Multilingualism and creativity: an integrative approach

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1. Introduction

The claim is often made, whether in the media or in political discourse, that there is a positive correlation between diversity and creativity. If such a link indeed exists, the ensuing social, political and economic implications may be significant, particularly in the case of linguistic and cultural diversity. Any such correlation between linguistic diversity on the one hand and creativity on the other would provide powerful arguments in favour of diversity-enhancing policies. The reason is that creativity is widely seen as the driver of innovation, which in turn fosters prosperity. States and their surrogates, including supra-national organisations such as the EU, would then be well advised to support policies that encourage multilateral worker mobility, the learning of foreign languages in schools, the protection and promotion of minority languages, and multilingualism in the internal operations of international organisations – starting, of course, with the EU itself.

However, the actual contents of the claim that diversity and creativity are positively correlated generally remains vague or somewhat slogan-like. This trend was possibly ushered in by the UNESCO report entitled 'Our creative diversity' (1996), and even in academic research it is not uncommon to come across contributions that appear to take for granted, with little more than anecdotal evidence, the claim that diversity breeds creativity. Although such a correlation arguably exists, it lacks strong empirical corroboration. Furthermore, the theoretical contributions explaining it (or part of it) are scattered over various research traditions.

It is therefore necessary to examine this relationship more closely, and to do so with a rigorous methodology and comprehensive theoretical approach. This is the mission of this chapter, in which we first consider various theoretical elements that can shed light on the

possible multilingualism-creativity connection, before presenting the methodology and results of our own research. In the final section, we discuss these results in relation to fundamental theoretical questions and in terms of some general implications of diversity for language policy and diversity management.

2. Positioning

The research reported on in this chapter is part of the MIME project and it fits into the MIME analytical framework outlined in Chapter 1 and discussed in more detail in Chapter 2 of this book. At the core of the framework lies the idea that linguistic diversity has both benefits and costs, whether material or symbolic (both are relevant in a public policy approach). Too little diversity means lost opportunities; opting for more diversity results in higher benefits and higher costs; and at some point the material and symbolic costs of diversity exceed its material and symbolic benefits, which means that the optimum, from a public policy standpoint, is what economists call an 'interior solution', i.e. neither *zero* nor *infinite* diversity.

One of the crucial dimensions of the problem, then, is the nature and magnitude of the benefits that may be associated with diversity, and this is where the diversity-creativity link comes into play. If diversity enhances creativity (which in turn stimulates innovation and, further down the line, prosperity), this is typically a component of the benefits generated by diversity, and those benefits require proper identification and measurement. These benefits, of course, are not limited, as claimed by some, to functional or material gain considerations. On the contrary, the research paradigm in which this economic tradition is anchored insists on the importance of the symbolic dimensions involved (see, for example, Grin, 2020; Gazzola, Grin & Vaillancourt, 2020). In this chapter, both symbolic and material benefits are involved; such creativity-related benefits may range from self-expression and individual well-being to innovation and the marketing of new products.

One important feature of the benefits that linguistic diversity may confer through its positive impact – if any – on creativity is that these benefits transcend the 'contingent versus absolute divide. Let us briefly recall this distinction (discussed in more detail in Grin, 2019): 'contingent multilingualism' defines a context of choice *in which the world is linguistically diverse*, and where the question is therefore whether individuals and groups (or even whole societies) should also nurture their own multilingualism. For example, is it useful for most European residents to speak one or two foreign languages in addition to their native language, whether for work, leisure, travel, or any other reason? (Answer: yes). 'Absolute multilingualism' refers to a hypothetical context of choice in which the world is, or may well be, monolingual. If the world is monolingual and all communication problems between speakers of different languages have thus vanished, the question then is whether human societies may nonetheless have reasons to encourage and cultivate a certain degree of multilingualism. The answer is yes if, among other possible reasons, the linguistic diversity found in multilingual people makes them happier, healthier, more accomplished or more prosperous. Creativity is one of the phenomena that possibly connects multilingualism with those positive outcomes, hence the need to analyse this phenomenon rigorously and, to the extent possible, estimate orders of magnitude for it. This is precisely what this chapter sets out to do.

Let us point out, however, that this paper focuses on the link between *individual* multilingualism and *individual* creativity. At the same time, this raises the broader policy problem of the link between multilingualism viewed in more general terms (that is, both individual and collective) and the creativity that may emerge, beyond the individual, in diverse work *teams*. Probing the existence of a link at the individual level, as is done here, is a necessary first step. However, common sense suggests it is reasonable to assume that demonstrating such a link at individual level foreshadows a similar demonstration at group level, once there is also an efficient solution for communication among the members of a linguistically diverse group.

3. Key concepts and definitions

We begin this theoretical section with extensive definitions of multilingualism and creativity. In addition, we also briefly consider the challenge of creativity assessment.

3.1 Definition of multilingualism

Let us characterise multilingualism as the fact that a person has high proficiency in several languages (in the specific and simpler case of bilingualism, in two languages). There is, however, some debate regarding what exactly 'proficiency' means. One definition of proficiency is 'the ability to function in a situation that is defined by specific cognitive and linguistic demands, to a level of performance indicated by either objective criteria or normative standards' (Bialystok, 2001: 18). Two implications quite naturally follow. The first is that a given ability to speak language *X* may be considered adequate or sufficient in one context (say, a leisure activity) but not in another (say, a professional activity). The second is that there is actually no sharp line separating monolingualism from bilingualism, and no sharp line separating bilingualism from multilingualism.

Hence, in this chapter, as in the MIME project in general, we consider that multilingualism is better described as a matter of *degree* than as a categorical variable. Empirically, we rely on the *Common European Framework of Reference for Languages*, which distinguishes between six levels (A1, A2, B1, B2, C1 and C2) and usually four skills (reading, writing, listening and speaking), sometimes five if 'interaction' is singled out. The key idea here is that we do not make a strong distinction between narrow definitions of multilingualism (i.e. very high proficiency in two or more languages) and a combination of more limited abilities, such as fluency in a first language and basic knowledge of a second.

Two additional remarks are in order. The first concerns the claim that languages, being social constructions, do not 'really' exist. Multilingualism should then be seen primarily in terms of fluid manifestations of code-mixing and code-switching, in which the boundaries between named languages ultimately disappear. Speakers' lived experience, however, seriously challenges this notion (Edwards, 2012; McSwan, 2017); and below in we consider named languages as empirically appropriate and analytically valid concepts.

The second remark concerns the fact that most of the literature relevant to this chapter (as we will see below) often comes from research on 'strong bilingualism', which compares people having strong abilities in two languages with supposedly monolingual people. Indeed, much of this literature deals with people from backgrounds that favour such strong bilingualism, such as immigrants who are fluent in both a native language and a host language (Mexican immigrants in the US, Turkish immigrants in Germany, for example).

Most exceptions to this general rule come from studies focusing on second language acquisition.

To sum up, our approach to multilingualism is based on four key ideas. First, we consider that different, distinct languages do exist and are identifiable as such. Second, we consider linguistic abilities as a continuum (rather a mere monolingual/bilingual dichotomy). Third, we also go beyond bilingualism and consider abilities in several languages. Fourth, we do not specifically focus on migrant populations. As we will see later, systematically focusing on such populations may be problematic because they are characterised by cultural traits that may be confounded with linguistic abilities.

3.2 Defining creativity

Before turning to the literature relevant to the multilingualism/creativity link, let us take a closer look at creativity. Quite broadly, creativity can be defined as 'the interplay between ability and process by which an individual or group produces an outcome or product that is both novel and useful as defined within some social context' (Plucker, Beghetto and Dow, 2004: 90). This compact definition calls for a bit of unpacking. First, it says that creativity can be achieved by *individuals* or *groups*. Second, there is a distinction between *abilities* and *process*. Indeed, creativity can be seen as emerging from a set of relatively stable abilities (e.g. knowledge, intelligence, flexibility) but also from a complex process (or, more precisely, from the interactions between sub-processes such as the generation and selection of ideas). Third, this definition emphasises the fact that a creative product must be both *novel* and *useful*. These two attributes are very important in creativity research; the former (sometimes referred to as originality or uniqueness) is the most intuitive and fundamental feature of creativity, but the latter (sometimes referred to as quality or appropriateness) is just as crucial. Original but inadequate ideas are useless; both criteria must be met.

Another important distinction is the one between creative potential and creative realisation or achievement (e.g., Runco, 2013; Sternberg, Grigorenko, & Singer, 2004). *Creative potential* usually refers to the presence, in the individual, of various traits (e.g. openness) and aptitudes (e.g. divergent thinking) known to be relevant to creativity. The notion of *creative realisation* or creative *achievement* refers to manifest, observable creativity, either in the form of a single product or as the overall creative output of a given person at a given point in time. The transformation from potential to realisation is neither direct nor guaranteed; rather, it is a long and uncertain process that can be influenced by numerous variables (mentoring, social support, persuasion abilities, life opportunities, societal attitudes toward creativity, etc.).

Finally, it is also important to distinguish between creative *domains*, for instance the minimal distinction between art and science. In principle, such distinctions can be almost infinitely refined (e.g. visual arts, painting and photography, portrait and landscape photography, etc.). As of today, there is no strong theory of domains; only a few practical classifications are used in creativity questionnaires (e.g. Carson *et al*., 2005). A potential pitfall here is to amalgamate some domains with creativity, for instance by considering that anything falling within the scope of art is creative, or that some vocational activities are intrinsically creative while others are not. This is true to a certain extent but, fundamentally, creativity can occur in any domain, and not only in stereotypical 'creative domains'.

3.3 The challenge of creativity assessment

All this should make clear that empirical testing or assessment of creativity is a complex matter. Indeed, creativity measurement has been approached using many methods. Very roughly, these can be organised into two main classes: *questionnaire-based* and *task-based* methods. Questionnaire-based methods are generally used to assess personality traits, preferences, attitudes, and thinking styles related to creativity (creative potential), as well as self-reported creative interests, activities, and achievements. These measures are very convenient and offer a quick way to assess several creativity-related variables. Nevertheless, all these questionnaire-based instruments may be seen as relatively indirect (and, to some extent, weak) measures of creativity because they are based on self-evaluation only – and people are liable to evaluate themselves incorrectly.

By contrast, measures based on creativity tasks allow direct evaluations of actual creative products. These tasks can be divided in two sub-categories: divergent thinking tasks and realistic/complex creativity tasks. Divergent thinking tasks are open-ended tasks in which participants are asked to produce a large number of different and original ideas in response to a given situation. Responses are generally scored for fluency (raw number of ideas), flexibility (variety of ideas), and originality (often scored as statistical rarity in a given sample). In realistic/complex creativity tasks, participants are asked to actually complete a creative product – write a short story, make a drawing or a collage, etc. Typically, these products are assessed by peers or experts, using a single dimension (i.e. 'creativity') or distinguishing between originality and quality (see Fürst & Grin, 2018 for further detail).

To sum up, the key idea in modern creativity measurement is to consider several constructs (e.g., creative potential and creative achievement; creative personality and creative processes; originality and quality of creative products) using different assessment methods (various questionnaires and different types of tasks). Accordingly, this type of approach is one of the guiding principles of our empirical work.

4. Multilingualism and creativity

In this section, we address the question of the connections between multilingualism and creativity. We start with a literature review before presenting our own research and findings.

4.1 Literature review

To assess the plausibility of a connection between multilingualism and creativity we first rely on three research traditions: bilingualism and cognition, bilingualism and creativity, and foreign experience and creativity. We use this relatively indirect approach because there are very few empirical studies that focus *specifically* on multilingualism and creativity (most contributions actually focus on bilingualism). To conclude this theoretical section, we synthesise this research and propose an in-depth assessment of the strengths and limitations of previous research.

Bilingualism and cognition. Although creativity is rarely equated with normal cognition (for an exception, see Bink and Marsh, 2000), the fact remains that several general cognitive processes are relevant to creativity, and some of these processes have been found to be positively related to bilingualism. The processes in question are those underlying 'executive functions', i.e. a vast and diverse group of cognitive abilities related to cognitive control (e.g. attentional control, cognitive inhibition, and flexibility).

As regards attentional control and inhibition, the key idea is that every time bilingual people person speak language *X*, they have to inhibit language *Y*. In other words, constant 'competition' between languages in the bilingual mind requires attentional control that is simply non-existent in their monolingual counterparts. Although the notion of a domain-wide inhibitory system remains a matter of debate, the idea here is that engagement in language inhibition has implications that go beyond strictly linguistic spheres (Bialystok, 2017). This enhanced attentional control and inhibition can be seen as favourable to creativity, because one of the key challenges in most creativity tasks is precisely to inhibit the most frequent – and therefore unoriginal – ideas (for example, see Finke *et al*., 1992).

As a corollary of the above, other studies suggest that bilingualism favours flexibility, switching and monitoring of attention (for an overview, see also Bialystok, 2017). These studies have shown that bilingual people (children, in particular) perform better than monolinguals in tasks that require switching abilities (e.g. sorting tasks in which the sorting rule changes). This ability is arguably related to inhibition – the old criterion (the sorting rule) must be inhibited in order to discover new ones. This enhanced flexibility of bilinguals is possibly mediated by language-switching abilities (Barbu *et al*., 2018). And just like inhibition, flexibility is important for creativity – actually, it almost defines creativity (see, for example, Guilford, 1950) – because it implies the ability to produce a variety of ideas and alternate between various perspectives and points of views.

To sum up, although some of these indirect routes are plausible (i.e. bilingualism influencing cognitive abilities that are in turn relevant to creativity), the connection between executive functions and creativity is in fact a very complicated one – some studies suggest that more inhibition is better, and others the opposite (e.g., Fürst & Lubart, 2013). A recent meta-analysis suggests that the link between bilingualism and executive functions is actually very weak or even nil when correcting for publication bias (Lehtonen *et al*., 2018). For all these reasons, we need to take a closer look and consider studies that directly test the link between bilingualism and creativity.

Bilingualism and creativity. In addition to the indirect evidence mentioned above, other studies focus directly on bilingualism and creativity. However, these studies are fewer. A small number of exceptions aside (Okoh, 1980 and Ghonsooly & Showqi, 2012), most of the research in this area was done by Anatoliy Kharkhurin; it is summarised in his 2012 book, *Multilingualism and Creativity*.

Empirically, Kharkhurin reports several studies in which bilinguals outperform monolinguals in a variety of creativity tasks. In one study (Kharkhurin, 2008) he shows that Russian-English bilinguals, as compared to monolinguals, display higher fluidity (number of ideas) and flexibility (variety of ideas) in a battery of divergent thinking tasks. No difference was found, however, in originality of ideas. In another similar study (Kharkhurin, 2009), complementary (or conflicting) results were reported. Indeed, in this study comparing Farsi-English bilinguals with English monolinguals, it was found that bilinguals outperformed monolinguals on originality scores but not on fluidity and flexibility.

Theoretically, Kharkhurin argues that bilingualism can expand concepts and broaden access to information, thereby increasing the number of mental elements and the probability of finding interesting conceptual combinations. He calls this process 'language-mediated concept activation' (Kharkhurin, 2009, 2012). The idea is that, through the confrontation of words' different meanings and focus on various subtleties in language, translation-related

questions can sharpen linguistic skills and consequently increase clarity of thinking. Indeed, language is a cognitive ability essential not only for communication, but also for conceptualising experience.

Multicultural experience and creativity. Finally, another research tradition relevant to this chapter includes studies focusing on the positive relationship between multicultural experience and creativity. By allowing access to different cultures, multilingualism can let people see the world through different lenses (e.g. Singleton & Aronin, 2007). Diversity of experience can surely be a valuable advantage for creativity, which often occurs when remote, very different ideas are combined (e.g. Mednick, 1962; Smith, Ward, & Finke, 1995). Being confronted with a variety of cultures and having the opportunity to compare different habits and values consistently leads to a variety of points of view. Flexibility in thinking and exposure to various cultures are notions close to the psychological dimension of openness, and it turns out that both diversity of information and openness are positively related to creativity (Feist, 1998; McCrae, 1987; Maddux & Galinsky, 2009; Root-Bernstein & Root-Bernstein, 2004).

Strengths and limitations of past research. Past research has shown that bilingualism seems to enhance creativity. However, many of these studies suffer from substantial limitations which make it difficult to conclude that overall, multilingualism is positively correlated to creativity.

- *Focus on bilingualism and migrant populations*. A first problem is that most studies do not in fact assess multilingualism but bilingualism. Moreover, these studies generally focus on highly proficient bilinguals, in most cases migrants. One can hardly draw conclusions on the impact of multilingualism in general from observations of highly proficient bilingual migrants.
- *Use of narrow manifestations of creativity*. Another limitation is that many studies assess creativity using a rather limited methodology. Many studies equate divergent thinking with creativity, which is problematic.
- *Weak control for multicultural experience.* Finally, most studies focusing on bilingualism and creativity do not control for multicultural experience. Given that multicultural experience is also positively correlated with creativity, this may compromise the strength of the conclusions because multicultural experience and multilingualism are unlikely to be independent; rather, it is more likely that multilingualism favours multicultural experience, and vice versa.

4.2 Method

Participants. The total sample of this study consists of four distinct subsamples. These are briefly described below; for a complete, detailed description of these subsamples and procedures, see Fürst and Grin (2018a). The first sample is composed of 262 students at the University of Geneva. Data gathering in this sample was based on a paper-and-pencil questionnaire (see below for a detailed description). The second sample (n=120) was collected through an online procedure. The questionnaire was the same, but was provided in a computerised version instead of paper and pencil. Sampling was explicitly designed to include both monolingual and bilingual participants. The third dataset was gathered during a pilot study run at a language fair in Liège (Belgium). This sample was small (n=59) but it allowed us to test and fine-tune a new data gathering procedure based on real-life creativity

tasks (as opposed to the questionnaires used until then – see below for a full description of these tasks). Finally, the fourth data set was gathered at the University of Geneva (n=179). Participants answered the same questionnaires as in the previous studies, and also completed the three creativity tasks tested in Liège.

Procedure. As indicated above, samples 1 and 2 were assessed with questionnaire-based instruments only. Participants in samples 3 and 4 also completed creativity tasks. In the case of the fourth sample, the entire data-gathering procedure took place in a controlled environment. Participants came to the study room in small groups of four people and completed the study on a tablet PC. They started with questionnaires, then completed the creativity tasks (their productions were automatically and instantly saved in a database when they were done), and finally they rated randomly selected output by previous participants, displayed on the computer interface.

Specifically, there were three such tasks: an 'everyday' imagination task, in which participants were asked to find as many creative uses for cardboard boxes as possible; a writing task, in which participants were asked to write a short story on a preassigned topic; and a drawing task, in which participants were asked to draw an original alien creature. This procedure has high ecological (real-life) validity, for it mimics peer evaluation, which is widespread in many creative domains, be it in the arts or in science.

Instruments. In the questionnaires, multilingualism was operationalised through the total number of languages known by a person (up to six), along with his proficiency in L2, L3, and L4 (based on the *Common European Framework of Reference for Languages*). Cultural diversity was operationalised through diversity of origins, time spent living and travelling abroad, and a proxy of 'multicultural identity' (a question in which participants could report up to five countries that are important to them). Creativity was first operationalised through interests, practices and achievements in various creative domains (e.g. visual arts, performing arts, music or scientific research). Two key creative processes known to be positively related to creativity were also assessed: idea generation (having pleasure and ease in generating many new and original ideas in a variety of situations) and idea selection (being critical, exacting and persistent in the selection and elaboration of one's ideas).

Creativity was also operationalised with three creativity tasks (cardboard boxes, story-writing, and 'alien' drawing). In these tasks, creativity ratings were obtained by mutual rating across participants. They rated each other's products through a double-blind randomised procedure. Each participant rated three outputs by previous participants according to several criteria. In the end, we obtained 24 ratings for each participant: three creativity ratings for two different ideas in the cardboard task; three ratings according to three criteria (creativity, originality, quality) in the story task; and three ratings according to three similar criteria in the drawing task. Additionally, participants in this study completed a remote association task (a measure of creativity based on association of ideas and relying on a standard, objective rating procedure). For a detailed description of this material and other, complementary statistical analyses, see Fürst and Grin (2018a, 2018b).

Analyses. The analytical procedure used in this chapter relies on Structural Equation Models (SEMs; for an introduction, see among others Byrne, 2013). In a nutshell, these models can be seen as a combination of factor analysis and multiple regression: latent variables (or factors) are estimated from observed variables (as in factor analysis), and correlations or regression coefficients between latent variables can be estimated. In the models discussed

below, we start by estimating four key latent variables: **MULTILINGUALISM**, **FOREIGN EXPERIENCE**, **CREATIVITY TASKS**, and **CREATIVITY QUESTIONNAIRE**. These latent variables were estimated using the observed variables described just above.

- The **MULTILINGUALISM** latent variable encompasses the number of languages known and proficiency in three languages (other than first language).
- The **FOREIGN EXPERIENCE** latent variable embodies four indicators: experience of *travelling abroad* (number and diversity of trips); experience of *living abroad* (number of countries and total duration of stays); *diversity of background* (a variable combining information about respondents' nationality and country of birth, as well as parents' country of birth); and *multicultural identity* (number of countries that respondents had reported as "important" to them).
- The **CREATIVITY QUESTIONNAIRE** latent variable is based on interests, activities and achievements in various creative domains, as well as questionnaires assessing idea generation and idea selection.
- Finally, the **CREATIVITY TASKS** latent variable combines the shared variance between three creativity tasks: the *boxes* and *story* tasks (in which participants rated each other) and the remote association task.[1]

4.3 Results

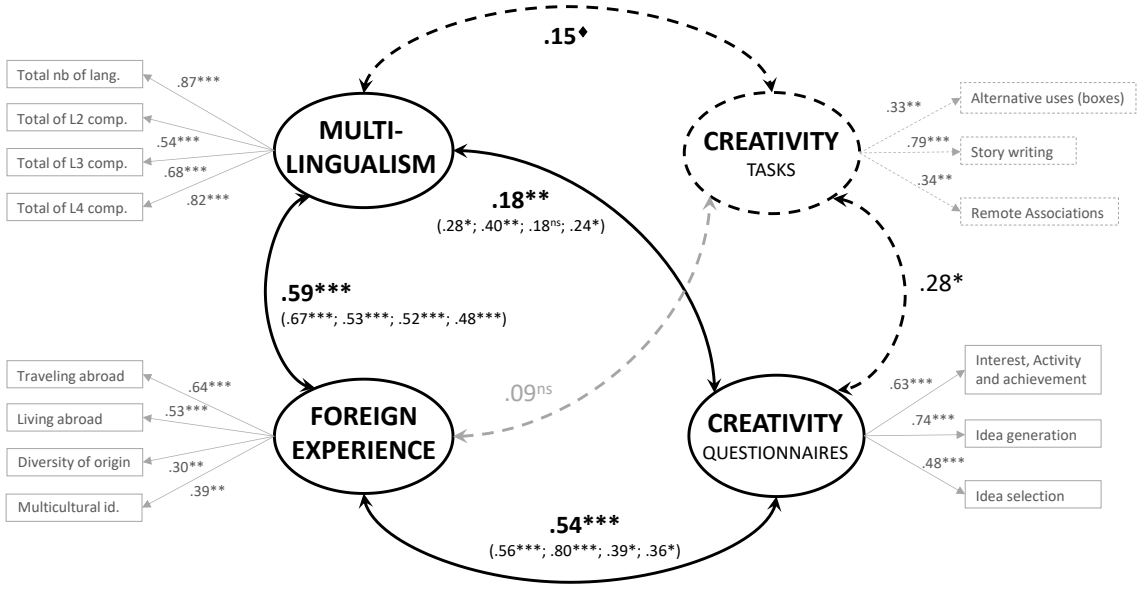
The first model (Figure 1) aimed at estimating correlations with the four key latent variables. In this model, we see that creativity, when measured by questionnaires, is correlated with both multilingualism and foreign experience. The overall correlation (across the four samples) is much stronger for foreign experience (r=.54) than for multilingualism (r=.18). However, both are significant. Additionally, it should be noted that there is substantial variability in these estimates across the four subsamples. The coefficients for each subsample are shown in brackets in Figure 1. For instance, the correlation between the creativity questionnaire and multilingualism is stronger in the second, general population sample (r=.40) than in the two student samples (.28 and .24). This correlation was not significant in the third, smaller sample.

As regards creativity measured by creativity tasks, things are a little different. First, this information is available only for one subsample (in the last of the four studies); this is symbolised by the use of dashed lines in Figure 1. Two obvious consequences of this are that the statistical power is much smaller (n=174 instead of n=596) and that group comparison is not possible. Despite this limitation, an interesting result emerges: the latent variable of creativity tasks correlates with multilingualism (r=.15, p=.10) but not with foreign experience (r=.09; p=.25). The discrepancy between these two correlations is not very large, and a significance level of .10 is barely acceptable, but these results nonetheless provide further evidence that multilingualism correlates positively with creativity.[2]

[1] The correlations between these three tasks are modest, but sufficient to create a latent variable (see Fig. 1). This latent variable arguably represents an indicator of 'general' creativity, because it focuses on what these three tasks have in common. However, it should be acknowledged that this variable has a very strong *verbal* component, since both the remote association test and the story-writing task are verbal in nature. The boxes task also relies on some verbal abilities, but to a lesser extent. The drawing task, which did not correlate well with these three tasks, was not included in this model.

[2] This particular result also has high value because in this case multilingualism and creativity were not measured with the same method – i.e. we used a *questionnaire* on multilingualism on one hand, and creativity *tasks* on the other. This is worth emphasising, because when two different variables are measured with the same method (typically with questionnaires) correlations between them are often inflated by a common-method effect.

***Figure 1**. A more complete model of creativity, multilingualism and foreign experience*

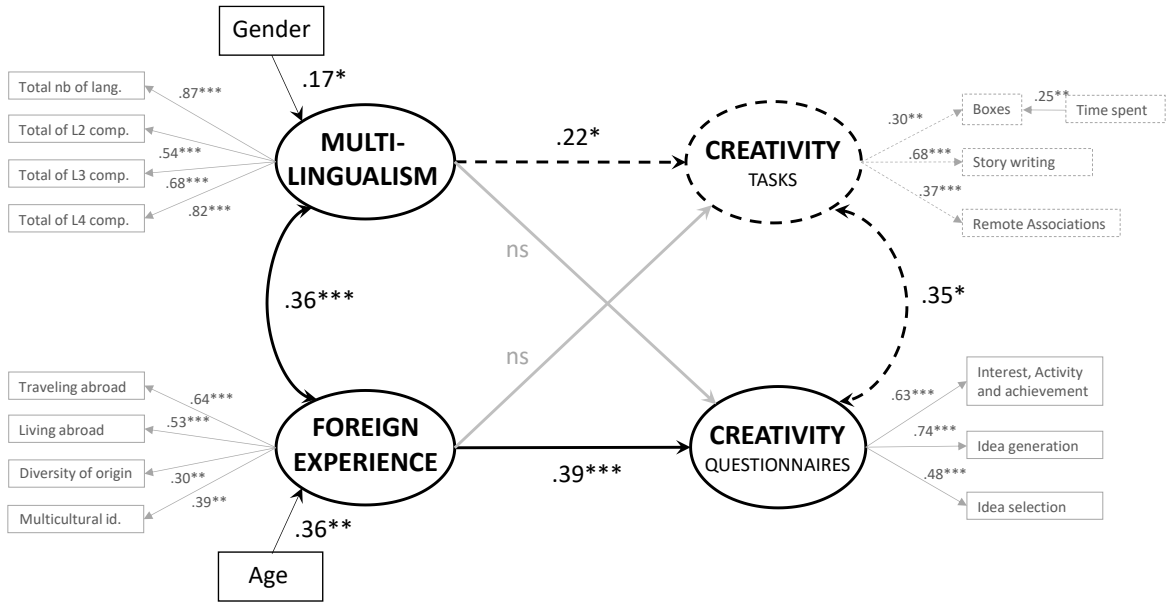


Details of model fit: χ^2(DF=100)=274.1; *p*>.05; χ^2**/DF**=2.74; **RMSEA**=0.068 (95%CI = [0.059-0.078]); **SRMR**=0.081; **CFI**=0.89; **TLI**=0.87.
Significance levels: ♦: *p* < .10; *: p <. 05; **: *p* < .01; ***: *p* < .001. Total sample size: solid lines: N=592; dashed lines: N=174.
All coefficients are standardized (interpretable as correlations). Values in parentheses are coefficients specific to each subsample.

At this point, two important questions remain: (1) what happens to these effects when we include control variables such as age or gender? (2) to what extent are the effects of multilingualism and foreign experience on creativity redundant? The model depicted in Figure 1 shows that both these variables are correlated with creativity questionnaires; however, the correlation between multilingualism and foreign experience is high (*r*=.59) and quite stable across subsamples (0.48 < *r* < 0.67); these two variables share a significant amount of information. In this context it is possible, for instance, that multilingualism has no effect on creativity when measured using questionnaires, once we control for the impact of foreign experience.

The model presented in Figure 2 provides answers to these questions. This model can be seen as a generalisation of a multiple regression model. Basically, the two creativity variables are the dependent variables, and they are both predicted by the two cultural diversity variables. In this model, additional control variables included are gender, which has a positive impact on multilingualism (women have higher scores), and age, which has a positive impact on foreign experience. The time spent on the 'boxes' creativity task was also included as a control variable. All these control variables have a significant effect and allow a 'cleaner' estimation of the effects investigated here. One consequence is that the correlation between multilingualism and foreign experience is now a little smaller (*r*=.36), probably because the initial correlation in the previous model was slightly inflated by age and gender differences; however, this correlation remains significant. Conversely, the correlation between creativity tasks and creativity questionnaires is now higher (*r*=.35), arguably because the latent variable reflecting creativity tasks is a better indicator of creativity once we take into account the time spent on the boxes task.

***Figure 2**. A more parsimonious model of creativity, multilingualism and foreign experience*



Details of model fit: χ^2(DF=148)=217.3; *p*>.05; χ^2**/DF**=1.48; **RMSEA**=0.057 (95%CI = [0.04-0.073]); **SRMR**=0.078; **CFI**=0.87; **TLI**=0.86. All coefficients are standardized. *: *p* <. 05; **: *p* < .01; ***: *p* < .001. Sample size: solid lines: N=592; dashed lines: N=174.

A more critical difference is the simplification of the network of relationships between the four main variables of interest. Instead of a model in which all correlations are estimated, only a few paths were estimated here, namely (i) the impact of multilingualism on creativity (when measured through respondents' scores on creativity tasks and (ii) the impact of foreign experience on creativity (when measured with answers to questionnaire items). What we found in this model is the following:

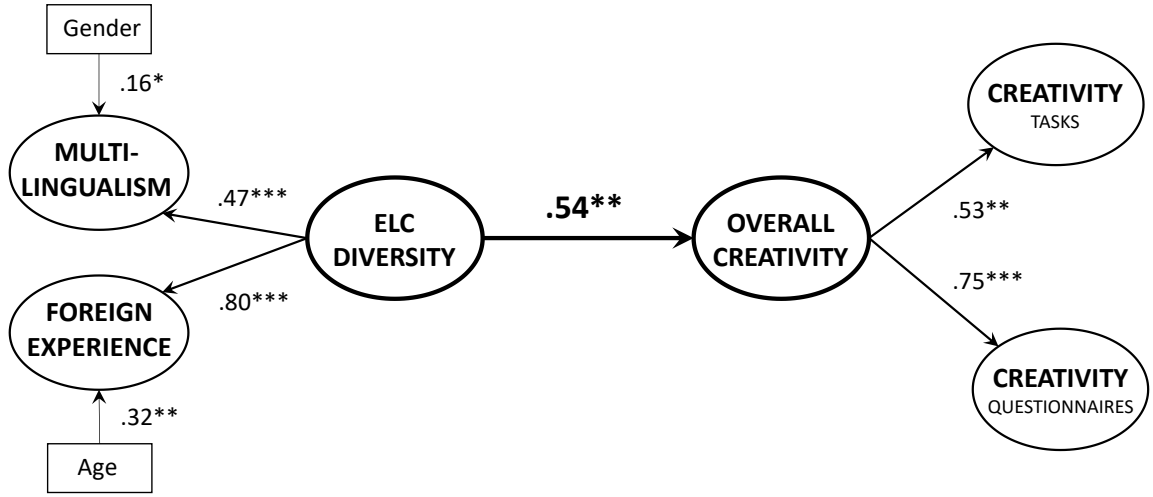
- there is a positive impact of multilingualism on creativity tasks (β=.22);
- there is a positive impact of foreign experience on creativity questionnaires (β=.39);
- there is no other significant effect: multilingualism has no impact on creativity questionnaires when the effect of foreign experience is taken into account;
- likewise, foreign experience has no impact on creativity tasks (estimating these two additional parameters did not improve the model and led to non-significant effects, as represented by grey arrows on Figure 2).

Finally, in order to offer a yet more synthetic view, one more model was estimated. This model is shown in Figure 3. In this model, two *second-order latent variables* were estimated: overall 'cultural diversity' and 'overall creativity'. The cultural diversity variable represents shared variance between multilingualism and foreign experience, and can been seen as the very core of cultural diversity. Similarly, the overall creativity variable combines shared variance between creativity questionnaires and creativity tasks, and can be seen as an empirical approximation of 'general creativity'. This model was estimated in the last subsample (N=174), because the shared variance between creativity questionnaires and creativity tasks was available in this subsample only. Sample size is relatively small; however, strong and interesting effects emerge.

First, it was possible to extract significance and meaningful covariance for the two second-order latent variables cultural diversity and overall creativity – a necessary condition for

testing the relationship between these two variables. Second, on the basis of this model, the relationship between a new latent variable that captures ethnic, linguistic and cultural (ELC) diversity and creativity was found to be strong (β =.54). However, the standard error of this effect was also relatively large (0.22), which means that the precision of this estimation is quite modest. If a similar study were replicated with a larger sample, this effect could be substantially lower – or higher, for that matter. Nonetheless, this effect was significant at the p <.01 level, and definitely suggests a fairly strong positive relation between these two variables. In the light of all the results described here, we can safely say that there is a positive relationship between the cultural diversity embodied in a person's profile and his creativity.

***Figure 3**. An even more parsimonious model of cultural diversity and creativity*



Details of model fit: χ^2(DF=149)=223.2; p>.05; **χ^2/DF**=1.51; **RMSEA**=0.059 (95%CI = [0.042-0.074]); **SRMR**=0.08; **CFI**=0.87; **TLI**=0.85. All coefficients are standardized. *: p <. 05; **: p < .01; ***: p < .001. Sample size: N=174. ELC: Ethnic, linguistic, and cultural.

At this point we could emphasise that generally speaking, using highly multivariate research designs like the one proposed here, is necessary to investigate such complex questions. Indeed, there is no such thing as a single good measure of creativity, multilingualism, or cultural diversity in general. Besides, when considering variables one by one, all we find is a collection of scattered small effects. However, when considering shared variance at a higher level of abstraction using combinations of several variables, the relationship between cultural diversity and creativity becomes more evident.

5. Discussion

Our results show that enhanced individual creativity can legitimately be included among the likely advantages of individual multilingualism. To our knowledge, this result, presented in more methodological detail elsewhere (see Fürst & Grin 2018a, 2018b, 2020), is the first to confirm the existence of a link under six important conditions that enable us to move beyond the results found in the existing literature. In particular, our approach to the relationship between multilingualism and creativity presents the following features:

i. It applies to the general public, rather than a specific subset of the population (usually relatively recent immigrants).

ii. It separates out the effects of linguistic skills and multicultural experience (rather than treating them as a single joint independent variable).
iii. In addition to multicultural experience, it uses a wide range of control variables that help to focus on the multilingualism/creativity link as such, eliminating some of the noise due to other determinants of creativity.
iv. Multilingualism is operationalised with an information-rich variable based on seven skill levels ('none', plus the six standard levels of the *Common European Framework of Reference for Languages*), and respondents' self-assessment in terms of that scale, but based on descriptors.[3]
v. Our study focuses on creativity as such (as distinct from abilities that are assumed to be correlated with creativity, such as 'divergent thinking').
vi. It proposes a sophisticated treatment of creativity as a dependent variable, because creativity is simultaneously approached through questionnaire-generated information about respondents' practices, and through respondents' performance on various creativity tasks.

All this makes the claim that contemporary societies should find it in their interest to support multilingualism among their members far more plausible. It is worth emphasising that the existence of a positive link even when controlling for multicultural experience has significant policy implications: it suggests that people who have few or no opportunities to encounter cultural differences (for example through travel, experience of living abroad or other forms of exposure) would benefit, in terms of creative abilities, from developing *linguistic* skills. This can be achieved through well-designed language education policies that the state can make available to all, including those who have no occasion or perhaps no particular inclination to travel and experience cultural differences.

Let us, however, remind the reader that such findings, even though they may be seen as genuine advances, should be considered as steps towards more conclusive results providing justification for public policies in support of foreign and second language education.

The first limitation is a classic one in quantitative research, and has to do with causality and its direction. A statistically significant association between two variables *X* and Y (even if reflected in a substantial effect size – in this respect the coefficients reported in the preceding section may be considered noteworthy, but not substantial) only establishes the existence of a link without *per se* proving causality in one direction or another. Bringing in a wide range of control variables, as in our multivariate analysis, makes a relationship between *X* and *Y* more plausible, but further tests are needed to confirm that the causation flows from multilingualism to creativity rather than the reverse. It can then not be ruled out that it is people who are more creative in the first place who opt to learn more languages, or push their skills in certain languages to a higher level.

Interpreting our results as proof of a causal effect from individual multilingualism to individual creativity also requires a theoretical explanation. Some explanations have been proposed in the literature (see Section 4 of this chapter), but more remains to be done, whether through the use of broader databases containing a wider range of variables, or by triangulating with other studies on closely related topics, such as the links between multilingual skills and personality traits such as 'openness' (Grin & Faniko, 2012).

[3] These descriptors had been duly pre-tested in previous research, including an earlier study on language skills with over 40,000 respondents; see Grin et al., 2015.

Finally, identifying and measuring a relationship at the individual level only partly answers the question of the actual importance of multilingualism for the creativity, innovative capacity and, ultimately, success of a society, since creativity and innovation often emerge at group level. To what extent can a relationship observed at the individual level be considered predictive of what happens in groups, such as working teams, large organisations or even nations as a whole? In other words, can we move from the notion that multilingual people are more creative to the notion that multilingual groups, organisations or countries are more creative and hence potentially more successful, all other things being equal?

At the group level, it may seem at first glance that *monolingualism* is favourable to creativity. Generally speaking, strong group cohesion leads to better group performance (e.g. Evans & Dion, 1991). By implication, group creativity probably relies (at least partially) on group *cohesion*, through factors such as fluency of communication and speed of information processing across members of the group. High-speed processing means that, in a given time frame, more ideas can be produced, suggested, discussed, evaluated, combined, selected and developed. This is true at the individual level (Rindermann & Neubauer, 2004) and can most likely be generalised to group level. If circulation of information is slow or poor in any way, the whole creative process may be compromised, because of misunderstandings or weariness related to communication issues. In this connection it may therefore seem preferable for people in a group to share a common and perfectly mastered language. Hence, from this perspective, universal monolingualism would seem to be the best option for group creativity.

However, diversity is likely to contribute to group creativity. Just as at the individual level, multilingualism allows groups to access different cultures and sources of information. In fact, it is monolingualism that often appears problematic, for it may lead to cultural hegemony and impoverishment. In a monolingual context, foreign potential sources of information have to be translated. But translation choices may be commercially driven, whereas creativity is not always related to commercial success. In such a context, some high-quality, inspiring works may therefore long remain unknown. This potential limitation may affect information diversity and encourage conformism, groupthink or excessively monolithic, culture-centred beliefs. None of this is good for creativity. It is therefore preferable to foster multilingualism as a way to achieve higher creativity, through the potential benefits of dissent and overall diversity within the group (Leung & Chiu, 2008; Nemeth & Nemeth-Brown, 2003).

In the end, there is probably an optimal trade-off between the advantages of a unique common language (for the sake of processing efficiency) and a multitude of other languages (for the sake of diversity of information). Wherever this optimal point is, multilingualism and its impact on creative processes and outcomes remain part of the assessment.

6. Conclusion

The results presented in the preceding pages clearly establish the existence of a positive relation between multilingualism and creativity. To our knowledge, these results are totally new, because the particular combination of variables and analytical instruments just discussed had never been tested: the models used here concern a broader population than the usual immigrant samples, rely on varied and sophisticated measurements of creativity, and explicitly include (and control for) multicultural experience as distinct from

multilingualism. Of course, further research is required, in particular along the lines sketched out in the preceding section, and on no account should the analysis presented in this chapter be deemed final, since various extensions may be considered in order to deepen our knowledge of the manifold connections between multilingualism and creativity. For example, a fuller range of creativity tasks would be welcome; language skills could be tested, rather than merely self-assessed; data permitting, the context of use of multilingual skills could be controlled more explicitly; and in general, a number of effects can only be estimated with a larger number of observations.

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