

Accentedness and Comprehensibility in Non-native Listeners' Perception of L2 Speech



Joan C. Mora

Abstract This study examined, from an individual differences perspective, the relationship between accentedness and comprehensibility in non-native English for non-native listeners. Forty non-native learners of English differing in L1 (20 L1-Catalan; 20 L1-German) and L2 proficiency level (10 low, 10 high within each L1 group) and 10 native English speakers performed two 60-trial rating tasks based on two 7-point Likert scales, one for accentedness and one for comprehensibility. The sentence stimuli were 10 different true/false English sentences spoken by four non-native English learners at an intermediate proficiency level (two L1-Catalan and two L1-German) and two native English speakers, so that each listener rated the same sentences six times, two in each accent (Catalan-accented, German-accented and native English). Non-native listeners perceived sentences spoken by L1-matched speakers as more weakly accented and comprehensible than those spoken by L1-unmatched speakers, irrespective of L2 proficiency level. However, all sentences were judged to be less comprehensible by low- than high-proficiency listeners, and high- but not low-proficiency listeners found Catalan- and German-accented sentences as comprehensible as native listeners did. Analyses of individual listener data revealed that inter-listener variation in how strongly accentedness was related to comprehensibility was dependent on non-native listeners' L1 background and L2 proficiency level.

Keywords Accentedness · Comprehensibility · Non-native speech · Non-native listeners · L2 proficiency

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V. G. Sardegna and A. Jarosz (eds.), *Theoretical and Practical Developments in English Speech Assessment, Research, and Training*, Second Language Learning and Teaching, https://doi.org/10.1007/978-3-030-98218-8_7

1 Introduction

Non-native spoken communication in English most often takes place between speakers of different L1 backgrounds and English proficiency levels (Pennycook, 2017). Fluent communication between non-native interlocutors largely depends on their ability to understand others and make themselves understood despite the presence of unfamiliar accents that may be detrimental to intelligibility (Bent & Bradlow, 2003) and differing levels of L2 competence that may pose a threat to comprehensibility. In line with this reality, and supported by decades of research on accentedness, intelligibility, and comprehensibility (e.g., Munro & Derwing, 1995a; Saito et al., 2016a), new developments in L2 pronunciation teaching and learning have witnessed a shift of focus from nativelikeness and accentedness to speech comprehensibility (Derwing & Munro, 2015; Isaacs, 2018; Levis, 2005). However, most research investigating the linguistic correlates of comprehensibility (Isaacs & Trofimovich, 2012; Saito et al., 2016a, 2016b), as well as much of the research investigating the relationship between foreign accent, comprehensibility, and perceived fluency (Derwing & Munro, 1997; Munro & Derwing, 1995a; Pinget et al., 2014) has primarily relied on native speakers' perceptual judgements of non-native speech, rather than on non-native speakers' perceptual judgements. The current study takes an individual differences approach in examining the relationship between accentedness and comprehensibility in non-native English from the perspective of non-native listeners by exploring the extent to which this relationship is modulated by L2 listener characteristics (L1 background and proficiency level).

2 Literature Review

2.1 *Factors Modulating Perceptual Judgements of Non-Native Speech*

Accentedness and comprehensibility are two of the main perceptual dimensions of non-native speech examined in relation to L2 learners' oral production ability. They are related to, and partly independent from, intelligibility—that is, the extent to which a spoken utterance is understood by the listener (Kennedy & Trofimovich, 2008; Munro & Derwing, 1995a)—and fluency, speech smoothness and fluidity (Lennon, 2000; O'Brien, 2014). Accentedness refers to how closely the pronunciation of an utterance matches that of a native speaker (Kennedy & Trofimovich, 2008), whereas comprehensibility refers to listeners' perception of how easy or difficult it is for them to understand L2 speech (Derwing et al., 2008). Both dimensions are typically assessed through scalar judgements (e.g., 9-point Likert scales) of 20/30 s-long L2 speech samples elicited through picture-based monologic oral narrative tasks (see Thomson, 2018, for an overview of measurement methods). Non-native (accented)

speech is generally perceived to be less fluent, less intelligible, and less comprehensible than native speech and has been shown to slow down processing (Ludwig & Mora, 2017; Munro & Derwing, 1995b). Accentedness and comprehensibility can be assessed as independent constructs, as it is perfectly possible for non-native speakers to speak with a strong accent and still be understood without difficulty (Munro & Derwing, 1995a; Munro et al., 2006). Speech features (i.e., linguistic properties of the speech samples), listeners' characteristics, and even the kind of speaking tasks used to elicit L2 speech (Crowther et al., 2015a) may affect perceptual assessments of L2 speech.

Recent research on the linguistic correlates of accentedness and comprehensibility has shown that L2 learners' phonetic and phonological speech features that differ from those of native speakers (e.g., inaccurate realization of L2 speech sounds, phonemic substitutions, misplacement of lexical stress, prosodic appropriateness) contribute most strongly to L1 listeners' perceived degree of accentedness. In contrast, the linguistic features of L2 speech that contribute to L1 listeners' perception of degree of comprehensibility (i.e., the amount of effort listeners need to put into understanding L2 speech) include, besides phonetic and phonological features, a variety of time-based fluency phenomena (speech rate, articulation rate, pause frequency, location and duration) as well as lexical and grammatical accuracy, richness and complexity (Crowther et al., 2015b; Derwing & Munro, 1997; Isaacs & Trofimovich, 2012; Munro & Derwing, 1995a; Saito et al., 2016b; Saito et al., 2017; Trofimovich & Baker, 2006). The relationship between listeners' perception of accent and comprehensibility may therefore be partly explained by the fact that accent is one of the features of non-native speech that may impact the amount of effort listeners need to put into understanding non-native utterances.

Listeners' characteristics, such as their experience or familiarity with a specific L2 accent, or their L1 background (i.e., the extent to which the listeners' L1 and the speakers' L2 are typologically related or the degree of L1-L2 mutual intelligibility), may affect their accentedness and comprehensibility judgements (Crowther et al., 2015b; Munro et al., 2006), but research to date has produced somewhat mixed results. For example, Kennedy and Trofimovich (2008) found native listeners differing in experience (extent of previous exposure to non-native speech) to rate accentedness and comprehensibility similarly, and Derwing and Munro (2013) found native and high-proficiency non-native speakers of English not to differ in how they rated L2 speech for these dimensions. However, research has also shown that raters are more lenient when they are familiar with the type of accent they are asked to judge (Foote & Trofimovich, 2018; Winke et al., 2013), exhibiting a processing advantage for non-native speech in their own L2 accent (Ludwig & Mora, 2017).

2.2 *Relationship Between Accentedness and Comprehensibility*

Although intelligibility, fluency, accentedness, and comprehensibility are related to one another, the degrees and the strength of these associations vary from study to study (Thomson, 2018), accentedness and comprehensibility are often reported to be as strongly related to one another as comprehensibility and intelligibility, whereas accentedness is more weakly related to intelligibility (Jułkowska & Cebrian, 2015; Munro & Derwing, 1995a). Scalar judgements (e.g., 9-point Likert scales) of these dimensions, however, reveal differences in the degree of accentedness and comprehensibility listeners perceive in non-native speech. Studies assessing the accentedness and comprehensibility in the same set of speech samples have consistently shown that the proportion of high comprehensibility ratings (ease or little difficulty in understanding) is much higher than the proportion of low accentedness ratings (little or no accent), irrespective of whether the speech samples assessed by native speakers consisted of picture-elicited oral narratives (Derwing & Munro, 1997) or isolated sentences obtained through a delayed sentence repetition task (Mora & Darcy, 2016) or whether the speech samples were assessed by non-native listeners (Jułkowska & Cebrian, 2015). That is, listeners perceive much higher levels of accentedness than they do of difficulty in understanding, which underscores the relative independence of accentedness and comprehensibility as perceptual dimensions of non-native speech.

There is a dearth of research on the relationship between accentedness and comprehensibility from the perspective of non-native listeners. Most research investigating the perception of non-native speech by non-native listeners has focused on intelligibility and potential L1-matched and unmatched speech intelligibility benefits (Bent & Bradlow, 2003; Hayes-Harb et al., 2008; Stibbard & Lee, 2006), whereas studies investigating accentedness and comprehensibility by non-native listeners have been mainly concerned with identifying the differential weight various speech features have on these dimensions (Crowther et al., 2016; O'Brien, 2014; Saito et al., 2019). Previous studies have shown a relatively strong association between accentedness and comprehensibility ratings, but they all report large variability among listeners. For example, Munro and Derwing (1995a) found accent and comprehensibility scores for Mandarin talkers of English performing an oral narrative task to correlate significantly for 17 of their 18 listeners, but the strength of the correlation ranged from $r = 0.41$ to $r = 0.82$. Similarly, in Munro and Derwing (1995b), the relationship between accent and comprehensibility for Mandarin talkers of English producing short sentences reached a significant *Pearson-r* correlation coefficient of $r = 0.624$, but for six out of the 20 native listeners the correlation was non-significant, and in fact correlations varied greatly in strength (from $r = 0.140$ to $r = 0.917$). The one study examining the relationship between accentedness and comprehensibility in non-native listeners' ratings of L2 speech (Polish-accented English) we are aware of (Jułkowska & Cebrian, 2015) found significant correlation coefficients that varied in strength as a function of listeners' L1: English ($n = 6$; $r = 0.804$), Polish ($n = 6$; $r = 0.344$) and Spanish ($n = 6$; $r = 0.557$), but only 10 out of the 18 listeners'

correlations reached significance (variability in the strength of correlations within listener groups is not reported). For the homogeneous L1 listener groups in Munro and Derwing's (1995a, 1995b) studies, variability in how strongly accentedness relates to comprehensibility suggests that some listeners paid attention to accent when judging ease of understanding, while others did not. Other kinds of individual differences, such as memory and attention (Isaacs & Trofimovich, 2011) or awareness of the importance of accent and comprehensibility for communication (Saito et al., 2020), might be at play, too. For the non-native listener groups in Jułkowska and Cebrian (2015), between group differences were attributed to listeners' L1 and accent familiarity as the researchers interpreted the weak correlation in the Polish listeners' group in terms of their better ability to understand Polish-accented English irrespective of degree of accentedness. These findings seem to suggest that the influence of accent on comprehensibility may be of a larger magnitude for listeners whose phonology differs the most from that of the speech input (i.e., native speakers). In addition, listeners' proficiency may not only affect accent (Eger & Reinisch, 2019) and comprehensibility ratings (Saito et al., 2019), but also how these dimensions relate to one another. The current study extends this line of research by assessing the relationship between accentedness and comprehensibility in non-native listeners differing in L1-background (which may or may not match the non-native speakers' accent) and L2 proficiency.

3 The Study

This study examined the relationship between the accentedness and comprehensibility ratings of non-native English for 40 non-native listeners (L2-English learners) differing in L1 background and L2 proficiency level. In a previous study based on data from the same participant pool (Ludwig & Mora, 2017), we explored the relationship between listeners' processing times and comprehensibility judgments and found that processing costs in sentence comprehension were associated with perceived effort in understanding, but this relationship, which was revealed through significant moderate correlations, was mediated by an interaction between listeners' L1 and their L2 proficiency. That is, accented English was processed faster and judged to be more comprehensible by non-native listeners if produced by L1-matched speakers, and it was faster to process and easier to understand than native English by low-proficiency listeners, whereas high-proficiency listeners showed a processing advantage over native English listeners. The present study extends these analyses by including the accentedness ratings provided by the same listeners on the same speech samples previously judged for comprehensibility, and by focusing on the relationship between accentedness and comprehensibility at an individual listener level. Our aim was to explore individual differences in non-native listeners' judgments of accentedness and comprehensibility in L2 speech as a function of L1 background and L2 proficiency. We therefore addressed the following two research questions (RQ):

RQ1: Are non-native listeners' ratings of accentedness and comprehensibility equally affected by L1 background (matched- vs. mismatched-L1) and proficiency (low vs. high)?

RQ2: Does L1 background and L2 proficiency modulate the relationship between accentedness and comprehensibility in non-native listeners?

4 Methods

4.1 Participants

4.1.1 Speakers

Two Catalan learners of English (1 female, 1 male), Catalan-dominant Catalan-Spanish bilinguals born and raised in Catalonia (Spain); and two German learners of English (1 female, 1 male), born and raised in Germany, were selected as non-native speakers of English from a larger pool of upper-intermediate EFL learners. Two native English speakers (1 female, 1 male), born and raised in the United Kingdom, were selected as native speakers. They were all selected on the basis of clarity of articulation and absence of pronunciation errors and hesitations (aged 21–25). The Catalan and German speakers had never lived in an English-speaking country and had learnt English as adults through formal instruction in a foreign language context. Their self-reported level of proficiency in English ranged from 3 to 4 on a 5-point Likert scale (1 = elementary; 5 = near-native). They read sentences from randomized printed lists that were recorded, spliced and normalized for amplitude to be used as speech stimuli. A one-way ANOVA showed that the three speaker groups produced the sentence stimuli at similar articulation rates: $F(2,117) = 1.29, p = 0.277$.

4.1.2 Listeners

The listeners were 20 native speakers of Catalan, 20 native speakers of German and 10 control native speakers of English. They were born and raised in Catalonia (Spain), Germany, and the United Kingdom, respectively. The non-native listeners had never lived outside their home country and were unfamiliar with non-native English accents other than their own. They were recruited at language schools from intermediate- and advanced-level groups (10 of each within the Catalan and German speaker groups). A vocabulary size measure confirmed listener groups had non-overlapping distributions (Table 1).

Table 1 Listeners' characteristics as a function of L1 and L2 proficiency (*SDs* in parentheses)

Listeners	Catalan (<i>n</i> = 20)		German (<i>n</i> = 20)		English (<i>n</i> = 10)
Age (years)	24.2 (1.06)		24.4 (1.31)		24.3 (1.19)
LoR (years) ^a	23.5 (2.07)		21.75 (2.05)		22.8 (2.03)
L2 proficiency	High	Low	High	Low	Native
FI (years) ^b	7 (0.84)	6.2 (1.03)	9.2 (0.63)	9 (0)	–
Proficiency (1–5) ^c	4.1 (0.57)	2.3 (0.48)	4.5 (0.53)	2.5 (0.71)	5 (0)
Vocabulary size (0–10,000)	6620 (481.4)	3215 (189.7)	6685 (460.7)	3300 (143.37)	9750 (156.4)
Fam-Cat (1–5) ^d	4.7 (0.48)	4.9 (0.32)	1.3 (0.48)	1.1 (0.32)	1.6 (0.39)
Fam-Ger (1–5) ^e	1.2 (0.42)	1 (1)	4.8 (0.42)	4.7 (0.48)	1.5 (0.79)

^aLoR = length of residence in home country

^bFI = years of formal instruction in English

^cProficiency = mean self-rated proficiency

^dFam-Cat = mean familiarity with Catalan-accented English

^eFam-Ger = mean familiarity with German-accented English

4.2 Materials, Rating Tasks, and Procedures

The elicited sentences were based on the single-clause statements in Munro and Derwing's (1995b) sentence verification task. Sixty different sentences (10 by each speaker) were recorded in a sound-proof booth, normalized for peak and mean amplitude and high-pass filtered (50 Hz). Cross-language cognate status was controlled for and content words were selected from within the 2000 most frequent English words. Sentences were comparable across accents in word length ($M = 5.66$, $SD = 5.6$; $F(2,57) = 0.617$, $p = 0.543$), syllable length ($M = 8.38$, $SD = 1.4$; $F(2,57) = 0.610$, $p = 0.547$), speech rate in syllables per second ($M = 0.47$, $SD = 0.51$; $F(2,57) = 1.909$, $p = 0.1580$) and duration ($M = 2421$, $SD = 318$; $F(2,57) = 0.374$, $p = 0.690$).

The 60 sentences were presented randomly to listeners twice in two separate computer-administered rating tasks, one for accentedness and one for comprehensibility. Listeners rated accentedness and comprehensibility on 7-point Likert scales ($1 = No\ foreign\ accent$, $7 = Very\ strong\ foreign\ accent$; $1 = Very\ easy\ to\ understand$, $7 = Very\ difficult\ to\ understand$). In the comprehensibility rating task, the sentences were embedded in cafeteria noise (SNR = 10 dB) to help listeners focus on perceived difficulty in understanding. Listeners were explained the difference between accentedness and comprehensibility and were encouraged to use the whole scale. They could listen to every sentence maximally twice before making a decision. Task instructions were given in their L1 and tasks were performed individually in one 45-min session.

5 Results

5.1 Listeners' L1 and Proficiency Effects on Accentedness and Comprehensibility

Listeners' accentedness and comprehensibility ratings were consistent among listeners within listener groups (intra-class correlation coefficients $\alpha > 0.9$), thus indicating homogeneity of ratings. The averaged ratings (Table 2) show differences between accentedness and comprehensibility as well as differences as a function of listeners' L1 and L2 proficiency.

For sentences spoken in a non-native accent, ratings were overall higher for accentedness than for comprehensibility (see Fig. 1), in line with previous research findings (Jułkowska & Cebrian, 2015; Munro & Derwing, 1995a). Catalan-accented sentences were consistently perceived by all listener groups to be more strongly accented than German-accented sentences, even by L1-Catalan listeners. This suggests that a Catalan accent might be perceived by all listeners as being more distant from native

Table 2 Mean accentedness and comprehensibility ratings (0–7) as function of listeners' L1 and proficiency level and sentence accents (standard deviations in parentheses)

	Accentedness			Comprehensibility		
	Catalan	German	English	Catalan	German	English
L1-Catalan	5.63 (0.47)	4.89 (0.48)	1.28 (0.39)	4.25 (0.86)	5.00 (0.63)	2.07 (0.71)
Low	5.31 (0.35)	4.71 (0.42)	1.40 (0.44)	3.80 (0.58)	5.19 (0.47)	2.56 (0.59)
High	5.96 (0.33)	5.08 (0.49)	1.17 (0.31)	4.70 (0.88)	4.82 (0.74)	1.58 (0.42)
L1-German	6.04 (0.47)	4.74 (0.51)	1.32 (0.42)	5.24 (0.66)	3.95 (0.58)	2.16 (0.76)
Low	6.04 (0.46)	4.56 (0.45)	1.42 (0.42)	5.69 (0.26)	4.03 (0.54)	2.77 (0.37)
High	6.05 (0.49)	4.92 (0.53)	1.22 (0.41)	4.80 (0.63)	3.88 (0.63)	1.56 (0.52)
L1-English	6.16 (0.25)	5.06 (0.54)	1.05 (0.15)	4.15 (0.55)	3.50 (0.44)	1.23 (0.31)

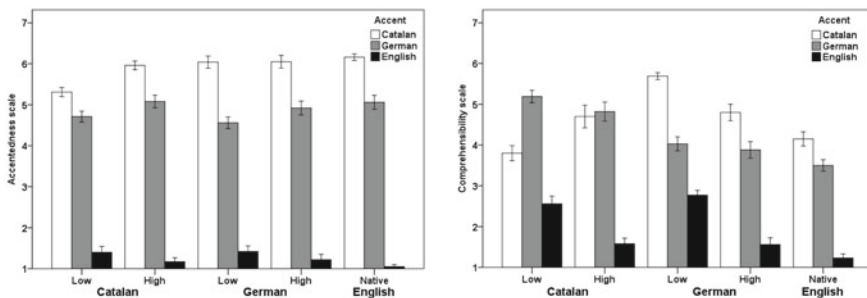


Fig. 1 Mean accentedness (left) and comprehensibility (right) ratings according to listeners' L1 and L2 proficiency (low, high, native) (error bars = $\pm 1SE$)

English than a German accent. Neither listeners' L1 background nor L2 proficiency seem to have affected accentedness ratings much (Fig. 1 left), whereas they seem to have had a large effect on comprehensibility (Fig. 1 right). A $2 \times 2 \times 2$ ANOVA on accentedness ratings with non-native listeners' *L1* (Catalan, German) and *Proficiency* (low, high) as between-subjects factors and sentence *Accent* (Catalan, German, native English) as the within-subjects factor, revealed a significant main effect of *Accent* ($F(2, 44) = 3722.8, p < 0.001, \eta^2 = 0.994$), but neither the effect of *L1* ($F(1, 45) = 0.87, p = 0.353, \eta^2 = 0.019$) nor *Proficiency* ($F(1, 45) = 2.41, p = 0.128, \eta^2 = 0.051$) reached significance. Bonferroni-adjusted pairwise comparisons showed that listeners perceived a significantly stronger accent on Catalan-accented sentences than on German-accented sentences ($p < 0.001$), both of which were obviously perceived as significantly more strongly accented than sentences spoken in a native English accent. However, *Accent* significantly interacted with *Proficiency* ($F(2, 44) = 11.83, p < 0.001, \eta^2 = 0.350$) and *L1* and *Proficiency* ($F(2, 44) = 4.62, p = 0.015, \eta^2 = 0.174$) because, according to Tukey post-hoc tests, Catalan-accented sentences were perceived to be significantly less strongly accented by L1-Catalan than by L1-German listeners ($p = 0.013$) or native English listeners ($p = 0.009$). This suggests that an L1 match between listener and speaker may result in more lenient accentedness ratings, that is, L1-Catalan listeners perceived less of an accent in Catalan sentences than L1-German listeners did (and vice-versa, though not significantly).

The comprehensibility ratings were submitted to the same $2 \times 2 \times 3$ ANOVA just described, revealing significant main effects of *Proficiency* ($F(1, 45) = 18.96, p < 0.001, \eta^2 = 0.296$) and *Accent* ($F(2, 44) = 352.13, p = 0.001, \eta^2 = 0.941$), but no main effect of *L1* ($F(1, 45) = 0.17, p = 0.898, \eta^2 < 0.001$). However, a complex set of significant interactions arose (*L1* \times *Accent*, *L1* \times *Proficiency*, *Proficiency* \times *Accent*, *L1* \times *Proficiency* \times *Accent*), suggesting that non-native listeners' comprehensibility ratings were affected by a match between their L1s and the sentence accents as well as their L2 proficiency level. In fact, all listener groups were found to rate all accents differently for comprehensibility (all $p < 0.001$). Accented sentences were significantly more comprehensible when the listeners' and speakers' L1 matched, whereas native English sentences were found to be equally comprehensible for L1-Catalan and L1-German listeners ($p = 0.898$). As regards proficiency, native English sentences were less comprehensible for low- than for high-proficiency listeners, as expected (all $p < 0.001$), whereas Catalan- and German-accented sentences were equally comprehensible for high-proficiency and native English listeners (all $p > 0.1$). However, all sentences were harder to understand for low- than for high-proficiency listeners irrespective of listeners' L1 (all $p < 0.001$).

To sum up, non-native listeners found sentences spoken in their own accent to be less strongly accented and easier to understand than those spoken in an unfamiliar accent, whereas L1-English listeners found all accented utterances to have a similar level of accentedness and to be equally difficult to understand. Interestingly, native English sentences were perceived to be the easiest to understand by all listener groups.

5.2 Relationship Between Listeners' Ratings of Accentedness and Comprehensibility

To explore how listeners' ratings for accentedness and comprehensibility related to one another, we conducted three sets of analyses. In these analyses, we included Catalan- and German-accented sentences ($n = 40$) only, as sentences spoken in a native English accent had on average received accentedness ratings of 1 (i.e., they were perceived as having no accent). First, we ran *Pearson-r* correlations on all ratings as a function of listeners' L1 and L2 proficiency (400 ratings per subject group: 10 raters \times 40 sentences, 20 in each accent). These analyses revealed significant positive correlations between the accentedness and comprehensibility ratings, except for the ratings from the low-proficiency Catalan listeners ($r = 0.276, p < 0.001$) for whom a stronger accent in the speech samples appeared to be weakly associated with ease of understanding. The correlation coefficients that resulted from the ratings by high-proficiency Catalan listeners ($r = 0.128, p = 0.01$), and those of the German (*low proficiency*: $r = 0.530, p < 0.001$; *high proficiency*: $r = 0.272, p < 0.001$) and English ($r = 0.373, p < 0.001$) listeners were all positive and weak-to-moderate in strength.

Second, we explored group correlations (10 listeners per group) between accentedness and comprehensibility as a function of listeners' L1 and L2 proficiency based on the averaged 20 ratings each listener provided per accent. As shown in Fig. 2, group differences in how accentedness was related to comprehensibility for non-native listeners mainly concerned low proficiency listeners, for whom there was a comprehensibility benefit in their own accent (i.e., less difficulty in understanding for speech in their own accent), whereas high-proficiency listeners showed larger overlap in the ratings for Catalan- and German-accented sentences. Given the low number of participants per group ($n = 10$) none of the correlations plotted below reached statistical significance.

Finally, we computed individual *Pearson-r* correlations by listener based on the ratings for accentedness and comprehensibility for each of the 40 sentences rated. These analyses revealed large individual variability in both the strength and the direction of the correlations. For example, some of the correlations for L1-Catalan listeners were negative and some were non-significant. Although for a majority of listeners accentedness was positively and significantly related to comprehensibility, the strength and direction of this relationship varied as a function of the listeners' L1 and L2 proficiency level. As shown in Table 3, the number of listeners for whom accentedness was significantly and positively related to comprehensibility varied as a function of subject group (Fig. 3). For the German and native English listeners, accentedness was always positively associated with comprehensibility—that is, a stronger accent was associated with greater difficulty in understanding—, whereas most Catalan listeners, especially low-proficiency listeners, perceived more strongly accented sentences to be easier to understand, thus showing a comprehensibility benefit for non-native speech. In general, these results support previous findings on the relationship between accentedness and comprehensibility for native (Munro & Derwing, 1995a) and non-native (Jułkowska & Cebrian, 2015) listeners.

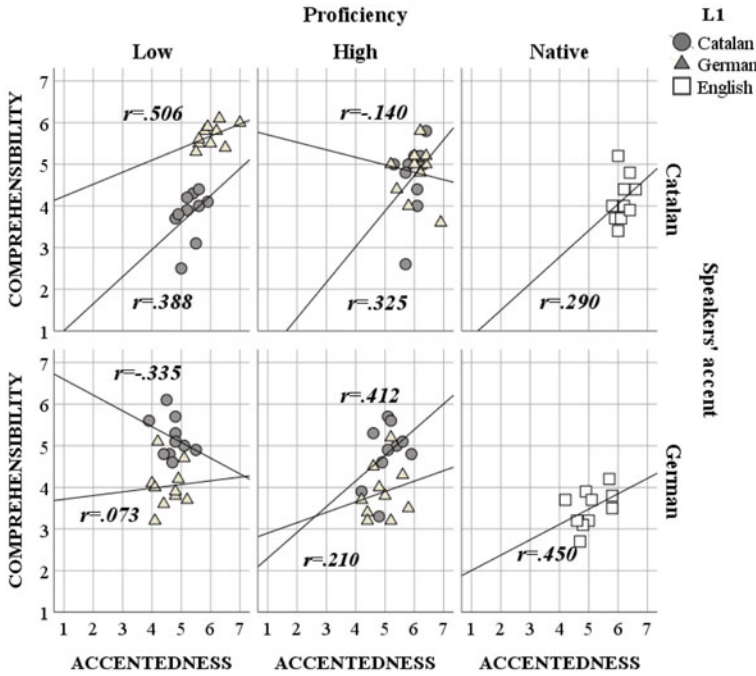


Fig. 2 Pearson-r correlations between accentedness and comprehensibility as a function of listeners' L1 and L2 proficiency

Table 3 Number of listeners (out of 10 per group) who obtained positive (+), negative (-), positive significant (+Sig) and significant (Sig) correlations

Proficiency	Low				High				Native			
	+	-	+Sig	Sig	+	-	+Sig	Sig	+	-	+Sig	Sig
L1												
Catalan	1	9	1	6	5	5	4	5	-	-	-	-
German	10	1	8	8	10	0	5	5	-	-	-	-
English	-	-	-	-	-	-	-	-	10	0	5	5

6 Discussion

The present study confirms and extends previous findings by Munro and Derwing (1995a) as well as Jułkowska and Cebrian (2015) on the relationship between accentedness and comprehensibility in several ways. Unlike Munro and Derwing (1995a), we focused on the perception of accentedness and comprehensibility by non-native listeners, as Jułkowska and Cebrian (2015) did. We also followed up on Jułkowska and Cebrian's study by including both a match and a mismatch between the accent

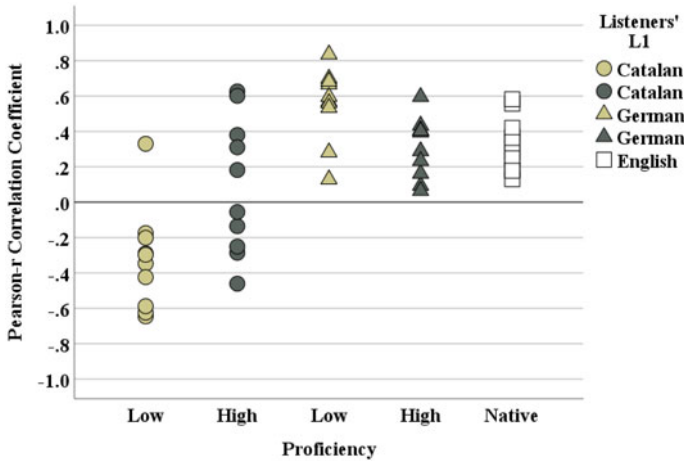


Fig. 3 Individual *Pearson-r* correlations between accentedness and comprehensibility as a function of listeners' L1 and L2 proficiency

in the speech samples and listeners' L1 for *two* listeners' L1s (Catalan- and German-accented sentences presented to L1-Catalan and L1-German listeners) rather than *one* (Polish-accented speech presented to L1-Polish and L1-Spanish listeners). We were able to show not only L1-based differences in how non-native listeners rate speech samples for accentedness and comprehensibility due to the presence or absence of a match between accent and L1, but also L1-based differences in how accentedness was related to comprehensibility for L1-matched sentences. Namely, whereas most L1-Catalan listeners (low-proficiency listeners in particular) perceived more strongly accented sentences in a Catalan accent to be easier to understand, this was not the case for the L1-German listeners, who generally showed a positive relationship between degree of accent and difficulty in understanding. These findings indicate that L1 background differences may modulate the relationship between accentedness and comprehensibility. In addition, we also extended Jułkowska and Cebrian's research by exploring the effects of non-native listeners' proficiency on the perception of accent-matched and mismatched sentences and on the relationship between accentedness and comprehensibility.

With respect to accent-based differences in the perception of non-native speech, the present study shows (confirming previous findings) that non-native listeners perceive speech in their own accent to be slightly less strongly accented than speech in an unfamiliar accent, despite overall differences in degree of accentedness between accents. This finding suggests that exposure to an accent leads to more lenient ratings, indicating a certain level of accent sensitivity loss. This effect was modulated by L2 proficiency: high-proficiency listeners perceived a stronger degree of accent than low-proficiency listeners did, and it appeared to be independent from listeners' L1, as Catalan-accented sentences were always perceived by all listeners to be more strongly accented than German-accented sentences. This difference might

be explained by the Catalan speakers being less proficient than the German speakers, or by a Catalan accent being more distant from native English than a German accent, or both. This finding lends support to previous research findings (e.g., Jułkowska & Cebrian, 2015; Munro et al., 2006) indicating that accentedness judgements are relatively independent from listeners' L1 background and L2 proficiency.

As regards comprehensibility ratings, two relevant outcomes were obtained. First, the data showed a robust interlanguage speech comprehensibility benefit, so that non-native listeners found sentences in their own accent easier to understand than sentences in an unfamiliar accent (irrespective of listeners' L1). However, this effect was found to be modulated by listeners' proficiency, as the size of the effect was strong for low-proficiency learners, but diminished for high-proficiency German listeners and disappeared for high-proficiency Catalan listeners. Second, sentences spoken in a native English accent were judged to be easier to understand than sentences spoken in either a familiar or unfamiliar non-native accent for both low- and high-proficiency listeners of both L1 backgrounds. This result might be due to listeners' greater exposure to L2 input in native English (e.g., through media) than in familiar or unfamiliar non-native accents, the lack of disfluencies and lexical and grammatical inaccuracies typical of more spontaneous types of speech (e.g., oral narratives), or the possibility that the non-native listeners paid attention to degree of accentedness when rating the speech samples for comprehensibility. Further research exploring the effects of these factors on comprehensibility ratings is warranted.

The individual data analyses on the relationship between accentedness and comprehensibility were generally in accordance with previous findings for both native (Munro & Derwing, 1995a, 1995b) and non-native (Jułkowska & Cebrian, 2015) listeners, but revealed large variability in the strength and direction of the relationship between the two dimensions. Although in general the relationship was significant and positive (i.e., listeners had a greater difficulty in understanding more accented speech), the majority of L1-Catalan listeners, especially those with low proficiency, associated stronger accentedness to easiness (rather than difficulty) in understanding. Comprehensibility benefits of an L1-matched accent (also present in L1 German listeners) might explain this outcome. It is also possible that German-accented sentences were easier to understand by L1-Catalan listeners than Catalan-accented sentences for L1-German listeners because the German accent is closer (than Catalan) to native English—that is, the L2 of the listeners. These findings underscore the potential effects of L1 background (an L1-match between listener and speaker, and closeness to the L2) and proficiency level in non-native listeners' perception of L2 speech as they both appear to modulate how accentedness relates to comprehensibility. Further research with other L1s is needed to corroborate the findings of this exploratory study.

7 Implications

The outcomes of the present study suggest a number of implications for L2 pronunciation teaching, assessment, and research. In L2 pronunciation teaching, a common recommendation (for the average L2 learner) is to focus on effective communicative competence, and consequently on those dimensions of speaking performance that make L2 learners' speech detrimental to comprehensibility, rather than on nativelikeness and pronunciation accuracy (Darcy, 2018; Derwing & Munro, 2005). In foreign language teaching contexts, learners are often exposed to L1-accented speech (from peer students or their teachers, or both), for which the current study shows benefits in comprehensibility. However, high levels of comprehensibility achieved on the basis of the common phonetic substrate of the listener's L1 and L1-accented L2 speech may be deceiving for learners, resulting in a comprehensibility cost when exposed to unfamiliar non-native accents of English. As shown in the present study, a non-native unfamiliar accent was detrimental to comprehensibility, especially to low-proficiency listeners, whereas native English was not. Thus, from a pedagogical perspective, it would seem convenient to expose learners to non-native accents other than their own besides exposing them to L2 speech by native speakers (Derwing et al., 2002).

Accentedness and comprehensibility are two important dimensions of L2 pronunciation assessment (Kang & Ginther, 2018). The present study has shown that non-native listeners' assessment of these dimensions is partly dependent on listeners' L1 background, L2 proficiency level, and how L2 speech is produced by listeners, which may determine familiarity with a specific accent. When assessing L2 pronunciation, therefore, instructors and testers should be aware of the potential biases that may affect their judgements resulting from L1-matched and mismatched L2 speech.

Finally, the current study has shown large variability in how non-native listeners relate accentedness to comprehensibility, partly modulated by L1 and proficiency effects. Whereas for some listeners these two dimensions appear to be completely independent from one another, for others they are strongly and positively associated. This largely under-researched area in L2 speech studies deserves attention in future research. Investigating the sources of individual differences in listeners' perception of L2 speech and in how accentedness is related to comprehensibility will help us gain a better understanding of the factors affecting L2 speech processing to inform L2 pronunciation instruction.

8 Conclusions

The study reported here underscores the important role of listeners' characteristics in the perception of L2 speech. Our findings indicate that non-native listeners judge speech in their own accent to be less strongly accented and to be more comprehensible than speech in an unfamiliar accent, supporting findings from previous research. In addition, we found this L1-match effect for accentedness and comprehensibility to

be stronger for low- than for high-proficiency non-native listeners. Our results also indicated that the relationship between degree of accent and ease of understanding for L1-matched speech may be positive or negative as a function of listeners' L1. Altogether these findings underscore the important role of non-native listeners' native language background and L2 proficiency in the perception of non-native speech. We hope to have contributed to a better understanding of the effects of listeners' native language background and proficiency level on the perceptual assessment of accentedness and comprehensibility in L2 speech. The speech materials used are limited in that they did not allow us to investigate learners' judgements of accentedness and comprehensibility and how they relate to one another while controlling for the pronunciation-unrelated speech features that characterize L2 speech, such as speaking dysfluencies and lexical and grammatical errors. Future research should further examine L1- and proficiency-based effects on the perception of L2 speech by non-native listeners using more extemporaneous types of speech materials as well as explore further sources of individual differences in the perception of L2 speech by L2 listeners.

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