royal Society and AAAS, 2010). In 2012, the quarterly journal *Science & Diplomacy* was launched by AAAS. First applied and analysed in the United States and the United Kingdom, which are both pioneering countries in this field, this particular class of activities is now part of the diplomatic portfolio of a growing number of countries. France is one of these countries, as demonstrated by the Ministry of Foreign Affairs' publication of a scoping report titled *Science diplomacy for France* in 2013 (Ministry of Foreign Affairs, 2013). If science diplomacy is an area that is becoming more salient within the field of public policy, it is also an emerging theme in academic research. Theses and other academic works and research programs have been devoted to science diplomacy, such as those launched by the European Commission in 2015 and 2016 under the auspices of the European H2020 program.[2] The following text is an introduction to this particularly rich dimension of contemporary international relations. The following sections define science diplomacy, frame the field from an international perspective and clarify its objectives.

2. What is science diplomacy?

Broadly speaking, diplomacy is a set of practices based on dialogue, negotiation and representation, by which a sovereign country defends and promotes its interests (and its values, according to some) in its relations with other countries. How do scientific research and its approaches and results relate to diplomacy? This question is the starting point for any discussion of science diplomacy. Following the pioneering approach of the Royal Society and the American Association for the Advancement of Science, which is an essential entry point into this subject, science diplomacy is defined on the basis of its three complementary dimensions, which are presented and commented upon here.

2.1 The three dimensions of science diplomacy

2.1.1 Diplomacy for science

Every country strives to promote its research community on the international scene and to facilitate scientific cooperation with other countries. To achieve this, public authorities use two main levers. The first involves scientific and technological cooperation agreements between governments, which are intended to establish an official framework for shared research priorities. Bilateral agreements, which are agreements signed between two governments, are the most common. Agreements signed by several governments are less frequent but often more publicised. Such agreements preside in particular over the construction of large research infrastructures, for which the involved countries share the costs and risks and derive benefits through the participation of their researchers in multinational programs. The International Thermonuclear Experimental Reactor (ITER) project is one example. Based on an idea that arose from the world of science, this colossal facility, currently under construction, should make it possible to verify the scientific and technical feasibility of nuclear fusion as a new energy source. However, this idea could never have become a reality without the ardent and enduring commitment of the leaders of the most powerful countries and the persistent negotiations of diplomats, who had to resolve difficult questions concerning the choice of the site (Cadarache, France) and the financing of the experimental reactor until the final signature of the agreement at the Élysée Palace on November 21, 2006.

The diplomatic networks abroad are another major vector of «diplomacy for science». The embassies that a country deploys around the world have among their missions the facilitation of bilateral scientific exchanges: the scientific advisors and attachés who work at embassies promote the mobility of researchers (by initiating or facilitating contacts, by granting financial aid, etc.) and assist them in certain negotiations (for intellectual property aspects, for example).

2.1.2 Science for diplomacy

In certain situations, scientific relations can foster diplomacy. This is the case when, for example, political tensions between countries do not allow traditional diplomacy to manifest itself. By helping to maintain or restore links between countries that officially find it difficult to communicate with each other or that no longer communicate with each other, science acts as a surrogate and vanguard of diplomacy. This is the most unique dimension of science diplomacy, but it applies only to particular instances of international relations. It is thus well known that during the Cold War, scientific exchanges between civilian researchers in the Soviet Union and the United States were never interrupted (as were commercial relations) and were only possible because the authorities of both countries issued the necessary visas: Researchers from both sides were sometimes even the liaisons of a form of parallel diplomacy. Another example is the relationship between the United States and Iran, two countries which have not had diplomatic relations since 1980. Nonetheless, their respective scientific communities have never interrupted their exchanges, and they have even intensified them: an agreement between the two countries' academies of science was concluded in the early 2000s, yielding around 20 bilateral research seminars over the following decade. Another example is President Obama's speech at Al-Azhar University in Cairo eight years after the 9/11 attacks. This inspiring, peace-making and constructive speech was a conciliatory gesture toward a community of countries that needed to be shown that America can speak a language other than that of belligerence. In addition to offers of scholarships for students from the Arab–Muslim world and the announcement of a new fund to support technological development in these countries, the American president announced his willingness to send «science envoys» to the Middle East: to date, more than 20 renowned American scientists have travelled to the Middle East to examine the possibilities of cooperation in the fields of health, engineering, energy and climate research.

2.1.3 Science in diplomacy

Some foreign policy issues require scientific insights, such as those arising from the implementation of international conventions regarding environmental, health or security issues. Diplomats responsible for negotiating and monitoring these conventions must be guided in their decisions by scientific expertise. All of the conventions whose subject matter lends itself to this need have had scientific councils and have used external experts and consultants. Some conventions with a particularly broad and complex scope (e.g., the environment, biodiversity, etc.) benefit from sophisticated structures of collective expertise referred to as «science policy interfaces». These structures are based on congregations of large groups of experts (panels) responsible for reporting on the available knowledge and formulating diagnoses. The Intergovernmental Panel on Climate Change (IPCC), created in 1988, is undoubtedly the most widely known of these interfaces. Another example is the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), which was officially created in 2012. In international arenas, the analyses and conclusions provided by experts contribute to negotiations between diplomats, hence the term «science in diplomacy». These various examples demonstrate that science diplomacy can operate in the traditional framework of relations between countries in a bilateral fashion, as well as in the framework of relations involving many countries, being referred to as multilateral science diplomacy. The threefold characterisation of science diplomacy by the Royal Society and the AAAS is as brilliant as simple. However, it warrants some comments and elaboration.

2.2 Comments and elaborations

2.2.1 The three parts are interdependent

Between these three compartments of science diplomacy, the boundaries are porous, and the relationships can be two-way (see for example Copeland, 2016; Penca, 2018). The «Cairo speech» illustrates this; the announced dispatch of high-profile American scientists to their counterparts in the Arab-Muslim world was part of an overall diplomatic effort to restore the image of the United States in these countries and to renew ties that had been eroded, particularly following the American intervention in Iraq. However, this relationship between science and diplomacy is inseparable from the reverse one. Although these contacts between American scientists and scientists from the targeted countries are supposed to favour the options of American diplomacy, they also provide American researchers with new perspectives of exchange and cooperation: with science envoys, science works for diplomacy, and diplomacy also works for science.

2.2.2 Science diplomacy is a matter of national interest

To fall within the scope of the theme analysed here, the scientific relations that are established between countries must necessarily have a diplomatic dimension. This means that science diplomacy is a matter of public action and is therefore neither spontaneous nor passive; rather, it is part of the broader framework of the external actions of the states that practice it. When combined with the adjective «scientific», the word «diplomacy» introduces the (geo)political dimension (in science): science diplomacy is one of the levers available to states to promote, directly or indirectly, their interests on the world stage. What kind of interests, then? It is useful to distinguish between scientific and non-scientific interests. The former interests refer to the desires of states to acquire scientific (and more broadly, technological) resources to increase their national potential and to change the international balance of power in a manner that is more favourable to them: the attraction of high-level foreign researchers typically falls into this category. The second category refers to situations in which international scientific relations are primarily guided by a political agenda: this was illustrated by the opening of European research programmes to Eastern European countries at the beginning of the 1990s within the framework of a «neighbourhood» policy preparing the docking of these countries to the European Union, here regarded as the political entity initiating the process. In observing international scientific relations, it is therefore important to identify the dominant objective (scientific or non-scientific, most often political) with the awareness that, in practice, objectives are often linked. For instance, the seminal Royal Society-AAAS report provides the following definition of «science for diplomacy»: «using scientific cooperation to improve relations between countries» (Royal Society and AAAS, 2010: vi).

Scientific cooperation reveals its dual nature: it allows each of the participating countries to benefit from sharing new research results, international co-publications and scientific capacity building. However, this scientific added value — which is the immediate objective of any cooperation between laboratories in different countries — can be associated with other forms of added value: the virtues of dialogue between researchers from different countries, the creation of relations of trust that can encourage the thawing of political tensions between countries that are accustomed to confronting each other, the transformation of the public's image and representation of other countries, etc. This relates to the argument most often proposed in the first writings devoted to science diplomacy: the power of science, by virtue of its «universal values», can contribute to pacifying international relations. In these situations, it is within the shared interest of each country to encourage scientific cooperation by signing international agreements, by issuing the necessary travel visas to researchers and by financially supporting collaborations in the framework of specific bilateral programs.

Similar arguments can be developed in the context of multilateral scientific relations, in which the interests of each country coalesce into a common interest. This applies to certain achievements which are frequently presented as emblematic of science diplomacy, such as those of the European Organisation for Nuclear Research (CERN) or the SESAME project. Created by 12 European countries in 1954 under the auspices of UNESCO, in a period marked by a strong desire for peace and for the development of European institutions, CERN has made it possible to restore bridges between nations that were eroded by the fractures of history. The replication of this model on a smaller scale, which is currently underway in the Middle East with the launch of the SESAME project, has been driven by similar intentions: to develop physics research for peaceful purposes and to promote cross-border cooperation in a region of the world embroiled in conflict. These multilateral scientific initiatives convey a specific vision of relations between nations that is based on the noblest values of science, dialogue, sharing and the public interest; this vision aims to help reconcile disparate groups of people. Nonetheless, the positive values of science never fully obscure the reality of international power relations. The aforementioned examples, in which the national interests of the signatory countries do not disappear, merely provide a partial view of the landscape of science diplomacy. In the context of this diplomacy, the national interests of the countries involved are not only present; rather, they are generally predominant. There is therefore no form of science diplomacy that does not have a direct relationship with the interests of the states that promote it. The link to national interests is the determining criterion that allows us to identify, in the vast array of international scientific relations, the endeavours that deserve to receive the label «science diplomacy».

2.2.3 Science diplomacy should not be conflated with international scientific cooperation

This cautionary note follows directly from the section above. International scientific cooperation and science diplomacy are not synonymous and should not be conflated with each other. Scientific cooperation refers to the work of researchers who are driven by the desire to advance science and who find renewed means to achieve this goal through working alongside their counterparts in other countries. There is not necessarily a national interest at stake, nor any expected diplomatic benefit. However, there are many situations in which international scientific cooperation and science diplomacy coincide and when the international work of researchers and their research institutes is part of diplomatic strategies that aim to favour contacts with certain countries, promote negotiations leading to international agreements or increased influence. Finally, science diplomacy can exist beyond the framework of international cooperation. Policies that aim to attract scientific and academic brainpower are a clear illustration of this. A country practices a particular form of «diplomacy for science» when it approaches and recruits students and researchers abroad with the support of its embassies. This can be conceptualised as a zero-sum game, since any resource gained by this country is lost to another, and it therefore deviates from the positive-sum game that generally characterises cooperation. While it is collaborative when it satisfies the joint interests of two or more countries, science diplomacy becomes competitive when the «every man for himself» rationale prevails (Ruffini, 2018). To the logic of cooperation, science diplomacy adds the logics of attraction and influence, which will be detailed later.

To speak of science diplomacy is to invoke a recent vocabulary that dates back about ten years. However, the novelty of the vocabulary should not obscure the historical links between science and foreign policy. A quick overview of history reveals that the great voyages of exploration undertaken by the European major powers in the 18th century were not devoid of geopolitical objectives, although they also had scientific goals (discovering distant lands or procuring unknown mineral or plant species). More recently, the Cold War period provided numerous examples in which foreign policy was strongly impregnated with science. This galvanised the ideological competition between the US and the Soviet Union, particularly in the fields of nuclear energy and space. The conquest of space, in particular, appeared to be the juncture *par excellence* in which scientific and technical issues converged with those of «systemic» competition. Retrospectively, this period appears to be the one in which the foundations of science diplomacy were established and the period in which the concept was incubated. However, in the post-Cold War period, the contemporary forms of the relationship between science and foreign policy have truly manifested themselves. This will result in the dissemination of a new vocabulary and the participation of a growing number of countries.

Why is this happening right now? This recent development can be attributed to the growing awareness of the existence of global issues, which intensified in the last quarter of the 20th century, and the increasing interest in «global public goods». Additionally, today's major challenges, such as climate change, food security and the spread of infectious diseases, have a scientific component. Facing these challenges is in the interest of the international community and calls for collective action. To inform this action, the use of experts is indispensable. Much of the interest in science diplomacy has arisen from the fact that these global issues are on the international agenda.

The growing role of non-state actors in diplomacy is a second reason for the emergence of science diplomacy. Non-governmental organisations and businesses occupy an important position in the debates that precede or surround major international negotiations: diplomacy is generally recognised today as being more inclusive than it was in the past (Hocking et al., 2012). The scientific community, which has always been accustomed to dialogue and exchange, has the necessary assets to make its voice heard in international forums and to take advantage of the attention now devoted to civil society actors.

Finally, the third reason is that soft power is asserting itself in the post-Cold War world as a means of expressing the power of nation-states on the international scene, alongside the traditional forms of military and economic power. Soft power can be defined as «the ability to get what you want through attraction rather than coercion or money» (Nye, 2004: x). Science is generally recognised as an effective vector of soft power. According to the available surveys, the United States are most respected in the world thanks to science and technology, in addition to the appeal of its music or cinema. Additionally, China, whose growing influence in Africa is often discussed today, has established a positive reputation in Africa through science and technology.[3] A country can therefore attract and influence through its scientific and technical achievements or its potential in this arena. The values of openness, sharing and universality inherent to the scientific approach are congruent with the expression of «soft» forms of influence and power, and this explains why they attract the interest of diplomats.

Thus, states have long been involved in science diplomacy, although they did not always invoke the vocabulary that is used today. The fact that science diplomacy is now named, claimed and conceptualised is a characteristic of the post-Cold War period, and increasingly more states now understand the benefits that they can draw from it in contemporary international relations.

4 The objectives of science diplomacy

What are the forces that govern the development of science diplomacy? Countries that wish to defend and promote their interests in the world are not unaware of the asset that scientific development represents. More precisely, they are committed to three objectives, namely to attract, cooperate and influence (Ruffini, 2017). The sections below illustrate these objectives with examples taken from the field of international scientific mobility.

4.1 Attract

Any country that wishes to have a significant impact on the world's knowledge economy and scientific affairs must have an attractive research and innovation system. Attractiveness is a major issue and a key word in science diplomacy. It is measured by the ability to attract and retain the best «brains», which, for our purposes, are those of professional researchers and doctoral students: increasing their incoming mobility is a central objective of science diplomacy. The countries, or at least the most powerful among them, are in direct competition to influence the global distribution of this brainpower. The challenge is to accumulate science-intensive human capital and to increase the national endowment by importing «brains».

According to UNESCO data, about 5 million students were in international mobility in 2017. This figure rapidly increased: internationally, there were only 800,000 mobile students in 1975, and according to forecasts, there will be 8 million by 2025 (OECD - Organisation for Economic Cooperation and Development, 2014). One area in which mobility is growing particularly rapidly is amongst doctoral students. According to UNESCO data, 359,000 doctoral students were internationally mobile in 2012. Many were writing their dissertations in the United States (40.1%), the United Kingdom (10.8%) and France (8.3%), to name the top three host countries. More than half of them were preparing a science or engineering thesis (UNESCO - United Nations Educational, Scientific and Cultural Organization, 2015).

Regarding the international mobility of researchers, the available statistics are unfortunately substantially less precise. The data collected by international organisations (OECD or UNESCO) concern the migration of highly qualified people, of which the population of researchers constitutes a portion. In the absence of an overall census specifically regarding researchers, this section focuses on the results of a survey conducted to study the different models of international mobility (Franzoni and Scellato, 2012).[4] Two broad categories of countries emerge: The first includes those in which the proportion of researchers who are foreigners represents 40 to 50% of the total number of researchers. Sweden, the United States, Australia, Canada and especially Switzerland, where more than one half of researchers are foreigners, belong to this group. At the other end of the spectrum, other countries have only a small proportion of foreign researchers: India, Japan, Italy and Spain are in this category. France occupies an intermediate position:

For public research alone, one researcher out of 10 is of foreign nationality, typically hailing from another European country. Regarding the countries of origin of expatriate researchers, India comes out on top, with approximately 40% of its researchers abroad, followed by Switzerland, the Netherlands and the United Kingdom. On the other hand, the researchers who expatriate the least are the Japanese, Americans and Spaniards. In addition to this summary, more specific data attests to the dynamism of the international mobility of researchers.

The «grey matter» of researchers and students who will be amongst the research elites of tomorrow is an essential fuel for the collective knowledge of society: foreign researchers, recruited within a global market that has become highly competitive, are a source of dynamism for the national research system. Doctoral studies are another strategic issue: welcoming students from abroad to prepare their thesis means broadening the pool from which the host country can draw to ensure the replenishment of its pool of researchers. The propensity of doctoral graduates to remain in their host country is high, whether they stay for a post-doctoral internship or to hold a permanent research position (Auriol, 2010).

To attract professional researchers or doctoral students, the means implemented by public authorities cover a broad spectrum that includes benevolent policies for granting visas, doctoral scholarships, material facilities for settling in the country, assistance to facilitate the return of expatriate researchers, etc.

4.2 Cooperate

In its essence, science has no borders, and cooperation between researchers from different countries strongly demonstrates the values of dialogue, sharing and universality. International scientific cooperation fosters a harmonious mode of communication between states and between peoples. It plays a role in the moderation of international tensions, the normalisation of inter-state relations and the reinforcement of existing solidarities. It also makes it possible to execute projects that no single country could accomplish independently. For diplomats, taking advantage of the positive values of science on a multilateral scale means working towards the realisation of projects, such as CERN or ITER. Another example is the cooperation between states in the framework of the International Space Station. In bilateral relations, diplomats are involved in the establishment of framework cooperation agreements and in their execution, due to the periodic meetings of bilateral commissions. These few examples suggest that international scientific cooperation is a terrain of choice for diplomatic action that lies at the heart of «diplomacy for science».To extend the discourse regarding international scientific mobility, it may be fruitful to give it another reading. We cannot reduce all matters to national logic alone, nor to the notion that what one country gains in «grey matter», another must lose. In addition to the logic of competition between countries, there is another logic, namely of cooperation. Thus, the mobility of «brains» between countries is not a zero-sum game; rather, it is a positive-sum game. Internationally co-authored publications that are the fruits of cooperation are on the rise: their share of all scientific publications increased from 16.7% in 2006 to 21.7% in 2016 (National Science Board, 2018).

International cooperation between researchers thus enriches the world's knowledge capital. In addition, international scientific mobility is gradually changing in nature: Alongside brain drain and brain gain, which describe the long-term or even permanent expatriation of researchers, the approach is now being extended to brain circulation. This encompasses all forms of international scientific mobility: brain drain and brain gain, as well as the temporary mobility (from a few days to a few months) of researchers. Temporary mobility, which refers to the ebb and flow of researchers between their laboratories and those of their colleagues abroad, is generally part of a cooperation process.

4.3 Influence

How can a country be influential and exert an impact on world affairs? In response to this question, J. Nye has supplemented the usual answers by introducing the now-classic distinction between hard power and soft power. Compared to hard power, soft power is based on the use of more subtle means. It allows a country to be influential via seduction and persuasion, the objective being to convince others to share its values, to reproduce its models and to adopt its modes of thinking. A country is thus influential because, rightly or wrongly, in the collective imagination, its way of life, its values and its success seduce, inspire and attract.

As demonstrated above, science is a vector of soft power. However, there are other channels through which a country can subtly influence the choices of others and attract foreign actors to the national research system or encourage them to cooperate with the system. Amongst these main channels, first and foremost is the presence of nationals in international scientific organisations. All countries attach importance to being well represented in these organisations, especially in positions of responsibility. Aside from considerations of prestige, some hold the conviction that nationals can be a source of information and influence. Expertise applied in an international context is another source of influence, as it allows technical standards, working methods and good practices to be disseminated in the country of intervention. This is particularly true for scientific expertise, whose link with foreign policy is particularly salient in multilateral diplomacy regarding global public goods, such as the climate or biodiversity. Finally, another little-known but effective vector of state influence is foreigners who, as former students or researchers who were temporarily hosted, ultimately return to their country of origin. Provided that they have been well received, they generally serve as ambassadors of the country where they were trained or where they worked.

5 Some questions, in conclusion

To conclude this overview of science diplomacy, it is important to recall that the intersection of science and foreign policy is not new: what is now called «science diplomacy» encompasses historical practices in which the interests of science and those of foreign affairs have been combined. However, even if science diplomacy did not originate in the 21st century, this century has placed it at the forefront. A growing number of countries now recognise its importance and make it one of the assets of their overall diplomacy. Science diplomacy is a factor of renewal and enrichment in the conduct of international relations.

In the necessarily limited format of this presentation, many issues have been excluded. This section formulates a few final remarks and questions. First, the rise of science diplomacy redefines the place of the researcher in society. It is trivial to presume that the researcher and the diplomat belong to drastically different and distant worlds and that they frequently ignore each other. Science diplomacy transcends this traditional vision by demonstrating that the initiatives and actions undertaken by researchers can uncover meaning, not only for science and for researchers, but also for diplomacy. However, in science diplomacy, is there a risk of the political exploitation of the researcher? In «science for diplomacy», geopolitical stakes are not absent, and the choice of words nearly suggests the subordination of science to the interests of diplomacy. Finally, what is the true scope and effectiveness of science diplomacy? To what extent does science facilitate diplomacy? To what degree can diplomacy support science? It is clearly difficult to make this kind of evaluation, and no country has produced any tangible assessments. However, it is evident that science benefits from the facilities offered by the cooperation agreements negotiated between countries and from the support provided by diplomatic networks for the implementation of research programs. Additionally, science helps the diplomat in action through the values it conveys, namely those of neutrality and universality. Fundamental research is an instrument of peace, in addition to being a factor of development; its results are a public good, and science is a common language of humanity, allowing it to transcend borders. Therefore, diplomacy accrues advantages in relying on science, as science does in relying on diplomacy. However, to ensure this symmetry of advantages and to evaluate the efficiency of the science diplomacy approach, a more thorough observation of concrete situations and a refinement of the concepts of analysis are indispensable.

Endnotes

1 This chapter is a translation of: P.-B. Ruffini, Diplomatie scientifique. De quelques notions de base et questions-clés, in: "Philosophia Scientiæ", n. 3, 2019, pp. 67-80. We thank the author and the publisher of "Philosophia Scientiæ" for allowing us to include a translated version of the original article in this volume. Simone Arnaldi edited the English translation.

2 These distinct but complementary projects are named as EL-SCID (*European Leadership in Cultural, Science and Innovation Diplomacy*), InsSciDe (*Inventing a shared Science Diplomacy for Europe*) and S4D4C (*Using Science for/in Diplomacy for Addressing Global Challenges*). The author of this text has participated as an expert in the InsSciDE project.

3 According to periodic surveys by the Pew Research Center.

4 This survey was conducted in 2011 among 17,182 researchers from 16 countries.