Intelligibility of L2 Specialist Oral Discourse: the Study of a Small Corpus of French Psychologists

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Année universitaire 2017-2018
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Acknowledgements

I would like to express my gratitude to my directors Linda Terrier and Henri Le Prieult for their support and advice throughout.

I would also like to thank Laura Vandendorpe for taking the time to check my transcriptions and Thomas Bonnet for his technical help.

Finally, I must thank my parents and JP for always encouraging me and being positive.
Abstract

This dissertation investigates the factors involved in achieving intelligibility in L2 specialist discourse. It is motivated by a desire to improve the intelligibility of French LANSAD students’ pronunciation. With the future of these students in mind, a corpus of four French psychologists presenting their research at an international conference has been chosen as the focus of study.

The first part reviews previous research in the fields of language acquisition, intelligibility, specialist discourse, listening comprehension and pronunciation in order to establish a listening grid through which to analyse the intelligibility of the corpus. The listening grid focuses on three key elements: pronunciation, technical vocabulary and academic presentation codes. Research suggested that the mispronunciation of the /h/, vowel contrasts, vowel reduction, consonant clusters, the non-aspiration of fortis plosives and the misplacement of word stress and sentences stress would impede intelligibility; that familiarity with the specific domain and technical vocabulary would facilitate intelligibility; and that adhering to academic presentation codes would also aid understanding.

The second part describes the corpus itself, the methodology used and discusses the results of the analysis. In fact, in this study, the mispronunciation of vowel contrasts and the misplacement of word stress and sentence stress hindered intelligibility but the mispronunciation of the /h/, vowel reduction and the non-aspiration of fortis plosives did not appear to do so. It was not possible to evaluate the impact of the mispronunciation of consonant clusters as they were pronounced in the standard way. Familiarity with the technical domain, however, proved to be far more crucial than initially thought. Two of the four presentations were deemed unintelligible due to the great number of unfamiliar technical vocabulary and concepts. Finally, all of the presentations followed the traditional academic codes. This appeared to help but did not overcome the lack of familiarity with the domain, in this case psychology.

These results reveal the complexity of intelligibility. While more research is needed, they also suggest that vowel contrast, word stress and sentence stress deserve more attention in the classroom.
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INTRODUCTION: The many facets of intelligibility
I have devised a small corpus from which I will analyse the oral presentations of four French psychologists in order to assess the intelligibility of their English. The aim will be to investigate which factors affect the intelligibility of L2 specialist oral discourse and assess whether the presentations are ultimately intelligible or not, in the hope that this will enable future researchers to better understand the phenomenon of intelligibility and subsequently that their research may allow teachers to help their students achieve intelligible communication.

Why intelligibility? I have been fascinated by pronunciation for as long as I can remember. As a child discovering the regional variations of my own language, English, and later coming into contact with foreign variations of English. As an English as a Foreign Language teacher in France and as a speaker of foreign languages myself, I have noticed that native pronunciation is incredibly difficult to master. More often than not, students retain a foreign accent that can be easily traced back to their first language. Even those who lose obvious traces of their first language can still be instantly identified as non-native speakers. This phenomenon intrigued me and still does.

Research in the fields of first and second language phonological acquisition has allowed us to better understand the way infants learn to speak their first language and adults their second or third. If we compare first language acquisition with second language acquisition there are several differences: age, instruction and social environment. Infants begin to perceive language in the womb and, according to many studies (especially those of neurolinguist Kuhl 2004 and 2010), possess incredible perceptive and aural capabilities that do not appear to continue on into adulthood. In addition to this, infants are not formally taught how their language works. They simply acquire language through natural input in a social environment, which brings us to the third difference. Second language acquisition usually takes place in a classroom setting rather than a social one. However, studies (Clark, 2004, 2009; Kuhl 2004, 2010; Ioup 1995) have shown that language learning is facilitated in a social environment as the brain makes connections between its different domains. These differences seem to affect the ultimate attainment of native pronunciation thus, in view of this, is native pronunciation really necessary?

As I shall explain in due course, there are many reasons why native pronunciation is an idealistic objective for students that is virtually unattainable. With this being the case, it seems more reasonable to investigate ways to help students to have intelligible pronunciation rather than native pronunciation. But what does it mean to be intelligible? Intelligibility seems to mean that a person can be understood regardless of the accent he or she possesses. The goal is being understood not
perfecting native phonology; a far more realistic aim. However, intelligibility is a multi-faceted phenomenon that involves not only speakers but listeners too. There are many elements to bear in mind such as: how does the listener perceive intelligibility from a native speaker and a non-native speaker perspective? Is there a significant difference between the two? What is intelligibility from the speaker’s point of view (ie. in terms of pronunciation) rather than from the listener’s point of view? Is there a scale of intelligibility and if so, what are some salient phonological characteristics of the English language, as pronounced by French learners, that can help build such a scale? Do some situations involve different levels of intelligibility? It is clear that the question of intelligibility is a complex one but I aim to address these questions in this study.

With the new goal of intelligibility in mind, it is necessary to understand how students can achieve it. In order to do this, we need to investigate the different factors involved in intelligible communication. Having taught in the three types of English degree program available to French students, I was able to observe the fact that LANSAD students spend the least time studying English per week and are therefore most in need of a succinct pronunciation syllabus that allows them to be intelligible communicators. The three different programs that allow students to study English are LLCE¹ (Classical English Studies), LEA² (Business English) and LANSAD³ (English for Non-Specialists). LANSAD is an option that is open to students from other degree programs. They may be studying History, Music, Art, Sociology, Psychology or a number of other subjects and decide to study English as an optional class. These students can enrol in classes of different levels from A1 to C1 (CEFR). When they leave University they may or may not use English in their workplace but if they were to do so, it would most likely be for communicative purposes. This being the case, it would not be essential for them to achieve native-like pronunciation but rather intelligible pronunciation.

Although a study assessing the intelligibility of my own students’ communicating with one another would have been pertinent and informative, the limitations such as time constraints, instability, etc., soon became apparent. Instead, I turned my attention to existing corpora. It was necessary, therefore, to establish and narrow down the focus of study whilst keeping in mind the objectives of LANSAD students. The majority of LANSAD students in my classes come from the sociology and psychology departments. Excluding for the purpose of leisure, the most common use for their

1 Langues, Littératures et Civilisations Étrangères
2 Langues Étrangères Appliquées
3 Langues pour Spécialistes d’Autres Disciplines
English language skills after graduation would probably be in an intellectual capacity and, if so, they would need to write scholarly articles in English or present their work to the international community at conferences. Therefore, they would not only be using English but specialist discourse. For this reason, I decided to research the existing oral English language corpora available in an attempt to find a French speaker using English in specialist context, preferably in the fields of sociology or psychology.

Not only was it difficult to find oral corpora, which are few and far between, but it was also difficult to find English language corpora that featured non-native speakers. The majority of English language corpora are centred on native-speakers’ use of English. Hence it became necessary to develop my own corpus. I have chosen to work on the *18th International Conference on Perception and Action* (ICPA 18) at the University of Minnesota in July 2015, in particular, four presentations in which French psychology scholars share their findings. As these presentations are inherently specialist in nature, they raise more questions about intelligibility: how does specialist discourse affect intelligibility? Does the listener need to be knowledgable on the topic for intelligible communication to take place? Does the speaker need to perfect the pronunciation of specific terminology? These are also questions, this study will address.

Intelligibility is an intricate, labyrinthine process, a layer of which this study hopes to unveil. Part one will investigate the work of previous researchers in order to develop a listening grid to analyse the corpus and part two will assess the intelligibility of the four oral presentations and the results will be discussed. Finally, this study concludes with the implications of the findings on future research and pedagogy.
PART ONE: Theoretical framework
1.1. Native pronunciation: an unnecessary demand

There are many reasons why encouraging students to achieve native pronunciation is unrealistic which this section aims to underline. First and foremost, it is widely agreed that it is incredibly difficult, nigh on impossible to obtain native phonology after a certain age; a phenomenon known as the Critical Period Hypothesis. Secondly, there are a variety of affective reasons for which L2 speakers have difficulty achieving or choose not to obtain native phonology such as motivation, loss of confidence, personality traits or the desire to retain their foreign accent. Thirdly, the globalisation of the English language means that nowadays English is being spoken around the world in many different contexts and a great number of these contexts involve non-native speaker interactions, which begs the question: without the presence of native speakers why should native pronunciation be achieved as long as communication is successful?

1.1.1. The critical period hypothesis

The Critical Period Hypothesis suggests that adults are unlikely to reach a native level in their second language acquisition. In phonological terms it implies that it is almost impossible to achieve native-like pronunciation as it proposes a period of time after which it is incredibly difficult to produce certain phonetic units and to perfect prosodic elements that differ from the mother tongue. It even seems to be difficult to perceive different units of sound. Researchers have endeavoured to ascertain the specific point at which this takes place and understand why it happens.

The Critical Period Hypothesis was “originally proposed in the neurolinguistic literature by Penfield and Roberts (1959) and vigorously followed up by Leneberg (1967)” (Bialystok & Wiley, 2003, p.31). Researchers discovered that proficiency levels declined in correlation with the increasing age that the learner began to acquire the second language. These findings are very difficult to interpret though as variants such as age and duration of exposure coupled with differences in social and linguistic background can have a great impact on language acquisition. In addition to this “there is little consensus about what age constitutes the critical point” (Bialystok & Wiley, 2003, p.31). Some scholars believe the age to be as young as five years old, others believe that it begins with the onset of puberty. In a study in 2003 Bialystok and Wiley stated that they “found no evidence of such discontinuity in language learning potential. Instead, the most compelling finding was that the degree of success in second language acquisition steadily declines throughout the life span” (p.37).
These discoveries have an important impact on the field of language acquisition. If this decline also holds true for phonological acquisition, we should question the use of promoting native pronunciation for our students.

According to American linguist, Ioup, there are two features that differ in child and adult language acquisition: “The first is ultimate attainment: children succeed in becoming bona fide native speakers, adults by and large don’t. The second relates to what has been referred to as input enhancement” (2008, p.95). That is to say how much explicit information is given on form. Children receive little to no input on form whereas adults are often instructed and corrected through the use of rules. Ioup evaluates the use of form-focused instruction versus primary learning data that children use to acquire language. In terms of phonology infants and children receive primary learning data by listening to their parents around the clock but they receive virtually no form-focused instruction as to how phonetic units are grouped together, when to stress syllables or words in a sentence. Yet, despite the lack of formal instruction they achieve native pronunciation. The same does not appear to be true for adults or even teenagers.

The psycholinguist/neurolinguist, Scovel, (1969) argues that there is a critical period but only in phonology. He believes that as our brains develop the ability to produce a native-like accent diminishes due to the neuro-motor connection that takes place when we speak. Speech is the only part of language that requires a physical effort and therefore may be affected by physical phenomena that we are as yet unaware of. He posits that the discrepancy between children and adults is due to physical causes rather than environmental ones, despite popular belief at the time he was writing. “Most linguists and psychologists have sought to explain this discrepancy in terms of nurture rather than nature: that there are environmental differences between child-learning and adult-learning that account for the superior ability of children to master languages without a foreign accent.” (1969, p.246). In contrast he believes that:

“there is a distinction made between the complete ability of all children to acquire language which I call a trait, and the varying abilities of adults to master a language which I call a skill. Nurture theories can account, to some extent, for the varying skills of adult speakers in learning a language, but they cannot account for the trait of all children to acquire a language.” (1969, p.248).

For Scovel this trait, as opposed to skill, found in children compels us to interpret phonological acquisition as a force of nature “which determines our ability to speak without a foreign accent”
(1969, p.249) rather than a nurturing environment. This nativist perspective suggests that speaking without a foreign accent is virtually impossible for L2 learners.

Flege, Munro and Mackay investigated the relationship between the age of learning English and the perception of a foreign accent in native Italian subjects. They found that native Italian speakers who learnt English after the age of 15 were consistently perceived as having a foreign accent. This study seems to support the Critical Period Hypothesis. Nevertheless, they highlight the fact that researchers are still unsure of what causes this critical period:

“Some believe that age-related changes in L2 pronunciation are due to a loss of neural plasticity, or to neurofunctional reorganization which affects the processing and/or storage in long-term memory of information pertinent to the L2 sound system…However, many other explanations for foreign accents have been proposed in the literature, including attitudinal and psychosocial factors” (1995, p.3125).

Though the reasons for this phenomenon are unclear, evidence seems to point towards a critical period for phonological acquisition. If we take this research into account, then we need to focus on achieving intelligible pronunciation rather than attaining native pronunciation. The CEFR sets out an appropriate list of phonological objectives for L2 learners:

“C2 - As C1
C1 - Can vary intonation and place sentence stress correctly in order to express finer shades of meaning.
B2 - Has acquired a clear, natural, pronunciation and intonation.
B1 - Pronunciation is clearly intelligible even if a foreign accent is sometimes evident and occasional mispronunciations occur.
A2 - Pronunciation is generally clear enough to be understood despite a noticeable foreign accent, but conversational partners will need to ask for repetition from time to time.
A1 - Pronunciation of a very limited repertoire of learnt words and phrases can be understood with some effort by native speakers used to dealing with speakers of his/her language group.” (CEFR, 2001, p.116)

This framework puts emphasis on being intelligible and natural rather than speaking without a foreign accent; goals which are more realistic for students. With this new objective in mind,
teachers are able to concentrate on reducing the phonological variations that impede intelligibility instead of eliminating variation altogether.

In recent years, given the compelling findings supporting the Critical Period Hypothesis, many linguists (Morely, 1991; Levis, 2005; Derwing & Munro, 2005) have argued that intelligibility is a more realistic goal. Levis divides pronunciation objectives into two principles: the nativeness principle and the intelligibility principle. For the former, native pronunciation is the ultimate goal whereas the latter deems intelligibility as the more realistic aim. The nativeness principle was dominant before the 1960s, but Critical Period Hypothesis research discouraged this view since “factors such as motivation, amount of first language (L1) use, and pronunciation training are positively correlated with more native-like pronunciation, but none of these other factors seems to overcome the effects of age” (2005, p.370). The intelligibility principle, on the other hand, postulates that one simply needs to be understood and “recognizes that communication can be remarkably successful when foreign accents are noticeable or even strong, that there is no clear correlation between accent and understanding” (2005, p.370). This implies that having native pronunciation is not necessary in order to be understood.

Not only is native pronunciation unnecessary, it can have a particularly negative impact on learners. Morley argues that if teachers set unrealistic goals for their students the effect could be detrimental and could even demotivate certain students who would see native pronunciation as an impossible goal. She believes that teachers should enable students to be “not ‘perfect pronouncers’ of English…but intelligible, communicative, confident users of spoken English, for whatever purposes they need” (1991, p.489). Her words highlight the implausibility of setting nativeness as the pronunciation standard and the need for mutual understanding. The Spanish linguist, Cortes Moreno, also advocates the importance of communication. He believes that “un acento extranjero es un fenómeno perfectamente comprensible y aceptable; no tiene por qué ser motivo de inquietud, a menos que entorpezca la inteligibilidad y, por ende, la comunicación” (Cortes Moreno, 2000, p.104) but he does bring forth an interesting point: “Cuando puede afirmarse que el habla de un aprendiente es inteligible?” (Cortes Moreno, 2000, p.104). Intelligibility is difficult to define and there is little consensus on a strict definition. As Derwing and Munro point out, more research into how to assess intelligibility is necessary: “Researchers need to explore how several factors interact

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4 “a foreign accent is a perfectly understandable and acceptable phenomenon; it should not be cause for dismay, unless it hinders intelligibility or, as a result, communication” (Cortes Moreno, 2000, p.104)

5 “When can we be sure that a learner’s speech is intelligible?” (Cortes Moreno, 2000, p.104)
at prosodic, segmental, and voice quality levels” (Derwing & Munro, 2005, p.391). They argue that this would in turn enable teachers to understand pronunciation difficulties and how to resolve them as they would be able to isolate factors that cause intelligibility problems. These are questions for teachers and linguists alike: which deviations cause a breakdown of intelligibility and, thus, which elements of pronunciation are absolutely necessary for intelligible communication and which are simply superfluous? The following section will look at how emotional factors affect phonological acquisition.

1.1.2. Affective factors impact on phonological acquisition

There are a number of affective reasons that may prevent a student from wanting to achieve native pronunciation. If the student does not wish to lose their L1 foreign accent and yet achieve intelligible communication who are we to say the contrary? Some learners are discouraged by the aim of native pronunciation as it seems (rightly so) an impossible goal. They may feel that there is no point in trying to achieve a pronunciation standard that will never be perfect and therefore lose motivation or lack confidence. As Morley affirms:

“At best, perfectionistic performance goals turn out to be unrealistic; at worst, they can be devastating: They can defeat students who feel that they cannot measure up, and they can frustrate teachers who feel they have failed in their job. How fortunate it is that perfect or native-like pronunciation is not a necessary condition for comprehensible communicative output.” (1991, p.498).

Morley is not alone in suggesting affective factors play a role in students’ pronunciation performance, Canadian psychologist, Gayle, argues that the “integrative motive” which refers to a strong desire to integrate oneself into the target language community and high levels of motivation to learn the target language can greatly enhance the learning outcome. Having a positive attitude towards the target country and people, the language itself, and the teacher all correlate with better acquisition. According to Gayle, “this specific orientation has loaded regularly on the attitudinal/motivational factor related to achievement and/or has displayed positive correlations with oral skills in second language learning” (1981, p.57). As teachers, we must therefore encourage a positive atmosphere in our classrooms and rethink the way we perform phonological error
correction. Rather than focusing on each minute detail, we can concentrate on only the elements that are crucial for intelligible communication.

Flege emphasises the impact of conformity and societal pressure on phonological acquisition which appears to be less present in adults. He echoes the work of Macnamara (1973) who “suggested that part of the reason children seem to pronounce foreign languages better than adults is that they generally feel stronger pressure from their peers to conform to the phonetic norms of the surrounding speech community.” (Flege, 1988, p.254). Macnamara, himself, even goes as far as saying that while most adults and teenagers have great difficulty in attaining a native accent in English, “this does not mean that they do not communicate in that language very effectively and even quite normally. It is unwise to overemphasize their phonological difficulties. Apart from this there is no evidence that after adolescence one cannot learn a language as rapidly and as well as a small child” (Macnamara, 1973, p.). This reinforces the idea that intelligibility can be achieved despite the presence of a non-native accent.

Flege also suggests that affective factors may have a greater impact than age on phonological acquisition. He refers to the work of Schumann (1975, 1978) who “asserted that affective factors are more important than age in determining success in L2 pronunciation, and suggested that adult’s progress in L2 may be impeded by their fear of making mistakes or being ridiculed for communicating ineffectively in L2” (Flege, 1988, p.254). In addition, he brings forth the idea that personality traits may be a key factor in impeding or enhancing a student’s phonological performance acknowledging Schumann once again:

“‘Affective factors’ included ‘language shock’ and ‘culture shock.’” Schumann speculated that anxiety induced by the many differences between L1 and L2, along with concomitant cultural differences, may impede progress. “Personality” factors included degree of extroversion, tolerance for ambiguity, sensitivity to rejection, and degree of self-esteem. These factors seemed likely to Schumann to affect the extent to which L2 learners seek out relevant L2 input and practice speaking L2.” (Flege, 1988, p.254).

We cannot and should not force our students to perform phonological tasks that they are not comfortable with in order to achieve native pronunciation. It seems that pushing students towards this goal would, in fact, have the opposite effect. Nevertheless, while some are stricken with timidity others merely desire to communicate with efficacy rather than ‘perfect accuracy’. Jenkins
highlights the inclination of non-native speakers towards the easiest route in terms of effort of articulation. Her research showed her that: “where such ‘difficult’ processes and sounds are involved, and in the presence of contextual information, speakers seem less likely to make the necessary cognitive effort to replace L1 transfer.” (2001, p.90). Thus, in the same way that native speakers reduce their efforts by using weak forms and connected speech, non-native speakers also tend to prefer the option that is easiest to articulate. If the message is still intelligible, then this poses no serious risk to communication.

As teachers, we must acknowledge the importance of affective factors and understand that a student may be inhibited, for a variety of reasons, in terms of pronunciation. It is our job to create a welcoming environment that facilitates learning and, it seems to me that setting meticulous pronunciation goals and over-correcting students errors when they are perfectly intelligible is likely to have the opposite effect. Especially for those students who lack confidence, are easily embarrassed or not particularly motivated.

Yet, while some are inhibited by a lack of motivation or confidence, others may want to retain their native L1 identity as they are proud of their heritage or do not wish to be identified with the target language group. I would argue that the two most important functions of language are communication, which requires intelligibility, and identity. We must not, therefore, overlook the importance of accent perception when teaching our students pronunciation. When we speak a language we reveal many things about ourselves including geographical origins, social status, gender, age, mood, etc. Language is an essential part of our identity and the two are inextricably linked.

On a sociolinguistic level, by promoting RP (received pronunciation) or GA (general American) as teachers, we are automatically setting these two accents as a gold-standard, as prestige accents which implies that any accent deviating from these norms is incorrect or inferior. For those who are proud of their heritage it is particularly insulting to assume or suggest that their accent is wrong or inferior. It also reinforces stereotypical, traditional and old fashioned sociolinguistic views within the English language; views that do not see regional variations in a positive light. As British linguist Jenkins points out: “popular attitudes to accent are, as the social psychological literature tells us, firmly entrenched and very slow to alter” (2001, p.13). This includes both regional L1 varieties and L2 varieties. In addition to promoting language variation intolerance, RP is not the best pronunciation model for three reasons that Jenkins highlights. Firstly, given that “RP is only spoken
by a tiny minority of English users” (2001, p.14) it seems illogical to teach the exception and not
the rule. Secondly, she argues that RP is by no means the easiest accent to learn due to the use of
weak forms, the great number of diphthongs, the ellipsis of the /r/ after vowels and the lack of
correlation with English orthography (2001, p.15). Finally, she highlights the fact that RP itself has
changed over time and so to teach it would mean “there is a risk of equipping learners with old-
 fashioned pronunciation” (2001, p.15). Jenkins suggests that instead we should advocate foreign
accents as regional dialects and expose students to as many regional differences as possible:
“Translated into pedagogy, inter-speaker variation implies the inclusion of extensive exposure to
different L2 varieties of English, particularly in the form of contrastive work, to make the
differences salient for learners, and thus to enhance their receptive competence for EIL.” (1998,
p.125).

Every language has its own cultural references and its own flavour, so why should we ask students
to dilute their flavour when speaking English as it is an integral part of their identity? Even in the
different English speaking countries around the world there are different expressions and references
being used. As the English language is being used more and more often in non-English speaking
countries, they bring their own flavour to English through vocabulary (that does not exist in
English) but also through the influence of their native pronunciation. As, British linguist, David
Crystal, suggests: “It is perfectly possible to develop a situation in which intelligibility and identity
happily coexist.” (2012, p.22) and as we see in the next section, this is already taking place around
the world.

1.1.3. English as global language

Increasingly, the English language is being spoken around the world in a variety of contexts and
more often than not without the presence of a native speaker. That is to say that the majority of
interactions in the English language are taking place between two non-native speakers. Is it
important then to achieve native English pronunciation when speaking to another non-native?

As Jenkins points out, English is now spoken by considerably more non-native speakers than native
speakers (2002 p.83). While linguists have made the conceptual leap to promote intelligible
pronunciation, many teachers have not. Given that “the language of the sceptred isle is rapidly
becoming the first global Lingua Franca” (The Globe and Mail qtd. in Crystal, 2012, p.1), teachers
can no longer close their eyes to this phenomenon. Crystal collected statistics that suggest that “about a quarter of the world’s population is already fluent or competent in English, and this figure is steadily growing – in the early 2000s that means around 1.5 billion people. No other language can match this growth” (2012, p.6). He puts the spread of English down to three main factors: initially due to British imperialism, then to the United States economic influence and more recently the fact that English is the language of the internet. In his eyes, a language becomes a global or international language when it is in a position of power be it political, economic, cultural or social. But this global prominence comes at a price as Crystal points out:

“if there is one predictable consequence of a language becoming a global language, it is that nobody owns it any more. Or rather, everyone who has learned it now owns it – ‘has a share in it’ might be more accurate and has the right to use it in the way they want” (2012, p.2).

Crystal is not alone in thinking that native speakers can no longer be the sole authorities on the English language as it holds a new place on the international stage. Widdowson argued fervently at the 27th Annual TESOL convention in 1993 that English was no longer property of its native speakers. He firstly questioned the tenets of standard English: “What are these standards? The usual answer is: quality of clear communication and standards of intelligibility. With standard English, it is argued, these are assured” (1994, p.379). However, he argues that as English has become an international language it serves a wider community with a huge variety of different communicative and cultural needs. People are constantly innovating language to suit their needs or to adjust it to the ever-changing world. He asserts that: “The custodians of standard English [native speakers] are self-elected members of a rather exclusive club” (1994, p.379). Furthermore, Widdowson clearly advocates the inclusion of non-natives in the ongoing dialogue about the English language and dismisses the idea that native speakers are the owners of English:

“How English develops in the world is no business whatever of native speakers in England, the United States, or anywhere else. They have no say in the matter, no right to intervene or pass judgement. They are irrelevant. The very fact that English is an international language means that no nation can have custody over it. To grant such custody of the language, is necessarily to arrest its development and so undermine its international status. It is a matter of considerable pride and satisfaction for native speakers of English that their language is an international means of communication. But the point is that it is only international to the extent that it is not their language.
It is not a possession which they lease out to others, while still retaining the freehold. Other people actually own it.” (1994, p.385).

Widdowson’s words distinctly highlight the growing belief among linguists that native speakers no longer own the English language, however, this sentiment is not necessarily shared by the general population or even among many teachers and students. Native speakers are often deferred to in the teaching profession as they are considered to be more authentic and speak ‘proper English’. “They become the custodians and arbiters not only of proper English but of proper pedagogy as well. But what if you shift the emphasis away from contexts of use to contexts of learning, and consider how the language is to be specially designed to engage the student’s reality and activate the learning process? The special advantage of native-speaker teachers disappears.” (Widdowson, 1994, p.387). As Widdowson suggests native speakers should no longer be considered the sole and utmost authorities on the English language.

As English has become an international language, we must reconsider the implications for our students: why have they decided to learn English? With whom will they be communicating? How will they use English in their professional life? If the answers involve communicating with non-native speakers of English then we must take this into account by realigning students pronunciation goals with their professional ones and teaching them to be intelligible communicators of English. In order to do that we first need to establish what is meant by the term intelligibility. The following section will outline the complexities of intelligibility.

1.2. Defining intelligibility

Intelligibility is an extremely complex phenomenon. It incorporates many layers, each of which interact and may at some level impede or facilitate communication. Intelligibility is production and reception combined; it is pronunciation and listening comprehension; it is an inherently interactive process. In order for intelligible communication to take place, each level must be appropriately enacted and received. Both production and reception are equally difficult to pinpoint. In other words, it is often a challenge to establish which elements of pronunciation inhibit the process and which areas affect comprehension on the listener’s behalf. In addition to this, each situation includes diverse speakers and listeners who may react differently to different stimuli. This section
will discuss linguistic definitions, the differences in writing and speaking and the particularities of specialist oral discourse. Let us begin by defining the word intelligibility and its origins.

1.2.1. Linguistic definitions: form vs meaning

The Oxford Living Dictionaries define intelligibility as “the state or quality of being intelligible”. When searching for ‘intelligible’ in the dictionary, one comes across various definitions: “1: apprehensible by the intellect only; 2: capable of being understood or comprehended” (Merriam-Webster); “(of speech and writing) clear enough to be understood” (Cambridge Dictionary). Macmillan Dictionaries define intelligibility as “the quality of being clear and possible to understand” or as “the ability to be understood when you speak”. Looking further back at the etymology of the word ‘intelligible’, we find that it comes from the Latin “intelligibilis, intelligibilis ‘that can understand; that can be understood,’ from intellegere ‘to understand, come to know’” (Etymonline, 2018). Later on, in Middle English it meant “to be grasped by the intellect (rather than the senses)” (Etymonline, 2018) and it was first recorded as meaning “capable of being understood, that can be understood” (Etymonline, 2018) circa 1600. According to these dictionary definitions, understanding is the principle tenet of intelligibility, yet, as Pickering points out, in linguist research “There is no universally agreed upon definition of what constitutes this construct, nor is there an agreed upon way of measuring it.” (2006, p.2).

Jenkins (2001) argues that for too long intelligibility has been viewed as a one-way process whereby native speakers decide what constitutes as intelligible, or not, and non-native speakers endeavour to reach this goal. As she rightly states, this approach is no longer feasible. The ELT (English Language Teaching) world needs to move towards a more tolerant approach that allows for more phonological variation. In addition, Jenkins reminds us that this view “fails to acknowledge any active role for the receiver” (p.69). Intelligible communication involves both parties: listener and speaker. Moreover, there are several possible combinations of speaker and listener; those that involve two native speakers, those that involve native and non-native speakers and those that involve two non-native speakers. In these various combinations different types of intelligibility problems may occur. Between two native speakers intelligibility issues are not often related to pronunciation but rather semantic or pragmatic causes whereas interactions between a native speaker and a non-native speaker and those between two non-native speakers can be affected predominantly by pronunciation and/or listening comprehension difficulties. For us, the latter is
particularly important as French psychology students enrolled in the LANSAD program may eventually need to communicate with the academic international community in English whereby they will be likely to interact with native speakers and other non-native speakers. Therefore, they need to be intelligible producers and decoders of the English language. The corpus takes place at an international conference, thus, may also be affected by listening comprehension and pronunciation difficulties.

Linguists have approached the problem of intelligibility in different ways. Some linguists have focused more on intelligibility from the listener’s perspective. Derwing and Munro (1995), for instance, distinguish differences and correlations between intelligibility, comprehensibility and accentedness postulating that intelligibility is “the extent to which an utterance is actually understood” (p.291); that comprehensibility refers to “listeners’ perceptions of difficulty in understanding particular utterances.” (p.291); and that accentedness is the “degree to which the pronunciation of an utterance sounds different from an expected production pattern” (2006, p.112).

In other words, intelligibility is how much the listener understands. These three definitions all put emphasis on the importance of the listener in order to have intelligible communication. Not only must the utterance be intelligibly pronounced, it must also be intelligibly decoded.

Smith and Nelson argue that understanding or intelligibility should be separated into three categories:

1 intelligibility: word/utterance recognition
2 comprehensibility: word/utterance meaning (locutionary force)
3 interpretability: meaning behind a word/utterance (illocutionary force).” (2008, p.429).

For them, these terms work on a scale of complexity from purely phonological to pragmatic which could entail a variety of interpretations. In their interpretation, intelligibility is simply recognising the words whereas comprehension is understanding them as part of a communicative message.

Other linguists hone in on the question from a more phonological point of view. Jenkins defines intelligibility as “the production and recognition of the formal properties of words and utterances and, in particular, the ability to produce and receive phonological form, but [she] regards the latter as a prerequisite (though not guarantee) of ILT success at the locutionary and illocutionary level” (2001, p.77). She even goes as far as to say that: “pronunciation is possibly the greatest single
barrier to successful communication” (2001, p.83). She is, of course, referring to interlanguage talk (ILT) in EIL communication which she argues relies more heavily on phonological cues than on contextual ones. As this is also the case for many French psychology students and scholars, it is important to bear this in mind.

While linguists disagree on the precise terminology, it seems that they do all appear to distinguish between two important concepts: form and meaning. In other words, is the utterance recognised phonologically and is it understood? Successful communication requires both recognition of the message and comprehension of it, therefore, we must consider both areas in the classroom. From the listener’s perspective there are many factors involved in understanding the message. Even understanding itself is difficult to measure as the listener may understand the speaker’s general message using the context to compensate for unintelligible pronunciation or on the other hand the speaker may have perfectly intelligible pronunciation and yet the message is incomprehensible due to the use of technical jargon. Studies have shown that a native speaker is more likely to engage in top-down processing whereby the listener uses the context, “shared knowledge” (Jenkins, 2001, p.73) and “phonemic and phonetic intuition” (Jenkins, 2001, p.74) in order to decode and understand the message. A non-native speaker, however, is more likely to rely on bottom-up processing, especially those who have not yet reached a certain level of proficiency. As they lack either knowledge, intuition or perhaps confidence, they prefer to listen for specific sound segments and any deviation from said segments may lead to confusion and lack of comprehension.

It seems therefore that it is essential for L2 speakers to be capable of producing and receiving phonological form in order to achieve intelligible and comprehensible communication. I will be defining intelligibility thus: intelligible speech is the ability to pronounce with enough phonological precision so that the listener may be able to recognise the words and understand the message, regardless of the presence of a foreign accent. From a listener’s perspective, intelligibility is being able to recognise phonological form and decode it into a comprehensible message. For teaching this implies focusing on pronunciation and listening comprehension. This leads us to question: which areas of pronunciation are essential for intelligible communication and which areas cause a breakdown from the listener’s point of view? Before we can answer these questions, we need to hone in on our focus of study: French psychology students and academics performing oral presentations. In the following section, we shall look into the differences between writing and speech and the effect this has on French speakers’ pronunciation and listening comprehension.
1.2.2. Writing vs speech

This study will assess the intelligibility of four oral presentations. For this reason, it is primordial to investigate the differences between written and oral discourse. There are two key differences to take into account when comparing writing and speech; the time factor and the relationship between orthography and phonology. The differences in the phonological and orthographical systems may influence French speakers pronunciation in particular and since the corpus is made up of French speakers, it seems pertinent to focus on this element. Once these differences have been established we will focus on what makes a successful academic oral presentation. This section will discuss the time factor, the difference between the phonological and orthographical systems and the traditional codes used in academic presentations.

The first important difference between written and spoken intelligibility is the time factor. When ideas are committed to the page, both the writer and the reader have time on their side. The writer can take the time to carefully weave ideas together and modify the language to the appropriate context; the reader can re-read, check challenging vocabulary, jargon or grammatical structures in the dictionary and pause for the information to take shape in his/her mind. In speech, on the other hand, everything takes place at break-neck speed. Ideas are hardly established before they come sneaking out of our mouths – as I am sure we are all well aware, having committed many a faux-pas in our time – and listeners have to confront pronunciation, lexicon, grammatical structures and any auditory distraction that may be taking place simultaneously. As a result: “Spoken text, and especially conversation, tends to be lexically lighter because interlocutors have less time to pack and unpack dense information during ‘real-time’ communicative events.” (Nesi, 2005, p.5). This is not the case for written discourse which is characterised by its density.

For an L2 speaker and listener, speech can be particularly challenging. As ideas must be formulated quickly, speech entails a certain level of grammatical and lexical knowledge and does not leave time for verification; the ideas must then be articulated in a way that is phonologically recognisable. On the other side, speech must be recognised and then decoded so as to make sense of the ideas that are being put to the receiver. All this in a matter of seconds. Is it a wonder that many L2 students, French included, struggle with oral comprehension? Even in our native language we are often compelled to ask others to repeat, speak louder or even clarify themselves. If we add to this an
unfamiliar accent, technical jargon, auditory distraction, etc., the task becomes more complicated (both from a native and non-native speaker perspective). The same goes for oral expression, we make mistakes and correct ourselves on a regular basis in our native language despite our grasp of the language. It should be expected then that L2 speakers will make mistakes when trying to formulate speech by combining all the aforesaid elements.

Rowley-Jolivet’s (2005) research shows that native speaker scientists differ considerably in their written and spoken discourse. They use information packaging and adapt their syntax when presenting orally. She found that “NNS scientists in [her] sample differentiate far less between written and spoken modes of scientific communication than their NS peers” (p.22). Extra-position and passive structures appear to be consistently overused by non-native speaker scientists which “not only makes their discourse much more difficult for the listener to comprehend and process, but also creates a different speaker ethos to that of NS scientists, one characterised by less subtle marking of stance and a much greater interpersonal distance with the audience” (p.22). This example shows us that not only pronunciation plays a role but that style and register are also factors that can impede intelligibility.

The second factor, the correlation between the orthographical and the phonological systems of a language, can be advantageous when high or have a disastrous impact when low. That is to say that if the two systems are closely related an L2 speaker can quickly learn how to recognise words and know how they are pronounced but will have difficulties if the opposite is true – as is the case with the English language. This has an impact on both oral comprehension and pronunciation as the speaker may be able to read and write words that they cannot recognise or produce orally. For example, my students often pronounce the word ‘honest’ thus /hɒnɪst/ because they have been told that they must pronounce the phoneme /h/, often a difficult one for French speakers, which they associate with the grapheme <h>. However, this is not always the case; <h> does not always equal /h/.

Looking more specifically at the differences between French and English we can see that there is an important difference concerning the relationship between orthography and phonology. The orthographical system of English does not directly correspond to the phonological one whereas the French one does to a certain extent. Some languages have direct correspondence between phonemes
and graphemes (Spanish, Greek), while others have a good correspondence in one direction. That is to say that a grapheme always represents a phoneme but a phoneme can be represented by several graphemes (French) but English does not correspond in either direction. (Terrier, 2011). For L2 speakers this presents a great difficulty in oral comprehension and pronunciation as they may be unable to recognise vocabulary that they are familiar with in a written context and unable to pronounce new unfamiliar words when they come across them.

Another important factor, which is due to the historical relationship between Britain and France, is that a significant amount of vocabulary is shared between the two languages. Even though some English words are no longer easily recognisable as having French origins there are still are great number of homographs, around 4196 “homographes parfaits” according to Walter (2001, p.104). For French speakers this is an additional challenge as homographs can be read and understood but become unrecognisable when heard orally. As Terrier (2011) puts it:

“si les mots qui ressemblent au français à l’écrit, et que l’on peut qualifier de « transparents à l’écrit », constituent dans l’ensemble un point d’appui en compréhension de l’écrit malgré les « faux-amis » possibles, ils sont susceptibles de devenir un obstacle en compréhension de l’oral en raison de leur « opacité », c’est-à-dire de leur caractère difficilement reconnaissable à l’oral.” (p.31).7

The disparity between English graphemes and phonemes means, therefore, that a French student may have great difficulty recognising homographs orally and as a result may not understand the spoken message; they are also likely to write new vocabulary incorrectly. Conversely, when a French student recognises a written homograph, they are likely to pronounce it with a considerable amount of L1 transfer.

Having established the differences between speech and writing, we must reflect on the corpus. Given that I will be analysing four academic oral presentations there are, therefore, several things to

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6 “perfect homographs” Walter (2001, p.104). This means that they are both spelt the same way and share the same meaning, unlike imperfect homographs or ‘false friends’ which are spelt the same way and differ in meaning.

7 “If the words that resemble written French and that we can call “transparent in writing”, serve as a point of reference in reading comprehension - despite possible “false friends” - they are likely to become an obstacle in listening comprehension due to their “opacity”, that-is-to-say their lack of oral recognisability.” (Terrier, 2011, p.31)
consider. Which features constitute an academic presentation and what the impact do these codes have on the intelligibility of oral specialist discourse? An oral presentation is a spoken form of communication that involves conveying pre-prepared ideas to an audience. It is usually designed to inform or persuade and is often supported by visual aids of some nature. The speaker must be well-informed on the topic and be organised in order to successfully share ideas with the audience; delivery must be rehearsed and the speaker is often required to handle questions following the presentation. This is not a simple task and demands a great deal of preparation. When the speaker has the additional burden of communicating in an L2, it can be particularly daunting. Hyland (1991) suggests that there are seven general stages in the process of developing oral presentation skills:

“1. Short talks and awareness of oral communication strategies
2. Deciding objectives and gathering facts
3. Organising discourse structure & developing an outline
4. Preparing supporting visual material
5. Rehearsals & feedback
6. Delivery of presentation & handling questions
7. Evaluation”
(p.36)

We shall be focusing essentially on stage 6 for our analysis but we must not neglect the fact that a good orator is always well-prepared. Hill & Storey (2003) highlight the importance of extra-linguistic factors too: “language proficiency is not the sole requirement...preparation, organization, body language, and visual aids are equally, if not more important.” (Hill & Storey, 2003, p.372). In addition, they argue that effective presentations include:

1. an awareness of the audience’s background
2. clarity of purpose
3. the ability to attract and hold the audience’s attention in the introduction
4. highlighting key points
5. the use of transition phrases
6. the use of anecdotes
7. the use of examples and evidence
An effective presentation entails giving the audience time to take in the information being presented. This means that it is important not to speak too quickly but also to reduce lexical density so that listeners have time to unpack the linguistic information. However, Nesi (2005) found that given the chance to prepare in advance “A kind of inverse relationship thus becomes apparent, with pre-rehearsal and the guarantee of an uninterrupted turn resulting in both an increase in density and a reduction in pace, whilst the cut and thrust of spontaneous conversation leads to delivery characterised by sparsity and speed.” (p.7). Nesi’s work was based on university lectures from the BASE and MICASE corpora but this could equally apply to oral presentations in a conference setting as lectures and conference presentations are both forms of specialist oral discourse. One lecturer in her sample was a non-native speaker and he produced one of the most lexically dense lectures which was “extremely difficult to follow” (p.20). Non-native speakers may be unwilling to speak without notes but it appears to have a negative impact on intelligibility.

Rather than having extensive notes, it is perhaps better for the speaker to have a detailed outline of the presentation. Hyland (1991) suggests the following as a guide on how to structure an oral presentation:

“Central idea (expressed in title)

1. Introduction
   A. Introductory statement
   B. Background, purpose, definition of terms
   C. Plan/overview of presentation structure.

2. Body
   A. Main Point
      i. sub-point
         a. supporting facts
         b. supporting examples or anecdotes
      ii. sub-point
         a. supporting facts
         b. other supporting material
   B. Main point etc. etc.

3. Conclusion
   A. Summary/reinforcement of main points
   B. Conclusions/recommendations if appropriate
This outline not only serves as a guide on structure but also on content. This is the standard academic presentation format including the canonic introduction, body and conclusion construction that is followed in most presentations. Not only does this allow the speaker to organise his/her ideas, it also helps the listener be guided through the presentation by developing the information in a logical order.

Another typical feature of academic presentations is discourse signalling using conjunctions such as furthermore, however, insofar as, etc., (Nesi & Basturkmen, 2006, p.2). It appears that discourse that is prepared in advance has a greater need for discourse structuring devices as it lacks that usual opportunities for negotiation of meaning that are found in conversation (Nesi & Basturkmen, 2006, p.6). In addition, native speakers have the advantage of being able to manipulate language and make use of collocations. Nesi & Basturkmen found that:

“four word lexical bundles can play a discourse signalling role in lectures, and we would argue that it is important for language learners to be aware of this. While native speakers of English can be expected to have implicit knowledge of the function of bundles, non native speakers are much less likely to have this understanding because they have consciously learned the language, rather than acquired it, and the role of lexical bundles as discourse signals is yet to be acknowledged in most language teaching materials” (2006, p.16)

They argue that more data-driven discourse marker lists that reflect spoken language be distributed to non-native speakers.

It is clear that there are many factors involved in creating a successful oral presentation. Ideas need to be clearly structured and delivered in order for the transmission of the message to be successful. All these factors need to be taken into account when assessing the corpus so as to evaluate the impact of academic format on intelligibility. But first, in the following section, we will look at the particularities of specialist discourse.
1.2.3. Specialist discourse

This section aims to define specialist discourse and its peculiarities, in particular those of the psychology domain since our corpus is based on the presentations of psychology academics. One of the most glaring features of specialist discourse in the technical vocabulary used by the initiated. We endeavour to investigate the effect of technical vocabulary on intelligibility.

What is specialist discourse? Petit (2010) argues that before tackling this question it is important to distinguish between ESP (English for Specific Purposes) and specialist discourse, whereby the former involves a fundamental relationship with the English language and the latter with its speciality:

“On peut donc penser que le discours spécialisé se distingue de la langue de spécialité dans la mesure où les éléments qui permettent de le reconnaître comme spécialisé, c’est-à-dire qui fondent ce que l’on pourrait appeler le jugement de spécialisé, ressortissent, par référence au couple langue-discours tel qu’il est traditionnellement conçu, au niveau du discours plutôt qu’à celui de la langue.” (Petit, 2010, p.6)

Specialist discourse is therefore conceived as a complex language phenomenon that involves many different elements such as the ways ideas are constructed and how the speakers intend to convey those ideas (persuasively, informatively) not just the language and terminology being used. It may require “une organisation discursive particulière...des constructions syntagmatiques originales aux yeux des novices, à un vocabulaire compris par les seuls initiés” (Charaudeau & Maingueneau, 2002, p.540 in Petit p.7). As a result, we must consider the implication that it is not the ability to receive and produce L2 pronunciation alone that affects the intelligibility of a specialist oral presentation. In our corpus English is used as the language of communication and the discourse is specialist in nature, which implies therefore that both language and discourse elements play important roles in the intelligibility of L2 oral specialist discourse.

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8 “We can say, therefore, that Specialist discourse distinguishes itself from English for Specific Purposes insofar as the elements that allow it to be recognised as specialist, that-is-to-say on which we base our judgement of the specialist, stand out, with reference to the language-discourse couple as it is traditionally conceived, at the level of discourse rather than that of language” (Petit, 2010, p.6)
Petit (2010, p.12) also distinguishes between what he terms “discours manifestement spécialisés” and discourse “auxquels les critères du manifestement spécialisé ne s’appliquent qu’imparfaitement”. He argues that the former has properties that are instantly recognised by the general public as being specialist such as subject matter, terminology and phraseology, whereas the content and terminology of the latter are more accessible to the general public. These characteristics are manifestations of specialist discourse not the sole factors that make a discourse specialist though. Some domains such as journalism can still be defined as specialist due to the particularity of the genre itself and other factors such as the use of rhetorical devices.

Another important factor to consider is the audience as intelligible communication always implies a speaker and one or more listeners. Hyland (2006) proposes the notion of a discourse community: “When applied to academic domains, the expression of community in the notion of discipline therefore offers researchers a framework for conceptualising the expectations, conventions and practises which influence academic communication” (Hyland, 2006, p.20). When communicating within the discourse community, speakers adapt and organise their ideas in ways that their audience are likely to comprehend easily. However, these patterns may not be so easily unstitched by those outside of the discourse community. Sometimes the presentations can be vulgarised to reach a larger public but more often than not academic oral presentations are given within their own discourse community. This is most certainly the case for our corpus which is taken from an academic conference. It has been proven that academics write in very different ways across disciplines but little research has been done on oral discourse across genres (Hyland, 2006). It is quite possible that this is also true of oral discourse as information is still being shared within a particular discourse community.

One of the features of specialist discourse that stands out the most is technical vocabulary. This does pose a problem to non-members of the discourse community. As Mortureux suggests, “Ce sont [les vocabulaires scientifiques et techniques] en effet leurs propriétés sémantiques qui suscitent les commentaires les plus vifs sur les termes, jugés indispensables à la communication efficace par les spécialistes, et condamnés comme « jargon » inutile, voire d’une opacité dangereuse, par les non-initiés.” (1995, p.28). Since technical vocabulary is seen as one of the important features of

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9 “manifestly specialist discourse” (Petit, 2010, p.12)
10 “to which the criteria of the manifestly specialist apply only imperfectly” (Petit, 2010, p.12)
11 “It is [scientific and technical vocabulary] in fact, their semantic properties that provoke the strongest commentaries on the terms, judged indispensable for efficient communication among specialists, and condemned as useless ‘jargon’, or even dangerously opaque, by the non-initiated” (Mortureux, 1995, p.28)
specialist discourse, it will be important for me to assess how much of an impact the technical vocabulary of the psychology domain has on intelligibility.

Linguists have endeavoured to quantify the different categories of vocabulary. According to Nation (2001), as cited in Hyland & Tse (2007, p.236):

“Vocabulary is typically seen as falling into three main groups (Nation, 2001):
1. High frequency words such as those included in West’s (1953) General Service List (GSL) of the most widely useful 2,000-word families in English, covering about 80% of most texts.
2. An academic vocabulary of words which are reasonably frequent in academic writing and comprise some 8% – 10% of running words in academic texts.
3. A technical vocabulary which differs by subject area and covers up to 5% of texts.”

What remains to be seen is whether this 5% has a significant impact on intelligibility. While some have argued that for L2 speakers it is simply a case of providing academic vocabulary lists, Hyland & Tse found that in their corpus “different disciplines showed clear preferences for particular meanings and collocations” (2007, p.244). This shows that words are not randomly used and can be particularly domain-specific therefore students need to learn discipline specific discourse within its context not general academic vocabulary lists. This is also true of the psychology domain.

French psychology academics are often required to publish articles and give conferences in English. This means that they need to learn not only the common vocabulary for communication in English but they also need to master psychology terminology. As it so happens, in English many technical domains use words of French, Latin or Greek origin. Even the word psychology itself, has metamorphosed from the Greek word “psykhe” meaning ‘soul’ and “logia” meaning ‘study of’, to the Latin “psychologia”, which came into English via the French word “psychologie”. (Etymonline, 2018). As Terrier rightly states: “la proportion de mots français dans le discours de spécialité [en anglais] est particulièrement élevée” (2011, p.31). This can lull French speakers into a false sense of security as they feel that they know the necessary vocabulary. This may be true of written English but it is not necessarily the case in spoken English. As we have seen, homographs in both languages can be pronounced in completely different ways.

12 “The proportion of French words in Specialist discourse is particularly high” (Terrier, 2011, p.31)
That being said, according to Psychologydictionary.org, there are over 20,000 psychological terms in their dictionary and another resource, the APA Dictionary of Psychology, state that there are more than 25,000 entries in theirs. This means that there are a great number of words that need to be mastered both productively and receptively. Words may also have several different meanings across genres so a term that has a particular meaning in general English may have a completely different meaning in psychology. This also means that speakers unfamiliar with the psychology domain may not know and/or be unable to derive meaning from technical terminology. Thus, rendering speech unintelligible despite the ability to recognise and produce phonological form.

Harlan (1926) highlights the difficulty of understanding discussions in the psychology domain when listeners are not acquainted with the technical terminology. I shall cite his work at length:

“One of the chief difficulties encountered by the student beginning the study of psychology is the vocabulary difficulty. New words or words which have no very clear connotation or words used in a technical sense are, at first, a serious handicap to the student in his reading of psychology, or in any psychological discussion. To many beginners in the field the large number of technical terms encountered constitutes, for them, almost a foreign language. If these are not mastered as the student proceeds in his study of this subject, he is soon lost in a seemingly hopeless jargon. He labors over the printed page ‘sliding over’ the technical words which are often the key to the sentence or paragraph, thereby missing some of the fundamental concepts and ideas. Or, he listens to the discussion of his psychology instructor speaking in psychological terms and fails to comprehend ‘what it is all about.’ Some careful attention to vocabulary building seems, therefore, to be essential to the effective teaching of psychology.” (p.554)

Harlan is referring to native speakers of English starting out in their psychology studies but, of course, French psychologists would need to master this terminology in both French and English, if they wish to present their work to the international community. Harlan developed a glossary of 176 words “with sufficient frequency to justify their inclusion in the psychology vocabulary of the well informed student” (p.555) which shows us that there are a considerable number of high frequency, yet domain-specific words in psychology; not to mention the number of additional technical words that are used when delving into specific branches of psychology.

Technical psychology vocabulary may have a crucial impact on intelligibility from a listener’s perspective therefore some of the questions to bear in mind when assessing the corpus will be: does
psychology terminology impede intelligibility for non-members of the discourse community? Can these difficulties be overcome by focusing on the surrounding context? We will now examine intelligibility from the listener’s point of view.

1.3. From a listener’s perspective

One of the reasons that students and teachers have been so keen to attain native pronunciation is due to the fact that, for a considerable period of time, it has been judged unacceptable to deviate from the native-speaker norms. However, this is also because native speakers have always been deemed authorities on their own language and therefore have considered foreign variations as error. Nevertheless, as we saw previously, English is becoming a global lingua franca and thus the native speakers can no longer be the only ones to voice their opinions on English pronunciation. For a long time the native speaker listener has decided what makes a non-native speaker intelligible or not but this must, and will inevitably, change. In the following section, we will look at how foreign accents are perceived both from a native and a non-native perspective, then we will elaborate the difficulties L2 speakers, and in particular French speakers, face in oral comprehension of English.

1.3.1. Perceptions of foreign accent

Many studies (Derwing & Munro, 1995, 1997, 2006) have found that intelligible communication can take place regardless of the presence of a foreign accent. This is true both of interactions between native and non-native speakers and between two non-native speakers. We need to consider therefore how foreign accents are perceived by different listeners and what causes the breakdown of intelligibility in the different types of interactions. In this way we may be able to tailor our findings to our students goals. Until very recently, researchers had primarily been focusing on accent perception and intelligibility from a native speaker perspective but considering the number of non-native speaker interactions taking place in the world on a daily basis this is no longer a feasible approach.

For the purpose of efficacy, when considering interactions between different speakers of English, I shall be employing the acronyms NS for native speaker and NNS for non-native speaker throughout this section. Jenkins proposes the use of new and what she sees as less pejorative terms: MES, BES
and NBES. She suggests “substituting the term ‘native speaker’ with ‘monolingual English speaker’ (MES)” (2001, p.9) whereas “for both those ‘native speakers’ who speak another language fluently and for ‘non-native speakers’ who speak English fluently, [she suggests] ‘bilingual English speaker’ (BES)” (2001, p.9). In addition, she advocates the use of a third term: “‘non-bilingual English speaker’ (NBES), to allow for the fact that a speaker may be bilingual, but not in English” (2001, p.10). While these acronyms put less emphasis on whether English is the speaker’s native language or not, I do not believe they remove the possible negative connotations of being a NNS. Furthermore, I believe Jenkins’ suggestions could shift the negative perception onto MES as they are only capable of speaking one language. I do see one advantage of using the terms BES and NBES: they allow us to distinguish between proficient bilingual speakers of English and those who may still be using interlanguage. However, for the reasons I have just stated and also due to the fact that these terms are not widely used as yet, I shall confine myself to the terms NS and NNS for this section.

Firstly, we shall discuss NS-NNS interactions. Research on accent perception shows that NS listeners are instantly able to perceive a foreign accent in most NNS, sometimes even to the extent of being able to say which country the speaker comes from. Flege’s 1984 study reveals to what extent NS are highly sensitive to foreign accent. Eight NS of English and eight NS of French were asked to record both rehearsed and improvised speech. After manipulating the data, he played shorter and shorter segments of speech to phonetically untrained listeners and they were able to reliably distinguish between NS and NNS of English; even when only 30 ms of speech was played. One of the participants had moved to the USA aged nine and had been living there for over twenty years and yet was still identified as a NNS.

When asked how they perceive foreign accents, NS often respond in a negative or condescending manner referring to foreign accents as childish, incompetent, funny, etc. While this may sometimes be related to prejudices, it could also simply be due to the extra effort needed in order to process the utterances in an unfamiliar accent. Derwing and Munro (1995) found that foreign-accented speech took longer for NS to process than native-accented speech. They asked twenty NS of English to listen to statements uttered by NS of English and NS of Mandarin and to indicate whether the statement was true or false as quickly as possible. With a few exceptions, it required more processing time for listeners to evaluate the Mandarin speakers’ utterances than it did for the fellow English speakers’ utterances. They were then asked to assess the comprehensibility of the Mandarin
speakers and rate the strength of their accent. The study showed that, while many of the Mandarin speakers were rated as having a moderate to strong accent and judged difficult to comprehend, the utterances were highly intelligible as the participants were able to correctly transcribe the majority of the utterances. This implies that the belief that a foreign accent is strong coupled with the additional time required to process the utterances may lead a NS to believe that foreign accents are difficult to comprehend. This may account for feelings of irritation or negative perception despite the fact that the speakers are perfectly intelligible. The extra difficulty alone is enough to incite negative feelings.

In a follow-up study in 1997, Derwing and Munro found that they had similar results across speakers of four different L1s- Cantonese, Japanese, Polish and Spanish. Although these speakers were less proficient than the Mandarin speakers of the previous study, the results echoed the same findings. The foreign accent ratings were “harsher than perceived comprehensibility ratings, which in turn [were] harsher than actual intelligibility scores” (1997, p.11). Once again, it is clear that while the three dimensions are related, they act independently. An L2 speaker can exhibit a strong foreign accent and be perfectly intelligible and comprehensible. The difficulty arises when the strong foreign accent leads to discrimination of any nature or does impede intelligibility.

Another study by psychologists, Lev-Ari and Keysar, in 2010 demonstrated that the increased processing time needed to understand NNS utterances led to a lack of perceived credibility. They asked participants to judge the truth value of trivia statements written by a NS. These statements were then read out by both NS and NNS of different L1s. The participants were divided into two different groups: the first were asked to assess the truthfulness of the trivia statements and the second were asked to rate truthfulness and difficulty of understanding. The assumption being that the second group would compensate for any difficulty due to their awareness of it. This was only partially true. The first group judged mild and heavy accents as less true than native ones and the second group judged heavy accents as less true but mild and native ones similarly. The additional processing time still affected their judgements of truthfulness. Lev-Ari and Keysar argue that the judgements cannot be linked to prejudice as the first group of listeners did not know what they were listening for. Whether or not this is true, it is clear that foreign-accented speech can elicit negative perceptions in NS. As unfortunate as this may be, we need to be aware of this when teaching our students.
There is a small beacon of hope, however, as Gass and Varonis’ (1985) study demonstrates that familiarity with NNS speech facilitates intelligibility. They found that familiarity with non-native speech in general, familiarity with a non-native accent in particular, familiarity with a particular non-native and familiarity with topic correlate with better comprehension, particularly the latter, which may prove interesting for our corpus. These findings suggest that while foreign-accented speech can have a negative impact on the perception of NNS themselves, becoming accustomed to foreign accents can aide intelligibility.

These studies demonstrate the need to reach a certain level of phonological intelligibility in order to facilitate communication and they also highlight the sad truth that having a foreign accent can lead NS to make discriminatory judgements of character, intelligence, credibility and competence. While we should not push our students to have native pronunciation, nor hide their own L1 accent, we must acknowledge the necessity to create easy intelligibility. My hope is that, in addition to this, the globalisation of the English language will also play a part in reducing the prejudices that arise when listeners perceive a foreign accent. Surely, the more NS hear different foreign accents, the more tolerant they may become.

Surprisingly, or perhaps not, NNS are also very quick to recognise other NNS pronunciation. Even more surprisingly, NNS can have particularly negative responses to strong foreign accents. This may be due to the difficulty they face in understanding unfamiliar accents. As we discussed previously, NNS, particularly the less proficient speakers, have a tendency to ignore contextual cues and focus on phonological form when listening to other speakers of English; therefore when they come across other NNS who deviate from the norms they are used to, it can perturb them. They prefer a bottom-up rather than a top-down de-codification system. This means, therefore, that phonological accuracy is relatively important when it comes to NNS-NNS interactions.

Jenkins (2009) conducted a questionnaire on accent perception within the Expanding Circle (see Kachru’s three circles, 1985) in order to determine how NNS perceive foreign accents. She found that NNS still predominantly prefer NS accents to their own or other NNS accents. In Jenkins’ study they failed to acknowledge Outer Circle accents as established varieties in their own right, rating “Indian English as poorly as Chinese or Japanese English for both for both acceptability and pleasantness, and only slightly higher for correctness.” (p.204). In addition to this, L2 varieties that are perceived to be more closely related to NS accents, such as Swedish, received higher ratings than those that are perceived to differ from NS accents: “the Japanese English accent was described
as ‘weird’ and ‘menacing’, the China English as ‘quarrel-like’ and ‘appalling’, and the Russian
English as ‘heavy’, ‘sharp’, and ‘aggressive’” (Jenkins, 2009, p.204). These pejorative remarks
highlight the fact that NS are not alone in perceiving foreign accents negatively. While little
research has been done as to why this is the case, one could presume these reactions are due once
again to processing difficulties, prejudice or lack of familiarity.

Despite the often negative or condescending perceptions that both NS and NNS have of a strong
foreign accent, it is clear that having a foreign accent does not necessarily impede intelligibility;
communication can be totally successful. In fact, the more successful the communication, the better
the perceptions of the L2 speaker. As Derwing and Munro state: “Although strength of foreign
accent is correlated with perceived comprehensibility and intelligibility, a strong foreign accent
does not necessarily reduce the comprehensibility or intelligibility of L2 speech.” (1995, p.74).
What remains to be considered is what causes a breakdown of intelligibility between speakers?
Is there a difference between NS-NNS and NNS-NNS interactions? Finally, can we devise from these
breakdowns in communication a schema for assessing the intelligibility of our corpus? The
following section will focus on listening comprehension difficulties for non-native speakers.

1.3.2. Listening comprehension: an obstacle for non-natives

We have established the fact that a strong foreign accent does not necessarily impede intelligibility
for native speakers and non-native speakers. However, there are times when pronunciation does
cause intelligibility breakdowns, particularly from a non-native speaker perspective whether they be
listening to native speakers or other non-native speakers. In addition, listening comprehension
difficulties can translate into pronunciation difficulties since listening and speaking are inextricably
linked. In this section we will delve into the difficulties for non-native listeners.

Although I will be analysing the video as a native speaker, I still want to take into account the
difficulties faced by non-natives. Intelligibility is a process that ‘takes two to tango’ therefore it is
primordial to assess different situations and be aware that each listener is different. Native speakers
are also able to make use of top-down listening strategies and the foreign accent perception studies
in the previous section show that pronunciation irregularities can be overcome. That being said,
even native speakers, as Lepage & Busa suggest, can have difficulty decoding L2 pronunciation:
“it is now well - known that when L1 listeners listen to L2 speech they apply their L1’s speech processing strategies in order to segment speech and identify words. Thus, when L1 English listener listen to L2 English speech, some loss of intelligibility may be due to listeners applying their L1 speech processing strategies, to a speech signal that contains features that are non-standard in terms of English phonology” (2014, p.388).

Despite the fact that listening to foreign-accented speech is often easier for natives speakers to decode than it is for non-native speakers, it can still be problematic. Whether the listener is native or not, there is evidence that human beings follow the same cognitive processes when listening to speech. O’Malley, Chamot and Küpper confirmed that we go through a three step process postulated by Anderson (1983, 1985): “perceptual processing, parsing and utilization” (1989, p.419). The first stage involves retaining the sounds in the echoic memory, the second requires the listener to derive meaning from the sounds – the listener needs to manipulate language into manageable chunks in order to do this – and the third stage includes using prior knowledge and relating it to the oral text. Of course, it is more difficult to realise these three stages in the L2 than in the L1 as the L2 listener may not be able to recognise sounds or segment large portions of speech into smaller chunks which in turn entails a greater difficulty in deriving meaning from the auditory input. As O’Malley et al. state:

“Second language listeners may have difficulty in understanding language spoken at typical conversational rates by native speakers if they are unfamiliar with the rules for segmentation, even though they may understand individual words when heard separately.” (1989, p.420)

In addition, the L2 listener may not possess the cultural or linguistic knowledge that they need to relate to the speech in order to better understand the message. Call’s findings suggest that knowledge of syntactical structures has an important impact on how much can be retained:

“Trying to understand target language input when syntactic structures are unfamiliar might be compared to trying to recall target language content words arranged in random order. The
participants in this study could recall fewer randomly arranged words than words arranged into sentences” (1985, p.777).

She also discovered that short-term memory span for the L2 is shorter than for the L1. This critical difference could explain why L2 listeners have trouble with decoding pronunciation as they cannot recall the new sounds for long enough to process them. Hence, we must not overlook the fact that pronunciation is not the only factor that contributes to intelligibility problems. The inability to recognise sounds and words, to recall them or to process them coupled with low proficiency in grammatical areas such as syntax can have disastrous consequences. All these factors interact and a problem in one area alone can debilitate the task of listening comprehension.

Goh identified five listening problems in L2 speakers. For her participants the five most common problems were: quickly forgetting what is heard, not recognising familiar words, understanding words but not the intended message, neglecting the next part when thinking about meaning and not being able to form a mental representation from words heard (2000, p.6). This data was extracted from her students’ listening diaries. The first difficulty is most likely related to Call’s research, in that the short-term memory cannot hold L2 linguistic data for as long as L1 data. The second problem is more pertinent to our question as it is likely to be linked to pronunciation and could perhaps be improved by teaching phonology. The last three, on the other hand, are more likely linked to the student’s attentiveness and their parsing and utilisation abilities. In relation to the second problem, Goh explains:

“although they knew certain words by sight, they could not recognise them by sound. Put another way, their listening vocabulary was underdeveloped. Their ability to understand spoken words was greatly handicapped because they had not stored the sounds of lexical items efficiently in long-term memory. This underdeveloped listening vocabulary could have been directly related to the way the students learnt new words. Many of them said they learnt by memorising the spelling of words and often neglected to remember how the words sounded. Another possible explanation for this problem is that word-referent relationships might not be automatised. The students ‘knew’ the words but were slow when activating this knowledge.” (2000, p.7)
Goh’s study involved Chinese students listening to native English speaking materials, however, French students also have difficulty recognising spoken words, especially in light of some factors that we shall discuss in due course.

As well as having difficulties with sound and word recognition, L2 speakers also struggle with how to approach listening comprehension. In the 1989 study, O’Malley et al. took effective and ineffective learners and retrieved ‘think-aloud’ data by eliciting the students to perform a listening comprehension task and pausing the material to ask them about their methodology. It seems that the ineffective learners used bottom-up processing, focusing too much on individual words not larger portions of speech, whereas the effective learners used top-down processing by applying existing knowledge to the topic and inferring meaning from the surrounding context. This indicates that listening comprehension can be taught and, as teachers, we need to help students find suitable listening strategies in order to tackle the difficulties of understanding speech.

As mentioned in an earlier section, Jenkins (2001) discovered the same phenomena among her L2 students. They too used bottom-up processing far more often than top-down. She interviewed her students after they had engaged in communicative tasks with other non-native speakers and found that the problems in the following areas of pronunciation affected her students’ understanding:

“1 Most consonant sounds
2 Appropriate consonant cluster simplification
3 Vowel length distinctions
4 Nuclear stress”
(Jenkins, 2001, p.132)

Apart from number four, all of these breakdowns in communication involved segmental elements of pronunciation. In addition, Jenkins’ follow-up questionnaires indicate that pronunciation was the main cause of intelligibility problems between her students rather than lexical, grammatical or syntactical issues. This demonstrates the importance phonology has in interactions involving two non-native speakers.
Pronunciation divergences affect intelligibility between non-native speakers, yet there are many areas of native pronunciation (in all its variations) that pose problems for non-native speakers. Connected speech can prove particularly troublesome for non-native speakers when listening to their native counterparts. As Alameen and Levis suggest: “the pronunciation of connected speech may become a significant challenge to intelligibility, both the intelligibility of native speech for non-native listeners, and the intelligibility of nonnative speech for native listeners. Connected speech, perhaps more than other features of English pronunciation, demonstrates the importance of intelligibility in listening comprehension.” (Alameen & Levis, 2015, p.2)

Connected speech involves a variety of processes. Alameen & Levis propose that “connected speech processes be classified into six main categories: linking, deletion, insertion, modification, reduction and multiple processes.” (2015, p.5). These processes allow the English language to keep its rhythm and reduces the effort of articulation for the speaker. In doing this, however, native speakers can render speech unintelligible to non-native speakers. In addition, different phonological variations of native pronunciation use different CSPs and learners are often frustrated as native speakers do not pronounce English the way it is taught in the classroom. That said, it is a double-edged sword in that non-native speakers do not often exhibit extensive use of connected speech, as Jenkins (2001) has attested, and this in turn can confuse native listeners as the lack of connected speech can impact the stress rules of English.

Lower level learners have difficulty with phoneme and word recognition and connected speech can modify phonemes considerably thus rendering the listening task more difficult. “The presence of CSPs may create lexical ambiguity due to the mismatch between the lexical segments and their modified phonetic properties.” (Alameen & Levis, 2015, p12). This coupled with less efficient use of lexical cues causes an overload of information to process and harms the listening comprehension process. Alameen & Levis argue that it is important to make use of bottom-up processing too and that “perceptual training should not be considered a luxury in the language classroom.” (2015, p.14)

Both Henrichsen (1984) and Ito (2001) demonstrate the effect of connected speech in the category of reduction, otherwise known as reduced forms or sandhi variations. It has been shown to greatly reduce perceptual saliency and therefore understanding for L2 speakers. Ito asked eighteen non-native speakers of Japanese, Korean, Chinese, Vietnamese and Thai origin and nine native speakers to partake in a dictation test. Nine of the non-native speakers had an advanced level of English and the other nine an intermediate level. The test consisted of twenty sentences read by an American
female, ten of which were pronounced with no reduced forms and another ten with reduced forms. She found that:

“(a) While NSs scored identically on both conditions, NNSs scored statistically significantly higher in the absence of reduced forms than in their presence; (b) the effect of reduced forms on learners’ listening comprehension did not vary according to their proficiency level; and (c) while NSs’ scores were the same on both reduced forms types, NNSs scored lower on phonological than on lexical forms.” (Ito, 2001, p.113).

Her study is evidence that CSPs and in particular reduced forms play an important role in listening comprehension. They heavily impact L2 learners’ ability to recognise sounds and break sentences down into smaller segments. For this reason, Ito questions the use of ‘authentic materials’ stating: “Since authentic listening materials (e.g., TV broadcasts) are produced for native speakers, input in those materials contains a large number of reduced forms. It would therefore seem that learners would require extra input to help the authentic input become intake.” (2001, p.115). All the evidence seems to point toward the fact that listening comprehension for L2 learners is strongly impacted by pronunciation and that with perceptual training, listening comprehension can improve dramatically. This needs to be taken into account when designing course materials and in the classroom on the whole. It is clear that more research is needed to see how CSPs, intelligibility and training interact.

Previous research on listening comprehension suggests that along with parsing and utilisation difficulties that affect both native and non-native speakers, L2 speakers are also strongly affected by perceptual difficulties both at a segmental and suprasegmental level. We need to spend more time focusing on learning strategies for listening comprehension, which would entail spending more time on phonological aspects of speech so that L2 students can learn to recognise words and phonemes more easily. In the following section we shall focus our attention on French speakers perceptual difficulties in particular.

1.3.3. Perception difficulties for French speakers

As I have mentioned, although I will be evaluating the corpus as a native speaker, it is important to consider intelligibility from a non-native speaker’s perspective as well. We must not forget that
listening and speaking are inherently linked and some pronunciation difficulties may, in fact, stem from perception difficulties. There is not a great deal of literature to be found that elicits French speakers’ listening difficulties, however, they will face much of the same difficulties in perceiving English speech as other L2 speakers, yet there are some important points to consider: written transparency and oral opacity, the addition of new phonemes to the French listener’s repertoire and difficulties with CSPs.

Two studies by Terrier in 2007 and 2008 proved that French university students were unable to grasp the main issue of a listening comprehension document after listening only once. It seems that the two main listening difficulties were the inability to perceive individual phonemes and to derive meaningful words out of them, in addition to taking on board any accent or speaker variations and/or background distractions at the time of speaking. Terrier (2011) also Seconds Alameen & Levis (2015), Henrichsen (1984) and Ito (2001) by arguing that CSPs impact French speakers ability to recognise words that they are familiar with in isolation and in written form. She states that vowel reduction can have a detrimental effect on listening comprehension as many grammatical words such as ‘the’ or ‘a’ have strong and weak forms, thus a failure to recognise these words may cause entire sentences to be incomprehensible. In addition to this, words in their weak forms can become homophones:

“les déterminants «a» et « her» et l’auxiliaire « are»», dont la forme pleine est respectivement /'eɪ/, /'hɜː/ et /'aː/, deviennent homophones dans le discours où ils sont tous réalisés par le schwa, leur forme faible. De la même manière, les formes faibles de « the» et « there » (/ə/), « have» et « of» (/əv/); « is», « has» et « does» (/z/) ou encore « an» et « and» (/ən/) sont des homophones et présentent, à ce titre, un danger de confusion pour l’apprenant s’il ne fait pas appel à ces compétences grammaticales et lexicales pour en interpréter correctement le sens.13” (2011 p.60)

This suggests that French speakers also have the same difficulties as other L2 listeners in that they are confused by vowel reduction and phoneme recognition.

13 “the determiners ‘a’ and ‘her’ and the auxiliary ‘are’, of which the strong forms are respectively /eɪ/, /hɜː/ et /aː/, become homophones in speech when they are all realised by the schwa, their weak form. In the same way, the weak forms of ‘the’ and ‘there’ (/ə/), ‘have’ and ‘of’ (/əv/); ‘is’, ‘has’ and ‘does’ (/z/) or even ‘an’ and ‘and’ (/ən/) are homophones and present, in this respect, a danger of confusion for the learner if he/she does not use his/her grammatical and lexical skills to correctly interpret the meaning” (2011, p.60)
In the section on the differences between written and spoken English, we established the fact that for French speakers there is a certain peculiarity when learning English: the written transparency and oral opacity of the language; to use Terrier’s terminology. This could have an important impact as it requires a serious amount of resistance to old listening habits. As Poussard highlights “un mot connu graphiquement n’est pas forcément reconnaissable phonétiquement par l’apprenant, qui devra établir des liens entre les deux codages” (2003, p.48). If the links between the two systems have not yet been established, listening comprehension is endangered.

Poussard suggests that “on peut mettre en avant quelques éléments qui constituent la spécificité de l’anglais oral concernant les phonèmes, l’accentuation, le rapport graphie-son et le lexique” (2003, p.47). As a result French speakers have to change their entire listening system. In addition, French speakers have to add new phonemes to their listening vocabulary:

“All there exist effectively more phonemes in English than in French, with, the number varies according to phoneticians, some twenty vowels posing listening and pronunciation problems and twenty four consonants, including the /j/ and the /w/.” (Poussard, 2003, p.48).

All of these factors combined with speaker variation, attitudinal deficits and parsing difficulties create problems for French speakers in listening comprehension.

It is clear that vowel reduction, phoneme recognition and the recognition of vocabulary that has already been acquired are all problems for L2 speakers, including those of French origin. In addition, the differences between the French and English phonological systems, which we will discuss in detail at a later stage, can play havoc with French students ability to discriminate sounds. What remains to be seen is whether these listening difficulties affect French speakers’ pronunciation and therefore their intelligibility. When assessing the corpus it will be necessary to bear in mind the impact of vowel reductions: do the speakers use them and what impact does this have on intelligibility? How are homographs pronounced and does this affect intelligibility? In the next section, we shall discuss the impact of pronunciation variants on intelligibility.

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14 “a word known in written form is not necessarily recognised phonetically by the learner, who must establish links between the two systems” (Poussard, 2003, p.48)
15 “we can emphasise some elements that constitute the specificity of oral English concerning phonemes, stress, the relationship between spelling and sound and lexicon” (Poussard, 2003, p.47)
16 “There are, in fact, more phonemes in English than in French, with, the number varies according to phoneticians, some twenty vowels posing listening and pronunciation problems and twenty four consonants, including the /j/ and the /w/.” (Poussard, 2003, p.48)
1.4. The impact of mispronunciation on intelligibility

For a long time, pronunciation variations have been considered as errors; any deviance from the norm was seen as incorrect rather than as part of a foreign accent. It is only recently that research has come to acknowledge international pronunciations of English and still many consider these as erroneous. Instead of attempting to ‘correct faulty pronunciation’, research turned to focusing on intelligible pronunciation as a goal and therefore which elements of pronunciation have a great impact on intelligibility. From here arose the segmental versus suprasegmental debate, which we shall look at in the following section, but before we discuss the specific elements that affect intelligibility, we should turn our attention to the ways in which researchers have analysed L2 phonological variation.

1.4.1. Contrastive analysis overview

It is almost unanimously acknowledged that one of the primary causes of phonological deviancy is caused by L1 transfer. That is to say, the speaker’s native or first language impacts the pronunciation of their second language. The CAH (Contrastive Analysis Hypothesis) asserts that by comparing the L1 and the L2, we can predict difficulties, and therefore errors, in the L2. This theory is especially prevalent in phonology since students’ phonological variations appear to be heavily influenced by their L1. That being said, linguists have criticised the CAH stating that it is imprecise and does not take into account subtle phonetic distinctions between phonemes and that phonological acquisition is far more complex than simple contrastive analysis between the L1 and L2.

Wardhaugh (1970) is critical of the CAH in its strongest form. He argues that that the strong version, which suggests that linguists can predict difficulties by comparing the L1 and L2, is untenable whereas the weak version focuses on explanation and “leads to an approach which makes fewer demands of contrastive theory than does the strong version. It starts with the evidence provided by linguistic interference and uses such evidence to explain the similarities and differences between systems” (Wardhaugh, 1970, p.7). Interestingly, he highlights the fact that many teachers reject criticisms of the CAH:
“Their experience tells them that a Frenchman is likely to pronounce English think as sink and a Russian likely to pronounce it as tink, that a Spaniard will almost certainly fail to differentiate English hit from beat, and that an Englishman learning French will tend to pronounce the French word plume as pleem or ploom. They…insist that some parts of that second language are easier to learn than others” (Wardhaugh, 1970, p.11).

Teachers see the influence of the L1 on pronunciation and the variation of errors in speakers of different languages, which they feel support the CAH argument in its strongest form. Wardhaugh, on the other hand, suggests that teachers and researchers ground their work in scientific evidence and not be swayed by intuition. Although some phonological deviancies can be predicted by the CAH, this is not always the case. Students also deviate in ways that are unpredictable and even in some cases err when consciously attempting to produce native sounds. To take an example of the latter from my own French students, it is not uncommon to hear students pronounce the word ‘thousand’ /θaʊθnd/ or the word ‘oven’ /hʌvn/. Sometimes they make such a conscious effort to pronounce the notoriously difficult sounds /θ/ and /h/ that they utter them in the wrong place.

In answer to these criticisms, Eckman’s Markedness Differential Hypothesis (1977) reformulates the CAH by proposing a notion of degree of difficulty. “The hypothesis asserts that, within areas of difference between the NL [native language] and TL [target language], marked structures are more difficult than the corresponding unmarked structures” (Eckman, 2008, p.98). That is to say, not all differences between the two languages will cause equal difficulty. Eckman, himself, admits that the hypothesis is not infallible as evidence shows that errors can also occur outside of the hypothesis, namely, when students make errors concerning structures that exist in both their native language and the target language. In addition to this, the hypothesis does not explain why students make the errors they do. Not satisfied with his hypothesis, Eckman devised another one: the Structural Conformity Hypothesis (1996). This states that “the universal generalisations that hold for primary languages also hold for interlanguages” (2008, p.102). He affirms that the interlanguage pattern is neither like the native language, nor the target language but it does follow the universal patterns of language.

The CAH, the MDH and the SCH reveal the strong influence of L1 transfer and allow us to predict some deviations but they do not tell us whether these variations are likely to impede intelligibility or not. Another important factor, “which is often underestimated or ignored in contrastive analysis – is
that pronunciation errors do not typically occur in isolation” (Collins & Mees, 2013, p.215). So, while some errors may not seem significant in isolation, the combination of different types of errors (grammatical, syntactical, lexical) can impede intelligibility. In addition, L1 transfer is affected by many other processes taking place: universal and developmental processes, stylistic and contextual factors, habit formation and automacy, cognitive factors and notions of ambiguity (Jenkins, 2001, p.100). It is important to see how these areas interact in order to better understand the phonological acquisition process.

Taking contrastive analysis into account, we can see that a person’s L1 will inevitably have an impact on their L2 pronunciation. As we have seen, some learners may wish to retain elements of their L1 as it is part of their identity and other factors such as age, personality and aptitude inhibit learners’ ability to achieve native pronunciation, which brings us back to the question of intelligibility. In the next section, we will look at previous research that focuses on pronunciation features and their effect on intelligibility.

### 1.4.2. Segmental vs suprasegmental

In the 1960s and 1970s the teaching of segmental features formed the basis of a great deal of research, many believing they were the most important factor in determining the intelligibility of L2 speakers. In the 1980s, however, many linguists argued that suprasegmental features have a greater, more serious impact on intelligible pronunciation. More recently, however, many researchers have come to feel that both elements interact to play a role in producing (or reducing) intelligible pronunciation. In this section, we will look at previous research in these areas and consider which features of pronunciation are harmful to intelligibility if mispronounced.

Nevertheless, it is important to not to forget the role of the listener. As we have seen, native speakers have predominantly been the authorities on the English language and thus have been the judges of intelligible pronunciation but we must bear in mind that what may cause intelligibility problems for a native speaker may not for a non-native speaker and vice-versa. We must consider whether L2 pronunciation difficulties match L2 listening difficulties and if not they do not, focus should not be placed on those elements in the classroom. The goal to keep in mind is one of international intelligibility not just intelligibility for native listeners.
The term ‘segmental’ refers to the individual phonemes of a given language: the distinct sounds that combine to make speech. Each language has an inventory of sounds that can be used to communicate orally. The mastery of these sounds, it was supposed, should enable L2 speakers to pronounce intelligibly, but if only it were that simple! Not only are many sounds difficult to acquire but they do not guarantee intelligibility, many other factors play a role. That being said, there are linguists who advocate a segmental approach to language teaching in order to help students become more intelligible. Suprasegmental features, on the other hand, include stress, rhythm and intonation. These elements give English its distinctive rhythm and allow speakers to make certain parts of speech salient for emphasis or meaning. There are many who feel that prosodic features are key to achieving intelligibility and thus advise that teaching should reflect this. Hence, the debate as to which features should take prominence in the classroom.

Jenkins (2001) argues that segmental features are the principal cause of intelligibility breakdowns in NNS-NNS interactions. She found that students who reverted to consonant conflation, whereby a speaker replaces a consonantal phoneme with another that is easier for them to pronounce, hindered intelligibility significantly. In addition, many of her students were prone to simplifying challenging syllables, particularly consonant clusters, by deleting consonants or adding an extra vowel sound to facilitate the articulation of the syllable. Most of the world’s languages prefer alternating between consonant and vowel sounds but this is not always true of English, hence the difficulty for many L2 speakers to pronounce consonant clusters. However, simplifying consonant clusters proved to be particularly detrimental to intelligibility and deletion of a consonant more so than the addition of a vowel. Jenkins postulates that the mispronunciation of segmental features is more harmful to intelligibility than suprasegmental features in NNS-NNS interactions because non-native speakers have a tendency to use bottom-up processing and often focus, therefore, on particular sounds rather than the overall rhythm and intonation in order to decode speech.

Derwing and Rossiter (2002) examined the perceptions of ESL students’ own pronunciation variations and found that the majority of the difficulties identified and perceived were segmental ones, despite the fact that the researchers themselves favour a global approach to pronunciation teaching. The following quotation summarises the students perceptions:

“When we asked respondents what pronunciation problems they typically experienced, 39 were unable to identify specific areas of difficulty. Eighty-four per cent of the specific problems identified by the remaining 61 students were segmentals. Allowing for more than one response per
person, 26 cited “th”, 12 mentioned “l/r”, and 28 noted other individual vowels and consonants as problematic. Seven noted difficulty pronouncing unfamiliar words; six had difficulty with word/sentence stress; two cited speech rate, two cognates, and one person identified intonation as a pronunciation problem. Altogether, only 10% of the problems mentioned were related to prosody.” (Derwing and Rossiter, 2002, p.161)

The “th” is commonly cited as a sound that L2 speakers find notoriously difficult to pronounce yet it is rarely cited by researchers as a posing a problem to intelligibility. The /h/ is also commonly indicated as a problem for some L2 speakers of English but is disputed as to whether it affects intelligibility. Vowel sounds, on the other hand, are often heralded as causing miscommunication problems between speakers of many different nationalities, which is why minimal pairs are often used in the classroom to help students practise the distinction between different vowel contrasts. What is interesting to note is that non-native speakers themselves appear to notice segmental variation more than suprasegmental variation. However, this does not appear to be true for native speakers.

Pennington & Richards (1986) advocate suprasegmental features as the primary cause of unintelligible pronunciation. They argue that: “pronunciation in a second language involves far more than the correct articulation of individual sounds. Pronunciation is not simply a surface performance phenomenon but is rather a dynamic component of conversational fluency” (p.212). They favour teaching suprasegmental features in order to improve students’ intelligibility. They cite Dirven & Oakeshott-Taylor (1984) who believe that “To interfere with stress, timing, fundamental frequency [and other aspects of prosodic continuity in discourse] usually has more drastic consequences for comprehension than removing the cues of a particular [phonological] segment” (Pennington & Richards, 1986, p.211). They are referring of course to native listeners but as we have seen this is not often the case for non-native speakers who tend to focus on individual sounds as opposed to the overall musicality and intonation of a language.

Capliez (2011) is another researcher who highlights the importance of prosodic elements. While he recognises the negative impact that segmental deviations can have, he postulates the following: “il semblerait que les suprasegments aient en fait plus d’importance que les segments, et que les erreurs
suprasegmentales n’aient pas la même ampleur que les erreurs phonémiques ou phonétiques\textsuperscript{17} (2011, p.30). For him this also implies teaching students the suprasegmental features of English.

The importance of prosodic instruction is supported by the findings of Derwing and Rossiter. Their study in 2003, evaluated the effects of different types of English pronunciation instruction. As part of that study, one group of students received segmental instruction which involved learning to distinguish between English sounds and to produce these sounds as accurately as possible. A second group was taught the suprasegmental features of English. They primarily focused on the rhythm and intonation of English speech. In their study the second group fared better in the final test. Thus, Derwing and Rossiter conclude in favour of a suprasegmental approach:

\begin{quote}
“We do not advocate eliminating segment-based instruction altogether, but, if the goal of pronunciation teaching is to help students become more understandable, then this study suggests that it should include a stronger emphasis on prosody.” (2003, p.14).
\end{quote}

Once again though, the participants evaluating the L2 speakers’ pronunciation were native speakers of English. The evidence seems to point towards the fact that native speakers have a tendency to decode speech using prosodic cues rather than segmental ones.

Lepage and Busa (2014, p.388) argue that misplaced vowel reduction can impede intelligibility and that it should be viewed as a suprasegmental feature rather than a segmental one. They also advocate the fact that word stress is harmful to intelligibility. In their study, Lepage and Busa sought to discover which feature affects intelligibility the most. 32 NS participants completed a perception test on Canadian French and Italian speech. They tested 184 words of 2/3/4 syllables all of which contain one reduced vowel in standard pronunciation. The carrier sentence: “I say X again” was uttered by 20 French Canadians and 20 Italians. They found that misplaced leftwards stress impairs intelligibility more than misplaced rightward stress and that misplaced vowel reduction impairs intelligibility more than the absence of vowel reduction. In addition, their findings suggest that vowel reduction and misplaced word stress both hinder intelligibility but when combined are particularly detrimental.

\textsuperscript{17}“It seems that suprasegmentals are, in fact, more important than segmentals, and that suprasegmental errors do not have the same impact as phonemic or phonetic errors” (Capliez, 2011, p.30)
Vowel reduction is a feature of connected speech and while it can be harmful if misplaced, it is not particularly harmful when absent altogether. In reference to connected speech, it has been argued that “Syllables or words which are articulated precisely are those high in information content, while those which are weakened, shortened, or dropped are predictable and can be guessed from context” (Pennington & Richards, 1986, p.211). However, this is not always the case for non-native speakers as they may be unable to guess or infer meaning from the surrounding linguistic context. Considering the fact that native speakers are more adept at interpreting speech even when connected speech is lacking, it seems unreasonable to expect non-native speakers to use it extensively; especially when it can endanger intelligibility between themselves and other non-native speakers. Another problem that arises is that the teaching of suprasegmental features is particularly challenging. The patterns are often irregular and therefore relatively unteachable in a classroom setting. It is perhaps better to draw attention to some of the features and let students acquire them in due course.

It is important to bear in mind the fact that both segmental and suprasegmental elements interact in facilitating or impeding intelligible communication. As Terrier rightly suggests:

“Le caractère artificiel de la séparation entre l’analyse des questions segmentales et suprasegmentales soulignée dans l’introduction de ce chapitre apparaît ici au grand jour car, en anglais, accentuer une syllabe a un effet majeur sur son contenu vocalique : les syllabes accentuées se distinguent non seulement par une plus grande intensité mais aussi en termes qualitatifs, par leur durée, la variation de fréquences et le timbre vocalique” (2011, p.51)

Although both features of pronunciation can act independently, they also intertwine. It may be true that segmental features are more harmful for non-native speakers and that suprasegmental features are more so for native speakers but we must not forget that more often than not these two types of pronunciation variations are found more often than not in combination. In the following section, we will look at French speaker variations in greater detail and review previous literature assessing the impact they have on intelligibility.

18 “The artificial nature of separating segmental and suprasegmental analysis underlined in the introduction of this chapter comes to light because, in English, to stress a syllable has a major effect on its vowel content: stressed syllables stand out not only through being intensified but also in qualitative terms, through their length, frequency variation and vowel tone.” (2011, p.51)
1.4.3. Hierarchy of French speaker pronunciation variants

Despite the wealth of research on L2 pronunciation, there is less information specifically focused on French speakers pronunciation and even, less on their reception of English. Yet, according to Capliez, “Dans un bref sondage que nous avons réalisé, 48 % de francophones étudiant l’anglais à l’université, tous niveaux confondus, ont affirmé que la phonétique était la matière qu’ils considéraient comme la plus difficile” (2011, p.44). We will look at the work that has particularly focused on French speakers in order to determine which phonological elements affect intelligibility and therefore should be the priority of our pedagogical focus.

We have seen in a preceding section that the CAH has been a dominant paradigm in phonology, and while interference from the L1 is not the only cause of phonological deviation, it has an irrefutable impact on the L2. If we compare English and French phonology we can see that, on a segmental level, there are phonemes that exist in one language but not in the other. To take just a few examples: /θ/ in think, /ð/ in this, /h/ in hat, /ɔː/ in first, /ɔː/ in sore, /oə/ in foot. These realisations exist in English but not in French and likewise the /r/ in rue, /ø/ in peu, /œ/ in heure exist in French but not in English. The former are potential difficulties for French speakers learning English as they have to be able to perceive and discriminate these phonemes from others, then appropriately arrange their articulatory settings in order to produce them.

Terrier (2011) exhaustively enumerated the differences between the two languages. She revealed that, while English has 24 consonants sounds and French 20, they share 19 consonant sounds – including /t/ although it is realised differently: [k] in French and [t] in English. This means that the following consonant sounds do not appear in the French language: /θ/, /ð/, /h/, /ɔː/, /tʃ/, /dʒ/. That being said, the last two appear in French words such as ‘match’ or ‘manager’. Conversely, the consonant sound /n/ does not exist in English. Turning her attention to vowels, Terrier found that RP has 20 vowel sounds, of which 12 monophthongs and 8 diphthongs, whereas GA has only 5 diphthongs and does not always maintain the distinction between tense and lax vowels. In French, on the other hand there are 16 vowel sounds. Her findings show that none of the vowel sounds in either language correspond apart from the schwa. This means that French speakers learning English are supposed to master four completely new consonant sounds and fifteen or twenty completely new vowel sounds; a huge number of new sounds to acquire. Research shows that approximations

19 “In a brief survey that we undertook, 48% of French speakers studying English at university, of all levels, stated that phonetics was the subject they considered the most difficult” (2011, p.44)
of many of these sounds are sufficient in order to provide intelligible communication therefore it is more appropriate to focus on the sounds that pose intelligibility problems.

On a suprasegmental level, there are also numerous differences between French and English. French is known as a syllable-timed language and English a stress-timed language. Nuclear stress is placed on the final syllable of a word or group of words in French, whereas in English individual words carry stress and important lexical words are stressed within a sentence, leading to a number of words, both grammatical and lexical, having strong and weak forms. As Capliez states: “L’accent lexical anglais n’est pas fixe dans le sens où sa place est peu prévisible, au contraire du français où l’accent correspond généralement à la dernière syllabe de l’unité intonative” (2011, p.22). While many studies have shown that suprasegmental features have an impact on intelligibility, few have been able to pinpoint precisely which features are the most problematic.

Linguists have attempted to devise hierarchical schemes for pronunciation divergences founded on the idea that intelligibility should be the goal for L2 students. Collins and Mees provide a ranking system for phonological errors in their handbook:

“In general terms, we can rank errors in the following way.
1. Errors which lead to a breakdown of intelligibility.
2. Errors which give rise to irritation or amusement.
3. Errors which provoke few such reactions and may even pass unnoticed” (2013, p.215).

They go on to present non-native error rankings for English according to the aforementioned categories in various different languages. Diana cites Collins and Mees by summarising the common errors they attribute to French speaking students:

“En ce qui concerne plus particulièrement les francophones, elles placent le contraste vocalique entre /ɪ/ et /iː/, l’effacement du /h/ et l’accent de mot dans la première catégorie. Dans la seconde catégorie, un /r/ inapproprié, le problème du th-, les contrastes vocaliques entre /ʌ:/ et /ɔ:/ et entre /v/ et /ʒ/, les allophones de /l/ et la présence, ou absence, inadéquate du /r/ en finale selon le modèle d'accent choisi (RP ou GA). Dans la troisième, elles mettent l’intonation, l’absence de

20 “English word stress is not fixed in the sense that its place is unpredictable, contrary to French where the accent generally corresponds to the last syllable of a prosodic unit” (Capliez, 2011, p.22)
consonnes syllabiques (comme dans bottle prononcé /ˈbɒtəl/, par exemple) et l’accentuation des composés” 21 (2010, p.15).

He also cites Kenworthy (1987) whose hierarchy is somewhat similar:

“Pour Kenworthy, le classement des priorités pour les francophones est le suivant :

High Priority concerne rythme et accent de mot ; la prononciation des consonnes /θ/ et /ð/ (bien qu’elle classe également ces deux consonnes dans la catégorie « Optional Attention »), l’absence de /t/ et /d/ dans /ʃ/ et /ʒ/, l’absence de /ŋ/ ou de /h/, la non aspiration de /p, t, k/ ; pour les voyelles, la confusion entre /i:/ et /ɪ/ (beat / bit), entre /ɔ/ et /ɔː/ (low / law), entre /e/ et /ɛ/ (pen / pain) ainsi que /æ/ et /ʌ/ (cap / cup) ; et, pour terminer, certains problèmes de liaison.

Low Priority concerne principalement l’articulation dentale de /t, d, l/, et les diphongues /ɛɪ/ et /ɔː/.


Although he does not present a specific hierarchy of French speakers phonological errors, Capliez (2011) argues that “Le principal problème de production des apprenants est sans nul doute celui du placement de l’accent tonique, également appelé noyau.23” (p.19) while the most frequent error is not being able to make the distinction between tense and lax vowels. He gives the example of “les paires /æ/-/ɑ:/, /ɪ/-/i:/, ou encore /ɔ/-/u/ sont neutralisées et deviennent respectivement /a/, /i/ et /u/.”24 (Capliez, 2011, p.5). He also believes that /θ/ and /ð/ should be replaced by /t/ and /d/ or /f/ and /v/ instead of /s/ and /z/, the way it is commonly replaced by French speakers, because these

21 “Concerning French speakers, they place vowel contrasts between /i/ and /ɪ/, the elimination of the /h/ and word stress in the first category. In the second category, the inappropriate use of /r/, the th- problem, vowel contrasts between /u:/ and /ʊ/ and between /ɔ/ et /u:/, allophones of /l/ and the inappropriate presence, or absence, of the final /r/ according to whether the chosen accent is (RP or GA). In the third, they place intonation, the absence of syllabic consonant (bottle pronounced /ˈbɒtəl/, for example) and compound stress” (Diana, 2010, p.15)

22 “For Kenworthy, the hierarchy for French speakers is the following:
High Priority concerns rhythm and word stress; the pronunciation of the consonants /θ/ and /ð/ (although these two consonants are also placed in the category “Optional Attention”), the absence of /t/ and /d/ in /ʃ/ and /ʒ/, the absence of /ŋ/ or of /h/, the non-aspiration of /p, t, k/; for the vowels, the confusion between /i:/ and /ɪ/ (beat / bit), between /ɔ/ and /ɔː/ (low / law), between /e/ and /ɛ/ (pen / pain) as well as /æ/ and /ʌ/ (cap / cup); and to finish, certain problems with connected speech.

Low Priority mainly concerns the dental articulation of /t, d, l/, and the diphthongs /ɛɪ/ and /ɔː/.

In the category Optional Attention, we find the pronunciation of /r/, of the /ɔ/ in book, and contrastive accent.” (Diana, 2010, p.14)

23 “The main production problem for learners is without a doubt, the placement of tonic accent, also known as nuclear stress” (Capliez, 2011, p.19)

24 “the pairs /æ/-/ɑ:/, /ɪ/-/i:/, or even /ɔ/-/u/ are neutralised and become /a/, /i/ et /u/ respectively.” (Capliez, 2011, p.5)
sounds have an effect on minimal pairs. He argues that the other two variations exist in Irish and Cockney accents and therefore should not pose intelligibility problems. Finally, he states that French speakers have a tendency to give syllables equal weight which eliminates the stress-rhythm of English and the vowel reduction phenomenon, factors that can affect intelligibility.

All four linguists, Collins & Mees, Kenworthy and Capliez, seem to agree that word stress, the absence of /h/ and vowel contrasts are the main concern for French speakers. However, these linguists are native speakers of English (apart from Capliez who is French) therefore they are analysing the phonological variations from a native speaker and French non-native speaker perspective, we must therefore ask ourselves whether these divergences also impede intelligibility for other non-native speakers. In the following section we shall look at Jenkins research which focused solely on NNS-NNS interactions.

1.4.3.1. Jenkins: The Lingua Franca Core

Jenkins has worked extensively on phonological intelligibility in the EIL context. She has assessed what is involved in phonological transfer and the links between transfer, intelligibility and teachability in order to develop the Lingua Franca Core (LFC). The idea being that teachers can focus their attention on the areas of pronunciation that directly affect the students’ international intelligibility. Her LFC is empirically based on years of study (ILT data including two studies, an experiment, and a corpus of field observations). According to her research the areas for preservation to assure mutual intelligibility in EIL are:

“1 Most consonant sounds
2 Appropriate consonant cluster simplification
3 Vowel length distinctions
4 Nuclear stress”
(Jenkins, 2001, p.132)

These were the areas that revealed breakdowns in communication. By analysing her students’ miscommunications and interviewing them afterwards, Jenkins was able to establish which pronunciation variations caused a loss of intelligibility and thus create the LFC. Due to the relevance of Jenkins’ work to my own, her LFC will be stated here in full:
According to the LFC, phonological error in EIL involves an error in producing any of the following (not in any order of priority):

1. The consonantal inventory with the following provisos:
   - rhotic [ɹ] rather than other varieties of /r/
   - intervocalic /t/ rather than /ɾ/
   - most substitutions of /θ/, /ð/ and /ɫ/ permissible
   - close approximations to core consonant sounds generally permissible
   - certain approximations not permissible (i.e. where there is a risk that they will be heard as a different consonant sounds from that intended)

2. Phonetic requirements:
   - aspiration following the fortis plosives /p/, /t/, and /k/
   - fortis/lenis differential effect on preceding vowel length

3. Consonant clusters:
   - initial clusters not simplified
   - medial and final clusters simplified only according to L1 rules of elision

4. Vowel sounds:
   - maintenance of vowel length contrasts
   - L2 regional varieties permissible if consistent, but /ɜː/ to be preserved

5. Nuclear stress production and placement and division of speech into word groups.”

(2001, p.159)

According to Jenkins any deviations that fall outside these areas should be considered as L2 regional variation and not error. She argues that there are certain areas of pronunciation that are unteachable and therefore teachers should merely draw attention to them so that they may be acquired at a later stage. She also believes that some elements, such as attitudinal intonation and connected speech, could be taught receptively but not productively as these areas can seriously impede international intelligibility. Her LFC allows teachers reduce their workload and provide more achievable goals for students. For French speakers this means not wasting time teaching
students to produce /θ/ and /ð/ or connected speech, although these are difficult for French speakers to produce, because the former is not highly detrimental to international intelligibility and the latter can be particularly so. Instead, teachers can focus on the /h/, vowel contrasts, the aspiration of fortis plosives, the maintenance of consonant clusters, sentence stress and word stress, areas which are difficult for French speakers to produce and do appear to have an impact on intelligibility. Jenkins’ research supports Collins & Mees, Kenworthy and Capliez with the addition of two factors. All of which shall be applied to listening grid in order to analyse the corpus.

1.5. Listening grid of analysis

I will be examining the chosen corpus using a listening grid to assess the intelligibility of specialist oral discourse. In terms of pronunciation, the grid takes into account previous research undertaken by Collins & Mees, Kenworthy, Capliez, Terrier and Jenkins’ Lingua Franca Core. The latter is particularly aligned with our goal of international intelligibility as it is a list of pronunciation elements that are, according to Jenkins, essential for intelligible communication between non-native speakers. The other linguists, on the other hand, allow us to hone in on phonological divergences that are specific to French speakers. Using this research, I aim to assess how successful the speakers are in communicating, which pronunciation variants impeded my understanding and which had little to no effect on understanding, and whether my assessment supports or contradicts previous research. The hope being that I may be able to confirm and/or suggest which elements of pronunciation are essential for intelligibility in the context of an international conference.

It is primordial to note that the listener plays an important role in the success of intelligible communication. This is even more apparent when considering the LANSAD context as two non-native speakers from different backgrounds may have more difficulty in understanding one another, especially if one of the listeners has not yet reach a proficient level in English. In this situation, the listener may be unable to identify the surrounding linguistic clues from the context. I shall be assessing the chosen corpus in terms of its intelligibility but, as I am a native speaker of English, we must consider the limitations of my analysis. What may be intelligible for me, would not necessarily be intelligible for a non-native speaker, particularly one who still has interlanguage status.
I will not only be analysing the speaker’s pronunciation, I will also be evaluating several other elements that may impede or facilitate intelligibility: the impact of technical vocabulary and academic oral presentation skills. I am keen to discover to what extent following the typical codes for making an academic oral presentation has on intelligibility and whether is it essential to possess expert technical knowledge in order to understand. In this way, I will be able to assess whether the intelligibility of specialist oral discourse is affected by knowledge of the subject. As a result, I will be able to compare how many difficulties – if there are any – can be attributed to technical knowledge and how many to pronunciation.

I have also included a section on listener factors and a section of statistical information in order to collect any further information that may play a role in intelligible communication.

<table>
<thead>
<tr>
<th>CATEGORIES OF ANALYSIS</th>
<th>RESEARCH BASIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essential question</td>
<td></td>
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<tr>
<td>Is the discourse intelligible?</td>
<td></td>
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<tr>
<td>Pronunciation</td>
<td></td>
</tr>
<tr>
<td>The speaker has a strong foreign accent</td>
<td>Derwing &amp; Munro 1995, 1997, 2006</td>
</tr>
<tr>
<td>The speaker has a moderate foreign accent</td>
<td>Derwing &amp; Munro 1995, 1997, 2006</td>
</tr>
<tr>
<td>The speaker has a mild foreign accent</td>
<td>Derwing &amp; Munro 1995, 1997, 2006</td>
</tr>
<tr>
<td>The following segmental requirements are realised in such a way that they do not impede intelligibility:</td>
<td></td>
</tr>
<tr>
<td>Vowel contrasts</td>
<td>Jenkins 2001, Collins &amp; Mees 2013, Kenworthy 1987</td>
</tr>
<tr>
<td>Aspiration of fortis plosives /p/ /t/ /k/</td>
<td>Jenkins 2001, Kenworthy 1987</td>
</tr>
<tr>
<td>Consonant clusters maintained</td>
<td>Jenkins 2001</td>
</tr>
<tr>
<td>The following suprasegmental requirements are realised in such a way that they do not impede intelligibility:</td>
<td></td>
</tr>
<tr>
<td>Sentence stress</td>
<td>Jenkins 2001</td>
</tr>
<tr>
<td>Word stress</td>
<td>Collins &amp; Mees 2013, Kenworthy 1987</td>
</tr>
<tr>
<td>Vowel reduction(^{25})</td>
<td>Lepage &amp; Busa 2014, Terrier 2011</td>
</tr>
</tbody>
</table>

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\(^{25}\) I do not consider vowel reductions as a necessary requirement, however, I am keen to assess the impact it may have as it has resurfaced several times over the course of my research.
<table>
<thead>
<tr>
<th>French and English Homographs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technical Vocabulary in Psychology Domain</strong></td>
<td></td>
</tr>
<tr>
<td>The number of Psychology terminology units used</td>
<td>Harlan 1926, APA Psychology Dictionary, Psychology Dictionary</td>
</tr>
<tr>
<td>The speaker explained/defined technical terminology</td>
<td></td>
</tr>
<tr>
<td>The number of signalling units used</td>
<td>Nesi &amp; Basturkmen 2006</td>
</tr>
<tr>
<td><strong>Oral Presentation Skills</strong></td>
<td></td>
</tr>
<tr>
<td>The speaker respects the academic presentation codes:</td>
<td></td>
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<tr>
<td>Clear structure (Introduction, Body, Conclusion)</td>
<td>Hyland 1991</td>
</tr>
<tr>
<td>Discourse signalling</td>
<td>Nesi &amp; Basturkmen 2006</td>
</tr>
<tr>
<td>The speed of delivery is appropriate</td>
<td>Nesi 2005</td>
</tr>
<tr>
<td>The volume of speech is appropriate</td>
<td>Hill &amp; Storey 2003</td>
</tr>
<tr>
<td>The speaker is lively and animated</td>
<td>Hill &amp; Storey 2003</td>
</tr>
<tr>
<td>The speaker uses body language effectively</td>
<td>Hill &amp; Storey 2003</td>
</tr>
<tr>
<td>The speaker uses visual aids</td>
<td>Hyland 1991, Hill &amp; Storey 2003</td>
</tr>
<tr>
<td>The speaker reads from notes</td>
<td>Nesi 2005</td>
</tr>
<tr>
<td><strong>Listener factors</strong></td>
<td></td>
</tr>
<tr>
<td>The listener is a native speaker of English</td>
<td></td>
</tr>
<tr>
<td>The listener is a non-native speaker of English</td>
<td></td>
</tr>
<tr>
<td>The listener uses the linguistic context to recognise words and/or decode the message</td>
<td>Jenkins 2001, O’Malley et al 1989</td>
</tr>
<tr>
<td>The listener is familiar with French pronunciation</td>
<td>Gass &amp; Varonis 1985</td>
</tr>
<tr>
<td>The listener is familiar with the Psychology domain</td>
<td>Hyland 2006, Mortureux 1995</td>
</tr>
<tr>
<td><strong>Statistical Information</strong></td>
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</tr>
<tr>
<td>The total number of words transcribed</td>
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</tr>
<tr>
<td>The number of unintelligible items</td>
<td></td>
</tr>
<tr>
<td>The total duration of the unintelligible items in seconds</td>
<td>26</td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
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</tr>
<tr>
<td>The duration of the video in minutes</td>
<td></td>
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<tr>
<td>The number of slides on the PowerPoint</td>
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<tr>
<td>The speaker was standing</td>
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<tr>
<td>The speaker was sitting</td>
<td></td>
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<tr>
<td>The speaker used a microphone</td>
<td></td>
</tr>
</tbody>
</table>

This listening grid will be used to analyse the corpus. In the part two we will discuss the corpus itself, how and why it was chosen and the source from which it is taken. We will describe the methodology used and finally discuss the results and analysis of the corpus.

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26 This number is rounded up to the nearest second.
PART TWO: A corpus of French psychologists
Part two will examine the four oral presentations taken from our small corpus of French psychologists. Firstly, we will discuss the elaboration of the corpus. Secondly, the methodology for analysing the presentations will be outlined. Thirdly, the results of the analysis will be presented and finally, we will evaluate the intelligibility of each presentation and the corpus as a whole; the objective being to ascertain which factors have an impact on intelligibility using the listening grid based on previous research.

2.1. The Corpus

Having taught in the first year of the LANSAD program, I was able to observe the fact that the students only have one hour of class per week. This means that there is not much time for in depth pronunciation training, which is why it is important to investigate the essential elements of intelligible pronunciation. Given that it was not possible in such a short space of time to create and enact a study using my students, it was necessary to find a corpus in order to examine the question of intelligibility. The focus of study was defined as specialist discourse since LANSAD students are specialists in other domains therefore the corpus needed to be comprised of French speakers talking about specialist subjects in English, preferably psychology as many of my students come from that field.

An exhaustive search of existing corpora revealed how challenging it is to find oral corpora as opposed to written corpora. The even greater challenge was to find L2 English corpora as most of the English language corpora are made up of native speakers’ writing or speech, not to mention finding French speakers talking about specialist topics. The first step was to look for oral corpora from which I had to eliminate any that were not English language corpora. I searched the remaining corpora: the British National Corpus (BNC), the Corpus of Contemporary American English (COCA), the Santa Barbara Corpus of Spoken American English, the Buckeye Corpus of Conversational Speech, the American National Corpus, the Brown Corpus, the International Corpus of English, TIMIT, and the Wellington Corpus of Spoken New Zealand English but they only include samples of native English speakers. I selected seven corpora which seemed to be relevant to my goals but had to disregard them for a variety of reasons. The Cambridge Learner Corpus features L2 English but it is a written corpus of learners’ exam scripts. The British Academic Spoken English corpus (BASE) and the Michigan Corpus of Academic Spoken English (MICASE) seemed promising as both are based on specialist discourse, such as lectures and seminars, but
found that both corpora featured primarily native speakers. The Backbone corpora and the Learning Prosody in a Foreign Language corpus (LeaP) focus on L2 English but neither were suitable because although they featured French speakers speaking English, the topics were often unrelated to specialist discourse. Finally, the Vienna-Oxford International Corpus of English (VOICE) appeared to be particularly pertinent as it includes 23 audio files that consist of interactions in English between speakers of a variety of L1s in different contexts, including specialist discourse. However, after listening to the VOICE audio files, I realised that unfortunately none of them precisely fit the focus of study: French speakers engaging in specialist discourse. Due to the lack of suitable corpora available, it was necessary for me to develop my own corpus.

Having extensively searched existing corpora and other academic sources, I decided to search YouTube where I was able to find conference presentations that had been filmed and uploaded. The chosen conference took place in the United States at the University of Minnesota and was the 18th International Conference on Perception and Action (ICPA18) which was organised by the International Society for Ecological Psychology (ISEP). The group has served to “connect ecological psychologists from around the world” (ISEP website) whose shared commitment is to “foster the development of psychology as a science of behavior from an ecological point of view” (ISEP website). It is clear, therefore, that ISEP members have mutual interests and common community ideals which may become apparent in the way that members present their work to one another. Those who took part in the conference came from universities around the world: from the United States, France, Norway, the United Kingdom, Japan, the Netherlands, Brazil, Turkey, Taiwan, South Korea and Spain. English was the language used so that the academics could communicate with one another and through which they presented their work. Four French psychology scholars presented their work at the conference that year and they shall be the focus of this study.

The reason these academic presentations were chosen is because the scholars presenting represent the future for some of the students in LANSAD. Whether they are psychology students or not, they may go on to be scholars in their domains and may thus need to communicate with other academics and present their work in English. As psychology students make up the majority of my LANSAD classes, this conference seemed all the more pertinent to me. The four academics come from the
Universities of Aix-Marseille, Grenoble and Montpellier and they present their research on a range of topics within the ecological psychology field.

Benoit Bardy, from the University of Montpellier, presents his work on “Music-induced synchronisation of biological systems”. He conducted a study which demonstrated that listening to music when performing physical activities enables the different biological systems to synchronise with one another. The same result is not obtained with a metronome or without music at all. He also found that when different biological systems are synchronised, physical performance is enhanced. It is this study that he presents to the audience. He starts the presentation by playing a short excerpt of music and making, what appears to be, a spontaneous joke before presenting his research to the community.

We see him standing close to the audience and from time to time he gesticulates towards the PowerPoint presentation seen below.
His presentation is punctuated with laughs from the audience as he often makes amusing comments. There are six seconds, however, where the recording cuts out and we see his mouth moving but hear no sound. The presentation lasts for a total of fourteen minutes and forty seven seconds.

Ludovic Marin, from the University of Montpellier, presents “Social interaction in schizophrenia”. He also carried out research but into how to improve schizophrenic patients’ levels of social interaction. He explains how he discovered that when patients share similar morphology to an avatar, it triggers synchronisation in a leader/follower situation thus initiating social interaction. He also found that in order to increase social interaction subsequently, it was necessary to switch to using a dissimilar avatar in order to maintain the patients’ attention. He suggests that this knowledge can help psychiatrists work with patients to improve their social interaction. While delivering his presentation, he too stood up in front of his audience, as we see here.
His presentation begins mid-sentence as the first minute of the recording is missing but continues uninterrupted, save a cough and a laugh, for eighteen minutes and twenty five seconds.

Remy Casanova, from the University of Aix-Marseille, shares his research entitled: “Catching: what is the order of the information needed?” As the title suggests, he discusses the different elements involved in catching a ball; how position, velocity, and acceleration affect locomotor interception. He explains how these factors were tested in a virtual reality setting by experienced football players who performed a goalkeeper’s interception task. His presentation was illustrated using a number of graphs and equations.
He tended to stand closer to one side and not as close to the audience.

There is a slight distortion of sound on the recording during the words “mechanism base” at the beginning. In addition, his presentation is the only one in which other speakers can be heard. At the very beginning, we hear Simon Ledouit introducing Casanova's topic and at the end an unknown
speaker utters the words “No not yet.” when Casanova offers the chance to speak. It is also the shortest presentation at thirteen minutes and twenty seconds.

Simon Ledouit, from the University of Grenoble Alpes, presents on a different aspect of the same topic: “Reversal movements in interception of balls”. He explains how fractional order concepts help to predict reversal probabilities in manual ball interception. He ran an experiment in which participants interacted with a graphic tablet to analyse interception behaviour and observed the results. Once again, he illustrates his presentation using graphs and equations, as we see below.

Like all of the four speakers, he presents standing up. His presentation lasts for seventeen minutes and one second and there are no interjections from other speakers, only a minor distortion on the recording at the beginning during the words “a ball”.

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All four of the presentations were specialist in nature and all of the speakers were French which is why they were chosen as part of the corpus. In addition, the speakers were presenting at an international conference and the language of communication being used was English therefore the aim of the presentations was to share their findings with the academic community. This profile was perfectly suited to this research as the goal is to investigate intelligibility in L2 specialist oral discourse. The following section explains the procedure used to analyse the presentations.

2.2. Methodology

Intelligibility is a two-way process. There is always a listener and a speaker and intelligible communication is reliant upon both. A great effort has been made to be as methodological as possible and to remain objective, being the only listener. Nevertheless, the nature of this type of analysis leads to a certain level of subjectivity and would be at least slightly different for every listener. This could be considered a limitation to this study. In an effort to be coherent and consistent certain steps have been followed. Beforehand though, we shall discuss what this study expects to find.
The listening grid devised to examine the corpus can be separated into three broad areas of analysis: pronunciation, oral presentation skills and technical vocabulary. The research elaborated in part one suggests that mispronunciation will impede intelligibility and this is what we expect to find. In addition, if the listener is a native speaker of English as I am, suprasegmental mispronunciations should have a greater impact than segmental ones and combinations of mispronunciations are expected to be particularly detrimental. The pronunciation of homographs is also expected to be closer to French than to English due to L1 inference. From a listening perspective, familiarity with the accent appears to facilitate intelligibility, thus being familiar with the French accent in English should aid my understanding. Familiarity with the topic and technical vocabulary should also lead to better intelligibility, however, I am not familiar with the psychology field therefore I expect to encounter difficulties in this area. Finally, adhering to the archetypal oral presentation format is expected to facilitate intelligibility as previous research suggests.

Several steps were followed to ensure rigorous analysis. The first step was to listen to each presentation and simply make notes of my first impressions in terms of pronunciation and technical vocabulary. The first question being whether I had understood the global message of each presentation. The answer was not always yes. A second and third listening allowed for more detailed notes on pronunciation. Subsequently, each presentation had to be transcribed orthographically in order to quantify certain elements on the listening grid. This took a considerable amount of time and led to unexpected discoveries; speakers who I had found to be intelligible when first listening, appeared to be less intelligible upon transcribing. It also became clear that for some presentations whole sentences could be missing and yet the message could still be understood. Conversely, for others the majority of sentences could be complete but the general message lost. Another native speaker of English was asked to check my transcriptions with the aim of completing the unintelligible items, however, some unintelligible items still remain. These items have been marked with an X in the transcriptions and any interjections or noises coming from other speakers have been written in italics. Once the transcriptions had been completed, notwithstanding some unintelligible items, it was time to fill out the listening grids with both quantitative and qualitative information. It was necessary to listen various times in great detail for specific elements on the listening grids before proceeding to analyse the results.
The following section presents the results using the listening grid developed from previous research; the ultimate question being whether the specialist oral discourse of this corpus is intelligible or not.

2.3. Results

The completed listening grids will be presented in this section by individual speaker and a summary of the findings will be given.

2.3.1. Benoit Bardy

<table>
<thead>
<tr>
<th>Essential question</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the discourse intelligible?</td>
<td>I found the presentation to be intelligible overall but there were a great deal of unfamiliar concepts.</td>
</tr>
</tbody>
</table>

**Pronunciation**

| The speaker has a strong foreign accent | No |
| The speaker has a moderate foreign accent | Yes |
| The speaker has a mild foreign accent | No |

The following segmental requirements are realised in such a way that they do not impede intelligibility:

| /h/ | It was produced inconsistently but this did not appear to affect intelligibility. |
| Vowel contrasts | They were not respected and sometimes caused confusion. |
| Aspiration of fortis plosives /p/, /t/, /k/ | Aspiration was produced inconsistently and did not appear to be problematic except in the instance of the word “talk”. |
| Consonant clusters maintained | Yes |

The following suprasegmental requirements are realised in such a way that they do not impede intelligibility:

| Sentence stress | It was not respected and caused confusion at times. |
| Word stress | It was not respected and caused confusion. |
## Vowel reduction
It was produced inconsistently and did not appear to impede intelligibility in terms of word recognition.

### French and English Homographs

<table>
<thead>
<tr>
<th>The pronunciation of homographs resembles the L2: English</th>
<th>Overall, the pronunciation of homographs resembles English.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The pronunciation of homographs resembles the L1: French</td>
<td>Three homographs resembled French.</td>
</tr>
</tbody>
</table>

### Technical Vocabulary in Psychology Domain

<table>
<thead>
<tr>
<th>The number of Psychology terminology units used</th>
<th>34</th>
</tr>
</thead>
<tbody>
<tr>
<td>The speaker explained/defined technical terminology</td>
<td>No</td>
</tr>
<tr>
<td>The number of signalling units used</td>
<td>4</td>
</tr>
</tbody>
</table>

### Oral Presentation Skills

<table>
<thead>
<tr>
<th>The speaker respects the academic presentation codes:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear structure (Introduction, Body, Conclusion)</td>
<td>Yes</td>
</tr>
<tr>
<td>Discourse signalling</td>
<td>Yes</td>
</tr>
<tr>
<td>Transitions</td>
<td>Yes</td>
</tr>
<tr>
<td>Examples</td>
<td>Yes</td>
</tr>
<tr>
<td>Metaphors</td>
<td>No</td>
</tr>
<tr>
<td>The speed of delivery is appropriate</td>
<td>Often too fast</td>
</tr>
<tr>
<td>The volume of speech is appropriate</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>The speaker is lively and animated</td>
<td>Yes</td>
</tr>
<tr>
<td>The speaker uses body language effectively</td>
<td>Yes</td>
</tr>
<tr>
<td>The speaker uses visual aids</td>
<td>Yes – PowerPoint with images and graphs</td>
</tr>
<tr>
<td>The speaker reads from notes</td>
<td>No</td>
</tr>
</tbody>
</table>

### Listener factors

| The listener is a native speaker of English | Yes |
| The listener is a non-native speaker of English | No |
| The listener uses the linguistic context to recognise words and/or decode the message | Quite frequently |
| The listener is familiar with French pronunciation | Yes |
| The listener is familiar with the Psychology domain | No |

### Statistical Information

| 74 |
Bardy’s presentation was revealed seemingly contradictory results. The message was intelligible in a global sense and yet his presentation contained a considerable number of unintelligible items. I believe this can be explained by a number of factors. Firstly, his presentation contained one clear message that music induces biological systems to synchronise with one another. Secondly, he used less technical vocabulary. Finally, although there were many unintelligible items, I believe this was due to the speed of his speech and the quality of the recording, not solely the pronunciation.

The pronunciation features that impeded intelligibility were vowel contrasts and word and sentence stress. I suspect unintelligible items involved a combination of mispronunciations. Homographs were, in fact, pronounced in a way that resembled English overall. In terms of technical vocabulary, there were terminology units that I did not understand but they did not prevent me from gaining a global understanding of the presentation. In addition, the academic presentation codes were respected which facilitated overall comprehension.

### 2.3.2. Ludovic Marin

| Essential question |  
|-------------------|---|
| Is the discourse intelligible? | I found that the presentation was intelligible overall but had great difficulties when transcribing. |
| Pronunciation |  
| The speaker has a strong foreign accent | No |
| The speaker has a moderate foreign accent | Yes |
| The speaker has a mild foreign accent | No |
| The following *segmental requirements* are realised in such a way that they do not impede intelligibility: |  

<table>
<thead>
<tr>
<th>/h/</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vowel contrasts</td>
<td>They were not always respected but this rarely caused intelligibility problems except for the word “motor”.</td>
</tr>
<tr>
<td>Aspiration of fortis plosives /p/, /t/, /k/</td>
<td>Aspiration was produced inconsistently but did not cause difficulties.</td>
</tr>
<tr>
<td>Consonant clusters maintained</td>
<td>Yes</td>
</tr>
</tbody>
</table>

The following suprasegmental requirements are realised in such a way that they do not impede intelligibility:

<table>
<thead>
<tr>
<th>Sentence stress</th>
<th>It was not respected and this caused an equalising effect that sometimes posed an intelligibility problem.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word stress</td>
<td>It was not always respected and sometimes caused difficulties.</td>
</tr>
<tr>
<td>Vowel reduction</td>
<td>It was produced inconsistently and possibly contributed to the equalising effect.</td>
</tr>
</tbody>
</table>

**French and English Homographs**

The pronunciation of homographs resembles the L2: English Overall, the pronunciation of homographs resembles English.

The pronunciation of homographs resembles the L1: French One homograph resembles French.

**Technical Vocabulary in Psychology Domain**

<table>
<thead>
<tr>
<th>The number of Psychology terminology units used</th>
<th>83</th>
</tr>
</thead>
<tbody>
<tr>
<td>The speaker explained/defined technical terminology</td>
<td>Yes – He defined “bidirectional interaction”</td>
</tr>
<tr>
<td>The number of signalling units used</td>
<td>9</td>
</tr>
</tbody>
</table>

**Oral Presentation Skills**

| The speaker respects the academic presentation codes: | 
|------------------------------------------------------|---|
| Clear structure (Introduction, Body, Conclusion) | Yes |
| Discourse signalling | Yes |
| Transitions | Yes |
| Examples | Yes |
| Metaphors | Yes – He used a car metaphor to explain bidirectional interaction. |

<table>
<thead>
<tr>
<th>The speed of delivery is appropriate</th>
<th>Sometimes too fast</th>
</tr>
</thead>
<tbody>
<tr>
<td>The volume of speech is appropriate</td>
<td>Satisfactory</td>
</tr>
</tbody>
</table>
Marin also elicited contradictory results. He too had a high number of unintelligible items despite giving a presentation that was essentially intelligible in terms of global understanding. Once again, I believe this can be attributed to the fact that his presentation contained one clear message. In addition, I was familiar with a great deal the technical vocabulary he used. On the other hand, he spoke very quickly and had a tendency to equalise stress.

Although I would argue that Marin’s segmental pronunciation is the best of the four speakers, this inclination to equalise word and particularly sentence stress contributed to intelligibility difficulties. Furthermore, he also pronounced homographs in a way that resembled English rather than French, once again deviating from expectations. While he used a lot of technical vocabulary, I was familiar with much of it and he also followed the academic presentation codes, both factors appeared to aid intelligibility.
<table>
<thead>
<tr>
<th>Essential question</th>
<th>Overall, I did not understand the concepts being presented therefore the presentation was unintelligible to me.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pronunciation</td>
<td></td>
</tr>
<tr>
<td>The speaker has a strong foreign accent</td>
<td>Yes</td>
</tr>
<tr>
<td>The speaker has a moderate foreign accent</td>
<td>No</td>
</tr>
<tr>
<td>The speaker has a mild foreign accent</td>
<td>No</td>
</tr>
<tr>
<td>The following <em>segmental requirements</em> are realised in such a way that they do not impede intelligibility:</td>
<td></td>
</tr>
<tr>
<td>/h/</td>
<td>It was produced inconsistently and sometimes misplaced but this did not impede intelligibility.</td>
</tr>
<tr>
<td>Vowel contrasts</td>
<td>They were not respected and sometimes caused intelligibility problems.</td>
</tr>
<tr>
<td>Aspiration of fortis plosives /p/, /t/, /k/</td>
<td>Aspiration was produced inconsistently but did not cause difficulties.</td>
</tr>
<tr>
<td>Consonant clusters maintained</td>
<td>Yes</td>
</tr>
<tr>
<td>The following <em>suprasegmental requirements</em> are realised in such a way that they do not impede intelligibility:</td>
<td></td>
</tr>
<tr>
<td>Sentence stress</td>
<td>It was not respected and often caused confusion.</td>
</tr>
<tr>
<td>Word stress</td>
<td>It was not respected and also caused problems.</td>
</tr>
<tr>
<td>Vowel reduction</td>
<td>It was not respected but did not pose a problem.</td>
</tr>
<tr>
<td><strong>French and English Homographs</strong></td>
<td></td>
</tr>
<tr>
<td>The pronunciation of homographs resembles the L2: English</td>
<td>Sometimes homographs resembled English but overall they were pronounced with a combination of French and English pronunciation.</td>
</tr>
<tr>
<td>The pronunciation of homographs resembles the L1: French</td>
<td>Sometimes homographs resembled French.</td>
</tr>
<tr>
<td><strong>Technical Vocabulary in Psychology Domain</strong></td>
<td></td>
</tr>
<tr>
<td>The number of Psychology terminology units used</td>
<td>58</td>
</tr>
<tr>
<td>The speaker explained/defined technical terminology</td>
<td>No</td>
</tr>
</tbody>
</table>
The number of signalling units used | 4

### Oral Presentation Skills

The speaker respects the academic presentation codes:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear structure</td>
<td>Yes</td>
</tr>
<tr>
<td>(Introduction, Body, Conclusion)</td>
<td></td>
</tr>
<tr>
<td>Discourse signalling</td>
<td>Yes</td>
</tr>
<tr>
<td>Transitions</td>
<td>Yes</td>
</tr>
<tr>
<td>Examples</td>
<td>Yes</td>
</tr>
<tr>
<td>Metaphors</td>
<td>No</td>
</tr>
</tbody>
</table>

The speed of delivery is appropriate | Fairly slow
The volume of speech is appropriate | Yes
The speaker is lively and animated | Not particularly
The speaker uses body language effectively | Not particularly
The speaker uses visual aids | Yes – PowerPoint with graphs and equations
The speaker reads from notes | No

### Listener factors

The listener is a native speaker of English | Yes
The listener is a non-native speaker of English | No
The listener uses the linguistic context to recognise words and/or decode the message | Quite frequently
The listener is familiar with French pronunciation | Yes
The listener is familiar with the Psychology domain | No

### Statistical Information

The total number of words transcribed | 1383
The number of unintelligible items | 8
The total duration of the unintelligible items in seconds | 9
The duration of the video in minutes | 13:20
The number of slides on the PowerPoint | 14
The speaker was standing | Yes
The speaker was sitting | No
The speaker used a microphone | Yes

Unlike Bardy and Marin’s presentations, I was unable to gain a global understanding of Casanova’s presentation as the technical concepts were too numerous and domain-specific. Conversely, there
were not many unintelligible items. Once more this appears to be contradictory, however, it could be explained by the fact that Casanova was the most timid speaker and therefore spoke slowly and cautiously allowing me time to decode his pronunciation.

With regard to pronunciation, Casanova did not respect many segmental or suprasegmental requirements yet this did not prevent him from being intelligible. It did, however, cause confusion particularly when stress was misplaced. He was the only speaker whose pronunciation of homographs was generally a combination of French and English pronunciation. However, the technical vocabulary used in the presentation and the concepts being described were unknown to me, therefore I had great difficulty in understanding despite the fact that the academic presentation codes were respected.

2.3.4. Simon Ledouit

<table>
<thead>
<tr>
<th>Essential question</th>
<th>Overall, I did not understand the concepts being presented therefore the presentation was unintelligible to me.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pronunciation</td>
<td></td>
</tr>
<tr>
<td>The speaker has a strong foreign accent</td>
<td>Yes</td>
</tr>
<tr>
<td>The speaker has a moderate foreign accent</td>
<td>No</td>
</tr>
<tr>
<td>The speaker has a mild foreign accent</td>
<td>No</td>
</tr>
<tr>
<td>The following segmental requirements are realised in such a way that they do not impede intelligibility:</td>
<td></td>
</tr>
<tr>
<td>/h/</td>
<td>It was produced inconsistently but did not impede intelligibility.</td>
</tr>
<tr>
<td>Vowel contrasts</td>
<td>They were not respected but on the whole did not cause intelligibility problems.</td>
</tr>
<tr>
<td>Aspiration of fortis plosives /p/, /t/, /k/</td>
<td>Aspiration was inconsistent but again did not pose a problem.</td>
</tr>
<tr>
<td>Consonant clusters maintained</td>
<td>Yes</td>
</tr>
<tr>
<td>The following suprasegmental requirements are realised in such a way that they do not impede intelligibility:</td>
<td></td>
</tr>
<tr>
<td>Sentence stress</td>
<td>It was not respected and caused some difficulties.</td>
</tr>
<tr>
<td>Word stress</td>
<td>It was not always respected and sometimes</td>
</tr>
</tbody>
</table>
Vowel reduction | It was fairly well maintained and did not cause intelligibility problems.

**French and English Homographs**

<table>
<thead>
<tr>
<th>The pronunciation of homographs resembles the L2: English</th>
<th>Overall, the pronunciation of homographs resembles English.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The pronunciation of homographs resembles the L1: French</td>
<td>Three homographs resembled French.</td>
</tr>
</tbody>
</table>

**Technical Vocabulary in Psychology Domain**

<table>
<thead>
<tr>
<th>The number of Psychology terminology units used</th>
<th>54</th>
</tr>
</thead>
<tbody>
<tr>
<td>The speaker explained/defined technical terminology</td>
<td>No</td>
</tr>
<tr>
<td>The number of signalling units used</td>
<td>7</td>
</tr>
</tbody>
</table>

**Oral Presentation Skills**

<table>
<thead>
<tr>
<th>The speaker respects the academic presentation codes:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear structure (Introduction, Body, Conclusion)</td>
<td>Yes</td>
</tr>
<tr>
<td>Discourse signalling</td>
<td>Yes</td>
</tr>
<tr>
<td>Transitions</td>
<td>Yes</td>
</tr>
<tr>
<td>Examples</td>
<td>Yes</td>
</tr>
<tr>
<td>Metaphors</td>
<td>No</td>
</tr>
<tr>
<td>The speed of delivery is appropriate</td>
<td>Sometimes too fast</td>
</tr>
<tr>
<td>The volume of speech is appropriate</td>
<td>Yes</td>
</tr>
<tr>
<td>The speaker is lively and animated</td>
<td>Sometimes</td>
</tr>
<tr>
<td>The speaker uses body language effectively</td>
<td>Yes</td>
</tr>
<tr>
<td>The speaker uses visual aids</td>
<td>Yes – PowerPoint with graphs and equations</td>
</tr>
<tr>
<td>The speaker reads from notes</td>
<td>No</td>
</tr>
</tbody>
</table>

**Listener factors**

<p>| The listener is a native speaker of English | Yes |
| The listener is a non-native speaker of English | No |
| The listener uses the linguistic context to recognise words and/or decode the message | Fairly frequently |
| The listener is familiar with French pronunciation | Yes |
| The listener is familiar with the Psychology domain | No |</p>
<table>
<thead>
<tr>
<th>Statistical Information</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The total number of words transcribed</td>
<td>2167</td>
</tr>
<tr>
<td>The number of unintelligible items</td>
<td>19</td>
</tr>
<tr>
<td>The total duration of the unintelligible items in seconds</td>
<td>23</td>
</tr>
<tr>
<td>The duration of the video in minutes</td>
<td>17:01</td>
</tr>
<tr>
<td>The number of slides on the PowerPoint</td>
<td>19</td>
</tr>
<tr>
<td>The speaker was standing</td>
<td>Yes</td>
</tr>
<tr>
<td>The speaker was sitting</td>
<td>No</td>
</tr>
<tr>
<td>The speaker used a microphone</td>
<td>Yes</td>
</tr>
</tbody>
</table>

The message of Ledouit’s presentation was unintelligible, like that of Casanova’s, which could be attributed to the fact that there were too many unfamiliar technical concepts. His presentation had less unintelligible items that Bardy and Marin’s but twice as many as Casanova’s. This seems to be due to the fact that he spoke quicker than Casanova but not as quickly as the other two speakers.

Pronunciation requirements were either inconsistently respected or not at all, yet did not threaten intelligibility considering the relatively low number of unintelligible items. Like Bardy and Marin, homographs were pronounced in a way that was closer to English. The use of technical vocabulary prevented the overall message of the presentation from being intelligible and, although the academic codes were respected, this did not make the presentation intelligible overall.

2.4. Discussion

This section aims to discuss the analysis of the four oral presentations in greater detail. The orthographic transcriptions for each presentation can be found in the annexes and be used for reference where necessary. The three main factors that have been identified as having an impact on intelligibility in L2 specialist oral discourse will be discussed each in turn: oral presentation skills, technical vocabulary and pronunciation. As I have stated I am a native speaker of English but in addition to this I am familiar with French pronunciation having been an English teacher in Toulouse for five years. However, I am not at all familiar with the psychology domain. These three factors will inevitably play a role in the way that I analyse the corpus and, not only this, may effect the level of intelligibility ultimately achieved in this speaker listener interaction. It is important to bear
this in mind. First of all, we shall investigate the effect of the speakers’ oral presentation skills on intelligibility.

2.4.1. Oral Presentation Skills

Oral presentation skills proved to be a very important tool in guiding the listener. By using the archetypal academic presentation codes, the audience can, to a certain extent, predict the basic content of the presentation and this facilitates general understanding. The table below summarises the use of these codes by the four speakers:

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Benoit Bardy</th>
<th>Ludovic Marin</th>
<th>Rémy Casanova</th>
<th>Simon Ledouit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear Structure</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Discourse signalling</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>The number of discourse signalling units</td>
<td>4</td>
<td>9</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Transitions</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Examples</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Metaphors</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>The speed of delivery is appropriate</td>
<td>Often too fast</td>
<td>Sometimes too fast</td>
<td>Quite slow</td>
<td>Sometimes too fast</td>
</tr>
<tr>
<td>The volume of speech is appropriate</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>The speaker is lively and animated</td>
<td>✓</td>
<td>✓</td>
<td>Not particularly</td>
<td>Not particularly</td>
</tr>
<tr>
<td>The speaker uses body language effectively</td>
<td>✓</td>
<td>✓</td>
<td>Not particularly</td>
<td>✓</td>
</tr>
<tr>
<td>The speaker uses visual aids</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>The speaker reads from notes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
As you can see the majority of the codes were respected which was useful for me as a listener. I was able to follow all of the presentations thanks to these elements. We shall, now look at each element in turn.

Structure was a factor that greatly facilitated my ability to comprehend the general message. Casanova and Ledouit used the following structure:

Introduction – Method – Results – Model – Conclusion.

Marin differed slightly in his presentation structuring it thus:


While this is slightly more complex than the introduction, body and conclusion that I had expected, it is still essentially the archetypal form. In addition, the speakers stayed true to the traditional protocol for psychology and this allowed me to follow as a listener and guide me through the presentations despite the fact that many concepts were not fully understood. The only speaker who did not follow this type of structure was Bardy who used a slightly freer approach. Despite this, I could clearly identify the introduction, in which he discussed previous research; the body, in which he described the study he conducted; and the conclusion, whereby he reviewed the implications of the study. Once again allowing me to gain a global understanding of his presentation.

All the presentations exhibited discourse signalling to more or less similar degrees. This aided the process of following the presentations. It is important to explain that I have chosen to count discourse signalling words or phrases as units. This means that whether the discourse signal has two words, for example: “second result”, or five words: “so what about the result?”, I have counted these as one discourse signalling unit each. That way there will be less discrepancy if one speaker is more verbose than another. As you can see there was not a huge difference between speakers as they all used discourse signalling to a similar extent. Bardy and Casanova less so, however, as I mentioned Bardy had a slightly freer presentation style so this may have been a stylistic choice and Casanova’s presentation was the shortest at only 13.20 minutes compared with Bardy’s 14.47, Marin’s 18.25 and Ledouit’s 17.01. While discourse signalling was helpful, it did not clarify other elements of the presentation as we shall see later on.
Transitions and examples were used effectively by all four scholars and Marin used the metaphor of following a friend’s car to illustrate the concept of bidirectional interaction. Sometimes the examples enabled me to understand a concept that was hitherto unclear. This was particularly the case when a visual aid was used to demonstrate an example. Bardy and Marin’s PowerPoint presentations contained photos and Marin’s also included a short video which facilitated my understanding of certain concepts. For me, an example accompanied by an image was very useful in aiding intelligibility. However, Casanova and Ledouit’s presentations, on the other hand, also used visual aids as they illustrated their examples using graphs and equations but, seeing as I was unfamiliar with many of the concepts and the equations, this did not help my understanding. Thus, examples in combination with a visual aid, particularly an image, seem to be beneficial to the intelligibility of the message but when the listener is a novice, visual aids in the form of graphs and tables are not necessarily helpful.

Volume, liveliness, and body language all contributed to promoting global understanding. Casanova was the least expressive speaker and this may explain, in part, why I had difficulty with his presentation but he also appeared to be the least confident, which perhaps explains his lack of expression. Marin, on the contrary, was particularly expressive and at one point I was able to recognise the word “paddle” that I had not been able to decode when transcribing, thanks to a hand gesture. Speed of delivery, on the other hand, did have a negative effect on intelligibility. It is difficult to establish whether this is due to not being able to decode the pronunciation in time or not having enough time to use parsing to understand the concepts being presented but it is clear that speed is an important factor. I found that, when transcribing the presentations, at first I was unable to understand whole sentences when speakers accelerated the speed of their speech. This was a problem for all of the speakers except for Casanova who spoke relatively slowly.

Finally, none of the speakers used notes. For me this had a positive effect on the presentations as the speech appeared to be more spontaneous and therefore more engaging. When a speaker reads his presentation it is easy to lose concentration as the intonation tends to be less lively and more monotonous. This was not the case. All of the speakers used intonation, albeit not in the standard way, to convey their messages. This also freed their hands so they were able to be more expressive which also contributes to overall intelligibility. One thing that would have been interesting to analyse if a speaker had been reading, would have been the effect reading has on homographs. But alas, this was not possible for this corpus.
Oral presentation academic codes proved to be a facilitator of intelligibility but did not play an essential role in ultimately understanding the message being transmitted. It is important to note though that all of the presentations followed the academic codes, had they not, perhaps the effect would have been more remarkable. Nevertheless, respecting academic codes alone was not enough to ensure intelligibility. Technical vocabulary, on the other hand, did appear to have a more drastic effect on intelligibility.

2.4.2. Technical Vocabulary in the Psychology Domain

It became instantly apparent to me that having knowledge of psychology terminology was crucial in order to understand the message of each presentation. I realised, particularly when transcribing, that I did not understand many of the concepts and sometimes not even the central concept of the whole presentation. I shall now elucidate my difficulties.

First of all, it was clear throughout the presentations that the psychologists were addressing an audience of experts. All four academics refer to their discourse community several times in their presentations as we see in the following quotations:

“principle that we study in this community” (Bardy)
“There’s a large body of evidence in the uh neuroscience music uh community” (Bardy)
“as most of you in this room know” (Bardy)
“I have no time to go into the details, most of you are familiar with this tools” (Bardy)
“as we mention already yesterday” (Bardy)
“as we mention yesterday” (Bardy)
“we are all aware that, we all know about” (Marin)
“what we call the model signature” (Marin)
“So here was the conceptual framework present by Reinood” (Casanova)
“we obtain the same pattern of initiation time than Simon present you before” (Casanova)
“We have a lot of uh work in literature” (Casanova)

“I would like to talk about a paper a bit alone in the literature” (Ledouit)

These quotations suggest that the presentations are tailored to an audience of experts who are knowledgable about psychology. This may also explain why anyone who is unfamiliar with the psychology domain could have difficulty understanding the information being shared with them, as was the case for me. I think it is fair to speculate that fellow psychologists would have understood far more than I did and achieved a greater level of intelligibility. The assumption, which was correct at the time of speaking given the context, that all the listeners are familiar with the field of psychology coupled with the fact that all four speakers used a great deal of technical vocabulary was highly detrimental to the intelligibility of the message as we shall now see.

The table below includes a list of words and/or concepts that can be categorised as technical vocabulary in the psychology domain. I have only included words and concepts that can be found in either the APA Dictionary of Psychology or on Psychologydictionary.org. This means that many other technical words were excluded from the list as they did not appear in either dictionary or did not fit into the category of psychology, namely mathematical vocabulary. There were several terms, which were unfamiliar to me, that were mathematical such as: Farey Tree, Arnold Tongue, Sine Circle Map, Taylor’s Series, fractional order, zero/first/second order and situation-dependent order. These terms were used to describe and analyse graphs, equations and statistics and were employed with high frequency. While they did not appear in the psychology dictionaries they were specialist terms and also hampered the intelligibility of the presentations from my listening perspective. Below, you will find psychology terminology units and the frequency with which they were used. The units highlighted in blue are those that I did not understand.

<table>
<thead>
<tr>
<th>Terminology units</th>
<th>Frequency</th>
<th>Terminology units</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>affiliation</td>
<td>1</td>
<td>model</td>
<td>19</td>
</tr>
<tr>
<td>alpha</td>
<td>25</td>
<td>motor control/coordination</td>
<td>3</td>
</tr>
<tr>
<td>anchoring</td>
<td>1</td>
<td>neural circuit (ry)</td>
<td>1</td>
</tr>
<tr>
<td>apathy</td>
<td>1</td>
<td>neurophysiology (ical)</td>
<td>6</td>
</tr>
<tr>
<td>asymptote</td>
<td>4</td>
<td>neuroscience</td>
<td>1</td>
</tr>
</tbody>
</table>
221 units were used across the four presentations and the high frequency of many of them shows that in order to understand the message of each presentation, it is vital to be able to understand psychology terminology. In addition, as you can see highlighted in blue, there were many concepts that I did not understand including the mathematical terms previously mentioned. This meant that I could not decode and therefore understand considerable parts of the message being transmitted, leading to an overall lack of intelligibility. There was total of 13 psychology terms with a frequency of 38 occurrences that I did not comprehend and unfortunately some of them were key to understanding the message being presented. This demonstrates how important it is to understand technical vocabulary in order for specialist discourse to be intelligible.

The amount of technical vocabulary used varied from one speaker to another. The table below summarises the frequency of terminology units used by speaker, regardless of whether the same unit was repeated or not.

<table>
<thead>
<tr>
<th>Term</th>
<th>Frequency</th>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>attention deficit disorder (attentional deficits)</td>
<td>2</td>
<td>non-verbal communication</td>
<td>1</td>
</tr>
<tr>
<td>attractor dynamics</td>
<td>1</td>
<td>phase locking</td>
<td>2</td>
</tr>
<tr>
<td>autism</td>
<td>1</td>
<td>physiology (ical)</td>
<td>3</td>
</tr>
<tr>
<td>avatar</td>
<td>27</td>
<td>psychiatry (trist)</td>
<td>3</td>
</tr>
<tr>
<td>confederates</td>
<td>1</td>
<td>schizophrenia</td>
<td>6</td>
</tr>
<tr>
<td>control group</td>
<td>2</td>
<td>social deficit(s)</td>
<td>2</td>
</tr>
<tr>
<td>derivative</td>
<td>1</td>
<td>social interaction</td>
<td>5</td>
</tr>
<tr>
<td>entrain</td>
<td>6</td>
<td>social phobia</td>
<td>1</td>
</tr>
<tr>
<td>entrainment</td>
<td>4</td>
<td>social psychology</td>
<td>1</td>
</tr>
<tr>
<td>function</td>
<td>2</td>
<td>social withdrawal</td>
<td>1</td>
</tr>
<tr>
<td>integral</td>
<td>1</td>
<td>synchronisation</td>
<td>18</td>
</tr>
<tr>
<td>kineman</td>
<td>1</td>
<td>theta</td>
<td>4</td>
</tr>
<tr>
<td>kinematic(s)</td>
<td>5</td>
<td>trajectory (ies)</td>
<td>50</td>
</tr>
<tr>
<td>locomotor play (interception, coupling)</td>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
As you can see, there is a great discrepancy between Bardy’s use of terminology units compared with the other speakers. It should be noted that he did use a number of mathematical terms which I did not grasp and, had they been included, it would have increased the total number of terminology units used. In fact, I found that his presentation was the easiest for me to understand in terms of the message. I believe, therefore, that this is due to the fact that he used less technical vocabulary than the other speakers. This may also be because the overriding concept of his presentation was simpler for a novice to comprehend: listening to music synchronises biological systems. Interestingly, Marin used the most psychology terminology, however, I also found his presentation easier to understand than the other two. Once again, this could be due to the fact that his presentation also had two overriding concepts that were comprehensible to a novice: similar morphology triggers social interaction in schizophrenia patients and dissimilar morphology can help maintain attention in social interaction. He also used a number of examples accompanied by images and a video which helped to clarify his message and some of the psychology terminology he used was familiar to me such as schizophrenia, psychiatry, social deficits, social interaction and social psychology. Thus, demonstrating that familiarity with the domain aids comprehension.

Casanova and Ledouit’s presentations, in my opinion, are very difficult to understand if the listener has no knowledge of the concepts in the ecological psychology domain. There were many concepts used throughout the presentations and they were often dependent on each other thus if the listener does not understand one concept, he/she cannot understand another. In addition, both speakers used a great deal of technical vocabulary both from the psychology domain and the mathematical domain, neither of which I am familiar with. Once again, had I included mathematical terminology units, the total number would have been much higher. Overall, I can still say that, despite having watched and listened to the presentations many times over the course of my analysis, there are many concepts that I still do not understand. Therefore, it seems to me that technical vocabulary and knowledge plays a very important role in the intelligibility of L2 specialist oral discourse.
When giving a specialist oral presentation, be it in the L1 or the L2, it is essential to keep in mind the audience. If the speaker is presenting to a group of experts, he/she is free to use the full range of his/her technical prowess, however, if the audience is a group of novices, then the speaker must reduce and/or explain the technical terminology being used otherwise the speaker risks being unintelligible. Technical vocabulary has proved to be far more challenging than I initially expected and a great threat to intelligibility when the listener is a novice in the particular technical domain. In the following section, I will assess the impact of pronunciation on intelligibility.

2.4.3. Pronunciation

All four of the French academics could be instantly recognised as non-native speakers and possibly identified as French speakers by those who are familiar with French-accented speech. I rated them as having accents ranging from strong to moderate. Yet, as we have established a strong accent can still be perfectly intelligible. We need to look in closer detail, therefore, at specific elements of pronunciation in order to identify the extent to which they affect intelligibility.

First of all, we shall evaluate segmental requirements. The phoneme /h/ was only correctly pronounced consistently by one speaker, Marin, and either inconsistently pronounced or sometimes misplaced by the others. Casanova and Ledouit both misplaced the /h/ phoneme several times, placing it before words beginning with a vowel: “harrival”, “horder”, “hus” and Bardy was erratic in his pronunciation of the /h/ but, more often than not, did not pronounce it at all. However, the lack of /h/ or its misplacement did not affect my ability to decode the pronunciation. This could be due to my familiarity with French-accented English, as previously mentioned, but it may also be due to the fact that I could divine many words linguistically, such as “have” for example. When a listener hears “we would ‘ave seen” (Bardy), the context implies the use of the auxiliary verb “have”. In addition to this, it is also common for native speakers to ellipse this phoneme, in this particular context, due to the phenomenon of connected speech where “would have” becomes “would’ve”. In the following examples, the speakers ellipsed the /h/ but the word could be deduced from the linguistic context:

“concepts permitted us to explain characteristic be’aviours” (Ledouit)
“I ‘ave to finish the work” (Casanova)

“We ‘ave the same result” (Casanova)

“music ‘as this power to entrain” (Bardy)

In all these examples, it was possible to deduce meaning despite the lack of /h/. For this reason, it was clear to me that, as a native speaker, not pronouncing the /h/ did not pose an intelligibility problem. A question we should ask ourselves is: would this be true for non-native listeners?

Vowel contrasts, on the other hand, did seem to affect intelligibility to a certain extent. There were moments, particularly during the transcription process, when I initially heard and transcribed the wrong word, only realising when listening a second or third time. For example, “bit” instead of “beat” (Bardy). The distinction between the /ɪ/ and /iː/ was difficult to make as the speakers tended to make an approximation between the two. For instance, very often it was a great challenge to distinguish “this” and “these” and as L2 speakers sometimes confuse these two words grammatically it is not always possible, therefore, to rely on the linguistic context. The confusion between /ɪ/ and /iː/ was a general concern across the four speakers which could sometimes be overcome thanks to the context and sometimes not as was the case for “this” and “these”. Not all vowel deviations were problematic though as these examples demonstrate:

“minus one metre” pronounced /miːnəs/ (Casanova)

“plus fifteen centimetres” pronounced /sentɪˌmetəz/ (Ledouit)

“That music can stæbɪlise or destæbɪlise this coupling” pronounced /stæbɪˈlaɪz/ (Bardy)

“they’re also working on the frefkwənsiː” pronounced /frefkwənsiː/ (Marin)

However, others were very harmful to intelligibility:

“If theta have a x minus” pronounced /teta/ (Casanova)

“I’m going to concentrate on this last part of my talk” pronounced /təʊk/ (Bardy)
“While rectilinear ball trajectories...” pronounced /bəʊl/ (Ledouit)

“Never on motor interaction even less on social motor interaction” pronounced /mɔrə / (Marin)

“I look for pattern of initiation time, angle of approach effect” pronounced /ɪnɪʃeɪʃn/ (Casanova)

“It’s a clear trajectory effect on the initiation time” pronounced /ɪnɪʃeɪʃn/ (Ledouit)

The first example was unrecognisable compared with the standard pronunciation /θiːtə/ and it was part of the technical vocabulary. I had to research this word in order to understand, therefore, perhaps this example would have been recognisable, if I were not ignorant of the term. The second example sounded to me like the word “joke” but I was convinced that did not fit with the context so after listening several times I came to the conclusion that it was “talk”. The third example did not cause too much trouble for me, thanks to the context, but it did resemble another word: “bowl” which could possibly confuse other listeners. The fourth example was difficult to deduce from the context and closely resembled the word “moral” due to the fact that the speaker pronounces his [t] with the American pronunciation as an alveolar flap /ɾ/, in addition to pronouncing the phoneme /ɒ/ rather than the diphthong /əʊ/. Hence, “motor” was unintelligible until I saw “social motor interaction” on the slide. Finally, both Casanova and Ledouit ellipsed the phoneme /iː/ that usually precedes the diphthong /eɪ/ in the word “initiation”. This was not only detrimental in terms of segmental ellipsis, it also altered the usual word stress by levelling it out. I could not decode this word until, once again, I realised it was on the slide. Thus, it seems that vowel contrasts and variants in general proved to be harmful to intelligibility in some cases and not in others.

All of the speakers produced aspiration of the fortis plosives sporadically. Sometimes aspirating, sometimes not. For instance, the speakers often pronounced “second” as “segond”. Nevertheless, this was not problematic for me because I was able to recognise words from the surrounding linguistic context and my native speaker intuition. Let’s take a look at some examples:

“first one is here in red with a reversal one, segond in blue without reversal” (Casanova)

“give rise to different kinematic patterns” (Ledouit) MORE

“I’m going to concentrate on this last part of my joke” (Bardy)
In the first example both the linguistic context and my intuition come into play as “first” is logically followed by “second” but, in addition to this, I know, as a native speaker, that “segond” does not exist. The same goes for the second example, I know intuitively that “battern” does not exist so the speaker must mean “pattern”. The last example was more complicated, as we have seen, the vowel sound /ɔː/ was pronounced /æʊ/ in addition to the non-aspiration of the /t/ thus causing confusion between the word “joke” and the word “talk”. This vowel variant combination with a non-aspirated /t/ did cause confusion for me. Therefore, I would argue that the aspiration of fortis plosives does not appear to have a great impact on intelligibility for me as a native speaker unless it is in combination with another phonological deviation. Once again, the question to ask ourselves is whether this would be the case for non-native speakers.

Consonant clusters seemed to be sufficiently maintained throughout by all four speakers. Of course, we are not including clusters made up of the two famous [th] sounds /θ/ and /ð/ in words such as “through”, “three” or “that”, apart from which, consonant clusters do not seem to be extremely difficult for French speakers to pronounce. This may be due to the fact many consonant clusters are pronounced in a similar fashion in both French and English such as /st/, /str/, /sp/, /spl/, /cr/, /fl/, /gl/ to name but a few. For this reason, it is difficult to estimate the effect of consonant clusters on intelligibility as the speakers all respected their standard pronunciation. It would be interesting to repeat this study with speakers of different nationalities in order to assess the impact of this phonological feature on intelligibility.

To summarise the impact of segmental features, I found that the pronunciation of the /h/ phoneme and the aspiration of fortis plosives did not appear to impede intelligibility when mispronounced or not realised. However, vowel contrasts did cause confusion but this could often be overcome by relying on the linguistic context. Unfortunately, it was not possible to analyse the effect of mispronounced consonant clusters as they were pronounced in the standard way across all four presentations. Overall, segmental features seemed to contribute more to having a foreign accent but did not seem to have a significantly negative effect on intelligibility on the whole. Usually, I was able to resolve my initial queries by listening to the segment again or relying on the linguistic context. This suggests, however, that certain L2 listeners who are unable to contextualise the individual sounds they hear, would probably have difficulty when segmental requirements are not respected.
The suprasegmental requirements were, for me, more problematic. Both sentence stress and word stress requirements were not respected and caused intelligibility difficulties. Word stress was consistently misplaced by all four speakers, not for all words of course but enough words to cause difficulty. Marin rather than misplacing word stress tended to equalise it so that no particular syllable was being stressed, thus causing confusion for certain words such as “psychiatry”, “withdrawal” and “rehabilitation”. Interestingly, I found his pronunciation to be the easiest to understand when I first listened to his presentation, however, I found his presentation the most difficult to transcribe. I believe this is due to the way he equalised stress in both words and sentences. When transcribing it is necessary to pause and I felt that without listening to whole sentences, it was difficult to recognise the words he was pronouncing. The other speakers tended to misplace word stress which was also harmful to intelligibility but less so:

“result” (Casanova and Ledouit)
“develop” (Bardy and Ledouit)
“effect” (Bardy, Casanova and Ledouit)
“trajectory” (Casanova) “trajectory” (Ledouit)
“compels” (Bardy)
“specific” (Casanova and Ledouit)

Usually, I could recognise these words straight away or after the second listening. The misplacement of stress seemed to contribute more to having a foreign accent rather than impeding intelligibility. Again this may be due to my familiarity with French-accented English but perhaps it is also due to my ability to contextualise the words within the context. This is not the case with sentence stress.

Once again, all four speakers misplaced or levelled out sentence stress and I found that this impeded intelligibility. Prosody is the music of a language so, as a native speaker, I have a tendency to listen for a certain musical rhythm. When the rhythm is missing, it is more difficult for me to break the
sentences down into segments. In the following examples, I had difficulty as the sentence stress was levelled out and no particular syllable was stressed:

“the interpersonal motor coordination” (Marin)
“what about locomotor interception” (Casanova)

and I had problems when sentence stress was misplaced:

“initial hand position” (Ledouit)
“angle of approach effect” (Ledouit)
“some people have problems” (Marin)
“so we can say that similar morphology and kinematic x” (Marin)
“listening to the beat of music entrain the way” (Bardy)

I had even greater difficulties when the sentence stress was levelled and the word stress was misplaced:

“lateral manual interception” (Casanova)
“angle of approach effect” (Casanova)

The most harmful to intelligibility was a combination of misplaced word stress with equalised sentence stress. I suspect that the unintelligible items were due to a combination of stress deviations and possibly also combined with segmental variants. From my listening perspective, not following the standard stress patterns caused processing problems and I suspect complete unintelligibility at times.
Vowel reduction was well respected by Marin and Ledouit as Casanova and Bardy tended to only reduce grammatical words such as “the” or “a” to a schwa. Although, even Marin did not reduce all the vowels in words such as “similar” which he pronounced /sɪmɪlər/; and “dissimilar” which he pronounced /dɪsɪmɪlɑːr/. Here are a few examples of the speakers not reducing vowels:

“regular” pronounced /rɛɡjuːlɑːr/ (Bardy)
“alpha” pronounced /ælfa/ (Casanova)
“trajectory” pronounced /trædʒektəriː/ (Casanova)

I found that not reducing vowels was not particularly problematic in terms of word recognition. That being said, the lack of vowel reduction could contribute to the equalising stress effect, in which case, it does pose a problem. This is a complex phenomenon and certainly deserves more investigation.

It seems to me that suprasegmental features are more detrimental to intelligibility than segmental features from my listening perspective. Of course, lest not forget that both factors interact but in this instance, suprasegmental pronunciation features impeded intelligibility to a greater degree than segmental ones. I do believe, however, that this would not necessarily be the case for non-native speakers, some of whom would be perplexed by segmental deviances. I would argue that the most harmful deviations occurred when both segmental and suprasegmental features were mispronounced.

Another aspect of pronunciation under analysis is that of homographs, which calls into question the impact of the orthographical similarities between French and English. The Oxford Living Dictionaries define a homograph as “Each of two or more words spelled the same but not necessarily pronounced the same and having different meanings and origins.”. I applied this definition to my listening grid and therefore only counted perfect homographs; the words that share the same spelling in English and in French regardless of the nuances of meaning they may have. This meant that I excluded words that share written transparency thus almost exactly the same but not completely, such as: “morphology” and “morphologie”, “natural” and “naturel” or “music” and
“musique”. Had I included them in my list, the number would have been considerably higher. In addition, I included words that have orthographical accents in French, for example: “différent” and “different” were considered homographs in this study. Although accented letters in French can change the pronunciation, I felt that the fact that they share the same graphemes with English could still impact pronunciation. In the table below you can see the list of homographs that were used in all four presentations.

<table>
<thead>
<tr>
<th>Homographs</th>
<th>Homographs</th>
<th>Homographs</th>
<th>Homographs</th>
</tr>
</thead>
<tbody>
<tr>
<td>acceleration</td>
<td>cycle</td>
<td>interaction(s)</td>
<td>ratio(s)</td>
</tr>
<tr>
<td>active</td>
<td>deficit(s)</td>
<td>interception</td>
<td>recent</td>
</tr>
<tr>
<td>affiliation</td>
<td>destabilise</td>
<td>lateral</td>
<td>relation</td>
</tr>
<tr>
<td>age</td>
<td>detail(s)</td>
<td>marathon</td>
<td>report</td>
</tr>
<tr>
<td>alpha</td>
<td>differences</td>
<td>match</td>
<td>science</td>
</tr>
<tr>
<td>amplitude</td>
<td>different</td>
<td>mention</td>
<td>signature</td>
</tr>
<tr>
<td>angle</td>
<td>dimension</td>
<td>metre</td>
<td>silence</td>
</tr>
<tr>
<td>animal</td>
<td>direction</td>
<td>metronome</td>
<td>simple</td>
</tr>
<tr>
<td>asymptote(s)</td>
<td>discussion</td>
<td>minute(s)</td>
<td>situation</td>
</tr>
<tr>
<td>attention</td>
<td>distance</td>
<td>moment</td>
<td>six</td>
</tr>
<tr>
<td>avatar</td>
<td>distribution</td>
<td>observe</td>
<td>social</td>
</tr>
<tr>
<td>axis</td>
<td>education</td>
<td>original</td>
<td>stabilise</td>
</tr>
<tr>
<td>calculation</td>
<td>entrain</td>
<td>participant(s)</td>
<td>stable</td>
</tr>
<tr>
<td>centimetre(s)</td>
<td>entrainment</td>
<td>patient(s)</td>
<td>standard</td>
</tr>
<tr>
<td>change</td>
<td>equation</td>
<td>perception</td>
<td>synchronisation</td>
</tr>
<tr>
<td>communication</td>
<td>etcetera</td>
<td>performance</td>
<td>synchronise</td>
</tr>
<tr>
<td>competences</td>
<td>evolution</td>
<td>piece</td>
<td>system(s)</td>
</tr>
<tr>
<td>competition</td>
<td>exception</td>
<td>point</td>
<td>test</td>
</tr>
<tr>
<td>compliments</td>
<td>excursion</td>
<td>position(s)</td>
<td>theta</td>
</tr>
<tr>
<td>conclusion</td>
<td>general</td>
<td>possible</td>
<td>transcends</td>
</tr>
<tr>
<td>condition(s)</td>
<td>important</td>
<td>presentation</td>
<td>variable</td>
</tr>
<tr>
<td>consequences</td>
<td>index</td>
<td>projection</td>
<td>video</td>
</tr>
<tr>
<td>construction</td>
<td>information</td>
<td>proposition</td>
<td>zero</td>
</tr>
<tr>
<td>coordination</td>
<td>initial</td>
<td>question(s)</td>
<td>zone</td>
</tr>
<tr>
<td>cultures</td>
<td>initiation</td>
<td>rapport</td>
<td></td>
</tr>
</tbody>
</table>
The pronunciation of French and English homographs varied from word to word and speaker to speaker. On the whole, the speakers pronounced the homographs with a pronunciation that closely resembled English with a British or, in Marin’s case, an American accent. Here are some examples of homographs that were consistently pronounced in an English way:

<table>
<thead>
<tr>
<th>Bardy</th>
<th>Casanova</th>
<th>Marin</th>
<th>Ledouit</th>
</tr>
</thead>
<tbody>
<tr>
<td>synchronisation</td>
<td>angle</td>
<td>communication</td>
<td>zero</td>
</tr>
<tr>
<td>general</td>
<td>question</td>
<td>social</td>
<td>position</td>
</tr>
<tr>
<td>different</td>
<td>dimension</td>
<td>interaction</td>
<td>point</td>
</tr>
<tr>
<td>interaction</td>
<td>six</td>
<td>deficits</td>
<td>possible</td>
</tr>
<tr>
<td>index</td>
<td></td>
<td>condition</td>
<td>initial</td>
</tr>
<tr>
<td>six</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I think it is interesting to note that many of these particular homographs ended with the suffix -tion. To me this suggests that the speakers have successfully acquired the phonological habit for words ending in -tion both in terms of phonemes and of word stress. However, they consistently pronounced the following homographs with pronunciation closely resembling French:

<table>
<thead>
<tr>
<th>Bardy</th>
<th>Casanova</th>
<th>Marin</th>
<th>Ledouit</th>
</tr>
</thead>
<tbody>
<tr>
<td>minute</td>
<td>theta</td>
<td>video</td>
<td>zone</td>
</tr>
<tr>
<td>system</td>
<td>alpha</td>
<td></td>
<td>alpha</td>
</tr>
<tr>
<td>active</td>
<td></td>
<td></td>
<td>asymptote</td>
</tr>
</tbody>
</table>

Some of those homographs were uncommon, which may explain why their pronunciation was strongly influenced by the L1. Certain homographs were pronounced by three of the speakers interchangeably, sometimes with French pronunciation and at other times with English pronunciation, which seems to demonstrate the fact that old phonological habits are difficult to overcome:
Others were pronounced with a combination of French and English pronunciation as we see in the following examples:

“zero” pronounced /ˈzɛrəʊ/ (Casanova)

“information” pronounced /ɪnˈfərmeʃn/ (Casanova)

“interception” pronounced /ɪntəˈsɛrpʃn/ (Casanova)

“metre” pronounced /ˈmɛtər/ (Casanova)

“moment” pronounced /ˈmɒmənt/ (Casanova and Ledouit)

“metronome” pronounced /ˌmɛtrəˈnɒm/ (Bardy)

“entrainment” pronounced /əntrəˈmeɪnt/ (Bardy)

“centimetres” pronounced /ˌsɛntɪˈmɛtəz/ (Ledouit)

“angle” pronounced /ˈæŋɡl/ (Ledouit)

“synchronisation” pronounced /sɪŋkronɪzaɪʃn/ or /sɪkronɪzaɪʃn/ (Marin)

“avatar” pronounced /ˈævətɑːr/ (Marin)

One homograph was pronounced in such a way that it resembled neither language and this was the one that posed a problem for me. I have already mentioned it in terms of vowel deviations:

“initiation” pronounced /ɪnɪˈʃeɪʃn/ (Ledouit and Casanova).

The ellipsis of the /iː/ phoneme considerably hindered my ability to decode this word, however, this was the only homograph that caused intelligibility problems for me. When looking at each speakers’ pronunciation of homographs overall, Casanova had a tendency to pronounce them with a
combination of French and English pronunciation, whereas Bardy, Ledouit and Marin primarily pronounced them in a way that was closer to English speaker pronunciation.

It appears that homographs can indeed have a seemingly sporadic impact on French speakers pronunciation of English. Sometimes old habits return, yet the fact that the majority of homographs were pronounced in a way that resembles English rather than French suggests that such habits can be surmounted. I was able to decode the homographs with relative ease. They rarely posed an intelligibility problem to me as a listener, even when they were pronounced in a non-standard way. Perhaps this was due to my familiarity with the French language and French-accented speech. That being said, this area most certainly deserves more research. It would be appropriate and beneficial to evaluate not only the pronunciation of French and English homographs but also words that share written transparency. In addition, it would be of interest to investigate whether reading homographs has more of an impact on pronunciation than spontaneous speech does, as none of the speakers in this study read from notes, and finally to examine how pronunciation variations of homographs affect intelligibility for a variety of listeners from different backgrounds and different L1s.

There is one final aspect to assess in this section. I think it pertinent to evaluate the overall intelligibility quantitatively by counting the number of unintelligible items in each oral presentation. At first I had hoped to quantify this by counting the number of words, however, it became clear that this would not be possible. Words are part of written language and as it was difficult to distinguish the sounds, they could not be divided into or identified as words therefore it became impossible to count them as such. I thought about defining and distinguishing unintelligible words using stress by counting stressed syllables but this method seemed to be unreliable. I decided, instead, to count the number of unintelligible items and the total duration of those items in seconds as a way of reliably quantifying unintelligibility. In addition, it was not possible to attribute a cause to the unintelligible items. They could have been due to mispronunciation or technical vocabulary that I am unfamiliar with and therefore did not recognise. They could also be due to the voice quality, the speed of speech of the speaker or the quality of the recording. The table below quantifies the intelligibility of each speaker by counting unintelligible items.
As you can see, the results are very interesting when compared with previous elements. Despite finding that Bardy and Marin’s presentations were easier to understand and that their pronunciation was closer to standard pronunciation than the other two speakers, it was actually much more difficult to transcribe their speech. In both of their presentations, there were considerably more unintelligible items than the others. Ledouit’s presentation had less than half the number of unintelligible items and in Casanova’s presentation, there were only eight unintelligible items, yet he is the speaker who I would argue has the strongest accent and deviates the most from standard pronunciation. I think this can be explained by several factors. Firstly, I postulate that Casanova’s presentation had less unintelligible items than the other three because he appeared less confident therefore he spoke more slowly, his presentation was the shortest by 01:27, 05:05, and 03:49 minutes respectively and the volume of the recording was loud and clear. Secondly, Ledouit’s recording was also loud and clear, which could explain why he had less unintelligible items than Bardy and Marin, and he spoke more quickly, which could contribute to him having more than Casanova. Thirdly, Marin’s recording was lower in volume and he spoke very quickly and confidently, which could explain why he had more unintelligible items. Finally, Bardy’s presentation was also lower in volume, he spoke quickly and he also seemed to accelerate and/or

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Benoît Bardy</th>
<th>Ludovic Marin</th>
<th>Rémy Casanova</th>
<th>Simon Ledouit</th>
</tr>
</thead>
<tbody>
<tr>
<td>The number of unintelligible items</td>
<td>63</td>
<td>48</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td>The total duration of unintelligible items in seconds&lt;sup&gt;27&lt;/sup&gt;</td>
<td>112</td>
<td>71</td>
<td>9</td>
<td>23</td>
</tr>
<tr>
<td>The total number of words transcribed</td>
<td>1948</td>
<td>2108</td>
<td>1383</td>
<td>2167</td>
</tr>
<tr>
<td>The number of words transcribed thanks to the linguistic context</td>
<td>4</td>
<td>11</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>The number of words transcribed thanks to the slides</td>
<td>13</td>
<td>11</td>
<td>11</td>
<td>7</td>
</tr>
</tbody>
</table>

<sup>27</sup> The number of seconds is rounded up to the closest second.
reduce his speech volume at the end of sentences which caused me difficulty. However, several times during his presentation, he made jokes which I was unable to transcribe but the audience laughed, therefore, he must have been intelligible to them. These results show that having a foreign accent is not the sole factor that contributes to unintelligibility but that volume and speed of speech also play important roles.

The speakers’ pronunciation certainly hindered intelligibility, however, it does not appear to be the factor that ultimately rendered the discourse unintelligible. Of a total of 14:47, 18:25, 13:20 and 17:01 minutes of speech I was able to transcribe 12:55, 17:14, 13:11, 16:38 minutes respectively. This task was not undertaken without difficulty but it was ultimately achieved therefore it demonstrates that the pronunciation was reasonably intelligible overall. As you can see, this was also greatly helped by various other factors including my familiarity with French-accented English, my ability to derive meaning from the context as a native speaker and at times words that appeared on the slides at the time of speaking. Perhaps other listeners such as non-native speakers or those less familiar with French-accented speech would have had more difficulty decoding the pronunciation. The next section will summarise the findings.

2.5. Is the corpus intelligible?

It became clear from the outset that both pronunciation and domain-specific knowledge, in this case psychology, were vital in order for the corpus to be intelligible. I think it is fair to speculate that the audience, comprised of ecological psychologists, at the conference that day would have understood a lot more than I did. However, I believe they would still have had difficulties perhaps in processing the information considering the number of unintelligible items and phonological variations. The aim of this study is, of course, not to criticise the psychology scholars presenting, but simply to investigate the factors involved in intelligible communication in order to help students achieve this goal.

While the pronunciation appeared to be a surmountable obstacle, albeit with difficulty, it seems that technical vocabulary proved to be more challenging for me in terms of intelligible meaning. Often, the pronunciation could be decoded thanks to the linguistic context or words that appeared on the slide. On the other hand, technical vocabulary and knowledge is something that you possess or, in
this case, do not. That means that if the terminology or the concepts are not explained, the message no longer has meaning, even though you are able to discern the prosody and distinguish the individual phonemes, in other words, to decode the rhythm and sounds into meaningful speech. In this study, the L2 specialist oral discourse was largely intelligible in terms of pronunciation with only some unintelligible items. This may be due to my familiarity with French-accented speech or to the fact that I am a native speaker, therefore, my intuition may have served me well. For these reasons, I think it would be beneficial to repeat this study with different listeners from different L1s and with listeners who are not familiar with French-accented speech.

Technical vocabulary, as I have reiterated, threatened intelligibility. As it turns out, Casanova and Ledouit’s presentations were unintelligible for a variety of reasons. In these two cases pronunciation hindered intelligibility but did not ultimately impede it, whereas my lack of knowledge of the psychology domain prevented me from understanding the meaning of the concepts, both overriding and specific, therefore prevented me from understanding the messages being conveyed. Marin and Bardy’s presentations contained concepts that were unintelligible to me and a great deal of unintelligible items, however, I was able to understand the global message of their presentations as I was familiar with some of the technical vocabulary they used. Thus, I postulate that being familiar with domain-specific terminology in L2 specialist oral discourse is vital to the overall intelligibility of the discourse.

If we return to the two levels of intelligibility, form and meaning, it can be said that the form, in other words the pronunciation, was for the most part recognisable and able to be decoded; the meaning or understanding the decoded terminology, on the other hand, was not always achieved. It is important to highlight that this was not due to the speakers but to the listener in this case. This study highlights the fact that listeners have an important role to play in the communication process and this also implies that the speaker must be aware of their audience and take listening factors into account such as the listener’s familiarity with the topic, the listener’s native language, the listener’s familiarity with the speaker’s accent and the listener’s background. Conversely, the listener must understand that communicative responsibility does not lie solely with the speaker. The listener needs to be attentive, tolerant of difference and have a positive attitude to the interaction.
CONCLUSION: Findings and implications.
This study began with a clear objective in mind: to investigate the intelligibility of L2 specialist oral discourse in order to be able to help students in the LANSAD sector become intelligible communicators. To achieve this, a corpus of French psychologists was developed and a listening grid based on previous research was used to assess the intelligibility of specialist discourse. The research suggested that pronunciation, technical vocabulary and oral presentation skills would play a role in achieving intelligible communication. Pronunciation deviances were expected to impede intelligibility, knowledge of technical vocabulary was expected to facilitate intelligibility and the same was expected of respecting academic presentation codes. While this was true, not being familiar with technical vocabulary was far more detrimental than initially expected. Two of the four presentations in the corpus were deemed unintelligible due to being too technical. Pronunciation deviances, on the other hand, impeded intelligibility but did not render the presentations unintelligible overall. Given that all of the presentations respected the academic presentation codes, it is difficult to assess whether their impact is great or not, however, following the archetypal format does appear to guide the listener.

One thing that has stood out both in previous research and in this study is that intelligibility is twofold. It requires interaction and effort on behalf of both the speaker and the listener. This means that a breakdown of intelligibility can be caused by either party. First of all, to avoid intelligibility problems for the listener, students must be aware that they need to know their audience when speaking in public. These are questions to bear in mind when presenting on a specialist topic: Is the listener(s) an expert or a novice in the domain? Will the listener(s) understand the technical terminology and/or concepts? Therefore, they must be taught how to adapt or explain the technical vocabulary they use in different communicative situations depending on the audience. Secondly, their responsibility as speakers is to achieve intelligible pronunciation and our responsibility as teachers is to help them achieve that goal.

How does this translate to the classroom? It is clear that pronunciation is an important factor in becoming an intelligible communicator. This implies that pedagogical focus should be given to L2 phonology. The aim should still remain intelligibility not perfection, of course, but phonology should not be neglected altogether. Although familiarity with the specific domain is perhaps the most crucial factor in L2 specialist oral discourse, pronunciation plays an important role. I daresay it would have become a more salient factor had the discourse not been of a specialist nature.
In this study, it appears that vowel contrasts, word stress and sentence stress hindered the intelligibility of French-accented English when mispronounced or misplaced, whereas not reducing vowels, omitting the /h/ or the non-aspiration of fortis plosives had a lesser impact. Consonant clusters did not appear to be problematic for French speakers to articulate and as they were pronounced in the standard way, therefore it was not possible to judge the negative impact that they might have had. Thus, this implies that the three former elements should receive more attention in the classroom. As it has often been acknowledged, pronunciation is frequently neglected in the classroom for a variety of reasons. Sometimes due to a lack of confidence on a teacher’s behalf or sometimes because other areas of the English language are seen as more crucial to attaining a communicative level. In addition to this, there are a great deal of elements to teach, some of which are challenging, particularly suprasegmental features. However, if we focus on some key features and merely draw attention to the others during speaking or listening tasks, I believe it would be beneficial to students.

LANSAD pronunciation classes could include detailed information about the physical process of articulating vowels, students could spend time practising them and performing listening exercises in order to differentiate them. Teachers could also focus on the basic rules of word and sentence stress, although there are many exceptions, and students could be given the chance to practice them in class. Other features of pronunciation could be highlighted during activities rather than spending a considerable amount of time teaching them since LANSAD students have less classroom time than other English language students at French universities.

The conclusions I have drawn from this corpus, albeit small, suggest that there are a great number of factors involved in achieving intelligible communication in L2 specialist oral discourse. There are many limitations to this work and many more avenues that I would have liked to explore. For instance, it would be of interest to apply the listening grid to a larger corpus of French specialists from different domains and for it to be evaluated by a range of different listeners. By other native listeners, by listeners from different L1s, by members of the discourse community and by novices as it would be beneficial to see whether pronunciation or technical vocabulary is more detrimental to intelligibility and for which listeners.
In another study, this work could be applied to a corpus with a different L1 such as Spanish, Arabic or Japanese or even multiple L1s. That way researchers could evaluate which pronunciation features of other L2 speakers affect intelligibility and whether these elements are the same as they are for French speakers. In this case, more research would need to be undertaken in order to refine the listening grid in terms of pronunciation, as speakers of different L1s may vary from standard pronunciation in different ways.

Or indeed, researchers could choose to focus on a particular aspect of the listening grid. Perhaps, centreing their attention on investigating the intelligibility of an aspect of pronunciation such as vowel contrasts or devising a comparative study to explore the intelligibility of technical vocabulary in different domains for novices. There is certainly more that could be evaluated in terms of homographs too. A study could evaluate the pronunciation of words that share written transparency in French and English not just perfect homographs. A study could also be carried out in which some participants are asked to speak spontaneously on a domain-specific topic and others are asked to prepare and read a written piece on a domain-specific topic in order to assess whether reading has an impact on the pronunciation of transparent words.

There are a great deal of possibilities to be explored, of course these ideas are meant to be suggestive. One thing is clear, intelligibility is a complex phenomenon and the more we research, the more we come to understand it. This allows us to be better teachers and guide our students on their way to achieving intelligible communication.
References


The International Society for Ecological Psychology
Retrieved 25 May 2018 from: http://commons.trincoll.edu/isep/


Annexes

1. Transcriptions

The orthographical transcriptions for the four oral presentations have been elaborated as methodologically as possible. Whenever a word or sentence was unintelligible, it has been marked with an \textit{X} and counted as an unintelligible item. In addition, any supplementary information has been included in italics such as other speakers intervening, auditory input from the audience or problems with the recordings.

1.1. Benoit Bardy

\textit{Music playing and people talking/laughing for 27 seconds}

Yes, yes, yes. I \textit{X}. Ok so I think \textit{X}

\textit{Audience laughs.}

Music compels us to move. There is natural entrainment of the movement to the beat of the music. It is a natural phenomenon. It’s universal, it transcends places and cultures. It’s very precocious.

\textit{Audience member coughs.}

It is rather a human thing although there is some discussion about whether \textit{X} animal \textit{X} entrainment to the music. With exception those of us that are a bit deaf because as all human beings, it’s of course, as we’ve seen very moving and pleasurable.

\textit{Audience member coughs.}

\textit{X}

\textit{Audience laughs.}
It favours social behaviour. It is sustained by a dedicated neural circuitry with the common sensory and X in the brain. The X and can be captured by general synchronisation principle that we study in this community. So music entrain movement at the same time, is it clear that we see X other biological systems such as breathing and if we had been recording your respiratory activity during the listening X we would have seen, we could have seen some frequency locking, phase locking patterns or synchronisation and with a beat of music and indeed there is a large body of evidence in the field showing that uh uh listening to the beat of music uh entrain the way we breathe so such as we a X and entrain the way we breathe in a different way than X number six or if you look at the synchronisation X in two thousand ten. If you look at across time, over time from the beginning of listening to the piece of music to the end, we see that the synchronisation express by the body increase of the time. So the more recent the X the more X. That’s X well of course here we can explain this happens to many other systems such as X. The pulsing system is known to be entrained by the beat of music or a sound just a rhythmic measurement. Here you see

*The sound cuts for six seconds.*

In this example, for instance, we’ve been doing that with X and X while we got here some frequency X locking and phase locking patterns during an active and intentional synchronisation of the pulsing system to the the uh sounds emitted by the X and in more discrete situation when you are instructed to synchronise to a metronome you intentionally or unintentionally look at the entrainment then you can see the same kind of effect that is to say this anchoring effect here where the metronome usually appears at the uh one peak of the pulsing system uh on its way. But also the intra-pulse dynamics uh is entrained by the beat of the of the metronome in that case, such uh as when we increase the frequency of the metronome, you can see this space position between the X coordination X back here to X. Brain is also entrained by the music and the beat of the music. There’s a large body of evidence in the uh neuroscience music uh community uh showing that the brain can picks up the uh music frequency in different ways and all these phenomena are uh they are evidence and convicted one we have improved together. And so we can see how uh moving and breathing and standing and clapping and uh dancing together uh you know produces a merging phenomena of people moving in sync with the beat of music. Ok so this it suggest that uh music has this power to entrain biology in different ways uh and in different compliments but of course these compliments are not independent of each other right, so uh breathing and moving are coupled by virtue of mechanical interactions or neurophysiolo neurophysiological interactions uh the brain is of
course a kind of a movement X or X of the music and so if you find ways here to couple these things together and uh they develop potentially a model able to uh to uh analyse the way the entrainment of the music and the movement happens. Both at the level of of the compliments and at the level of the coupling it happens. I do not have such a model today.

*Audience laughs.*

What I do have, however, is a glimpse into how such a model can work. And I’m going to concentrate on this last part of my talk on a very simple part of it which is this coupling between breathing and running, known as the X respiratory coupling as most of you in this room know. And indeed running and breathing are couple by virtue of X

*Audience member coughs*

sharing the same kind of a system. Uh but also coupled by virtue of uh neurophysiological pathways X it’s very delicate coupling X neurophysical functions between the two systems, sharing some uh pathway or informing each pathway and those whose mechanical and neurophysiological interaction produce at a higher level this very interesting frequency ratios between breathing and running such as we can breathe once every two cycles or three or four or two or three or the limits, uh with all these frequency ratios at the higher level rising from the interaction and the lower level of mechanics and neurophysiology uh can be uh analysed and uh expressed in different ways and my goal today in this remaining five six minutes is to show you that music can actually act as a synchroniser of these two biological systems. That music can stabilise or destabilise this coupling between breathing and running and I’m gonna very briefly show you two example of that, showing how we can do that. Uh we have uh a choice, tools available coming from physics that we can use and it’s uh quite a rhythmic uh situation this uh different frequency ratios you know we have the Arnold Tongues the Farey Tree this mathematical construction that we using uh to look at uh how standard these uh frequency ratios are uh the Sine Circle map we can use X to compute this data. I have no time to go into the details, most of you are familiar with this tools. Most of them is being applied uh in the field of this locomotory respiratory coupling. Uh what I will briefly show you today are two examples uh showing how music can be used to stabilise or destabilise this coupling between the systems. So one is doing cycling. This one is doing cycling where subjects have to cycle in sync, this is intentional synchronisation task where people have to sync with the uh the X peddling or the breathing with the music. There is no music actually in this situation so with a
regular metronome, just a regular beat, set up at a natural breathing or cycling frequency of the participants and basically we can see there is no music, no sound here, sound there, is that in the no sound condition then there is a wide distribution of a uh of the frequency ratios in the Farey Tree that we can see here, compress into only one frequency ratios which is, uh in this particular case the most stable ratio in the Farey Tree for breathing and uh running. And so you see the effect of sound on the stabilising system. If you can return now which is basically here in relation between regular times t plus two I think have the function of the same X t then X down here and you can see there that with sounds uh then the uh the phase coupling that you get you can compute all these X and take the mean and this gives you an index of the phase coupling uh is uh increase is stronger with sound and if you look at the X distribution over time which X to the beat of the metronome and you can see the same type of thing so music is X with synchronised X over time in a uh very interesting way. This is for cycling and uh this is accompanied by uh a reduction of oxygen consumption by X five per cent. Cycling is more stable, breathing is more stable, the coupling between the two is more stable it goes up into the Farey Tree of the more stable ratio and after that consumption is reduce by five per cent. Running is another example, this is a pre-controlled protocol. I’m not gonna go in to that, we’re here to enjoy physiology not the X of the running. Uh the this is a non a non-intentional synchronisation situation where a participants had to run on a metronome with a metronome or a music we can X for the motivational it’s that particular aspect of the music. Set up at the uh preferred frequency of the running, synchronisation entrain phenomenon appears to be easily you X it uh beh behind with the metronome you a little bit ahead of time of the music with with with the music. It’s basically in sync. Look at this high quantity lines here and the X index with silence, metronome and music and you can see that it’s very strong X index X but mostly with music. Now if you look at the physiology of that, while looking at this uh oxygen consumption, you see that uh metronome and music produce more efficiency. And uh interesting is two parameters seems to be linked together uh explains why this relation is so the uh this increase in phase coupling due to music is accompanied by a decrease in oxygen consumption due to the music. So one more time here in this non-intentional synchronisation situation running uh which X entrain by the music uh you are more stable in your running patterns and in your breathing patterns the coupling between the two is more stable is higher than the Farey Tree and you will spend less energy running. So this is the kind of thing that we do in this BeatHealth project, that we mention already yesterday with some possibility you know potentially to develop specific paths. They are playing with the synchronisation phenomenon between running and uh breathing. We know they’re on the market but this series of X. Do not download them, they’re X.
Audience laughs.

They don’t X but X just wait for us to be X

Audience laughs.

Ok so conclusion here. Running in sync with the beat stabilises running and breathing, stabilising the coupling between the two. Boosts X efficiency more with music than metronome and so this X party with music X as a co-ordinating device between the two biological systems. There are some more wide consequences, uh of this type of research, uh of course in sport, so plus six per cent, I mean this is for my X with my X, but for six per cent is like six minutes of a marathon, I mean it’s like no six per cent is like three minutes of a marathon, which is you know not bad. Of course this is very speculative because the physiology, you know, of running for twenty minutes or forty minutes X but that gives an idea of why, you know, that gives an idea of why music is forbidden during running. So in international competition, you know you’re not allowed to use your MP3 Player and we X is considered as technological doping.

Audience laughs.

It is. X is considered technical doping. And we believe that is not only motivating, it’s not only a distractor from pain, it is also a way to synchronise biological systems and and enhance performance, which you know the famous Haile Gebreselassie report on the time, beats his record you know when X is being played in the area and he says what you can read here. Ok so uh physical activity in general, music performance, X as we mention yesterday, music at work is ano another arena where this kind of ideas can be a further develop. X thank to some of my co-collaborators on this BeatHealth project and especially Charles Hoffman who was the one doing this experiment X. Thank you.
1.2. Ludovic Marin

No sound for one minute.

...body X. There are

Audience member coughs.

people that we can see that one is happy, shy, maybe X or grumpy. And that looks a little bit like uh the X to non-verbal communication but universal motor coordination is also base on synchronisation and we know that uh X uh the the people cannot avoid being synchronised with each other. And what’s interesting also is that acting morally in synchrony increase their affiliation. So on that slide X very very brief state of art because here X we are aware that, we all know about this things but what I want to say here is well the more interpersonal motor coordination is very important in any social interaction X ok. And we know that if we weren’t told these processes however some people have problems uh in in in following those processes and uh because they are suffering some uh social deficits such as you know autism, social phobia and schizophrenia. X here we are mostly focusing on schizophrenia it’s one of the most like very social deficit symptoms. But they all have some common characteristics such as attentional deficits, social withdrawal, apathy and uh our teams also show they have co-verbal communication deficits such as uh less smile or less co-verbal gesture that helps speech. But also we uh show synchronisation deficits for example that X when we ask a participant suffering from schizophrenia to synchronise with a healthy participant what we observe is always that more variable in the X and uh they never like the uh coordination. So you’ll get the fir the previous slide. I said it was very important for social interaction to take into account the motor aspect of that interaction. And here on that slide we see that, that a lot of problems X uh for uh people suffering from

Audience member coughs.

schizophrenia. From a clinical point of view, where’s the logic? The logic is to find a way to intervene to treat that problems and then social interaction will be better. The problem is paradoxically barely focus X on the emotional aspect. Never on motor interaction, even less on social motor interaction so that’s the whole of our work and X also. It’s the uh proposed line of
enquiry that will enhance increase this social motor competences in the uh schizophrenia. So for that we use uh, let’s say, it’s a new concept in schizo in psychiatry. Now, the other science and concept is that the similar similarity process between two systems so how does it work? Well you all know that here that it’s to say that when two systems are similar then they’re it’s more uh and well we don’t need the trying to process the same frequency than to be more synchronised ok. In neurophysiology you have uh you know a firefly one or two that lights up then similar

*The sound is distorted on the video*

behaviour in motor control if you have, uh if you exchange so if it’s in our more the exchange they will be more synchronised and so on and so on for example social psychology through the carry on effect. If I’m in a social interaction and I mimicry your gesture then will increase the rapport and the synchronisation. Alright so we can find more example in but the point here is to say that when systems are more synchronised what are we. So ok similarity but what kind of similarity? Because we can’t find a whole of components uh of similarity here to focus on two. In kinematics so basically how we in and morphology, how we look.

*Audience laughs.*

So how do we know this? So the method is uh the same that uh show this morning except patients and going to talk to you about of the rest of the of the past is kind of the same. So we have patients suffering from schizophrenia and control match in term of age, gender and level of education. So participants are facing either similar or dissimilar avatars that I just talk to you about in the next slide and the task is the mirror game task. So they’re holding a paddle that they move horizontally in one dimension along the and the participants are either follower or leader of the interaction. So how do we do this those avatar. We manipulate the morphology of the avatar and the kineman ok? So how do we do that? So after that sorry we have several conditions and the conditions you have either very similar to or an avatar the looks like you and moves like you, or totally similar or mix so one aspect is similar, the other is dissimilar with some kind of control that I won’t really focus. So if we stay on the morphology aspect ok. So how can you do a similar avatar? So we have our uh our collaborator specialist uh control reality and they design uh in one day because the experiment is two days all the time. So one day you create the avatar and the second day to run the experiment. So during the first day they uh pretty fast are able to design and see if they resemble so it’s kind of uh the same face I’m talking to, looks so similar avatar. And for the
dissimilar avatar that we also have create that’s kind of simple, two confederates among the uh all
the avatar we uh uh they choose the one that looks like dissimilar from the X participant. Ok so by
the end of the first day each participant have his own similar avatar and his own dissimilar avatar ok
two of them. But we have to make them move so this is comes now the the kinematic part. Some
some way how do we do similar movement? So the very first day we ask them to do what we call
sole movement so along the X they, we provide and our mathematicians collaborators in the UK,
they capture in that movement, the way we move. So they find a velocity profile, and they’re also
working on the frequency profile in order to to show to see, sorry, to see the avatar moving uh so
it’s not like in a mirror when you every morning you move move, well I mean you see yourself X
but X exactly X. Here it’s not that it’s like the avatar moves on your own style what we call the
motor signature. So if you you’re someone move very fast well then you capture that and put it into
the avatar to move it this way ok? Well then the similar it’s kind of easy, you just add you know X.
Ok so by the end of this day two avatars, one similar one dissimilar and both either move with your
style or not ok? So what’s the experiment? The experiment is uh the protocol is two part, first we
have the test so the test is, you are uh facing your avatar and you’re on the uh, the participant is the
follower. So I’m gonna show you so wait. It’s uh the follower, the the this one so here is uh in what
we call a bidirectional interaction. If it is unidirectional, it’s like if you do this and you move
however you want and you don’t take care if the other one is able to follow you or not. Bidirectional
means that I have to take into account how you move to see if you can follow me. It’s the same
metaphor if you’re driving a car, you’re the leading car and behind you have a friend in another car,
well if you do the original, you go along here X friend and then you keep going. So you’re with
your friend and you want them to follow you but if you see that they’re too slow then you slow
down in order to bring him back into this uh leader follower interaction and that’s exactly what will
happen so I’m going to show you. So here you see the participant is the follower and at some point
we will see the participant not following and you will uh uh here and look at the leader, the avatar is
trying to bring him back into the interaction ok? And he was uh uh uh this one was the uh the leader
but at some point he understand I cannot follow so he bring it back ok. So that’s the test and the
second part is what we call exposure, exposure is too high, too X to explore how to to to interact
with that uh avatar ok? So in that case when you have a X it’s better to not be the follower and that
time you are the leader so now the participant is the leader and X he challenges the avatar to see
how and you can see that the uh the avatar can follow pretty well so you really can explore and
play. Well I did it on purpose for the video. X. Alright so the protocol you see it’s the serial of the
test, being exposed to one avatar and then the uh other X condition etcetera ok. So what we’re
gonna we have two questions. The first main question is well what is the effect the spontaneous
effect of the similarity? What does uh happen when you face for the first time those avatar ok? So what we measure is the optimal line across $X$ so it’s the temporal delay you know between the movement of the avatar and the participant. So basically a perfect synchronisation is shorter. So the result is that patients who who find a an avatar that looks like you and move like you then they are synchronise. So one explanation for what we did, as a modern scientist I can say it’s because similarity is that your more exchange of information so that’s why you get more coordinated and for psychiatrists they say well when you face those avatars that like capture your attention and that reduces obviously the attentional deficit $X$ we have $X$. But what is interesting is not only patients but also healthy participants are better synchronised with their own avatar so we can say that similar morphology and kinematic $X$ impact on social motor performance. So we had a second question also and the second question is how can we, is it possible to make them even more synchronised? Ok so for that we go back to $X$ remember we had all this pretest, exposure about the condition and then the process and the goal is to see what happen after each exposure how they they they react ok? And we find a way to to see that we can keep uh increasing that synchronisation but it’s only a morphological effect. So what we did is like here we uh gathered the old morphology regardless of the kinematics. So here we have a control group patient and that is the delay so zero looks like a perfect synchronisation and the line here the average of that delay so we can see three results here. First, on a control group well they they were not better before or after they were like so they didn’t increase synchronisation. The second uh result is just about similarity in morphology of the patients and that although well for the pretest they $X$ you know but they don’t improve here but the most important here is when they face dissimilar morphology then their interaction increase. So two things to uh remember $X$. First, the early stage, you know, the use of a similar avatar trigger and that’s very important to trigger a synchronisation because for patients that’s one of the problem, they don’t want to engage into a social interaction and now we find a way to engage them, you know to capture something. And then after the second point is well if we wanna keep increasing that synchronisation, they need to switch to uh something dissimilar and that’s actually very important for uh uh psychiatrist because they’re they said well what we want for the our patients, $X$ I don’t want to face uh in the street their twins. I want then at some point to be able to interact with everyone and anyone that’s dissimilar ok. So that’s the uh our now goal we uh are uh uh $X$ we’re trying to it figure out a meth method of rehabilitation to more or less two steps one with to launch a trigger interaction with similarity and after that to keep increasing with something dissimilar. I wanna thanks everyone because it’s like a big group and thank you very much for your attention.
1.3. Rémy Casanova

Simon Ledouit: Now Rémy is going to talk about the locomotor interception.

Rémy: Uh Simon gave you a uh lot of information and I have to finish the work with locomotor interceptions. So here was the conceptual framework present by Reinood, mechanism

The sound is distorted on the video

base on recurrent acceleration present you what we can catch with a fractional order than integral model and I come to talk about the fact that alpha can be situation dependant with the function of territory. So what about locomotor interception Here is a current ball arrival for an order of alpha and locomotor interception had to know this quantity. Question was which order of alpha do we need to capture interception movement organisation? So to test that we have an experiment base on the virtual reality set-up in a soccer goalkeeper situation. So here is the task, subject have to move on uh lateral axes and catch ball coming from uh aero-dynamical model uh with magnet effect uh take account of magnet effect that’s why we have curve trajectory. So some trajectory come with uh clockwise spin ball other counter-clockwise uh spin and some with no spin. So we have three kind of trajectory the uh the green one here, the red here was the straight one and the blue in the other spin. We have separate the two departure here with minus four and plus four but it just for clarify the situation, of course the four arrival was the same for the two departure. So we have twenty four condition randomise and play in five blocks. So that is the projection in X play but trajectory was played in three dimension. So what about the result, I look for pattern initiation time, angle of approach effect and different pattern for each trajectory. So first we obtain the same pattern of initiation time than Simon present you before with later initiation when ball crosses the zero axis was the initial position of subject and coming close to the subject. So you can see that for the straight trajectory the same time than Simon work. Second result we see the angle of effect in the case of locomotor X interception. We have a lot of uh work in literature with lateral angle interception but we found the same with locomotor interception and last result, each trajectory led to different behaviour and more if you look this eight trajectory, they lead to reversal movement. So look at this uh specific trajectory now X. So if we take the trajectory with uh departure at minus four metres and coming at the right of the subject at point six metre, first thing is we see two kind of behaviour, first one is here in red with a reversal one, second in blue without reversal. The line dot
here was the velocity for each behaviour. So we look at the initial time and we found that the two arrival were separate by the moment of initiation so we have the same result than Simon manual interception. Reversal depend of the moment of your initiation time. So which order of info information can explain this behaviour? We are looking the zero order, the first order and the second order state all around the time serie. So the first one here was the zero order, so just a theta. If theta have a $X$ minus that means that with an attractor model he attacks you to the left and if it’s plus he attacks you to the right. The same for the first order. If it’s negative, he attacks you to the left, if it’s positive he attacks you to the le to the right. So look at specific time, first when reversal behaviour begin, here, zero order and first order are negative to lead to a behaviour to the left. We can explain that subjects beginning movement to the left side. Second order leads to the right so a second order more than can’t explain that we go to the left side uh at this time. Look the specific moment now when the subject come back to the right side to catch the ball, th the zero order information still leads the subject to the left. The first order information still lead to the left so only the second order information can lead subject to go back to the right. If we look the other trajectory readings the reversal movement we have the same. This particular uh is interesting because at the beginning the zero order information here is minus so lead to the left and people go to the right so that means that at the beginning we need the first order to go to the right side but to go back to the good direction, zero order and first order can’t explain that only the second order can explain so and we have the same result for all the four ball coming from minus one metre and also the same result with the ball coming for the other departure. That means that we need a functional order between one and two to explain this behaviour. So to sum up, on writing our trajectory we have a number a number of $X$ effect that means that alpha is under one, so like Simon show you in his uh presentation, but in curve trajectory timing of reversal movement need to have a uh alpha between one and two. So now is proposition of a model with a functional order self-selected by the trajectory. So we construct a model base on attractor dynamic with nulling strategy so the acceleration was lead by the half of derivative of theta over time. For question of dimension we need two gain, one typical gain uh and a second one with uh time dimension to accord the changing of alpha in this uh calculation. How can we choose the alpha? We choose it in order to capture a feasible strategy. So when this quantity was very high, we increase alpha and when this quantity go under $X$ base on optical size and the time characteristic were the same of the first equation alpha stopped. I come back on this situation after the next slide. And last equation was the recurrent acceleration uh equation leading to the initiation time, the same uh than Simon uh present you. Uh so what about this alpha? We begin with a alpha zero and we look if this quantity was or not uh on or under the threshold. So look at this specific uh trajectory, we begin with the alpha to zero, we calculate this quantity and we are out of the zone so
we increase alpha and alpha increases increases and at this specific moment we go in the zone and we stop alpha and for this example we find a one point seven alpha and after that we try to move this quantity to catch the ball. If we look three different trajectories so the green’s the same with the one point seven alpha $X$, look the straight trajectory, alpha begin to zero, increases and go in the zone uh $X$ than the green one and stopped at point nine. For the other trajectory the blue one

Rêmy clears his throat

so we calculate the alpha derivative of theta over time and we go into the zone just here corresponding to this little place but go out so the increase continue before coming back in the zone and here we have the strategy of nulling. So three different trajectory lead to three different alpha. Here is the result for all the trajectory, you can see that we have capture all the effect. The angle of approach effect, all the reversal, the eight reversal and all the timing of the reversal. So model uh capture the moment for our subject go back to the right side. So our proposition lead to have movement pattern result from perception motor control of situation-dependent order, different trajectory lead to a different alpha, with that we have an explanation of the angle of effect with straight tra trajectory, an explanation of timing of reversal movement and an explanation of trajectory effect on initiation time uh and uh show you that but we have to. Thanks for your attention. Just three word of Reinood.

Unknown speaker: No not yet.
1.4. Simon Ledouit

I will demonstrate how, it’s ok you can hear me? I will demonstrate how fractional order concepts permitted us to explain characteristic behaviours uh

The sound is distorted on the video.

a ball in manual interception. Before to start, I would like to talk about a paper a bit alone in the literature written by Montagne et al. They run a quite a simple experiment X. Uh it was three initial hand positions possible minus five zero and plus twenty five and participant had to cut uh three kind of ball trajectories with three angle of approach different minus four, zero and four. So what about the results, X what we have here it’s average time X of the position all over the time. The first thing you can observe it’s when the hand position was minus thirty five or plus thirty five centimetre participant move differently to catch the three different ball trajectories. That’s what we call angle of approach effect. While rectilinear ball trajectories converging to the same point give rise to different kinematic patterns but that result were largely demonstrate in the literature. The more surprising thing is the reversal movement it’s when the initial hand position corresponded to the future arrival ball position. X to catch a ball coming from the left, people operated a first movement on the left to after be back at the initial hand position. A long time that is one of the only paper reported that result. So the first thing that we need is to run an experiment to see if we observe uh we observe it as well. Oops sorry. 11 participants sat down in a dark room in front of a graphic tablet uh and interacting with it uh X. On the tablet uh many virtual ball appeared with different kind of trajectories. It was four ball departures possible, minus fifteen, minus five, plus five and plus fifteen centimetres and converging to seven uh arrival ball uh ball arrival positions. Four ball speeds was possible resulting in a hundred twelve conditions perform in three blocks. About the result, I will present the result in two parts, the first part about the angle of approach effect, it’s concerning trajectories not arriving in the zero point because the zero point corresponded to the initial hand position of the participants. And the second part will be about the reversal movements. The four different trajectories starting from four different ball position but converging to the zero point the initial hand position. First of all, I will present the result about the ball speed one but we observe the same qualitative results for all ball speeds. So on the first X here you have the twenty four different trajectories not arriving in zero. And here you have the kinetic patterns on the y uh uh
on the axis, on the slide, on the tablet all over the time. The first thing that we observe it’s a systematic angle of approach effect. I mean that if you observe the four trajectories arriving in the point minus fifteen centimetres, participant move differently each time. It was not the same kinetic pattern and those differences were the same for the six ball arrival position. But here’s the thing that we observe, it’s a clear trajectory effect on the initiation time. The circles here are uh represent the uh ball position when participant initiated. What we can observe it’s it’s not each time the same uh uh uh position and some trajectories, especially the four crossing the x axis and arriving arriving close to the initial hand position uh led to later initiation time. That one, that one, that one. And kind of a pattern is observed each time, it’s kind of systematic. About the reversal movement, here again you have the ball position evolution all over the time and here you have all the trial. On five twenty two trials uh twenty trials, we observe one hundred eighty reversal movement, it mean an excursion more important than one centimetre. So it was not systematic but we observe it. Minor details uh uh we observe stable rate relative to the ball the factor ball speed. Always the rate was between thirty and forty per cent. But more we observe a significant differences related to the ball factor the factor of ball departure position. For the trajectories with a more external uh ball departure position, minus fifteen and plus fifteen, it was a rate of forty uh five per cent of reversal and for the more internal ball departure position almost twenty five per cent. To go further, ninety four per cent of reversal were in direction of the ball departure position. To understand that graph here you have the ha the reversal amplitude in centimetre and here we have the initiation time the time to contact so the time to contact at initiation time. Here you have the example of one trial, participant starting in the zero point for ball departure coming from the left, going on the left first to be back and catch the ball. If you take the initiation time and the more external amplitude you get that square. So here you have representing the one hundred eighty reversal movement and what we observe is that the reversal amplitude depends on the initiation time. More we initial early more the amplitude will be large. So to sum the result part, we observe a systematic angle of approach effect, a systematic trajectory effect on the initiation time and about the reversal in the uh one hundred eight reversal observe initiation time had an effect on the amplitudes. For now I will talk about the model. Before the start I will talk about the series the the Taylor series. So Taylor’s \( X \) define that it’s the zero it’s the current ball position on the axis deplacement. If you take in account the velocity and the time remaining the first order for a straight trajectories you get the arrival it’s xb one. If it’s a curve trajectories and you take in account the acceleration and also the time remaining you can have the u the f uh the future arrival position and so on and so on if you increasing the order. In the literature uh two different model were develop, quite close but including two different information: the zero order model and the first order model. So if you look uh, if you simulate the uh the model, the zeros or the model it
means that the f the the attractor all over the time will be xb zero, the current ball position. So model predict that you will go on the left first if you need to catch that six trajectories the red one for example to after be back on the right if the ball uh converge to the right so you get the angle of approach effect. But it’s not the pattern that we observe in our data. About the first order model, you don’t see the red but it exist as well but for four trajectories arriving to the same point, if you take in account the velocity, the attractor all over the time will be the same so a model like that can’t predict uh the angle of approach effect. So here is the fractional order concept, uh here you have a trajectory starting in minus fifteen centimetres and going to plus fifteen centimetres. So the uh if the attractor xb zero it will track to you here at the beginning and sliding to here to the end. If you take in account the velocity and the time remaining so directly, you get xb one and xb one will not change all over the time. So the attractor all over the time will be xb one. But why not consider continuum between zero and one? Putting an alpha in front of the time remaining we will take as an example alpha equal to o point eight. So it’s not exactly xb one, it’s not xb zero it’s closer than xb one but it’s not that and like that you have an attractor xb all over the time to the arrival point of course but not exactly xb zero not exactly xb one. And like that you can have different trajectories with the same alpha but not with the same attractor evolution all over the time and first of all the that could capture the angle of approach. To go further, hand back on the initiation time, do you remember I was talking about the four trajectories uh leading to systematic later initiation time? If you put here your point, if you divide xb one at initiation time there is not pattern. But if you do the same with the attractor all over the time, if alpha is equal to o point eight, you can see that after the other there is a time when participant never initiated during this time period but you can also maybe distinguish a non-action zone. Of course if the attractor is far is far than you, you are going to initiate really early because you have to move if you want to catch the ball but if the attractor it’s it’s specifying in a zone close to your initial hand position, there is no reason to move. And that’s why the four trajectories crossing the x the zero axis but going close to you, the value of xb alpha if alpha is o point eight are going to have a value close to zero. So there is no reason to move if the attractor it’s specifying is not close to you. So what about our model uh. The model we have, the model explained by it’s velocity to do minus your current velocity and here you have the results. So the model is triggering on the asymptote it’s mean that it’s starting when the value of the attractor is exceeding the value and as you can see the systematic angle of approach is captured but now the question is what about the reversal movement? To explain how the model uh is working with the reversal movement I have to go again back a bit on the initiation time because it’s the first moment that something happen and we are sure of this. Of course that it’s the mean of the initiation time but not all the participant initiating at the same moment so if you are
if you get that two trajectories, different. You can develop, you can observe the distribution of the initiation time but you’ll see on our trajectories that there’s not a lot of distribution because on the blue point it means that ten per cent of the trial were initiated before and after X it’s twenty per cent thirty etcetera to the end and what you look is that uh for the specific trajectories leading leading to later initiation time, there is a larger distribution. So if you put it under, you’re confounding that result with the value of the attractor all over the time, you can again develop the idea that the time and the non-action zone but of course you will have different asymptote, representing a different kind of sensitivity of people at the moment. So I just have a look about, you remember it was four trajectories converging to the zero point the initial hand position? So for that trajectories xb alpha, if alpha is o point eight, means an attractor evolu uh evolution all over the time like that, four trajectories. So you have four attractor and if you simulate the model, you can see that the two trajec the two trajectories with the most exter external uh ball departure position minus fifteen and plus fifteen crossing the asymptote uh the first one representing ten per cent of the trial initiated, twenty per cent, thirty per cent, forty per cent but not all and for the more internal it’s just one X. And more interesting and more X uh proving that you will have a more important amplitude, a larger amplitude, if you initiate early because of course, if the attractor the value attractor is that one at that moment, you will, there is, the distance to do will be more important that if you wait to if you wait more and that the attractor is converging in closer uh to end to the to the a arrival position. So triggering the model with the asymptotes a ten per cent, twenty per cent, uh etcetera, the probability to observe a reversal is captured and more the initiation time influencing amplitudes is also captured. So what does the fractional order concept do for us? An explanation of the systematic angle of approach effect, an explanation of the trajectory effect and a movement initiation and an explanation of reversal probabilities mean that sometime you can do that but sometime not and why amplitude is depending is dependent on the initiation time. And now Rémy…

*The video cuts mid-sentence.*