



ESTUDIOS / RESEARCH STUDIES

Why publish in English versus Spanish?: Towards a framework for the study of researchers' motivations

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Abstract: This paper proposes a framework for the comparative study of researchers' motivations for publishing either in English as an additional language or their first language. This framework seeks to present a view of motivation as dynamic, multidimensional, and multilevel. Empirical support is provided through the results of an on-line large-scale survey carried out among Spanish scholars. Our aim was to investigate which factors motivate them to publish their results in academic journals in either English or Spanish, as well as the extent to which these motivations are shaped by individual characteristics of researchers, particularly gender, seniority and publication experience. Results show an instrumental use of publication in English and fragmented social and ideological motivations for the use of Spanish.

Keywords: Research article; academic writing; publication strategy; researchers' motivation.

Publicar en inglés o en castellano: Un marco teórico para el estudio de las motivaciones de los investigadores

Resumen: Este trabajo propone un marco para el estudio comparativo de las motivaciones de los investigadores a la hora de publicar en inglés o en su lengua materna. Dicho marco tiene por objeto ofrecer una visión dinámica, multidimensional y multinivel de la motivación. Los resultados de este trabajo provienen de una encuesta on-line a gran escala realizada entre investigadores españoles. Nuestro principal objetivo es investigar los factores que motivan a los investigadores a la hora de publicar en revistas académicas, ya sea en inglés o en español, así como el grado en que estas motivaciones son moldeadas por determinadas características individuales, especialmente el género y la experiencia investigadora y en publicación. Los resultados muestran un uso instrumental del inglés con fines académicos frente a una visión del empleo del castellano más fragmentada y basada en motivaciones sociales e ideológicas.

Palabras clave: Artículos científicos; escritura académica; estrategias de publicación; motivación.

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1. INTRODUCTION

A large number of previous studies have reported the importance of English for the communication of scientific knowledge and have shown how researchers who do not have English as their first language are under pressure to publish their research findings in this language (see Curry and Lillis, 2004; Swales, 2004; Lillis and Curry, 2010). At the same time, many speakers of languages other than English defend the use of their first language in academic contexts, particularly in countries with strong languages used widely on a global scale (Petersen and Shaw, 2002; Swales, 2004; Flowerdew and Li, 2009).

A researcher's choice of language for the publication of their research depends not only on linguistic considerations (such as linguistic proficiency or difficulties with using English for academic purposes), nor does it only have linguistic implications (Hwang, 2005, 2013). It is also a response to the desire that research results should reach a wider international audience (Rey-Rocha and Martín-Sempere, 1999; Haarman and Holman, 2001; Gómez et al., 2006; Uzuner, 2008), to the growing internationalization of teaching and research in universities and research centres (Pérez-Llantada et al., 2011), and to the practice that many national Science and Technology (S&T) systems have of rewarding publication in English-medium scientific journals (Ferguson, 2006; Moreno, 2010; Osuna et al., 2011). As a result, areas such as science communication, scientific collaboration, scientific productivity, visibility and impact of research, and research assessment all come into play. They are all widely measured and evaluated through a number of S&T indicators used for science policy purposes and for the assessment of the research activity of scientists. Appropriate contextualization and interpretation of these S&T indicators cannot exclusively rely on crude figures and statistics. A detailed knowledge of researchers' publication patterns, their attitudes towards the use of English and other languages for academic purposes, and their motivations for using one or other of these languages is required. This information is essential for research assessment, well-informed decision-making and S&T policy implementation.

While there have been several attempts to characterize scientists' motivations and attitudes, there are a number of problems with these accounts. We provide a critical review of these in the next section. There has also been a lack of systematic data collection and of robust samples, shortcomings which we also seek to address in our methodology section. Finally, motivations and attitudes specifically in relation to language choice by researchers who use English as an additional language are issues that have not yet been directly addressed.

This study proposes a framework based on Self-Determination Theory (SDT) for the study of researchers' motivations for publishing either in English as an additional language (henceforth EAL) or their first language (henceforth L1). It aims to contribute to our empirical understanding of these motivations. Additionally, the framework has been used for the study of the main factors that motivate Spanish academics to publish the results of their research in either English or Spanish-medium journals. The study highlights the continuum of extrinsic to intrinsic motivations underlying researchers' publishing attitudes and behaviour in EAL as opposed to Spanish (as L1). We also investigate the extent to which these motivations are related to the individual characteristics of scientists, namely gender, seniority and publication experience.

The paper is structured as follows. First, we review the existing literature on motivation for scientific work. Secondly, we describe our proposal of a framework for the study of motivations for researchers' language choices for scientific publication purposes. Next, we apply the framework to the study of Spanish researchers' motivations to publish the results of their research in academic journals either in EAL or in Spanish. Finally, we discuss the main features of the motivational framework together with the main results of our study of Spanish researchers' motivations.

2. A REVIEW OF STUDIES OF MOTIVATION FOR SCIENTIFIC WORK

In this non-exhaustive review, we focus on three approaches that bring together current perspectives on academic motivation: the psychological perspective, the sociological perspective and the rational-economic perspective. Although each comes from a different intellectual tradition, we provide a cross-sectional analysis tracing the common thread running through the three perspectives. By doing this, we are able to identify the principal unresolved issues. Having determined where there is a need for more information, in the next section we suggest a framework that will allow for an analysis of motivation for academic publication purposes incorporating features from all three perspectives.

Psychological motivation theories have emerged from the distinction between intrinsic and extrinsic motivations (see Deci and Ryan, 2000 for a review). Extrinsically motivated behaviours are "the ones that the individual performs to receive some extrinsic reward (e.g., good grades) or to avoid punishment", while "with intrinsically motivated behaviours the rewards are internal (e.g., the joy of doing a particular activity or satisfying one's curiosity)" (Dörnyei, 1990). Many intrinsic and extrinsic motivational factors have been identified for researchers. Among the most important of

the extrinsic factors is financial reward (Levin and Stephan, 1991; Stephan, 1996). Intrinsic motivations include the satisfaction derived from carrying out research (Hagstrom, 1965), contributing to the advancement of knowledge, engaging in challenging and creative activities (Lam, 2011), and in creative puzzle-solving (Eiduson, 1962; Cotgrove, 1970). A characteristic feature of the scientific reward system is its multidimensional nature, comprising the three components that Stephan and Levin (1992) called the 'ribbon' (reputational/career rewards), the 'gold' (financial rewards) and the 'puzzle' (intrinsic satisfaction).

Despite the appeals of the psychological perspective, it is an approach that can be criticised for providing an excessively mechanistic explanation that lacks theoretical dynamism and for characterizing various types of input as intrinsic or extrinsic without fully taking into account the relationships between them (Ryan and Deci, 2000b). Although this approach has been useful for empirical research, it has often become bogged down in irreconcilable debates between those who promote the prevalence of intrinsic motivations (Hull, 1943; Herzberg et al., 1959; Deci, 1971; Lepper et al., 1973) versus those who see extrinsic motivations as predominating (Skinner, 1953; Opsahl and Dunnette, 1966; Lawler, 1971). Both sides have generally failed to formulate a theory that accounts adequately for these apparent contradictions. In addition, the failure to take into account the social and contextual factors that frame participants' decisions (Rowley, 1996), along with an excessive emphasis on extrinsic motivations as predictors in organizational psychology research, make it clear that the approach needs to be modified if the complexities underlying researchers' motivations are to be understood.

The sociological approach foregrounds the fact that most of the extrinsic motivations referred to in the literature – reputation, citations, money – are in fact interim steps towards obtaining resources within an institution that functions in accordance with "a set of cultural values and mores governing the activities termed scientific" (Merton, 1973). Within the sociological approach there are three main schools of thought which, while complementing one another, on many occasions, have approached organizational arrangements in science from three distinct explanatory paradigms, characterised as normative, cognitive and utilitarian.

The normative paradigm (Merton, 1973; Long and Fox, 1995; Scott, 2005) particularly emphasises the values that underpin the way in which the scientific community functions and how these factors influence researchers' behaviour. Merton's (1973) work on the normative structure of science has it that the development of science, like any other social institution, is supported by a set of

values. In the case of science, these values are of a technical and moral nature. Moral values such as 'Communalism', 'Universalism', 'Disinterestedness' and 'Organized scepticism' constitute the ethos that drives researchers in their work. In the traditional 'Mertonian' academic environment, recognition by peers (i.e. by the scientific community), mainly in the form of citations, constitutes the principal and fundamental form of extrinsic reward for researchers.

The assumptions underlying the Mertonian paradigm have come under attack from several quarters with criticisms being leveled at the notion that scientific behaviour is driven by altruistic factors, the claimed existence of a clear and unequivocal normative framework or the longstanding belief that there is a direct relationship between norms and action (Mulkay, 1969, 1980; Barnes and Dolby, 1970; Rothman, 1972; Fernández-Esquinas and Torres-Albero, 2009). At this point in our discussion we can draw parallels between the development of the psychological and sociological perspectives since both have led to a major shift in their respective disciplines, namely the calling into question of functionalism, and the loosening of the structuralist paradigm which had produced too narrow an interpretation of action in both social and individual domains.

The sociological approach, with its traditional grounding in macro and institutional perspectives, has thus seen itself obliged to look to the field of subjectivity in order to formulate new questions, the answers to which necessarily entail the inclusion of subjective elements such as beliefs, interests, values and even emotions (Thune, 2007). These elements cannot be understood as falling outside institutional dynamics, now that we have seen that the scientific community's norms and regulations also have their origins at the level of social interaction. This has meant that these norms and regulations are now regarded as having a degree of flexibility and as adapting themselves to the particular circumstances in which they arise while being essential components of uncertainty (Mulkay, 1980).

From the sociological perspective, we now turn to the approach we have termed 'rational-economic', since it draws on work in the economics of scientific knowledge (Polanyi, 1962; Radnitzky, 1987; Dasgupta and David, 1994; Hands, 2001), in which the production of scientific knowledge is viewed as a social process that can be analysed with the aid of conceptual tools drawn from economics (Zamora-Bonilla, 2012). In this approach, initially grounded in rational choice and game theory (Shi, 2001), scientists "try to attain the maximum possible merit with their stock of intellectual and material resources" to achieve their individual goals (Zamora-Bonilla, 2012).

Polanyi (1962), who was a pioneer in the use of this approach with his "Republic of Science", noted the parallels between the market and science, characterizing both as being based on self-coordination of independent initiatives aimed at achieving maximum benefit. There have, once again, been some criticisms of this approach as it sees scientific decision-making as rational and essentially constrained by scarcity of resources (Wible, 1998 cited in Zamora-Bonilla, 2012). Furthermore, despite a bid to include social factors in the analysis, the metaphor of the market has attracted the same accusations of internal contradictions levelled at classical economics, on which it draws in its efforts to argue for the existence of an "epistemic invisible hand" behind the process of scientific research. It has been pointed out, for example, that the existence of disciplinary monopolies runs counter to the notion of a free ideas market (Mirowski, 1996; Mirowski and Sent, 2002). The idea that the functions of science are underpinned by the market-based returns model has also been questioned (Gans and Stern, 2010).

Sociological and rational-economic approaches aimed to fill the gap in the earlier individualist conceptualizations and have made a major contribution to motivational studies of scientific production. However, unlike psychological perspectives, hypotheses derived from sociological and rational-economic approaches are yet to be tested empirically in a systematic manner.

Overall, the main theoretical and methodological shortcomings of previous approaches may be summarised as follows:

- (i) Little empirical testing and validation of measurement instruments: the most highly developed theoretical contributions have not been followed up by empirical testing (for a review, see Fernández-Esquinas and Torres-Albero, 2009; Zamora-Bonilla, 2012), while the earlier psychological perspectives have generally only validated their hypotheses at the individual level.
- (ii) Lack of a multilevel perspective: Following Ostroff and Bowen (2000) and Kozlowski and Klein (2000) on organizational theory, it would be desirable to integrate the macro level (normative systems, compensatory mechanisms, cultural context) and the micro level (attitudes, behaviours, perceptions) with intermediate positions between the two levels to produce a more complete and global perspective on the organizational system under study.
- (iii) The absence of dynamic and interactive explanations for researchers' preferences: the main contribution of the psychological perspective has been to distinguish between internal and external motivations. However,

despite its explanatory power, the approach thus far has been too static and little attention has been given to the relationship between these types of motivation and the processes that turn one type of motivation into the other.

In the next section, we present a framework that seeks to address the shortcomings discussed above and to provide a more satisfactory account of the motivations implicated in publication strategies.

3. DEVELOPING A FRAMEWORK FOR THE STUDY OF MOTIVATIONS FOR RESEARCHERS' LANGUAGE CHOICES FOR SCIENTIFIC PUBLICATION PURPOSES

As we have sought to explain through our review of the three main approaches, despite their many differences, they share much common ground both in terms of their theoretical contributions and the various contradictions and impasses they confront. In this section, we present a framework based on SDT (Deci and Ryan, 1985, 2000, 2002; Ryan and Deci, 2000a; Gagne and Deci, 2005), one of the major theories of motivation in social psychology. We will now show how this approach addresses the three main shortcomings of the classical paradigms we described earlier by offering an understanding of motivation as a dynamic, multidimensional process, integrated at various levels. Furthermore, in the empirical domain, it is one of the approaches that can rely upon a larger body of research evidence to justify its hypotheses and validate its measurement instruments (Vallerand et al., 1992; Cokley, 2000; Fairchild et al., 2005). For this reason, it provides a particularly interesting and fruitful basis for the formulation of our framework.

SDT avoids the dichotomization of motivation as intrinsic and extrinsic in favour of a view where individuals' actions can be plotted along a motivational continuum from amotivation through extrinsic motivation to intrinsic motivation. Amotivation, the lack of intention to act because of lack of interest or because one does not see the activity as valuable, represents another of the important innovations provided by this theory. At the same time, SDT retains the concepts of extrinsic and intrinsic motivation but introduces a more nuanced explanation of how the two types of motivation work in practice. Firstly, the locus of motivation is seen in relation to the distinction between autonomous motivation and controlled motivation. Autonomous motivation involves "acting with a sense of volition and having the experience of choice", while controlled motivation involves "acting with a sense of pressure, a sense of having to engage in the actions". Thus, intrinsically motivated behaviour is "prototypically autonomous", while extrinsically motivated behaviour "can vary in the degree to which it is autonomous versus controlled" (Gagné and Deci, 2005).

Another central argument of SDT is that an extrinsically motivated behaviour can become autonomous, i.e. it can be "transformed into intrinsically motivated one as individuals internalize the values and behavioural regulation that underlies it" (Lam, 2011). The SDT controlled-to-autonomous continuum describes the degree to which an external regulation has been internalized. Internalization is "an active, natural process in which individuals attempt to transform socially sanctioned mores or requests into personally endorsed values and self-regulations" (Ryan et al., 1985, quoted in Deci and Ryan, 2000). It occurs when "people taking in values, attitudes, or regulatory structures, such that the external regulation of a behavior is transformed into an internal regulation and thus no longer requires the presence of an external contingency" (Gagné and Deci, 2005).

SDT identifies three distinct processes of internalization: introjection, identification and integration. Thus, extrinsic motivation is divided into four points along the continuum: external, introjected, identified and integrated regulation. *External regulation* refers to the least self-determined form of extrinsic motivation, involving actions for which the locus of initiation is external to the person, as in the case of rewards or threats. *Introjected regulation* involves externally imposed rules that the individual accepts as norms that pressure him or her to behave, while not accepting them as his or her own norms. *Identified regulation* occurs when people identify with the value of behaviour for their own self-selected goals and accept the regulatory process because they recognize its usefulness. The behaviour is thus more congruent with people's personal goals and identities. The most developmentally advanced form of extrinsic motivation is *integrated regulation*, which involves regulations that are fully assimilated with the individual's other values, needs, and identities. Integrated motivation is still considered extrinsic motivation but shares some qualities with intrinsic motivation (Deci et al., 1991; Gagné and Deci, 2005; Lam, 2011).

Associated with the different types of motivation, three outcome types can be identified: material, social and affective. Material outcomes are primarily related to extrinsic motivation, affective outcomes are closely related to intrinsic motivation, and social outcomes are related to the 'in-between' types of motivation such as introjection and identification (Lam, 2011).

Lam (2011) has recently reviewed the main characteristics and postulates of SDT with regard to academics' motivation. She underlines the emphasis of SDT on self-regulation in the motivational process seeing it as "particularly germane to the case of academics who enjoy considerable freedom in their work" and cites

Amabile et al. (1994) arguing that "some highly autonomous individuals [as most scientists are] may be strongly intrinsically interested in the activity and, at the same time, strongly motivated to acquire extrinsic rewards (e.g. recognition, careers and money) for that activity". At the same time, a researcher's motivation should be seen as a dynamic and multidimensional phenomenon (Viau, 2004).

Drawing on Deci and Ryan (2000) and on the existing literature on motivation, in this paper we propose a framework for the study of researchers' language choices for scientific publication purposes. After discussion with a sample of informants, we identified the main factors motivating researchers to publish in English or Spanish-medium journals (Table I). These factors are placed in the self-determination continuum of motivational factors according to: a) the sphere which is affected, either individual or collective; b) the type of motivation: amotivation, extrinsic or intrinsic; c) the type of regulation along the continuum between self-determined and controlled forms of motivation: external, introjected, identified, integrated and intrinsic regulation; d) the locus of causality, either impersonal, external or internal; and e) the three types of outcomes: affective, social and material (Figure 1).

Our framework brings together material, affective and social outcomes. It incorporates the recent broadening of intrinsic motivation to include a social, normative dimension, in addition to the traditional link to affective outcomes (Grant, 2008).

Many of the motivational factors we asked informants about are easily positioned along this continuum. This is the case of the desire to increase the possibility of receiving a bonus payment and, at the other end of the continuum, of the set of motivations related to self-confidence and need for achievement. The desire to meet the requirements for professional promotion represents a source of introjection, as does individuals' acceptance of the external norms ruling the reward system of science, where publication in mainstream international journals is one of the main, if not the principal, criteria for professional promotion in the public Research and Development system. Similarly, the desire for their work to be recognised and to get cited more frequently reflects researcher's identification and acceptance of research articles as the primary vehicle for obtaining recognition, and consequently of their acting in order to obtain this recognition. Seeking recognition can be considered as an external (though invisible) reward that depends on others (i.e. the scientific community), while getting citations could be seen as its visible counterpart. Both respond to the individual's desire to become fully integrated into their continually evolving academic community.

Figure 1. Motivations of scientists for writing research articles in English or Spanish, placed in the self-determination continuum of motivational factors

Sphere	Collective					<i>JouExst</i>	<i>IntComm</i>		
	Individual		<i>BonPaym</i>	<i>PrfProm</i>	<i>Citations</i> <i>ResRegn</i>	<i>RspInv</i>	<i>LocComm</i>	Self-Confidence: <i>WrtAbil</i> <i>ArtQual</i> <i>PubExpr</i>	Need for Achievement: <i>StiChll</i> <i>ItlDevl</i> <i>WrtImpr</i>
Type of Motivation	Amotivation	Extrinsic motivation ←				→ Intrinsic motivation			
Type of Regulation	Non-regulation	External regulation	Introjected Regulation	Identified Regulation	Integrated Regulation	Intrinsic Regulation			
Perceived Locus of Causality	Impersonal	External	Somewhat External	Somewhat Internal	Internal	Internal			
Control	Lack of Motivation	Controlled Motivation	Moderately Controlled Motivation	Moderately Autonomous Motivation	Autonomous Motivation	Inherently Autonomous Motivation			
Outcome		Material			Social		Affective		

Source: based on Deci and Ryan (1985, 2000) and Ryan and Deci (2000a, b)

Figure legend:

Sphere:

- Individual: affect or fall within the individual scope.
- Collective: transcend the individual and affect or incumbent upon the collective sphere.

Type of motivation:

- Amotivation: having no intention to act because of lack of interest or not valuing the activity.
- Extrinsic: doing something for a separable outcome or external rewards.
- Intrinsic: doing something for its inherent pleasure and satisfaction.

Internalization process:

- External regulation: actions for which the locus of initiation is external to the person. Compliance, external rewards and punishments.

- Introjected regulation: fitting in or feeling worthy, accepting external norms. Self-control, ego-involvement, internal rewards and punishments.
- Identified regulation: acting appropriately, identifying and accepting regulatory processes. Personal importance, conscious valuing.
- Integrated regulation: regulations fully assimilated with the individual's values, needs and identities. Congruence, awareness, synthesis with self.

Outcome:

- Material outcomes: primarily related to extrinsic motivation.
- Social outcomes: related to the 'in-between' types of motivation.
- Affective outcomes: closely related to intrinsic motivation.

Motivational factors: See Table I.

Table I. Motivational factors

StiChll	My desire for stimulating challenges
ItlDevl	My desire to develop intellectually (as a result of editors' and peer reviewers' comments)
WrtImpr	My desire to improve my writing ability in this language
WrtAbil	My assessment of my ability to write up the results of my research in this language
ArtQual	My assessment of the quality of my article
PubExpr	My experience publishing in this language
IntComm	My desire to communicate the results of my research to the international scientific community
LocComm	My desire to communicate the results of my research to the local scientific community
JouExst	My desire for the continued existence of scientific journals in this language
RspInv	My desire to respond to a request or invitation from an institution, association or publisher, etc.
Citations	My desire to get cited more frequently
ResRcgn	My desire for my research work to be recognised
PrfProm	My desire to meet the requirements for professional promotion
BonPaym	My desire to increase my chances of receiving a bonus payment

The desire to communicate to international or to local scientific communities can be considered as lying at the boundaries between extrinsic, integrated regulation, and intrinsic motivation. Initially, we opted for categorizing these motivations as intrinsic while acknowledging the existence of arguments for regarding them as extrinsic. Ultimately, we chose to categorise the local/universal interest of research as an extrinsic-type motivation on the grounds that communicating research in a given language may respond to the individual's desire to integrate into one community rather than another. In any case, it can thus be considered as an instrumental motive since it consists of a well-internalized extrinsic motive (integrated regulation) centred on the individual's future professional endeavours. It should, however, be noted that the desire to communicate to either an international or to a local scientific community also involves intrinsic and affective components.

The desire for the continued existence of scientific journals in a given language and the desire to respond to a request or invitation from an institution, association or publisher, etc. can be seen as a motivation echoing the Mertonian value of communalism. In so far as we consider these motivations as related to scientists' recognition of the usefulness of the existence of these journals and the fact that they consider responding to these invitations as appropriate conduct, they can be placed close to the 'Identified regulation' point on the continuum.

Finally, motivations placed at the 'intrinsic' extreme of the motivational continuum include six motivators, three of which fit into the 'self-confidence' category, encompassing the aspects of perceived competence (the assessment of my ability to write up the results of my research in this language), self-efficacy (my assessment of the quality of my article) and attributions about past experiences or causal attributions (my experience publishing in this language). The other three motivators are included within the 'need for achievement' component (the desire for stimulating challenges, the desire to develop intellectually and the desire to improve my writing ability in this language).

4. APPLYING THE FRAMEWORK TO THE STUDY OF SPANISH RESEARCHERS' MOTIVATION

We next describe an experimental application of the framework. We investigated the main factors that motivate Spanish researchers to publish the results of their research in academic journals either in EAL or in Spanish (as L1).

4.1. Methodology

The study was carried out through a survey of researchers from four Spanish universities and the Spanish Council for Scientific Research. This paper draws on data from the study by the

ENEIDA (Spanish team for Intercultural Studies on Academic Discourse) research team of the current needs, experiences and strategies of Spanish researchers with regard to the writing and publishing of research articles in English and Spanish-medium journals. The analysis is based on responses to a large-scale on-line survey carried out among Spanish scholars with doctorates who have received most of their secondary and pre-doctoral education in Spain and in Castilian Spanish, and who work at either a research-only institution (the Spanish Council for Scientific Research) or at one of four Spanish universities. The population of participants, the general aspects of the methodology used and the design, validation and implementation procedures of the ENEIDA survey are described in detail in Moreno et al. (2012, 2013). However, to facilitate comprehension of the present article, key methodological aspects of the study are summarized below with particular emphasis being given to those relating to researchers' motivations.

The ENEIDA instrument (Moreno et al., 2013) was designed drawing on previous literature (Cea D'Ancona, 2001; Cohen et al. 2007; De Vaus, 2002; see also Moreno et al., 2012), our existing knowledge, and information obtained from consultation with experts. In order to achieve adequate construct validity for the questions used in the survey, a two-step procedure based on respondent debriefing (qualitative approach) and a pre-test survey (quantitative approach) was employed. For the respondent debriefing (Hess and Singer, 1995; Martin, 2004), we conducted semi-structured face-to-face interviews with a sample of 24 informants with the aim of identifying or confirming relevant variables for inclusion in the questionnaire and to find the most appropriate register and language for communication with our informants in the subsequent survey. Afterwards, we tested the on-line questionnaire with a selected subsample of 200 informants, in order to trial the instrument both technically and in terms of interpretation of results. As a result of the double pre-test we redefined and reduced the number of items in the survey.

Both the interviews and the pre-test on-line survey involved a good cross-section which was representative of our population in terms of gender, seniority (junior and senior scientists), institution (CSIC and University) and disciplinary field (Natural and Exact Sciences, Technological Sciences, Social Sciences and Arts & Humanities).

The original Spanish version of the questionnaire was administered in late 2010 to a population of 8,794 academics. We received 1,717 responses (19.6% response rate). Of these, 1,454 (84.7%) met the L1 and educational

background criteria we had established. The size of the sample guarantees an error of less than 2% for a confidence level of 95%. Men and women responded at a similar rate (17.1% and 15.6% respectively) so both genders were adequately represented among respondents, reflecting the percentage distribution for the population. The response rate was higher among CSIC researchers (21.3%), who are thus over-represented in the sample with respect to university academics (response rate from 10.6% to 13% across the four universities).

We asked these informants to assess to what extent a series of factors influence their decision to publish in English or in Spanish when they decide to publish a research article in a scientific journal (Moreno et al., 2013). The series of factors on which we sought information through this question are those we plotted along the SDT continuum from extrinsic to intrinsic motivations (Figure 1).

Answers were provided on a five-point Likert scale (see Table II). For each motivational factor we estimated the position index (PI). The PI quantifies the position of the sample on an ordinal scale without having to take into account the number of categories that make it up. PI takes values between 0 and 1. It is null (PI = 0) when the sample is located in the lower end of the interval, and takes its maximum value (PI = 1) when all the elements of the sample are at the top. It allows for the representation of a motivational-profile graph for each independent variable, displaying their 'shape' and graphically showing similarities and differences among them. The way PI is formulated is reported in the Appendix.

Seniority was calculated as the time elapsed since individuals obtained their doctoral degree. The three 33.3-percentile groups of scientists considered in the present study were a) junior scientists, i.e., those who obtained their doctorate between 0 and 10 years previously; b) individuals in the middle percentile (doctorate obtained from 11 to 19 years previously), and c) senior scientists (doctorate obtained more than 19 years previously). The number of articles published as corresponding authors over the preceding ten years in English (as L2) or in Spanish has been used as a proxy for publication experience in either of the two languages.

Statistical analysis was performed with the SPSS statistical package for Windows (version 19.0). Means comparisons were performed with the Student's t-test adjusted using the Bonferroni correction. Significant differences are reported at $p < 0.05$ in the two-sided test of equality for column means assuming equal variances (see Tables II to V).

4.2. Results

Table II shows mean ratings provided by informants for the factors that influence their decision to publish research articles in Spanish or in EAL, and Figure 2.a displays their motivational-profile graph for publication in English and in Spanish. We performed the Two-sample Hotelling's T-Square test in order to contrast differences in sample mean vectors. Results show significant differences between the vectors representing averages for all the motivations for publishing in English or in Spanish (Hotelling's trace=0.497 p -value<0.001). In order to determine whether the means for this paired sample were systematically different, we applied the Student's t-test, adjusted using the Bonferroni correction. In Table II, values in the same row not sharing the same subscript (a or b) are significantly different at $p < 0.05$ in the two-sided test of equality for column means. Motivations for publishing in English were mainly related to utilitarian aspects such as communicating the results of research to the international scientific community, having research work recognized, and meeting the requirements for professional promotion. Opinions about the use of Spanish are somewhat fragmented and are linked mainly with ideological (defence of local issues, desire for the continued existence of scientific journals in Spanish) and social reasoning (responding to a request or invitation from an institution, association or publisher).

The general motivational profiles for publishing in English and in Spanish displayed in Figures 2a are nearly unchanged irrespective of gender, seniority and publication experience, with slight variations that affect the different scores given to some of the particular motivations. Male and female researchers follow a similar motivation pattern both when publishing in English and in Spanish, with the main differences being found in the higher scores by women on most of the items (Table III, Figures 2.b and 2.c). An exception observed in both languages is the desire to increase the chances of receiving a bonus payment, where men and women put equally low expectations either in English or in Spanish.

Seniority does not seem to influence the motivations of scientists to publish research articles in Spanish (Table IV, Figure 2.e), with the exception of the interest in using publication in this language for professional promotion, an interest which decreases as researchers become more senior. The use of EAL shows more differences (Table IV, Figure 2.d). Differences arose in both the extrinsic and the intrinsic extremes of the motivational continuum. With respect to extrinsic motivations, as in the case of Spanish, those who are at the beginning of their academic career are the most concerned about aspects of professional promotion when deciding to publish in EAL, meanwhile those who are distinguished by pursuing extra remuneration through their publications in English are senior researchers. Junior scholars are the most intrinsically motivated by need for achievement when choosing to publish in English.

Table II. When you decide to publish a research article in a scientific journal, to what extent do the following factors influence your decision to publish in Spanish or in English?

Motivations ^a	English ^b (n=1284)	Spanish ^b (n=878)	Contrast ^c
StiChll	3.3±1.5(4) a	2.8±1.5(3) b	EN>SP
ItlDevl	3.8±1.2(4) a	2.6±1.4(3) b	EN>SP
WrtImpr	2.6±1.5(2) a	2.1±1.5(1) b	EN>SP
WrtAbil	2.4±1.4(2) a	2.7±1.6(3) b	SP>EN
ArtQual	3.7±1.4(4) a	2.9±1.5(3) b	EN>SP
PubExpr	2.8±1.5(3) a	2.5±1.5(2) b	EN>SP
IntComm	4.7±0.7(5) a	2.5±1.5(2) b	EN>SP
LocComm	2.6±1.5(2) a	3.9±1.4(4) b	SP>EN
JouExst	2.0±1.3(1) a	3.2±1.6(3) b	SP>EN
RspInvt	3.1±1.4(3) a	3.4±1.4(4) b	SP>EN
Citations	4.0±1.2(5) a	2.2±1.3(2) b	EN>SP
ResRcgn	4.5±0.9(5) a	3.2±1.4(3) b	EN>SP
PrfProm	4.2±1.1(5) a	2.7±1.4(3) b	EN>SP
BonPaym	2.6±1.5(2) a	1.9±1.2(1) b	EN>SP

^a Legend: see Table I.

^b Scale: 1 = not at all; 2 = a little; 3 = to an average extent; 4 = quite a lot; 5 = a lot. Figures expressed as Mean±StdDev(Median)

^c In order to determine whether the means for this paired sample were systematically different, we applied the Student's *t*-test, adjusted using the Bonferroni correction. Values in the same row not sharing the same subscript (a or b) are significantly different at $p < 0.05$ in the two-sided test of equality for column means.

Table III. Motivations to publish in English and in Spanish. Differences by gender

Motivations ^a	English			Spanish		
	Male ^b (n=925)	Female ^b (n=529)	Contrast ^c	Male ^b (n=925)	Female ^b (n=529)	Contrast ^c
StiChll	3.3±1.5(3) a	3.5±1.4(4) b	F>M	2.7±1.5(3) a	2.9±5(3) b	F>M
ItlDevl	3.7±1.3(4) a	4.0±1.1(4) b	F>M	2.5±1.4(2) a	2.9±5(3) b	F>M
WrtImpr	2.5±1.5(2) a	2.8±1.6(3) b	F>M	2.1±1.4(1) a	2.3±5(1.5) a	---
WrtAbil	2.4±1.4(2) a	2.5±1.4(2) a	---	2.6±1.6(2) a	2.9±5(3) b	F>M
ArtQual	3.7±1.5(4) a	3.8±1.4(4) a	---	2.8±1.5(3) a	3.1±5(3) b	F>M
PubExpr	2.8±1.5(3) a	3.0±1.4(3) b	F>M	2.5±1.5(2) a	2.7±5(3) b	F>M
IntComm	4.7±0.7(5) a	4.7±0.7(5) a	---	2.4±1.5(2) a	2.7±5(3) b	F>M
LocComm	2.5±1.5(2) a	2.8±1.5(3) b	F>M	3.7±1.4(4) a	4.1±5(5) b	F>M
JouExst	1.9±1.3(1) a	2.1±1.4(2) b	F>M	3.1±1.6(3) a	3.4±5(4) b	F>M
RspInvt	3.0±1.4(3) a	3.3±1.4(3) b	F>M	3.2±1.4(3) a	3.6±5(4) b	F>M
Citations	4.0±1.2(4) a	4.2±1.1(5) b	F>M	2.0±1.2(2) a	2.5±5(2) b	F>M
ResRcgn	4.4±0.9(5) a	4.6±0.8(5) b	F>M	3.1±1.5(3) a	3.4±5(4) b	F>M
PrfProm	4.1±1.2(5) a	4.4±0.9(5) b	F>M	2.5±1.4(2) a	3.0±5(3) b	F>M
BonPaym	2.6±1.5(2) a	2.5±1.5(2) a	---	1.8±1.1(1) a	2.0±5(1) a	---

^a Legend: see Table I.

^b Scale: 1 = not at all; 2 = a little; 3 = to an average extent; 4 = quite a lot; 5 = a lot. Figures expressed as Mean±StdDev(Median)

^c In order to determine whether the means for this paired sample were systematically different, we applied the Student's *t*-test, adjusted using the Bonferroni correction. Within each subtable (English, Spanish), values in the same row not sharing the same subscript (a or b) are significantly different at $p < 0.05$ in the two-sided test of equality for column means.

Table IV. Motivations to publish in English and in Spanish. Differences by seniority

Motivations ^a	English				Spanish			
	Seniority (three percentiles)				Seniority (three percentiles)			
	Junior ^b (< 11 years) (n=453)	Medium ^b (11-19 years) (n=453)	Senior ^b (>19 years) (n=548)	Contrast ^c	Junior ^b (< 11 years) (n=453)	Medium ^b (11-19 years) (n=453)	Senior ^b (>19 years) (n=548)	Contrast ^c
StiChll	3.5±1.4(4) a	3.3±1.5(4) a,b	3.3±1.5(3) b	J>S	2.9±1.4(3) a	2.8±1.5(3) a	2.7±1.5(3) a	---
ItlDevl	4.0±1.2(4) a	3.8±1.2(4) a,b	3.7±1.3(4) b	J>S	2.7±1.4(3) a	2.7±1.5(3) a	2.6±1.4(2) a	---
WrtImpr	2.9±1.5(3) a	2.3±1.4(2) b	2.6±1.5(2) c	J>S>M	2.2±1.4(2) a	2.1±1.4(1) a	2.2±1.5(1) a	---
WrtAbil	2.6±1.4(3) a	2.3±1.4(2) b	2.5±1.5(2) a,b	J>M	2.8±1.5(3) a	2.6±1.6(2) a	2.7±1.6(2) a	---
ArtQual	3.7±1.5(4) a,b	3.6±1.5(4) a	3.9±1.4(4) b	S>M	3.0±1.4(3) a	2.8±1.5(3) a	3.0±1.5(3) a	---
PubExpr	3.0±1.4(3) a	2.7±1.5(3) a	2.8±1.5(3) a	---	2.6±1.4(3) a	2.4±1.5(2) a	2.5±1.5(2) a	---
IntComm	4.7±0.7(5) a	4.7±0.7(5) a	4.7±0.6(5) a	---	2.6±1.4(2) a	2.4±1.5(2) a	2.6±1.5(2) a	---
LocComm	2.6±1.5(2) a	2.6±1.5(2) a	2.5±1.5(2) a	---	3.9±1.3(4) a	3.9±1.4(4.5) a	3.8±1.4(4) a	---
JouExst	2.1±1.4(1) a	1.8±1.2(1) a	2.0±1.3(1) a	---	3.2±1.5(3) a	3.1±1.6(3) a	3.2±1.6(3) a	---
RspInvt	3.0±1.4(3) a	3.2±1.4(3) a	3.2±1.4(3) a	---	3.2±1.3(3) a	3.5±1.3(4) a	3.5±1.5(4) a	---
Citations	4.1±1.2(5) a	4.1±1.2(5) a	4.0±1.2(5) a	---	2.3±1.3(2) a	2.2±1.4(2) a	2.1±1.3(2) a	---
ResRcgn	4.5±0.8(5) a	4.5±0.9(5) a	4.5±0.9(5) a	---	3.2±1.3(3) a	3.2±1.4(3) a	3.1±1.5(3) a	---
PrfProm	4.4±0.9(5) a	4.2±1.1(5) b	4.0±1.2(4) b	J>(M,S)	3.0±1.4(3) a	2.7±1.5(3) a,b	2.4±1.4(2) b	J>S
BonPaym	2.4±1.5(2) a	2.6±1.5(2) a,b	2.7±1.5(2) b	S>J	2.0±1.2(1) a	2.0±1.3(1) a	1.8±1.1(1) a	---

^a Legend: see Table I.^b Scale: 1 = not at all; 2 = a little; 3 = to an average extent; 4 = quite a lot; 5 = a lot. Figures expressed as Mean±StdDev(Median)^c In order to determine whether the means for this paired sample were systematically different, we applied the Student's t-test, adjusted using the Bonferroni correction. Within each subtable (English, Spanish), values in the same row not sharing the same subscript (a or b) are significantly different at $p < 0.05$ in the two-sided test of equality for column means.**Table V.** Motivations to publish in English and in Spanish. Differences by publication experience

Motivations ^a	English				Spanish			
	Publication experience: articles published in English as corresponding author over the preceding ten years (three percentiles)				Publication experience: articles published in Spanish as corresponding author over the preceding ten years (three percentiles)			
	Low ^b (1-6) (n=432)	Medium ^b (7-18) (n=439)	High ^b (19-200) (n=413)	Contrast ^c	Low ^b (1-3) (n=341)	Medium ^b (4-10) (n=267)	High ^b (11-100) (n=270)	Contrast ^c
StiChll	3.4±1.4(4) a	3.3±1.5(3) a	3.4±1.5(4) a	---	2.3±1.4(2) a	3.0±1.4(3) b	3.2±1.5(3) b	(M,H)>L
ItlDevl	3.7±1.2(4) a	3.8±1.3(4) a	3.8±1.3(4) a	---	2.1±1.3(2) a	2.8±1.4(3) b	3.1±1.4(3) b	(M,H)>L
WrtImpr	2.8±1.5(3) a	2.5±1.5(2) b	2.5±1.5(2) b	L>(M,H)	1.7±1.2(1) a	2.2±1.5(1) b	2.6c±1.6(2) c	H>M>L
WrtAbil	2.5±1.4(2) a	2.4±1.4(2) a	2.4±1.5(2) a	---	2.2±1.4(1) a	2.8±1.6(3) b	3.2c±1.6(3) c	H>M>L
ArtQual	3.7±1.4(4) a	3.7±1.5(4) a	3.8±1.4(4) a	---	2.4±1.4(2) a	3.1±1.5(3) b	3.5c±1.4(4) c	H>M>L
PubExpr	2.9±1.4(3) a	2.8±1.5(3) a	2.8±1.6(3) a	---	2.0±1.3(1) a	2.7±1.5(3) b	3.0c±1.5(3) c	H>M>L
IntComm	4.5±0.9(5) a	4.8±0.7(5) b	4.9±0.4(5) b	(M,H)>L	1.9±1.2(1) a	2.6±1.5(2) b	3.2c±1.5(3) c	H>M>L
LocComm	2.4±1.4(2) a	2.6±1.5(2) a,b	2.7±1.6(2) b	H>L	3.5±1.5(4) a	4.1±1.2(5) b	4.1±1.3(5) b	(M,H)>L
JouExst	2.0±1.3(1) a	1.9±1.3(1) a	2.0±1.3(1) a	---	2.8±1.6(3) a	3.3±1.5(3) b	3.5±1.5(4) b	(M,H)>L
RspInvt	3.0±1.4(3) a	3.1±1.4(3) a	3.3±1.4(3) b	H>(M,L)	3.2±1.5(3) a	3.4±1.3(3) a,b	3.6±1.3(4) b	H>L
Citations	3.9±1.3(4) a	4.1±1.2(5) b	4.2±1.1(5) b	(M,H)>L	1.8±1.2(1) a	2.3±1.3(2) b	2.6±1.4(3) c	H>M>L
ResRcgn	4.4±0.9(5) a	4.5±0.9(5) a,b	4.6±0.8(5) b	H>L	2.6±1.4(2) a	3.3±1.3(3) b	3.7±1.3(4) c	H>M>L
PrfProm	4.3±1.1(5) a	4.2±1.1(5) a	4.1±1.2(5) a	---	2.2±1.3(2) a	2.8±1.4(3) b	3.1±1.4(3) b	H>M>L
BonPaym	2.6±1.5(2) a	2.5±1.5(2) a	2.6±1.5(3) a	---	1.6±1(1) a	2.0±1.3(2) b	2.1±1.2(2) b	(M,H)>L

^a Legend: see Table I.^b Scale: 1 = not at all; 2 = a little; 3 = to an average extent; 4 = quite a lot; 5 = a lot. Figures expressed as Mean±StdDev(Median)^c In order to determine whether the means for this paired sample were systematically different, we applied the Student's t-test, adjusted using the Bonferroni correction. Within each subtable (English, Spanish), values in the same row not sharing the same subscript (a or b) are significantly different at $p < 0.05$ in the two-sided test of equality for column means.

Figure 2. Graphical representation, through the Position Index, of motivations for publishing in English and in Spanish

Figure 2.a. Total English vs. Spanish

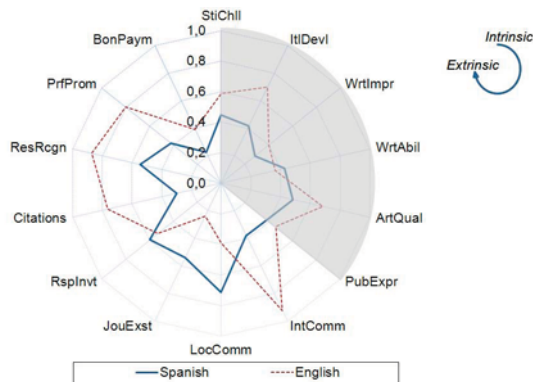


Figure 2.b. Motivations by gender. English

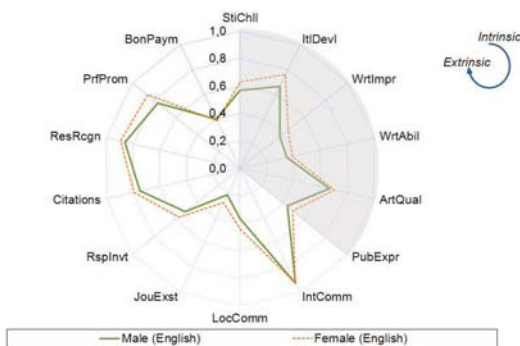


Figure 2.c. Motivations by gender. Spanish

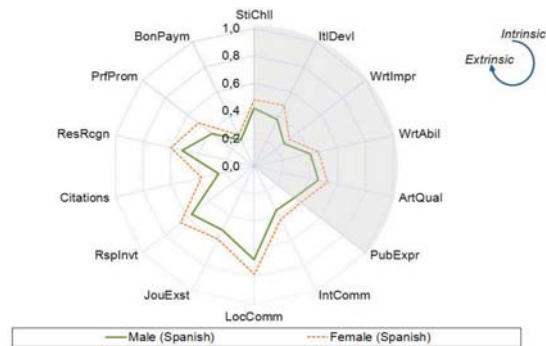


Figure 2.d. Motivations by seniority. English

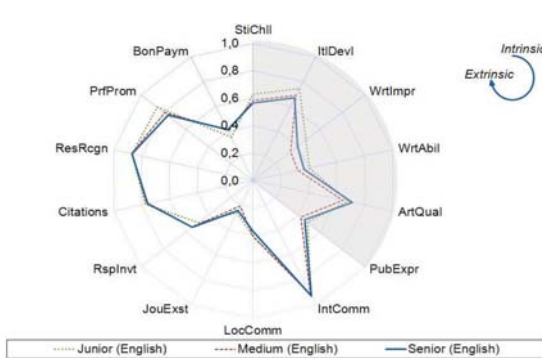


Figure 2.e. Motivations by seniority. Spanish

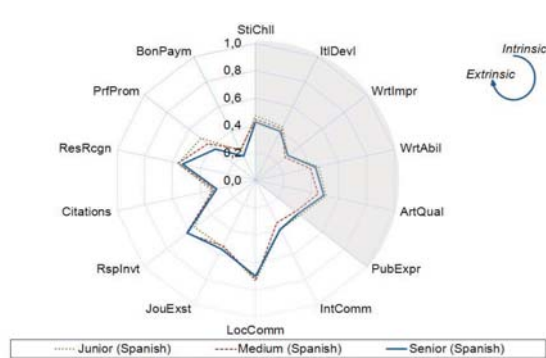


Figure 2.f. Motivations by publication experience. English

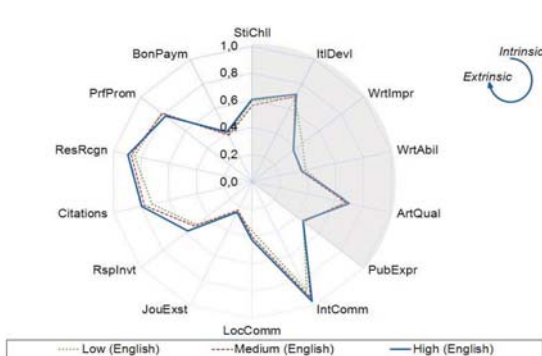
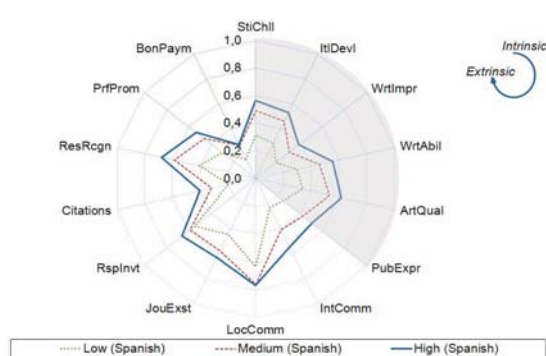


Figure 2.g. Motivations by publication experience. Spanish



The greater or less experience in the publication of articles in Spanish corresponds with a different intensity in the motivation to publish in this language in most of the items valued, so that in general the degree of experience and the intensity of motivation are linked, with both increasing in parallel (Table V), although the motivational profile is similarly shaped in both low-, medium and highly experienced authors (Figure 2.g). Less significant are the differences based on the experience of publishing in English (Table V, Figure 2.f). More experienced authors in English are more motivated to write in English in response to invitations, and are also more concerned with obtaining citations and recognition through English publication, though not with professional promotion, a motivation that is equally important for all scientists. More experienced authors are also more concerned with the scientific audience to whom they direct their research articles when choosing English as language of communication. On the other hand, when it comes to motivations related to proficiency, researchers with lower levels of experience are those who are more concerned particularly with the improvement of their writing skills in EAL.

5. DISCUSSION AND CONCLUSIONS

This study presents a motivation framework for the study of researchers' language choices for scientific publication purposes. This framework seeks to address the three main shortcomings identified in the classical paradigms. To this end, it presents a view of motivation as dynamic, multidimensional, and multilevel. The adoption of the SDT' controlled-to-autonomous continuum of motivational factors by Deci and Ryan (1985, 2000) allowed for an analysis that overcomes the problems inherent in the traditional dichotomy between intrinsic and extrinsic motivations, a dichotomy which we do not regard as appropriate in the context of our study. Applying this approach meant breaking with the conception of researchers' motivation as a fragmented phenomenon and allowed us to understand more complex links between motivations for the use of English for academic purposes while also revealing the contradictions and ambivalent preferences in the case of the use of Spanish.

The results presented here provide empirical evidence on how the behaviour of researchers when selecting English or Spanish for communicating their results through research articles is influenced, to varying degrees, by an ensemble of extrinsic and intrinsic motivations involving concerns for personal or professional benefit along with other, more altruistic considerations.

Spanish scientists' major motivations for publishing in EAL are in the range of the self-determined forms of extrinsic motivation, including the broad range of internalized motivation.

Motivations for publishing in English were mainly related to utilitarian aspects such as communicating the results of research to the international scientific community (integrated regulation) as well as to the maximization of non-economic benefits such as having research work recognized (identified regulation) and meeting the requirements for professional promotion (introjected regulation).

It has been argued that the dominance of English in international academic communication has its origins in the practice of many national S&T systems of providing greater rewards for English than those provided for national language publication, as is the case in the current Spanish system (Curry and Lillis, 2004; Ferguson, 2006; Moreno, 2010; Osuna et al., 2011), and in the growing internationalization of teaching and research in universities and research centres (Pérez-Llantada et al., 2001). As a consequence, the *sine qua non* of dissemination of research results to the international scientific community is publication in journals with international readerships, particularly in the so-called 'mainstream journals', which are primarily published in English. Researchers who do not have English as their first language are thus pressured to publish in English instead of their L1 (Rey-Rocha and Martín-Sempere, 1999; Curry and Lillis, 2004; Uzuner, 2008). Consistent with these arguments, the researchers in our sample share the desire to obtain more intellectual feedback, broader international diffusion, as well as more citations, recognition and possibilities of professional promotion through their use of English as a language of research publication instead of Spanish. Our results thus point to a high degree of internalization by Spanish scientists of the requirements of the regulatory process that governs research evaluation.

Opinions about the use of Spanish are somewhat fragmented and are linked mainly with ideological (defence of local issues, desire for the continued existence of scientific journals in Spanish) and social reasoning (to respond to a request or invitation from an institution, association or publisher), and thus mainly with integrated regulation of behaviour and consequently with a mixed affective-social outcome. Despite this dispersion, publication in Spanish is chiefly motivated by the most self-determined, integrated regulated, form of extrinsic motivation (communicating to the local scientific audience). From the salience of this item we can infer that there is a degree of concern among Spanish researchers that their results should reach the local community and not just those abroad even though they are in fact encouraged to privilege the international community by research evaluation practices.

As we have seen, motivation is a dynamic process of interactions between motivational factors. Thus the motivations themselves that drive researchers to behave as they do are important,

but the relationships between these motivations and the individual characteristics of researchers must also be taken into account. Identifying these relationships is cumbersome when it is a question of understanding the direction of some motivations. Overall, we found that the set of motivations of researchers to publish in EAL or in Spanish follow a similar pattern or profile regardless of gender, seniority, and publication experience. Thus, it can be concluded that the motivational profile remains virtually constant among Spanish researchers, with only some differences in the absolute values that different groups of individuals (on the basis of these individual characteristics) give to the different motivations. Overall, motivation to use EAL tends to be more homogeneous than motivation to publish in Spanish.

On the other hand, considering that motivation is not only a psychological process, the likely influence not only of individual characteristics, but of contextual factors, must be considered. In this sense, the existing literature has underlined the role of social networks in which individuals are embedded (Granovetter, 1973) and the influence of contextual factors on the different aspects of researchers' activity and knowledge dissemination practices (Swales and Leeder, 2012), provided that different disciplines have different traditions, different uses and modes, even different standards, affecting practices in the dissemination of knowledge (Petersen and Shaw, 2002). The next step in our research will be to analyse the extent to which researchers working in different disciplines are motivated differently to publish in EAL and in their L1.

In summary, in this paper we propose a framework for studying researchers' motivations for selecting a particular language for communicating their results through research articles. This is a preliminary, open, dynamic framework that is likely to evolve as it is put to use in more empirical research. Applying the framework to other scientific communities might identify valuable modifications and developments. Be that as it may, the openness of the framework provides the basis for its use in the study of academics' motivations for participating in other scientific activities such as public engagement, public communication of science and so on.

To conclude, some caveats on our study must be mentioned. Although we surveyed a broad range of researchers from all academic domains, we only surveyed Spanish informants from a public research institution and public universities. We did not, for example, survey researchers from the private research sector or the private higher education sector. Additional empirical work with more researchers and more varied types of researchers could further develop the framework. At the same time, the limitations inherent in the study should also be taken into account. The participants chose

whether or not to take part and do not therefore constitute a randomly selected sample. It may be that this has generated the typical bias in the estimators so prevalent in studies of this kind. Additionally, our research has concerned itself exclusively with one particular type of academic communication, namely the research article. This allowed for greater precision in terms of delimiting our field of study but it is also possible that by excluding other instances of academic publication (such as book chapters, reviews) we may have missed information on language choice in these other genres.

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Appendix. Formulation of the Position Index (PI)

The PI is formulated as follows (Silva, 1997; author's own translation into English):

Being P_i the proportion of individuals who choose the category i of the scale (in our case i can take integer values between 1 and 5), one can calculate the weighted score M in the following way:

$$M = \sum_{i=1}^k iP_i$$

And from that PI is defined as follows:

$$PI = (M-1)/(k-1)$$