

Comparisons between speech and singing with focus on the synchronization process

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Speech has been studied in its phonetic details on experimental basis since the turn of the 19th to the 20th centuries, thanks to remarkable figures as Abbé Rousset. Thereafter, studies on the acoustics of speech, based mainly on the theory of Gunnar Fant, have gone through great development: just to name an example, the Journal of the Acoustical Society of America (JASA) has existed for nearly a century and devotes great part of its publishing to the acoustics of speech. A large body of work in which the phone and prosodic aspects, such as intonation curves, are alternately analyzed provides knowledge and understanding on how these speech units work.

Singing has also been the subject of many studies that deal with other phenomena that do not necessarily correspond to units. Broadly speaking, studies focus on articulatory maneuvers and their relation to energy, or on questions about intelligibility and emotion expression. Those aspects are clearly different from those investigated in studies on speech. This may be due to the fact that singing has never been a good candidate to enter the realm of speech, for epistemological reasons that will not be treated here.

In the present work, however, the tenet is that singing is a kind of speech, *sung speech*. A question is raised: how do speech and singing aspects intersect and how can such intersections be studied? What we do with speech and singing is at the same time artistic and puzzling. For example, intoning high notes and consequently causing loss of intelligibility, meaning no problem for the listener, or sustaining the same duration for both stressed and non-stressed syllables and keeping the lexical stress. However, very little is known on how we do whatever we do while singing, as to date this has been the subject of few descriptions and discussions.

For this round-table we will focus on the speech synchronization issue. In an exploratory study, we considered the relation between speech timing and metrical structure in both a poetic and musical context. Furthermore, we enriched the exploration of the relation between speech and musical rhythm by considering two types of musical rhythm: a simple 4/4 rock and a more complex samba rhythm. Dyads of subjects were formed by twenty self-professed competent singers and all of them were native speakers of Brazilian Portuguese. Thus, we recorded ten pairs of subjects, inside a booth, with head mounted microphones, singing two different songs, saying spoken versions of these songs and speaking a nursery rhyme and a prose text. The most important instruction for them was that they had to sing and/or speak in synchrony.

From the results obtained through estimation of synchronization based on Cummins 2009, we outlined planned comparisons among the six different types of speech. On the one hand, comparisons were between a nursery rhyme (metrical speech) and a prose text (speech devoid of metric). On the other side, comparisons were between two different song rhythms, a simple one versus a more complex one. Finally, a simple rhythm song was compared to a speech metric rhythm. For each comparison a simple t-test was run followed by a Bonferroni correction. As asynchrony values were not normally distributed, they were log transformed before statistical tests.

One of the results showed that the rock song facilitated synchronization between singers, while samba did not, suggesting that song temporal structure may have various degrees of proximity to that of speech. This and other results will be discussed in the light of the idea that relations between speech and singing deserve a more elaborated explanation than those simplistic ones that alternately claim that these are completely different phenomena or merely the same thing.

References

Cummins, Fred (2009). Rhythm as entrainment: The case of synchronous speech. *Journal of Phonetics*. 37(1):16-28.
