The phonetic characteristics of implosives in a Southern China dialect
Cun Xi
PhD student in The Hong Kong University of Science and Technology
humcunxi@ust.hk

Implosives are observed in the Min dialect of Hainan (海南) in South China. This study is going to explore the phonological contrast between the implosives and the voiced stops by investigating their phonetic characteristics. What is the distinctive feature between the implosives and the voiced stops is one of the controversial issues in the study of implosives. By definition, when producing implosives, there is negative air pressure in the mouth, and result in a momentary ingressive airflow into the mouth. However, many experiments (Ladefoged 1964: 6 & 1971:26-27, Lindau 1984:152, Pinkerton 1986:125-139, Nihalani 1991, Clements and Osu 2002) showed that the negative intra-oral pressure is not always present when pronouncing implosives; meanwhile positive intra-oral pressure is observed. This kind of phenomenon makes it a puzzle to distinguish implosives from the normal voiced stops phonologically.

In the Min dialect of Hainan (海南), the implosives and the voiced stops are phonologically contrast with each other. We made physiological record including the intra-oral air pressure, oral airflow, nasal air pressure, and nasal airflow of the two sets of sound. Comparing the aerodynamic data with the acoustic data, firstly, we found that the implosives are sometimes produced with a negative intra-oral pressure, but sometimes it is with a positive intra-oral air pressure. This is consisting with the previous studies. And secondly, we found that the implosive is produced with the increasing subglottal air pressure (as shown in Figure 1 (a) and (c)); this phenomenon is not present along with the voiced stops. When pronouncing the voiced stops, the subglottal air pressure decreases when more and more air coming up into the oral cavity and finally stops the vibration of vocal folds (as shown in Figure 1 (b) and (d)). In this way, we propose that the increasing subglottal air pressure should be the feature to distinguish implosives from the voiced stops.

Figure 1: (a) (b) are the transglottal air pressure of implosives and voiced stops before the explosion. (c) and (d) are the audio wave of implosives and voiced stops before the explosion. Implosives are produced with increasing subglottal air pressure, as shown in (a) and (c); the voiced stops are produced with the decrease of subglottal air pressure, as shown in (b) and (d).
Reference:
Nihalani, P. (1986) Phonetic implementation of implosives, Language and Speech, 29, 253-262