

Feature Article

Perceptions of University Instructors when Listening to International Student Speech

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Abstract

Intensive English Program (IEP) Instructors and content faculty both listen to international students at the university. For these two groups of instructors, this study compared perceptions of international student speech by collecting comprehensibility ratings and transcription samples for intelligibility scores. No significant differences were found between the two groups, suggesting that the perceptions of these two groups are reasonably well-matched. Seven linguistic features were assessed, and grammatical accuracy was found to have the strongest effect on content faculty's ratings of comprehensibility. None of the linguistic features correlated significantly with intelligibility. These results raise questions about IEP assessment practices for speaking. Rankings of speech samples based on comprehensibility, intelligibility, and linguistic features all yielded different pictures of who was most understandable, highlighting the implications of using different criteria to assess student speech.

Key Words: *Comprehensibility, intelligibility, IEP, higher education, speaking assessment, content faculty*

Introduction

Over the last decade, international student enrollment increased markedly at many universities in the USA. In the 2015-2016 academic year, 54 US universities reported more than 10% international students (US News and World Report, 2016), up from 38 two years earlier. Given this situation, issues of mutual comprehensibility between international students and their professors and classmates have gained salience in discussions of pedagogy and

policy. At one US university, a recent survey of instructional faculty found that 73% of respondents expressed concern about the oral communication skills of international undergraduates, with “an overwhelming sense that non-native speaking students are taking courses before their English language proficiency is adequate” (Evans, 2014, p. 2). When international students are underprepared in language, it can lead to negative outcomes such as a loss of confidence for

students and a lack of respect for the skills and knowledge these students bring to their universities (Ryan & Viete, 2009).

As instructors in a university-based Intensive English Program (IEP), the first two authors prepare international students to communicate in English at the university. When teaching speaking skills, we began to wonder how well our perceptions and assessments of our students' speaking matched the perceptions of the instructional faculty who would work with our students after they exited the IEP. If there were a mismatch in perceptions, it could lead to misdirected instruction and wasted effort. We wondered whether some specific features of our students' spoken English might have a greater or lesser effect on perceptions of comprehensibility among university instructors outside of the IEP. If this were the case, we could place a greater emphasis on developing those features before students matriculate to the university. Thus, our research questions were:

1. *Do university ESL instructors' perceptions of international student speech match the perceptions of university faculty?*
2. *What features of spoken language should we emphasize in order to best prepare students to meet the expectations of university faculty?*

Literature

Comprehensibility and intelligibility both refer to how well speech can be understood. They are sometimes used interchangeably, but here we use them in their narrow definitions based on Munro & Derwing (1995). Comprehensibility is defined as a listener's subjective rating of how easily they could understand. It is conventionally measured with a nine-

point Likert scale. Intelligibility, however, is defined as a somewhat more objective measure of how much the listener can actually understand the speaker's message. It is often measured via transcription accuracy, but

sometimes other techniques such as questions about the content of the audio text are used.

It is apparent from these definitions that both comprehensibility and intelligibility depend on the listener as well as on the speaker. They are measures of listener perception, not features of speech, and have been found to correlate with various features of the listener such as familiarity with the topic (Gass & Varonis, 1984; Kennedy & Trofimovich, 2008), familiarity with the accent or first language (L1) of the speaker (Bradlow & Bent, 2008; Derwing & Munro, 1997), general familiarity with language learner speech (Kennedy & Trofimovich, 2008; Baese-Berk, Bradlow & Wright, 2013), and attitudes towards the speaker (Lindemann, 2002; Kang & Rubin, 2009).

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A variety of studies have investigated what features of speech correlate with higher ratings for comprehensibility and intelligibility, generally using native speakers as listeners. The following features have been found to have a statistically significant relationship with comprehensibility ratings:

- Word stress (Isaacs & Trofimovich, 2012; Hahn, 2004)
- Grammatical accuracy (Derwing & Munro, 1997; Isaacs & Trofimovich, 2012);
- Lexical richness (Isaacs & Trofimovich, 2012)
- Fluency (Isaacs & Trofimovich, 2012) and speaking rates (Kang, 2010; Munro & Derwing, 2001).

The following features have been found to have an effect on intelligibility scores:

- Word stress accuracy (Field, 2005; Hahn, 2004)
- Phonemic accuracy in strong syllables (Zielinski, 2006)
- Grammatical accuracy (Derwing & Munro, 1997).

Finally, important literature criticizes approaches to measuring comprehensibility and intelligibility that assume the perceptions of native speakers are the only or most appropriate standard by which to judge the speech of non-native speakers. A more appropriate standard might be mutual comprehensibility among non-native speakers of English (Jenkins, 2002; Murphy, 2014), or among subject groups with actual communication needs (e.g. undergraduate students and their professors). For this reason, the current

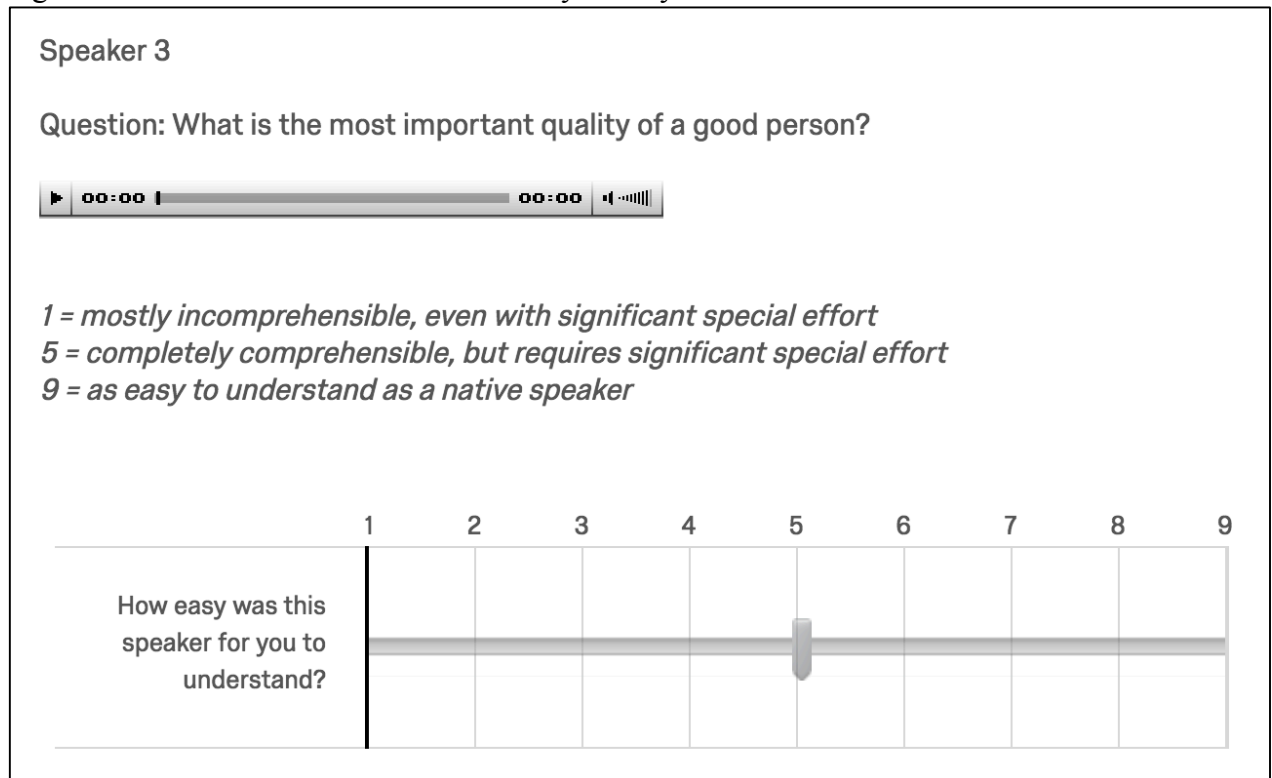
study compares perceptions of international students' speech in two target audiences (ESL instructors and Content Faculty at the same university) without regard for the L1 of these listeners.

Background

In a previous study (Sheppard, Elliott, & Baese-Berk, 2017), two online surveys collected responses from different groups of instructors at a U.S. university. The first group included instructors in any field except language; we referred to this group as Content Faculty. The second group included ESL instructors who currently or recently taught speaking skills in the university IEP. The surveys were slightly different for each group.

Both surveys included 10 classroom recordings of IEP students in their last weeks before entering the university. The students spoke spontaneously for 1-2 minutes in response to a question. Content Faculty were asked to rate the comprehensibility of these speeches on a 9-point Likert scale with directions to assign a 9 if the speech was very easy to understand, a 5 if the speech was completely comprehensible given significant special effort, and a 1 if the speech was mostly incomprehensible even with extra effort (see Figure 1). ESL Instructors were asked to rate overall comprehensibility using the same directions, and were also asked to rate six language features (vowel pronunciation, consonant pronunciation, stress/rhythm, intonation, grammatical accuracy, fluency) of the speech on the same 9-point Likert scale, with directions to rate the degree to which each specific aspect was a cause of comprehensibility challenges. Both groups were instructed

Figure 1 – Screen shot from Content Faculty Survey



to listen only once, and both groups rated all 10 speakers in random order.

Participants in both surveys were then presented with short excerpts from the same 10 student speech samples, once again in random order. These were excerpted from the same recordings by selecting the first complete sentence of appropriate length (4-6 content words). Survey participants were asked to listen once and type what they heard. The resulting transcripts were then coded as a match or a mismatch for each content word, and trivial errors such as regularizations and substitution of equivalent forms were disregarded. After one researcher coded all the transcription data, the other researcher coded 10% of the data. The two researchers agreed on 241 out of 242 content words in this

sample, or 99.59% agreement. Our measure of intelligibility was the proportion of words correctly transcribed, represented as a score of 0-1 (e.g. if 87% of words were correctly transcribed, the intelligibility score was 0.87).

In this previous study, there was no significant overall difference between the two groups of participants in either comprehensibility or intelligibility. This result bears on research question 1, and we will return to it below.

ESL Instructors' ratings of the six language features were highly inter-correlated in the previous study. The four pronunciation features had Pearson correlations between 0.78 and 0.96, and grammar and fluency also were

significantly correlated with many pronunciation features. Since we could not be sure that these scores represented separate constructs, reports of these features were omitted from the published paper (Sheppard, Elliott, & Baese-Berk 2017). We hypothesized that this result may have arisen because instructors were only allowed to listen once. Scoring six separate language features in one hearing may be an excessive demand that resulted in a halo effect (the tendency for scores on separate items to be based on a general impression of skill, rather than on the actual criteria to which they are supposed to refer). It should be noted that scoring rubrics with six dimensions for use in classroom situations are not altogether uncommon in our profession. We will discuss our update to this portion of the study below.

Methods

Due to our limited confidence in the scores for individual features in the previous study, we conducted a follow-up study. We applied for and were awarded a Marge Terdall Research Grant from ORTESOL to hire five expert raters, who provided careful ratings of the speech samples used in the previous study. Raters were ESL instructors specializing in speaking instruction, selected from among the leadership of our IEP. Instead of listening just once, they had 15 minutes to rate each 1-to-2-minute speech segment.

“What features of spoken language should (ESL Instructors) emphasize, in order to best prepare students to meet the expectations of university faculty?”

One additional feature (lexical accuracy) was added to the analysis, for a total of 7 dimensions: vowel pronunciation, consonant pronunciation, stress/rhythm, intonation, grammatical accuracy, lexical accuracy, and fluency. Raters were also given space to write comments on each speaker.

These new ratings of language features were combined with survey data from the study described in “Background” above.

Results and discussion

For each speaker and language feature, five expert raters provided scores on a scale of 1-9 (with the same definitions of end and middle points as in the previous survey). The five raters were quite consistent in their assignment of scores. As a measure of inter-rater reliability, Chronbach’s alpha was calculated separately for ratings of each feature of the students’ speech, with results ranging from 0.840 to 0.915. The mean interrater reliability for all seven features was 0.860 (SD 0.037).

For each speaker (n=10), a mean score was taken from the five raters to represent perception of that speaker in each of the seven language features. These means (presented in Table 1) were entered into subsequent analyses as language feature ratings. Results were analyzed for inter-correlation between the features, and the results are presented in Table 2.

Table 1 – Mean language feature ratings for each individual speaker

	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
Vowel pronunciation	5.6	4	5	4	5.8	5.6	4.4	5.8	5.4	3.6
Consonant pronunciation	5.2	3.6	4.6	5.2	6.4	4.6	4.4	6.2	5.6	3.4
Stress/rhythm	4.8	3.2	4.6	4.8	5.4	5	4.4	5.8	4.8	4.2
Intonation	4.6	4.6	4.8	5.6	6.2	4.6	4.8	6.8	4.8	4.8
Grammatical accuracy	4.4	4.8	4.4	5	5.4	6.4	5	5.6	5	4.4
Lexical accuracy	4.4	4.8	4.8	5.2	5.2	6.6	4.6	5.4	5	4.8
Fluency	4.4	4.6	4.4	5.8	5.4	6.4	5	7	4.6	5

Table 2 – Pearson's correlations for expert ratings of language features. * $p < .05$; ** $p < .01$

	Vowel pronunc.	Consonant pronunc.	Stress/rhythm	Intonation	Grammat. accuracy	Lexical accuracy
Consonant pronunciation	.782**					
Stress/rhythm	.751*	.857**				
Intonation	.368	.735*	.711*			
Grammatical accuracy	.490	.372	.492	.339		
Lexical accuracy	.358	.186	.404	.185	.911**	
Fluency	.303	.401	.631	.673*	.795**	.741*

Inter-correlation between ratings of the seven language features was found to be less powerful than they were in survey results from the previous study, but still significant in many cases. In particular, the four pronunciation features (vowels, consonants, stress, and intonation) were significantly correlated with each other, and the three other features (grammatical and lexical accuracy, fluency) were also correlated with each other. Unlike previous study's survey results, these two groups of features were distinct from each other, with no statistically significant correlation between the groups taken as a whole ($r = .493$, $p = .147$).

Research Question 1: *Do ESL instructors' perceptions of international student speech match the perceptions of university faculty?*

For comprehensibility ratings, ESL Instructor ratings were significantly correlated with Content Faculty's ratings ($r = .665$, $p = .036$). For intelligibility scores, the two groups were even more highly correlated ($r = .942$, $p < .001$). These results indicate no reason to suspect a major mismatch between perceptions of ESL Instructors and Content Faculty when listening to international students – an encouraging outcome, since it suggests that the two groups may evaluate student speech using similar implicit standards and should be able to communicate about students' language needs.

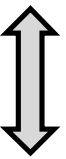
“These results indicate no reason to suspect a major mismatch between perceptions of ESL Instructors and Content Faculty when listening to international students”

Although the two subject groups had broadly similar perceptions of student speech, the different criteria used to evaluate understandability (comprehensibility scores, intelligibility transcriptions, and ratings of language features) resulted in different evaluations of which students were more understandable. The 10 speech samples were ranked from highest to lowest scores for each set of criteria, giving an impression of which speakers were perceived to be more understandable according to the different criteria.

For language features, the mean of all seven feature scores was used for this ranking. In Table 3, speech samples (identified as S1-S10) are arranged in rank order according to each of these three criteria, with those at the top perceived as the most understandable and those at the bottom the least understandable.

Within each type of rating/score, the two sets of rankings look fairly similar, and indeed, the rankings from the two groups are statistically correlated for within each criterion. In other words, Content Faculty and ESL Instructors tend to agree about which speech samples are the most/least comprehensible (except for S9, who was removed from these analyses as an outlier) and about which speech samples are the most/least intelligible. Similarly, ESL instructors in the previous study tended to agree with expert raters in the current study about which speech samples had strong/weak language feature ratings.

Table 3 – Speech samples 1-10 ordered according to rating/score from highest to lowest

Ranking	Comprehensibility Ratings		Intelligibility Scores		Mean rating of 7 language features	
	Content	ESL	Content	ESL	Survey	Paid raters
Highest score/rating  Lowest score/rating	S6	S6	S3	S4	S8	S8
	S4	S5	S2	S3	S5	S5
	S8	S4	S6	S6	S6	S6
	S9	S7	S4	S7	S4	S4
	S7	S8	S5	S2	S9	S9
	S5	S2	S7	S5	S7	S1
	S3	S1	S1	S1	S3	S7
	S1	S10	S9	S9	S2	S3
	S2	S3	S8	S8	S10	S10
	S10	S9	S10	S10	S1	S2

Between the three types of ratings/scores, however, greater differences in rankings appear. Rankings based on comprehensibility showed some similarity with rankings based on language features, although this was weaker than the similarity within each type or rating reported above. Rankings based on intelligibility scores did not have any significant correlation with rankings based on either comprehensibility or language features. This suggests that intelligibility (transcription accuracy) is a clearly different construct from comprehensibility and feature ratings. The relationship between overall

comprehensibility and the mean of language feature ratings in the ranked evaluation of speech samples is less clear, but the visible difference in rankings gives reason to suspect that comprehensibility, while related to the seven language features analyzed here, also references other information. This result demonstrates the importance of clearly defining terms and criteria when discussing whether a speaker is “easy to understand.”

Research Question 2: *What features of spoken language should we emphasize, in order to best prepare students to meet the expectations of university faculty?*

Results from expert raters' analysis of the 10 speech samples were compared to Content Faculty survey results for

comprehensibility and intelligibility. Findings are displayed in Table 4.

*Table 4 – Pearson's correlations between language feature ratings and Content Faculty comprehensibility and intelligibility. * = $p < .05$, ** = $p < .01$*

	Vowel	Consonant	Stress/Rhy	Intonation	Grammar	Lexical	Fluency
Content Faculty Compre.	.312	.444	.559	.318	.769**	.739*	.701*
Content Faculty Intellig.	.043	-.050	-.202	-.242	.099	.077	-.184

Grammatical accuracy, lexical accuracy, and fluency ratings were significantly correlated with Content Faculty comprehensibility ratings. None of the other features correlated with either comprehensibility or intelligibility. A stepwise multiple regression showed that grammatical accuracy had the greatest effect on Content Faculty comprehensibility $F(1,8)=11.596$, $p=.009$, indicating that 76.9% of the variance in comprehensibility ratings could be accounted for by expert ratings for grammatical accuracy. No other variables entered into the equation, indicating that they did not add to the statistical effect. It should be remembered, however, that lexical accuracy and fluency were strongly inter-correlated with grammatical accuracy. These three features may not be acting as separate variables in our study.

Implications for instruction and assessment of ESL students

Comprehensibility is an important goal for IEP instruction, particularly when measured according to the perception of an actual target audience (in this case, content faculty). Listener

perceptions of effort and difficulty in understanding can affect attitudes and willingness to listen. The finding that the Content Faculty group perceived speech as more easily comprehensible when it was rated as more grammatically accurate (in conjunction with higher ratings for lexical accuracy and fluency) aligns with previous work (Isaacs & Trofimovich, 2012). This might influence IEP speaking instructors to increase their emphasis on oral grammar, vocabulary, and fluency, perhaps reducing pronunciation instruction. Certainly, instruction for accuracy in grammar and vocabulary may support increased comprehensibility. It is less clear that pronunciation instruction should be reduced. Comprehensibility (perceived ease of understanding) is just one construct that affects communication between speakers and listeners, and pronunciation can affect communication in other ways. Aspects of pronunciation that were not captured in this study may also affect comprehensibility.

Intelligibility is also an important goal for IEP instruction, since international students often need to make themselves explicitly understood when

speaking to their instructors, peers, and others. The fact that none of the language feature ratings examined here had a significant correlation with transcription accuracy raises questions about what features impact intelligibility and what methods of assessment can capture these features. The literature indicated that aspects of pronunciation can affect intelligibility. Our first study indicated that grammatical accuracy positively affected intelligibility while fluency negatively affected it. Further study is needed on both intelligibility and comprehensibility with a variety of target audiences.

Finally, the inter-correlations that occurred when ESL teachers rated student language features can have implications for rubric design in speaking assessment. ESL teachers in this study had a hard time differentiating students' strengths and weaknesses in vowel, consonant, stress, and intonation, even when they spent 15 minutes replaying each 1-2 minute recorded speech sample. Analytic rubrics used for classroom assessment sometimes include these elements, while in other instances, a single "pronunciation" score is included. This latter approach may be preferable in light of these findings. More significantly, grammar, vocabulary, and fluency were not clearly differentiated by expert raters in this study, and these are frequently represented as separate dimensions on classroom rubrics for speaking assessment. Of course, it may also be the case that the students whose speech samples were recorded really did vary in only two dimensions, that every student who had good grammar was also very fluent and made accurate vocabulary choices. It seems more likely, however,

that something is amiss in teachers' ability to separately assess these features. Perhaps such rubrics could be redesigned to focus instructors' attention on very specific aspects of each feature (e.g. speaking rate and/or use of pauses, instead of fluency). Additionally, instructors should stay aware of the possibility of halo effects whenever they use complex analytical rubrics.

Conclusion

This study compared the perceptions of two actual audiences for international student speech: IEP instructors who prepare the students for university study, and the content faculty members with whom they work upon completion of their studies in the IEP. No significant differences between the perceptions of the two groups were found – a potentially encouraging result for collaboration between IEP instructors and content faculty who teach international students. Grammatical accuracy in association with lexical accuracy and fluency was found to have the most significant effect on faculty ratings of comprehensibility, while no individual feature's ratings clearly predicted faculty's intelligibility scores.

There were several limitations in the design of this study, and a need for further research. Although clear instructions were given for the survey, researchers cannot guarantee that all subjects followed directions to use headphones and listen only once. If possible, it would be preferable to run the study in a controlled environment. However, the choice to use an online survey was based on the need to include busy professors at a research university. Two limitations may have contributed to the lack of significant correlations

between expert ratings of language feature and target audience intelligibility. First, intelligibility scores were based on excerpts taken from longer speeches, which were considered in their full length for ratings of language features. If the selected sentence was not representative of other sentences in the sample, it would weaken results. Second, language feature ratings were based on holistic rater impressions, while intelligibility scores were based on a quantitative measure for words transcribed. For some language features, quantitative measurement of the speech sample would be possible, and would be a useful comparison. The use of expert raters who are also ESL instructors, however, allows increased applicability to questions of ESL speaking assessment. Future studies should consider matching

the length of comprehensibility and intelligibility samples, and analyzing speech samples for those features that can be quantitatively measured.

Since challenges with comprehensibility and intelligibility can reduce international students' academic confidence and reduce opportunities for everyone at the university to benefit from the cultural and content area knowledge of international students, it is important to understand how international students and their listeners succeed and fail to understand each other. Other universities may want to complete similar studies to compare aspects of student speech with the perceptions of various target audiences.

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