



Study on the Contribution of Multilingualism to Creativity

Final Report

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Multilingualism: realising our creative potential

1. Introduction to the Study

The *Study on the Contribution of Multilingualism to Creativity* examines what scientific reporting reveals, what people think, and how multilingualism contributes to creativity through examples from European life.

The first step was to track down primary research published in European countries and languages, and in international forums, to respond to five hypotheses. These hypotheses are:

- There is a link between multilingualism and creativity
- Multilingualism broadens access to information
- Multilingualism offers alternative ways of organising thoughts
- Multilingualism offers alternative ways of perceiving the surrounding world
- Learning a new language increases the potential for creative thought.

A forum of 30 country-specific experts searched for data published regionally or nationally across a wide range of EU languages. The data was then evaluated by an inter-disciplinary team of European experts.

This led to a compendium database and accompanying scientific commentary with information on landmark studies that strengthened our understanding of the linkage between knowledge of languages and creativity. From this, indicators were identified and grouped into clusters. These have some bearing on the relationship between multilingualism and creativity.

The second step was to use some of the main indicators to sound out public opinion via an online questionnaire and telephone interviews.

The online survey gathered opinion on how individuals think about the five hypotheses. The rationale for doing this was to determine which hypotheses were typically considered true to life, and which were not.

The telephone survey examined the hypotheses in the context of the business world, particularly as they apply to multilingual team dynamics.

The third step involved identifying case studies that demonstrate the practical applicability of multilingualism to a range of human activities.

By comparing what science reveals and what people think, it was possible to construct recommendations and a communications proposal for the European Commission and other stakeholders.

2. Key Definitions

Creativity is understood as:

‘imaginative activity fashioned so as to produce outcomes that are both original and of value’
(NACCCE 1999: 30)

Multilingualism is understood as:

‘... the ability of societies, institutions, groups and individuals to engage, on a regular basis, with more than one language in their day-to-day lives.’
(EC 2007: 6)

3. Insights from Science

3.1. Approaching Multilingualism and Creativity

Currently, there is considerable anecdotal evidence for arguing that the ability to use more than one language leads to creative outcomes for individuals and society. There is also speculation about a positive link between knowledge of languages and enhanced cognitive ability.

Anecdotal evidence can be very significant. It includes findings that may not yet have been subjected to rigorous scientific analysis. This should not reflect negatively on the anecdotal evidence itself, but take into account that sufficient scientific studies have not yet been fielded.

Linking multilingualism to some form of specific added value such as 'creativity' is complex. One reason is due to the multi-dimensionality of language and the brain. Individuals do not live in a vacuum. Their capacity to think and act is determined by many surrounding influences. Indeed, some would argue that creativity is not an innate quality which individuals have, but something which is largely generated through interaction with the environment, including other people. This interaction is particularly supported by the ability to communicate through more than one language.

There are many factors which influence how knowledge of more than one language can lead to specific outcomes. Individuals are unique, and even if half of the world's population is 'bilingual', we are barely scratching the surface in understanding the impact of knowing more than one language.

There has been much work done on creativity from different perspectives, particularly in the field of artistic expression. But relatively little has been achieved with respect to knowledge of languages and the inner workings of the mind. It is highly likely that a multilingual mind differs in some respects from a monolingual one, but in what way and with what outcomes is at present an open question. It is obviously not the case that creativity can only be achieved through multilingualism.

We are now in a period when scientific insight into the working of language in the brain is rapidly expanding. This is partly due to the fact that researchers can now look inside the brain using neuroimaging techniques such as functional magnetic resonance imaging (fMRI), positron emission tomography (PET), and functional near-infrared spectroscopy (fNIRS). These and other techniques enable us to see the physical structure and activities in the brain on a scale not possible earlier. Biomedical research on the neurosciences only emerged as a distinct discipline after the 1970s.

We are approaching a threshold stage where research conducted in rigorously controlled laboratory settings is at a crossroads with research outside the laboratory. There is an increasing body of evidence about multilingual individuals in various cultural environments that points to enhanced functioning of these individuals when compared to monolinguals. This points to a greater *potential* for creativity amongst those who know more than one language, when compared with monolinguals.

3.2. Approaching the Evidence-base

The available evidence supporting the notion that multilingualism is linked to creativity is equivocal, and subject to multiple interpretations. However, by grouping together findings from different research disciplines over the last 30 years, one sees the emergence of several "evidence clusters."

These clusters of findings are based on the following: that knowledge of more than one language leads to specific forms or conditions which could be linked to creativity. The contents of these clusters constitute indicators.

The indicators have to be handled with caution because creativity is a multi-dimensional phenomenon. Research reveals six major clusters: mental flexibility, problem solving capability, metalinguistic ability, learning capacity, interpersonal ability and, finally, the ageing process.

3.3. Enhanced mental flexibility: 'The Flexible Mind'

The *flexible mind* is about extending the capacity to think. We can consider this in terms of the human body. A person who exercises and is physically fit is more able to adapt to different situations, like the need to swiftly walk up a steep hill. In a similar way, a flexible mind is an adaptable mind that responds to the demands of different situations. Monolinguals obviously have flexible minds, but there appear to be changes in the types of flexibility found in the multilingual mind.

One of the long-standing analogies about bilinguals has centred on being able to 'see the world through different lenses'. Thus, as the multilingual engages with life, s/he has various types of binoculars which can be used as and when the need arises. The binoculars enable choice, and the choice is linked to the extent to which the mind is flexible in adapting to situations. As we interact with our environment, a more extensive range of interpretations can lead to increased choices.

Being able to look at the same thing – for example a problem or some other form of challenge – from different perspectives is an important competence in the Information Age. Access to information, and the need to navigate this, has become a defining competence of the times. If the multilingual mind has the potential to support 'looking at things from different perspectives', then it may be that the multilingual mind can be regarded as a mind well-equipped for modern times.

There has long been an anecdotal view that 'tension' is often required to achieve creativity. 'Creative tension' is a popular concept in organisational management and it relates to how people perceive the gap between what they know/where they are, and what they want to know/where they want to be. Creative tension is considered as a form of energy. It is often linked to iconic creative figures in history such as Michelangelo, Van Gogh and Mozart, amongst others.

Researchers are keenly interested in how two or more languages interact within the brain in respect of creative tension, and what it might mean for the individual in relation to thought.

In thinking about this, we should not think of tension as something which is negative. Creative tension has been compared to a bow and arrow. In itself the bow – i.e. the mind – is not able to project the arrow without enough energy or "tension" to reach the target. So if the target is some form of problem, the tension could be viewed as resulting from the interaction of the bow, string and the person. And it is this capacity for tension which links back to flexibility.

Divergent and convergent thinking are two frequently discussed thought processes in enquiries into the multilingual mind, creativity and problem-solving. Put simply, both are linked to how we generate ideas. There is much difference of opinion on the terms between researchers, and it is possible that creativity could result as much from convergent as from divergent thinking, or variants of each. One argument linking divergent thinking to multilingualism and creativity relates back to the idea of lenses. The ability to simultaneously activate and process multiple unrelated categories may be greater when more than one language is available for the process.

The modern age is one of widespread information and communication. Thinking processes and cognitive flexibility have been under the spotlight in various research fields for decades, but now there is great attention being given to 'digital literacy and competences'. Being able to respond to the opportunities and demands of information and communication technologies is an area of some interest. Cognitive flexibility has a role to

play here, and there are now open questions about how the experience of multilingualism helps develop flexibility, and access to this type of potential may emerge as an asset in competence-building for the Information Age.

3.4. Enhanced Problem Solving Capability: 'The Problem Solving Mind'

Language processing in a bilingual or multilingual mind will differ from the monolingual mind because there is more than one language to use at a given time. The existence of more than one language in the brain suggests that multilinguals have enhanced cognitive control when compared to monolinguals. This leads us to "*executive function*", which is a key concept in understanding cognitive control.

The multilingual mind relies on mechanisms that differ from the monolingual mind since the latter has only one fundamental linguistic frame of reference. The question then arises: is a multilingual 'executive function' a form of cognitive asset that enhances the potential for creativity? A range of reports argue that multilinguals, and specifically bilinguals, have executive function capacity superior to that of monolinguals.

The advantages of enhanced executive function relate to problem solving, including abstract thinking skills, creative hypothesis formulation, higher concept formation skills, and overall higher mental flexibility. The reasons for such advantage may be linked to the management of two or more active language systems, and the experience of that management over time.

Being able to interpret information and solve problems involves not only deciding what deserves one's attention, but also what does not. This is even more significant in situations where a large amount of information must be processed. Separating what is important information and what is not constitutes a problem-solving competence. Related research frequently refers to 'inhibitory control'. Inhibitory control involves the scale at which a person is able to ignore distracting and irrelevant stimuli, and could lead to a significant advantage for the multilingual mind in relation to creativity.

Some studies have looked at problem-solving, multilingualism and multimedia gaming. This links closely to the development of digital literacy, or to the types of competence required when using specific forms of information and communications technology. These studies reveal that bilinguals tend to be faster in solving problems which are cognitively demanding.

Research on processing demands indicates that the multilingual mind may be better at multitasking than the monolingual mind. This is partly attributed to attention and inhibitory control. Multitasking can be considered as the simultaneous handling of more than one task and is directly linked to executive control.

Research reveals that bilingual students outperform monolinguals when engaged in highly demanding problem solving tasks, but that this is not the case when each group handles relatively less demanding tasks. Sometimes, it is not that the bilinguals have a clear overall advantage, but that they may be quicker at handling the cognitive demands involved. This speed could be attributed to the prior experience of the multilingual mind in separating two or more language systems.

Some problem solving tasks include processes which could lead to creativity. Conceptual expansion is closely aligned to hypothesis formulation in problem solving. This is sometimes discussed as 'fluid intelligence', which can be considered as a higher order problem solving capacity.

Problem solving is a constant feature of life. The indicators in this respect suggest that multilingualism tends to provide a multi-competence (the added value resulting from more than one language) which itself becomes a skill for achieving creativity in the modern age. Put simply, knowing more than one language may help the brain sharpen its ability to focus.

3.5. Expanded Metalinguistic Ability: 'The Metalinguistic Mind'

Awareness of language as a tool for thinking and human communication is a valuable skill. Whether we are interpreting someone's behaviour, or otherwise critically thinking about what we read, hear or see, language awareness is important. It enables a person to be 'street-wise' in handling communication dynamics more effectively by being able to go 'beyond the words'.

Metalinguistic awareness is essentially about enriched linguistic processing, leading to skills in analysing how language is used, and using language to achieve desired goals. This leads to a deeper understanding of how language functions. When the metalinguistic mind is developed through the interaction of two or more languages it can enrich the use of each, with benefits for the individual. Access to different languages helps one to synthesise concepts and make distinctions between them, from which new ideas can emerge. This is where the metalinguistic mind is associated with achieving creative conceptual expansion, and the potential for creativity.

3.6. Enhanced Learning Capacity: 'The Learning Mind'

This evidence cluster revolves around memory and the impact of memory on learning. Research suggests that the multilingual mind may have superior memory function in relation to 'episodic memory' and 'semantic memory' when compared to monolinguals.

Episodic memory is used to describe the memory of events linked to episodes (times, places, feelings, and other phenomena which can be explicitly stated). Semantic memory describes more general knowledge which, though unrelated to specific experiences or events, is used to help interpret these.

The possibility of enhanced memory function affects the learning of other subjects in the education curriculum, and learning in general. The ability to retain, organise, store and retrieve information is a vital human skill, and indications that multilingualism provides an advantage have a bearing on the potential for creativity. This relates to the possible impact of cross-language interactivity, a process denied to the monolingual.

Humans learn by interacting with their environment. During this interactive process new knowledge is constructed and learned, and then integrated with previous knowledge.

The results are always more than the sum of the environmental percepts; they are new concepts which cannot be foreseen. So learning is not adding information to information already stored, but constructing new knowledge. In a way every learning process can be seen as a creative process. In psychology and philosophy this is called the emergence phenomenon.

Links have been reported between multilingualism and superior performance in hypothesis formation in terms of higher order thinking and syntactic complexity. Such work has been done on various subjects, including maths and science.

There may be specific neuro-circuitry and multisensory brain systems (changes in brain organisation and plasticity) which result from knowledge of more than one language. This raises the issue of whether knowing more than one language makes it easier to learn other languages, where language learning becomes a cumulative process.

Even limited exposure to second-language learning is now under the spotlight through research within the neurosciences. Changes in the brain's electrical activity may occur much earlier than previously thought. It has been argued for some years that any impact from knowing a second language would only be realised when a certain degree of competence is attained. But it is now increasingly viewed that change in the brain can take place with relatively little exposure to a second language. The consequences of this for both learning in general and creativity remain uncertain.

That there may be a collateral relationship between multilingualism and learning in general has been under discussion in research for decades. Executive control, memory, divergent thinking, inhibitory control and metalinguistic awareness are all factors involved here.

It is possible that the interplay between languages in the multilingual mind is a key factor. This interplay includes the role of emotions, which is increasingly considered an important aspect of learning. It is the interplay within the mind, and how it interacts with the surrounding environment, that highlights the potential for creativity. Interplay of languages can be found in educational settings where more than one medium of instruction is used, e.g. through bilingual education and Content and Language Integrated Learning (CLIL). Research on forms of bilingual education have reported surprisingly good results across the curriculum by multilingual learners.

3.7. Enhanced Interpersonal Ability: 'The Interpersonal Mind'

Parents who opt to have their children educated wholly or partly in a second language sometimes voice concern about whether this could have a negative impact on the child's first language.

However, research over many decades suggests that education through the medium of a second language actually enhances communication awareness in the first language. This could be linked to the types of language awareness which can be developed when a person has access to more than one language.

Multilingualism is reported as helping to nurture interpersonal communication awareness and skills. For example the ability of multilinguals to see that people have differing, or even false beliefs, is said to develop earlier in multilinguals than in monolinguals.

The impact of multilingualism on interpersonal communication is referred to as

- understanding and responding to the communicative needs of others
- contextual sensitivity
- interactional competence in communication
- enhanced skills in differentiating languages in contextually sensitive ways.

These suggest that multilingualism tends towards multi-skills in interpersonal interaction. If so, then this can have a bearing on the potential for creativity.

By definition, interpersonal communication involves communicating with one or more people.

There is much anecdotal opinion that cultural diversity leads to enhanced levels of creativity, but research on this question frequently deals with ethnicity or culture, and neglects to examine the role of language. There is little quality research available on the language dimension in relation to creativity and, for example, group performance and regional economic performance, but the interpersonal advantage is often reported.

3.8. Reduced Age-related Mental Diminishment: 'The Ageing Mind'

One potentially significant avenue of research of recent years concerns the relationship between multilingualism and age-related mental diminishment. The suggestion is that changes in the executive function and working memory resulting from knowledge of more than one language may slow the rate of decline of certain cognitive processes as a person ages.

We have included this in the scope of our enquiry into creativity because, if verified, it could have a profound impact on the period of active creativity of older and more experienced individuals.

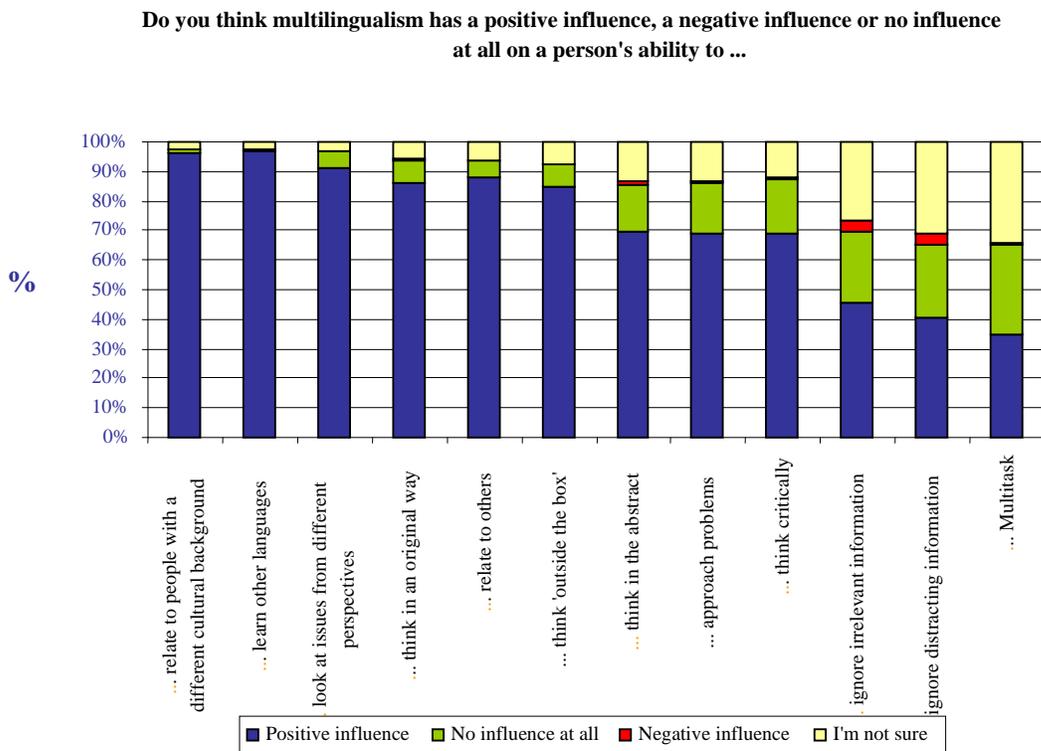
If the brain has more than one linguistic processing system, and is affected by organic or functional deterioration through normal ageing or even possibly forms of dementia, the rate of deterioration may be slowed down. Thus, rates of loss of cognitive function may be affected by the greater capacity afforded by different languages.

The implications of any offset of age-related diminishment of cognitive function and processes could be considerable. If incoming research further reveals that multilinguals have a 'cognitive reserve' which protects against these aspects of ageing, then the consequences for multilingualism and age may be significant for not only individuals and families, but for societies.

4. Insights into Public Opinion

4.1. The Online Survey

The online survey, which covered all EU Member States plus Norway and Turkey, polled individuals on their opinion about the five hypotheses. The purpose was to find out which hypotheses were viewed as 'commonsense', and which were less acceptable.



4.1.1. Enhanced Creative Thinking Skills

A very large percentage of respondents are indeed convinced that multilingualism has a positive influence on a person's ability to think in an original way: in fact, none of the respondents challenged this hypothesis. An important, though smaller, proportion of respondents also consider that multilingualism has a positive influence on the ability to 'think in the abstract'.

We find a different picture when it comes to the influence of multilingualism on bypassing or ignoring distracting and/or irrelevant information. Less than half the respondents think that multilingualism has a positive influence in these respects, and a substantial number think there is no link between multilingualism and the ability to ignore distracting and/or irrelevant information. There is also some uncertainty on this issue.

4.1.2. Flexible thinking

An overwhelming majority of respondents think that multilingualism has a positive influence on the ability to look at issues from different perspectives, and a very large proportion believe there is a positive link between multilingualism and a person's ability to think 'outside the box'. Large percentages in the sample think that multilingualism has a positive influence on a person's ability to solve problems.

Close to none of the respondents think multilingualism has a negative influence, and less than 20% of respondents think there is no link.

4.1.3. Interpersonal Communication Skills

There is little doubt among survey participants that multilingualism has a positive influence on both a person's ability to relate to others, including people of a different cultural background.

4.1.4. Ability to learn other languages

There is equally little question among survey participants that multilingualism has a positive influence on a person's ability to learn other languages.

4.1.5. Ability to multitask

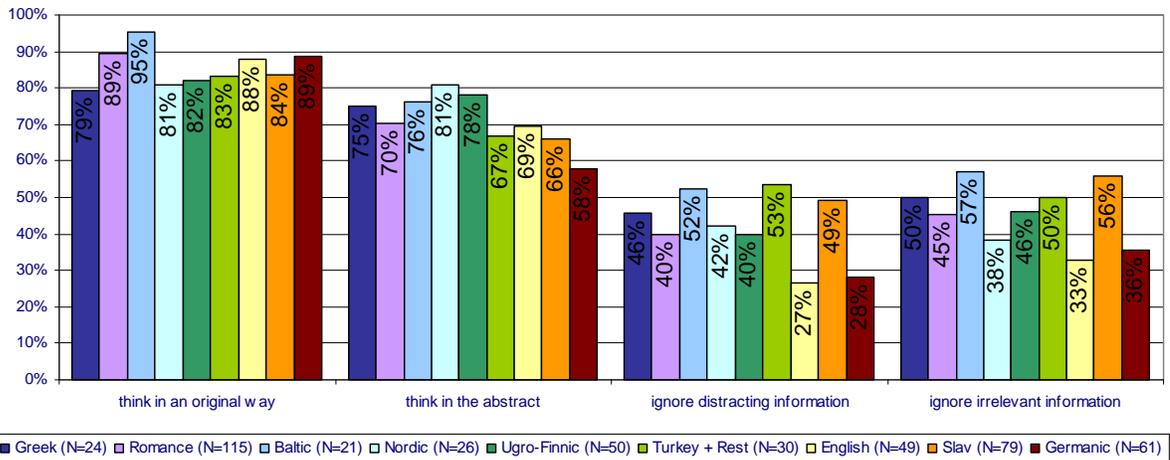
About one-third of all respondents think multilingualism has a positive influence on a person's ability to multitask. Close to one-third think there is no link between the two, while another third are uncertain whether or not there is a relation between the two.

4.1.6 Results per Language Group

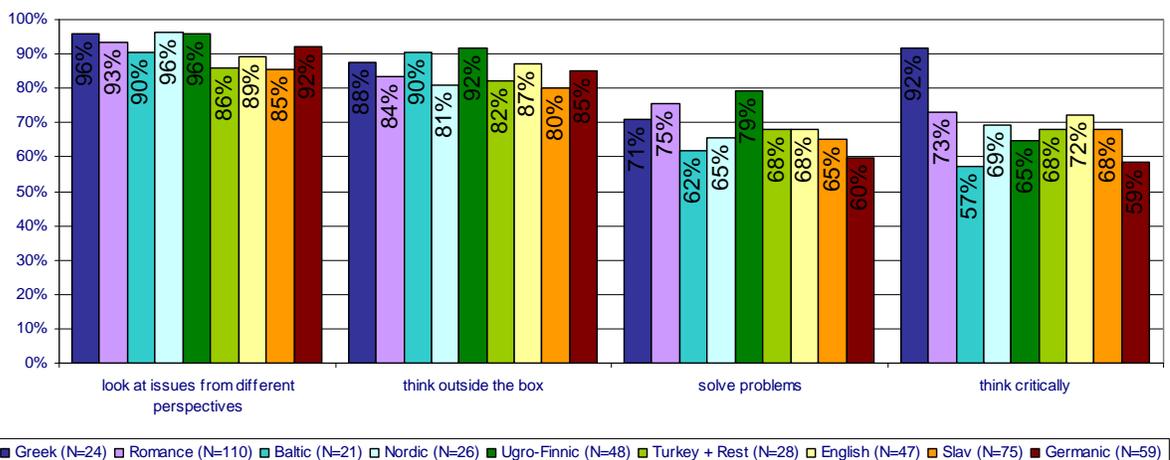
Because the number of respondents per country was too low to come to meaningful conclusions, we grouped countries by language family (an admittedly arbitrary approach, but the only practical one):

'Greek'	Greece Cyprus
'Romance'	Italy Spain Portugal France Romania Belgium (43%) Luxemburg
'Baltic'	Lithuania Latvia
'Nordic'	Norway Sweden Denmark
'Ugro-Finnic'	Finland Estonia Hungary
'English'	UK Ireland Malta
'Slav'	Poland Czech Republic Slovenia Croatia Bulgaria
'Germanic'	Germany Austria Netherlands Belgium (57%)
'Turkey + Rest'	Turkey Other countries not featured above

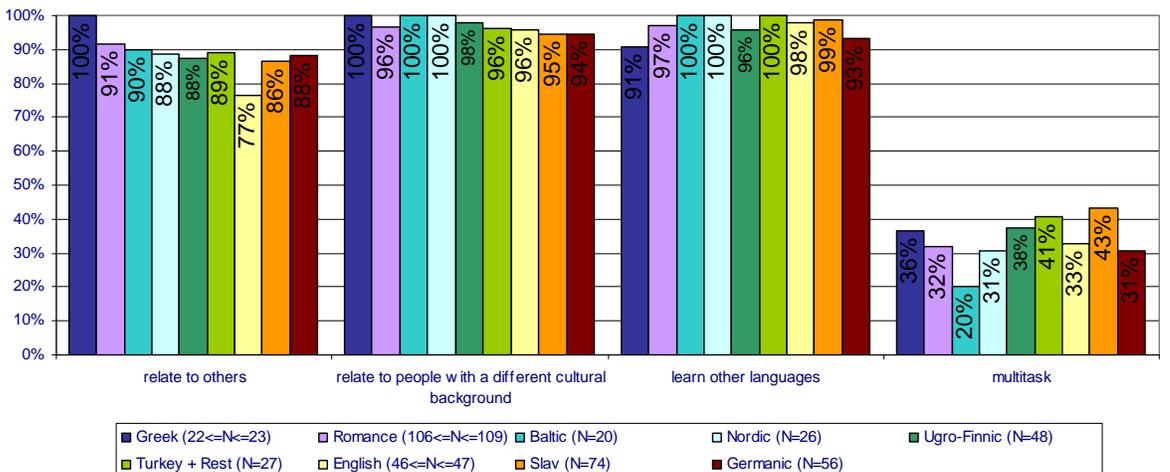
Proportion of positive answers to "Do you think that multilingualism has a positive influence, a negative influence or no influence at all on a person's ability to ..."



Proportion of positive answers to "Do you think that multilingualism has a positive influence, a negative influence or no influence at all on a person's ability to ..."



Proportion of positive answers to "Do you think that multilingualism has a positive influence, a negative influence or no influence at all on a person's ability to ..."



Although still not always high enough to come to statistically valid conclusions, some conclusions can be drawn.

'Greek'

- This group has the most respondents in the 'not sure' category with regard to the link between multilingualism and a person's ability to think in an original way.
- It is also slightly above the proportion of the total sample in regard to the positive influence of multilingualism on a person's ability to ignore distracting information.
- Respondents are significantly more often 'positive' with regard to the link between multilingualism and a person's ability to think critically. All think multilingualism has a positive influence on a person's interpersonal skills.
- A higher proportion than the total sample is 'not sure' about the link between multilingualism and a person's ability to learn other languages. This is also the case for the link between multilingualism and a person's ability to multitask.

'Romance'

- This group of respondents has among the highest proportion of 'positives' as regards the link between multilingualism and a person's ability to solve problems.
- The 'Romance' group also features the maximum proportion of 'positives' on the link between multilingualism and the ability to ignore irrelevant information.

'Baltic'

- All but one respondent thinks multilingualism has a positive influence on thinking in an original way. We also find a relatively higher percentage than the total sample with regard to the link between multilingualism and a person's ability to think in the abstract.
- They are more often convinced of the positive influence of multilingualism on ignoring distracting and/or irrelevant information. Yet, regarding the latter, the largest proportion of 'negatives' and respondents who are 'not sure' are also in this group.
- In the 'Baltic' group we find the second highest proportion of respondents that think multilingualism has a positive influence on a person's ability to think outside the box. On the other hand, the group also the second lowest proportion of respondents that think multilingualism has a positive influence on a person's ability to solve problems.
- Less respondents think multilingualism has a positive influence on a person's ability to think critically, while there is an elevated percentage of respondents that think there is no link between the two or who are unsure.
- This group features the highest percentage of respondents who say they are 'not sure' about the link between multilingualism and a person's ability to multitask.

'Nordic'

- This group has the highest proportion of respondents that think there is no link between multilingualism and a person's ability to think in an original way.
- On the link between multilingualism and a person's ability to ignore irrelevant information, this group is one of the least positive.
- The highest proportion of respondents that think multilingualism has no influence on a person's ability to solve problems are also in this group (27%).

- Finally, the group has one of the highest proportions of participants who say they are 'not sure' about the influence of multilingualism on a person's ability to relate to others.

'Ugro-Finnic'

- This group has one of the highest proportions of respondents that think there is no link at all between multilingualism and a person's ability to think in an original way.
- On the other hand, they have one of the highest proportions of respondents who think multilingualism has a positive influence on the ability to think in the abstract.
- This group has the highest proportion of respondents who believe multilingualism has a positive influence on a person's ability to think 'outside the box' and on a person's ability to solve problems.
- However, there is an elevated proportion of respondents that are 'not sure' about the link between multilingualism and a person's ability to think critically.

'Turkey + Rest'

- This group has one of the largest proportions of respondents that say they think there is no link at all between multilingualism and a person's ability to think in an original way.
- Yet it is one of the most positive of all when looking at the link between multilingualism and a person's ability to ignore distracting information.
- The group also has an elevated proportion of respondents who say they are 'not sure' about the influence of multilingualism on a person's ability to think critically.
- This is also the case for the influence of multilingualism on a person's ability to relate to others.
- In this group we find the second highest proportion of respondents who think that multilingualism has a positive influence on a person's ability to multitask.

'English'

- The respondents in the 'English' group are least positive, when compared with the total sample, about the influence of multilingualism on a person's ability to ignore distracting and/or irrelevant information. The group has one of the highest proportions of respondents who think there is no link at all.
- We also find here one of the highest proportions of people who think multilingualism has no influence on a person's ability to relate to others. The group also features the highest proportion of participants who say they are 'not sure'.

'Slav'

- The only two respondents who find that multilingualism has a negative influence on thinking in an original way are in this group
- The proportion of respondents who think multilingualism has a positive influence on a person's ability to ignore distracting information is higher here than the total sample.
- Although still very high, the proportion of 'positive' responses overall is lowest here. The group also has the highest proportion of people who think there is no link between multilingualism and a person's ability to look at issues from different perspectives.
- This group also has the lowest percentage of positive responses on the influence of multilingualism on a person's ability to think 'outside the box'.

- More often than most others, this group thinks that multilingualism has no link with the ability to think critically, and no influence on a person's ability to relate to others.
- The proportion of respondents that think multilingualism has a positive influence on a person's ability to multitask is highest in this group.

'Germanic'

- A large proportion of respondents think there is no link at all between multilingualism and a person's ability to think in an original way.
- The percentage of respondents who feel multilingualism has a positive influence on the ability to think in the abstract is considerably lower than the total sample.
- Respondents are less positive about the link between multilingualism and a person's ability to ignore distracting and/or irrelevant information: a large proportion think there is no link between the two.
- This group features the highest proportion of respondents who think there is no link between multilingualism and a person's ability to look at issues from different perspectives.
- Relatively fewer respondents think there is a positive influence on a person's ability to solve problems: in fact a large percentage of respondents think that multilingualism has no influence on this.
- Respondents think, less often than most other groups, that multilingualism has a positive influence on a person's ability to think critically. In fact, they think more often than most others that there is no link at all.
- The largest proportion of people who think that multilingualism has no influence on a person's ability to relate to others is in this group.

Other observations with regard to language groups.

	Q1 a	Q1 b	Q1 c	Q1 d	Q2 a	Q2 b	Q2 c	Q2 d	Q3 a	Q3 b	Q4	Q5
Greek	-7%	6%	5%	5%	5%	3%	2%	23%	12%	3%	-6%	2%
Romance	3%	1%	-1%	0%	2%	-1%	6%	4%	3%	0%	0%	-3%
Baltic	9%	7%	12%	12%	-1%	6%	-7%	-12%	2%	3%	3%	-15%
Nordic	-5%	11%	2%	-7%	5%	-4%	-4%	0%	0%	3%	3%	-4%
Ugro-Finnic	-4%	9%	0%	1%	5%	7%	10%	-4%	-1%	1%	-1%	3%
Turkey + Rest	-3%	-3%	13%	5%	-6%	-3%	-1%	-1%	1%	0%	3%	6%
English	2%	0%	-14%	-13%	-2%	3%	-1%	3%	-12%	-1%	1%	-2%
Slav	-3%	-4%	9%	10%	-6%	-5%	-4%	-1%	-2%	-2%	2%	9%
Germanic	3%	-12%	-12%	-10%	1%	0%	-10%	-10%	0%	-2%	-4%	-4%
Percentage of positive answers in the survey sample	86%	69%	40%	45%	91%	85%	69%	69%	88%	97%	97%	35%

The greatest difference between a language group's score and the overall score, i.e. +23%, is to be found in the 'Greek' group's answer to question 2d ("... ability to think critically"). The 'Greek' group also had more 'positives' to the question 3a ("... ability to relate to others").

Other groups that have considerably higher proportions than the overall sample are the 'Slav' group on question 1d ("... ability to ignore irrelevant information"), the 'Turkey + Rest' group on question 1c ("... ability to ignore distracting information"), the 'Nordic' group on question 1b ("... ability to think outside the box") and the 'Baltic' group on question 1c [see above] and 1d [see above].

Groups that had a considerably smaller proportion of 'positives' than the total survey sample are the 'Germanic' group (on questions 1b [see above], 1c [see above] and 2d ("... ability to think critically"), the 'English' group's answer to question 1c [see above], 1d [see above] and question 3a ("... ability to relate to others") and the 'Baltic' group's answer to question 2d.

4.1. 7. Results per Age Category

Age Category 15 – 24

This category is least positive and features the highest percentage of 'negatives' with regard to question 1c ("... ability to ignore distracting information") and question 1d ("... ignore irrelevant information"). It also has the lowest proportion of 'positives' on question 2a ("think in an original way). On this question the group features the highest percentage of respondents thinking there is no link between the two.

There is also an elevated percentage of respondents that think there is no link between multilingualism and a person's ability to solve problems.

With regard to the influence of multilingualism on a person's ability to think critically, this group has the lowest proportion of 'positives' and a high proportion of respondents that think there is no link.

Respondents in this category are also least inclined to think that multilingualism has a positive influence on a person's ability to relate to others. This category also has the highest proportion of respondents that think there is no link between the two. On the other hand, they think more often than people in other age groups that multilingualism has a positive influence on a person's ability to multitask.

Age Category 25-39

This age category has the lowest percentage of respondents considering that multilingualism has a positive influence on a person's ability to think in an original way. Most of these 'non-positives' either think that it has no influence or are unsure about this aspect of creativity. We also find the lowest percentage of 'positives' for "thinking in the abstract".

Furthermore, this group has the lowest proportion of 'positive' respondents regarding the link between multilingualism and a person's ability to solve problems.

They are also least inclined to give a 'positive' answer on the link between multilingualism and a person's ability to multitask. This is the category with the largest proportion of respondents that think there is no connection between the two.

Age Category 40-54

No significant issues for this age category.

Age Category 55-69

This age category has the highest percentage of 'positives' on the link between multilingualism and a person's ability to think in the abstract.

About half of these respondents think multilingualism has a positive influence on a person's ability to ignore distracting and/or irrelevant information.

This age group also has the highest proportion of 'positives' on the influence of multilingualism on a person's ability to look at issues from different perspectives and to think critically.

However the highest percentage of people that are 'not sure' of its influence on a person's ability to relate to others, as well as on the ability to multitask, is in this age group.

Age category >70

This category is too few in number to permit conclusions.

4.1.8. Results according to Gender

Female respondents tend to answer 'positive' more often than male respondents. More male respondents than female respondents think multilingualism has no influence on 'thinking in an original way'.

Although female respondents tend to think more often than male respondents that multilingualism has a positive influence on the ability to think in the abstract, the difference is small.

For the other questions we found no significant gender differences.

4.1.9. Results according to Occupation (respondents could tick more than one option)

Government

Half of the respondents who indicated they are working for Government think multilingualism has a positive influence on the ability to ignore distracting information. This is considerably higher than the total sample.

All respondents in this category think multilingualism has a positive influence on the ability to look at issues from different perspectives. This category also features one of the highest percentages of 'positives' on the link with an ability to think 'outside the box', to solve problems, to think critically, and to relate to others.

Participants in the NGO and Government sectors are also often more inclined to think that multilingualism has a positive influence on a person's ability to multitask

Academic

This group has one of the lowest proportions of 'positives' regarding the links with an ability to think 'outside the box' and to solve problems. In the latter case, a larger percentage than the total sample think there is no link between the two: they are also unsure of the link with an ability to multitask.

Business/Industry

The lowest score for the question on the link with an ability to think in the abstract is found in this category. People working in Business/Industry are also more inclined to think there is no link with an ability to ignore distracting or irrelevant information.

The group also features a lower proportion of 'positives' and an elevated percentage who think there is no link with an ability to look at issues from different perspectives, to think 'outside the box', and to solve problems. Business/Industry is also least inclined to think multilingualism has a positive influence on an ability to multitask.

Media

This group features the largest percentage of respondents who are 'not sure' about the link with an ability to think in an original way, yet it has the highest percentages of respondents who believe multilingualism has a positive influence on the ability to think in

the abstract. On the other hand, the category has one of the lowest proportions of 'positives' for "ignoring irrelevant information".

Respondents tend to think more than other categories that multilingualism has a positive influence on thinking 'outside the box', but less than other categories on an ability to solve problems. In effect, the Media group has one of the largest proportions of respondents who think there is no link with an ability to solve problems and to think critically.

Cultural Sector (apart from Media)

Respondents working in the cultural sector, in education and/or in an NGO respond most positively to the link between multilingualism and an ability to think in an original way.

This category has the highest percentage of 'positives' for the links with an ability to think 'outside the box' and to solve problems.

For the link between multilingualism and an ability to relate to others, the proportion of 'positive' answers here is the lowest of all. This category is also one of the two where the percentage of 'not sure' answers is highest.

Educational

This category has the highest percentage of respondents who believe multilingualism has a positive influence on the ability to think in the abstract, and also has more 'positives' regarding the link with an ability to ignore irrelevant information. We also find here the largest proportion of respondents 'not sure' about the link with an ability to multitask.

Healthcare

Only one respondent indicated that (s)he was working in the healthcare sector.

NGOs

Respondents working in the cultural sector, education and NGOs believe most positively in the link with an ability to think in an original way. The highest proportion of people who think multilingualism has a negative influence on the ability to ignore distracting information is also in this category.

Like respondents in the educational sector, people working in NGOs tend to be more 'positive' about the link with an ability to ignore irrelevant information. However the NGO sector also has the largest proportion of 'not sure' answers to this question.

The NGO category has the largest proportions of positive answers on the link with an ability to solve problems and also believes, more than all other categories, that there is no link with an ability to relate to others.

Finally people working in NGOs, like respondents in the Government sector, tend to think more often that multilingualism has a positive influence on a person's ability to multitask.

Students

The Student category has the highest percentage of respondents believing there is no link between multilingualism and an ability to think in an original way. It also features the highest percentage of respondents who think there is no link with an ability to ignore distracting information.

This category has the second lowest proportion of 'positives' and, more than respondents in other categories, is inclined to see no link with an ability to ignore irrelevant information. Students also have lower proportions of 'positives' on the link with an ability to look at issues from different perspectives or to think 'outside the box'.

Only 50% think there is a positive influence on an ability to think critically. This category also has the highest proportion of respondents who think there is no link with critical thinking or with an ability to relate to others. More often than respondents in other categories, they think there is no link between multilingualism and multitasking.

4.1.10. Results according to Language Skills

The percentage of 'positives' often rises with the number of languages known.

Conclusion: knowing more languages tends to encourage a favourable response to the influence of multilingualism on several aspects/indicators of creativity.

4.2. The Telephone Survey

The initial intention was to interview European multinational companies selected from the ranking of the 'Top 100 Most Innovative Companies' drawn up by the Boston Consulting Group and published in *Business Week* magazine (2006).

The telephone survey, however, coincided with the full impact of the 2008-2009 economic downturn. In crisis mode, many corporate executives declined to participate in the survey. Accordingly, the field research team drew up a complementary list of executives with human resources, management and creative consultancies operating multinationally.

By definition – all companies covered by the survey being multinational in their activities – responses were valid at the pan-European/international level.

While recording individual opinions, the survey provided the opportunity to obtain quality input from respondents with extensive experience in the field of multinational operations and team dynamics.

The questions were related to the indicators identified by the Core Scientific Research Team (CSRT), covering the five hypotheses.

It can be concluded from these interviews that, while there is dissent on the validity of two of the indicators, the responses support the five underlying hypotheses and, thereby, endorse the scientific evidence demonstrating that multilingualism contributes to creativity.

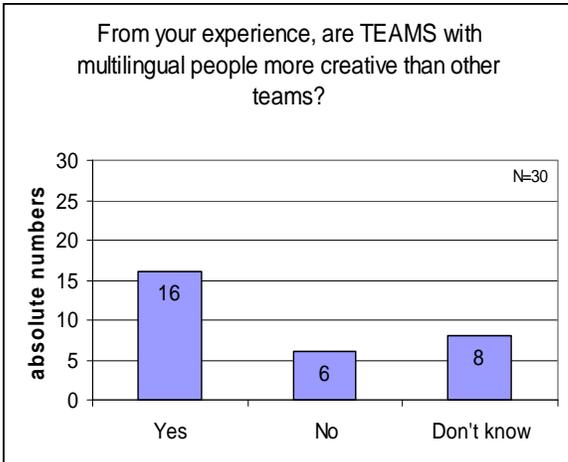
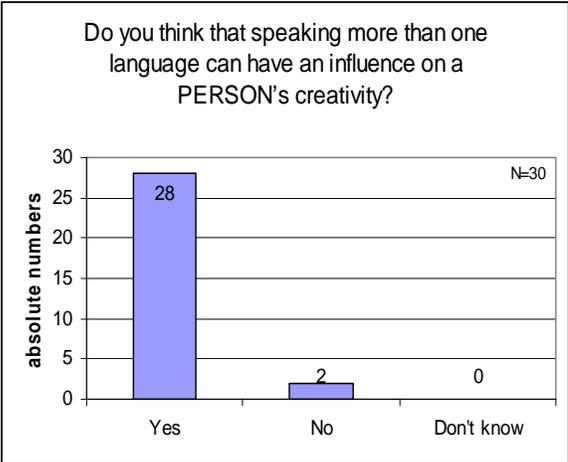
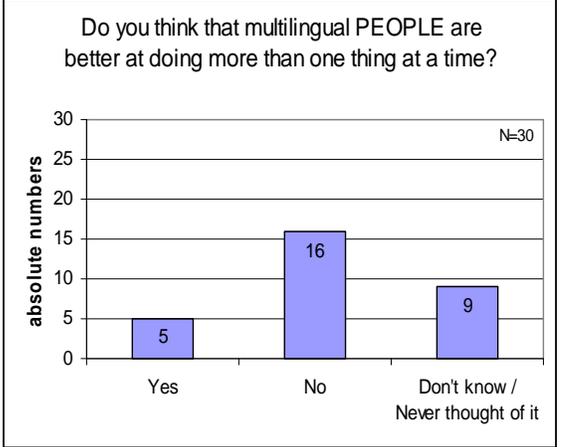
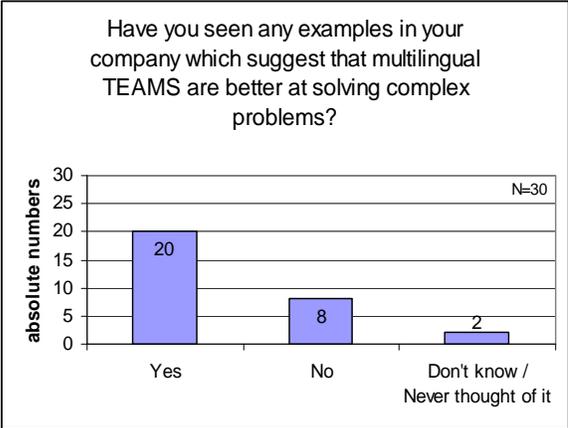
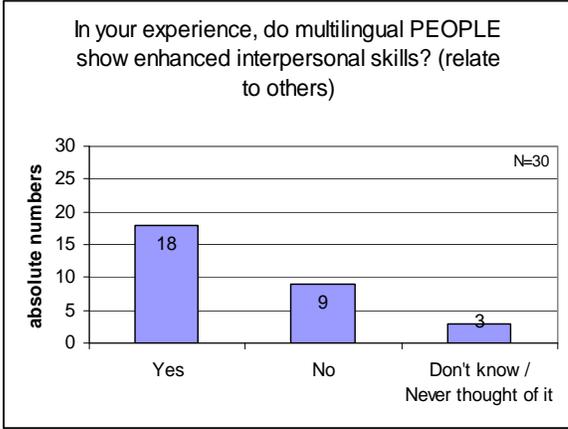
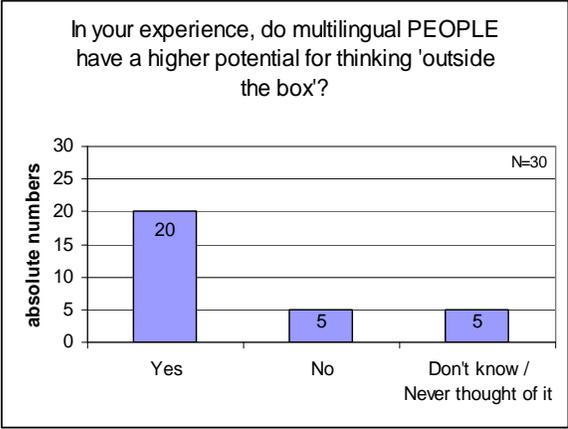
Reservations were expressed by some of the respondents, notably creativity consultants, about multitasking which was one of the indicators identified by the CSRT. There were also a few emphatic dissenters who questioned the contribution of multilingualism to enhanced interpersonal skills.

On the other hand, some respondents even felt that dialoguing in a foreign language can help simplify the thought processes.

Various factors were considered to be at play in teamworking where creativity may be a specific feature of multilingual/multicultural team dynamics, as opposed to the individual creativity of multilingual persons.

Corporate opinion particularly places emphasis on the importance of mixed multilingual and multicultural groups in project planning and brainstorming teams. Because of their diverse approaches to common issues, such teams are reported as seeming slower in getting up to speed but, once they are functioning effectively, can be much more versatile in problem solving situations and can come up with creative solutions.

Many respondents also brought up the encompassing factor of culture itself, of which the linguistic aspect is only a part.



4.3. The Case Studies

With the active assistance of the study's Country Experts representing all EU Member States plus Norway and Turkey, the process of obtaining 'in-the-field' evidence included the identification of specific cases substantiating the contribution of multilingualism to both individual and group creativity.

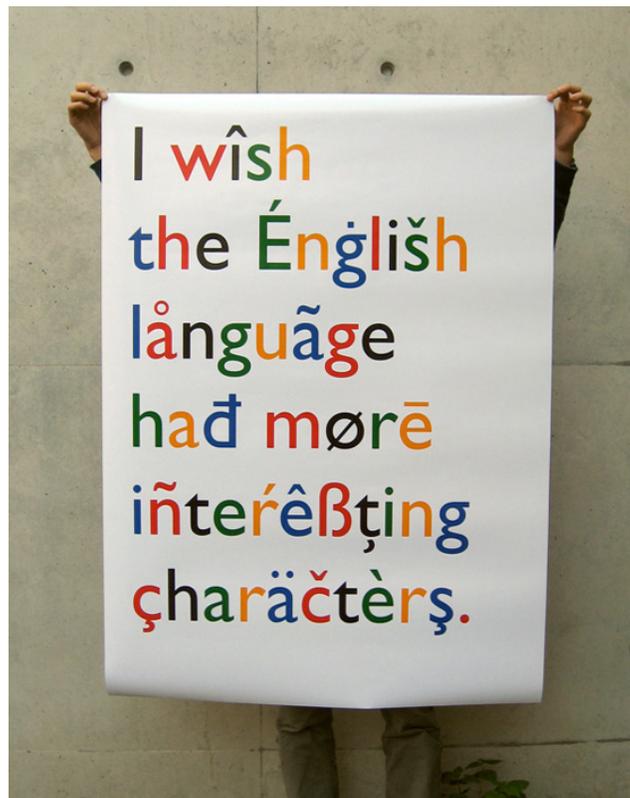
Nine case studies were selected from the 82 submitted, all of them drawn up in the light of these five hypotheses (all nine meet at least three of them). They also come from nine different Member States (although one is of international scope) and cover a range of activities, from drama and cuisine, via the communications industries (TV, telecom, branding, communication research and consultancy), to education and healthcare.

They demonstrate the impact of a multilingual environment on creative applications in varying realms of everyday life.

The common theme that links them is that, thanks to the multilingual and multinational composition of the teams and the ways these initiatives have been organised, all have been both innovative and successful.

Other case studies submitted (82), but not selected, illustrate the impact of multilingualism on the accomplishments of talented individuals as well as on teams and, in particular, focus on various creative aspects of language training and teacher training. All submissions are listed in Annex 7 to this report.

It is also noticeable that some countries (e.g. Austria) focus on international initiatives while others (e.g. Belgium, Finland) highlight the domestic language issue.



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5. Overall Conclusions

We are at a period in history when innovation through creativity is viewed as a key driver for social and economic success. Innovation is an essential component of a successful society. One of the potential sources fuelling innovation and creativity is multilingualism.

By combining traditional research approaches with those of the newly emerging neurosciences, we are at a unique point in time where we can compare observations of human performance with ever greater understanding of what happens inside the brain. These are early days, and there is likely to be a considerable increase in research activity over the next decade. But already it is possible to see a level of convergence, with similar findings reported through very different research approaches.

This opens doors to further promoting multilingualism because, from the evidence, knowing a second or third language is more than 'the sum of its parts'. There is added value that has supplementary benefits for a range of human endeavours. Experienced people have endorsed this assertion throughout the reporting process, demonstrating a shared understanding of the contribution of multilingualism to creativity in the belief that 'languages really are good for you'.

The team responsible for compiling this report has taken a very small step in a very wide space. It has engaged in a 'look and listen' approach, and the signs are that there is something very exciting to be explored in the added value potential of various levels of multilingualism. The key word in this report is indeed 'potential'.

Knowledge of more than one language points to the expansion of specific types of competence. Multilingualism appears to help people realise and expand their creative potential. In addition, thinking, learning, problem solving and communicating, all of which are transversal knowledge-steeped skills used in our daily lives, show signs of enhancement through multilingualism.

Recognition of European multilingualism as a lever for economic growth and social cohesion, and not as an 'expensive inconvenient reality', is one issue. Communicating the value of languages and supporting their development through policy and education is another. Valuing the knowledge and use of different languages, regardless of contemporary status, is yet another. Understanding the multilingual dimension can lead to pragmatic initiatives nurturing the potential that the knowledge of languages can bring to individuals and the societies in which they live and work.

The world is leading to a new age in which science can examine the impact of languages on the brain. The next decade promises even greater insights. This understanding will be driven by the neurosciences, enabling us to clarify our knowledge of multilingualism and its relation to creativity and other factors.

"The major future challenges in the educational field are how to reform our learning systems to prepare our young people for jobs that do not exist yet, using technologies that have not been invented yet, in order to solve problems that haven't been identified yet." (Jan Figel 2009).

The evidence clusters described here suggest that multilingualism is a resource that could play a key role in responding to the challenges of the present and the future. It is an existing resource that is likely to nourish emergent processes of creativity that will expand individual and societal opportunity.

6. Summary of Recommendations

The following recommendations are proposed in the light of the study findings:

6.1. European Commission:

- That the main overall conclusion – that multilingualism provides benefits that go beyond the ability to use the languages themselves – be communicated to the general public. This will energise efforts to promote take-up of language learning; support social cohesion through recognition of the value of all additional language competence (majority, minority, regional, heritage); and impact on strategic decision-making in public life.
- That an initiative be taken through the European Commission's FP7 programme to encourage research, in the field of the neurosciences, into the contribution of multilingualism to creativity.
- That an analysis of the economic, social policy, health, statistical and language policies of the EU be prepared to demonstrate the causal relationship and role of multilingualism as human capital in the European Union.
- That future activities sponsored in the field of multilingualism by the European Commission should also examine the issue in the broader context of multiculturalism and overall personal competence.
- That further research, and identification of 'best practice' case studies, be undertaken in respect of the dynamics of multilingual project teams, with the involvement of European multinational corporations.

6.2. EU Member States:

- That a group be formed of Member State stakeholders involved in language teaching and learning to consider the implications of the findings for educational practice, with a view to possible modifications to specific types of methodologies and materials in order to improve their effectiveness.
- That a group be formed of Member State stakeholders to examine the implications for the articulation of language policies, particularly with respect to inter-linkage with other policy fields such as finance, social administration, education and health.

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