# How Many People Knock on the Table When Talking: An Investigation into Speakers' Individual Differences in Hand-Tapping Behavior

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Human sounds can be roughly divided into two categories: speech and non-speech sounds (Yarmey 2004, Janicki 2012). The latter include the non-speech sounds in spoken language (e.g. laughter or clicks) but also the sounds derived from body movements, such as sound of knocking, footsteps, etc. Traditional Forensic Speaker Recognition (henceforth FSR), which mainly relies on auditory-acoustic-phonetic approaches, puts more emphasis on speech sounds, especially phonetic-acoustic features of speech (Hollien 1990, Rose 2002, Yang et al 2005, Cambier-Langeveld 2008, Morrison 2009, Foulkes & French 2012). In FSR casework, it is generally required that the speech recordings to be examined meet certain conditions (e.g. in terms of quantity and quality). However, in practice, forensic phoneticians often encounter short recordings with insufficient speech units, making it difficult to compare the suspect's speech sample and the offender's speech sample. In such cases, the effectiveness of speech information is reduced, which will affect the forensic conclusion drawn by the expert.

However, in the recording material, in addition to the voice of the parties, sometimes there is some useful non-speech information. This includes the information that people intentionally or unintentionally convey with non-verbal sounds produced with the same vocal organs as speech, such as screaming, crying, coughing, breathing or laughing; but also concomitant sounds that may overlap with speech in a forensic recording (e.g. drinking water or making a variety of body sounds such as finger tapping, fiddling with some object, knocking on the table, etc.). Among these non-speech sounds, knocking on a table or finger tapping while talking is a common non-speech sound, at least according to the observations made by the authors throughout several years of forensic practice and also in view of informal feedback provided by other colleagues. To the best of our knowledge, no systematic study, however, has been attempted so far to investigate inter-speaker individual differences regarding these non-speech sounds or their frequency of occurrence.

This study examines the forensic importance of the different ways (See table 1) of knocking on the table as a possible basis for discriminating among speakers by forensic phoneticians. From statistics of knocking behavior among 445 young people(17-23 years old, 316 boys and 129 girls) of Chinese in a questionnaire, it was observed that only about 32.1% of the respondents have the habit of knocking on the table in their conversation, while the majority of the respondents do not have the habit. Furthermore, it is generally believed that men are more likely to knock on the table than women, and different people have different types of knocking and the ratio of different types are different too. In view of these findings, it is suggested that hand tapping or the way of knocking on the table is likely to be of assistance to forensic phoneticians in the examination of FSR cases.

**Table 1.** Different ways of knocking on the table.

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|---|---|---|---|
|  |  |  |  |
| 1. The whole hand clapping down with fingers closed together | 2. The whole hand clapping down with fingers apart | 3. Punch down with the fist eye up | 4. Hit with the face of the fist |
|  |  |  |  |
| 5. Tap with the four fingertips in turn | 6. knock down with the back of the hand | 7. Tap with fingertip of index finger | 8. Tap with four fingers together |
|  |  |  |  |
| 9. Palm up, tap down with the second finger joints | 10. Four fingertips strike together | 11.Palm down, tap down with the second knuckles | 12. Hit with the back of the fist |
|  |  |  | 16. Other ways of knocking on the table |
| 13. Tap with the outside of the middle finger | 14. Tap with the second joint of the middle finger | 15. Five fingertips poke down at the same time | |

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