



Listening to accents: Comprehensibility, accentedness and intelligibility of native and non-native English speech

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Abstract

This study investigates how well English as a Foreign Language (EFL) learners report understanding (i.e. comprehensibility) and actually understand (i.e. intelligibility) native and non-native accents of English, and how EFL learners' self-reported ease of understanding and actual understanding of these accents are aligned. Thirty-three Dutch-speaking EFL learners performed a comprehensibility and accentedness judgement task, followed by an orthographic transcription task. The judgement task elicited listeners' scalar ratings of authentic speech from eight speakers with traditional Inner, Outer and Expanding Circle accents. The transcription task assessed listeners' actual understanding of 40 sentences produced by the same eight speakers. Speakers with Inner Circle accents were reported to be more comprehensible than speakers with non-Inner Circle accents, with Expanding Circle speakers being easier to understand than Outer Circle speakers. The strength of a speaker's accent significantly affected listeners' comprehensibility ratings. Most speakers were highly intelligible, with transcription accuracy ranging between 79% and 95%. Listeners' self-reported ease of understanding the speakers in our study generally matched their actual understanding of those speakers, but no correlation between comprehensibility and intelligibility was detected. The study foregrounds the effect of native and non-native accents on comprehensibility and intelligibility, and highlights the importance of multidialectal listening skills.

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1. INTRODUCTION

Listening in a second or foreign language (L2) is more difficult than listening in a first or native language (L1). Even highly proficient L2 learners may find it arduous to listen to the non-native language they have been learning for many years (Cutler et al., 2004; Graham, 2011; Kilman et al., 2014). Several reasons lie at the heart of this difficulty, some of which are related to the inherent nature of listening: speech is fast, continuous and fleeting, meaning that listeners can-

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not go back and listen again, in the same way as they can reread a written passage (Bloomfield et al., 2010). Additional difficulties may arise when there is background noise (e.g., Rogers et al., 2004; Sarampalis et al., 2009; Scharenborg and van Os, 2019) or when the speaker has an unfamiliar (regional or non-native) accent (e.g., Adank et al., 2009; Bent and Bradlow, 2003). Background noise and unfamiliar speaker accents are considered to contribute to the creation of 'non-optimal' conditions for listening, which may result in, for instance, increased processing effort (Mattys et al., 2012: 955). These are opposed to 'ideal' listening conditions, that is when speech is produced in a quiet environment in a familiar accent. Most research on speech perception and intelligibility has used read speech or speech elicited in the laboratory, but nascent research is increasingly using unscripted, casual speech to examine how non-optimal listening conditions may complicate speech understanding (e.g., Ernestus et al., 2017; Hansen Edwards et al., 2018; Tucker and Ernestus, 2016; see Tucker and Mukai, 2022, for an overview). In line with this ongoing trend, the current study isolates speaker accents as one of the complicating factors for listening and examines how natural, unscripted speech produced in authentic contexts affects L2 speech perception and comprehension.

English lends itself well to studying how variation in spoken language affects listening, as it has become the default linguistic bridge to facilitate communication in business and education internationally (see Jenkins et al., 2018). With its millions of native speakers and an even larger number of non-native speakers (English as a Second/Foreign Language (ESL/EFL) and English as a Lingua Franca (ELF) users; see Pennycook, 2017), learners of English need to be able to understand a wide variety of 'Englishes' (Raihan and Deterding, 2018). In Flanders, the Dutch-speaking part of Belgium, EFL learners are generally trained to speak and listen to General British English and General American English (Roberts, 2020; cf. the attainment targets for English in Flanders: GO!, 2014; VKSO, 2014).¹ However, understanding exclusively non-regionally accented speech or acrolectal accents of English often no longer suffices for these and many other EFL learners to effectively function in today's globalized and multicultural world. In Flemish higher education institutions, for example, English is increasingly used as the medium of instruction in non-language subjects by native and non-native teachers (Vandenbussche, 2020). Beyond the classroom environment, Belgian Dutch learners of English are also exposed to different accents of English through television series, films, music and other types of (social) media (Simon and Van Herreweghe, 2018; De Wilde et al., 2020). EFL learners are thus frequently confronted with a wide range of native and non-native accents of English. As Canagarajah (2006) argues, a crucial aspect of present-day language learning is to acquire and consolidate multidialectal listening skills, as there seems to be an ever-growing need to understand multiple accents of English.

This study aims to map the multidialectal listening skills of proficient EFL learners in Flanders. The goal is to determine non-native listeners' ease of understanding and their actual understanding of different accents of English, with special attention to how their self-reported ease of understanding and performance-based understanding of these accents are aligned. The relevance of our study is threefold. First, it has theoretical relevance in that it aims to contribute to our knowledge of how non-native listeners can process variation in speech caused by speaker accents. While most previous studies on accented speech perception have focused on native listeners (but see recent studies such as Larraza and Best, 2018; Saito et al., 2019; Shin et al., 2021), investigating how non-native listeners deal with different accents can further our understanding of the flexibility of non-native phonological representations. Secondly, the study aims to have methodological relevance: unlike many previous studies, which are based on speech elicited in a laboratory (including read speech), the present study uses authentic and unscripted speech that was not tailored or intended for experimental use. The methodology used and described in this study may be of interest to other researchers who want to use authentic data in their perception or listening research. Finally, the study has societal relevance, since with this study we aim to raise EFL students' awareness of the omnipresence of variation in English, including 'World Englishes' (Kachru, 1985; cf. Section 2). We believe that awareness raising is a first step in the process of increasing tolerance towards accent variation and ultimately fostering solidarity with speakers of English with native and non-native accents and different L1 backgrounds (Eisenchlas and Tsurutani, 2011).

2. BACKGROUND

An accumulated body of research has established that L1 listeners are highly successful at adapting their perception to accommodate for phonetic variation in language, whether this variation results from unfamiliar talkers (Kraljic and Samuel, 2007; Norris et al., 2003), regional accents (Bent and Baese-Berk, 2021; Dahan et al., 2008) or non-native accents (Kennedy and Trofimovich, 2008; Witeman et al., 2013). Previous studies have also shown that speech perception strongly depends on both speaker-based and listener-based parameters (see Saito et al., 2019). Kraut and Wulff (2013), for instance, analyzed how native speakers of English perceive the speech of English L2 learners with

¹ The terms General British English and General American English are used here to refer to acrolectal varieties lacking regionally coloured features (cf. Collins et al., 2019: 289).

different language backgrounds. They found that the biological sex and the L1 background of the speaker as well as listeners' self-reported familiarity with the accent of the speaker influenced how strong the speaker's accent was perceived and how well native English listeners reported understanding the L2 speakers (see also Baese-Berk et al., 2020; Yoho et al., 2019).

Fewer studies have investigated to what extent non-native listeners can deal with accent variation in their foreign language (but see Barrass et al., 2020; Hansen Edwards et al., 2018; Jeong et al., 2021). Since L2 learners typically have a more limited command of the target language than native speakers in terms of the lexicon, the sound system and syntactic rules (Abrahamsson and Hyltenstam, 2009), they are generally slower than L1 listeners at adapting their perception to accommodate for unfamiliar accents. One factor that has repeatedly been shown to influence listeners' ability to understand L2 speech is their linguistic background profile. Like for L1 listeners, familiarity with a particular accent results in better comprehension for L2 listeners (Adank et al., 2009; Bent and Bradlow, 2003; Winke et al., 2012). For example, Schoonmaker-Gates (2018) found that L2 Spanish learners' understanding of L1 Spanish speakers with a regional accent was more accurate when the L2 learners had previously been exposed to the regional accent during a study abroad experience (see also Schmidt, 2018). Even short-term exposure to an unfamiliar accent may suffice for listeners to become better at understanding speakers with that accent within the context of the experiment (Bradlow and Bent, 2008; Clarke and Garrett, 2004). Although these studies have demonstrated that non-native listeners can adapt to variation in spoken language, further research is needed to determine how L2 listeners perceive and actually understand both native and non-native accents of the same language.

To evaluate EFL listeners' perception and understanding of native and non-native accents of English, we follow Munro and Derwing (1995) in using three separate constructs: *comprehensibility*, *intelligibility* and *accentedness*. They define comprehensibility as listeners' judgements on how easy or difficult it is to understand what a speaker is saying. Judgements of comprehensibility are inherently subjective and may vary between listeners, even when listeners' actual understanding of a speaker's utterance is the same. The extent to which listeners actually understand a speaker is termed intelligibility by Munro and Derwing (1995). Intelligibility is commonly measured through sentence transcription tasks (see Kang et al., 2018). In such tasks, listeners are asked to write down the sentences they hear, with intelligibility being operationalized as the proportion of correctly transcribed words in an utterance.

A third construct that relates to comprehensibility and intelligibility is accentedness. Munro and Derwing (1995) conceptualized this as the degree of perceived foreign accent. Such foreign or non-native accents arise when segmental and suprasegmental features of the firmly established native language are transferred into the target language (cf. models of L2 speech perception and production: Best, 1995; Best and Tyler, 2007; Flege, 1995; Flege and Bohn, 2021; van Leussen and Escudero, 2015). As we are examining EFL learners' ability to understand both native and non-native accents, accentedness will be interpreted more broadly as the degree to which a speaker's pronunciation deviates from an expected norm or from what a listener expects a speaker of English to sound like (see also Nagle and Huensch, 2020; Ockey and Wagner, 2018). Just like comprehensibility, accentedness is based on listeners' self-reported perceptions. Specifically, assessments of both dimensions rely on scalar ratings by listeners, who are asked to evaluate the perceived ease of understanding a speaker and the perceived strength of that speaker's accent (Isaacs and Thomson, 2013; Munro, 2017). Comprehensibility and accentedness judgements are thus subjective by nature and may be influenced by listeners' attitudes towards the accent they perceive (see Simon et al., 2022; Kennedy and Trofimovich, 2019; Munro and Derwing, 2020).

While comprehensibility, intelligibility and accentedness are distinct constructs, measured in different ways, previous research has examined the extent to which they are interconnected. Although some research has found that the perceived degree of accentedness can impact intelligibility, the majority of studies have found little or no relationship between these constructs (e.g., Derwing and Munro, 1997; Hansen Edwards et al. 2018; Huensch and Nagle, 2021, 2023; Jułkowska and Cebrian, 2015; Pérez-Ramón et al., 2022). Accented speech, in which some words are pronounced differently from what the listener might expect, may thus still be highly intelligible to listeners. Additionally, when speech is perceived as highly comprehensible, it is very likely to be highly intelligible to the listeners, often regardless of the speaker's accent. An often-cited study by Munro and Derwing (1995) illustrates this point with respect to Mandarin speakers of L2 English: speakers whose speech was rated as 'heavily accented' by L1 English listeners were not necessarily less comprehensible or less intelligible than speakers with a milder accent.

Following recent studies, we use Kachru's (1985) model of 'World Englishes' to get a deeper insight into the comprehensibility and the intelligibility of English speakers around the globe (cf. Kang et al., 2018, 2019). This framework places countries of the English-speaking and English-using world into three circles.² The Inner Circle is traditionally represented by native English-speaking countries, including the United Kingdom, the United States of America, Australia

² It should be noted that the boundaries between the Circles are not always strict: some accents may fall in between Circles and move from one Circle to another (cf. Kachru, 1985; see also Rajadurai, 2007).

and New Zealand. The Outer Circle consists of countries that have an early history of English occupation, largely as the result of colonization, such as India, Nigeria and Kenya. Compared to Inner Circle countries, English in Outer Circle countries was granted the status of an official language or became the language of education, administration and the court, while the indigenous languages often continued to be used in many contexts alongside the nativized variety of English. The Expanding Circle comprises all countries where English is used as the international language of communication in commerce, media or higher education, but where it is not the first or dominant language of the majority, and typically does not have an official status. Most European countries are Expanding Circle countries, and so are China, Japan and many countries in Central and South America.

Kang and Moran (2018) examined how comprehensible Inner and non-Inner Circle accents are to L1 English listeners. They observed that speakers with Inner Circle accents were consistently rated higher for comprehensibility than speakers with non-Inner Circle accents. By contrast, the comprehensibility ratings for speakers with Outer and Expanding Circle accents did not consistently differ as a function of Circle membership. For instance, the South African English speakers (Outer Circle) were judged as less comprehensible to L1 English listeners than the Mexican or Chinese speakers of English (Expanding Circle). Moreover, Kang and Moran found that even highly comprehensible L2 speakers were perceived as less comprehensible than L1 speakers by native listeners. Various factors are linked to listeners' self-reported ease of understanding accented speech, such as accent familiarity, and the fluency and authenticity of the speaker (see also Rajadurai, 2007; Smith and Nelson, 2006). A number of studies have also shown that Inner Circle speakers are highly comprehensible and highly intelligible to both L1 and L2 listeners (Chung and Bong, 2019; Jeong et al., 2021; Kang et al., 2019), while other studies have demonstrated that American or British English speakers are not always easier to understand or more intelligible than some speakers with Outer and Expanding Circle accents (Hansen Edwards et al., 2018; Smith and Rafiqzad, 1979). It is to be determined whether the pattern observed for L1 listeners in Kang and Moran's study holds for L2 listeners, and whether non-Inner Circle speakers are also less intelligible than speakers with Inner Circle accents to the EFL learners in our study.

3. THE PRESENT STUDY

The present study sets out to examine to what extent different native and non-native accents impact on English as a Foreign Language (EFL) learners' ability to understand spoken English. Specifically, it digs deeper into the influence of accents on L2 learners' self-reported ease of understanding and performance-based understanding of speakers of English with various accents. To that end, we designed an experimental survey that, besides a questionnaire on the participants' demographic and linguistic background, consists of two parts: (i) a speaker judgement task, in which listeners are asked to rate speakers on their comprehensibility and accentedness, and (ii) an orthographic transcription task, in which listeners are asked to write down the sentences they hear. Listeners were native speakers of Dutch who were proficient in English and were enrolled at an institute of higher education in Flanders, Belgium. Speakers in the experimental survey represented all three concentric Circles in Kachru's (1985) model, with Inner Circle accents further divided into non-regional or acrolectal accents and regional accents.³ In the interests of ecological validity, we used authentic speech excerpts for the speaker judgement and transcription tasks, which were taken from talk shows and radio interviews, as these unscripted excerpts closely resemble the spontaneous speech that L2 listeners come across in real-life listening situations (Major et al., 2005; Wagner and Ockey, 2018).

We formulate the following three research questions (RQs):

RQ1: How comprehensible are speakers with different native and non-native accents of English to EFL learners in higher education and to what extent do the perceived strength of the speaker's accent and listeners' familiarity with the speaker's accent impact on their comprehensibility ratings?

RQ2: How intelligible are speakers with native and non-native accents of English to EFL learners enrolled at an institute of higher education in Flanders?

RQ3: To what extent are EFL learners' comprehensibility ratings of speakers with native and non-native accents of English related to their intelligibility scores for these speakers?

³ Acrolectal Inner Circle accents are generally supra-regional, which means that the accent can be linked to a particular country but not unequivocally to a particular (dialect) region within that country. Two examples of such supra-regional accents are General British English in the UK and General American English in the US. Regional Inner Circle accents, by contrast, are characterized by certain dialect features, which allow listeners to identify if a speaker is, for instance, from the northern part of the UK or from the southern part of the US.

We hypothesize that listeners' judgements of comprehensibility will vary as a function of which Circle the speakers represent in Kachru's (1985) model of World Englishes (cf. RQ1). Specifically, we hypothesize that the speakers with Inner Circle accents will be more comprehensible to the Flemish EFL listeners in our study than the speakers with non-Inner Circle accents (cf. Kang et al., 2019). Understanding non-regionally accented speech, such as General British English and General American English, is expected to require relatively little effort for Expanding Circle speakers of English since these accents are widely used as the pedagogical models in EFL classroom contexts internationally (Abeywickrama, 2013; Tsang, 2019), and EFL learners are frequently exposed to these accents through the media (e.g., Simon and Van Herreweghe, 2018; De Wilde et al., 2020; Sayer and Ban, 2019). Differences between British and American English may be observed, as in Flanders the amount of exposure through popular media is larger for American than for British English (Simon and Van Herreweghe, 2018). As noted by Proshina (2019), Expanding Circle accents combine standards from norm-providing varieties, and most typically from British and American English, which means that there may be great variability in the target models used in EFL classrooms. Speakers with regional Inner Circle accents are also expected to be highly comprehensible to non-native listeners, although regional-specific differences in pronunciation may complicate L2 listening. Due to EFL learners' familiarity with Inner Circle accents, we predict that listeners will rate these speakers as having a weak accent, with the speakers of General British and American English having an even less pronounced accent than the speakers of regionally accented English.

Regarding the non-Inner Circle accents, we hypothesize that the speakers with Expanding Circle accents will be slightly easier to understand than the speakers with Outer Circle accents for the EFL learners in the current study (cf. Kang and Moran, 2018). Expanding Circle accents are, by definition, exonormative, i.e. modelled after acrolectal Inner Circle accents. Expanding Circle speakers typically develop a hybrid linguistic system, in which patterns and rules of their first language(s) are transferred into the system of a target Inner Circle variety of English (i.e. an *interlanguage*; Selinker, 1972). Some Outer Circle varieties, conversely, are codified varieties of English, which have developed their own linguistic systems and endonormative pronunciation models. For instance, a standardized accent of Indian English, called General Indian English, has emerged, and its phonological system and pronunciation are recognized as a regional norm (Pandey, 2015). Since Flemish EFL learners may be less familiar with Outer Circle accents, these accents may be further removed from listeners' expectation of English than Expanding Circle accents. We therefore expect that listeners will rate Outer Circle accents as more difficult to understand and more accented than Expanding Circle accents. Recall that mild or even strong speaker accents do not preclude listeners from perceiving accented speech as comprehensible.

With respect to intelligibility (RQ2), and the relation between comprehensibility and intelligibility (RQ3), we hypothesize that when a speaker is perceived as highly comprehensible (i.e. easy to understand), that speaker will also be highly intelligible. Such a pattern would align with Munro and Derwing's study (1995), in which speakers who were perceived as highly comprehensible were almost fully intelligible to the listeners. Similar to our hypothesis for comprehensibility, we expect a difference in intelligibility between speakers with Inner and non-Inner Circle accents. That is, we assume that Inner Circle speakers with an acrolectal or regional accent will be more intelligible to the Flemish EFL listeners than Outer and Expanding Circle speakers, and will hence be transcribed more accurately (i.e. higher proportion of correctly transcribed words). Given that the participants in the current study are Expanding Circle speakers of English, who also take Inner Circle accents as the target model in EFL classrooms, we hypothesize that the Outer Circle speakers will be less intelligible to these listeners than the Expanding Circle speakers (Kang and Moran, 2018; Winke et al., 2012). However, the difference in intelligibility scores between these Circles may also depend on listeners' self-reported familiarity with the Outer and Expanding Circle accents.

4. METHOD

4.1. Speakers

Based on Kachru's (1985) model of World Englishes, eight male speakers were selected with eight distinct accents of English. For Inner Circle accents, two speakers of British English and American English each were selected: one speaker had a non-regional or acrolectal accent (i.e. General British English and General American English) whereas the other spoke with a regional accent (i.e. Newcastle English, which is a clear representative of Northern British English, and Texan English, falling under Southern American English). An Indian and a Nigerian speaker of English were selected as speakers with Outer Circle accents. Finally, a Chinese and Spanish speaker were the Expanding Circle speakers in our study. Speaker ages ranged between 34 and 88 years ($M = 48.4$ years, $SD = 18.6$ years) at the time of recording. Only male speakers were selected to rule out that gender-related differences in voice quality would influence listeners' perception and the intelligibility of the native and non-native speakers (e.g., Flege et al., 1995; Kraut and Wulff, 2013).

Following Major et al.'s (2002: 179) requirements for speaker eligibility, speakers needed to (i) sound conversational, (ii) have mature voice quality and (iii) sound like a genuine speaker of the given variety. The first conversational criterion was met by sampling passages of spoken English from real interviews and talk shows. All speakers were guests invited for interviews or in talk shows, active in the cultural sector, sports or politics, allowing us to trace their age as well as their country and region of origin. The disadvantage of using speakers with a certain fame is that we cannot rule out that some listeners may have recognized speakers' voices, despite the fact that excerpts were short, decontextualized and that care was taken not to include any excerpts that contained content referring to the speaker's profession, sector or origin. The second criterion was met because all speakers were in their thirties or older when the interviews took place. To ascertain whether the accents were authentic and sufficiently recognizable (cf. criterion 3), 20 native speakers of English, recruited through *Prolific* (<https://www.prolific.co/>), performed an accent verification task. These participants were undergraduate or graduate students, aged between 18 and 25 ($M = 21.5$ years, $SD = 1.8$). They were presented with the excerpts from the comprehensibility and accentedness rating task for each speaker of English (cf. Section 4.3.2), and they were asked to identify which English accent they heard in a five-alternative forced-choice task. All speaker accents were correctly identified by at least 16 of the participants, with General British English, Texan English, Indian English, and Nigerian English being correctly recognized by all participants, and General American English and Chinese English by 95% of the participants. We take these results as evidence that the speech samples contained sufficient features for the listeners to recognize each speaker's accent.⁴

4.2. Listeners

Thirty-three Belgian Dutch students ($M_{age} = 18.9$ years, $SD = 1.3$, range = 17–22) with self-reported normal or corrected-to-normal hearing participated in this study. Female participants ($n = 27$, 82%) outnumbered male participants ($n = 6$; 18%). All participants were born and had spent most of their childhood in Flanders. They started learning English in a classroom setting at the age of 12 on average ($SD = 1$ year) and none of them had stayed in an English-speaking country for more than three months. At the time of testing, they were undergraduate students enrolled in the Linguistics and Literature programme at a Flemish university, with English and a second (foreign) language as main subjects. Informed consent was obtained from the participants at the beginning of the survey. As compensation for their time, they received ten euros.

All participants can be expected to have had at least an upper-intermediate level of English (B2) in the Common European Framework of Reference for languages (CEFR) scale (Council of Europe, 2001), since this level is an entry requirement for the English courses the students were taking at the time of testing. Participants were also asked to specifically rate their *listening* skills: six participants (18%) rated their listening skills in English as intermediate (CEFR equivalent: B1), 16 (49%) as upper-intermediate (CEFR equivalent: B2) and 11 (33%) as advanced (CEFR equivalents: C1–C2). Focusing on intermediate to high proficiency rather than on low proficiency listeners is motivated by the fact that language proficiency has been found to impact on L2 listeners' ratings of comprehensibility and accentedness (Kang et al., 2019; Ludwig and Mora, 2017; for an exception, see Saito et al., 2019). Specifically, low proficiency listeners (CEFR equivalent: A1–A2) may encounter more difficulties when they are listening to different accents of English and consequently rate the speakers as less comprehensible, because their representations of L2 speech sounds and words are not yet sufficiently developed or detailed to recognize the individual sounds or words in accented speech (see Cutler, 2015; Eger and Reinisch, 2019).

4.3. Materials

4.3.1. Questionnaire

A questionnaire was administered to gather information about the demographic and linguistic background of each listener, and about the difficulties that these EFL learners experience when listening in English. Listeners were also asked to indicate how often they were exposed to the eight accents used in the present study on a 5-point scale (1 = never, 5 = very often). We added familiarity as a variable in the questionnaire, because listeners' linguistic background and prior exposure to a particular accent have been found to affect ratings of comprehensibility and accentedness, as well as intelligibility scores (cf. Section 2).

⁴ Although the eight speakers can be considered to be good representatives of the eight different accents of English, these accents are of course not monolithic, in that there may still be individual differences.

Table 1

Properties of the speech samples used for comprehensibility and accentedness judgements.

Accent	Duration (s)	Syllables (n)	Speaking Rate (Syllables/s)
General British English	16.51	78	4.72
General American English	16.19	87	5.37
Newcastle English	16.32	86	5.27
Texan English	15.56	53	3.41
Indian English	16.87	85	5.04
Nigerian English	21.15	98	4.63
Chinese English	20.69	79	3.82
Spanish English	18.17	71	3.91
Mean (SD)	17.68 (2.13)	80 (13)	4.52 (0.73)

4.3.2. Comprehensibility and accentedness judgement task

Stimuli for the comprehensibility and accentedness judgement task were eight passages of spoken language, one for each of the selected accents of English (cf. Section 4.1; Appendix A). Speech excerpts were drawn from interviews and talk shows, and the topics discussed in those excerpts were diverse: film reviews, fandom, political issues and personal relationships with family and friends. In the selection of the speech samples, care was taken to avoid references to the speaker's name, country of origin or first language, and exclude the voices of other speakers (e.g., talk show host or interviewer). Following Crowther (2020) and Kang et al. (2018), instances of backchanneling, false starts, throat clearings and salient background noises were removed from the audio using Praat software (Boersma and Weenink, 2022; Version 6.2.09). This was done to ensure that speaker fluency in all speech samples was comparable. In all excerpts, the root-mean-square amplitude was scaled to 70 dB to minimize the potential effect of intensity differences on listeners' judgements. Additionally, we controlled for the total duration, number of syllables and speaking rate to rule out that salient differences between the passages would bias listeners' comprehensibility and accentedness ratings (see Table 1). Excerpts contained 80 syllables on average (SD = 13), with a mean duration of 17.7 seconds (SD = 2.1 s). Speaking rates, as calculated by the number of syllables per second, ranged between 3.8–5.4 syllables per second (M = 4.5; SD = 0.7).

4.3.3. Orthographic transcription task

Stimulus materials for the orthographic transcription task were 40 short sentences (i.e. five for each speaker of English) selected from the same talk shows or interviews, but different from the excerpts selected for the comprehensibility and accentedness judgement task, in order to rule out the potential effect of previous exposure (see Appendix B). The disadvantage of using transcription tasks to measure intelligibility is that listeners may recognize and transcribe words they do not actually understand (cf. Munro and Derwing, 2020; Zielinski, 2008). To mitigate the risk of confounding word recognition with intelligibility, each selected sentence contained only moderate to high frequency content words, which were matched as closely as possible in lexical frequency using the SUBTLEX-UK (van Heuven et al., 2014) and SUBTLEX-US (Brysbaert and New, 2009) databases (cf. Table 2).⁵ Using high frequency words has been found to facilitate L2 listening comprehension, because such words can be mapped more easily and more quickly onto L2 listeners' representations in the mental lexicon (Matthews and Cheng, 2015; White et al., 2013). Similar to the speech samples used for comprehensibility and accentedness rating, sentences were also controlled along several speech dimensions (see Table 2). The average duration of the transcription sentences was 2.45 s (SD = 0.51 s) and sentences had on average 11.8 syllables (SD = 1.95). Speaking rate was held constant between the sentences (M = 4.90, SD = 0.63), and all sentences were scaled to an average intensity of 70 dB to increase inter-stimulus similarity. Multiple one-way ANOVAs and post-hoc pairwise comparisons using Tukey's HSD test indicated that the speech dimensions of the transcription sentences did not differ significantly.

⁵ A standardized Zipf value was calculated for each word based on its proportional frequency per million words (fpmw), because the accuracy of interpreting word-specific fpmws has been shown to be highly contingent on the size of the corpus (van Heuven et al., 2014). The Zipf scale is a logarithmic scale with values ranging from 1, which are low frequency words, over 6, which are high frequency lexical words, to 7, which are highly frequent, but often semantically neutral function words such as pronouns and copulas.

Table 2

Properties of the speech samples used for the orthographic transcription task per Accent.

Accent	Duration (s)		Syllables (n)		Speaking Rate (Syllables/s)		Content Word Frequency (Zipf)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
General British English	2.63	0.64	13.00	1.87	5.05	0.78	4.78	0.18
General American English	2.31	0.41	11.40	1.82	5.02	0.89	4.95	0.51
Newcastle English	2.45	0.32	11.20	2.17	4.58	0.71	5.07	0.21
Texan English	2.52	0.55	11.60	1.82	4.66	0.30	4.37	0.58
Indian English	2.58	0.52	13.20	1.10	5.22	0.61	5.14	0.45
Nigerian English	2.40	0.33	11.80	1.48	4.94	0.40	5.01	0.23
Chinese English	2.00	0.76	9.40	2.41	4.87	0.74	4.99	0.43
Spanish English	2.69	0.37	12.60	1.14	4.74	0.64	4.79	0.35
Mean (<i>SD</i>)	2.45	0.51	11.78	1.98	4.88	0.63	4.89	0.42

4.4. Procedure

The experimental survey was developed in *LimeSurvey* (Version 2.73.1). Written on-screen instructions explained that the survey consisted of a questionnaire followed by two listening tasks. All questions and instructions were provided in English to activate an English listening mode (see Grosjean, 1998). Listeners were instructed to test their audio using headphones and they were encouraged to adjust their computer volume to a self-selected comfortable listening level. Participants completed the online experimental survey in a single session in a quiet room of their choice, which lasted on average 30 minutes (*SD* = 12 minutes).

In the first part of the survey, listeners completed the questionnaire about their demographic and linguistic background. In the second part, listeners were asked to rate the speech of the eight speakers on comprehensibility and accentedness using nine-point scales. Clear and concise definitions of both terms were provided to the participants. Comprehensibility was defined as how easy or how difficult it is to understand what a speaker is saying (1 = easy to understand; 9 = hard to understand). Accentedness was defined as the degree to which a speaker's speech sounds different from a listener's expectation of English (1 = no accent; 9 = strong accent). Unlike in Munro and Derwing's study (1995), accentedness did not exclusively pertain to foreign accents; we considered the effect of acrolectal and regional Inner Circle, and Outer and Expanding Circle accents on L2 listening comprehension. The selected speech samples were randomized across all participants and were only played once. After completion of the comprehensibility and accentedness judgement task, listeners could take a self-paced break. In the final task, listeners were presented with 40 short sentences which they needed to transcribe orthographically. They were encouraged to transcribe as many words as possible. Participants heard each sentence only once and stimulus presentation was pseudo-randomized, in that no two sentences of the same speaker could immediately follow each other. After 20 sentences, participants could take a short break.

4.5. Analysis

To analyze the comprehensibility and accentedness judgements, a linear mixed-effects regression model was built in *R* using the *lme4* package (Bates et al., 2015) (cf. RQ1), with participants' Comprehensibility ratings (score from 1 to 9) as the dependent variable. The native or non-native Accents of English (8 accents) and Accentedness ratings (score from 1 to 9), including their interaction, were entered as the fixed effects, with the Comprehensibility ratings for General British English mapped onto the intercept. Familiarity (5 levels of exposure) was also included as a fixed factor, but due to data sparsity, it was recoded as a binary categorical variable: Unfamiliar (exposure frequency: *never* or *rarely*) and Familiar (exposure frequency: *sometimes*, *often* or *very often*). Variability between Participants was accounted for through the addition of by-subject random intercepts and slopes.

Participants' transcription accuracy in the second task was measured as the number of correctly transcribed words in each utterance, which we interpreted as a proxy for Intelligibility (cf. RQ2). All words (content and function words) in each stimulus sentence were coded as either correctly or incorrectly transcribed. Transcription errors which could clearly be identified as spelling mistakes were not considered incorrect (e.g., *studio audience* for *studio audience*). Intelligibility was analyzed using a mixed-effects logistic regression model, with transcription Accuracy (correct vs. incorrect transcription) as the dependent variable. Accent (8 accents), Word Type (Content vs. Function word) and Familiarity (Familiar vs. Unfamiliar) were included as fixed factors. Random intercepts were added to the model for Sentences

and Items (with Items nested in Sentences), and both random intercepts and slopes were added for Participants. We opted for a fine-grained analysis at the word level, as we are also interested in which types of transcription errors the non-native listeners made most frequently. Similar to the taxonomy used in Munro and Derwing (2020), we coded the incorrectly transcribed words for (i) replacements (i.e. one word is substituted for another word, such as *Ireland* for *violent*, or *industries* for *businesses*), (ii) content word omission (i.e. absence of nouns, adjectives, adverbs and non-auxiliary verbs in the transcriptions), (iii) function word omission (i.e. absence of prepositions, pronouns, particles, determiners and auxiliary verbs in the transcriptions), (iv) word form (e.g., plural noun form instead of singular form).

Finally, we tested to what extent EFL learners' comprehensibility ratings can account for their transcription accuracy (cf. RQ3). We hypothesize that if comprehensibility scores are strongly skewed towards the highly comprehensible end of the scale, the intelligibility scores will be high too. To verify this, we built a linear-mixed effects regression model, with the proportion of correctly transcribed words per speaker as the outcome variable. Comprehensibility ratings (score from 1 to 9) and Accent (8 accents), including their interaction, were entered as the fixed effects, with the reference level for the intercept set to the comprehensibility ratings for General British English. Variability between Participants was accounted for through the addition of by-subject random intercepts and slopes.

Statistical analyses and visualizations were performed in R (R Core Team, 2022; Version 4.2.0) with *RStudio* and are available at <https://doi.org/10.18710/8F0Q0L> (Verbeke and Simon, 2023). The following R packages were used: *afex* (Singmann et al., 2022), *car* (Fox and Weisberg, 2019), *dplyr* (Wickham et al., 2021), *effects* (Fox, 2003; Fox and Weisberg, 2018, 2019), *ggeffects* (Lüdtke, 2018a), *ggplot2* (Wickham, 2016), *lattice* (Sarkar, 2008), *lme4* (Bates et al., 2015), *Matrix* (Bates and Maechler, 2021), *optimx* (Nash and Varadhan, 2011; Nash, 2014), *sjmisc* (Lüdtke, 2018b).

5. RESULTS

5.1. Comprehensibility and accentedness

Fig. 1 summarizes the comprehensibility and accentedness ratings for each of the eight speakers of English. The violin plots present the distribution of ratings on a nine-point scale (y-axis), with the width of the curves corresponding to the frequency of data points (x-axis). Low ratings for comprehensibility and accentedness indicate that the speaker was perceived as easy to understand and as having no or a weak accent; high ratings for both constructs indicate that the speaker was perceived as more difficult to understand and as having a strong accent. On average, all speakers were perceived as highly comprehensible (i.e. easy to understand) ($M = 2.7$, $SD = 1.6$), while most speakers were rated as having a noticeable accent in English ($M = 5.5$, $SD = 2.3$). These results suggest that all speakers with native and non-native accents were comprehensible to the non-native listeners regardless of their accent. With regard to the Inner Circle accents, participants perceived the General British English speaker as slightly less comprehensible (i.e. more difficult to understand) ($M_{GBE} = 2.0$, $SD = 0.9$; $M_{GAE} = 1.1$, $SD = 0.3$) and more strongly accented ($M_{GBE} = 4.2$, $SD = 2.1$; $M_{GAE} = 2.2$, $SD = 1.6$) than the General American English speaker. The General American English speaker was also more consistently rated as easy to understand (score range 1–2), while the comprehensibility ratings for the General British English speaker varied considerably across listeners (score range 1–7). Moreover, almost half of the participants indicated that the speaker of General American English had no accent ($n = 14$, 42.4%), whereas only three participants did so for the General British English speaker (9.1%).

Relative to the acrolectal Inner Circle accents, the speakers with a regional Inner Circle accent (Newcastle and Texan English) were rated as less comprehensible ($M_{Acrolectal} = 1.6$, $SD = 0.6$; $M_{Regional} = 3.7$, $SD = 1.7$), and noticeably more strongly accented ($M_{Acrolectal} = 3.2$, $SD = 1.8$; $M_{Regional} = 6.7$, $SD = 1.5$). The Newcastle and Texan speaker were perceived as equally comprehensible ($M_{NewEng} = 2.2$, $SD = 1.3$; $M_{TexEng} = 2.4$, $SD = 1.5$), but the Texan speaker was rated higher for accentedness ($M_{NewEng} = 5.1$, $SD = 2.1$; $M_{TexEng} = 6.3$, $SD = 1.8$). The speakers with non-Inner Circle accents were rated as less comprehensible ($M_{Inner} = 2.0$, $SD = 1.2$; $M_{Non-Inner} = 3.5$, $SD = 1.5$) and more heavily accented ($M_{Inner} = 4.5$, $SD = 2.4$; $M_{Non-Inner} = 6.7$, $SD = 1.5$) than the speakers with Inner Circle accents. The speakers with an Outer Circle accent were slightly less comprehensible than the speakers with an Expanding Circle accent (i.e. Indian and Nigerian English speakers were harder to understand than the Spanish and Chinese speakers) ($M_{Outer} = 3.8$, $SD = 1.6$; $M_{Expanding} = 3.3$, $SD = 1.3$), and they were also rated higher for accentedness ($M_{Outer} = 6.9$, $SD = 1.5$; $M_{Expanding} = 6.5$, $SD = 1.6$). Similar to the ratings for the acrolectal Inner Circle speakers, there were also considerable differences between participants in terms of the comprehensibility and accentedness ratings for the regional Inner Circle and non-Inner Circle speakers in our study. For instance, for some accents, such as Newcastle English, the entire scale for accentedness is used (score range 1–9), revealing interspeaker differences (see violin plots in Fig. 1).

To assess whether listeners' familiarity with the different accents affected their Comprehensibility and Accentedness ratings, participants were asked how often they hear the sampled accents of English. As shown in Table 3, there is a

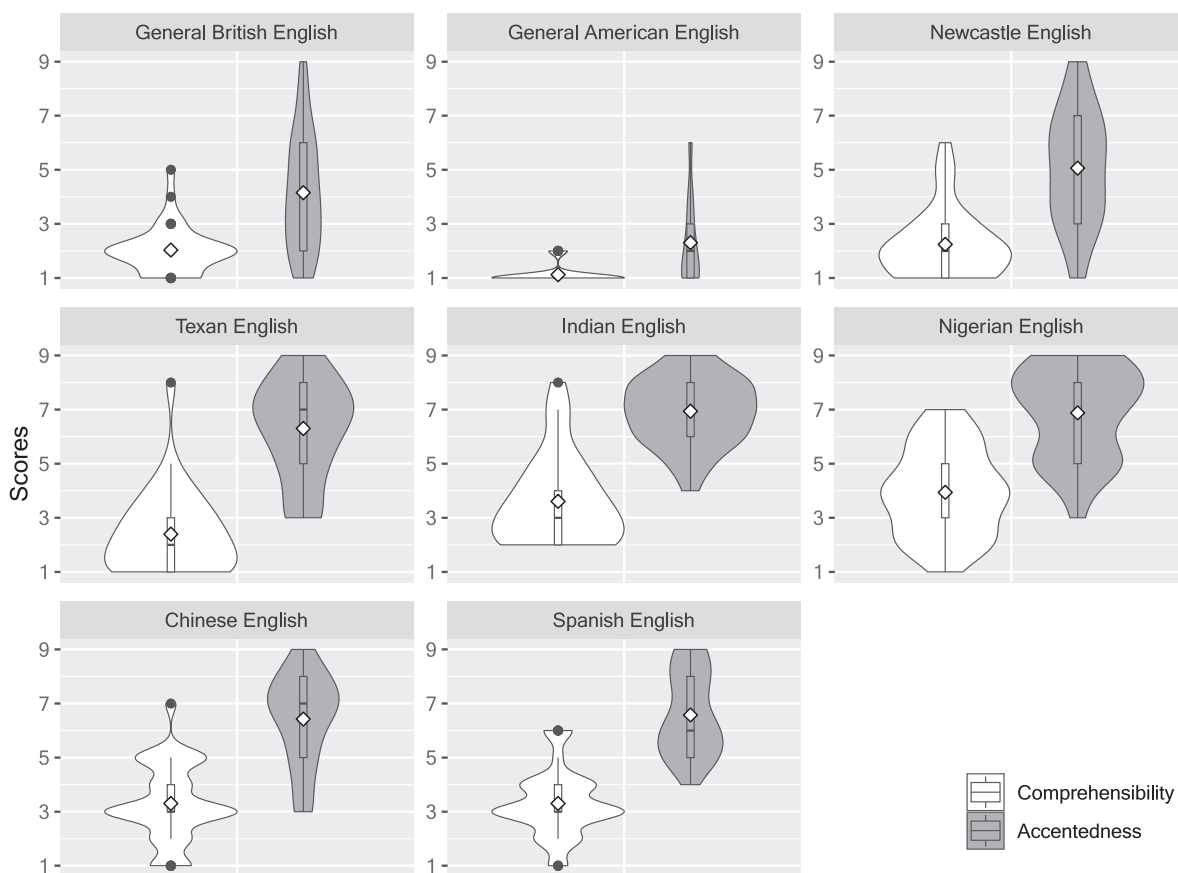


Fig. 1. Comprehensibility (low scores = easy to understand) and Accentedness (low scores = no accent) judgement scores (violins) and mean judgement scores (diamonds) by Accent.

Table 3
Participants' self-reported familiarity with the different accents of English.

Accent	Frequency of Exposure				
	Never	Rarely	Sometimes	Often	Very Often
General British English	2 (0.06)	1 (0.03)	6 (0.18)	13 (0.39)	11 (0.33)
General American English	-	-	2 (0.06)	7 (0.21)	24 (0.73)
Newcastle English	1 (0.03)	9 (0.27)	16 (0.48)	4 (0.12)	3 (0.09)
Texan English	2 (0.06)	10 (0.30)	16 (0.48)	4 (0.12)	1 (0.03)
Indian English	6 (0.18)	20 (0.61)	6 (0.18)	1 (0.03)	-
Nigerian English	21 (0.64)	10 (0.30)	2 (0.06)	-	-
Chinese English	20 (0.61)	9 (0.27)	3 (0.09)	1 (0.03)	-
Spanish English	13 (0.39)	13 (0.39)	5 (0.15)	2 (0.06)	-

clear contrast between participants' familiarity with Inner and non-Inner Circle accents, in that listeners are noticeably less familiar with the latter (Outer and Expanding Circle accents). Moreover, frequency of exposure differs within the Inner Circle: all 33 participants indicated to hear General American English sometimes, often or very often, whereas all but three reported to be at least sometimes exposed to General British English. A total of 21 participants (63.6%)

and 23 participants (69.7%) indicated hearing Newcastle and Texan English at least sometimes, respectively. The majority of the participants was unfamiliar with the Outer and Expanding Circle accents, but there was no clear difference in frequency of exposure between these types of non-Inner Circle accents. Of all accents, participants reported being most familiar with General American English and least familiar with Nigerian English.

Listeners' self-reported ease of understanding these different speakers was assessed using a mixed-effects linear regression model. A likelihood-ratio test showed an interaction effect between Accentedness and Accent ($\chi^2(7) = 15.30$, $p = 0.032$). The addition of listeners' Familiarity with the native and non-native accents of English in our study did not significantly improve model fit ($\chi^2(1) = 0.68$, $p = 0.41$) and was therefore not included in the model. Overall, there was a significant positive relationship between accentedness and comprehensibility ($b_{\text{Intercept}} = 1.06$, $SE = 0.33$, $t(219) = 3.23$, $p = 0.001$; $b_{\text{Accentedness}} = 0.25$, $SE = 0.08$, $t(247) = 3.25$, $p = 0.001$). That is, when speakers received a higher score on the accentedness scale, they also received a higher score on the comprehensibility scale, meaning that they were perceived as more difficult to understand. However, the strength of the relation between comprehensibility and accentedness varied across speakers, as is visualized in Fig. 2 (see also Table 6 in Appendix C). For example, the accentedness ratings for the General American English speaker were only weakly associated with the comprehensibility ratings, as this speaker was highly comprehensible to all listeners, regardless of their ratings for accentedness. The perceived strength of the Nigerian speaker's accent, by contrast, had a significantly stronger effect on the comprehensibility ratings: the higher the speaker was rated for accentedness, the higher the speaker was rated for comprehensibility (i.e. higher difficulty of understanding the speaker) ($b_{\text{Accentedness} \times \text{NigEng}} = 0.24$, $SE = 0.12$, $t(224) = 2.05$, $p = 0.04$).

5.2. Intelligibility

Participants' transcription accuracy is presented in Table 4, which reports the number and proportion of correctly transcribed content and function words in the utterances of each speaker of English. Generalized over Accent and Word Type, the speakers were highly intelligible to the EFL learners, in that about 86% ($n = 9286$) of all words were correctly transcribed. Transcription accuracy was higher for function words ($n = 4856$, 88.6%) compared to content words ($n = 4430$, 83.9%). Accuracy ranged between 79% and 95% and was only rarely at ceiling for individual listeners, even for the Inner Circle speakers: 8 participants reached ceiling performance for the General American speaker of English (24.2%), 4 participants for the Texan English speaker (12.0%), and 1 participant for the Newcastle and Spanish speaker each (3.0%). The intelligibility scores for General British English (84.2%) were noticeably lower than those for General American (95.2%) and Texan English (93.0%), and marginally lower than the scores for Chinese (86.0%) and Spanish

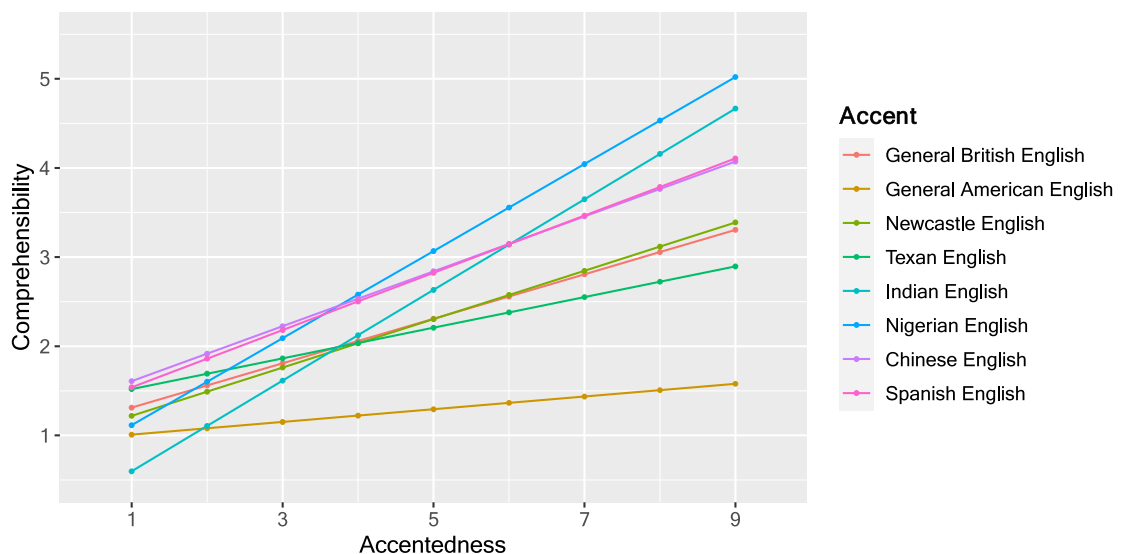


Fig. 2. Effect display for the interaction of Accent and Accentedness ratings (low scores = no accent) in the linear mixed model fit to Comprehensibility ratings (low scores = easy to understand).

Table 4

Number and proportion of correctly transcribed Content, Function and Total words by Accent.

Accent	Content		Function		Total	
	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect
General British English	595 (0.78)	164 (0.22)	767 (0.89)	91 (0.11)	1362 (0.84)	255 (0.16)
General American English	560 (0.94)	34 (0.06)	759 (0.96)	33 (0.04)	1319 (0.95)	67 (0.05)
Newcastle English	707 (0.86)	118 (0.14)	674 (0.93)	52 (0.07)	1381 (0.89)	170 (0.11)
Texan English	494 (0.88)	67 (0.12)	641 (0.97)	19 (0.03)	1135 (0.93)	86 (0.07)
Indian English	664 (0.81)	161 (0.20)	439 (0.78)	122 (0.22)	1103 (0.80)	283 (0.20)
Nigerian English	492 (0.78)	135 (0.22)	557 (0.80)	136 (0.20)	1049 (0.79)	271 (0.21)
Chinese English	456 (0.86)	72 (0.14)	395 (0.85)	67 (0.15)	851 (0.86)	139 (0.14)
Spanish English	462 (0.82)	99 (0.18)	624 (0.86)	102 (0.14)	1086 (0.84)	201 (0.16)
<i>Grand Total</i>	4430 (0.84)	850 (0.16)	4856 (0.89)	622 (0.11)	9286 (0.86)	1472 (0.14)

English (84.4%) (i.e. two Expanding Circle accents). Transcription accuracy for Indian English and Nigerian English speakers was 79.6% and 79.5%, respectively, which is lower than for the Inner and Expanding Circle speakers.

The effect of Accent, Word Type and Familiarity on transcription Accuracy at the word level was assessed using a mixed-effects logistic regression. A likelihood-ratio test showed no significant three-way interaction effect between the predictor variables ($\chi^2(18) = 17.56, p = 0.49$). Familiarity was removed from the regression model because it did not significantly improve model fit ($\chi^2(1) = 0.30, p = 0.58$). As plotted in Fig. 3, both Accent and Word type were found to have a significant effect on transcription Accuracy (cf. Table 7 in Appendix C). That is, participants were significantly better at transcribing the words in the utterances produced by the speaker of General American English ($b_{\text{GAE}} = 1.70, SE = 0.64, z = 2.64, p = 0.008$) and the speaker of Texan English ($b_{\text{Intercept}} = 2.34, SE = 0.47, z = 5.04, p < 0.001$; $b_{\text{SAE}} = 1.31, SE = 0.65, z = 2.01, p = 0.04$) compared to the speaker of General British English. Participants' transcription accuracy for Newcastle English, as well as for the Outer and the Expanding Circle accents, was not statistically significantly different. Word type was also found to have an effect on transcription Accuracy, in that Function words were transcribed more accurately than Content words ($b_{\text{WordType}} = 0.62, SE = 0.22, z = 2.75, p = 0.006$).

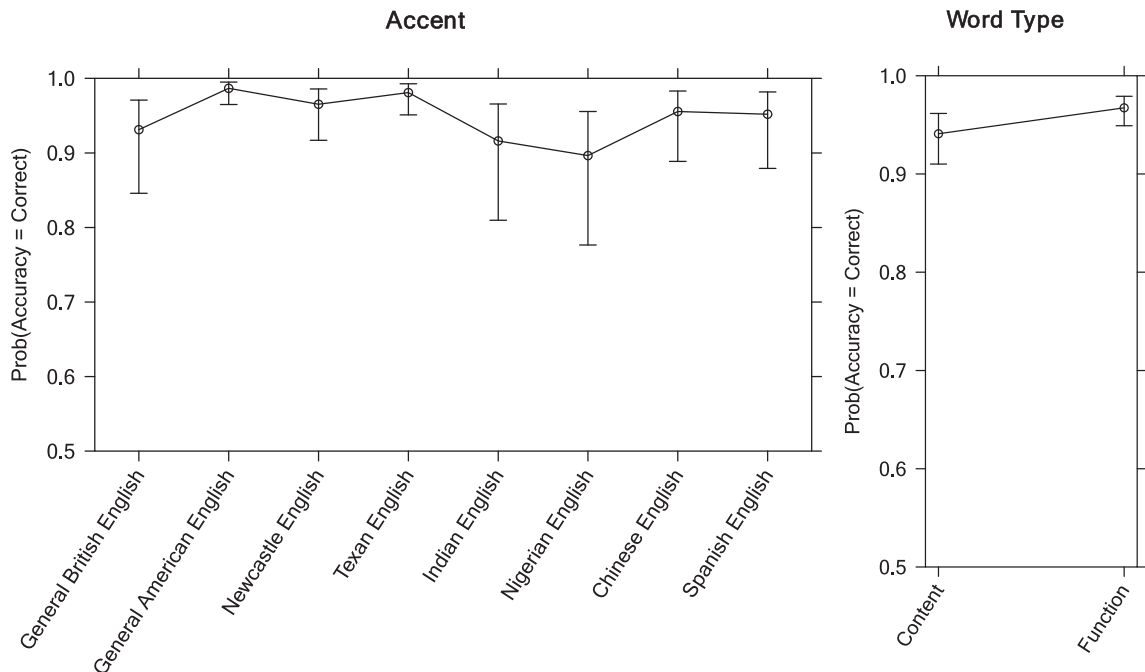


Fig. 3. Effect displays of the significant predictors, with correctly transcribed words modelled as the outcome level.

Table 5
Number and proportion of transcription error types by Accent.

Accent	Replacements		Omission		Word Form	Grand Total
	Content Word	Function Word	Content Word	Function Word		
General British English	88 (0.35)	49 (0.19)	76 (0.30)	29 (0.11)	13 (0.05)	255
General American English	24 (0.36)	15 (0.22)	8 (0.12)	14 (0.21)	6 (0.09)	67
Newcastle English	48 (0.28)	21 (0.12)	65 (0.38)	28 (0.16)	8 (0.05)	170
Texan English	33 (0.39)	7 (0.08)	29 (0.34)	9 (0.10)	8 (0.09)	86
Indian English	55 (0.19)	29 (0.10)	102 (0.36)	88 (0.31)	9 (0.03)	283
Nigerian English	63 (0.23)	60 (0.22)	62 (0.23)	76 (0.28)	10 (0.04)	271
Chinese English	41 (0.29)	23 (0.17)	30 (0.22)	20 (0.14)	25 (0.18)	139
Spanish English	28 (0.14)	45 (0.22)	67 (0.33)	55 (0.27)	6 (0.03)	201
Grand Total	380 (0.26)	249 (0.17)	439 (0.30)	319 (0.22)	85 (0.06)	1472

We also mapped which types of transcription errors occurred most frequently. Table 5 shows that half of the words that were coded as incorrect were not transcribed (i.e. omission, $n = 758$, 51.5%), and that over 40% of the words were replaced by another word ($n = 629$, 42.7%). The remaining transcription errors were incorrect word forms ($n = 85$, 5.8%). In what follows, we will briefly exemplify these error types. For instance, a typical feature of Texan English is that /ɛ/ is often realized as a diphthong with a schwa off-glide (Carr, 2020). The Texan English speaker in our study produced such a diphthong in words like *blessed* ([bleɪst]), but the speaker also produced the vowel in this specific example noticeably more open than in General American English.⁶ This could explain why 10 participants transcribed *blessed* as either *blast* ($n = 3$, 9%) or *blasted* ($n = 7$, 21%). Mandarin Chinese speakers of English, then, often use [v] and [w] interchangeably (Wiener and Shih, 2013), which was also the case for the Chinese speaker in the current study. As that speaker pronounced *involved* in the verb phrase *get involved* ('never get involved in the casino gambling') as [ɪn'vɔ:..və], none of the participants correctly transcribed this participle. Rather, they mostly transcribed the verb phrase as *getting over* ($n = 12$, 36%) or did not provide any transcription ($n = 13$, 39%). Content words were also more frequently replaced by another word, or even omitted from the transcription, than Function words. Interestingly, Content words were replaced more often in listeners' transcriptions of Inner Circle speakers than in those of Outer and Expanding Circle speakers. To give an example: only one participant correctly transcribed the entire noun phrase *profoundly serious subject* in the speech of the General British English speaker. Some participants replaced the first two nouns by *profound disserious* ($n = 1$, 3%) or *profound in/of this (sub)area* ($n = 8$, 24.2%), while others did not provide any transcription at all, suggesting that listeners encountered segmentation difficulties (i.e. finding the boundaries between two words in the auditory input).

5.3. Comprehensibility and intelligibility

Finally, we examined to what extent listeners' self-reported ease of understanding speakers with different English accents matched their actual understanding of these speakers. Fig. 4 shows the relative rankings of the eight speakers for comprehensibility and intelligibility, grouped by the three Circles in Kachru's (1985) framework. As hypothesized, the speakers who were evaluated as the most comprehensible, and thus easiest to understand, were also ranked high for intelligibility. That is, the speakers with Inner Circle accents were generally ranked higher for both comprehensibility and intelligibility than the speakers with Expanding and Outer Circle accents, although the differences in scores are sometimes subtle. Despite the high stability in the relative rankings of the accents across the two tasks, the results for General British English deviated from the overall pattern. The speaker with this acrolectal accent was viewed as the second most comprehensible speaker, but only ranked sixth for intelligibility, given that listeners' transcriptions for the other Inner Circle and Expanding Circle speakers were more accurate. It should be mentioned that the relative positioning of Newcastle English and Texan English was reversed for comprehensibility and intelligibility. Nevertheless, the ranking of the acrolectal and regional Inner Circle accents – except for General British English – and the Expanding and Outer Circle accents remained constant.

In addition to the relative rankings of the speakers for comprehensibility ratings and intelligibility scores, we assessed to what extent listeners' self-reported ease of understanding was a predictor of transcription accuracy. We expected that

⁶ F1 frequency of the vowel in *blessed* was 625 HZ, whereas F1 frequencies for /ɛ/ and /æ/ in General American English are on average 550 Hz and 690 Hz, respectively (see Ladefoged and Johnson, 2011: 193).

#	COMPREHENSIBILITY		INTELLIGIBILITY	
1	General American English	1.12	General American English	95.2%
2	General British English	2.03	Texan English	93.0%
3	Newcastle English	2.24	Newcastle English	89.0%
4	Texan English	2.39	Chinese English	86.0%
5	Chinese English	3.30	Spanish English	84.4%
6	Spanish English	3.30	General British English	84.2%
7	Indian English	3.61	Indian English	79.6%
8	Nigerian English	3.94	Nigerian English	79.5%

Fig. 4. Rankings of the Accents for Comprehensibility and Intelligibility. Accents are grouped in terms of the three Circles in [Kachru's \(1985\)](#) model: Inner Circle (dark grey), Outer Circle (light grey) and Expanding Circle (white).

comprehensibility and intelligibility would be linearly correlated, in that speakers who are reported to be easier to understand would be transcribed more accurately. An inspection of the scatterplots in [Fig. 5](#) suggests that the correlation between comprehensibility and intelligibility is very weak, if not absent, and that there are clear individual differences in test performance. This Figure also shows that the datapoints for the General American English speaker are clustered in the highly comprehensible and highly intelligible quadrant of the plot, with 24% of the participants reaching ceiling scores ($n = 8$). Specifically, all participants gave this speaker a rating of 1 or 2 on the comprehensibility scale and correctly transcribed at least 80% of the words produced by this speaker.

A mixed-effects linear regression model was built to estimate the effect of Comprehensibility (score from 1 to 9) and Accent (8 accents) on Intelligibility. A likelihood-ratio test revealed an interaction effect between the two predictor variables ($\chi^2(7) = 14.89$, $p = 0.037$), which suggests that the exact relation between listeners' Comprehensibility ratings and Intelligibility scores differs depending on the native or non-native accent of the speaker. For each Accent, however, the estimated slope was close to zero (see [Table 8](#) in Appendix C). That is, when the listeners perceived a speaker as easy to understand (i.e. low comprehensibility score), their actual understanding of that speaker was not necessarily higher than when the speaker was perceived as more difficult to understand (i.e. high comprehensibility score). Based on the scatterplots in [Fig. 5](#) and the results of the regression analysis, we are led to conclude that there is no linear trend between the comprehensibility ratings and the proportion of correctly transcribed words.

6. DISCUSSION

The aim of this study was to investigate how proficient English as a Foreign Language (EFL) learners deal with accent variation in spoken English. Specifically, we wanted to get a deeper insight into how comprehensible, accented and intelligible speakers with native and non-native English accents are to Dutch-speaking EFL learners. To that end, thirty-three Belgian Dutch learners of English completed a comprehensibility and accentedness judgement task, followed by an orthographic transcription task, during which they were exposed to eight speakers with acrolectal and regional Inner Circle accents, Outer Circle and Expanding Circle accents.

The first task assessed how comprehensible the speakers were to the EFL learners, and to what extent the perceived strength of a speaker's accent and listeners' familiarity with the accents influenced their comprehensibility judgements. We hypothesized that listeners' self-reported comprehensibility would vary in ratings with the three Circles in [Kachru's \(1985\)](#) model. That is, we expected that the Inner Circle speakers would be easier to understand than the Outer and Expanding Circle speakers, with the speakers with an acrolectal Inner Circle accent being perceived as the most comprehensible and speakers with an Outer Circle accent as the least comprehensible. The results indeed confirmed that the Inner Circle speakers, especially the speakers of General American and General British English, were considered to be easier to understand than the non-Inner Circle speakers. Compared to the Inner and Expanding

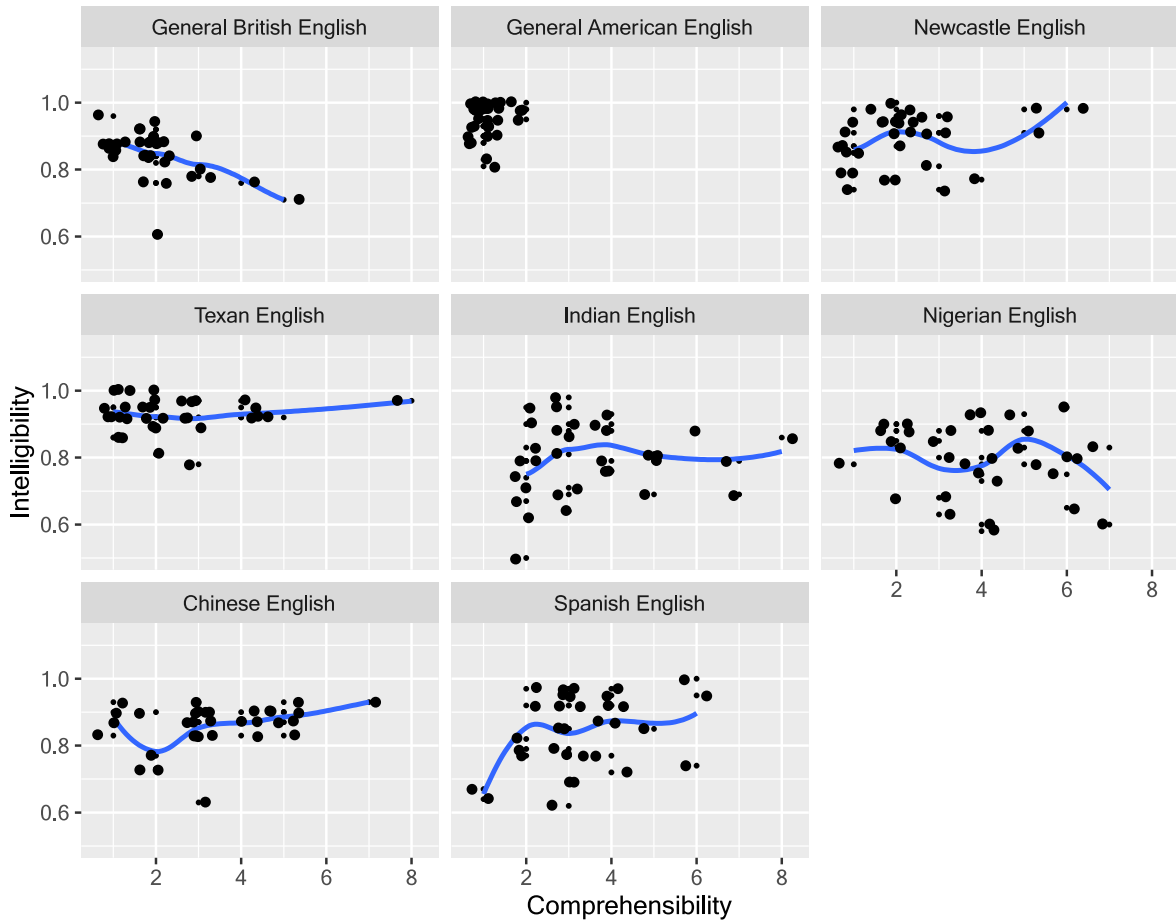


Fig. 5. Scatterplots of the correlation between listeners' Comprehensibility ratings (low scores = easy to understand) and the proportion of correctly transcribed words in the orthographic transcription task per Accent.

Circle speakers, the Outer Circle speakers were slightly less comprehensible, i.e. the Indian and Nigerian speakers were reported to be the hardest to understand. Accordingly, listeners rated the non-Inner Circle speakers as having a stronger accent than the Inner Circle speakers. Speakers with an Outer Circle accent were reported to have the strongest accent. Thus, listeners' accentedness ratings were correlated with their comprehensibility ratings, in that speakers with a strong accent were often also perceived as less comprehensible. Note that all speakers, even the Indian and Nigerian speakers, were still comprehensible at least to a certain extent and that the strength of the relation between comprehensibility and accentedness varied across speakers.

This alignment of the Circles for comprehensibility and accentedness supports previous studies, which have observed that listeners who are frequently exposed to, and are hence highly familiar with, a particular accent tend to be more lenient in their ratings of that accent (e.g., Bent and Bradlow, 2003; Foote and Trofimovich, 2018; Winke et al., 2012). More than 90% of the participants reported hearing General British English at least sometimes, whereas all participants indicated being exposed to General American English sometimes or more often. This should not come as a surprise, given the centrality of these acrolectal accents in educational contexts internationally and the likelihood of out-of-class exposure to these accents through the media (e.g., Abeywickrama, 2013; Sayer and Ban, 2019). Due to their high degree of familiarity with these accents, listeners may have evaluated the speakers of General British English and General American English to be more comprehensible and to have a weaker accent than the other speakers in our study. It bears mentioning here that listeners also differentiated their ratings for the two acrolectal Inner Circle speakers. That is, the General American English speaker was evaluated as the most comprehensible and the least accented

speaker in our sample. Given our definition of accentedness, this suggests that listeners' expectation of what a speaker of English sounds like in terms of accent is primarily a General American English speaker.

By comparison, listeners indicated to be less familiar with the L1 regional accents: only 70% and 64% of the participants reported hearing Newcastle and Texan English sometimes or more frequently. As such, these accents may have been further removed from listeners' expectations, leading them to rate the Newcastle and Texan speaker of English considerably higher for accent, yet still perceiving both speakers as highly comprehensible. This finding underpins [Munro and Derwing's \(1995\)](#) claim that strong speaker accents do not preclude speech to be perceived as comprehensible. Note that the effect of listeners' familiarity with the different speaker accents on their comprehensibility and accentedness judgements needs to be interpreted with caution, since it was not a significant predictor of the comprehensibility ratings. Frequency of exposure cannot, for instance, explain the difference in comprehensibility and accentedness judgements for the Outer and Expanding Circle speakers. Since only very few participants reported being familiar with the Outer and Expanding Circle accents, the effect of familiarity on listeners' comprehensibility ratings could not be reliably estimated.

The degree to which listeners actually understood the different speakers of English was assessed in the transcription task (cf. RQ2). Our hypothesis was that the EFL learners would perform significantly better on the task when transcribing the speech of the Inner Circle speakers compared to the speech of the Outer and Expanding Circle speakers. The results generally confirmed this hypothesis and showed that listeners' sentence transcriptions were overall accurate, although ceiling performances were hardly ever reached. However, the proportion of correctly transcribed words was significantly lower for General British English than for the remaining Inner Circle and the Expanding Circle accents. Participants' transcription accuracy of the content words was even marginally lower for General British English than for Indian and Nigerian English, the latter of which was the least intelligible accent to the listeners in our sample. This finding is at odds with prior studies which have established an intelligibility benefit for the Inner Circle accents (e.g., [Chung and Bong, 2019](#); [Jeong et al., 2021](#); [Kang and Moran, 2018](#)), but corroborates earlier research which suggest that Inner Circle accents, and in particular General British English, are not always more comprehensible or more intelligible than Outer or Expanding Circle accents (e.g., [Hansen Edwards et al., 2018](#); [Nejjari et al., 2020](#); [Orikasa, 2016](#)). It should be emphasized that each accent was represented by only one speaker. While the speech samples were controlled along various dimensions and an accent verification test confirmed that the excerpts contained sufficient features to correctly recognize the accent of the speaker (see analysis of transcription errors in [Section 5.2](#) for examples), we cannot rule out that speaker idiosyncrasies in segmental or suprasegmental aspects of their speech may have affected intelligibility (see [Crowther et al., 2016](#); [Kang, 2010](#)).

Expanding Circle speakers were not only perceived as more comprehensible than Outer Circle speakers, but the results of the transcription task showed that the Spanish and Chinese speakers were also more intelligible than the Indian and Nigerian speakers. One explanation for this trend might be related to the status and role of English in Outer and Expanding Circle countries. In the Outer Circle, English has often been nativized in grammar (i.e. phonology, morphosyntax and semantics), and is used as a second language in multilingual communicative settings. In the Expanding Circle, conversely, English has foreign language status and is traditionally only used as an international medium of communication (cf. [Section 2](#)). [Bradlow \(2022\)](#) demonstrated that non-native accented speech is characterized by considerably fewer instances of phonetic reduction, such as segment deletion and vowel reduction, than speech produced by native speakers. It may thus well be that some words in the speech of the Outer Circle speakers were phonetically reduced, whereas phonetic reduction phenomena were substantially less frequent, or even absent, in the speech of the Expanding Circle speakers. As such, segmenting the continuous stream of speech into words might have been more challenging for the EFL learners when listening to the Indian and Nigerian speakers of English, with whose accent they are, in any case, less familiar. Note that the speech samples in the current study were controlled for speaking rate and lexical frequency of the content words, but not for phonetic reduction processes.

The final aim of this study was to examine the relation between learners' self-reported ease of understanding and performance-based understanding of different accents of English (cf. RQ3). We hypothesized that, when listeners perceive a speaker as highly comprehensible (i.e. easy to understand), that speaker would also be highly intelligible to the listeners (i.e. a high proportion of correctly transcribed words). Regarding listeners' comprehensibility judgements, the Inner Circle speakers were reported to be easier to understand than both the Outer and Expanding Circle speakers, with the Expanding Circle speakers being rated slightly more comprehensible than the Outer Circle speakers. Although no statistically significant correlation could be detected between comprehensibility and intelligibility measures in the present study, the ranking of the speakers for comprehensibility almost perfectly matched the ranking for intelligibility, with the exception that the General British English speaker was less intelligible than the other Inner Circle and the Expanding Circle speakers of English. The mismatch between the comprehensibility and intelligibility of the General British English speaker leads us to suggest that the listeners may have overestimated the degree to which they actually understood the speaker. The absence of an intelligibility benefit for the General British English speaker might be related to a potential

shift in the target model for English language teaching and the frequency of exposure to the acrolectal Inner Circle accents in our study. Traditionally, General British English has been the target model for speaking, listening and writing in foreign language classrooms in Flanders (cf. attainment targets: [VVKSO, 2014](#): 5). However, due to the central role of General American English in the entertainment industry and on social media, and thus in the everyday lives of many EFL learners, there is an increasing tolerance for General American English in language education so as to bridge the gap between in-class and out-of-class learning experiences. The observed discrepancy in transcription accuracy for the acrolectal Inner Circle speakers may, at least to some extent, also be explained by listeners' self-reported higher frequency of exposure to General American English (see [Section 2](#) on accent familiarity and intelligibility). Although these factors could explain why listeners understood the General American English speaker better than the General British English speaker, they cannot account for the difference in intelligibility scores between the General British English speaker and the regional Inner and Expanding Circle speakers.

While the present study investigated the extent to which different accents of English are comprehensible and intelligible to advanced EFL learners in Flanders, future research could dig deeper into the causes of differences between accents. Specifically, with respect to intelligibility, future studies could further scrutinize language-internal factors (i.e. segmental or suprasegmental properties) which are responsible for the increased or decreased intelligibility of particular accents. We have briefly touched upon the latter when discussing the types of transcription errors produced by listeners. For instance, the degree of phonetic reduction in speech production varies cross-linguistically. Instances of phonetic reduction can thus be more prevalent in some native and non-native accents (e.g., [Bradlow, 2022](#); [van Dommelen, 2018](#)), and listeners who are not familiar with reduced pronunciation variants may experience more difficulties to understand the speaker. Similarly, suprasegmental properties, such as pitch range, have also been shown to affect intelligibility. For instance, [McCloy et al. \(2015\)](#) found that speakers with overall larger pitch ranges are predicted to be more intelligible. However, as there are to the best of our knowledge no studies that have systematically examined and compared the pitch ranges of General British English and General American English, it remains to be examined whether any potential differences in terms of pitch range could explain differences in intelligibility. Further research examining an array of phonetic properties of conversational speech is clearly needed to better understand the causes of intelligibility breakdowns.

7. CONCLUSION

In the current study we set out to map the multidialectal listening skills of English as a Foreign Language (EFL) learners enrolled at a Flemish higher education institute. Specifically, we have determined the comprehensibility and intelligibility of various accents of English to non-native listeners, and the extent to which their self-reported ease of understanding and their actual understanding of native and non-native accented English are aligned. Through this study, we hope to have pushed the field of comprehensibility and intelligibility research a step further and we suggest a number of areas for future research.

First, the results have revealed that there are indeed differences between speakers with native and non-native accents of English in terms of their perceived accentedness and comprehensibility to a group of EFL learners. The results of the comprehensibility and accentedness judgement task showed that Inner Circle speakers with both acrolectal and regional accents were reported to be easier to understand than Outer and Expanding Circle speakers, with Expanding Circle speakers being slightly easier to understand than Outer Circle speakers. The strength of a speaker's accent significantly affected listeners' comprehensibility ratings, in that speakers with a strong accent were perceived as less comprehensible, although the strength of the relation between comprehensibility and accentedness varied across speakers. Despite the observation that listeners reported to be more familiar with Inner Circle accents compared to Outer and Expanding Circle accents, self-reported familiarity with the native and non-native accents was not a significant predictor of comprehensibility. This may be the result of the fairly homogeneous population from which the participants were recruited. Since all participants were university students of English at a Flemish institute, their exposure to and familiarity with the different accents of English were relatively similar. Future studies with more listener groups, differing in familiarity with Inner, Outer and Expanding Circle accents, would further our understanding of the link between familiarity and comprehensibility judgments. In addition, future studies with a selection of accents different from the ones used in the present study could reveal whether the trends we observed for accents representing different Circles are confirmed.

Secondly, the results of the transcription task demonstrated that non-native, but proficient listeners of English are generally good at understanding spoken English, given that the transcriptions for most speakers were accurate. Intelligibility scores ranged between 79% and 95%, with General American English ranked as the most intelligible accent in our study and Nigerian English as the least intelligible accent. The General British English speaker was transcribed significantly less accurately, despite the frequent use of this acrolectal Inner Circle accent in EFL classroom contexts.

Although listeners’ transcriptions were overall accurate, we argue that there is still room for improvement through exposure: the intelligibility scores for the speakers with Outer Circle and Expanding Circle accents were lower than those for the speakers with Inner Circle accents (except for the General British English speaker), which implies that the non-native listeners in our study, and EFL learners in general, can still get better at understanding speakers with non-Inner Circle accents. Moreover, familiarizing learners with diverse English accents could not only help learners to consolidate their multidialectal listening skills, but could also enhance tolerance and open-mindedness towards speakers with native and non-native accents. Further research into the effect of different types of listening training on learners’ listening skills could provide us with practical suggestions for implementing multidialectal listening proficiency in the Foreign Language classroom.

Thirdly, on a methodological level, we hope to have demonstrated the feasibility of using authentic, unscripted data in comprehensibility and intelligibility research. Even when in earlier studies attempts have been made to elicit spontaneous speech in laboratory settings, the speech that is eventually produced remains to some extent scripted. In addition, an observer’s paradox can hardly be avoided, in that speakers are aware that their speech is going to be the object of study. As such, laboratory settings – quite naturally – tend to elicit speech that is closer to the formal end of the formality register scale. We have shown that, if stimuli are carefully selected on the basis of strict criteria and specific speech dimensions (such as frequency, number of syllables, duration), the use of authentic stimuli produced in natural settings (e.g., in talk shows or interviews) is possible. As such, we believe that non-scripted spontaneous speech that was not intended for experimental use could be a promising alternative or addition to the use of elicited laboratory speech. We would therefore advocate the use of more ecologically valid listening materials in comprehensibility and intelligibility research, in line with current trends in linguistic research in general to complement laboratory speech with spontaneous speech produced outside the laboratory.

ETHICS STATEMENT

Ethical clearance was secured from the Ethics Committee of the Faculty of Arts and Humanities, Ghent University (EC/2021/58).

DATA AVAILABILITY STATEMENT

Data and data analysis are shared in *The Tromsø Repository of Language and Linguistics* (TROLLing); <https://doi.org/10.18710/8F0Q0L>, see Verbeke and Simon (2023).

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

APPENDIX A

Materials for the comprehensibility and accentedness judgement task.

Accent	Transcription of the speech samples
General British English	“Yes, yeah. I mean, he had those two talents. I I think perhaps the most extraordinary film he made, the most remarkable film he made was that Oh! What a Lovely War, uh, which was. It was almost surreal, as you remember, I mean it wasn’t a realistic film and not like Gandhi or all the rest of it.”

General American English	"He actually was wonderful about it and they, I think, his people, you know, big star like that. He's got so many people around him. Kind of said: "Oh, you can't get in touch with him, uh, you know, he's off shooting a film in Ireland", or something, and then that afternoon he called in and said, it was, you know, we could use it. It was really nice of him."
Newcastle English	"We wanted it to be like a conversation, so you can hear both of us talking through each story and every chapter is every show that we work on. So one will be about SMTV or one will be about Saturday Night Takeaway and it's all the kind of backstage stories or that stuff that's happened to us throughout the years on those shows."
Texan English	"You feel the pressure, right, because you, you've got fans that are wanting you to keep doing it. And then a lot of times people that are in the industry, they think that everybody else out in the world wants their job, right."
Indian English	"So, there should be a strong start. Then there should be moments of sadness, or there should be a moment of laughter or discomfort. Then there should be, you know. So, like you, you have a three-act structure for a story, you kind of have to now put a three-act structure for a special, so that you keep them as engaged as a film would do, as a story would do."
Nigerian English	"I think what really needs to happen is government has to get out of the way because the way it is right now, government is literally in the way of innovation and access to the internet [...]. For instance, taxing the, because of laying fibre optics is not just about the immediate cost. There's also the cost of paying taxes to governments to lay those fibre optics."
Chinese English	"Then, I, I let the police department help me, government help me. [...] But nothing happen (sic.) and it takes a long time. And I just find out myself. Later on, they found out who is this old gentleman. Then, they find out I have a special background: I'm trained for the special force, navy seal. Uh, I just find out who killed my daughter."
Spanish English	"Honestly, it's a big pleasure, because, uh, we enjoyed a lot of good experiences together, working together with my friend. Now to be able to be here expanding [...] the, the brand here in Australia is something that uh I am super happy, you know, and be part of."

APPENDIX B

Materials for the orthographic transcription task.

Accent	Transcription of the speech samples
General British English	<ol style="list-style-type: none"> 1. the man from the London Zoo was gonna do the presenting 2. share a picture of a kitten playing with a ball of wool 3. and bought out by the tail the biggest rat I've ever seen 4. diving on a coral reef for the first time 5. about this profoundly serious subject
General American English	<ol style="list-style-type: none"> 6. and say in my ear like the most racist thing 7. it was a studio audience like this 8. it sparked a lot of really interesting conversations 9. the cardboard box that had a bunch of clocks in it 10. I mean, she really took it to heart
Newcastle English	<ol style="list-style-type: none"> 11. we've got good kind of backstage stories 12. it's like a black cab with a flipped-down seat 13. it clicked quite quickly once we started working together 14. to be involved in three of the biggest shows on telly 15. the whole clip is still with the lawyers now

Texan English	16. I was blessed it went pretty smooth for me
	17. the entertainment industry would destroy families
	18. stress would be detrimental to my marriage
	19. the message of what a picture of success looks like
	20. so your friendships are going to suffer
Indian English	21. I made a very good pasta the other day
	22. I don't think she had put the contact lens properly
	23. paparazzi outside his house waiting with cameras
	24. the largest ever tour in the history of comedy
Nigerian English	25. your leader's just making irrational decisions
	26. that prevents businesses from getting in that space
	27. but as a collective, the numbers are bad
	28. it's a right to freedom of expression
	29. when I just finished serving one of my friends died
Chinese English	30. our capacity to bring everybody together
	31. my friend is a documentary director
	32. forget all the violent things
	33. never get involved in the casino gambling
	34. he's just a very humble guy
Spanish English	35. you cannot spill the water
	36. a chance to compete at the highest level
	37. to maintain our private lives away from all this
	38. relationships are more important than any game
	39. I am devastated for all this information
	40. to promote the company is a big satisfaction

APPENDIX C

Output of the regression models.
(See [Table 6](#), [Table 7](#), [Table 8](#)).

Table 6
Comprehensibility and Accentedness model output (cf. RQ1).

<i>Predictors</i>	Comprehensibility and Accentedness model			
	<i>Estimates</i>	<i>SE</i>	<i>CI</i>	<i>p</i>
(Intercept)	1.062	0.328	0.418 – 1.706	0.001
Accentedness	0.249	0.077	0.099 – 0.400	0.001
AccentGAE	−0.125	0.418	−0.944 – 0.694	0.765
AccentNBE	−0.114	0.504	−1.102 – 0.874	0.821
AccentSAE	0.286	0.647	−0.983 – 1.555	0.659
AccentIndEng	−0.973	0.966	−2.867 – 0.921	0.315
AccentNigEng	−0.436	0.735	−1.876 – 1.003	0.553
AccentChinEng	0.239	0.692	−1.117 – 1.594	0.730
AccentSpanEng	0.157	0.782	−1.375 – 1.689	0.841
Accentedness:AccentGAE	−0.178	0.118	−0.410 – 0.054	0.134
Accentedness:AccentNBE	0.022	0.100	−0.174 – 0.218	0.826
Accentedness:AccentSAE	−0.077	0.111	−0.295 – 0.140	0.487
Accentedness:AccentIndEng	0.259	0.147	−0.029 – 0.548	0.080
Accentedness:AccentNigEng	0.239	0.117	0.010 – 0.468	0.042
Accentedness:AccentChinEng	0.059	0.116	−0.169 – 0.286	0.614
Accentedness:AccentSpanEng	0.072	0.127	−0.176 – 0.320	0.572

Table 7
Intelligibility model output (cf. RQ2).

Predictors	Intelligibility model			
	Estimates	SE	CI	p
(Intercept)	2.345	0.466	1.433 – 3.257	< 0.001
AccentGAE	1.696	0.643	0.435 – 2.957	0.008
AccentNBE	0.668	0.624	–0.555 – 1.890	0.284
AccentSAE	1.313	0.653	0.033 – 2.593	0.044
AccentIndEng	–0.306	0.630	–1.540 – 0.929	0.627
AccentNigEng	–0.546	0.632	–1.784 – 0.692	0.387
AccentChinEng	0.370	0.669	–0.941 – 1.680	0.580
AccentSpanEng	0.299	0.649	–0.973 – 1.572	0.645
Word_Type_Function	0.616	0.224	0.176 – 1.055	0.006

Table 8
Intelligibility and Comprehensibility model output (cf. RQ3).

Predictors	Intelligibility and Comprehensibility model			
	Estimates	SE	CI	p
(Intercept)	0.894	0.032	0.831 – 0.956	< 0.001
Comprehensibility	–0.023	0.015	–0.052 – 0.005	0.113
AccentGAE	0.058	0.053	–0.047 – 0.162	0.280
AccentNBE	–0.019	0.039	–0.096 – 0.057	0.620
AccentSAE	0.045	0.038	–0.030 – 0.120	0.244
AccentIndEng	–0.117	0.044	–0.202 – –0.031	0.008
AccentNigEng	–0.050	0.045	–0.139 – 0.039	0.270
AccentChinEng	–0.049	0.044	–0.135 – 0.037	0.268
AccentSpanEng	–0.145	0.047	–0.237 – –0.052	0.002
Comprehensibility:AccentGAE	0.023	0.040	–0.055 – 0.101	0.558
Comprehensibility:AccentNBE	0.030	0.017	–0.004 – 0.063	0.081
Comprehensibility:AccentSAE	0.019	0.016	–0.014 – 0.050	0.261
Comprehensibility:AccentIndEng	0.028	0.016	–0.004 – 0.060	0.090
Comprehensibility:AccentNigEng	0.011	0.016	–0.021 – 0.043	0.492
Comprehensibility:AccentChinEng	0.027	0.017	–0.006 – 0.060	0.112
Comprehensibility:AccentSpanEng	0.052	0.018	0.017 – 0.086	0.004

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