

Spanish in Science and Higher Education: Perspectives for a Plurilingual Language Policy in the Spanish-speaking World

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Language planning for international scientific communication needs to be understood in the context of some general language policy for the larger field of science and higher education. The academic field is a sociological and sociolinguistic field of production and circulation of science. This field contains monolingual and bi- or multilingual activities and subfields. Careful policy-decisions and language planning activities are needed to organise the coexistence of different languages in shared territories from a plurilingual enrichment perspective. This paper sketches elements of a heuristic language policy for the academic field in the Spanish language community that is taken as a collective actor, stakeholder and addressee.

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Introduction

The Spanish-speaking world constitutes one of the most vigorous language communities of the globe today, the language of a former linguistic empire where the sun never set. Looking at the sheer linguistic figures, Spanish seems to have all the necessary factors to be a first class world language: it is spoken as a first language by some 350 million people, almost the same number as English. Both share a second place only after Chinese, but Spanish is growing faster than English; it represents 50% of the speakers of Romance languages and is the official language in 20 countries. Contrary to English and French, however, 94.6% of the people in these countries speak Spanish as L1, whereas the average for English in its former colonies only reaches 27.2% (Leáñez Arístimuño, 2002). Furthermore, Spanish is solidly grounded in two of the main poles of world development, the USA and the European Union. It is an official language of the UN and many other international organisations and has a world class literature. Its idiomatic unity, its phonological and orthographical simplicity are unrivalled by any other world language. And yet, the fact that none of the Spanish-speaking countries have managed to enter the first circle of industrialised nations reflects the main weakness of Spanish as an international language. This is evident in its frail position in industry, science and technology, where it ranks far behind French, German and Japanese. By the end of the 20th century only 0.5 % of the articles in natural sciences and 3.5 % in the social

sciences and humanities in international scientific journals were published in Spanish (CINDOC, 1998, 1999; Hamel, 2005).

Given such low figures, should the Spanish-speaking world abandon its language in the field of science and technology altogether? Should it limit itself to translating the blueprints of technical instructions into Spanish? Or, to take the perspectives of globalisation and the renewed international division of labour even a step further – should the Hispanic countries give up any attempt to participate, even in a subordinate position, in the international arena of scientific research and technological growth?

The dynamics of science and language development are not independent from the global economic power of the countries they represent and the emergence of global empires. They are closely related to the general industrial and cultural development of a country or group of countries, although complex relations arise between general factors of development and more specific functions and the status languages adopt in specialised domains. Furthermore, science, technology, and language constitute strategic components of a community's cognitive capital in a present and future society of knowledge.

To approach the topic of planning international scientific communication (ISC) requires, therefore, a series of previous considerations. In the first place we should ask ourselves: who plans for whom? Who are the actors behind a scene that tends to blow a big smokescreen over a series of mechanisms, policy-decisions, and the power relations always implicated in language planning. As Baldauf and Kaplan (2003) point out convincingly, the identification of the actors, the interested parties, the stakeholders and the decision-makers seems crucial for language policy and planning issues. So far, the shift from a model of limited multilingualism for scientific communication at the beginning of the 20th century to the present hegemony of English (Ammon, 1998) has rarely been analysed from the perspective of overt or hidden agency or power relations. Rather, the process commonly appears as a naturalistic course of action along the lines of Crystal's (1997) well-known formula about the advent of English as the global language: English is 'a language which has repeatedly found itself in the right place at the right time' (1997: 110).¹ Who are the real actors and who the addressees of such policy-decisions and – if any – planning processes? Could we target individual scientists or small groups of them? To what extent could they be stripped from their cultural, linguistic and national context when acting as researchers?

At least three perspectives appear relevant in the intersection of language policy and science. Language communities organised in nation states, as well as language empires encompassing a significant number of member countries, develop their own perspectives on the role of their scientific communities, international scientific communication and their common languages. If we take language communities both as actors and targets of language policy-decisions, we will usually encounter divergent perspectives and interests at stake. Second, individual scientists and scientific communities, who are both stakeholders and objectives of language policies too, develop their own orientations and struggle for their interests and needs of access to the international scientific networks which are in part related to language(s). The relationship between the common and specialised scientific languages, for instance, has been a matter of debate

and of controversial strategies since the Renaissance (Kheimets & Epstein, 2005). The group of intellectuals, the *intelligentsia*, has always played a decisive role in promoting either closer relations with the general public or segregation and the building of a social class of intellectuals, as Gouldner (1979) maintains. Consequently, he frames the specialised languages not as registers, but as sociolects. Third, the international sphere of science is often identified as an independent unit that supposedly regulates its own field of action. To a large extent, however, the allegedly 'independent' market represents the interest and expresses the power of the English-speaking scientific community and its publishing industry who are vividly interested in extending their market and reducing competition. Last but not least, big multinational corporations have considerable influence on the development of science and technology, especially in fields directly related to their production, and are commonly inclined to support a drive to English monopoly when they expect advantages from such centralisation.

It is also necessary to define in a more explicit way what is meant by the composite expression 'international scientific communication'. Ammon (this volume) argues that 'acts of communication are considered "international", or "transnational", if native speakers of different language communities participate'. Would the communication between Polish and German researchers thus be defined as international, whereas interaction between scientists from Spain and Chile, or Britain and New Zealand, would not since they speak the same language? Here, more fine grained distinctions are called for since globalisation is in fact diluting the distinction between the national and the international sphere (Hardt & Negri, 2000). The central question concerning international communication seems to be whether languages other than English are able to function in scientific fields of a significant dimension and, even more so, as a *lingua franca scientifica* between speakers of other languages.

Another problem arises when we attempt to isolate the sphere of communication (i.e. the oral and written exchanges between scientists) from its larger communicative context. Seen from a broader perspective that integrates a policy of science *and* of language, it may not be recommendable to separate international communication from the larger field it belongs to, i.e. the field of scientific production, circulation, and the construction of human capital through academic teaching and team-working, since linguistic and other conflicts typically arise in the multiple connections between circulation (i.e. the communication of results) and other components of the field. As shall be seen, for a given non-English scientific community to adopt a monolingual English policy for ISC may only transfer the conflict line to some other, internal and possibly more sensible, area of the field as a whole.

In this paper I will sketch elements of a heuristic language policy for the academic field in the Spanish language community that is taken as a collective actor, stakeholder and addressee. I will not address the past and present language policies in science in the Spanish-speaking countries which are, in most cases, rather implicit and undefined. My main experience and reference will be Mexico, although most arguments apply to other Hispanic countries as well. Mexico is by far the largest Spanish-speaking country with some 106 million inhabitants in 2005. It counts among the three or four nations that hold a leading position in science and higher education within the Hispanic world

and more so in Latin America.² At the same time, Mexico shares a complex and conflictive border and multiple academic relations with the USA.

As shall be seen, the conceptualisation of this field will allow us to study the object within a general sociolinguistic framework of societal multilingualism. Here, a conflict model operates that identifies present international and national scientific production and communication as an asymmetric relationship between a globally dominant language – English – the hyper-central language³, and a limited number of other languages that share different sub-domains of the field, as well as the national languages of each country. Language conflict, shift and spread are at work as in other domains of societal multilingualism.

The central sociolinguistic question is whether the present day hegemony of one language in the multilingual field of science will give way to a state of monolingual monopoly, where English becomes the only admitted language, possibly with irreversible consequences for other languages and their communities; or whether the international field of science will be able to advance from an orientation of multilingualism as a problem, to an enrichment perspective of plurilingualism⁴ in the academic field.

We may now return to our initial question about a policy of science and of language in the Spanish-speaking world. Rather than give up their own development of science, the leading Spanish-speaking countries attempt to increase investment in science to reach an expenditure of at least 1% of their GNP. They will have to find ways to insert their own potential of research and higher education into the international arena to take the optimal advantages of information flow, participation and enrichment, without giving up their own independence to orient their scientific development to cover their interests and needs. Language policy and planning should be part and parcel of such a policy in science and higher education. Regarding languages in science, the Spanish-speaking world must envisage policy-decisions that put into perspective its weight and vitality as one of the world's largest language community with its limited share in scientific production and publication in Spanish.

Advantages of Linguistic and Cultural Diversity in the Academic Field of Science and Higher Education

The advantages of scientific communication in one language, closely connected to the expansion of electronic communication, have usually been taken for granted and are widely promoted by most actors who interfere in the field. Possible disadvantages for many scientific communities and for the advancement of science itself seem less evident and are often dismissed as provincial backwardness in an era of globalisation. With a few exceptions (e.g. Durand, 2001), it was only within the fairly marginal field of language policy that critical voices surfaced, usually emphasising the disadvantages, as Ammon points out in this volume, probably as an attempt to counterbalance the general uncritical approval. My argument is that, for super-central language communities such as French, German, Spanish, Portuguese or Russian, there are at least three good reasons to maintain and promote a model of plurilingualism in science and higher education and to oppose monolingualism in English, today's only hyper-central language.

Thesis 1: The reduction of diversity to one language in the production of models, topics and strategies of research might lead to a dangerous impoverishment of scientific creativity itself, since it destroys its constitutive, historical base of diversity in ways parallel to other ecological systems and fields.

This thesis is certainly controversial, since it postulates that the choice of a language for scientific work interferes with research itself, given their differentiated cognitive potentials. Science, however, has postulated the universal character of scientific findings and procedures since its very foundation, which supposedly are independent of cultural and linguistic circumstances. Scientific discovery, namely the scientific construction of knowledge, claims universal validity and could therefore be expressed in any language without affecting its content. Such controversies refer to the historical debate between universalism and particularism (or relativism) (Díaz-Polanco, 2000), to Humboldt's and Herder's view of the role languages play for cultures and nations, and to the Sapir-Whorf hypothesis about cultural relativism and linguistic determinism. Although this latter hypothesis has received severe critique and refutations, at least in its strong version, research in recent years on non-Occidental cultures shows to what extent those societies organise and systematise their knowledge in ways radically different from Western procedures (e.g. Etsa, 1996). Some of these studies revised the Sapir-Worf hypothesis within a broader conceptual framework which includes categories such as discourse and grammaticalisation that help to differentiate some previous simplifications (see Gumperz & Levinson, 1996). Thus, to establish a direct link between grammar and patterns of culture has always been considered reductionist both from an anthropological and a sociolinguistic perspective. A new approach which includes discourse structures and cultural models (Gumperz, 1982; see Hamel, 1997) could contribute to clarify to what extent different research and discourse traditions shape and construct their objects in different ways.

No doubt such differentiations are more relevant in the social sciences and humanities since they are more closely linked to specific languages and cultural traditions, than in the natural sciences. Even in the latter, however, a certain 'speciation' of scientific thought and development seems to be necessary or at least desirable to maintain essential creativity and original thought (see Durand, 2001).⁵ To what extent will the pressure brought to bear on German, Hungarian or Mexican scientists to produce in English, a language they may only have a limited command of, affect the creation of complex theoretical frameworks if they do not dispose of the 'mental spaces', the terminology, partners in interaction, the freedom and the leisure to think, discuss and write as they would in their own languages? What might have been the fate of academics such as Foucault, Bourdieu or Habermas, three theorists who are eminently universal just because their work is deeply rooted in their national traditions, if they had been forced to discuss, write and, ultimately, think in English right from the beginning of their academic life span?

We certainly do not have straightforward answers to the questions presented here. They exist and are relevant within the broader context of a global menace to ecology and diversity in culture and thought; its collapse or at least severe

reduction, as predicted in the field of languages (Hale, 1992; Krauss, 1992; Skutnabb-Kangas, 2000), may have consequences difficult to foresee for the field of science.

Thesis 2: The total imposition of English in the field of science, contrary to the idea of granting maximum flow and access to scientific communication, would reinforce the existing asymmetries of participation, particularly in terms of the production and circulation of other language communities' own scientific and technological production in the international sphere. If we consider the value of science and technology as a first order means of production, the withdrawal from science in their own language would probably affect the economic development of those countries or language communities that completely abandoned the use of their own languages in the field of science.

At first sight, to maintain that non-English scientific communities will experience increasing difficulties if English becomes the only language in the field seems to contradict obvious evidence. No doubt the massive diffusion of digital information and communication technologies has broadened access to the output of scientific and technological research in ways impossible to imagine only a few decades ago. Furthermore, relevant scientific communities such as the German, Dutch or Japanese have to a large extent shifted to publishing in English in natural sciences and technology. However, if we consider the scientific field as a whole and do not isolate international scientific communication from the rest of the interactions in this communicative domain, we will realise that linguistic and other conflicts may increase, particularly in the social sciences and humanities. Barriers persist on the three levels of academic discourse: language, discourse structures and cultural models. Those academics who do not reach a high level of proficiency in English on the three discursive levels will inevitably experience major difficulties to submit their research to international journals that publish in English only and are usually controlled by the Anglo-Saxon academia.

The predominance of English also affects language policy-decisions on a macro-societal level. Whereas English-speaking countries can make significant savings in foreign language teaching and translation, all the other linguistic communities have to spend a considerably larger portion of their educational budget on teaching English and on translation.⁶ Those countries that exhibit a successful policy of foreign language teaching, e.g. the Scandinavian countries, have until now maintained a plurilingual provision. Some of them are now involved in a debate; how to establish necessary language policies to prevent their own national languages from being totally swept from their field of higher education and science (see Committee on the Swedish Language, 2002). Critical voices (Phillipson, 2001a, 2001b, 2003) warn that a total withdrawal from using and developing their own national languages may entail long term negative consequences not only for the development of the language in question, but also for the economic development and the qualification of professionals of those countries.

As is the case with areas like health care, education, water supply and other

public services that only a few decades ago were considered to belong undoubtedly to the public sphere and not subject to the laws of market economy, the field of science has come under increasing pressure to obey international market forces. The metaphor of the 'market of science' permeates academic discourse without explaining its far-reaching implication. More and more areas of scientific research have been taken over or are heavily determined by private corporations; and even those areas whose findings do not easily yield commodities, are increasingly subordinated to procedures of funding that adopt central concepts from the market economy. Basic research in any field and especially the social sciences are submitted to questioning about their value and purpose in a market society. This applies as well to ISC where axioms from the market ideology are presupposed without critical analysis or their appropriateness. Thus, the maximum flow of information and the elimination of all barriers are often taken for granted as premium objectives in science communication. As in other domains, however, the market of science is not as free as often postulated. The powerful countries protect their research and technology in many ways, as becomes evident with the multiple barriers the USA imposes on importing advanced electronics technology from India and elsewhere. For many good reasons, then, the so-called free market may not be the best option for science and higher education, at least for countries of the second and third layer. Any other alternative implies specific policy-decisions about how to protect and support the fields of science, higher education and the use of their national languages. Similar cases have been successfully fought for, such as the protection of the Francophone cultural and linguistic industries using the concept of 'cultural reserve or exception'.⁷ In sum, to postulate a free market for English as the language of science and formal equality of those language communities that are structurally diverse *vis-à-vis* English as a supposed 'free' *lingua franca* will probably deepen existing inequalities.

Thesis 3: The growing monolingualism of the Anglo-Saxon scientific community and some of their satellites, as part of more general English monolingual practices and attitudes, poses problems not only to the international scientific community, but also in the fields of culture, international relations, intercultural communication and the preservation of peace.

The advanced monolingualism practiced and defended by the Anglo-Saxon scientific community is well documented (Ammon, 1998; Hamel, 2003b) and needs no further evidence. Except for experts in a specific region (Europe, Latin America, Asia), most scientists in the US, Great Britain and Australia share and practice the view that whatever is relevant in science will have to be published in English. Very few of their members maintain the need of multilingualism in science for practical and even epistemological reasons, as does Immanuel Wallerstein, the famous expert on globalisation from New York (Wallerstein, 1995). General monolingualism in the USA showed its inadequacy in the events of 9/11 and afterwards, when the US government met serious difficulties to understand, interpret, react and maintain communication with the Muslim world. Since then, the Pentagon has spent many million dollars on attempting to reverse monolingualism and on detecting and mobilising citizens with

advanced proficiency in Arabic and other languages spoken in the Middle East and the rest of Asia. Although the field of science certainly keeps its independence from the realm of general national and international politics, the fragility of an international monolingual community that is engaged in preserving its hegemony may sooner rather than later become evident. The non-English scientific communities could contribute to counteract such monolingualism by language policies that keep or make their languages vigorous and attractive for the international community of scientists.

The Academic Field: Types of Discourse, Power Relations and Language Distribution

Language *planning* for ISC should be defined in the context of some general language *policy* for the larger field of science and higher education where ISC is included. In what follows I will outline the academic field as a sociological and sociolinguistic field of production and circulation of science, i.e. the integrated processes where scientific knowledge is produced and scientists are formed. This field contains monolingual and bi- or multilingual activities and subfields. Very often, language conflicts arise when some dominant languages invade domains and displace other languages from their functions and spaces. Careful policy-decisions and language planning activities are needed to organise the coexistence of different languages in shared territories from a plurilingual enrichment perspective.

The nature of the field: Interaction and power relations

Sociolinguistic studies about language use in the field of science have traditionally reduced their scope to the subfield of circulation, i.e. the communication of research finding via publications and oral presentation at conferences (see Ammon, 1998, 2003; CINDOC, 1998, 1999). Most figures and debates about unequal language distribution refer to the publication of articles in international journals which are to a large extent controlled by an Anglophone and Anglo-centred scientific community and their publishers. Books are usually left aside in compiling these statistics since they play no significant role in the natural sciences; they do, however, in the social sciences. Also, the languages admitted and actually used at international conferences enter into given reports. On the whole, statistics that limit their scope to publications in international journals tend to give a distorted image of the real quantitative and qualitative distribution and use of languages in the field of sciences in its full extension.

Language policy and planning initiatives in non-English countries that propel English commonly refer to this sphere of circulation and do not interfere with the domains of production as such, i.e. the process of doing research. Yet recently a debate about the use of English for academic teaching has surfaced in different parts of the world, notably in the European Union (Ammon, 1998). Specific surveys identified teaching as the subfield most resilient to English, a stronghold of the national languages (Ammon & McConnell, 2002: 23).

If we are interested in obtaining a more global view of the problems and perspectives related to the use of languages in the field of science and higher education, we should not limit our scope to the sphere of circulation only. Costs

and benefits of different language policy options could not easily be established for international communication only. What may look an advantage in this domain might have more important costs and disadvantages in the global field, both from the perspective of a given language community and a community of academics. As I have argued, possible conflicts may only be transferred from one domain to the other.

A series of different domains or subfields make up the field of science and higher education: first comes the production, i.e. the planning and implementation of research as such, related teaching and then the circulation of findings. In his seminal ethnomethodological work on scientific procedures, Garfinkel (1967, see also Garfinkel *et al.*, 1981) already postulated and demonstrated some 40 years ago that, in science, basically the same procedures of construing sense and producing accountable actions through 'lived work' of interaction apply as with other social events. Interaction and communication play a central role in this specific field, and many communicative events contribute to the process of doing research: interaction in the research laboratories, fieldwork, teaching while doing research, multiple informal ways in which academics relate to each other, and email communication; all these activities contribute to the creative process of developing science. They could not easily be detached from the communicative process of formulating and circulating the hypotheses and findings in the larger academic community. Most of the challenges and problems of multilingual communication that arise are related to the necessary transitions, translations or bilingual bridges in the use of more than one language in and between activities and subfields. In the case of Mexico and similar countries, a significant characteristic that demands attention is the fact that, as a matter of principle, in the field as a whole and in most subfields, multilingualism is present, at least as regular references to the other language(s), even in domains that are clearly controlled by one or the other language.⁸ To put it in sociolinguistic terms, the field as a whole is multilingual, and a continuum of selection rules ranging from optional to obligatory apply in different subfields. When it comes to elaborate concrete proposals for policy-decisions and language planning we will have to pay attention to diverse aspects of language distribution. General cultural and ideological orientations towards academic monolingualism or *plurilingualism* will certainly play a role. We will also have to identify the areas of most conflict where the use – sometimes the imposition – of one or the other language may be problematic, and to the transitions that cause particular problems such as the production of scientific knowledge in the native language of the researchers and its formulation in papers in English as a foreign language.

The field of science is not only a domain of communication but also of power relations. This aspect can best be conceptualised with the sociological concept of 'field'. From this perspective, science constitutes a specialised field, that is, a system of power relations constructed by the agents who are directly involved in the production and circulation of its object (Bourdieu, 1975, 1986). There, different power groups, positions, schools and traditions zealously confront each other in their search to impose their definitions of each science, their limits, who belongs to it and who does not. According to Bourdieu's (1984) extensive study of the academic field, the central question is not so much its overt purpose of producing valid assertions, but who has the socially recog-

nised capacity of acting and speaking with legitimacy; who has the right to impose definitions and to reject or destroy others. As in other arenas, existing power relations determine the dynamics of the field where the orthodoxy is rarely questioned as such. The academic field constitutes first and foremost an arena of rituals closely linked to language, more specifically to certain types of discourse and specialised registers, where the written word occupies the top of the ladder in academic prestige as a typical expression of literate societies. No wonder, then, that the term 'scientific production' does not usually designate the whole process of scientific fabrication, but only one of its final results, publication, namely the written objectivation exhibited in the legitimised journals of the field. Such ideological procedures of metonymy reduce an entire process of interactive, usually collective activity to an individual final product which is then framed as *production* in order to represent the field as a whole.

If we agree that language constitutes the main tool in any scientific activity – although language is, as we know, more than a docile tool – we can conceptualise the academic field as a specific space of discourse (or of discursive practice) where different discourses and languages compete for legitimacy and functionality. The use of one or the other language in such an arena activates and at the same time capitalises the totality of connotations related to each of them. As in other diglossic domains, language choice, specifically the use, disuse or exclusion of a given language, is part and parcel of the full array of discursive resources that social actors set in motion as a component of their discourse strategies in the field. Therefore, the prestige of a language in a specific field constitutes an ideological and political construction that may legitimate or de-legitimate scientific production as a whole in a given language. Low prestige will probably deter potential learners and users well beyond the factual value, quality and quantity of scientific production generated through it. As I commented earlier, Spanish enjoys a high prestige in literature and other fields of culture, but is considered of little value for science. Under certain circumstances, prestige or attraction may be shifted, at least in part, from one field to another, although there is no automatic transfer. Thus, the increasing attraction for Spanish as a foreign language in different parts of the world may contribute indirectly to enlarge the basis of potential participants in scientific communication in Spanish.

Several proposals have emerged to structure the field of science from a discursive perspective and types of language use (Ammon, 1991; 1998; Ammon & McConnell, 2002; Durand, 2001; Municio, 2001; Skudlik, 1990). Taking into account those typologies, I will in a first step sketch a simple scheme that identifies basic subfields or spheres, activities and subactivities which distinguish the basic four language skills (see Table 1).

The table is to a large extent self explanatory. *Production* refers to the whole process of doing research. *Circulation* integrates the communicative process of receiving information through reading scientific literature and listening to conferences (*Reception*), and the *Distribution* of one's own results at conferences and through publications. This subfield includes *Dissemination* or vulgarisation of scientific knowledge to a non-academic public. Finally, different types of teaching related to research are incorporated in the sphere of *Education for science* which includes technical training as well as graduate and post-graduate studies. New electronic and digital media play a growing role and influence language

Table 1 The academic field. Science and higher education. Subfields of production, circulation and education for science

<i>Subfields</i>	<i>Activities</i>	<i>Sub-activities</i>
Scientific Production	Doing science: Design and development of individual and collective research projects	<ul style="list-style-type: none"> • Work with instruments in labs; • work with informants; • production of data, analysis,; • interpretation; • production of findings, etc.; • writing, communication by e-mail.
		Verbal interaction with colleagues and students
Circulation	Reception	Reading of scientific texts
		Listening to presentations, interaction with colleagues (oral, e-mail)
	Distribution	Elaboration and presentation of papers, conferences, workshops Use of audiovisual media
		Writing and publishing of articles, books
		Evaluation, reviewing, discussion of publications
	Dissemination of scientific findings to lay public	Conferences, workshops
Writing publications, using audiovisual media		
Education for science	In-service training	Teaching and learning, workshops, group work, etc.
	Undergraduate	Teaching, lectures, evaluation, interaction, initiation to research
	Postgraduate, post-doctoral activities	Teaching, lectures, evaluation Interaction, collaborative research

distribution. Obviously, the boxes in the scheme are interrelated in multiple ways and have open boundaries. University teaching reaches far beyond the whole domain of research. And no attempt is made at this point to represent the processes as such in a flow chart or similar representation.

Language distribution in the academic field in Spanish-speaking countries

In what follows I will sketch the language use and distribution in the academic field in Spanish speaking countries, taking again Mexican public universities as the main reference. Most sociolinguistic studies about language use in science identify significant differences between groups of disciplines. They agree that in physics, mathematics, chemistry or biology, international integration and homogenisation has led to a much extended, almost exclusive use of English in international communication which represents some 90% or more of the articles published in international scientific journals (CINOC, 1998, 1999). Some national

and regional publications still survive in other languages, but any scientific findings in these disciplines published in any language other than English run the risk not to be taken into account by the international scientific community.

On the other hand, many disciplines in the *social sciences* and particularly in the *humanities* maintain a strong loyalty rooted in their national languages, at least in the case of Spanish. In Latin America, vast areas of Hispanic, Latin American or Americanist studies, journals and conferences show a significant vitality of Spanish and Portuguese in their national and international communication. Two complementary phenomena contribute to this differentiation between natural and social sciences⁹ and establish a much more strategic relevance of the own language for the latter: on the one hand, the specificity of their 'object' – society – which we often prefer to call 'subject', as well as their procedures, imply a much closer relationship than in the natural sciences between the scientific language as a tool of research and the common or natural languages they derive from and which are, almost inevitably, part of their 'object'. Second, social sciences and humanities are much more heterogeneous and diverse than natural sciences by the very nature of their disciplines, and not for evolutionary reasons as some positivist scientists still sustain. Therefore, they develop and rely to a much lesser extent upon highly formalised scientific languages that operate as pivots between natural languages and their scientific use in the natural sciences. Thus scientific English, Spanish and German in physics or biology tend to converge to a sufficient degree to facilitate inter-comprehension and automatic translation. On the contrary, in the social sciences, translations and the writing of scholarly texts in a foreign language count among the most complex activities.

Especially in the natural sciences, but increasingly in the social sciences, the pressure of the 'market' imposes publications of original results in English first to be able to participate and compete in the international arenas of science.¹⁰ Therefore, universities, research institutions and councils in other countries will have to improve access to English both in the reception and dissemination of their own research from an enrichment perspective, as I shall argue later.

The differentiated activities of Table 1 serve as a starting point to develop a heuristic scheme which exemplifies the distribution of language use over the field as a whole (see Table 2). Following Skudlik (1990) and others, the scheme operates with four types of sciences. Activities are organised along a continuum from English to Spanish, including references to the use of other languages. Again, this distribution refers to public universities in Mexico. Clearly, the design cannot represent more differentiated actions; it presupposes homogeneous groups of participants and idealised standard events. Thus, the presence of a single visiting researcher in the lab who does not speak Spanish may cause the whole group to shift to English in their focused interaction.

As we can see, English dominates in the top left area of the scheme. The further we move down to the bottom and to the right, the presence of Spanish increases. Here the sociolinguistic field becomes visible where complex bilingual relations arise. At the extremes (top left, bottom right), obligatory selection rules apply that impose the use of one or the other language. In the natural sciences, international circulation of findings happens almost totally in English. In the other corner we find an almost exclusive use of Spanish in scientific production. Spanish is also dominant in the dissemination of scientific findings to a

Table 2 Language distribution in the academic field. Organised by dominance of language use: English → Spanish

<i>Sub-activities</i>	<i>Types</i>	<i>Natural Sciences</i>	<i>Applied Natural Sciences, Technology</i>	<i>Social Sciences</i>	<i>Humanities</i>
Write journal articles	i	E	E >> S	S > E	S >> E
Listen to conferences, interaction with colleagues	i	E	E >>> S, OL	E > S > OL	E > S > OL
Develop presentations for conferences	i	E	E >>> S > OL	E > S > OL	E > S > OL
Evaluate, referee, discuss publications	i	E	E	E > S	S > E
Read scientific publications	i	E	E >> S	S > E >> OL	S >> E > OL
Training, workshops	i	E	E > S, OL	S > E, OL	S > E, OL
Communication via e-mail	i	E >> S >> OL	E >> S > OL	E = S >>> OL	S > E >> OL
Develop presentations for conferences	n	E = S	S > E	S	S
Training, workshops	n	S > E	S > E	S >> E	S
Production of first drafts of results, notes		S > E	S >> E	S	S
Postgraduate level: Teaching, interaction, lectures, evaluations, collaborative research, reading and writing	n	E > S(r) S >> E(o) S >> E(e)	S >>> E(o) E > S(r) S(e)	S(o) (w) S = E(r) E >> OL(r)	S (o)(w) S > E(r) (OL)(r)
Undergraduate level Teaching, lectures, evaluations, reading and writing		S(o) E = S(r) S(w)	S (o) E = S (r) S(w)	S(o) S >> E(r) S(w)	S(o) S >> E(r) S(w)
Listen to papers, discuss with colleagues	n	S >> E	S >> E	S >>> E > OL	S >>> E > OL
Evaluate, referee, discuss publications	n	S >> E	S >>> E	S	S

Table 2 (Contd.) Language distribution in the academic field. Organised by dominance of language use: English → Spanish

Production	n	S	S	S	S	S
Collective lab-work with instruments, materials, interaction with informants, producing data						
Production/Verbal interaction with colleagues and students while doing research	n	S	S	S	S	S
Communication via e-mail	n	S	S	S	S	S
Dissemination:Conferences, workshops (o)	n	S	S	S	S	S
Dissemination:Write papers, produce audiovisuals for a general public (w)	n	S	S	S	S	S

S Spanish
 I English
 OL other foreign languages
 w productive: writing
 o receptive: audio-oral
 r receptive: reading
 i international
 n national

= equal weight
 ≥ slight predominance
 > predominance
 >> strong predominance
 >>> very strong predominance

Table 3 Language use in national and international circulation (communication) in the Mexican scientific community

No	Group	Type of Discipline	Language distribution: International	Language distribution: National	Type of register (technolect)
1	Natural Sciences	physics, mathematics, chemistry, biology, etc.	Almost total monopoly of English	Predominance of Spanish or equilibrium with English	Universal specialised language with formulaic structures
2	Applied sciences and technologies	applied physics, physical engineering medicine, engineering, information technology etc.	Strong hegemony of English, but no total monopoly	Predominance of Spanish Subordinate presence of English	Universal specialised language + specific applied registers in each natural language
3	Social Sciences	Anthropology, sociology, economics, including some human sciences like psychology, linguistics	Headed by English but with ample spaces for Spanish	Hegemony of Spanish, subordinate presence of English	Specialised languages linked to the natural language of origin, little homogenisation
4	Humanities	History, geography, literature, philology, etc.	Headed by English in most disciplines	Strong hegemony of Spanish, little presence of English	Specialised language deeply rooted in the natural languages, strong presence of cultural differences

non-academic public, and in teaching, except for the scientific literature used in the courses. Some social and human sciences are to a large extent sustainable in Spanish in the core of their activities and in the connection between the central subfields of production, circulation and education. Only at the borders foreign languages appear. In my view, no menace of significant language shift is currently in sight. Even a better command of English and other languages would probably not affect the present linguistic stability. More detailed research will have to identify which disciplines qualify for such a label.

In the majority of boxes on the grid both languages are co-present, in asymmetric relations most of the time. They share common discursive spaces, a process which occurs in harmonious ways in some cases; in others structural conflicts arise which raise barriers and produce language shift and resistance. Language policy and planning will have to pay specific attention to this kind of areas and processes.

In synthesis, in the case of Spanish-speaking participants, ISC in English is fed by production chiefly carried out in Spanish which needs writing in or translation into English. Teaching, as in other countries, occurs predominantly in Spanish as well, but it has to incorporate the reading of texts in English and other languages. Finally, scientific dissemination of recent developments and international findings

requires a dual process of translation in the opposite direction: from English to Spanish and from a specialised register into a common language.

The distribution of languages in the sphere of *circulation* could be captured in a continuum of disciplines between two poles that correspond to specific language varieties: the specialised language based on formulaic expressions in the natural sciences versus a register much closer to the common and natural languages used in the humanities (e.g. history). The social sciences (e.g. economics, sociology, anthropology) occupy an intermediate position (see Table 3). Two axes of variables emerge from this distribution: the relation between the use of English (or other foreign languages) and Spanish; and the kind of register (specialised language or technolect) vs. common language. Certainly, various disciplines will not easily accommodate to a scheme that probably oversimplifies the complex language distribution. Rather than account in detail for existing language use, the scheme aims to stimulate specific investigations in Spanish-speaking and other areas where empirical research is still scarce.

Towards a Plurilingual Model of Language Policy in the Academic Field

In what follows I shall explore the perspectives and possibilities of a specific language policy in science and higher education for the Spanish-speaking world. The latter concept encompasses the 20 countries where Spanish is the sole or main official language of the state and at the same time the first language of the majority of the population except for Bolivia and Guatemala.¹¹ Second, it includes the vast population of Spanish L1 speakers in immigrant countries like the USA and Canada, and the rapidly expanding circle of those who learn and use Spanish as a foreign language. Whereas the first type of community can establish official policies as sovereign states, the second group of L1 and L2 speakers cannot, at least not directly. They are subject to the policies of the states they live in, which may promote, allow, discourage or repress the use of immigrant and foreign languages. They can, however, influence state policies to foster positive orientations and concrete measures to advance plurilingualism; in addition, they may establish their own group policies regarding the use and promotion of a given language. Therefore, this second group is very important as partners to promote a language spread policy for Spanish beyond the borders of their native states.

If the Spanish-speaking countries¹² decide to preserve and strengthen the Spanish language in these fields, they will have to find strategies to exploit the vitality, size of the language community, and attractiveness of Spanish as an international language of the second layer to counterbalance its weakness in the field of science, particularly in international scientific communication.

For many language communities of this level, especially for French, German and Russian that have a stronger scientific tradition than Spanish, any monolingual model, either in their own language or in English, seems inadequate and difficult to put into practice. Thus, Francophonie has implemented state policies to foster French by isolating specific domains in order to maintain monolingual spheres including certain areas of science.¹³ A lockout of other languages, however, has by and large experienced increasing difficulties, if not the impos-

sibility to seclude the highly interconnected field of science, technology, and higher education from multilingual communication. On the other hand, an 'all-to-English' rush seems to make even less sense for super-central linguistic communities and their countries.

Rather, what we need to develop is a flexible model of plurilingualism for the production and circulation of science from an enrichment perspective.¹⁴ Language policy based on such a model should foster plurilingualism and oppose monolingualism wherever this makes sense and is feasible. A dual strategy may be the most appropriate. As one pillar it should reinforce and consolidate the use of Spanish in all those national and international subfields where it is or could be successfully present. The other pillar should be to develop measures and activities that reduce the barriers of access – both in reception and distribution – to the international spaces of sciences that usually operate in English and some other international language. To build up such a strategy we need to develop research in order to identify functions and subfields for each language use, as well as those areas where conflicts exist and bridges need to be built to transit in both directions.

Changes based on such an approach will need to operate various conceptual movements, alongside practical measures. Orientations, as we know, play a significant part in language policy and its success (Hamel, 2000; Ruiz, 1984). As general collective ideologies, they often relate cultural, discursive and linguistic choices in the minds and action systems of the communities. Therefore, a plurilingual strategy implies the transition from a monocultural to a pluricultural¹⁵ orientation. A monocultural, or rather a-cultural view understands the field of science as largely independent from its historical and social contexts; in terms of language and register, it asserts autonomy from the discourse structures and cultural models of its language community. Conversely, a pluricultural orientation:

- admits the legitimate existence of other scientific cultures when defining basic concepts of its own scientific culture and approach;
- seeks complementary integration of different types of knowledge instead of a substitution of one by another;
- means to strengthen the development of science in each country in close relationship to its own culture, acknowledging multiple relations between history, society and science;
- takes as a starting point the recognition of a structural asymmetry in the development of science in different countries. For that reason it fosters measures to protect and strengthen the development of science in the weaker countries as a basis to participate in international communication and exchange;
- finally, it encourages reciprocity in international communication.

A monocultural orientation as part of a strong nation-state ideology is still alive in most Latin American countries including Spain and Portugal.¹⁶ Based on an ideal of scientific communication in one dominant language, the coexistence of various languages is seen as a problem of language barriers that hinder the free flow of scientific information. A plurilingual orientation,

Table 4 An intercultural and plurilingual model for the production and communication of science

Intercultural orientation: Premises
<ul style="list-style-type: none"> – Science in each country develops in close relationship with its culture, history and society. – Cultural diversity constitutes a source for the development and enrichment of scientific models. – The development of sciences is in principle polycentric.
Intercultural strategies
<ul style="list-style-type: none"> – define the basic elements of local scientific knowledge from the local scientific culture and needs, and in relation to other scientific cultures; – recognize the structural asymmetry between different types of countries as a point of departure for dialogue and scientific exchange; – seek to acquire international scientific knowledge taking local scientific knowledge as a point of departure and not denying it; – seek complementarity between diverse types of knowledge rather than a replacement of one by another.
Plurilingual orientation: Premises
<ul style="list-style-type: none"> – A plurilingual model of scientific communication is based on the coexistence of several languages. – Linguistic diversity constitutes a potential source of enrichment for scientific models.
Plurilingual strategies
<ul style="list-style-type: none"> – strengthen scientific production and transmission in the local language; – promote the acquisition of English and other foreign languages for science; – resist the monopoly of English. – create plurilingual discursive spaces.

instead, regards language diversity in science as a potential asset to enrich the development of research or even as a *condition sine qua non*. It seeks to strengthen the own national languages as a better basis to learn and use foreign languages in science. Thus a model which integrates language, discourse and culture, will take into account and combine both orientations and strategies (see Table 4).

For many involved in concrete, down-to-earth language planning in science, such a broad approach will certainly appear as wishful thinking. From the history of language planning we know, however, how often language planning activities in the past have ended up in complete failure because general orientations, cultural background, and the voices of stakeholders have not been taken into account. Any preservation or (re)construction of a plurilingual field of science will be bound to fail if we do not achieve a pluralistic orientation among the involved parties.

Some basic principles should be kept in mind when developing strategies and planning measures. Very often, language policies that defend national or even continental languages are accused of imposing barriers that will hamper the free development of science.¹⁷ Objective divergence in priorities may in fact exist, e.g. between small elites of researchers in natural or other sciences who prefer an English-only strategy to maintain maximum connection with

the international community, versus a larger community including students, addressees of research or the institutions themselves that foster or claim the use of the national language. Yet policies for science and higher education need not conflict with language policies which have to take into account the sociolinguistic context and design strategies that advance the development of science and higher education, both individually and collectively.

A plurilingual strategy will have to be based on empirical research to assess existing language dynamics and to develop realistic programmes. As an immediate task it should counteract the transition from the present English hegemony or monopoly in scientific fields and disciplines where this seems possible. Such a strategy will have to reinforce the use of Spanish where appropriate *and* at the same time facilitate access to English and other languages.

The vitality of Spanish in the academic field

A number of concrete decisions and planning activities can be envisaged to develop this strategy. Based on the distinctions between types of disciplines developed earlier, a differentiated array of measures could be envisaged in Hispanic countries.

Given the advanced control of English in *natural sciences*, particularly in the subfields of international circulation (publications, congresses), planning efforts should centre on activities and subfields that have shown resilience to English. Even in the core areas of English dominance, however, the presence of other languages, even to a small degree, is possible and desirable. Facing this dilemma, Francophonie discussed 20 years ago whether the subfield of publications in natural sciences should be considered as irremediably 'lost' to English (Walter, 1996, personal communication Jacques Maurais, 2003). An 'English only' policy, however, was never adopted by French institutions. On the contrary, Quebec promotes and finances a large congress every year organised by ACFAS (Association francophone pour le savoir) where several thousands of academics from all fields of knowledge and many countries including the USA present and discuss their findings almost exclusively in French. Thus, Quebec puts its language policy into practice in order to preserve and strengthen areas of sustainable French language use. In the huge Hispanic world no similar institution exists so far, although many international congresses, especially those held in Latin America, preserve large or even hegemonic spaces for Spanish.

There seem to be two good reasons to preserve a qualitative presence of other languages, even with low percentages in publications and a limited international impact: on the one hand, total fossilisation of a language like Spanish should be avoided in a field of strategic relevance; on the other, even a small number of publications helps to keep up the development and modernisation of terminology, which in turn is relevant for different subfields of production, teaching and dissemination. Teaching and other forms of interaction in the process of science need to be nourished with terminology and other input.¹⁸

The main efforts of a Spanish-language policy in the academic field should focus on the *social sciences and humanities* since they preserve large areas and full

circuits of production, circulation and teaching in Spanish. Given their historical relevance and vitality in the main European languages, a courageous policy of promotion might contribute to recovering and reinforcing their attractiveness for other scientific communities including the Anglophone community. The strategic need to preserve the national language in these disciplines is based on two related reasons: their scientific registers are much closer to the natural languages they stem from than in the natural sciences, which implies a permanent enrichment and innovation from their primary sources; second, the existence of differentiated cultural models of research and types of discourse according to linguistic communities and research traditions require a close relationship with the languages they use. The greater difficulty in carrying out research in one's own language but expressing the findings in another via L2 writing or translating constitutes a major barrier as I have argued. Such translations, often transculturisations, are among the processes that raise the highest barriers; they increase individual and collective time, costs, and psychological and financial investment, and they enhance asymmetries between native and non-native speakers of English.

In sum, Spanish enjoys a significant vitality in various academic subfields and many disciplines within the Spanish-speaking world. The whole circuit of production, circulation and teaching develops predominantly in Spanish in them, with specific transitions into English and other languages of science, mainly in reading and international communication.

To qualify as an international or at least regional language of science, a central question is whether Spanish is able to attract users from other languages in specific disciplines or topic areas. Certainly, Brazil has always used Spanish textbooks and other academic publications, given its own limited production in the past. And, since regional integration advances in South America, Spanish-Portuguese receptive bilingualism in many areas has improved (Hamel, 2003a). This includes the field of science where researchers of both language groups increasingly avoid a detour via English or French in their communication. Everyone speaks his or her own language and understands the other. Beyond such neighbouring bilingualism Spanish has probably attracted academic users from Europe and Anglophone North America in specific topics like the economic and sociological dependency theory in the 1970s, and Latin America area studies. Here again, as I analyse elsewhere in more detail (Hamel, 2003b), researchers from outside need Spanish primarily to obtain information, data or raw material for their studies. Very often they do not take into account scientific publications in Spanish, produced by local scientists. Since 1990, however, a gradual change seems to have come about in some social sciences, particularly in the increasing interaction between the USA and Canada with Mexico as a result of the North American Free Trade Agreement. In very topical themes like transnational migration, more and more US researchers participate in joint research projects with Mexicans, and in publications and congresses in Spanish. Whether these events constitute genuine 'niches' (Ammon, 1998) for scientific development in Spanish remains to be seen. In synthesis, prospects to preserve the vitality of Spanish in crucial subfields of scientific development such as production and teaching are quite good. Devastating domain invasion by English and displacement of Spanish is not in sight in the short term, except for those

areas in the natural sciences where this process has already happened. The attraction of Spanish as a language of science in social sciences and humanities exists around specific topic areas, but is limited on the whole.

The preservation and strengthening of Spanish as a language of science will have to count on state and private sponsoring of journals, textbooks and other materials that could not compete on an open market with publications in English. Such support already exists for scholarly publications within the universities at least in the leading Hispanic countries, but it usually turns out to be insufficient, and, more significantly, it is normally not established as part of an explicit and systematic policy of scientific and linguistic development.

Improving access to international scientific exchange: Teaching, writing and translating to other languages

A plurilingual approach could not work without its second leg, namely all policy decisions and planning measures that help reduce the barriers of access to the international spheres of science that operate in English or other international languages. Access here means both the reception of foreign language products and the international diffusion of the Spanish scientific community's own findings. This implies efficient foreign language teaching, translation, and writing in foreign languages. All such measures should complement each other as components of an integral plurilingual language policy.

Foreign language teaching

Given deficient foreign language teaching in public secondary education in most Hispanic countries, the universities have to create foreign language centres to compensate for such insufficiency. Since most universities require certification in one foreign language at undergraduate level, the language centres teach a number of foreign languages either as general courses or as courses for academic purposes. In many smaller universities, the offer is limited to English and possibly French. Big universities may offer up to 14 foreign languages. In many Mexican public universities, however, the efficiency is low and students do not reach an advanced proficiency that would allow them to read scientific literature with ease, much less to write papers in a foreign language. University language centres should improve teaching and reinforce requirements in such a way that students really achieve minimal proficiency during the first semesters of their undergraduate studies. Specific needs analyses are called for to identify problematic gaps and their possible solutions.

For postgraduate students and faculty, specific programmes that include courses and research periods abroad are becoming increasingly available. They should be oriented toward advanced proficiency in all four macroskills including the writing of papers.

Translation in both directions

No doubt translation of academic texts into Spanish will be needed for a number of different publics. Given fast international integration but slow language learning, the relevance of translations will still grow over a long period of time. The translation of scientific literature could and should not be left to the market, which only covers profitable topics and areas. Since academic needs do not necessarily obey market forces, state and institutional support is required

to provide students and the general public with adequate translations. So far, however, universities have study courses for translators and interpreters, but no professional translation centres that could supply appropriate translations based on the most advanced technology including automatic translation. Universities and other institutions should define priorities as to disciplines, areas, topics and types of texts that need to be translated.

Along the same lines, the production of scholarly texts in foreign languages either through direct writing or translation hardly finds any institutional or policy support. Although researchers on the topic agree in identifying writing in a foreign language as the single most difficult barrier in multilingual scientific communication, particularly in the social sciences (Ammon, 1998; Skudlik, 1990), this very relevant issue is left to individual researchers as a private problem.

To write in a foreign language requires not only advanced linguistic competence, but also a good knowledge of the discourse conventions and the cultural models underlying the way research is carried out and presented in the academic culture of the target language. Such competences can only be acquired in the long term and require a significant investment for many years of a researcher's life. In my own experience as an advisor, Latin American students – who have not learned a given foreign language through some private bilingual schooling – rarely reach the level required to write a PhD thesis by themselves in German, English or French, even after years of study and living in the country.

For all these reasons, achieving the degree of proficiency and experience required for L2 academic writing in the social sciences implies a very significant investment for a society and the individual. Societies like the Netherlands or the Scandinavian countries have achieved such high degrees of proficiency (Ammon & McConnell, 2002) in the course of a long historical process of high quality education in general, and a strong orientation to foreign languages and international communication. In the Spanish-speaking world such levels of competence will probably not be achieved on a massive basis in the short or medium term. In the meantime, academic institutions will have to continue to deal with that need, but they will have to focus more clearly on the problems discussed here. Our traditional language centres will have to create labs for translation, for teaching academic writing, tutorship and counselling for academic publication. The work of foreign language teachers will have to be complemented by that of senior researchers experienced in writing and publishing in foreign languages.

As an additional measure we will have to obtain grants to fund the publication of our publications in foreign languages as some European countries, e.g. Germany, do.

Fostering plurilingual zones, shared discursive spaces, activities and attitudes

None of the proposed measures, policies and changes will probably be successful in the long run if they do not overcome the ideology of monolingualism in science, a cultural orientation deeply rooted in the national elite's belief system in the Western world. Accordingly, traditional models of language policy and rather 'military' views of territories (linguistic domains are 'lost' or 'occupied') will probably not be very helpful in explaining scientific and linguis-

Table 5 Recommendations for a language policy in the academic field for Mexico and other Spanish-speaking countries

<i>Pluricultural and plurilingual spaces</i>		
<i>Spanish Pole</i>	<i>Plurilingual Zone</i>	<i>English (and OFL) Pole</i>
Global Objective 1: <ul style="list-style-type: none"> Strengthening of Spanish as an international language of science 	<ul style="list-style-type: none"> Foster the development of pluricultural and plurilingual spaces and attitudes 	Global Objective 2: <ul style="list-style-type: none"> Acquisition of English (and OFL) for scientific purposes
Terminology and Data Banks <ul style="list-style-type: none"> Promote and participate in the development of data banks in Spanish Promote the presence of Spanish publications and bibliographies in international data banks Promote the inclusion of abstracts in Spanish in international data banks and publications 	<ul style="list-style-type: none"> Promote and participate in the development of multilingual data banks 	Terminology and Data Banks <ul style="list-style-type: none"> Promote and participate in the development of data banks in English and OFL Facilitate and promote their diffusion in Spanish speaking countries
Publications <ul style="list-style-type: none"> Support and subsidise scientific publications in Spanish Promote their international market 	<ul style="list-style-type: none"> Publish in various languages as a personal, group and state policy 	Publications <ul style="list-style-type: none"> Promote the diffusion of research findings produced in Spanish in the international sphere through: <ul style="list-style-type: none"> writing in English and OFL translations into English and OFL (see next section)
Translation <ul style="list-style-type: none"> Promote and subsidise the translation of scientific literature into Spanish Support and participate in the development of advanced systems of translation (automatic, etc.) 	<ul style="list-style-type: none"> Promote the use of various languages Facilitate translations in both directions 	Translation <ul style="list-style-type: none"> Support and subsidise the translation of research findings produced in Spanish into other languages
Teaching Spanish for Academia Purposes <ul style="list-style-type: none"> Promote the teaching of Spanish as a language of science on a national and international level 	<ul style="list-style-type: none"> Promote the learning and use of various languages to create additive bi- and plurilingualism 	Teaching English (and OFL) for Academia Purposes <ul style="list-style-type: none"> Spread and improve foreign language learning for academic purposes including the scientific writing Create centers for academic writing, translation and consulting for publication in other languages

Table 5 (Contd.) Recommendations for a language policy in the academic field for Mexico and other Spanish-speaking countries

<p>Academic Teaching in Spanish</p> <ul style="list-style-type: none"> • Promote and subsidise academic teaching in Spanish in non Spanish speaking countries • Create and promote bi- or plurilingual study programs with a Spanish component 	<ul style="list-style-type: none"> • Promote academic teaching in various languages from an enrichment perspective • Promote multilingual study programs 	<p>Academic Teaching in English and OFL</p> <ul style="list-style-type: none"> • Promote academic teaching in English and OFL in an additive perspective • Build bridges to bring faculty and students closer to the functioning of the academic field in other languages and cultures
<p>International Exchange (IE)</p> <ul style="list-style-type: none"> • Define a national and institutional language policy for IE: • Promote exchange with other Hispanic countries and the integration of research teams and collaborative work • Promote Spanish language learning and use among professors and scholars visiting Hispanic countries • Promote the use of Spanish by Hispanic academics during academic work abroad when appropriate • Co-author papers in Spanish with visiting academics 	<ul style="list-style-type: none"> • Promote pluricultural and plurilingual spaces and attitudes in exchange situations 	<p>International Exchange (IE)</p> <ul style="list-style-type: none"> • Define a national and institutional language policy for IE: • Promote the achievement of a high L2 proficiency by Hispanic academics during residence abroad • Take advantage of visiting academics to practice and improve academic registers in foreign languages • Co-author papers in English and OFL with visiting academics

tic dynamics in an era of globalisation. Conversely, if we manage to transform such views into a plurilingual and enrichment orientation, the dynamics will not end up as a zero sum game – where one language enters the other ones have to leave – but rather in a new integration where the potentials of the languages involved could add to and complement each other (see Table 5)¹⁹.

In the academic field such an orientation means to accept plurilingualism – the co-presence of several languages in shared spaces seen as an asset – as the normal, unmarked situation. Academic work and discourse constitute a privileged arena to demonstrate that intercultural understanding and additive plurilingualism are not only possible, but improve scientific quality.

Such a policy needs international partners. Within the developed world plural orientations sometimes gain grounds on a conceptual and discursive level, but are often not put to practice in a principled way. Just a case in point in the field of academic circulation is the fact that Multilingual Matters as a renowned publisher practices a consequent policy of fostering multilingualism, but

publishes in English only in all its journals and book series.²⁰ It does, however, facilitate access by reducing or cancelling subscription rates for readers in developing countries, which reflects an economic policy that indirectly benefits many readers whose first language is not English. What is still missing is a language policy that reduces the barriers to access in the other direction, namely the opportunity for non-native writers of English to publish in their journals. Multilingual Matters and other similar publishers could set up review committees in significant other languages such as French, Spanish, German or Chinese to be able to receive manuscripts in these languages and review them. Once a paper is accepted, resources for translation could be made available in various ways. State, supranational and private funding agencies could develop specific programmes to reduce structural inequalities between language communities in international scientific communication. And no doubt publishers would profit from richer sources for publication given the fact that their authors would write within the full wealth of their own cultural models, discourse structures and languages, and would not be forced to reduce their conceptual potential to the limits of their proficiency in English. Appropriate review policies open to other cultural and discourse models could help democratise the selection process and reduce vertical power relations based on the control through Anglo models and the English language.²⁰

Final Remarks

In sum, language choice and use play a significant role in the academic field. Neither reflecting extreme universalistic beliefs that language does not matter in science nor the view that science is best expressed in English as the natural language of science, the field of science and higher education as a sociological entity is determined by cultural diversity and enriched by a plurality of languages. Language is neither neutral nor detached; it materialises in discourse structures and forms part of specific cultural models of how to conceive the world and the science of each society. For these reasons, I have argued, the reduction of science to one language would probably limit scientific creativity itself and increase existing asymmetries in access to international scientific production and the diffusion of local scientific production.

Considering gains and losses, it is probably not to the advantage of a linguistic community of the dimensions of the Spanish-speaking world – and probably to none – to abandon the strategic field of science and to risk fossilisation and loss in this domain. Efforts are worth while to maintain and revitalise plurilingualism in all areas of science, even if existing asymmetries will probably not disappear altogether. A pluralistic language policy in the Hispanic world should at the same time sustain the development of terminology, data banks and publications in Spanish, and facilitate better access to English and other languages to enhance the development of a pluralistic international society of knowledge. The Spanish-speaking world, one of the globe's largest language communities, could in this way contribute to foster international pluralism in the strategic field of science and higher education

Notes

1. Certainly, such a view has been contested from multiple perspectives, stressing the role of agency and hidden actors in this process (e.g. Phillipson, 1992, 1997).
2. According to the UNESCO 2002 report, in Latin America three countries – Brazil, Mexico and Argentina – account for 85% of the region's expenditure in science and technology (UNESCO, 2002).
3. In de Swann's (1993, 2001) hierarchy, which has been elaborated by Calvet (1999), English is the only hyper-central language. Important international languages like French, Spanish, Portuguese, German and others are named super-central languages; the authors then count roughly one hundred central languages, mostly national languages in some country and the rest are vernacular languages.
4. In different studies on language conflict, shift, and language policy, a distinction between three ideological orientations has proven useful: monoculturalism (and monolingualism) denies any right, even the existence of minorities within a given nation state (e.g. the language policy of Argentina and Brazil towards their indigenous population up until the 1970s); multiculturalism (and multilingualism) recognises factual diversity and is used here as a descriptive, neutral term; finally, pluriculturalism (and plurilingualism) assesses diversity from a positive enrichment perspective, namely as additive bilingualism. The latter concept is congruent with UNESCO's terminology and is more largely used in Romance languages than in English; it exploits the positive connotations related to the prefix 'pluri'.
5. Durand, a French information technologist who worked in the US and Japan for 28 years, warns that scientific creativity may be menaced if research is reduced to one language only. Surprising examples from military technology such as the development of conceptually very different military airplanes including the Russian Ekranoplane, the British Harrier and the French Trident serve as examples to what extent hermetic segregation contributes to achieve unexpectedly divergent solutions even in a common field as military technology (Durand, 2001). He calls for 'intellectual speciation', i.e. some kind of reproductive isolation that prevents 'genetic exchange' between culturally and linguistically different groups of researchers to maintain the kind of diversity in scientific approaches and orientations that might be fundamental for scientific creativity.
6. The expenditure for foreign language teaching on nation-state level has been analysed with different economic models (e.g. Coulmas, 1992; Grin, 2003; Muncio, 2001). In a recent study for the French government, Grin (2005) estimates the savings for Great Britain in foreign language teaching, given the privileged position of English, by some €17–18 billion, based on van Parij's (2004) model of maxmin analysis.
7. In the 1990s France headed a movement of resistance to keep their cultural industries, especially films, out of the international free market agreements that were negotiated at that time in the framework of the newly created WTO. Specific quotas for French films should be respected as a barrier against the devastated competition from Hollywood, meaning that the field of culture constitutes a 'reserved' or 'exceptional' area exempted from total market forces (see García Canclini, 2002; Groupe de travail, 2002).
8. This is probably the case as well in many European countries as I experienced through academic teaching in various countries. In the USA, however, I felt an increasing, solid orientation towards English monolingualism when teaching there in the 1990s. Recently, however, especially since 9/11, more and more people among the academic and political elite became aware about the risks of being or becoming a quasi-monolingual empire.
9. In this paper I will use the terms 'natural' (physics, chemistry, biology including mathematics) and 'social' sciences, as well as 'humanities'. Very often the term 'social sciences' will encompass the humanities as well. As far as possible, I will avoid widespread ideological distinctions and typologies that establish or perpetuate – implicitly or explicitly – obsolete and unacceptable hierarchies and exclusions. Thus, the common expression 'science and the humanities' denies by exclusion a status of science to the humanities; a faculty of 'exact' sciences ascribes 'inexactness'

to all other disciplines; 'formal' linguistics implies that all other fields of linguistics are 'informal', etc.

10. A caveat may be expressed, however, concerning the persistent myth about the omnipresence of English. To a significant extent, this myth is exaggerated. Phillipson (2001a) and my own conversations with senior experts in digital video from Hollywood report that Japanese investigators continue to publish their findings in digital technology in Japanese first. Thus Japanese firms enjoy comparative privileges over English-speaking enterprises to take advantages from those findings. Similarly, the *Revista Mexicana de Física*, Latin America's most prestigious journal of physics, was reported years ago to have changed its name to *The Mexican Journal of Physics* and to publish in English only. Again, this information is wrong since the journal keeps its name in Spanish and publishes articles in both languages, Spanish and English. All articles carry abstracts in both languages. In a wider context, Graddol (1997), in his worldwide acknowledged report on the future of English, counted 19 countries as currently shifting from an EFL (English as a foreign language) to a L2 status for English, meaning that 'the use of English for intranational use is greatly increasing' (Graddol, 1997: 11). At least for Argentina, Honduras and Nicaragua, some of the Latin American countries mentioned there, such an assertion is clearly incorrect.
11. Whether Spanish has a legal status as official language or not is fairly irrelevant for our debate. As a matter of fact, most Hispanic countries did not establish such an explicit legal status in their Constitutions or other bodies of law.
12. Interestingly, the Spanish language community does not count on an official international organisation like the British Commonwealth or the Organisation Internationale de la Francophonie (OIF). To some extent, the Asociación de Academias de la Lengua Española where all Spanish-speaking countries participate, and Spain's official Instituto Cervantes attempt to cover a series of common activities related to language and culture abroad. Another institution is the Organización de Estados Iberoamericanos (OEI) which includes Portugal, Spain and the Latin American countries where either Portuguese or Spanish is the official language.
13. This policy is characteristic for Quebec where French monolingual institutions are maintained. In a highly educated country like Canada, 43% of the population of Quebec was reported to be French monolingual in 2000. Needless to say that English-French bilingual rates are much lower in Anglophone Canada outside Quebec. In Paris I know some brilliant young students of physics who work on their PhD but have never learned English and therefore hardly read any English literature. Although these cases probably do not constitute a majority, they are by no means isolated. Even more so, large areas in the social sciences and humanities in the Francophonie work without consulting hardly any scientific literature in other languages than French.
14. Such a proposal is certainly not new. It has existed in the past as the most natural orientation in science, even in the Anglophone countries (see Ammon, 1998, 2000). The myth about the omnipresence and might of English, however, has delegitimised such orientations and driven them into a defensive position.
15. In Latin America the term 'intercultural' is more widely used, especially in education, to refer to a specific relation between cultures in a perspective of mutual understanding (Fornet-Betancourt *et al.*, 2002).
16. Limited space does not permit a debate on this topic which has been discussed extensively elsewhere in the case of Latin America (Hamel, 2000, in press) and the Hispanic world (del Valle & Gabriel-Stheeman, 2001). Suffice to say that the monolingual orientation of the dominant social sectors in Latin America centred on Spanish and Portuguese as the pretended exclusive national languages is to a certain extent transferred to English by an Anglo-oriented academic elite, certainly in a contradictory manner. In the same way as Spanish monolingualism should reign in most spheres of public life, English might be the sole language of science. The general monolingual orientation turns out to be stronger in this sector than nationalist traditions rooted in the own language.
17. Usually such a critique is issued by international institutions in alliance with their

- local partners who benefit from English language spread. A similar critique is voiced by international corporations who accuse e.g. Quebec's labelling laws that impose French on the labels as an obstruction of the 'free' market.
18. A good example for such a strategy is the practical language policy applied by the Instituto Mexicano de Medicina Genómica (Mexican Institute of Genomic Medicine), created by the federal government in 2003, shortly after the first complete decipherment of the human genetic code was made public. This institute is involved in applied and basic research. Its main objective is to study that 0.1% of the human genome that distinguishes between biogenetic areas to help find cures for specific diseases that abound in Mexico. Such research can only be successfully developed in close connection with the medical profession and the population at large. The website of the young institute is entirely in Spanish (<http://www.inmegen.org.mx/>), with some links to publications in English about the topic and the Mexican institute. The basic and applied research, as well as dissemination and concrete intervention, mean a significant challenge and opportunity to develop terminology and a whole array of activities in Spanish.
 19. It is only for reasons of simplicity that these spaces are represented as discrete columns.
 20. Whether the reasons of economy and problems of impact hold should be the matter of another debate, given counterexamples like the fairly successful book series launched by Cambridge University Press in Spanish.

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