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# A pilot study on Mandarin Cued Speech

Li Liu and Gang Feng

*Univ. Grenoble Alpes, CNRS, Grenoble INP\*, GIPSA-lab, 38000 Grenoble, France*

*\* Institute of Engineering Univ. Grenoble Alpes*

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## Abstract

To overcome the low performance of lip reading and improve the reading ability of deaf children, in 1967, Cornett invented a Cued Speech system which uses the hand gestures to complement the lips information to make all the phonemes of spoken languages clearly visible. It is reported that the Cued Speech system has been developed for more than 60 languages in the world. However, as far as we know, there seems no official accessible Mandarin Cued Speech. In this work, we propose a Mandarin Cued Speech system, which possesses several advantages, especially in terms of efficiency.

*Keywords:* Cued Speech, Mandarin Cued Speech

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## 1. Introduction

2 Cued Speech (CS) is a system<sup>1</sup> using the hand codes as a complement  
3 to the natural lip reading, invented by Dr. Cornett [1] in 1967 to make the  
4 hearing impaired people access spoken language easier. In this system, as a  
5 combination of different hand shapes and positions near the face, the hand  
6 coding complements the lip reading process to enhance the speech perception.  
7 More precisely, the hand shapes are used to code the consonants, while the  
8 hand positions on one side of the face or the neck are used to code the vowels.

9 CS is now becoming more and more attended by the world and has been  
10 adapted to over sixty languages for the moment. The *National CS Associa-*  
11 *tion* (NCSA)<sup>2</sup> for American English CS and *Cued Speech Association United*  
12 *Kingdom* (CSAUK)<sup>3</sup> for British English CS have been established to general-

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<sup>1</sup>A demo can be seen on Youtube: <https://www.youtube.com/watch?v=jn4e9V3oigs>

<sup>2</sup><http://www.cuedspeech.org/>

<sup>3</sup><http://www.cuedspeech.co.uk/>

13 ize this system. For the French CS, which is named *Langue Française Parlée*  
14 *Complétée* (LPC) [2], the ALPC<sup>4</sup> has been established. These associations  
15 have been trying their best to improve the communications between the deaf  
16 or hearing impaired children and the normal hearing family members through  
17 the CS system.

18 Although the CS system has been developed for many spoken languages  
19 in the world<sup>5</sup>, as far as we know, it seems that no official research work<sup>6</sup> has  
20 been dedicated to Mandarin version of CS. However, according to the *China*  
21 *Disabled Persons' Federation*<sup>7</sup>, about 21 million people have hearing loss out  
22 of the 60 million disabled people in China. For the moment, Sign language is  
23 the most popular method for the communication among Chinese deaf people.  
24 It will be meaningful if the Mandarin CS system can be developed, which will  
25 make the deaf people (especially deaf children) have better communications.  
26 On the other hand, it provides another way for people to learn Mandarin.

27 In this work, we propose an efficient and reasonable design for Man-  
28 darin Cued Speech (MCS) system, which satisfies the main criterion that no  
29 intersection between hand and lips coding (i.e., the phonemes which have  
30 similar lip shape should be distinguished by different coding). At the same  
31 time, the proposed MCS need coders spend minimum energy to use it. In  
32 our proposed MCS, five groups of hand positions and eight hand shapes are  
33 used to code vowels and consonants. More precisely, it uses minimum hand  
34 positions (five) to code all basic vowels without using any additional hand  
35 movement. All the combined vowels which start with [i,u,y] are coded with  
36 semi-consonants. The proposed MCS system possesses about 95% compati-  
37 bility with the French CS, which has confirmed its optimal performance.

## 38 2. The development of Mandarin Cued Speech

39 The MCS is based on the following criteria. In Mandarin, there are 35  
40 vowels, and about 20 of them are combined vowels beginning with [i,u,y] (i.e.,  
41 [ia, uai]). It causes a huge difficult to code them only with several hand po-  
42 sitions. We may add some additional movements to distinguish them. How-

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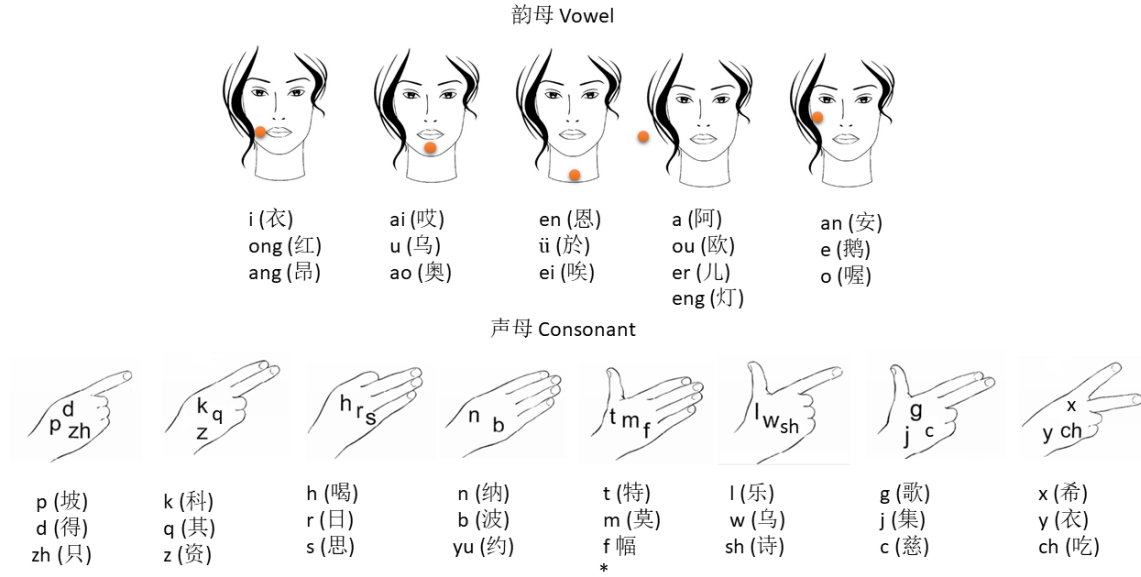
<sup>4</sup><http://alpc.asso.fr/>

<sup>5</sup><http://www.cuedspeech.org/cued-speech/about-cued-speech>

<sup>6</sup>An analysis of Mandarin CS is referred to <https://acroakingdalek.wordpress.com/2015/09/23/cued-mandarin-planting-the-seed/>.

<sup>7</sup><http://www.cdpc.org.cn/english/>

汉语全唇语表 Mandrin Cued Speech (MCS)



\*...This position also means an isolated vowel

Figure 1: The proposed chart for Mandarin Cued Speech.

43 ever, this coding system will be very complicated and be difficult for the CS  
 44 learners. Since [i,u,y] play a semi-consonant role in all these combined vowel  
 45 s, we propose to code [i,u,y] in case of combined vowels by semi-consonants  
 46 instead of vowels. This reduces the number of vowel from 35 to about 15,  
 47 which can be efficiently coded by 5 hand positions. In addition, we have  
 48 found these 15 vowels have a good correspondence with 15 French vowels,  
 49 which leads us to construct the MCS with a maximum compatibility with  
 50 French CS system.

51 All these considerations make us propose an MCS which is shown in  
 52 Fig. 1.

53 [1] R. O. Cornett, Cued speech, American annals of the deaf 112 (1967)  
 54 3–13.

55 [2] C. J. LaSasso, K. L. Crain, J. Leybaert, Cued Speech and Cued Language  
 56 Development for Deaf and Hard of Hearing Children, Plural Publishing,  
 57 2010.