

# Analysis of an invented writing system for the Shanghainese language

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## Abstract

The present study uses qualitative methods to analyze and restore an invented missionary writing system for the Shanghainese language, and uses the restoration to check for historical sound change. The project consists of two parts: the analysis and restoration of the orthography and the confirmation of historical sound changes in Shanghainese. The restoration of the writing system provides all symbols with equivalent International Phonetic Alphabet (IPA) symbols. Following the restoration to IPA is an explanation of the rules for combining initial and final symbols to form a single character, as well as rules for tonal distinction. The analysis of the restored orthography compares its development with the academic criteria for orthography development, and finds that it is a sound writing system. The evaluation also reviews the sociolinguistic criteria crucial for orthography acceptance, and shows that the writing system does not meet these criteria in present day Shanghai. The results of the check for historical sound change confirm that many of the sounds not found in present day Shanghainese existed in this writing system. The phones found in this writing system are able to confirm the disappearance or merger of various sounds in Shanghainese since the mid 19<sup>th</sup> century. Overall, the study shows that the invented writing system is sound, but would not be accepted in Shanghai today. However, it should be reviewed by other linguists as having the possibility to represent other languages.

## 1 Introduction

In 1854 a phonetic writing system for the Shanghainese language was invented by an American missionary. However, shortly after its publication it was abandoned and forgotten. The purpose of this study is to

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restore and analyze the writing system to establish its practicality; as well as to use it as a source to check for sound changes in Shanghainese between the mid 1800s and present. As an invented missionary writing system it will serve as a precious phonological source. The restoration and analysis of the writing system will fill a research gap of missionary documentation of what are now known as Chinese dialects (Zwartjes, 2018). Additionally, as both top-down and bottom-up language revitalization and maintenance movements have become more prominent in Shanghai in recent decades this study could prove useful towards solving the city's everlasting orthography issues.

This study contains two main parts, the first of which is the restoration and analysis of the writing system. To achieve this there will be a discussion of missionary linguistics and writing systems followed by a review of the history of the writing system and its author, Reverend T.P. Crawford. The writing system will then be explained and restored to contain entries for the International Phonetic Alphabet (IPA), which had not yet been invented at the time of its publication. Following the restoration will be an analysis of the practicality of the writing system. This analysis will be performed by comparing it to other invented writing systems for Chinese dialects and written forms of Shanghainese; as well an evaluation based on various academic sources for orthography development. The second part of the study will use the restored orthography to confirm sound changes in the contemporary Shanghainese language.

As Zwartjes (2018) points out, there is a huge gap in the literature of the missionary documentation of Chinese dialects. Since the language reforms of the 1950s, Mandarin was the favored language and thus many dialects have been forgotten in academic publications. This study will be the first complete restoration and description of this orthography. Over the past century, as Shanghai has grown and developed into the most populated city in the world it has surely been exposed to other Chinese and foreign languages and has thus experienced more rapid phonological changes than most languages experience in hundreds of years. This writing system, which has never been used as a source to check for sound change, can now be a concrete reference for phoneticians to compare sound changes for Shanghainese from the mid 19<sup>th</sup> century.

To accomplish its objectives this the study will aim to answer the following questions: Is this a thoroughly developed, useful, and practical writing system that is possible for the average person to learn? Could it ever effectively be used today to represent Shanghainese or any other language? What historical sound changes are evident upon comparing the phonological properties of the orthography to those of modern Shanghainese?

## **2 Theoretical Issues and Literature Review**

### **2.1 Missionary Linguistics**

Although missionary linguistic work is often rebuffed today, to say that missionary linguistic fieldwork has not been beneficial to the development of linguistics would simply not be true. Many, if not most of today's languages, received their linguistic descriptions from missionaries (Hovdhaugen, 1996). Early explorers seldom bothered to learn native languages and often produced biased reports about their vulgarity and lack of proper grammar and vocabulary. In times of exploration it was often viewed by Europeans that if a language did not contain a proper written grammar and writing system that it was not a real language. Fortunately, it was one of the missionaries' main goals to learn the local languages in order to convert the locals. In order to achieve this they needed to learn the local tongue and then translate the religious scriptures into the native language. Working alongside local informants, early missionaries were in effect the first professional linguistic field workers. Nearly all historic grammars and scientific collections of languages were not created by linguists, as the study of languages had not yet been established as a scientific field (Nowak, 1996) Although the grammars produced by missionaries were intended to help future missionaries learn the local language more quickly, they could also be used to promote literacy among the locals, most importantly to be able to read the bible (Hovdhaugen, 1996). For example, Dutch missionaries in Taiwan accompanied by the Dutch East India Company, produced a writing system for many of the local languages, allowing natives to read in their own language for the first time, and to aid in converting them to Christianity (Heylen, 2001).

Missionary works that used the Roman script are particularly useful phonological resources and can be used by phoneticians searching for historical sound change. They are often some of the only remaining resources for severely endangered, or sometimes already extinct languages (Zwartjes, 2018). As the field of endangered language documentation and revitalization continues to grow, missionary linguistics resources are proving to be priceless assets.

### **2.2 Orthographies**

There are thousands of different writing systems, or orthographies, used throughout the world. These orthographies can be divided into three broad categories: ideographic/logographic, syllabic, and alphabetic. Ideographic orthographies represent languages by using graphic symbols to represent ideas rather than words, and logographic orthographies use written characters to represent morphemes or words rather than ideas. Examples of these types of orthographies are Egyptian hieroglyphs, Chinese characters, and Mayan. Syllabic orthographies use the syllable as the main elements, which are represented by a symbol, usually made up of a consonant plus a vowel; this is the case in most Japanese symbols (Campbell & Moseley, 2012). Alphabetic orthographies contain letters

that, separate or combined, represent the consonants and vowels for the language. The most used alphabets in the world are the Roman and Cyrillic alphabets, which are used to represent hundreds of languages (Sasson, 2004).

The orthography that is the focus of this study can be described as a phonemic alphabet, where every symbol has strictly one sound/phone. Two symbols, an initial and a final, are combined to form one syllable, the equivalent to one character in Chinese characters. The design of the symbols in this kind of alphabet is not necessarily important as long as they remain constant throughout the system and are easily distinguishable (Nida, 1964).

### **2.3 Orthography development**

There are numerous factors that constitute what makes a sound writing system. These include the design of the orthography, and sociolinguistic factors such as standardization, promotion of the orthography and local/national politics. In order to promote and maintain literacy in a given language it must be represented with an appropriate orthography. Many languages are poorly represented with the Latin alphabet because of the huge differences in sound inventories (Sasson, 2004). As no two languages in the world have the same phonology, an orthography that is designed for one language will fail to accurately represent another language, although if the sound systems of two languages are similar, minor adaptations to the orthography may suffice (Munro, 2014). Many scripts such as the Latin and Cyrillic scripts appear easier to read than other scripts, but can be difficult to pronounce when used for other languages. Numerous scripts that appear extremely difficult to learn and read are usually easy to pronounce once learned. Cahill (2014, p. 10) states that an effective orthography is not only a) linguistically sound, but is also crucially b) acceptable to all stakeholders, and c) usable. Smalley (1964) cites five criteria for a sound orthography: 1. Maximum motivation for the learner, 2. Maximum representation of speech, 3. Maximum ease of learning, 4. Maximum transfer, 5. Maximum ease of reproduction. Furthermore two rules exist for the representation of speech; every symbol must always represent the same phoneme and every phoneme must always be represented in the same way (Munro, 2014). When developing an orthography, even if they are not trained in linguistics, it is essential that native speakers have input, and that the orthography is easy for writers to use, in order to promote literacy (Snider, 2014). It is crucial that the characters are easily distinguished from one another. Hinton (2014) reminds us that we often underestimate the difficulty of learning many phonetic alphabets. The IPA, for example, does not do a very good job of visually distinguishing many consonants, making it very difficult to memorize and use, even for linguistic students.

The vast majority of the nearly 7,000 languages in the world are tonal languages. However, very few of the orthographies for these languages actually represent tone, often causing serious obscurities when

being read (Lojenga, 2014). With African languages in particular tone is often left out of the orthography so that it resembles the non-tonal national or regional language (Cahill, 2014). Tonal representation in an orthography is often debated by the language community as well as linguists for three main reasons: tonal representation is not found in English or any other romance language, it is difficult to analyze, and people often think that it looks extremely difficult to read and are thus discouraged from learning it. Lojenga (2014, p. 54) says that the four different ways of marking tone in an orthography are 1) accents, 2) punctuation, 3) numbers, and 4) unused consonant letters. The chosen method for marking tone often depends on the amount of tones found in the language and whether the language has stable or moveable tones. The tones in certain languages, such as Shanghainese, change depending on the other tones around them, other tonal languages have tones that remain constant. Using accents is most useful in languages with three or less tones, and punctuation is more useful with those with more than three tones as it is easier to read. At the time of invention of the Crawford orthography the City group of Shanghainese that Crawford modeled his orthography on was a moveable tonal language with eight different tones. Tonal representation in this orthography was shown in two different parts by punctuation, this will be further discussed in the explanation of the system.

Even if an orthography looks perfect to a linguist there are still many other factors that will determine if it will actually be used or not, if the native speakers or the local government do not approve of it, it will simply never be used. Gaur sums this up in saying:

Writing systems are essential elements of the political infrastructure and enable people to express their ideas and present their views to the world. (Gaur, 1985)

Certain governments, often those that govern over countries with numerous languages, often have laws regarding orthography usage and development, and require approval of individual orthographies. Governments frequently see non-compliance of these laws and regulations as an act of rebellion towards the state (Cahill, 2014), often resulting in many problems for the minority group, increasing the potential for a strong government reaction (Karan, 2014). After government approval, it is essential to receive the support of the language community. Community members must not only be involved in the creation of the orthography, but its promotion as well. Four important factors of orthography promotion are community participation, the contribution of local authors, the production of literature, and the support of the school system (Wedekind

& Wedekind, 1997, p. 26). Only once an orthography has been correctly developed and approved by a language community can it be extended to the wider language community and begin to spread on its own (Adams, 2014).

#### **2.4 Other orthographies for Chinese languages**

If available, missionaries would use a foreign script to produce their works, but if none were available they had to decide whether to use an existing script from another language, or to adapt or invent a new one. If the local script was too difficult, the missionary would employ a Romanized version (Zwartjes, 2018). Nonetheless numerous scripts have been developed by locals and foreigners in Taiwan and China over the years, maybe as many as 2,000 different phonetic systems alone (Chen, 1994) For example in 1915 missionary James Ostram Fraser developed a script for the Lisu people of Yunnan Province. This orthography is an adaptation of the Roman script and employs only uppercase roman letters, with additional letters that are rotated versions of the originals. Fraser utilized a system of dots and colons next to the letters to indicate tone. This writing system, officially recognized by the Chinese government in 1992, is still used by the Lisu people today.

Another well-known script among Chinese linguists is the Pollard Script. This script was invented by missionary Samuel Pollard in 1936 for the Western Hmong speaking Ta Hwa Miao people of Yunnan Province. This orthography consists of simple shapes to represent the initial consonants followed by an attached diacritic symbol to represent the final vowel sound. The position of the final vowel indicates one of the four tonal values (Campbell & Moseley, 2012). The script is still used among Hmong inside and outside of China.

Since the beginning of the 20<sup>th</sup> century there have been numerous attempts at creating phonetic writing systems for Chinese. Chen (1994) identifies the five major Romanization attempts of the century as Guanhua Zimu ‘Mandarin Alphabet’ in 1900, Zhuyin Zimu ‘Sound-annotating Alphabet’ in 1918, Gwoyue Romantyh ‘National Language Romanization’ in 1926, Latinxua Sin Wenz ‘New Writing of Latinization’ in 1931, and most notably Hanyu Pinyin ‘Phonetic Alphabet for Chinese’ in 1958. The second attempt at Romanization, Zhuyin Zimu, proved most successful in Taiwan where it is called Bopomofo. It is still used there today to represent various Formosan languages and is used as the main input method for Chinese characters into computers and mobile phones. Although missionaries on the mainland invented Zhuyin Zimu it was quickly picked up in Taiwan and was used to represent the Paiwan, Atayal, Bunnun, Amis, Drukai, Yomi, and Sediq languages (Smalley, 1964). This script consists of 39 phonetic symbols representing the initials and finals, combining to form a word, similar to the Crawford script.

The most famous Romanization is Hanyu Pinyin, which was invented by linguists during the 1950s, most notably Zhou Youguang. It is the only recognized Romanized script in Mainland China to represent

standard Mandarin and is used throughout the world to teach Chinese to foreigners. Pinyin has become the standard entry method for Chinese characters into computers and mobile phones.

### **2.5 Identifying sound change**

As the Crawford orthography was developed before the IPA existed and there are no living speakers of 19<sup>th</sup> century Shanghainese, normal methods of sound change analysis cannot be used to check for sound change in this situation. However, other sources from the same time period can be used to establish the closest approximate. Few linguistic resources about Shanghainese phonology exist before the 20<sup>th</sup> century, however two missionary works with phonological notes from the mid 1800s can be used to help establish the phonology of mid 19<sup>th</sup> century Shanghainese: *Joseph Edkins' 1853 Grammar of Colloquial Chinese, as Exhibited in the Shanghai Dialect*, and *Reverend John Macgowen's 1862 Collection of Phrases in the Shanghai Dialect*. Once the phonology of Crawford's orthography has been restored using these sources it can then be compared amongst the less scarce resources of the 20<sup>th</sup> century to establish sound change.

### **2.6 Shanghainese phonology**

Shanghainese is a sub-variety of Wu Chinese, one of the seven main varieties of Chinese languages. As Shanghai is the economic and cultural center of the Wu speaking area, Wu is often incorrectly labeled in English as Shanghainese. However, Wu is divided into many different varieties, Shanghainese simply being the most well known. Shanghainese can be further broken down into five varieties based on their tonal systems; the Chongming group, Jiading group, Songjiang group, Liantang group, and the City group; the characteristics of which can all be found in Chen (2003). Chen identifies the City group as the downtown urban area where the Huangpu River and Wusong Rivers meet in Shanghai. For the purposes of this study, particularly referring to historical sound change, only the City group will be referenced.

The entire Wu variety is famous among linguists as being extremely diverse as it shares a very low percentage of mutual intelligibility with other varieties of Chinese. It shares only 29% of the lexicon with standard Mandarin (Tang & Heuven, 2015). Today it is estimated by Ethnologue that there are 80.1 million Wu speakers, with 14 million speakers of Shanghainese. Shanghainese has more vowels than most varieties of Chinese and has maintained its initial stops and affricates unlike Mandarin and Cantonese. Unlike other Asian tonal languages the Shanghainese tonal system is more similar to many African languages. It has two phonation registers distinguished by voiceless and breathy voiced initials. Modern Shanghainese has five tones, instead of four like Mandarin, and is actually more similar in pitch accent to Japanese than many Chinese varieties (Duanmu, 1994).

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Following the common Chinese syllable structure, Shanghainese can be divided into initials, finals and tone. The initial consists of a consonant and the final, a vowel. According to Chen (2003) the modern City group contains 28 initials, 43 finals and 5 tones.

### **2.7 Language situation in Shanghai**

Since the 1950s language reforms in China, standard Mandarin, or Putonghua, has been promoted as the national language. In the early 1950s only 41% of the population could understand Putonghua, the figure rose to 90% by 1984 (Chen, 2007). Due to the promotion of Putonghua, although the population of Shanghai has doubled in the last 20 years, the proportion of Shanghainese speakers has fallen from 80% to 50% (Wellman, 2013). Not only has Shanghai's urban development, and the promotion of Putonghua led to a drop in the transmission of Shanghainese, it has also led to an overall language shift towards standard Mandarin. For example, Liu (2012) identifies the recent shift in pronunciation of "I" in Shanghainese from [ɲu:] to [u:] which shows the loss of the [ɲ] among young speakers of Shanghainese. This study will further identify sound changes that have taken place between the present, and the invention of Crawford's orthography.

## **3 T.P. CRAWFORD AND HIS INVENTION**

Tarleton Perry Crawford was born in Warren County, Kentucky, USA on May 8<sup>th</sup>, 1821. At the age of 16 he converted to Christianity. In 1848 Crawford began his studies at Union University in Murfreesboro, Tennessee and graduated at the top of his class in 1851. In 1850, one year before he finished his studies, he vowed to dedicate his life to missionary work in China. At the end of 1850 the Foreign Mission Board of the Southern Baptist Convention in Richmond, Virginia appointed him as a missionary to Shanghai. After just one week of engagement, he married Martha Foster on March 12, 1851. On November 17<sup>th</sup>, 1851 the Crawfords sailed from New York, arriving in Shanghai on March 30<sup>th</sup> 1852. Only a few months after arriving Crawford began to spend most of his free time inventing a writing system for the Shanghainese language (Bostick, 1892).

Shortly after his arrival in Shanghai one of Crawford's colleagues, Reverend Dr. Taylor, presented a report to the Monthly Missionary Conference on the sounds of the Shanghainese language, using Roman letters and diacritics for tones. The committee appreciated Taylor's report, but upon further discussion it was evident that it was not possible to correctly express all of the sounds of Shanghainese by just using the Roman alphabet. The conference decided to create a committee to develop a new system of symbols to represent the sounds of Shanghainese. Being a newcomer, Crawford was not amongst the members, but being extremely interested in the language he was granted permission to attend all of the meetings. After agreeing on all of the sounds it was decided that each member of the committee would develop their own system and that the best would be selected at a special conference. Although Crawford was still

not a member of the committee, he also began to develop a system of symbols for his own pleasure. He describes how he first got the idea for his invention:

I began trying after a fashion, to invent a series of signs for writing the dialect on the initial and final basis, but without any satisfactory result. Quite a number of seemingly good starts broke down before reaching the middle of Dr. Taylor's list of sounds, which perplexed me not a little. One day while thus engaged, my eye incidentally falling upon the Chinese character for door (門) the thought occurred that its form might serve as a base of procedure. Turning the backs of its two parts together, I first made a number of initial signs on the left perpendicular, then a number of final signs on the right perpendicular. This beginning, crude as it was proved to be a start in the right direction, and much encouraged me though the work still seemed beset with difficulties. But, proceeding on in this way, the thought finally occurred to me that one perpendicular stroke would serve for separating the initial and final parts far better than two, by making the characters become much more simple and compact, which proved correct. (Crawford, 1888, p.101)

After more than a year of developing the symbols, one of the committee members presented Crawford's system to the special conference. The committee soon recommended that all missionaries in the area use Crawford's phonetic system. Crawford reported that a few of them learned it well and also taught it to the Chinese people that they knew; at one point there were a few hundred locals who were able to read and write using the new symbols. Unfortunately, only a few years after Crawford's invention began to take off, he and all of the other foreign missionaries who used the phonetic system had left Shanghai. In 1863 Crawford was posted to Tongzhou near Beijing where he adapted his phonetic symbols for Mandarin, but nothing was ever produced or printed using it. Nearly 35 years after its invention, Crawford finally published his phonetic system to the public in the March 1888 *Chinese Recorder and Missionary Journal*. In his description of the writing system Crawford declares his opinion on Chinese characters and dialects stating:

Through the course of ages they (Chinese characters) have become so numerous and complicated in form and sense as to place their acquaintance hopelessly beyond the reach of the common people, seven-tenths of whom are now

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wholly unable to read intelligently. But new subjects, new relations and new ideas must continue to force themselves upon the attention of the people from every direction, demanding both verbal and written expression in some way. The common characters being already complete and crystallized around the thought of the past, and therefore unable to meet the requirements of the age, must inevitably be superseded by the living dialects of the land, as was the case in Europe. Chinese hieroglyphics, like their Egyptian predecessors, are doomed to the tomb and the antiquary. (Foster, 1909, p.353)

In between arriving in China in 1852 and his last publication in 1888, Crawford and his wife produced various publications such as a phonetic primer for Shanghainese, Catechisms, Mandarin grammars, and a translation of *The Three Maidens in Phonetic Characters*, most of which have been lost or destroyed. In October 1900 the Crawfords sailed home to America for a short visit, however T.P.'s health began to decline and they returned to Georgia to stay with family. On April 7<sup>th</sup>, 1902 T.P. passed away. His wife Martha returned to China in October 1902 and passed away 7 years later in Liaoning. (Foster, 1909)

#### **4 Explanation and Restoration**

Various versions of manuals for Crawford's phonetic writing system exist, during this study I had access to two different manuals, and recently discovered a third. The first manual is called *Xin zi Shanghai tu yin* (新字上海土音) (New Characters for Vernacular Shanghainese) and was first printed in 1854, shortly after it would have been accepted by the special committee in Shanghai. This manual contains the Crawford symbols alongside Roman equivalents and an example in Chinese characters. The second manual is titled *Shanghai tu yin xie fa* (上海土音写法) (Writing Vernacular Shanghainese) and is a non-dated work from the Oxford Library Bodleian Digital Archives. This manual only contains examples of equivalent sounds in Chinese characters. These manuals have slight aesthetic variations amongst them but do not differ in the sounds that they represent, both were used for this study. The third manual, which was discovered after the restoration was already complete, is titled *Dialect of Shanghai, China*, and can also be found in the Oxford Library Bodleian Digital Archives; it does not contain a publication date.

Crawford's phonetic writing system can be described as a phonemic alphabet in which all symbols are divided into the initial consonant and the final vowel; one initial symbol and one final symbol are combined to make one syllable, which in Shanghainese, like Mandarin, may or may not be a separate word. The 1854 manual contains 41 initial symbols and 38

final symbols; the second manual contains 40 initial symbols and 38 finals; the Bodleian manual contains 41 initials and 38 finals. Some symbols differ between the manuals, this will be discussed below. The basic framework of this writing system is a perpendicular line; all consonants exist to the left of this perpendicular line, all vowels to the right.

All rules for this writing system were translated from traditional Chinese characters in the manuals mentioned above, or found in Crawford's notes from his 1888 Chinese Recorder Publication. A small upward hook to the left at the bottom of the perpendicular line determines whether the tone is in the upper (yin 阴) or lower (yang 阳) tonal class; if there is a hook the word will be in the lower tonal classification. This makes Crawford's system unique from nearly all others as tonal classification is partially built into the phones themselves and not added on separately. Crawford employed a system of dots to further determine tone; some of them built into the final symbols themselves, some found near the corners of the final characters. A dot in the lower left of the final character represents the first (ping 平) tone. A dot on the upper left corner of the final character, regardless of dots to the right of the perpendicular, represents second (shang 上) tone. A dot on the upper right corner of the final character, regardless of dots to the right of the perpendicular represents third (qu 去) tone. No dots around the outside of the final character, regardless of dots inside the character, represents fourth (ru 入) tone. Two dots to the right of the perpendicular are not a sign of tone, but rather that the vowel is nasalized.

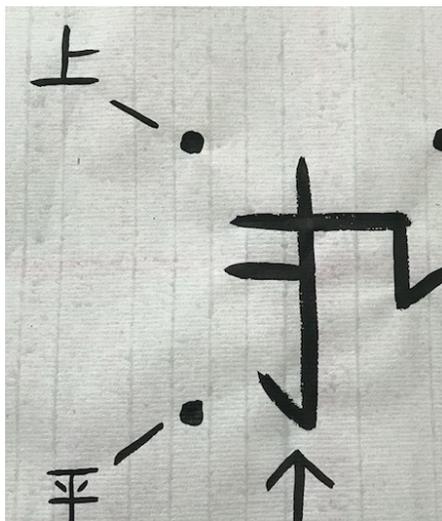


Image 1

If there is a right triangle on the left of the perpendicular this is an indication that the consonant is aspirated, if there is no triangle the

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consonant is sonant. A small square to the left of the perpendicular line indicates that the consonant is nasalized. If there is a single horizontal line on top of the perpendicular line this is an indication that the consonant is guttural. A right slanting upward stroke to the right is an indication that the consonant is liquid. A stroke to left in the middle of the perpendicular line is an indication that the consonant is dental. Two strokes to the left near the top of the perpendicular line are an indication that the consonant is labial.

All final vowel sounds are made to the right of the perpendicular line. As stated above if there are two dots to the right of the perpendicular line this is not an indication of tone, but that the vowel is nasalized. A single dot to the right of the perpendicular indicates that the final ends in a glottal stop. If there are two strokes to the right of the perpendicular, one big and one small, this is an indication that the vowel is a diphthong.

The 1854 manual contains an entry not found among the other manuals;  [tɕ']. In the updated IPA this symbol has received the equivalent sound as another symbol, initial 9, perhaps when Crawford made these symbols they represented different phones, which have now merged into the same. The same situation arises for the 12<sup>th</sup> and 15<sup>th</sup> final entries; both have been given the same current IPA entry, but it is likely that when they were created were to distinct sounds. The Bodleian manual contains an entry not found among the other manuals; . It is likely that this symbol is simply a merger of the initial [ŋ] and a labiovelar approximate final. This symbol most likely represented the [ŋu:] sound that Liu describes as changing in modern Shanghainese to [u:].

To restore the Crawford phonetic writing system for current use I worked with two native Shanghainese speakers, both familiar with Shanghainese sound changes. With the help of my advisor we were able to compare the data found in the Crawford manuals alongside the Shanghainese grammars from the 19<sup>th</sup> century previously mentioned, as well as modern Shanghainese phonological descriptions. As it nearly impossible to be 100% accurate about the mid 1800s phones for Shanghainese the IPA equivalents provided are what we deem to be the sounds for modern Shanghainese; except of course for those sounds that have disappeared.

#	SYM	Manual DES	EX	IPA	#	SYM	Manual Des	EX	IPA
1		k	鸽, 梗	[k]	22		ny	娘, 念	ŋ
2		g'	辮, 茄	[g]	23		p	不, 叭	[p]
3		k'	磕, 揩	[k']	24		p'	泼, 派	[p']
4		kw	骨, 刮	[kuɔ]	25		b	孛, 排	[b]

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5		gw	骨, 环	[guɔ]	26		ng'	元, 俨	[ŋ]
6		k'w	阔, 筷	[k'uɔ]	27		ng'	元, 衙	[ŋ]
7		ky	吉, 姜	[tɕ]	28		m	末, 妈	[m]
8		j	及, 掘	[dʒ]	29		m	末, 埋	[m]
9		ch	歉, 腔	[tɕʰ]	30		f	拂, 法	[f]
10		t	答, 搭	[t]	31		v	佛, 伐	[v]
11		d	台, 潭	[d]	32		w	活, 娃	[ua]
12		t'	脱, 贪	[tʰ]	33		w	活, 槐	[ua]
13		ts	执, 勺	[ts]	34		hw	忽, 歪	[hua]
14		dz	侄, 着	[dz]	35		s	失, 栅	[s]
15		ts'	出, 绰	[tsʰ]	36		z	舌, 柴	[z]
16 <sup>1</sup>		l	拉,	[l]	37		h	吸, 哈	[h]
17		l	拉, 冷	[l]	38		h	合, 鞋	[h]
18		n	纳,	[n]	39		y	叶, 耶	[i]
19		n	纳, 捺	[n]	40		y	叶, 药	[i]
20		ch'	七	[tɕʰ]	41		sh	歇, 罇	[ɕ]
21		ny	釀, 捻	ɲ					

#	SYM	Manual DES	EX	IPA	#	SYM	Manual Des	EX	IPA
1		a'	挨, 加	[A] <sup>2</sup>	19		ing	丁, 庭	[iŋ]
2		a'h	扼, 格	[aʔ]	20		oh	恶, 客	[oʔ]
3		ang	樱, 梗	[ã]	21		ong	盎, 缸	[õ]

<sup>1</sup> Certain initial symbols contain identical IPA entries because they are the same phone but contain different tonal values. For example, initial entries 16 and 17 both contain the IPA entry [l], they are the same phone, but 16 belongs to the upper tone class and 17 belongs to the lower tone class. This occurs for 6 other sets of entries in the initial table.

<sup>2</sup>Small capital A: A fully open central unrounded vowel. Cf. Geoffrey Pullum and William Ladusaw (1996)Phonetic Symbol Guide. The University of Chicago Press. 2<sup>nd</sup> edition.

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4		ia'	爹, 借	[ia]	22		uh	革, 刻	[əʔ]
5		ie'h	爵, 雀	[iEʔ]	23		ung	恩, 根	[əŋ]
6		iang	钙, 祥	[iã]	24		u'	乌, 哥	[u]
7		rh	N/A	<sup>3</sup>	25		ung	翁, 公	[oŋ]
8		'h	鸭, 夹	[Aʔ]	26		o'	跨, 朵	[o]
9		ah	监, 铅	[uE]	27		o'h	屋, 谷	[oʔ]
10		e'	哀, 该	[E]	28		â	凹, 高	[ɔ]
11		illegible	鸽, 磕	[əʔ]	29		iâ	凋, 挑	[iɔ]
12		e'u	庵, 甘	[ø]	30		eu	伋, 勾	[ɣ]
13		ö	追, 随	[uø]	31		ieu	丢, 酒	[iɣ]
14		öh	曷, 葛	[əʔ]	32		ü	於, 居	[y]
15		öh	安, 干	[ø]	33		ün	云, 君	[yn]
16		i'	衣, 鸡	[i]	34		û	朱, 除	[un]
17		i'eh	烟, 坚	[iʔ]	35			时, 之	[ɪ]
18		ih	一, 吉	[iəʔ]	36		ui	而	[ər]

## 5 Evaluation

Having restored the Crawford system for modern use it can now be evaluated on linguistic and sociolinguistic factors, as well as by comparing it to the other writing systems discussed in the study. These factors will cover all of the main linguistic criteria for orthography development, as well as tonal representation; and the sociolinguistic criteria for orthography approval and usage.

Linguistically, the Crawford system meets many of the requirements for orthography development discussed above. For example, the Crawford system meets Munro's (2014) requirement that one symbol must represent only one phoneme, and that one phoneme must always be represented by the same symbol. In his notes Crawford mentions working with an unidentified local to learn Shanghainese and develop his writing system, although input from more than one source may have proven more beneficial, Crawford still meets Sniders (2014) requirement that native speakers need to have input into the development of the orthography.

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<sup>3</sup> A dark ending

Some of the symbols in the Crawford system look very similar to one another, but this is because they belong to the same phone class, characters of different phone classes are not too similar to one another, meeting Hinton's (2014) requirement that characters are easily distinguished from one another.

Representing tone becomes increasingly difficult for languages with numerous and moveable tones. Crawford's idea to insert a hook at the bottom of the perpendicular line to divide between lower and higher tones is extremely practical, as it essentially lowers the number of tone signs needed from eight to four. The use of punctuation (dots) alongside the perpendicular line for tone indication makes the tones in Crawford's system easy to recognize, this is in agreement with Lojenga (2014), who says that tonal representation by punctuation is better than representation by accents in languages with more than three tones. Having met the linguistic criteria for orthography development, it can be said that Crawford's system is linguistically sound.

In order for an orthography to be successfully incorporated into a language community it not only needs to be accepted by those who are going to use it, but also often needs approval from the local and national government. According to the October 2000, 'Law of the People's Republic of China on the Standard Spoken and Written Chinese Language' Putonghua is the national language and Standard Chinese characters the national orthography. The law also states "all ethnic groups have the freedom to use and develop their own spoken and written languages" (Pan, 2016). However, as the majority of the Shanghainese speaking population is of Han ethnic background, this law does not technically apply to them. At this stage it is unlikely that the Chinese government would accept any other writing system for Shanghainese other than Chinese characters. In recent years Shanghainese has been in decline, with many under the age of 18 not speaking it anymore. It is likely that if the Crawford system were introduced in Shanghai, it might receive some interest from the older population, but it is unlikely that it would receive much interest by a young generation who is not concerned with keeping Shanghainese alive.

Governmental and social factors unfortunately impede the Crawford system from meeting many of the sociolinguistic factors required for orthography acceptance. For example the system meets two of Cahill's (2014) requirements in that it is linguistically sound and usable, but it is not necessarily acceptable to stakeholders. It meets Smalley's criteria for 'max representation of speech' and, 'max ease of learning', but does not meet the criteria for 'max motivation for learner', 'max transfer', or 'max ease of reproduction'. It is also unlikely to meet any of Wedekind and Wedekind's (1997) requirements of community participation, participation of local authors, production of literature, and support of the school system.

In comparison to the Fraser and Pollard scripts it is clear that the Crawford system falls short in terms of community and governmental acceptance. Both the Fraser and Pollard scripts are still used today and the Fraser Script was officially accepted by the Chinese government. Although

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the Crawford system has not seen the same success as these systems it still has a better design. The Fraser system is similar to the Crawford in that it uses similar symbols to represent phones of the same class, however tonal representation in the Fraser script is confusing and difficult to read. The Pollard system contains too many symbols that are all very similar and difficult to differentiate. The Crawford system has a superior design in how it distinguishes phones of the same and different classes, as well as in clear tonal representation.

Although Crawford's writing system would fail many of the sociolinguistic criteria in order to be accepted in Shanghai today, this does not mean that it is a failed writing system. Reviewing the linguistic criteria it is clear that this is a sound writing system that accurately represents all sounds of the Shanghainese language. Now that this system has been restored it is possible that it may one day be used by minority groups in and outside of China to represent their unwritten languages.

## **6 Historical Sound Change**

Between the mid 1800s to the 1920s Shanghai's population exploded from around 544,000 residents to over 2.64 million. During this time influence from outside immigrant dialects, particularly the nearby Suzhou dialect, affected the City Group of Shanghainese the most. Between the 1920s and 1950s the City Group of Shanghainese continued to be influenced by nearby dialects, particularly the Jiading and Ningbo dialects. However after the People's Republic of China was established in 1949 most of the influence on the City Group of Shanghainese has been from the promotion of Putonghua. This section will compare the Crawford system with others from the same time period, followed by a comparison of these established sounds with material from other time periods to check for sound changes.

To establish the phones of mid 1800s Shanghainese two reliable sources exist. The first is a grammar by Joseph Edkins published in 1853; the second a phrase book published by Reverend John Macgowan in 1862. Zhongmin Chen (2003) has updated Edkins' list of initials and finals with IPA. Edkins only list 28 initial phones in Shanghainese and in the Crawford initial table above there are 41. This is simply because Crawford was more particular about his break down of initial sounds. For example, in the Edkins initial table there are three entries for plosive velars; [k], [k'], and [g]. We see the same entries for 1-3 in the Crawford table, however we do not find equivalents for 4-6 in the Crawford table in the Edkins table. This is because they begin with the same sound, but Crawford chose a different initial length than Edkins, choosing to add the following [uɔ] sound in his initials, rather than leaving it for the finals. The other reason for the large amount of initials in the Crawford system, as mentioned previously, is because some of the symbols have tone built in to them and do not represent different phones, but the same phone with different tones. The reverse situation exists for the final sounds. The Edkins table lists 60 finals, and the Crawford table only 36; this is because many of the

finals not found in the Crawford list have been listed in the initial table. Nevertheless, upon examination of the tables it can be established that all of the phones in the Edkins table can also be found in the Crawford table.

Chen (2003) compares Edkins' and Macgowan's sources to establish the following: [dz] and [z] initials were becoming interchangeable. In Crawford's manuals these sounds are listed with different examples, but both sounds exist, most importantly the [dz] which was beginning to disappear at this time. Furthermore Chen discusses the merger between the final stops [-ʔ] and [-k]. In Crawford's manual he discusses that the finals -h, -k, -p, and -t exist in his system but does not explain how this is done. Upon examination of the finals it appears that finals with a single dot in the middle contain the glottal stop at the end, and the speaker is supposed to know whether the sound is -h, -k, -p, or -t. As Crawford did not find this matter important enough to explain this shows that at the time the coda merger was already taking place and that the distinction between the final stops was less important.

A final important cross-reference with these sources is that of tone in which they both identify Shanghainese as having eight distinct tones, also confirmed by Crawford. This is important, as these are some of the only remaining missionary texts that give eight tones for Shanghainese.

The tables show that certain vowels, which now contain identical IPA entries, have different Crawford symbols. This is evidence that over time these vowels have changed from having different positions in the mouth, but have now lost these differences. Final number 34 also shows that rounding, which is now obsolete, was used in mid 1800s Shanghainese.

At the beginning of the 20<sup>th</sup> century Shanghainese was undergoing many sound changes due to neighbouring dialects. For example the number of initials had dropped by one to 27, and the number of finals had dropped to 51 from 60 (Chen, 2003). The lower second and lower third tone had merged by this time giving Shanghainese 7 tones (Chao, 1928). The coda merger to all codas becoming a glottal stop was fully complete by this time and the loss of another tone was already beginning to take place. By the 1950s Chen (2003) identifies 27 initials and 43 finals and an eventual drop to five tones with the final merger of the lower first, second and third tones, as well as the merger of the upper second and third tones. Beginning in the 1950s Shanghainese received most of its influence from Putonghua, however the phones remained constant up until the 1990s when Chen lists Shanghainese as having 28 initials and 43 finals. A list of recent changes, particularly with nasalised vowels and checked finals can be found in Chen (2003, p. 184). Although many of the major sound changes took place well after the mid 1800s Crawford's system provides us with more concrete evidence of the changes that were taking place at the time. Crawford's system proves the existence of the now lost initial [dz], the existence of the different final codas before their eventual merger into a glottal stop, and additionally the numerous original tones before their mergers.

## **7 Conclusion and Discussion**

The objective of this study was to restore and analyse the Crawford writing system in order to answer three main research questions; 1. Is this a sound writing system? 2. Could it be used to represent Shanghainese or other languages? 3. What sound changes can be confirmed? Upon analysis it is clear that this is a sound writing system, meeting all of the orthography development requirements discussed in the literature review. After a discussion of the sociolinguistic situation in Shanghai it is not likely that this orthography would ever be used to represent Shanghainese in the present, however this writing system could easily be adapted to represent other multi tonal languages. By comparing the restored writing system with other sources from the same time period numerous sound changes have been confirmed.

This study has helped to fill the gap in missionary linguistic studies by not only restoring this forgotten writing system, but also by discussing its author and his timeline of developing this orthography. The restoration has provided new insights into the process of orthography invention, development, and acceptance. Although this writing system was not successful in Shanghai and is unlikely to be accepted there today it easily meets all rules for orthography development, rules that were developed long after its invention.

This study was limited in the amount of research I was able to perform on historical sound changes. Studies of sound changes in Shanghainese are numerous and this study merely sought to provide another source for mid 19<sup>th</sup> century Shanghainese. Many of the sources used for this study were also either incomplete, or damaged; making the restoration and analysis very difficult. There are also very few sources available about T.P. Crawford and other Baptist missionaries in Shanghai. It is my hope that more sources will be digitally archived to provide researchers with more opportunities to perform missionary linguistic research. I am optimistic that this study will encourage others to explore archives to try and discover lost works that have yet to be restored and analysed. Most importantly of all I hope that this writing system can one day be used to represent an unwritten language.

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