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Universal Design for Learning as a pathway to accessibility in the linguistics classroom

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Abstract. This paper offers suggestions on enhancing accessibility in our introductory linguistics courses, with a particular focus on teaching phonetics and phonology to students with hearing and visual disabilities. After reviewing some existing resources designed to make linguistics content more accessible, we address some of the practical constraints we experienced in trying to adopt these resources for our own courses. In light of such challenges, we offer practical strategies for improving accessibility both in the physical classroom as well as for online or hybrid courses. We suggest that implementing such strategies, which are in line with the principles of Universal Design for Learning, can prove beneficial for all students, with or without the need for accommodation. Finally, we encourage instructors to take proactive steps to make their course content more accessible, both in their current and future classes.

Keywords. universal design; accessibility; deaf; hard of hearing; blind; visual impairment; phonetics; phonology; IPA; pedagogy

1. Introduction. Since the onset of the COVID-19 pandemic, many universities have shifted their linguistics classes to an online asynchronous format. This change in modality has prompted us to consider how students with disabilities might be affected. This project originated from a practical need when one of the authors had several students with varying degrees of hearing and visual disabilities in his online linguistics class. Not being experts in this field, we embarked on a journey to educate ourselves, survey existing resources, and identify practical ways to enhance accessibility in the introductory linguistics classroom. This paper explores strategies for teaching linguistics to D/deaf or hard of hearing and blind or low-vision students,[1] drawing on our literature review and personal experiences. We aim to provide practical guidance and insights for educators in linguistics and related fields who seek to create inclusive and accessible learning environments that will serve the needs of students with hearing and visual disabilities.

The paper is structured as follows. In section 2, we discuss existing resources for teaching phonetics and phonology to students with hearing or visual disabilities and share the benefits and challenges of using these tools. In section 3, we offer some practical suggestions for making phonetics and phonology more accessible based on our own classroom experiences. We conclude in section 4 with some final remarks.

2. Existing resources. We surveyed several resources that specifically address teaching phonetics and phonology to blind and low vision students, including IPA Braille (Englebretson 2008, 2009), Tactile IPA (Lillehaugen et al. 2014), and ADEPT (González & Hardison 2022). We found

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[1] We follow the conventional practice in the literature on deafness of using the capital *Deaf* to refer to cultural deafness, which signifies a community of individuals who share a language, values, and beliefs, and lowercase *deaf* to refer to the audiological condition involving hearing loss.

comparatively few resources specifically aimed at teaching the IPA to students who are D/deaf or hard of hearing (e.g., Gould 1982).

2.1. IPA BRAILLE. Braille is a tactile writing system designed for people with vision impairments. A braille version of the International Phonetic Alphabet (IPA) (initially developed by Merrick and Potthoff 1934) has been revised and updated by Englebretson (2008) to provide braille equivalents for all of symbols in the IPA chart, revised to 2005.

While IPA braille allows blind students and professionals full access to the IPA, its use in the introductory linguistics classroom may not be feasible. First, some blind and low-vision students do not know braille; less than 10% of the 1.3 million people considered legally blind in the United States are braille readers, according to the National Federation of the Blind Jernigan Institute (2009). Second, preparing materials in IPA braille to make them Unicode-compliant and machine-readable (for screen readers or braille displays) has a steep learning curve (for student *and* instructor) that may not be surmountable within the introductory class timeline, in which phonetics may only be covered for one to two weeks.

2.2. TACTILE IPA. Lillehaugen et al. (2014) created a Tactile IPA Magnet-Board System tailored for educating visually impaired students in phonetics and phonology. To field-test this system, we borrowed it through interlibrary loan (Figure 1).

Figure 1. Box of magnet tiles for IPA consonants

This system uses magnetic tiles with raised IPA symbols and phonological rule symbols in braille and handwriting (Figure 2) which users can manipulate on a magnetic board.

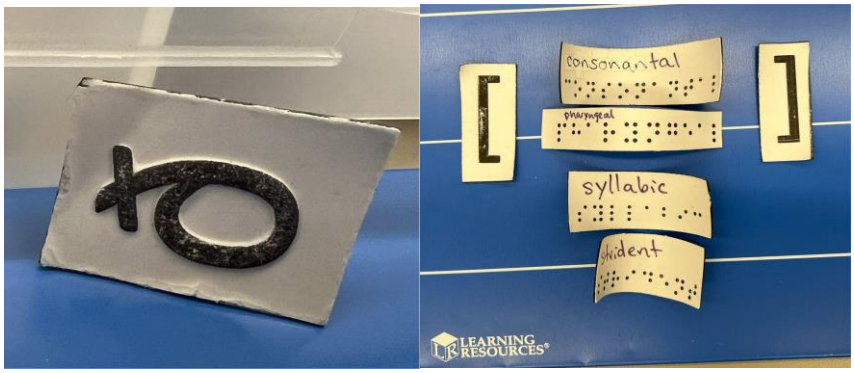

Figure 2. Sample tiles, with raised IPA symbol (left) and phonological features in handwriting and braille (right)

While we recognize the benefits the use of such a system could have for providing students with visual impairments access to the IPA, it poses potential implementation challenges for instructors. In our case, obtaining the tool through interlibrary loan took two weeks and its use was restricted to the library, preventing its use in the classroom. Additionally, the storage method led to tiles being misshapen, resulting in them not being usable with the magnet board (Figure 3).

Figure 3. Misshapen tiles contained in small storage sections

2.3. ASSISTIVE DESIGN FOR ENGLISH PHONETICS TOOLS (ADEPT). Drawing on multisensory learning and Universal Design for Learning principles, González and Hardison's (2022) Assistive Design for English Phonetic Tools (ADEPT) was developed to aid in teaching the IPA to blind and low-vision second language learners of American English. They developed a set of visual-tactile cards, each containing an IPA symbol with its phonetic description in English and in braille, along with a website reference number that allows students to find print and audio information on the pronunciation of the sound on a companion website. González and Hardison include instructions on how to make the cards on their website, which requires either printing them on special swell (thermal) paper or in hard format with a 3D printer to create the raised effect. Such a system would have considerable utility in introductory linguistics courses, particularly for teaching phonetics, but producing it requires time, planning, materials, and possibly funding that may be an obstacle for quick use in the introductory classroom.

2.4. PHONETIC RESOURCES FOR THE D/DEAF AND HARD OF HEARING. Resources specifically designed to teach the IPA to university students who are D/deaf or hard of hearing proved harder to find. One we consulted is Gould (1982) who suggests a multi-sensory approach to teaching the IPA, ensuring D/deaf students have access to representations of sounds in multiple formats, such as visual or tactile. Visual representations of speech in the form of interactive online midsagittal diagrams (e.g., Seeing Speech, Lawson et al. 2018) can be useful in this regard.

3. Practical suggestions. Drawing on these existing resources are excellent long-term strategies for making the IPA accessible to students with hearing or visual disabilities but may require a longer timeline or additional resources than an introductory linguistics instructor can quickly implement once determining they have a student requiring disability accommodations. Here, we offer practical suggestions instructors can employ to make their linguistics courses more accessible generally.

3.1. CONSULT WITH THE ACCESSIBILITY CENTER ON CAMPUS. Before developing a plan for a student who needs accommodation, instructors should first consult with advisors at the accessibility center on their campus (see, e.g., Rushforth 2019). Such advisors can provide guidance, insights, and

resources tailored to the specific needs of the student including information about assistive technology available in their office or tools that individual students may need to complete their coursework. This can include specialized software, hardware, or other accommodations that can help students with disabilities gain equal access to course materials.

3.2. CLASSROOM TIPS ON WORKING WITH STUDENTS WITH HEARING AND VISUAL DISABILITIES. To facilitate the learning experience of students with hearing or visual impairments, instructors should make certain adjustments in the classroom to address communication issues that may arise. Instructors may also consider alternative class activities and assignments that consider the students' abilities and strengths.

For blind or low-vision students, simple classroom and communication strategies are crucial. These strategies include: verbally describing what is being referenced or written on the screen; avoiding use of deictics without clear references; double-spacing handouts and data sets; using larger font sizes and high-contrast colors in presentations; and utilizing alternative formatting (such as tabs instead of tables for IPA charts and phonological data presentation) for improved use with screen readers. Additionally, alternative in-class activities or assignments that are more generally accessible can be employed. For instance, instead of having students label a midsagittal diagram, instructors can have students describe the location of articulators with respect to one another. Tactile learning can also be effective, such as by using pipe cleaners or embossed paper to work with IPA symbols (e.g., Wells-Jensen 2005; González & Hardison 2022).

When teaching a class with students with hearing disabilities, instructors should ensure that they are speaking only when facing the classroom or camera, referring to IPA symbols by name or articulatory description instead of solely by pronunciation, and providing interpreters or transcribers (who are generally not trained linguists) with names of IPA symbols and word lists with articulatory terms. For such students, emphasizing articulatory features over acoustic or transcription exercises may be beneficial, as is using visual representations of sounds and articulation (e.g., interactive midsagittal diagrams; Lawson et al. 2018). Instructors may also consider working with hard of hearing students to determine which sounds they have access to and design customized learning materials focusing on those sounds, something one of the authors did with a student of his (after careful consultation with the student and accessibility advisors). In just one meeting with the student, he went through a word list containing all the sounds of English to identify those sounds that were problematic. While the student received the same instruction as the rest of the class, their assignments and quizzes were tailored to include only those sounds they had access to. Finally, including lesson materials and assignments related to the phonetics and phonology of sign languages (e.g., teaching the concept of minimal pairs using sign language parameters) would foster an inclusive learning environment by acknowledging and respecting the linguistic system used and valued by Deaf communities (see Hochgesang 2019, 2022 and Zuraw 2020, 2022 for additional examples).

3.3. UNIVERSAL DESIGN FOR LEARNING. Educational institutions receiving federal funding are required (by section 508 of the Rehabilitation Act) to ensure that electronic and information technology are accessible to individuals with disabilities. As institutions increasingly enforce these policies to ensure online course materials are compliant with the Americans with Disabilities Act (ADA), there is a lot of pressure for instructors, who may only learn they have a student with a disability in the first week of class, to make such accommodations without adequate preparation, training, and time. With this in mind, instructors should consider working toward adopting the Universal Design for Learning (UDL) framework, a set of principles aimed at preparing lessons in a way that eliminates barriers and ensures equal access to learning for all

individuals. UDL principles emphasize providing multiple means of representation, engagement, and expression to accommodate diverse learning needs and preferences (CAST 2018). We urge instructors to adopt a proactive stance and work to design their current and future courses with UDL principles in mind, not just for their students who may need disability accommodations but for all students in their classes. This way, instructors will be prepared with ADA-compliant materials if/when they receive a request for accommodation.

Miller (2021) provides suggestions involving fairly simple changes instructors can implement in their online material to make them more accessible, e.g., incorporating alternative text for images, using heading styles for text-based documents, replacing hyperlinks with descriptive text, and choosing videos with closed captioning. Additional solutions include using a multisensory approach to learning to engage students with diverse learning styles or allowing students to submit assignments in different formats to accommodate their individual needs and preferences (e.g., allowing a final project to be submitted as a paper or as a video). Finally, many learning management systems have a tool (such as Ally for Blackboard or Canvas) that can be used to identify areas where accessibility can be improved and provide suggested fixes.

4. Concluding remarks. This article identifies ways instructors can enhance accessibility in their introductory linguistics courses, focusing on students with hearing and visual disabilities. In considering the suggestions offered, it is important to understand there is no 'one-size-fits-all' solution; each student's needs vary. For example, some Deaf students use sign language or interpreters, while others may rely on hearing devices, lipreading, and/or English transcribers. Similarly, some students with low vision may use Braille while others may rely on print magnification or screen readers. It is crucial to work with each student to determine their specific needs and identify those accommodations that will be most useful to them. We urge instructors to take proactive steps in making their courses more accessible, even if they do not currently have students with disabilities. Finally, we stress that redesigning course materials *takes time*. Instructors should aim for continuous improvement rather than immediate perfection. Since many changes made through learning management systems can be kept and carried over from course to course, it is useful for instructors to set realistic, achievable goals that can be built up and improved upon over time (Bjorndahl et al. 2024).

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