

Harmonica Phonetics and the Harmonica Syllable

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Abstract

A range of speech sounds help shape harmonica music. Various advanced harmonica players occasionally mention speech sounds and phonetics, but only in passing. Too little has been discussed about this integral aspect of technique. Systematic phonetic information has been available since the 1930s. This short paper aligns relevant phonetic information with harmonica technique. It then proffers the “harmonica syllable” as a useful composition tool for learning and teaching.

spoken language vs harp speak

Two aspects of note greatly distinguish the collection of articulations and techniques used for playing the harmonica from familiar spoken language and from common musical instruments.¹

1. The harmonica plays on the in-breath as well as the out-breath.

2. Harmonica breath carries whispered (at times, sub-audible) language.²

But there’s more. The lowly jew’s harp can play, like the harmonica, on the in-breath as well as the out-breath. It has the novelty in the adroit mouth of playing varied pitches on the vowel formants, heard as pitches above the static pitch of the metal “reed”. And take the similarly lowly kazoo. It can play on the voiced sounds of language (in this case, hums), but not on the unvoiced sounds nor on the in-breath.

The purpose of mentioning these is to remind the seasoned player who is teaching the extreme beginner that alternating breath direction, *plus* making whispered language sounds, *plus* shifting to a higher or lower hole on the harp – these combine as a complicated set of unique coordinations found on no other instrument.

¹“Familiar” and “common” language and musical instruments because among the thousands of languages, and the musical instruments their speakers play, there’ve got to be some, to our minds, unimaginable.

²“Voiced language” is not part of harmonica technique, notwithstanding occasional enthusiastic primal grunts of supralaryngeal origin.

phonetics

The Term. *Phonetics*³ is a technical term in academic linguistics designating the study of all possible vocal tract sounds. The number and nuance of these is vast. Studying the inventory of sounds of a particular language is to study its *phonemes*. Every language has its own set of phonemes. The general study of speech sounds is *phonology*.⁴ “*Phonics*” is a word that has entered our vocabulary through the commercial enterprise, *Hooked on Phonics*, a system to teach reading and writing through phonemic awareness.

In studying phonetics, as a broad discipline within linguistics, there are fields of specialization. There’s auditory phonetics (hearing and perception), acoustic phonetics (physics), orthographic phonetics (written symbolization), and in the field of focus here, articulatory phonetics (anatomy and vocal tract mechanism).

An even cursory search of “phoneme” reveals that it is an abstract, complex concept. For harmonica phonetics purposes here, the face-value and

³Considerable credit for the formalization of Phonetics goes to philologist Henry Sweet (1845-1912). Philology, literally “love of language”, has disappeared, having been replaced by the more clinically approached “linguistics”. Professor Higgins in George Bernard Shaw’s *Pygmalion*, known to movie audiences as *My Fair Lady*, was modeled on Henry Sweet. “The rain in Spain...”

⁴“Phonology is a branch of linguistics concerned with the systematic organization of sounds in languages. It has traditionally focused largely on study of the systems of phonemes in particular languages”(Wikipedia).

less abstract understanding of the phoneme (i.e., speech sound) is entirely sufficient for learning and teaching. English has 42 phonemes.⁵

the International Phonetic Alphabet (IPA)

This is a collection of phoneme symbols evolved to map phonetics in general. Among the phonemes that constitute the speech sounds of English, a number of them have application to harmonica articulation technique. As listed, there are three vowels and nine consonants (two of which, the last two, are semi-vowels, also called glides, which have characteristics of *both* vowels and consonants).

consonants-stops

1. [ʔ], [k], [t], [p];

consonants-misc

2. [h], [tʃ], [l];

vowels

3. [ə], [i], [u];

semi-vowels

4. [j], [w].

The square brackets are conventional for displaying IPA notation. This set is presented as tentative/theoretical, and is intended to be neither final nor definitive.

quick-fix symbol translation and the Harmonica Syllable

An introductory clarification of each symbol is given, and its possible use in the Harmonica Syllable is proposed. The Harmonica Syllable can be vowel-consonant (VC), consonant-vowel (CV), or consonant-vowel-consonant (CVC). The phenomenon of “liaison” shows syllables sometimes being linked, as in the example “toot (pause), too” vs “tootoo”.

[ʔ] is the “glottal stop,” often mistakenly oversimplified as equivalent to a “cough”. It’s best identified with the click-sound heard at the start of a whispered vowel. It can both begin and end a syllable. The word “glottis”, technically, can refer to the

vocal cords or the opening between them, but appears to be more frequently used for and specifically descriptive of the opening.

[k], [t], [p] represent the normal-letter sounds. They are used to begin or end a syllable. There is no correct place for their articulation. As examples, a [k] is articulated farther front in the mouth when followed by [i] than it is when followed by [u]. A [t] can be articulated on the gums above the teeth, or even against the hole of the harmonica itself. The [p], though usually not thought of as a harmonica articulation, is perfectly logical as being one. The lips can be more or less puckered.

[h] in everyday-language is the audible turbulence before a vowel. Since in harmonica there is no voiced vowel, [h], when playing, is followed by a whispered vowel (or played as an inaudible whisper on a light breath). It is the only pulmonic (lungs) consonant. Pulsing with the belly or rib cage on a whisper gives h+vowel on the exhale or inhale. “Belly” is more practically descriptive than “diaphragm”. As a technique for rapid note alteration, it is very effective, but only when alternating the breath in and out, more-or-less panting. For repeated inhales or exhale, it is relatively slow.

[tʃ] is the “ch-” of “chug”. It is the only phoneme here with a compound sound. It begins with a “t” and is followed by “sh”. It can begin but not end a harmonica syllable. The “sh” merges into a high/front vowel range, such as “ee”. When used for the train effect, it changes vowel quality as in “cheeoo” or “cheeuh”.

[l] appears in the instructions of many harmonica teachers when they use “iddle” or “uhddle” articulations. The [l] can be used to begin or end a syllable. But [l] seems to be little used in that way. It’s most remarkable use is in playing rapid triplets, as in “uh-dl-luh”, “duh-dl-luh”, “duh-dl-duh”, or the like. The [l] has the distinction among English phonemes of being able to be articulated laterally. In this sense, it is the only non-symmetrical phoneme. Roughly speaking, it articulates twice: first, like a [d], the tongue touching the pallet – but then the tongue opens on the side (laterally) for a second stroke. So a two syllable “uh-duh” becomes the three syllable “uh-dl-la”.

⁵A search in Wikipedia shows languages with as few as 11 and as many as 112 phonemes.

[ə] is commonly called “schwa”. It is the most frequent vowel-sound in English and has the vowel quality heard in “the”. It is the neutral vowel. In speech, when vowels are on unaccented syllables, they tend toward this unemphatic vowel quality. It is likely to be the harp player’s default vowel. It’s the vowel of the hesitation pause, heard when someone is in thought, and says “uhhh”.

[i] has the Romance Language value as in English spelling, “ee”.

[u] has the value of the vowel quality of “too”.

[j] has the “semi-vowel” quality of the “glide” sound before the “-t” of “yet”. Phonetically classified as a “semi-vowel” or “glide”, it’s very much used in harmonica technique.

[w] has the “semi-vowel” quality of the “glide” sound before the “-t” of “wet”. It is, like [j], phonetically classified as a “semi-vowel” or “glide”, and is important for harmonica.

the problem with vowels and an introduction to formants

The whispered vowel is a contradiction in terms, sort of. Yet any harmonica note rides on an essentially whispered vowel.⁶

What makes a vowel unique are its formants. A specific vowel has at least five formants, the first and second are the most relevant. Formants are frequencies (itches) that are, by one definition, “peaks of acoustic energy”. But that, and other definitions, leave one in the lurch, able to repeat the definition, but without meaningful realization to back it up. Formants are not harmonics.

If a scale is sung on the syllable “oo”, the changing pitches of the scale steps comes from the vocal chords. However, the vowel quality of the “oo”, determined by its vowel formants, stays the same. No

⁶The word “vowel”, coming into English through French from Latin, indicated “vocal” or “voice”, thus making the “vocalized whisper” an oxymoron. Nonetheless, not only can we whisper a vowel, there are, in a sense, silent vowels, perhaps better called “potential vowels”. What does this mean? Even if we are absolutely silent and still, the resting vocal tract has inactive vowel resonances, such that if the vibration of the vocal chords or the breath of a whisper were to become engaged, a vowel would result, the potential frequencies of the resting tract being realized.

matter where in your vocal range you sing “oo”, the formant frequencies, which determine the vowel, stay the same.

An interesting experiment is to try to sing a scale with “oo” on a whisper. It can’t be done. If you further experiment, whistle a scale. Take away the whistle sound, only sounding the scale degrees as turbulence. You will hear the scale as ascending or descending whispered vowels.

Whispered vowels were observed to have pitches as long ago as 1781.⁷ The scientist of note, Hermann Helmholtz (1821–1894), was in the late 19th century, the theorist who identified formants.

For the harmonica, the formants contribute to resonance and the ability to bend and overblow. A simple direction to apply this idea: whistle the approximate note you want to bend or overblow, keep the shape inside your mouth, drop the tweet from the sound but keep the turbulence. Relax your lips then play around with it. Your harp, of course, has to be suited to play particular bends and overblows, firstly. Secondly, easier said than done.

vowels here used

For the current presentation, three vowels are used:

1. [i] as in “bee”,
2. [u] as in “too”,
3. [ə] as in “the”.

Central for the understanding of these ideas: vowels are spectral phenomena. English vowels can be diagrammed as points along continua. On analogy with mixing colors, mix the vowel formant frequencies one way and the quality goes in one direction; mix in another way and the quality goes in another.⁸

Vowels can be classified as somewhere on a grid matrix: high/front, high/back, low/front, low/back. Internet searches will show diagrams. For the harmonica player, [i] (the highest front vowel) and

⁷Search Christopher Friedrich Hellwag (1754-1835)+ vowels.

⁸Introducing another level of complexity, raising or lowering formant 1 (the lower pitched formant) and/or formant 2 (higher pitched) is the “mix” that moves the vowel quality along the spectral possibilities

[u] (the highest back vowel), are the vowels perceived as most distinct from one other. These are conveniently heard in the beginning and ending of the “glide” quality of the word “you” – going from high/front to high/back. And in the word “we”, in the opposite direction, the glide quality moves from high/back to high/front.



Figure 1. Hellwag vs Harmonica Triangles

In 1781, Hellwag elaborated the “vowel triangle”. The vowels with the greatest contrast in perception are indicated at the points, the other vowels (not here included) would be set at intermediate positions.

He used [i] as the top left of the triangle, [u] as the top right, and for the bottom point he used “ah” (the vowel in “father”). For the Harmonica Triangle, used here, “ee” and “oo” are used as the top two points of a continuum. Hellwag’s bottom point is omitted because “ah” needs the mouth open for its quality to be distinctive. The lips would have to open and no longer touch the harmonica.

The schwa [ə] is used here as the third vowel. This is the most common vowel sound in spoken English. Because it is typified by the tongue in relaxed position, it is likely to be the default vowel of the harmonica player when he is not thinking about vowels.

The study of vowels can be an ever expanding preoccupation.¹⁰

thoughts on consonants

In speech, vowels and consonants do not exist independently. When the harmonica student is asked, “play a ‘t’ sound”, he will most likely sound whispered [tə], that is, “tuh” – two phonemes.

If one speaks or whispers “ee”, it will usually be written in IPA as [i], but in fact, there is an introduc-

¹⁰Search google “professor carl vowels” for my simple presentation of the vowels of American English. Currently it has about 225,000 visits, plus the visits to sites having borrowed it.

tory glottal stop consonant, making the technically correct form [ʔi], not [i]. The distinction between voiced [ʔə] (“uh”) and [hə] (“huh”) is clear. But on the whisper, they need to be introspectively analyzed.

Glottal stop symbols are often not written in common practice. In fact they are usually not understood, even by many linguists, to be present at all.¹¹ The other stops, “k”, “t”, and “p” are clearly recognized as consonantal stops, but the glottal stop is more remote to usual thinking.¹²

In normally speaking “uh” and “huh”, the first syllable, “uh”, has a glottal stop at its start, whereas “huh” does not.

a final thought on “articulations” and harmonica syllables for the beginner student

The harmonica replicates many articulations and nuances found in common language. Students exposed to a notation system for practicing phoneme articulations (as harmonica syllables) have found doing so useful. Beginners focusing solely on note isolation find it slow going, uncertain, and frustrating, whereas harmonica syllables are for playing individual notes, and *also chords*.

Teachers might develop written sheets based on two- or three-hole chords with patterns of in- and out-breath, playing combinations of (VC), (CV), and (CVC). These would prepare the beginner for playing articulations on clean isolated notes when the note isolation technique is ready.

More advanced: play [hə, ʔə, kə]; or concentrate between [ʔi] to [ʔu], and then reverse it, [ʔu] to [ʔi]; and the glides [ju] to [wi]. Then play around with it, like [ijuwijuwi] – in more friendly symbols, “ee you wee you wee”. In this last there are no glottal stops.

¹¹The explanation for this is that all IndoEuropean languages, of which English is a family member, have their utterance-initial vowels begin with a glottal stop, and they are, so to speak, built into the vowels.

¹²When a student is asked to produce a “k”, “t”, or “p” sound, perhaps it is splitting hairs, yet the instruction might be better, make a *whispered* “g”, “d”, or “b” sound.