The Ohio State University Intercultural English Language Programs' Interactive IPA Charts

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1   Introduction

This resource is a collection of interactive International Phonetic Alphabet (IPA) charts, in PDF format with clickable IPA symbols that play an audio clip of each phone. They have been customized to cover the phonemic inventories of the most frequent languages of students in The Ohio State University's Intercultural English Language Programs (as of 2022).

There are a number of interactive online IPA charts that are useful teaching aids. The most basic one is the chart created by Peter Isotalo of the UCLA Phonetics Lab Archive, which plays an audio clip of the relevant phone when the user clicks on a phonetic symbol. More elaborate is the chart created by John Esling, of University of Southern California's Speech Production and Articulation Knowledge Group (SPAN). This one plays audio accompanied by real-time MRI (rtMRI) video clips showing Esling articulating the sounds. The audio can be paused and advanced frame by frame. Esling also includes minimal sets illustrating many English vowels, as well as several panphonemic passages in English. Even more useful are the charts created by Lawson, Stuart-Smith, Scobbie, and Nakai of the University of Glasgow's and Queen Margaret's University's Seeing Speech program. These charts provide not only audio and rtMRI clips of speaker Janet Beck for each sound, but also include black-and-white animations for the consonant articulations, which are sharper than MRI images, suppress irrelevant details, and show the teeth (which are invisible in MRI images).

However, all these charts share two drawbacks when it comes to ESL/EFL instruction. First, like IPA charts in general, these charts typically exclude (or relegate to a supplemental chart at the bottom of the page) certain phones that involve a suprasegmental articulation (such as aspiration) or are composed of multiple phones (such as affricates). But, for example, when English has two affricates and Mandarin has six, it's useful to be able to see all the affricates at a glance when you're trying to sharpen a speaker's awareness of the similarities and differences between the two languages' sounds.

Second, in addition to systematically excluding certain phones, existing charts also necessarily include too many phones for any given language. In looking at a full IPA chart, it is up to the reader to know which phones are part of the phonetic inventory of whatever language they're interested in, amidst the visual clutter of all the other phones. Learners of English are unlikely to have this knowledge, either for English or their primary language, at least at the beginning of their studies. Even if they know the phonemic inventory of a language, they might not know which phones correspond to which IPA symbols.

The charts available here avoid both of these problems, at least for the languages that are represented. For each language, the charts include its entire phonemic inventory, including the types that typically don't appear in IPA charts. In addition, the charts for each language include a version with IPA symbols, and a version in that language's native script or alphabet.

Earlier versions of these charts have already proven useful in my own teaching; they have also been a frequently sought-out resource on OSU's IELP webpages (especially in recent weeks, between the retirement of some HTML-based earlier versions of these charts, and the revised and corrected charts now available).

2   Using the charts

To use these charts, you will need to download the charts for the languages of interest, and open them with Adobe Acrobat. Unfortunately, unlike other interactive IPA charts, these cannot be used within a browser, but the PDF format allows for easier updating and correcting of the charts.

Clicking on a symbol will play an audio clip of the relevant phone. Consonants are presented in the format [Cə, əCə]. Vowels are presented in clips of 60-80 ms, uttered with a level F0 to the extent possible.

Unless otherwise noted, phones that are part of multiple languages are linked to the same sound file. This sometimes results in divergences from typical speaker pronunciations. For example, both English and Korean have aspirated voiceless stops, but in Korean, the difference in voice onset time between aspirated and non-aspirated stops is greater than in English. Even so, the same audio clips are used for both English and Korean for these phones. As another example, palatal consonants in some languages appear only adjacent to front vowels; thus, the sequence [əCə] would not be well-formed in those languages. The intent is not to have an L1-like pronunciation of all the phones in each language, but to give an idea of the commonalities and differences among phonetic inventories.

Sources are listed on the final page for each PDF.

3   Creating the charts

For each language, the chart creation process consisted of the following steps:

3.1   Researching the phonetic inventory

For this step, I used a variety of sources, starting with the relevant chapter of *Learner English* (Swan & Smith, 2001) if it existed, and the Wikipedia page for the language's phonology. If further clarification

was needed on particular phonemes, I searched the OSU Libraries' academic research databases for articles on that language's phonology, and additional ordinary internet searching to find whatever source out there might have the right detail. These sources included commercial language-learning sites and sometimes pages targeted to niche interests that happened to intersect with my phonetics question.

3.2 Creating the consonant charts

To create the consonant chart for a language, I made a copy of a master consonant chart in Microsoft Word, then deleted the unneeded rows, columns, and specific phones. I then made a copy of that chart and replaced the IPA symbols with the language's own orthography if it existed. Next, I saved each chart as a PDF file.

3.3 Creating the vowel charts

Creation of a vowel chart for a language followed the same sequence as for creation of a consonant chart. The difference was that all charts used the same vowel trapezoid, with the same height and anteriority bands. As with the consonant charts, I saved the Word charts as PDF files.

3.4 Assembling the PDF

To assemble the PDF, I duplicated a template consisting of a blank consonant chart, a blank vowel chart, and a blank references page, each with the metadata already included. I duplicated the blank consonant chart and vowel chart to allow for both IPA and native script versions. Then I added the PDF consonant chart(s), PDF vowel chart(s), and list of references as layers. With the charts in place, I then used the "rich media" tool to create a button for each phone, placed on top of the relevant chart cell with a transparent fill and border. (With later charts, I was able to "select all" to copy an entire table of buttons at once; paste it into the new chart; and make adjustments to the borders, and add and delete cells as needed.)

3.5 Creating the audio clips

To create the audio clips, I used Praat (Boersma & ??) with a Blue Snowflake microphone. I uttered each consonant in the format [Cə, əCə] multiple times. I then viewed the recording and selected a token that was between 1.6 and 1.7 seconds in duration, with 40-48 ms between the [Cə] and the [əCə]. For voiced consonants, I checked to make sure that the waveform was periodic for at least half of the obstruction phase. I also sliced out noticeable background noise.

I recorded the vowels with a similar process. I aimed to have an internally consistent set of vowels with respect to their F1 and F2. For example, my [i] might have a lower F2 than that of some other speaker, and my [e] might have a higher F2 than that of yet another speaker, but in choosing my tokens, I made sure that my [i] had an F2 higher than my [e] F2. Each vowel clip is between 60 and 80 ms in duration, uttered with a constant F0.

As the process went on, I recorded for each language only those phones that I had not already recorded in creating some other language's chart.

3.6 Adding audio clips to the buttons

I then returned to the buttons in the PDF charts and linked the relevant audio clip to each button. I added them just to the IPA version of the chart; then selected all to copy all buttons on one page

simultaneously. I pasted the result onto the PDF page with the native script, then adjusted borders as needed to allow for wider cells to accommodate some of the non-English symbols.

4   Closing remarks

If you have created clickable IPA charts in PDF form for other languages, we might be interested in linking to them from the Intercultural English Language Programs' Clickable IPA web page.

Corrections, or suggestions for improvement or other languages to cover, should be sent to Dr. Philip Neal Whitman, whitman.11@osu.edu.

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