

**The influence of bilingualism on the onset of dementia.
A survey in the Flemish Community of Belgium.**

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TABLE OF CONTENTS

LIST OF TABLES AND FIGURES	4
1 INTRODUCTION.....	5
2 BILINGUALISM AND DEMENTIA	7
2.1 Bilingualism	7
2.1.1 Introduction	7
2.1.2 Bilingualism and second language acquisition	8
2.1.3 Positive effects of bilingualism	8
2.2 Dementia	10
2.2.1 Introduction	10
2.2.2 Symptoms	11
2.2.3 Causes and risk factors	12
2.3 Correlation between bilingualism and dementia	13
3 SURVEY IN THE FLEMISH COMMUNITY OF BELGIUM	16
3.1 Objective	16
3.2 Research methodology	16
3.2.1 Target audience	16
3.2.2 Questionnaire	17
3.3 Data	18
3.3.1 Introduction	18
3.3.2 Data analysis	19
3.4 Discussion	38
4 CONCLUSION	40
BIBLIOGRAPHY	42
APPENDIX	47
SCRIPTIEFICHE	68

LIST OF TABLES AND FIGURES

Tables

Table 1: Is the patient monolingual, bilingual or multilingual?	19
Table 2: Is the subject a man or a woman?	20
Table 3: Mean age of onset of dementia for monolingual and bilingual subjects	25
Table 4: <i>t</i> -test: measuring significance of age of first signs and mean age difference per sample	25
Table 5: Mean age of onset of dementia for monolingual male and female subjects	26
Table 6: <i>t</i> -test: measuring significance of age of first signs and mean age difference per gender in the monolingual sample	27
Table 7: Mean age of onset of dementia for bilingual male and female subjects	27
Table 8: <i>t</i> -test: measuring significance of age of first signs and mean age difference per gender in the bilingual sample	28
Table 9: Distribution of the independent variables for the ANOVA	29
Table 10: Two-way ANOVA: measuring interaction between the dependent variable ‘age of first signs’ and the two independent variables ‘gender’ and ‘number of languages’	29
Table 11: Mean age of diagnostic picture for monolingual and bilingual subjects	30
Table 12: <i>t</i> -test: measuring significance of age of diagnostic picture and mean age difference per sample	30
Table 13: What is the subject’s mother tongue?	35
Table 14: Mean age of first signs for Dutch and French as mother tongue	36
Table 15: <i>t</i> -test: measuring significance of age of diagnostic picture and mean age difference per sample	36

Figures

Figure 1: The number of people with dementia in Belgium from 1960 to 2005	11
Figure 2: Areas of the brain affected by dementia	12
Figure 3: Histogram monolingual sample	24
Figure 4: Histogram bilingual sample	24
Figure 5: Box plot monolingual and bilingual sample	25

1 INTRODUCTION

Due to globalization and multiculturalism, the world has seen a rapid increase of bilingual or multilingual speakers. Throughout the world people have grasped the importance of acquiring a second or third foreign language (Bhatia and Ritchie, 2006: 1). Carol Myers-Scotton (2006: 2) indicates that there are more bilingual people in the world than there are monolingual people. Since the mid-twentieth century, bilingualism has been offering a broad spectrum of research possibilities. For instance, the positive influence of bilingualism on children and the correlation between bilingualism and cognitive decline have already been examined and shown (Bialystok 1991; Bialystok 2006). Over the last decades, Ellen Bialystok, a research professor of psychology at York University in Toronto, has proven to be a pioneer in this field of study. Thus, it would be valuable to conduct further research to see if this positive influence of bilingualism affects elderly people as well. Literature on the influence of bilingualism on the onset of dementia, however, is scarce since its investigation is a recent phenomenon. In Toronto, Canada, Bialystok, Craik and Freedman (2007) examined the effect of lifelong bilingualism on the onset of symptoms of dementia. Results showed that bilingualism has a protective effect in delaying the onset of dementia by four years.

So, the question arises whether bilingualism has a protective effect on elderly people in Belgium as well. The objective of this dissertation is to conduct a pilot replica study in Belgium since this country, too, is acquainted with the issue of bilingualism. It aims at contributing to a solution to a problem that people worldwide are facing: a considerable rise in the ageing population indeed underlines the necessity to examine possibilities to delay the onset of age-related illnesses such as dementia if a remedy for the disease is not a matter of the near future.

Research on the causes of dementia is still going on (Van Broeckhoven 2008). At present, doctors are still experiencing difficulties to give a clear diagnostic picture of dementia and every attempt at the prevention or even the delay of the onset of brain dysfunction is welcome.

The second chapter of this dissertation gives an introduction to bilingualism and second language acquisition. Furthermore, this chapter will look into previous pioneering research concerning the correlation between bilingualism and dementia.

The third chapter will inquire into the correlation between bilingualism and dementia in the Flemish Community of Belgium by means of a questionnaire which was sent to over thirty rest homes in Flanders and Brussels. The aim of this research is to determine whether bilingual dementia patients in the Flemish Community of Belgium actually develop the first symptoms of dementia at a later age compared to monolingual dementia patients. The actual significance of our results was measured by means of several *t*-tests and an ANOVA.

The fourth chapter will give a general conclusion of this survey. In addition, the difficulties and challenges of our study are discussed, as well as indications for future research.

2 BILINGUALISM AND DEMENTIA

The objective of this chapter is to introduce the terms bilingualism and dementia.

First, bilingualism will be discussed by means of a comparison of several different interpretations of bilingualism. We will look into some characteristics of bilingualism and second language acquisition. The discussion of bilingualism will be concluded by referring to some claims about positive effects linked to bilingualism.

Second, this chapter will look closer into the term dementia. We will first give a definition of what dementia actually is. Next, this chapter will discuss the prevalence of dementia both globally and in Belgium. Furthermore, we will address the symptoms and possible causes or risk factors of dementia.

Finally, this chapter will discuss the correlation between bilingualism and dementia through comparison of previous studies.

2.1 Bilingualism

2.1.1 Introduction

The term of ‘bilingualism’, - and that of ‘multilingualism’, too - is used frequently. However, not everyone refers to the same concept. Even in the scholarly literature, there is disagreement about a fixed definition for bilingualism. According to Edwards, in Bhatia and Ritchie (2006: 8), for instance, early definitions of bilingualism restricted bilingualism to “a perfect mastery of two languages” whereas “later ones have allowed much greater variation in competence”. According to Myers-Scotton, “being bilingual does not imply complete mastery of two languages” (2006: 3). She already regards people as bilingual when they have acquired a minimum level of competences, such as reading, writing and speaking, in a foreign language: “bilingualism is the ability to use two or more languages sufficiently to carry on a limited casual conversation” (2006: 44). Chin and Wigglesworth (2007: 3), however, focus on other aspects of bilingualism than the purely linguistic ones. According to them, bilingualism not only includes language competence, it also involves socio-cultural and cognitive factors. They believe that the interpretation of bilingualism may differ from one individual to another.

Speakers may often have a different opinion than researchers when it comes to their language knowledge. In reality, most bilinguals fall somewhere between different definitions of bilingualism. Edwards, in Bhatia and Ritchie (2006: 8), indicates that there are at least twenty dimensions of language to determine whether a person is bilingual.

2.1.2 Bilingualism and second language acquisition

The age of acquisition of a second language is such a dimension to determine whether a person is bilingual or not. Early childhood bilingualism involves spontaneous learning, which means that children learn a second or third language without effort or instruction. Second language acquisition, however, is “more conscious and involves more efforts that do not pay off in great success” (Myers-Scotton, 2006: 344).

Johnson and Newport, in Myers-Scotton (2006: 345), state that there is no “sharp cut-off point” between acquiring a second language at an early age or later in life. Thus, researchers cannot determine at what age the ability to learn a second language actually declines. Most estimates indicate that even by the age of nine to twelve, retention rates have fallen sharply. According to Pennfield and Roberts, in Sanz, children have “a specific capacity for language learning due to cerebral flexibility that subsides at approximately nine” (2005: 107). However, these findings do not exclude adults as eligible second language learners. In fact, Myers-Scotton (2006: 350) and Sanz (2005: 3) emphasise that - apart from age - various other factors or “individual differences” should be considered, such as exposure, the amount of practice and motivation.

2.1.3 Positive effects of bilingualism

Bilingualism is an intriguing field of study for many researchers. According to Myers-Scotton, there are “two intrinsic values in studying bilingualism” (2006: 12). First, she indicates that “studying bilingualism tells us something about the genetic potential of humans” (2006: 12). Linguists can gather information on how language is processed in the brain or investigate how languages are acquired in general. Second, Myers-Scotton believes that “simply living in a community where two or more languages are spoken is a part of the

human experience” (2006: 13). Thus, the status of languages spoken within the community is an important factor in studying bilingualism.

The possible benefits of bilingualism have raised many questions during the latter half of the twentieth century. Before, bilingualism was considered as an obstacle in cognitive development (Chin and Wigglesworth 2007: 56; Lee 1996: 503). According to Patrick Lee, in *Bilingual Research Journal*, early studies claimed that “bilinguals never reached comparable levels of linguistic proficiency as did monolinguals” (1996: 501). Until the 1950s, researchers mainly focused on behavioural consequences of bilingualism. Later, the cognitive implications of bilingualism were considered. Peal and Lambert were the first to establish the positive effects of bilingualism in 1962 (Chin and Wigglesworth 2007: 58; Lee 1996: 503). Their study showed that bilingual children scored significantly higher on verbal and non-verbal intelligence tests. They therefore argued that bilingual children achieved better results than monolingual children due to their “enhanced mental flexibility and strong concept formation skills” (Lee 1996: 503).

Chin and Wigglesworth state that during the latter half of the twentieth century, various researchers have shown that bilinguals score significantly higher on “tasks requiring cognitive flexibility and metalinguistic awareness” (2007: 61). Cognitive ability involves creative and spontaneous thinking, for instance being consistent and result-oriented when facing a problem or situation. Bilingualism is therefore believed to increase divergent thinking. Furthermore, bilinguals are said to have an advantage in analysing language forms. Hence, they are linguistically more aware. Chin and Wigglesworth define metalinguistic awareness as “the ability to focus on different levels of linguistic structures such as words, phonemes and syntax” (2007: 62). For example, Ellen Bialystok indicated that linguistic abilities as well as non-verbal cognitive abilities are positively affected by bilingualism in children and younger adults (Bialystok 1991).

In conclusion, various studies have clearly indicated that bilingualism does not obstruct the normal course of cognitive development. However, not all studies report a similar positive effect since different studies use different standards of measure. Findings should thus be interpreted with caution (Chin and Wigglesworth 2007: 70).

2.2 Dementia

2.2.1 Introduction

The term ‘dementia’ stems from a combination of two Latin words, i.e. ‘de’ and ‘mens’, which means as much as “failure or loss of the mental powers; usually consequent on other forms of insanity, mental shock, various diseases, etc.” (Oxford English Dictionary 2008).

Most definitions of dementia, such as the above-mentioned, are very broad. On the one hand, the term is mostly used in a general sense to refer to different brain disorders such as Alzheimer’s disease, vascular dementia, Lewy body dementia, fronto-temporal dementia, Creutzfeldt-Jakob disease and other rarer causes of dementia (Alzheimer’s Society 2007). On the other hand, the term can also be well-defined. For instance, Medical Subject Headings (National Library of Medicine 2008) defines dementia as follows:

An acquired organic mental disorder with loss of intellectual abilities of sufficient severity to interfere with social or occupational functioning. The dysfunction is multifaceted and involves memory, behaviour, personality, judgment, attention, spatial relations, language, abstract thought, and other executive functions. The intellectual decline is usually progressive, and initially spares the level of consciousness.

According to a worldwide survey by Ferri et al. (2005), 24.3 million people suffer from dementia. Globally, 4.6 million new cases of dementia are reported every year. In fact, this is the same as one new case every seven seconds. They believe that by 2040, approximately 81.1 million people will be affected by dementia. Sixty per cent of people diagnosed with dementia live in developing countries. Ferri et al. even predict a rise to 71% by 2040. While the western world is forecast to suffer an increase by 100% between 2001 and 2040, India, China, South Asia and regions in the western Pacific may even see a rise by 300% (Ferri et al. 2005).

In Belgium, too, researchers noticed a sharp rise in the prevalence of dementia. Ferri et al. (2005) estimated that Belgium counted approximately 130,000 cases of dementia. According to a survey by Statistics Belgium, a division of the Federal Public Service Economy, Small and Medium Enterprises, Self-employed and Energy¹ (2007), approximately 2,000 new cases of dementia have been reported each year since 2000. At present, six per cent of Belgians

¹ Nationaal Instituut voor de Statistiek / Federale Overheidsdienst Economie, K.M.O., Middenstand en Energie

over the age of 65 suffer from dementia, whereas the percentage has increased up to thirty per cent for those over the age of 85. Even between the ages of 30 to 59, approximately 5,600 people suffer from dementia.

The Eurodem-study² of 1991 had even estimated that in 2005, Belgium would count 140,000 people with dementia or 1.35% of the total population in Belgium (cf. Figure 1). This percentage is slightly higher than the European average of 1.27% (Alzheimer Europe 2006).

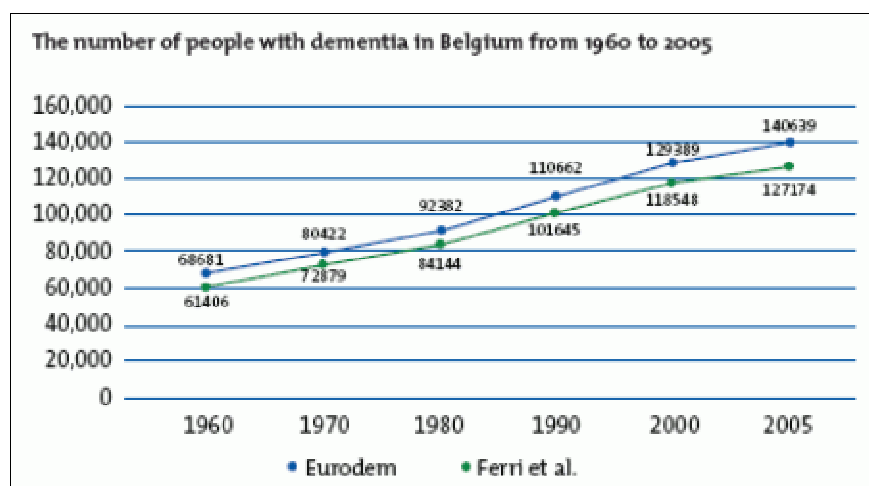


Figure 1: The number of people with dementia in Belgium from 1960 to 2005³

2.2.2 Symptoms

According to the Flemish Alzheimer Association (Vlaamse Alzheimer Liga 2002), dementia is a continuing process. Dementia can, therefore, not be considered as a fixed mental state since patients undergo a gradual memory loss.

The first symptoms of dementia appear when the short-term memory starts deteriorating. Our short-term memory is responsible for absorbing information and stimuli from our environment, such as words in a conversation or the amount due on a receipt while talking to the cashier. Most of this information is soon forgotten, whereas some of it is stored in our long-term memory. Once a person experiences difficulties in doing these tasks, he or she may be suffering from the first symptoms of dementia. For instance, if a person can no longer follow a conversation because he or she cannot remember what was said, early dementia may

² Eurodem: European Community Concerted Action Epidemiology of Dementia

³ Source: Alzheimer Europe [Online] <http://www.dementia-in-europe.eu/?lm2=PJMOWRYGJPOC> [06.04.08].

be the cause. In a later stage, patients suffering from dementia may find it hard to retrieve the correct word to name certain objects. The final stage implies total memory loss: patients will lose their short-term memory as well as their long-term memory. In this case, people will no longer be able to name any object (Vlaamse Alzheimer Liga 2002).

The image below illustrates which areas of the brain are affected by dementia.

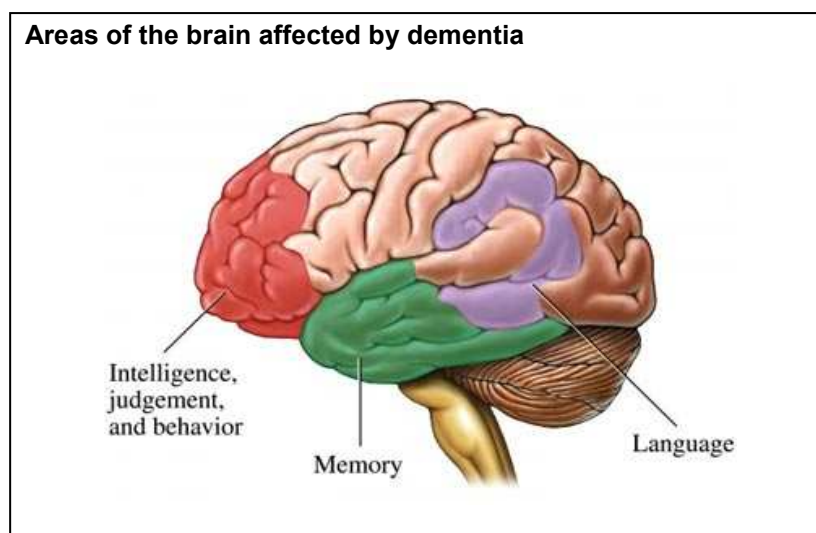


Figure 2: Areas of the brain affected by dementia ⁴

2.2.3 Causes and risk factors

The Flemish Alzheimer Association (Vlaamse Alzheimer Liga 2002) emphasises that it is impossible to indicate one single comprehensive cause of dementia. There are, however, several risk factors which may eventually lead to an increased risk of developing dementia.

First, age is probably the most well-known factor. The risk of developing symptoms of dementia increases as people get older.

Second, other diseases that affect the body or the brain can also lead to dementia. For instance, diseases such as diabetes or Parkinson are possible risk factors. Moreover, heart or cardiovascular diseases imply greater risk as well.

⁴ Source: EBSCO Publishing – Health Library [Online]
<http://healthlibrary.epnet.com/GetContent.aspx?token=38405ca3-6cab-4817-9cba-de64dc5c69f1&chunkid=11910> [06.04.08]

Third, maintaining a healthy eating habit can postpone the onset of dementia. Both vascular dementia and Alzheimer's disease are enhanced by a high consumption of saturated fats.

Fourth, dementia can also occur with patients who suffered from a head injury. For instance, dementia is quite common with people who had a concussion after the age of sixty.

Fifth, women with lower oestrogen levels have a greater risk in developing dementia. There are indications that women who use female hormones after the menopause show fewer cases of dementia.

Finally, the Flemish Alzheimer Association (Vlaamse Alzheimer Liga 2002) emphasises that dementia is mostly not hereditary. Alzheimer, for instance, has rarely been found dominantly hereditary. In some cases, children inherit genetic material that can cause dementia from one of the parents. Dementia will, therefore, occur early in life in those families. However, these cases are an exception. The Flemish Alzheimer Association refutes the argument that the disease is hereditary. In spite of the fact that dementia is mainly caused by genetic deficiencies, those abnormalities were mostly not present in the genetic material of either of the parents. Even though most cases of dementia are not hereditary, family anamnesis is considered as a minor risk factor.

2.3 Correlation between bilingualism and dementia

Research on the correlation between bilingualism and dementia has only started recently. Most studies mainly focus on the effects of neurological, social and environmental factors on the onset of dementia. For example, one study by Valenzuela and Sachdev (2006) primarily focused on the effects of education, occupational complexity and late-life mental activity. Their investigation indicated that some environmental factors may postpone the onset of symptoms and illnesses that produce dementia. For instance, sustained mental activity, and hence higher brain reserve, can protect against dementia and cognitive decline in elderly individuals.

It is mainly Bialystok's research group that initiated research into the effects of bilingualism on the memory of elderly people. They found that bilingualism enhanced attention and cognitive reserve in older adults (Bialystok, Craik and Ryan 2006). They compared the

responses of monolingual and bilingual subjects in two studies, namely an eye movement study and a behavioural study. The eye movement study showed few differences between monolingual and bilingual subjects. Nonetheless, older bilingual subjects scored significantly higher during a key press response test. The behavioural study, therefore, indicated advantages in older bilingual subjects.

In a consecutive study, and this is the one that is relevant to the present investigation, Bialystok, Craik and Freedman (2007) investigated how dementia was influenced by bilingualism. They examined the effect of lifelong bilingualism on the onset of dementia in old age. The study was conducted in Canada among 184 patients diagnosed with dementia and their caregivers. Fifty-one per cent of all patients were bilingual. To be considered as bilingual, patients had to have spent a majority of their lives using two languages. Eleven judges, specialised in behavioural research with bilinguals, were asked to determine whether a patient could be considered as bilingual.

The research itself was conducted by means of a series of questions. First, families and caregivers were asked when symptoms of dementia were first noticed. Bialystok et al. (2007) acknowledge that this question may lead to a subjective estimate. However, there should be no reason for families or caregivers to give a misrepresentation of the truth. Secondly, information about language history was gathered, such as languages spoken, fluency and the use of both languages. Furthermore, the study included personal information, such as gender, level of education and occupation.

Results of this study showed that on average bilingualism delays the onset of dementia by an average of 4.1 years. Bialystok et al. (2007) concluded that there is no difference between the results for men and those for women. Even though a comparison of the level of education showed that bilinguals had often had less education, educated monolinguals showed few advantages over uneducated bilinguals. Most bilingual patients had had little opportunity to receive proper education since many had fled to Canada during the Second World War.

Apart from the level of education, the primary occupation of the patients was compared. Results indicated that bilinguals with the same occupational status as monolinguals developed the first symptoms of dementia at a later age. Women and men without occupation were not included in the analysis.

Bialystok et al. (2007) emphasise that, in order to come to unambiguous conclusions, both patient groups should not differ apart from their language abilities. Some knowledge of another language is not sufficient to be considered as being bilingual. Furthermore, they mention that this study may be seen as subjective since most data relies on reports of the patient, family members or caretakers.

They nevertheless conclude that the research has indicated that bilingualism can be considered as a possible factor to protect against dementia and cognitive decline in elderly individuals. This was, therefore, the motivation to conduct a pilot investigation in the Flemish Community of Belgium.

3 SURVEY IN THE FLEMISH COMMUNITY OF BELGIUM

3.1 Objective

Since Bialystok et al.'s results (2007) indicated that bilingualism has a protective effect in delaying the onset of symptoms of dementia by 4.1 years, it was decided to set up a pilot investigation into the effects of bilingualism on subjects diagnosed with dementia in the Flemish Community of Belgium. Its main question is to ascertain whether bilingualism has a comparable protective effect on patients suffering from dementia. Other questions are whether factors such as gender, family anamnesis or the level of education may be of importance, too.

3.2 Research methodology

3.2.1 Target audience

The present survey was aimed at both monolingual and multilingual subjects diagnosed with any form of dementia, such as Alzheimer's disease or Korsakoff. It was decided to cover both Flanders and Brussels, together constituting an area in which the Flemish Community is responsible for education, welfare and health. In order to obtain a representative sample of both subject groups, approximately sixty rest homes or nursing homes spread across the Flemish Community of Belgium were contacted by telephone. Rest homes willing to cooperate were then sent a number of questionnaires according to an estimate of the number of residents corresponding with the target audience. Subsequently, these rest homes were asked to distribute the questionnaires among relatives or caregivers of patients diagnosed with dementia, either monolingual or bilingual.

In order to be considered as being bilingual, subjects had to have spent an important part of their lives using two languages frequently, i.e. on a daily basis or at least several times during the week. Subjects were required to have had an active knowledge of both their mother tongue and their second language.

3.2.2 Questionnaire

The research paper by Bialystok et al. (2007) was used as a guideline to draw up a questionnaire for the Flemish Community of Belgium. In total, thirteen questions were included (cf. Appendix A for Dutch and French versions). The questions were divided into two main sections. The first section contained six general questions which were addressed to both monolingual and bilingual subjects. The second section consisted of five linguistic questions aimed at bilingual subjects. Finally, two more questions were addressed to the relatives or caregivers who had filled in the questionnaire.

Section 1: These questions were to be filled in by relatives or caretakers of both monolingual and bilingual subjects.

1. Is the subject⁵ monolingual, bilingual or multilingual?
2. Is the subject a man or a woman?
3. Where did the subject primarily live during his or her life?
4. Which is the highest level of education the subject graduated from?
- 4b. What was the subject's main occupation?
- 5a. At what age could the first signs of dementia be observed?
- 5b. At what age did a physician make the diagnosis of dementia?
- 5c. Which test was administered to make the diagnosis of dementia?
6. (Family anamnesis) Has there been a previous case of dementia in the family?

Section 2: These questions took a closer look into the knowledge and acquisition of the second or third language.

7. Which languages does the subject speak?
8. What is the subject's mother tongue?
9. When was each of the languages used?
10. When did the subject acquire the second language?
11. How did the subject acquire the second language?

⁵ The present study used the term 'subject' instead of 'patient' to refer to individuals in our sample. 'Patient' often implies a more negative connotation whereas 'subject' is more neutral.

Ultimately, the last two questions were aimed at the relatives of our sample group.

12. May we contact you for further information? Please leave your contact information.

13. Do you wish to be informed about the outcome of this survey?

3.3 Data

3.3.1 Introduction

Thirty-five rest homes or nursing homes were willing to contribute to this survey. Subsequently, a total of 471 questionnaires were spread across the Flemish Community of Belgium.

Participating rest homes were then asked to distribute these questionnaires, together with an accompanying letter, among caretakers or relatives of monolingual or bilingual subjects diagnosed with dementia.

Ultimately, twenty-two rest homes returned a number of questionnaires (cf. Appendix B). In total, 131 questionnaires were remitted by the end of February. Thirty-one questionnaires were incomplete and were therefore excluded from our sample. The final sample consisted of one hundred subjects, fifty of whom were considered as bilingual or multilingual.

Subsequently, all results were inserted into an Excel-file and an SPSS dataset. Results between monolingual and bilingual subjects were compared as well as differences between men and women. Both the significance of our age difference concerning the onset of dementia in bilinguals and monolinguals and that of the age difference between men and women were measured by means of a *t*-test in SPSS. In addition, an ANOVA tested whether there is any interaction between the dependent variable ‘age of first signs’ and the two independent variables ‘gender’ and ‘number of languages’.

3.3.2 Data analysis

Question 1: Is the patient monolingual, bilingual or multilingual?

The exact distribution of our final sample is reported in Table 1. The sample, which consisted of fifty monolingual subjects and fifty bilingual subjects, actually showed a bilingual group of thirty-nine bilingual and eleven multilingual subjects.

The present study will focus on two samples: monolingual and bilingual subjects. Multilingual subjects will therefore be considered as a part of the bilingual sample.

MONOLINGUAL, BILINGUAL OR MULTILINGUAL								
	Monolingual		Bilingual		Multilingual		Total	
	Frequency	Per cent	Frequency	Per cent	Frequency	Per cent	Frequency	Per cent
Subject	50	50.0%	39	39.0%	11	11.0%	100	100.0%

Table 1: Is the patient monolingual, bilingual or multilingual?

Question 2: Is the subject a man or a woman?

Table 2 illustrates the number of male and female subjects in our two samples. The monolingual group as well as the bilingual group counted approximately 25% men (monolingual n=13, bilingual n=15) and 75% women (monolingual n=37, bilingual n=35). In fact, these percentages were in accordance with the percentages of elderly Flemish men and women in rest homes or nursing homes. According to *Leefsituatieonderzoek Vlaamse Ouderen*, a survey of Flemish elderly people's living conditions, the rest home population over the age of 75 is mostly made up of women. Seventy-seven per cent of all residents in rest homes or nursing homes are women (Vanden Boer and Pauwels 2005). In addition, dementia affects more women than men. In Belgium, 63% of patients diagnosed with dementia are women whereas only 37% are men (Federale Overheidsdienst Economie, K.M.O., Middenstand en Energie 2008).

GENDER				
	Monolingual		Bilingual	
	Frequency	Per cent	Frequency	Per cent
Male	13	26.0%	15	30.0%
Female	37	74.0%	35	70.0%
TOTAL	50	100.0%	50	100.00%

Table 2: Is the subject a man or a woman?

Question 3: Where did the subject primarily live during his/her life?

Results showed a clear correlation between bilingualism and the geographical factor. On the one hand, most bilingual questionnaires were returned by rest homes in West Flanders or Brussels (cf. Appendix B). As a consequence, the percentages for those regions were obviously more significant. Thirty-four per cent of all bilingual subjects (n=17) had primarily lived in Brussels, 32% (n=16) in West Flanders and 16% (n=8) in East Flanders (cf. Appendix C Table 1). On the other hand, most monolingual questionnaires were returned by rest homes in East and West Flanders. Despite the fairly high percentage of bilinguals in West Flanders, the province even has more monolingual subjects (44%), compared to 36% who had mostly lived in East Flanders. However, while processing these results, we only considered the region where the subject lived longest. A more thorough analysis, taking into account all the different places the subject lived, may reveal a different result.

Perhaps not surprisingly, only 1% of our monolingual sample had mainly lived in Brussels compared to 34% of all bilingual subjects. Brussels has always been known for its linguistic variety owing to the large ethnic population and bilingual status of the city.

Brussels was officially declared a bilingual region in 1963. Consequently, all public institutions were required to use both Dutch and French (Vlaamse Overheid – Cel Coördinatie Brussel 2003). However, this bilingualism has always been questioned. For instance, according to a survey by Rudi Janssens, “Brussels is a bilingual city, but the language situation is a lot more intricate in reality” (Goetvinck 2008: 2). On the one hand, the survey stated that the French speaking population in Brussels is increasing as immigrant minority speakers often opt to learn French instead of Dutch. Thus, French is and remains the lingua

franca in Brussels. On the other hand, the study indicated that the Dutch speaking population in Brussels is continuing to speak its own languages and dialects, at home as well as in public places. Even though English is said to be the third language in Brussels, many acknowledged that their knowledge of English is superior to their knowledge of Dutch. In conclusion, multilingualism is considered as an important asset in the complex linguistic landscape of Brussels (Goetvinck 2008: 2).

Question 4a: Which is the highest level of education the subject graduated from?
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Our classification is based on the present Flemish educational system. In Belgium, children between the ages of six and eighteen are of school age. Vocational students can however start working by the age of sixteen by means of apprenticeship training.

First, children ages six to twelve go through primary education. Subsequently, they move on to secondary education. Pupils have four options: art academy, vocational secondary education, technical secondary education and general secondary education. The present study excluded the option art academy. On 1 September 1971, the Education Commission of the Flemish Community decided to introduce the option art academy as an alternative for the normal course of secondary education (Cultuurraad voor de Nederlandse Cultuurgemeenschap 1975: 2). Thus, art academy did not exist during the first half of the twentieth century and was therefore not relevant for this study. Once students have completed their secondary education, they can either decide to start working or they can continue their education at college or university.

A comparison of the years of schooling of both our monolingual and bilingual sample indicated that monolinguals had fewer years of education (cf. Appendix C Table 2). Sixty-two per cent of our monolingual sample (n=31) graduated from primary education whereas only twelve per cent (n=6) went on to higher education. These findings are not unexpected. On 20 May 1914, Belgian parliament passed a bill which obliged children to go to school until the age of fourteen. The law actually came into effect after the First World War (Depaepe, Simon and Van Gorp 2005: 306). Consequently, many children left school after the age of fourteen when school was no longer obligatory. According to a survey by the General Bureau for Statistics and Economic Information (Federale Overheidsdienst Economie, K.M.O.,

Middenstand en Energie 2008), one in two people over the age of 65 did not continue their education beyond elementary school.

Bilinguals generally showed a higher level of education. Twenty-six per cent (n=13) finished primary education, another 26% (n=13) completed vocational secondary education. Twenty-four per cent of our bilingual sample (n=12) graduated from general secondary education. Ten per cent (n=5) continued their education at university. The majority of our monolingual sample (62%) left school after primary education. Eighteen per cent (n=9) graduated from vocational secondary education. Six monolingual subjects (12%) had had the opportunity to be enrolled in higher education. None of the monolingual subjects studied at university.

In general, more men were educated in higher education. For instance, 27% of our 15 bilingual men (n=4) had studied at university whereas only 3% of our 35 bilingual women (n=1) shared this experience. Considering the monolingual group, results indicated that 23% of our male sample (n=3) had completed higher education (3 or 4 years) compared to 8% of the female sample (n=3).

Question 4b: What was the subject's main occupation?
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This question was in fact an open question. The VDAB, a Flemish service for occupational assistance and professional education, applies a standard list⁶ to classify occupations into two main categories: labourers and employees. This classification was also used to process the occupations of our two samples. Nonetheless, this study included two more categories: housewives and self-employed professionals. The Canadian study by Bialystok et al. (2007) did not include housewives or men without occupation. We decided to introduce housewives in our study owing to differences in the perception of women nowadays and during the first half of the twentieth century. According to Depaepe and Simon, in Depaepe, Simon and Van Gorp (2005: 293), women were first and foremost responsible to bring up their children. During the Interbellum period, questions raised whether it was acceptable for women to go to work. Catholics, on the one hand, took the view that women should stay at home to raise their children. Working women were said to cause mischief such as ill-bred or abandoned children, disturbed domestic lives, illnesses, high child mortality rates or juvenile

⁶ VDAB [Online] <http://arvastat.vdab.be/nwwz/help/nwwzber.htm> [25.03.08].

delinquency. In addition, worker's unions even accused working women of raising unemployment figures and causing wage reductions. Socialist women, on the other hand, considered working as a form of independence for married women, emancipation from the fixed stereotype of women destined to be solely housewives (Depaepe, Simon and Van Gorp 2005: 294-295).

A comparison of the occupational status of our two samples (cf. Appendix C Table 3) indicated that 24% (n=12) of our bilingual participants were classified into the labourer-category whereas 58% (n=29) of all monolingual subjects were identified as a labourers. Surprisingly, 54% (n=20) of monolingual women belonged to the labourer-category. Another 32% (n=12) were housewives. Thus, despite the stereotypical thinking at that time, more than half of our female monolingual sample group actually worked.

Whereas most of the women in the monolingual group were labourers, most bilingual women were either classified as employees or housewives. Overall, the male subjects showed little difference in occupational status.

Question 5a: At what age could the first signs of dementia be observed?

Relatives or caregivers were asked to estimate when the first symptoms of dementia were noticed. We decided to conduct statistical analyses of the data to determine the significance of our results.

First, we had to examine whether our sample was normally distributed or not in order to determine which statistical test would be most appropriate. For instance, the Kolmogorov-Smirnov statistic tests the hypothesis that the data are normally distributed. This test indicated that our sample showed a normal distribution. Consequently, we decided to measure the correlation between the age of onset of dementia in monolingual and bilingual subjects by means of a *t*-test, which has been defined as follows:

“A statistical test involving confidence limits for the random variable *t* of a *t* distribution and used especially in testing hypotheses about means of normal distributions when the standard deviations are unknown.” (Merriam-Webster's Online Dictionary 2008)

In other words, a *t*-test or Student's *t*-test involves an evaluation of means and distributions of each group.

To analyse the results of ‘age of first signs’, we used an Independent Samples *t*-test as we were dealing with two different samples. Before running the *t*-test in SPSS, we looked for anomalies such as extreme values. These extreme values were shown in two box plots (cf. Figure 5). Apart from these box plots, values were also visualised in two histograms, one for each sample group as well (cf. Figures 3 and 4). In view of these findings, we deselected the extreme values before running the *t*-test.

As can be seen in Table 3, results showed a mean age of 78.75 years for our monolingual subjects and a mean age of 79.11 for our bilingual subjects after exclusion of extreme values. Thus, there is only a difference of approximately four to five months.

Table 4 contains Levene’s Test for equality in variances which is a test of the equality of variance assumption. The test is not significant because the *p*-value ($p = 0.648$) exceeds the 0.05 threshold for statistical significance. Thus, equal variance is appropriate. Since we assume that the mean age of our bilingual sample is higher than the mean age of our monolingual sample, we considered a directional (one-tailed) alternative hypothesis. The calculated *p*-value turns out to be 0.414, which is higher than the threshold for statistical significance of 0.05. We can therefore assume that we the null hypothesis, i.e. that there is no difference between monolinguals and bilinguals, cannot be rejected. Therefore, the difference in age of onset of symptoms of dementia is of little significance. As a consequence, the main research question of this study cannot be substantiated.

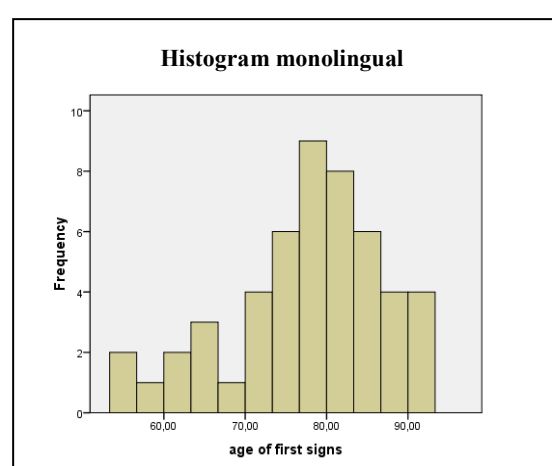


Figure 3: Histogram monolingual sample

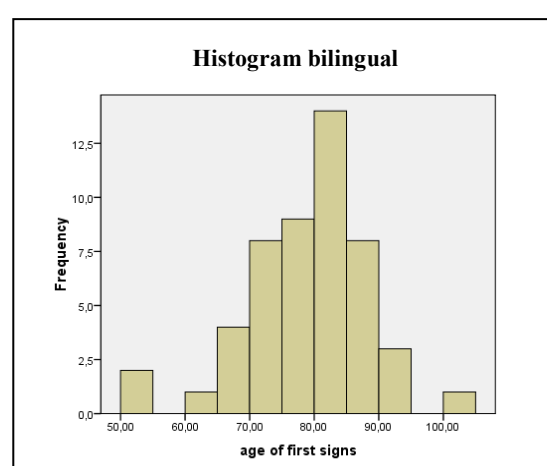


Figure 4: Histogram bilingual sample

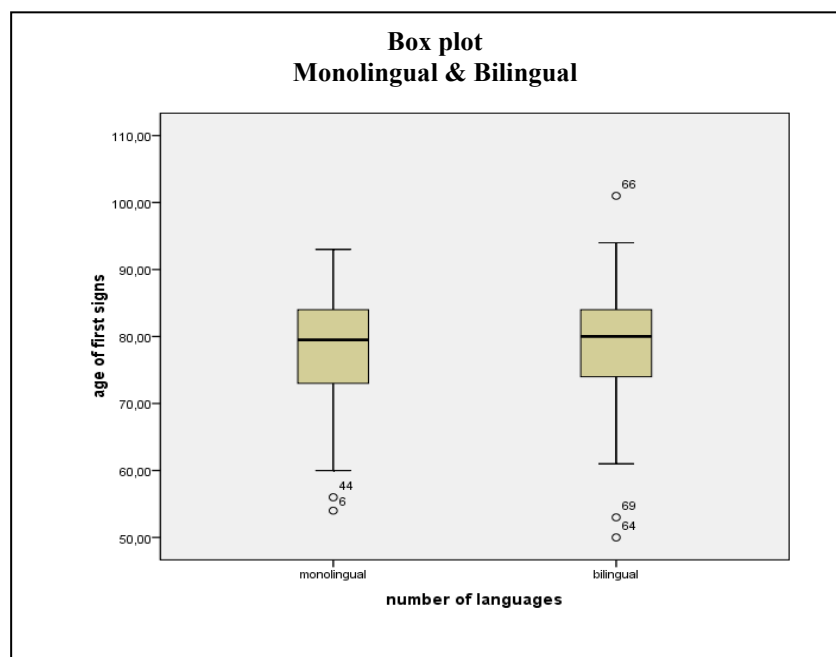


Figure 5: Box plot monolingual and bilingual sample

GROUP STATISTICS					
	Number of languages	N	Mean	Std. Deviation	Std. Error Mean
Age of first signs	monolingual	48	78.8	8.35515	1.20596
	bilingual	47	79.1	7.52166	1.09715

Table 3: Mean age of onset of dementia for monolingual and bilingual subjects

INDEPENDENT SAMPLES TEST										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference ⁷	
									Lower	Upper
Age of first signs	Equal variances assumed	0.210	0.648	0.218	93	0.828	0.35638	1.63218	-3.59756	2.88480
	Equal variances not assumed			0.219	92.356	0.827	0.35638	1.63036	-3.59425	2.88149

Table 4: *t*-test: measuring significance of age of first signs and mean age difference per sample

⁷ The 95% confidence interval of the difference between the means of the age of onset for men and women gives the lower and upper bounds between which 95 out of 100 differences would lie if a large number of samplings were undertaken. This concept is not relevant for the analysis of our results and will therefore not be discussed in detail.

In order to find out whether the mean age differences between men and women were representative, the significance of the age difference between male and female subjects was measured in both samples by means of an Independent Samples *t*-test. For each of these tests, we selected a random sample of women to equal the number of men. Thus, for each test a certain number of monolingual and bilingual women were excluded.

- ◆ Monolingual sample

The monolingual sample consisted of 13 men and 37 women. Fourteen women were excluded from the final sample as we wanted to compare an equal number of men and women. Table 5 illustrates that our male subjects showed a mean age of 74.5 years in age of onset of dementia compared to a mean age of 79.7 years for our female sample group. The significance of this 5.2 year age difference between men and women was measured by means of an Independent Samples *t*-test.

Levene's Test in Table 6 gives a *p*-value of 0.884. Thus, our *p*-value is higher than the threshold of 0.05 which indicates that equal variances are assumed. We can therefore focus on the results in the upper row. We may assume a directional (one-tailed) alternative hypothesis owing to the five year age difference between men and women. This time, the *t*-test calculated a *p*-value of 0.089 which exceeds the 0.05 threshold for statistical significance. Thus, we cannot assume that the 5.2 year age difference is significant.

GROUP STATISTICS					
	Gender	N	Mean	Std. Deviation	Std. Error Mean
Age of first signs	male	13	74.5	9.846	2.731
	female	13	79.7	9.096	2.523

Table 5: Mean age of onset of dementia for monolingual male and female subjects

INDEPENDENT SAMPLES TEST										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Age of first signs	Equal variances assumed	0.022	0.884	-1.386	24	0.178	-5.154	3.718	-12.827	2.519
	Equal variances not assumed			-1.386	23.851	0.178	-5.154	3.718	-12.829	2.521

Table 6: *t*-test: measuring significance of age of first signs and mean age difference per gender in the monolingual sample

- ◆ Bilingual sample

The bilingual sample consisted of 15 men and 35 women. First, 20 women were excluded to reach an equal number of men and women. Additionally, one male and one female subject were excluded since their age of onset was considered as an extreme value. Male subjects showed a mean age of 75.1 whereas women displayed a mean age of 78.6 years (cf. Table 7). The significance of the 3.5 year age difference was also measured by means of an Independent Samples *t*-test.

The results of the Independent Samples *t*-test are reported in Table 8. The *p*-value in Levene's Test for equality of variances is 0.324, which exceeds the 0.05 threshold for statistical significance. Thus, we can neglect the bottom row. As was the case for our monolingual sample, we may assume a directional (one-tailed) alternative hypothesis. The *t*-test's *p*-value equals 0.102, which does not confirm any statistical significance.

GROUP STATISTICS					
	Gender	N	Mean	Std. Deviation	Std. Error Mean
Age of first signs	male	14	75.1	7.898	2.111
	female	14	78.6	6.186	1.653

Table 7: Mean age of onset of dementia for bilingual male and female subjects

INDEPENDENT SAMPLES TEST										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Age of first signs	Equal variances assumed	1.011	0.324	-1.305	26	0.203	-3.500	2.681	-9.011	2.011
	Equal variances not assumed			-1.305	24.588	0.204	-3.500	2.681	-9.027	2.027

Table 8: *t*-test: measuring significance of age of first signs and mean age difference per gender in the bilingual sample

Subsequently, we considered a different technique which looked at three variables (number of languages, age of first signs and gender) in the same test, namely the Analysis of Variance (ANOVA) test for independent samples. We used ‘age of first signs’ as the dependent variable, and monolingual/bilingual and male/female as independent variables. The important advantage of this test is that it reveals not only any effects due to number of languages and gender alone, but also any interaction between these two variables.

We first created a random sample which included as many women as there are men. The exact distribution of our two independent variables can be seen in Table 9. In the ANOVA-table labelled ‘Test of Between-Subjects Effects’, the variable ‘number of languages’ indicates whether the subjects are monolingual or bilingual. This variable is not significant since $p = 0.879$, thus far greater than the 0.05 statistical threshold. The results for the variable ‘gender’ ($p = 0.022$) are, however, significant. We can therefore assume that there is a significant difference in age of onset between men and women. The interaction between the two independent variables is indicated by ‘Number of languages * Gender’ and is not significant as $p = 0.763$. We can therefore conclude that the ANOVA confirms our findings of the different *t*-tests, except for the variable ‘gender’.

A comparison of the age of onset between the monolingual and bilingual sample indicates that there is a difference of approximately 0.6 years between monolingual and bilingual men. Monolingual and bilingual women showed a mean age difference of 1.1 years. Surprisingly, dementia occurred earlier in bilingual women than in monolingual women.

BETWEEN –SUBJECTS FACTORS			
		Value Label	N
Number of languages	1	monolingual	26
	2	bilingual	30
Gender	1	male	28
	2	female	28

Table 9: Distribution of the independent variables for the ANOVA

TESTS OF BETWEEN-SUBJECTS EFFECTS					
Dependent Variable: Age of first signs					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	508.020 ^a	3	169.340	1.948	0.133
Intercept	329681.319	1	329681.319	3792.346	0.000
number_of_languages	2.033	1	2.033	0.023	0.879
gender	486.541	1	486.541	5.597	0.022
number_of_languages * gender	7.969	1	7.969	0.092	0.763
Error	4520.533	52	86.933		
Total	336283.000	56			
Corrected Total	5028.554	55			

a. R Squared = 0.101 (Adjusted R Squared = 0.049)

Table 10: Two-way ANOVA: measuring interaction between the dependent variable ‘age of first signs’ and the two independent variables ‘gender’ and ‘number of languages’.

Question 5 b: When was the actual diagnosis of dementia made?

The mean age differences of the age the diagnostic picture was made, were also analysed by means of an Independent Samples *t*-test. Table 11 shows that the diagnostic picture for monolinguals was made at a mean age of 77.2 years whereas bilinguals showed a mean age of 79.6 years. Beforehand, 13 monolingual and 9 multilingual subjects were excluded, either because of extreme values or because the question remained unanswered. A comparison of the two mean ages gives a difference of 2.4 years.

Table 12 visualises the results of the Independent Samples *t*-test. Levene's Test shows a *p*-value higher than 0.05, thus equal variances are assumed. As has been the case for our previous *t*-tests, we considered a directional (one-tailed) alternative hypothesis. Consequently, the *p*-value is 0.130 and thus greater than the 0.05 threshold for statistical significance.

Similar to the *t*-test concerning the first symptoms of dementia, we may assume that our results are statistically not significant.

GROUP STATISTICS					
	Number of languages	N	Mean	Std. Deviation	Std. Error Mean
Age of diagnosis	monolingual	37	77.2	10.266	1.688
	bilingual	41	79.6	7.963	1.244

Table 11: Mean age of diagnostic picture for monolingual and bilingual subjects

INDEPENDENT SAMPLES TEST										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Age of diagnosis	Equal variances assumed	3.092	0.083	-1.133	76	0.261	-2.345	2.069	-6.466	1.777
	Equal variances not assumed			-1.118	67.731	0.267	-2.345	2.096	-6.528	1.839

Table 12: *t*-test: measuring significance of age of diagnostic picture and mean age difference per sample

Question 5 c: Which test was administered to make the diagnosis of dementia?

Neurologists, neuropsychiatrists, psychiatrists or geriatric internists can determine whether patients suffer from dementia. In Belgium, on the one hand, dementia is diagnosed through a neurological examination, an EEG or a CAT scan. On the other hand, there are five main tests to make a diagnostic picture of dementia.

1. Mini-Mental State Examination (MMSE)

The MMSE is a screening tool which is used as a quick and objective instrument to measure possible cognitive impairment. The following areas of cognitive function are

tested: orientation in time and place, imprint capacity, attention, memory, language and constructive praxis.

The MMSE comprises a number of questions and commands. The test takes ten to fifteen minutes per person. Patients should take the test in a quiet environment and have sufficient time (ten seconds) to respond to each question. The patient may correct himself one time while the interrogator must stay neutral at every moment. The interrogator mostly reacts with 'yes' or 'OK' to cause the least interference possible. Before initiating the test, the interrogator must intend to make the patient feel at ease.

MMSE scores vary between 0 and 30. A patient receives one point for each good answer or well-executed command. However, when interpreting the result, different factors should be considered, such as age, level of education or mental state (e.g. depression). A final score lower than 24 out of 30 is considered as abnormal and therefore indicates significant cognitive impairment (Jansen-Cilag Academie 2002).

2. Basic Activities of Daily Living (B-ADL)

This test actually interviews the caregivers and takes ten minutes to administer. It inquires into the performances of the patient during daily activities spread over a period of four weeks. The Katz Basic Activities of Daily Living (ADL) Scale is used to evaluate the ability of the patient during basic daily activities. For instance, one question may be whether the patient is capable to wash or dress himself/herself independently.

Ideally, the test should be administered in a quiet environment to create an appropriate atmosphere which allows the caregiver to respond to more delicate or painful questions. At all times, the interrogator has to address only those questions relevant to the patient. For instance, if a person has never cooked a proper meal during his or her life, it is not relevant to determine whether the patient is able to prepare a meal now. In this case, the interrogator has to address a more appropriate question.

The Basic Activities of Daily Living questionnaire by Katz considers six basic domains: bathing, dressing, toileting, transferring, continence and feeding. Patients receive a score between 1 and 4 for each of the six domains. A score of one indicates that patients can function independently whereas a score of four means that patients completely depend on

others to carry out these basic tasks. The maximum score is 24. The lower the score, the better the patient is able to function independently (Jansen-Cilag Academie 2002).

3. Instrumental Activities of Daily Living (I-ADL)

The Instrumental Activities of Daily Living test is a variation of the Basic Activities Daily Living test. This test measures more complex abilities by using the Lawton-Brody Instrumental Activities of Daily Living Scale (IADL).

The Lawton-Brody Scale is divided into 9 domains. Each domain is graded on a three-part scale: one indicates that the patient can perform the given tasks without assistance whereas three shows that the patient is incapable of carrying out the task independently. The maximum score is 27. The higher the score, the more capable the patient is to carry out complex tasks such as handling finances.

In both the I-ADL and the B-ADL test, the interrogator should consider external or physical factors in grading the patients. For instance, a person of eighty years old will not be able to carry out tasks as swiftly as someone of thirty years old (Jansen-Cilag Academie 2002).

4. Neuropsychiatric Inventory (NPI)

The Neuropsychiatric Inventory is a questionnaire which assesses twelve behavioural disturbances. The NPI detects possible behavioural failures or changes in patients diagnosed with cognitive impairment. Subsequently, the test administers the frequency and the severity of these behavioural changes and analyses the impact they have on the patient.

The Neuropsychiatric Inventory mostly focuses on ten behavioural domains and two neurovegetative domains: delusions, hallucinations, agitation, depression, anxiety, night-time behaviour, apathy, disinhibition, irritability, aberrant motor behaviour, euphoria, and appetite and eating disorders.

This test, too, concerns interrogation of a well-informed caregiver. It may take ten to thirty minutes to administer the test, depending on the presence or the severity of behavioural failures or changes. All questions address the behavioural changes that have occurred between making the first diagnostic picture of dementia and the last visit to the

interrogator. Each question must be read literally and answered with 'yes' or 'no'. Each of the twelve domain evaluations consists of screening questions, subquestions, an assessment of the frequency and the severity, and an assessment of the emotional charge for the caregiver. Should the caregiver hesitate or respond affirmatively to screening questions, subquestions are then asked. If these subquestions are confirmed, the interrogator will determine the severity, frequency and distress for each of the behavioural domains.

The scores of the first ten questions are then added up. The total score may vary between 0 and 120. It equals the frequency multiplied by the severity of the behavioural failures or changes. A score of 0 demonstrates that there is no impairment whereas a score of 120 indicates heavy impairment (Jansen-Cilag Academie 2002).

5. Global Deterioration Scale (GDS)

The Global Deterioration Scale is based upon the findings of the interrogator in all the tests. He then gives a global impression of the disease stage.

The GDS is a scale that allows the interrogator to attribute every patient to one of the seven stages of the disease: normal (no cognitive decline), very mild cognitive decline, mild cognitive decline, moderate cognitive decline, moderately severe cognitive decline, severe cognitive decline and very severe cognitive decline (Jansen-Cilag Academie 2002).

Our results show that the majority of participants were unable to answer this question (cf. Appendix C Table 4). Sixty per cent of the bilingual sample could not recollect the method or test used to make the diagnostic picture. Results in both samples were alike and indicated that a neurological exam is the most common method to diagnose dementia. Furthermore, the Mini Mental State Examination and a CAT scan were frequently used as well. In rarer occasions, the diagnosis was made by means of an EEG or a questionnaire.

Question 6: (Family anamnesis) Has there been a previous case of dementia in the family?

The results for family anamnesis showed little difference between bilinguals and monolinguals (cf. Appendix C Table 5). In both groups, approximately 70% answered that there had not been any previous case of dementia in the family. Thus, as has been mentioned in 2.2.3, family anamnesis is only a minor risk factor as dementia is mostly not hereditary. However, in both samples, the percentages for our male subjects are significantly higher than the results for family anamnesis in women. We can therefore assume that men are more susceptible to incidents of family anamnesis.

Question 7: Which languages does the subject speak?

This particular question inquired into the language knowledge of our bilingual subjects. Relatives were asked which languages the subject had acquired during his or her life. The results showed that most of our bilingual subjects had acquired both Dutch (n=46) and French (n=48). English is the third foreign language with 8.4% whereas German occupies a fourth place with 7.5%. One subject's mother tongue was Norwegian whereas another male subject had acquired two Congolese dialects during his life (cf. Appendix C Table 6).

These results are consistent with the research findings of the Special Eurobarometer study *Europeans and their languages*. This survey was requested by the Directorate General for Education and Culture and coordinated by the Directorate General Press and Communication of the European Commission. The study indicated that "English remains the most widely-spoken foreign language throughout Europe" (2006: 12). Fifty-nine per cent of Belgian respondents answered they could speak English well enough to have a conversation compared to 27% who stated they had sufficient knowledge of German to carry out a conversation (2006: 13).

In view of these results, we should, however, keep in mind that the proficiency of each of the known languages may vary. For instance, a multilingual subject stated that he spoke both Dutch and French fluently, whereas he only had some notions of English and German.

Question 8: What is the subject's mother tongue?

The bilingual sample group showed a proportional representation of subjects whose mother tongue is Dutch or French, with no difference between men and women. Table 13 shows that 48% (n=24) of our respondents indicated Dutch as mother tongue compared to 46% (n=23) who stated that the subject's mother tongue was French. German, Norwegian and Spanish were each mentioned once as being a subject's mother tongue.

During the analysis of the results, another research question arose: is there a correlation between mother tongue and the age of onset of dementia? We decided to carry out a final *t*-test to measure this possible correlation, the results of which can be found in Table 15.

First, extreme values and the subjects with mother tongues German, Norwegian and Spanish were excluded for the test. The mean age of the first symptoms for subjects with Dutch as mother tongue is 79.3 years compared to a mean age of 80.36 years for subjects who spoke French as mother tongue (cf. Table 14).

Levene's Test indicated a *p*-value of 0.989, which is greater than the 0.05 threshold (cf. Table 15). We can therefore exclude the bottom row. Considering a one-tailed *t*-test, the *p*-value of 0.333 exceeds the 0.05 threshold for statistical significance. Thus, the results of this final *t*-test are not significant.

MOTHER TONGUE						
	Bilingual					
	Men		Women		TOTAL	
Dutch	7	46.7%	17	48.6%	24	48.0%
French	7	46.7%	16	45.7%	23	46.0%
German	0	0.0%	1	2.9%	1	2.0%
Norwegian	0	0.0%	0	0.0%	1	2.0%
Spanish	1	6.7%	1	2.9%	1	2.0%
TOTAL	15	100.0%	35	100.0%	50	100.0%

Table 13: What is the subject's mother tongue?

GROUP STATISTICS					
	Mother tongue	N	Mean	Std. Deviation	Std. Error Mean
Age of first signs	Dutch	23	79.30	8.059	1.680
	French	22	80.36	8.364	1.783

Table 14: Mean age of first signs for Dutch and French as mother tongue

INDEPENDENT SAMPLES TEST										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Age of first signs	Equal variances assumed	0.000	0.989	-0.433	43	0.667	-1.059	2.448	-5.997	3.878
	Equal variances not assumed			-0.432	42.709	0.668	-1.059	2.450	-6.002	3.883

Table 15: *t*-test: measuring significance of age of first signs and mother tongue per sample

Question 9: When was each of the languages used?

- ◆ Mother tongue

The majority of our bilingual subjects (88%) used their mother tongue on a daily basis. Those subjects who did not use their mother tongue on a daily basis indicated several circumstantial reasons such as retirement, marriage, moving and family which did not provide them the opportunity to use their mother tongue on a daily basis (cf. Appendix C Table 7).

- ◆ First foreign language

Table 8 in Appendix C illustrates the usage of the second language (or first foreign language). Forty per cent (n=20) of our bilingual sample group claimed to use their second language on a daily basis. Results showed that, relatively speaking, more men used the second language on a daily basis compared to women. According to the Eurobarometer survey, “47% of EU citizens who know at least one language apart from

their mother tongue indicate that they use foreign languages almost everyday” (European Commission 2006: 16).

Another 22% (n=11) mostly used their second language at the workplace. Twelve per cent (n=6) had mainly used the second language at school. Fourteen per cent of the female bilinguals particularly used the second language in conversations with their partner.

- ◆ Second or third foreign language

The majority of our multilingual subjects stated that they mostly needed their second or third foreign language at work (cf. Appendix C Table 9).

Question 10: When did the subject acquire the foreign language(s)?
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The results for the exact time of acquisition show little difference between the given answer possibilities (cf. Appendix C Table 10). Thirty-four per cent (n=24) had acquired the second language during their childhood. Another 27% (n=19) had learnt the second language through secondary education while 26% (n=18) had acquired the second language at work. Respondents could fill in more than one possible answer if the subject had acquired the foreign language over a longer period.

Question 11: How did the subject acquire the foreign language(s)?

Table 11 in Appendix C illustrates how our bilingual subjects acquired the foreign language. Respondents often gave multiple answers if the person had acquired the foreign language through several different manners.

Thirty per cent (n=22) answered that the subject was bilingual because of a bilingual parental situation. Another 20% (n=15) had acquired or improved the second language through work experience. In addition, 18% (n=13) had been raised in a bilingual region. Sixteen per cent (n=12) had learnt the second language through their partner or marriage.

3.4 Discussion

In the answers to our main research question, viz. does bilingualism have a protective effect on the onset of dementia in the Flemish Community of Belgium, we found a difference of approximately four to five months between the mean ages of onset of dementia in monolinguals and bilinguals. Neither the Independent Samples *t*-tests nor the ANOVA did validate any significance of our results. Given that the *t*-test's probability value associated with the difference between means for bilingual and monolingual subjects is 0.414, it is highly unlikely that a significant result ($p \leq 0.05$) would be obtained even if the sample size were increased considerably. The present survey can, therefore, not confirm whether there is an actual significant difference between the age of onset of dementia in monolingual and bilingual subjects in the Flemish Community of Belgium.

Other variables such as family anamnesis or mother tongue did not influence our results. Bilingual subjects did generally show a higher level of education and enjoyed a higher occupational status. More than half of the monolingual sample did not continue their education after primary school whereas the majority of our bilingual subjects completed secondary education or even higher education and university. Furthermore, a large majority of monolinguals were classified as labourers while most bilinguals were considered as employees. However, these findings did not affect our final conclusion.

As has been mentioned in 2.1.1, the term bilingualism covers a wide spectrum of definitions. This survey considered subjects as bilingual when they had spent an important part of their lives using two languages frequently, i.e. on a daily basis or at least several times during the week. However, relatives may have interpreted bilingualism differently. For instance, one relative indicated that the subject had acquired the second language during secondary school and at work. Thus, the question arises whether the subject's second language proficiency was sufficient to be considered as bilingual. The Canadian survey by Bialystok et al. (2007) appointed eleven judges specialised in behavioural research to determine whether patients should be classified as monolingual or bilingual. In their own study, they acknowledge that "the protective effect of bilingualism found in the present study cannot be generalized to individuals who have some knowledge of another language but are not fully bilingual" (2007: 462). Furthermore, they examined medical records of their patients to have certainty about the diagnostic picture. For instance, the MMSE scores of the initial visit to the memory

clinic were equivalent for both sample groups. Consequently, their research findings had a more firm bias to start from.

In addition, the present study asked the relatives of our subjects to determine when the first symptoms of dementia were noticed. This question implies a subjective answer and may lead to inconsistent measures. Relatives will have their own subjective conceptualization of awareness. Thus, the age of first signs may refer to different levels of awareness, such as memory problems, behavioural changes or altered daily activities.

The ANOVA in the present study, however, showed a correlation between gender and age of onset of dementia. Nevertheless, this correlation could not be confirmed by two additional *t*-tests. Our results showed a mean age difference of 5.2 years between monolingual men and women and a mean age difference of 3.5 years for bilingual men and women. According to a survey by the General Bureau for Statistics and Economic Information (Federale Overheidsdienst Economie, K.M.O., Middenstand en Energie 2008), men are more susceptible to dementia at an earlier age compared to women. Until the age of seventy, more men than women suffer from dementia. Thus, gender differences are important and cannot be ignored. However, the present study cannot statistically substantiate whether there is a significant difference concerning the age of onset of dementia in men and women.

4 CONCLUSION

The main objective of this dissertation was to ascertain whether bilingualism has a protective effect on the onset of dementia in the Flemish Community of Belgium. A survey in thirty-five rest homes by means of a questionnaire addressed to relatives or caregivers of both monolingual and bilingual patients diagnosed with dementia yielded a final sample of answers to 100 questionnaires from a total of twenty-two rest homes. Half of them were monolingual, the other half bilingual.

We measured the significance of the correlation between monolingual and bilingual subjects, and the age of onset of dementia by means of an Independent Samples *t*-test. The results indicated that our two sample groups show a mean age difference of approximately four to five months, which could not be considered as significant. Furthermore, we carried out an Analysis of Variance (ANOVA) test to examine the interaction between the dependent variable 'age of first signs', and the independent variables 'gender' and 'number of languages'. However, the results were not significant and the ANOVA, therefore, only confirmed the results of the *t*-test. In other words, our findings are not consistent with the significant 4.1 years difference of the Canadian study by Bialystok et al. (2007). Other variables such as family anamnesis, education, occupation and mother tongue did not show significant differences in mean age between monolingual and bilingual subjects. The ANOVA did confirm a significant difference in age of onset between male and female subjects. The results showed that, on average, men developed symptoms of dementia approximately 4 years earlier than women. However, these results were not substantiated by two additional *t*-tests.

The present study does however show a considerable difference in age of onset between Belgian and Canadian subjects. Bialystok et al. (2007) indicated that their monolingual subjects developed the first symptoms of dementia at 71.4 years whereas in our study, monolinguals showed the first symptoms of dementia at 78.8 years. Canadian bilingual subjects developed the first symptoms of dementia at 75.5 years compared to 79.1 years for our Belgian bilingual subjects. Thus, we may assume that Canadians are more likely to develop the onset of dementia at an earlier age than Belgians.

An analysis of our approach shows that our research suffered some limitations in relation to the survey conducted by Bialystok et al. For instance, the present study could not verify whether subjects who were considered bilingual by their relatives, could in fact be regarded as

fully bilingual. Given that all questionnaires were sent and returned through the post, we had little to no supervision over the selection of subjects. Since we had no control over this selection, we do not know whether the person who completed the questionnaire is a close relative or not. Therefore, we cannot be absolutely sure that the person in question knew the subject's complete history. Furthermore, the age of first signs involves a subjective estimate. The results were therefore solely based on the judgement of the relatives or caregivers.

The present findings require further investigation into a possible correlation between bilingualism and a later age of onset of dementia. Future research should first and foremost define selection criteria such as 'bilingualism' more closely. For instance, it would be advisable to appoint a panel of experts who can determine whether a subject is monolingual or bilingual. In addition, a similar study may benefit from a close cooperation between linguists, psychologist and neurologists, each contributing a high level of expertise in their field of study to the research.

The Flemish Community of Belgium constitutes the ideal starting point. During the last decade, the Flemish Parliament has been continuously underlining the importance and advantages of multilingual education. Furthermore, the sharp rise in the ageing population requests more thorough investigation into age-related diseases such as cognitive decline. In conclusion, the present study can be considered as an initial investigation into the correlation between bilingualism and the onset of dementia in the Flemish Community of Belgium.

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APPENDIX

Appendix A: Dutch and French questionnaires and accompanying letter

- **Accompanying letter in Dutch**

Geachte mevrouw

Geachte heer

Deze brief ontvangt u als familielid of kennis van een patiënt met dementie.

Mijn naam is Vanessa Scheir. Ik ben studente Master in de meertalige communicatie aan het departement Vertaalkunde van de Hogeschool Gent. In het kader van mijn opleiding zal ik dit jaar een masterproef schrijven over de invloed van tweetaligheid op de ontwikkeling van dementie.

Aan de hand van bijgevoegde enquête zal ik nagaan of er een verschil merkbaar is betreffende het ogenblik waarop eentalige en tweetalige patiënten aan dementie beginnen te lijden. In Canada hebben enkele onderzoekers reeds aangetoond dat tweetalige patiënten op latere leeftijd dementie ontwikkelen en het is de bedoeling na te gaan of dat hier in België, waar wij toch ook een tweetalige situatie kennen, ook het geval is.

Mag ik u vragen deze enquête zo goed als mogelijk in te vullen? Deze enquête is vrijblijvend en anoniem. De gegevens zal ik later verwerken in mijn masterproef.

Kan u de enquête aan de instelling terugbezorgen zodra u alles heeft ingevuld?

Indien u verdere vragen heeft, kan u mij steeds bereiken via e-mail vanessa_scheir@hotmail.com of per telefoon 0473/ 77 29 11.

Met vriendelijke groet

Vanessa Scheir

- **Questionnaire in Dutch**

**ONDERZOEK NAAR DE INVLOED VAN TWEETALIGHEID OP DE
ONTWIKKELING VAN DEMENTIE**

ENQUÊTE

1. Is de patiënt ééntalig, tweetalig of meertalig?

- Eéntalig Tweetalig
 Meertalig (De patiënt spreekt ... talen.)

2. Is de patiënt een man of een vrouw? (Kan u ook het geboortjaar vermelden?)

- Man Vrouw

**3. Waar heeft de patiënt een groot deel van zijn/haar leven gewoond?
(Meerdere antwoorden mogelijk)**

- Provincie Antwerpen Provincie West-Vlaanderen
 Provincie Limburg Wallonië
 Provincie Oost-Vlaanderen Andere:
 Provincie Vlaams-Brabant

4. a) Welk opleidingsniveau heeft de patiënt genoten?

- Lager onderwijs
 Secundair onderwijs
 Beroepsgericht Secundair Onderwijs
 Technisch Secundair Onderwijs
 Algemeen Secundair Onderwijs
 Hoger Onderwijs
 Hoger Onderwijs Korte Type (2 tot 3 jaar)
 Hoger Onderwijs Lange Type (4 jaar)
 Universiteit

b) Welk beroep heeft de patiënt lange tijd uitgeoefend?

.....

5. Wanneer werden de eerste tekenen van dementie opgemerkt bij de patiënt? (+ leeftijd)

.....

Wanneer werd door de arts de diagnose gesteld? Via welke test?

.....

6. Is er reeds een voorgeschiedenis van dementie in de familie?

- Ja Nee

De volgende vragen hoeven enkel ingevuld worden indien de patiënt tweetalig is.

7. Welke twee talen spreekt de patiënt?

- Nederlands Italiaans Spaans
 Frans Turks Duits
 Engels Marokkaans Andere:.....

[Bekijkt u ook nog even de vragen op de achterkant?]

8. Welke taal is de moedertaal?

.....

9. Wanneer werd elke taal gebruikt?

.....

10. Wanneer werd de tweede taal verworven?

(Indien er sprake is van meertaligheid, vermeld dan de talen boven de kolom.)

- | | |
|--|--|
| <input type="checkbox"/> Kindertijd | <input type="checkbox"/> Kindertijd |
| <input type="checkbox"/> Middelbare school | <input type="checkbox"/> Middelbare school |
| <input type="checkbox"/> Werk | <input type="checkbox"/> Werk |
| <input type="checkbox"/> Andere: | <input type="checkbox"/> Andere: |

11. Hoe werd de tweede taal verworven?

(Indien er sprake is van meertaligheid, vermeld dan de talen boven de kolom.)

- | | |
|--|--|
| <input type="checkbox"/> De patiënt had één of twee tweetalige ouders. | <input type="checkbox"/> De patiënt had één of twee tweetalige ouders. |
| <input type="checkbox"/> De patiënt is opgegroeid in een tweetalig gebied, maar thuis werd geen tweede taal gesproken. | <input type="checkbox"/> De patiënt is opgegroeid in een tweetalig gebied, maar thuis werd geen tweede taal gesproken. |
| <input type="checkbox"/> De patiënt is opgegroeid in twee verschillende taalgebieden. | <input type="checkbox"/> De patiënt is opgegroeid in twee verschillende taalgebieden. |
| <input type="checkbox"/> De partner van de patiënt sprak een andere taal. | <input type="checkbox"/> De partner van de patiënt sprak een andere taal. |
| <input type="checkbox"/> De patiënt werkte in een anderstalig gebied. | <input type="checkbox"/> De patiënt werkte in een anderstalig gebied. |
| <input type="checkbox"/> Andere: | <input type="checkbox"/> Andere: |

12. Kan ik voor verdere vragen in verband met deze enquête contact met u opnemen?

Gelieve uw contactgegevens hieronder te vermelden. (emailadres, telefoonnummer, ...)

.....

13. Indien u op de hoogte wenst gebracht te worden van de resultaten van dit onderzoek, vermeld dan hier uw contactgegevens.

.....

Hartelijk dank voor het invullen van deze enquête!

Vanessa Scheir
 Studente Master in de meertalige communicatie
 Departement Vertaalkunde – Hogeschool Gent

- **Accompanying letter in French**

Chère Madame

Cher Monsieur

Vous recevez cette lettre en tant que membre de la famille d'un patient qui est dément.

Mon nom est Vanessa Scheir. Je fais un Master en communication multilingue au Département de Traduction à l'Haute Ecole de Gand. Dans le cadre de ma formation, j'écris une thèse sur l'influence du bilinguisme sur le développement de la démence.

A l'aide de mon enquête, je voudrais examiner si le moment où les patients développent la démence, dépend du fait qu'ils soient monolingues ou bilingues. Au Canada, quelques chercheurs ont démontré que les patients bilingues développent la démence quand ils sont plus âgés. Le but est de voir si c'est également le cas en Belgique, où on connaît aussi une situation de bilinguisme.

Puis-je vous demander de remplir cette enquête aussi complètement que possible? L'enquête est sans engagement et anonyme. Je traiterai les données dans ma thèse.

Si vous avez des questions, vous pouvez toujours me contacter via e-mail vanessa_scheir@hotmail.com ou par téléphone 0473 /77 29 11.

Sincèrement

Vanessa Scheir

- **Questionnaire in French**

**RECHERCHE SUR L'INFLUENCE DU BILINGUISME SUR LE
DEVELOPPEMENT DE LA DEMENCE**

ENQUÊTE

1. Le patient, est-il monolingue, bilingue ou polyglotte?

- Monolingue Bilingue
 Polyglotte (Le patient parle ... langues.)

2. Le patient, est-il un homme ou une femme ? (Veuillez mentionner aussi l'année de naissance?)

- Homme Femme

3. Le patient, où a-t-il vécu la plupart de sa vie? (Plusieurs réponses possibles)

- Anvers Limbourg
 Brabant Flamand Wallonie
 Flandre Occidentale Autre:
 Flandre Orientale

4. a) Quel niveau de formation le patient a-t-il reçu?

- L'enseignement primaire
 L'enseignement secondaire
 L'enseignement secondaire professionnel
 L'enseignement secondaire technique
 L'enseignement secondaire général
 L'enseignement supérieur
 Haute Ecole (2 ou 3 ans)
 Haute Ecole (4 ans)
 Université

b) Quelle profession le patient a-t-il exercée ?

.....

5. Quand les premiers signes de démence ont-ils été remarqués chez le patient? (+ âge)

.....

Quand le diagnostic a-t-il été affirmé par le médecin?

.....

6. Y-avait-t-il déjà un cas de démence dans la famille?

- Oui Non

Les questions suivantes doivent être remplies uniquement si le patient est bilingue.

7. Quelles langues le patient parle-t-il?

- l'allemand le français le néerlandais
 l'anglais l'italien le turc
 l'espagnol le marocain autres:.....

8. Quelle est la langue maternelle?

.....

9. Quand est-ce que les langues ont été parlées?

.....

10. Quand est-ce que la deuxième langue a-t-elle été acquise?

(S'il y a question de plurilinguisme, veuillez mentionner les langues au-dessus de la colonne.)

- | | |
|---|---|
| <input type="checkbox"/> L'enfance | <input type="checkbox"/> L'enfance |
| <input type="checkbox"/> L'école secondaire | <input type="checkbox"/> L'école secondaire |
| <input type="checkbox"/> Au travail | <input type="checkbox"/> Au travail |
| <input type="checkbox"/> Autre: | <input type="checkbox"/> Andere: |

11. Comment est-ce que la deuxième langue a-t-elle été acquise?

(S'il y a question de plurilinguisme, veuillez mentionner les langues au-dessus de la colonne.)

- | | |
|---|---|
| <input type="checkbox"/> Le patient avait un ou deux parents bilingues. | <input type="checkbox"/> Le patient avait un ou deux parents bilingues. |
| <input type="checkbox"/> Le patient est éduqué dans un environnement bilingue mais à la maison on ne parlait qu'une langue. | <input type="checkbox"/> Le patient est éduqué dans un environnement bilingue mais à la maison on ne parlait qu'une langue. |
| <input type="checkbox"/> Le patient est éduqué dans deux régions linguistiques. | <input type="checkbox"/> Le patient est éduqué dans deux régions linguistiques. |
| <input type="checkbox"/> Le partenaire du patient parlait une autre langue. | <input type="checkbox"/> Le partenaire du patient parlait une autre langue. |
| <input type="checkbox"/> Le patient travaillait dans une région où on parlait une langue étrangère. | <input type="checkbox"/> Le patient travaillait dans une région où on parlait une langue étrangère. |
| <input type="checkbox"/> Autre: | <input type="checkbox"/> Autre: |

**12. Puis-je prendre contact avec vous si j'ai encore des questions concernant cette enquête ?
Veuillez donner vos données de contact ci-dessous (email, numéro de téléphone...).**

.....
.....
.....

13. Si vous souhaitez être au courant des résultats de cette enquête, pourriez-vous donner vos coordonnées?

.....
.....
.....

Merci beaucoup pour votre coopération!

Vanessa Scheir
Etudiante Master en communication multilingue
Département de Traduction – Haute Ecole de Gand

Appendix B: List of cooperating rest homes

BRUSSELS

Institut Pacheco Grootgodhuisstraat 7 1000 BRUSSEL 02/ 226 42 11	Résidence Clos Saint-Rémi Vandernootstraat 29 1080 SINT-JANS-MOLENBEEK 02/ 421 11 11	Residentie Van Zande Gentsesteenweg 645 1080 SINT-JANS-MOLENBEEK 02/ 482 08 80
Clos de la Quiétude Gemoedsrustlaan 15 1140 EVERE 02/ 702 09 20	Residentie De Fuchsias Fuchsiasstraat 26-28 1080 SINT-JANS-MOLENBEEK 02/ 414 62 39	Seniors OCMW Ottervangerstraat 69 1170 WATERMAAL-BOSVOORDE 02/663 08 00
Home Decamps Zaventemstraat 60 1140 EVERE 02/ 726 60 08	Residentie Scheutbos Gelukkige Grijsheidsstraat 1 1080 SINT-JANS-MOLENBEEK 02/ 482 17 11	

WEST FLANDERS

WZC Sint-Bernardus Koninklijkebaan 18 8660 DE PANNE 058/ 41 11 33	Belgisch Zeeinstituut Zeedijk 286-288 8400 OOSTENDE 059/ 70 51 80	Sint-Jozef Condédreef 16 8500 KORTRIJK 056/ 24 47 00
WZC Ten Anker Albert I-laan 71 8620 NIEUWPOORT 058/ 23 45 41	De Boarebreker Kairostraat 82 8400 OOSTENDE 059/ 55 50 15	Sint-Vincentius Groeningestraat 2 8500 KORTRIJK 056/ 22 59 39
WZC Sint-Anna Bulskampstraat 39 8630 BULSKAMP (Veurne) 058/ 31 31 67	Tehuis Sint-Elisabeth Zwaluwenstraat 2 8400 OOSTENDE 059/ 70 16 13	Biezenheem OCMW Hendrik Dewildestraat 10 8501 BISSEGEM (Kortrijk) 056/ 24 45 00
vzw Sint-Monica Ooievaarslaan 3 8400 OOSTENDE 059/ 55 11 00	Herdershove Oude Oostendsesteenweg 95 8000 BRUGGE 050/ 45 40 50	

EAST FLANDERS

Domino vzw Rusthuis Tempelhof Sint Margrietstraat 36 9000 GENT 09/ 235 44 88	WZC Sint-Jozef Leegstraat 17 9960 ASSENEDE 09/ 341 91 40
--	--

WALLONIA

Home Emmaus Chaussée de la Libération 9 7750 ORROIR (Mont-de-l'Enclus) 069/ 45 45 42
--

Appendix C: Data analysis – Tables

Table 1: Where did the subject primarily live during his/her life?

PROVINCE OR REGION													
	Monolingual						Bilingual						
	Men		Women		TOTAL		Men		Women		TOTAL		
Antwerp	0	0.0%	1	2.7%	1	2.0%	1	6.7%	0	0.0%	1	2.0%	
Brussels	1	7.7%	0	0.0%	1	2.0%	6	40.0%	11	31.4%	17	34.0%	
Limburg	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	
East Flanders	5	38.5%	13	35.1%	18	36.0%	1	6.7%	7	20.0%	8	16.0%	
Flemish Brabant	0	0.0%	1	2.7%	1	2.0%	0	0.0%	2	5.7%	2	4.0%	
West Flanders	4	30.8%	18	48.6%	22	44.0%	4	26.7%	12	34.3%	16	32.0%	
Wallonia	2	15.4%	3	8.1%	5	10.0%	2	13.3%	3	8.6%	5	10.0%	
Other													
	1	7.7%	0	0.0%	1	2.0%	0	0.0%	0	0.0%	0	0.0%	
	0	0.0%	0	0.0%	0	0.0%	1	6.7%	0	0.0%	1	2.0%	
	0	0.0%	1	2.7%	1	0.0%	0	0.0%	0	0.0%	0	0.0%	
TOTAL	13	100.0%	37	100.0%	50	100.0%	13	100.0%	37	100.0%	50	100.0%	

Table 2: Which is the highest level of education the subject graduated from?

EDUCATION													
	Monolingual						Bilingual						
	Men		Women		TOTAL		Men		Women		Total		
Primary Education	6	46.2%	25	67.6%	31	62.0%	4	26.7%	9	25.7%	13	26.0%	
Vocational Secondary Education	2	15.4%	7	18.9%	9	18.0%	3	20.0%	10	28.6%	13	26.0%	
Technical Secondary Education	2	15.4%	0	0.0%	2	4.0%	2	13.3%	3	8.6%	5	10.0%	
General Secondary Education	0	0.0%	2	5.4%	2	4.0%	2	13.3%	10	28.6%	12	24.0%	
Higher Education (3 years)	1	7.7%	3	8.1%	4	8.0%	0	0.0%	2	5.7%	2	4.0%	
Higher Education (4 years)	2	15.4%	0	0.0%	2	4.0%	0	0.0%	0	0.0%	0	0.0%	
University	0	0.0%	0	0.0%	0	0.0%	4	26.7%	1	2.9%	5	10.0%	
TOTAL	13	100.0%	37	100.0%	50	100.0%	15	100.0%	35	100.0%	50	100.0%	

Table 3: What was the subject's main occupation?

OCCUPATION												
	Monolingual						Bilingual					
	Men		Women		Total		Men		Women		Total	
Labourer	9	69.2%	20	54.1%	29	58.0%	8	53.3%	4	11.4%	12	24.0%
Employee	4	30.8%	5	13.5%	9	18.0%	7	46.7%	14	40.0%	21	42.0%
Housewife	0	0.0%	12	32.4%	12	24.0%	0	0.0%	14	40.0%	14	28.0%
Self-employed	0	0.0%	0	0.0%	0	0.0%	0	0.0%	3	8.6%	3	6.0%
TOTAL	13	100.0%	37	100.0%	50	100.0%	15	100.0%	35	100.0%	50	100.0%

Table 4: Which test was used to make the diagnostic picture?

DIAGNOSIS: TEST												
	Monolingual						Bilingual					
	Men		Women		Total		Men		Women		TOTAL	
CAT scan	0	0.0%	3	8.1%	3	6.0%	2	13.3%	3	8.6%	5	10.0%
EEG	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	2.9%	1	2.0%
Mini Mental State Exam	2	15.4%	3	8.1%	5	10.0%	1	6.7%	4	11.4%	5	10.0%
Neurological examination	2	15.4%	6	16.2%	8	16.0%	3	20.0%	6	17.1%	9	18.0%
Questionnaire	0	0.0%	1	2.7%	1	2.0%	0	0.0%	0	0.0%	0	0.0%
Unknown	9	69.2%	24	64.9%	33	66.0%	9	60.0%	21	60.0%	30	60.0%
TOTAL	13	100.0%	37	100.0%	50	100.0%	15	100.0%	35	100.0%	50	100.0%

Table 5: Has there been a previous case of dementia in the family?

ANAMNESIS												
	Monolingual						Bilingual					
	Men		Women		TOTAL		Men		Women		TOTAL	
Yes	6	46.2%	9	24.3%	15	30.0%	5	33.3%	6	17.1%	11	22.0%
No	7	53.8%	27	73.0%	34	68.0%	10	66.7%	26	74.3%	36	72.0%
Unknown	0	0.0%	1	2.7%	1	2.0%	0	0.0%	3	8.6%	3	6.0%
TOTAL	13	100.0%	37	100.0%	50	100.0%	15	100.0%	35	100.0%	50	100.0%

Table 6: Which languages does the subject speak?

LANGUAGE KNOWLEDGE						
	Bilingual					
	Men		Women		TOTAL	
Dutch	13	30.9%	33	42.9%	46	38.7%
French	15	35.7%	33	42.9%	48	40.0%
English	5	11.9%	5	6.5%	10	8.4%
Turkish	1	2.4%	0	0.0%	1	0.9%
Italian	1	2.4%	0	0.0%	1	0.9%
Moroccan	0	0.0%	0	0.0%	0	0.0%
Spanish	1	2.4%	1	1.3%	2	1.7%
German	5	11.9%	4	5.1%	9	7.6%
Other						
Congolese dialect	1	2.4%	0	0.0%	1	0.9%
Norwegian	0	0.00%	1	1.3%	1	0.9%
TOTAL	42	100.0%	77	100.0%	119	100.0%

Table 7: Usage mother tongue

USAGE MOTHER TONGUE						
	Bilingual					
	Men		Women		TOTAL	
Daily basis	14	93.3%	30	85.7%	44	88.0%
Family	0	0.0%	1	2.9%	1	2.0%
Daily until pension	0	0.0%	1	2.9%	1	2.0%
Daily until marriage	0	0.0%	1	2.9%	1	2.0%
Daily until moving	1	6.7%	1	2.9%	2	4.0%
Work	0	0.0%	1	2.9%	1	2.0%
TOTAL	15	100.0%	35	100.0%	50	100.0%

Table 8: Usage first foreign language

USAGE FIRST FOREIGN LANGUAGE						
	Bilingual					
	Men		Women		TOTAL	
Daily	8	53.3%	12	34.3%	20	40.0%
Often	0	0.0%	3	8.6%	3	6.0%
Occasionally	0	0.0%	2	5.7%	2	4.0%
Work	4	26.7%	7	20.0%	11	22.0%
School	3	20.0%	3	8.6%	6	12.0%
Family	0	0.0%	1	2.9%	1	2.0%
Partner	0	0.0%	5	14.3%	5	10.0%
After moving	0	0.0%	2	5.7%	2	4.0%
TOTAL	15	100.0%	35	100.0%	50	100.0%

Table 9: Usage second or third foreign language

USAGE SECOND OR THIRD FOREIGN LANGUAGE						
	Bilingual					
	Men		Women		TOTAL	
Work	4	66.7%	4	80.0%	8	72.7%
Partner	1	16.7%	0	0.0%	1	9.1%
Military service	1	16.7%	0	0.0%	1	9.1%
After moving	0	0.0%	1	20.0%	1	9.1%
TOTAL	6	100.0%	5	100.0%	11	100.0%

Table 10: When did the subject acquire the foreign language?

LANGUAGE ACQUISITION (WHEN)						
	Bilingual					
	Men		Women		TOTAL	
Childhood	11	40.7%	13	29.5%	24	33.8%
Secondary Education	6	22.2%	13	29.5%	19	26.8%
Work	7	25.9%	11	25.0%	18	25.4%
Other						
Moving	0	0.0%	3	6.8%	3	4.2%
Marriage/partner	0	0.0%	3	6.8%	3	4.2%
Social contact	0	0.0%	1	2.3%	1	1.4%
University	2	7.4%	0	0.0%	2	2.8%
Military Service	1	3.7%	0	0.0%	1	1.4%
TOTAL	27	100.0%	44	100.0%	71	100.0%

Table 11: How did the subject acquire the foreign language?

LANGUAGE ACQUISITION (HOW)						
	Bilingual					
	Men		Women		TOTAL	
Parents	7	28.0%	15	30.6%	22	29.7%
Bilingual region	2	8.0%	11	22.4%	13	17.6%
Two language regions	3	12.0%	2	4.1%	5	6.8%
Partner	3	12.0%	9	18.4%	12	16.2%
Work	8	32.0%	7	14.3%	15	20.3%
Other						
Moving	0	0.0%	2	4.1%	2	2.7%
Social contact	0	0.0%	2	4.1%	2	2.7%
Other FL at home	0	0.0%	1	2.0%	1	1.4%
Military service	1	4.0%	0	0.0%	1	1.4%
University	1	4.0%	0	0.0%	1	1.4%
TOTAAL	25	100.0%	49	100.0%	74	100.0%

- Data bilingual subjects

		A	B	C	D	E	F	G	H	I	J
1	Bilingual	1	1	1	1	1	1		1		1
	Multilingual							1		1	
2	Man				1						
	Woman	1	1	1		1	1	1	1	1	1
3	Antwerp										
	Brussels	1				1	1	1		1	
	Limburg										
	East Flanders										
	Flemish Brabant								1		
	West Flanders		1	1	1						
	Wallonia										1
	Other										
4a	PE	1	1	1		1	1				
	VocSE				1						
	TechSE							1			
	GenSE								1		1
	HE(3y)									1	
	HE(4y)										
	Univ										
4b	Occup	emp	emp	hw	lab	ind	emp	emp	hw	emp	emp
5a	Age 1st signs	101	76	77	75	53	72	76	65	88	79
5b	Age diag	101	76	82		54	72	79		88	79
	Test?	MMSE				CAT		NE			
6	Hist yes				1						
	Hist no	1	1	1		1	1	1	1	1	1
7	Dutch	1	1	1	1	1	1	1	1	1	
	French	1		1	1	1	1	1	1	1	1
	English							1		1	1
	Turkish										
	Italian										
	Moroccan										
	Spanish										
	German		1					notions	notions		
Other											
8	Mother tongue	French	German	Dutch	Dutch	Dutch	French	French	Dutch	French	French
9	Usage MT	retire-	marry-	daily	daily	youth/work	daily	daily	daily	daily	daily
	Usage FL1	move(70)	marry+	often	work	work	daily	D:work	school	daily	school
	Usage FL2							E:work		work	
10	Childhood			1		1			1		
	SE				1			1			1
	Work				1	1	1	1		1	
	Other	move+	marry								
11	Parents						1		1		1
	Bilingual region			1		1	1	1	1		1
	2lang regions										
	Partner		1								
	Work				1			1		1	
Other	move										
12	YES										
	NO	1	1	1		1	1	1	1	1	1
13	YES						1				
	NO	1	1	1		1		1	1	1	1

		U	V	W	X	Y	Z	AA	AB	AC	AD
1	Bilingual	1		1	1	1	1		1		1
	Multilingual		1					1		1	
2	Man				1			1		1	
	Woman	1	1	1		1	1		1		1
3	Antwerp										
	Brussels			1	1	1			1		
	Limburg										
	East Flanders										
	Flemish Brabant										
	West Flanders	1	1				1			1	1
	Wallonia							1			
	Other										
4a	PE						1				1
	VocSE		1	1							
	TechSE										
	GenSE	1				1			1		
	HE(3y)										
	HE(4y)										
	Univ				1			1		1	
4b	Occup	hw	emp	ind	emp	hw	hw	emp	emp	lab	hw
5a	Age 1st signs	88	90	84	81	85	83	70	87	84	82
5b	Age diag	89		86	81	87	83	70		84	83
	Test?			MMSE	MMSE		NE	NE			
6	Hist yes			1				1			
	Hist no	1	1		1	1	1		1	1	1
7	Dutch	1	1	1	1	1		1	1	1	1
	French	1	1	1	1	1		1	1	1	1
	English			notions				1		1	
	Turkish										
	Italian							1			
	Moroccan										
	Spanish		1								
	German		1				1	1		1	
	Other						Norwegian			Cong	
8	Mother tongue	French	Dutch	French	French	Dutch	Norwegian	French	French	Dutch	Dutch
9	Usage MT	daily	daily	daily	daily	daily	family	daily	daily	daily	daily
	Usage FL1	school	F:partner	daily	daily	daily	partner	D:daily	daily	F:daily	work
	Usage FL2		S:move+					work		work	
10	Childhood				1	1		1	1	1	
	SE	1	1	1	1						
	Work		1							1	1
	Other		move+				partner	univ			
11	Parents			1				1	1	1	
	Bilingual region				1	1					
	2lang regions				1						
	Partner		1				1				
	Work		1		1			1		1	1
	Other	FLhome									
12	YES	1	1		1	1	1	1	1	1	1
	NO			1							
13	YES	1	1		1	1	1	1	1	1	
	NO			1							1

		AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
1	Bilingual	1	1	1	1	1	1	1	1	1	1
	Multilingual										
2	Man						1	1	1	1	
	Woman	1	1	1	1	1					1
3	Antwerp									1	
	Brussels				1		1	1			
	Limburg										
	East Flanders			1		1			1		
	Flemish Brabant										
	West Flanders	1	1								
	Wallonia										1
	Other										
4a	PE						1				
	VocSE	1			1			1		1	
	TechSE			1		1			1		
	GenSE										1
	HE(3y)		1								
	HE(4y)										
	Univ										
4b	Occup	hw	emp	hw	emp	emp	lab	lab	emp	lab	hw
5a	Age 1st signs	91	68	83	74	74	83	78	74	89	84
5b	Age diag		68	84	74	80	83		75		85
	Test?					MMSE					
6	Hist yes		1	1		1				1	
	Hist no	1			1		1	1	1		1
7	Dutch	1	1	1	1	1	1	1	1	1	1
	French	1	1	1	1	1	1	1	1	1	1
	English		notions								
	Turkish										
	Italian										
	Moroccan										
	Spanish		notions								
	German		notions								
Other											
8	Mother tongue	French	Dutch	Dutch	French	Dutch	Dutch	French	Dutch	Dutch	French
9	Usage MT	daily	daily	daily	daily	daily	daily	daily	daily	daily	daily
	Usage FL1	marry+	daily	partner	daily	work	work	school	daily	work	often
	Usage FL2										
10	Childhood				1			1	1		
	SE		1	1		1		1			
	Work					1	1			1	
	Other	marry(24)									move+
11	Parents	1	1	1	1				1		
	Bilingual region										
	2lang regions							1			
	Partner	1									
	Work		1			1	1			1	
Other										soc	
12	YES	1	1	1	1	1	1	1	1	1	1
	NO										
13	YES		1	1		1	1		1	1	1
	NO	1			1			1			

Dissertatiegegevens bij fiche

Titel van de scriptie

The influence of bilingualism on the onset of dementia.
A survey in the Flemish Community of Belgium.

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Taal van de scriptie

Engels

Vrije trefwoorden

tweetaligheid
dementie
enquête
replica-studie

Trefwoorden en annotatie

Trefwoord:

Studie in de meertalige communicatie

Annotatie:

Bialystok, Ellen, Craik, Fergus I.M., & Freedman, Morris 2007 Bilingualism as a protection against the onset of symptoms of dementia. *Neuropsychologia*, vol. 45, issue 2, 459-464.

Iwetocodes

H363-sociolinguïstiek
H350-linguïstiek

Doelstelling, methode en resultaten

Doelstelling:

Het doel van deze masterproef is te bepalen of tweetaligheid het begin van dementie zou kunnen vertragen. Een studie van de Canadese onderzoekers Bialystok, Craik and Freedman (2007) heeft aangetoond dat bij tweetaligen dementieverschijnselen ongeveer vier jaar later dan bij eentaligen optreden. Deze masterproef zal aan de hand van een replica-studie onderzoeken of tweetaligheid een dergelijk positief effect heeft op ouderen in Vlaanderen en Brussel.

Methode:

Deze masterproef werd ontwikkeld aan de hand van het onderzoek van Bialystok et al. (2007). Er werd een vragenlijst opgesteld die in totaal 13 vragen bevatte. Eerst werden enkele algemene vragen gesteld om het profiel van de patiënt te schetsen. Vervolgens werd gepeild naar de talenkennis van de patiënt. Uiteindelijk werd een populatie van 100 patiënten met dementie uit een twintigtal rusthuizen in Vlaanderen en Brussel samengesteld, waarvan de helft als tweetalig werd beschouwd. De resultaten van de enquêtes werden opgenomen in een dataset en getoetst op significantie aan de hand van een statistische t-test en ANOVA in SPSS.

Resultaten:

De resultaten van het onderzoek toonden aan dat eerste tekenen van dementie bij tweetalige dementerende patiënten ongeveer vier tot vijf maanden later optreden dan bij eentalige dementerenden. Zowel de t-test als de ANOVA bevestigden dat dit verschil statistisch gezien weinig significant was. Variabelen zoals opleiding, beroep of voorgeschiedenis van dementie bleken geen invloed te hebben op dit uiteindelijke resultaat. Daarnaast toonde de ANOVA echter wel een significant verschil aan tussen mannen en vrouwen onderling. Mannen bleken gemiddeld vier jaar vroeger vatbaar voor dementia dan vrouwen. De significantie van dit verschil werd evenwel niet bevestigd door de t-test.