

Wenzhounese ideophones: Phonosemantic mapping, marking and semantic domains

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I hereby declare that, except where it is otherwise acknowledged in the text, this thesis represents my own original work.

All versions of the submitted thesis (regardless of submission type) are identical.

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Signed

A handwritten signature in cursive script, reading 'J. Daley'.

Joseph Daley, October 2023

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Abstract

Many languages contain ideophones – ‘[members] of an open lexical class of marked words that depict sensory imagery’ (Dingemanse, 2019, p. 16). Despite growing interest, few languages have received extensive description of their ideophonic lexicons. This thesis is a description of ideophones in Wenzhounese, a Wu (Sinitic) language known for its complex tone sandhi. The three main areas of inquiry are how Wenzhounese ideophones are marked, how they employ mimesis in order to depict sensory imagery, and the kinds of sensory imagery they depict. The analysis is based on data collected from several native speakers in Sydney and Melbourne, as well as data from a Wenzhounese dictionary (Shen & Shen, 2009). Firstly, I present evidence for a marking system including reduplication, tone, and semantic radicals. An additional elicitation-based experiment was conducted, showing that unlike other Sinitic languages, there is no evidence tone sandhi is involved in marking. I then demonstrate several phonosemantic correlations, revealing mimesis occurring at the level of the sound. Finally, I discuss the semantic domains of ideophones using a semantic map developed by Van Hoey (2022) and show that they are broader than many other Sinitic languages previously studied. Based on the semantic domains observed, I also propose a refinement to this typological tool.

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Glossing conventions and abbreviations

The glossed examples in this thesis are presented as follows:

洋	皂	瀑
yyi2	sse4	bbo8
ocean	soap	waterfall
Soap bubbles		

The first line contains the example written in simplified Chinese characters. In examples for which no characters are available, or for which the characters are not necessary, this line may be omitted. The second line contains the pronunciation of the example, rendered using Shen and Shen's romanisation system (Shen & Shen, 2013). This system was created by the authors of the Wenzhou to Mandarin dictionary referenced throughout this thesis and is the most widely used romanisation system for Wenzhounese. It is quite intuitive for those already familiar with Chinese Pinyin. A conversion table between Shen and Shen's system and IPA can be found in Appendix 1. The third line contains a morpheme by morpheme translation, following the Leipzig glossing rules (Comrie et al., 2008). The one additional abbreviation is "id.". This is used in the case of an imitative syllable in an ideophone whose character is used only for its phonetic value rather than to indicate a particular morpheme. Examples that differ from these conventions include row labels.

天不怕
地不怕
就怕温州人说温州话

Fear not the heavens, fear not the earth, fear the
Wenzhounese man speaking Wenzhounese

Chapter 1. Introduction

Speakers around the world use ideophones to vividly depict the most sensorially immediate elements of the world around them. Whether they are used to mimic a loved one or recount a dangerous experience, ideophones and the emotional response they elicit are an important part of the vibrancy of language. In recent decades, ideophones have received increasing scholarly attention, including several crosslinguistic typologies (e.g. Akita & Dingemanse, 2019; Dingemanse, 2018; Van Hoey, 2022). Ideophones in many languages, however, are yet to receive any dedicated study.

This thesis is a description of ideophones in Wenzhounese, a Sino-Tibetan language spoken in Southeast Zhejiang province, China. Although Wenzhounese is spoken by as many as seven million people, its study in Western linguistic contexts has been relatively limited. Wenzhounese is a member of the Wu sub-branch. Wu languages differ from Modern Standard Mandarin in their vocabulary, phonetics, tonology, and tonetics. Even within the Wu sub-branch, there are significant differences and low levels of mutual intelligibility between languages. Wenzhounese is known for being particularly divergent and difficult to understand for speakers of other Sinitic languages due to its use of archaic Middle Chinese vocabulary and complex system of tonal alternation. This system of tonal alternation, known as tone sandhi, is

perhaps the most widely recognisable feature of Wenzhounese (Cao & Maddieson, 1992; Chao, 1967).

As of yet, there has been no dedicated study of ideophones in Wenzhounese. This thesis aims to establish that ideophones do constitute a significant word class in Wenzhounese and to describe their most significant characteristics using data collected from native speakers and lexicographical resources.

Mark Dingemanse defines ideophones as “member[s] of an open lexical class of marked words that depict sensory imagery” (Dingemanse, 2019, p. 16). This definition contains several salient elements: ideophones must be marked, ideophones must depict rather than describe and ideophones must depict sensory imagery. These salient elements form the basis for the three major research questions addressed in this thesis.

The first research question concerns the marking of ideophones in Wenzhounese. According to Dingemanse, ideophones may be marked through reduplication, prosodic foregrounding and intonation among other means. Research into ideophones in other tonal languages has found that tone is also an important part of marking, both in terms of the frequency of certain tones and altered tone sandhi (Mphande, 1992; Thompson, 2018; Thompson & Do, 2019). Other studies find that reduplication is the most significant element of marking in many Sinitic languages (Dingemanse, 2015; Van Hoey, 2015, 2023).

This thesis analyses marking in Wenzhounese ideophones along several lines. First, an elicitation-based experiment is conducted, investigating the differences in tone sandhi between ideophones and prosaic words. Secondly, the frequency of the high-level tone in ideophones is investigated, along with its role in marking. Next, reduplication in ideophones is analysed, revealing a complex system involving full-reduplication, rhyme and alliteration with different realisations depending on the number of syllables. Finally, the role of a specific semantic component of the Chinese character in the marking of written ideophones is discussed.

The second research question concerns iconicity: how do ideophones depict rather than simply describe sensory imagery? In order to depict sensory imagery, there must be a non-arbitrary relationship between the ideophone and its referent. One way iconicity manifests is through probabilistic associations between certain sounds and certain meanings, referred to as phonosemantic mapping. Phonosemantic mapping in ideophones is investigated using a methodology detailed in a study recent study by Thompson and Do (2019). Salient elements of meaning and various features of sound are coded using binary values, allowing contingency tables for each sound-meaning pair to be created. Results indicate that several crosslinguistically common phonosemantic correlations also occur in Wenzhounese, demonstrating iconicity at the level of the sound. Evidence is also presented for iconicity at the suprasegmental level.

The third research question concerns the semantic domains expressed using ideophones in Wenzhounese. The semantic domains expressed using ideophones differ crosslinguistically. Some languages allow only ideophones that depict sound – onomatopoeia. Others allow ideophones depicting sound, vision, somatosensation and inner senses. The semantic domains expressible by ideophones have been studied in several Sinitic languages, including Middle Chinese and Mandarin. I use two typological tools – an implicational hierarchy and a semantic map (Dingemanse, 2019; Van Hoey, 2022) to quantify and visualise the semantic domains in Wenzhounese. Results indicate that the semantic domains are broad, providing evidence for the existence of a robust class of ideophones in the language, comparable to more widely studied languages such as Korean and Japanese. I also compare the semantic domains expressed using ideophones in Wenzhounese to those in Middle Chinese, emphasising the similarity between the two languages. Finally, I investigate instances of multisensoriality or synaesthesia in Wenzhounese ideophones and propose a possible amendment to Van Hoey’s semantic map.

The thesis is structured as follows. Chapter 2 reviews the literature on ideophones and iconicity. Chapter 3 provides background on the Sinitic branch and the Wenzhounese language. Chapter 4 details the research on ideophones in Sinitic languages and motivates the current study. Chapter 5 details the collection of data using elicitation tasks and lexicographical resources and the identification of ideophones

to create a database for analysis. Chapters 6-8 form the analysis of the three major research questions. Chapter 6 contains an analysis of phonosemantic mapping and other sources of iconicity in Wenzhounese ideophones. Chapter 7 details the role of tone sandhi, tone, reduplication and semantic radicals in the marking of ideophones. Finally, Chapter 8 employs several typological tools in order to document the semantic domains depicted by ideophones in Wenzhounese.

Because each chapter employs different methodologies, I first introduce the methodology, then discuss the results and limitations.

Chapter 2. Iconicity and ideophones

Ideophones, as imitative words, contain iconicity. This chapter reviews the literature on iconicity, ideophones and the relationship between the two. Section 2.1 discusses the difference between iconicity and arbitrariness in language. Section 2.2 discusses ideophones and the types of iconicity they may display. Section 2.3 examines several tools used to compare the ideophonic lexicons of various languages.

2.1. Arbitrariness and iconicity in language

The Saussurian dictum of the arbitrariness of the sign states that a linguistic sign is a two-sided psychological entity made up of signifier and signified. The signified is the entity or idea being referenced. The signifier is the combination of sounds, gestures, and/or written characters used to refer to it. Crucially, Ferdinand de Saussure asserted that the relationship between signifier and signified is ultimately arbitrary and exists due to social convention (Yakin & Totu, 2014). This is illustrated by the fact that the same signified is expressed through entirely different signifiers in unrelated languages. Arbitrariness is assumed to be the default in lexical items crosslinguistically. But not all words are entirely arbitrary. Non-arbitrariness occurs in language in two main ways: systematicity and iconicity. These will be discussed in turn.

2.1.1. Systematicity

Morphological processes such as affixation predictably modify meaning through derivation and inflection (Van Langendonck et al., 2010).

Something of the meaning of derived or inflected forms is transparent to speakers of a language even if the root lexical item is unknown. This grammatical phenomenon is known as *systematicity* and is non-arbitrary. Studies show systematicity may influence perceptions about which word class particular lexical items belong to (Dingemanse et al., 2015).

2.1.2. Iconicity

In iconic lexical items, something of the meaning of the signified is reflected in the form of the signifier (Dingemanse et al., 2015). Although different languages may emphasise varying elements of the signified, the non-arbitrary relationship between sound and referent means that iconic lexical items display crosslinguistic similarity. They can be identified with better than chance probabilities in psycholinguistic experiments (Dingemanse et al., 2015; Lockwood & Dingemanse, 2015).

Study of iconicity has historically been restricted to onomatopoeia; words in which the sound of the signified is imitated by the signifier (Dingemanse et al., 2015; Van Langendonck et al., 2010). Familiar examples of onomatopoeic words include “bang”, “crash” and

“drip” in English. Onomatopoeic words imitate the sounds of humans, animals, nature and inanimate objects (Assaneo et al., 2011). Many forms of iconic expressions other than onomatopoeia are, however, used crosslinguistically. The first of these is phonosemantic mapping, in which certain sounds are probabilistically associated with certain meanings (Joo, 2020; Thompson et al., 2021).¹ The second, more relevant to this thesis, are expressions in which other elements of the meaning of the signified such as size, weight, repetition, distribution, intensity and duration are reflected in the signifier (Dingemanse, 2019; Dingemanse et al., 2015). These expressions are known as ideophones and are discussed in more detail in the next section.

2.2. Ideophones

An ideophone is defined as ‘A member of an open lexical class of marked words that depict sensory imagery’ (Dingemanse, 2019, p. 16). This definition contains several salient elements: the establishment of ideophones as a lexical class, how they are marked, how they depict sensory imagery and the types of sensory imagery they depict. The final three of these constitute the main inquiries dealt with in this thesis. Study of ideophones requires investigation of both systematicity and iconicity: systematicity informs the crosslinguistic variance in the

¹ Phonosemantic mapping does occur in ideophones, as discussed in Chapter 6, however, much of the existing research is also on phonosemantic mapping in the prosaic lexicon.

marking of ideophones, as well as their existence as a lexical class in various languages, while iconicity informs the types of sensory imagery they depict and how they depict them (Dingemanse et al., 2015). This section contains an overview of the history of the study of ideophones followed by an examination of the literature on their more specific features - marking and semantic domains. These specific features form the basis of much of the research in this thesis.

Ideophones were first described in prehistoric grammars of Sanskrit and later in 17th century Japonic grammars. In the 19th century, western grammarians described large ideophone inventories in several west-African languages (Dingemanse, 2018). This did not, however, lead to ideophones becoming a mainstream area of inquiry in western linguistics. Former Oxford chair of philology, Max Müller, described ideophones as ‘the playthings of language’, leading to their marginalisation as an area of academic inquiry (Dingemanse, 2018; Müller, 2013).

The last few decades have seen a resurgence in the study of ideophones. The book section *Are ideophones really as weird and extra-systematic as linguists make them out to be?* emphasised that ideophones are best studied in their linguistic context due to their tendency to bend rather than disregard entirely the rules of their languages (Newman, 2001).

This century, much of the scholarship regarding ideophones has, in fact been language specific. Mark Dingemanse has published several

works on ideophones in the Niger-Congo language of Siwu (Dingemanse, 2009, 2011a; Dingemanse & Akita, 2017). Kimi Akita has written extensively on ideophones in Japonic (Akita, 2013, 2021). Bonnie Mclean has also published several works on Japonic ideophones (McLean, 2021, 2019; McLean et al., 2022).² Tomas Van Hoey has described ideophones in Sinitic languages in several publications (Van Hoey, 2015, 2018, 2020, 2022, 2022). The literature on ideophones in Sinitic languages is still, however, concentrated around Mandarin, Cantonese and Middle Chinese, with relatively few publications on ideophones in less widely spoken languages. The present study provides empirical evidence for the existence of ideophones in a less widely spoken Sinitic language, and adds another point of comparison for those interested in the phenomenon.

Ideophones are, by definition, marked words. They are marked through intonation, phonotactics, reduplication, prosodic foregrounding and non-adherence to morphosyntactic rules among other methods. The ways in which they are marked vary crosslinguistically, however, unlike interjections they tend to bend rather than entirely break phonetic and phonotactic rules. They are at least somewhat lexicalised, sometimes taking inflection and rarely occurring as stand-alone utterances (Dingemanse, 2019). The systematicity in language specific marking of ideophones is one criterion by which they may be established as a unique word class.

² Ideophones are often referred to as mimetics in Japonic linguistics.

The semantic domains expressed by ideophones also differ between languages. Some languages have a minimal ideophonic lexicon containing only onomatopoeia, while others contain ideophones depicting semantic domains such as distribution and internal feelings. The reason for this lies in the different types of iconicity inherent in the depiction of different semantic domains. The relevant types of iconicity are imagic iconicity and diagrammatic iconicity.

2.2.1. Imagic iconicity

In the case of imagic iconicity, the signifier resembles the signified by virtue of sensory characteristics or perceptuomotor analogy. This is the type of iconicity in onomatopoeic words such as 'bang' and 'swish'. Given that spoken language is transmitted through sound, the most readily available perceptuomotor analogy is the use of words which sound like their referents.

2.2.2. Diagrammatic iconicity

In the case of diagrammatic iconicity, relations between parts of the signified are represented by similar relations between parts of the signifier. It is important to note that the individual parts in each side of the linguistic sign need not resemble one another in isolation. An example of an ideophone containing diagrammatic iconicity would be one in which repeated action is represented through reduplication (Dingemanse et al., 2015). This can be seen in the English example

‘zig-zag’ – two syllables differing in one element (their vowels) represent two or more movements differing in one element (their direction).³ The relationship between the types of iconicity and the crosslinguistic prevalence of various semantic domains in ideophones is discussed further in section 2.3.

Diagrammatic iconicity is also a feature of some writing systems. Notably, some Chinese characters clearly resemble their referents through the relationships between their parts. For example, in the Chinese character for *net*, visible in Figure 1, none of the individual lines resemble individual parts of a net. The character as a whole, however, does resemble a net.

Figure 1 - Iconicity in Chinese characters

Character	Meaning
火	fire
马	horse
网	net
山	mountain

This phenomenon is relevant to the study of Sinitic ideophones because the characters in polysyllabic ideophones often share common semantic radicals. In the Chinese writing system, radicals are

³ The word ‘zig-zag’ is used to demonstrate diagrammatic iconicity although it may not be an ideophone in formal terms.

components of characters indicating something of the characters' meaning and often located on their left-hand side (Van Hoey, 2015).

Based on the aforementioned cross-linguistic research, several typologies of the iconicity and systematicity of ideophones have been published (Akita, 2021; Dingemanse, 2017, 2018; Dingemanse et al., 2015). Most relevant among these for this thesis are the publications detailing cross-linguistic hierarchies of iconicity. These are discussed in the following section.

2.3. Hierarchies of iconicity

An important insight gained through cross-linguistic study of ideophones is that the semantic domains expressed using ideophones differ in a predictable way across languages based on types of iconicity used to depict them. Ideophonic lexicons minimally contain ideophones depicting sound, as this is the most readily available perceptuomotor analogy in spoken language.⁴ Other languages contain ideophones expressing more varied semantic domains expressed by less readily available analogy. An important observation is that languages containing ideophones expressed through less immediate analogy will also contain ideophones expressed through more immediate analogy. This observation was formalised in an implicational hierarchy proposed by Mark Dingemanse, shown in Figure 2 (Dingemanse, 2012).

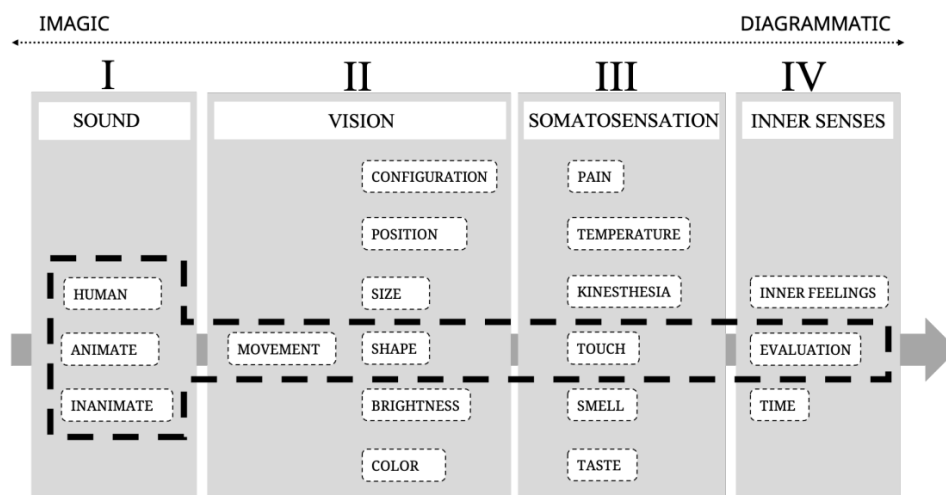
⁴ In signed languages, the most readily available perceptuomotor analogy is to spatial relation and movement. These are the most common semantic domains expressed through ideophones in such languages.

Figure 2 - Implicational hierarchy for ideophones (Dingemanse, 2012)

SOUND < MOVEMENT < VISUAL PATTERNS < OTHER SENSORY PERCEPTIONS < INNER FEELINGS AND COGNITIVE STATES

Dingemanse's implicational hierarchy states that a language with ideophones depicting, for example, visual patterns, will also have ideophones depicting movement and sound. This implicational hierarchy has subsequently been adapted by Bonnie Mclean and Thomas Van Hoey (B. McLean, 2021; Van Hoey, 2022). Van Hoey's revision is a semantic map, splitting each element of the implicational hierarchy into subsections allowing easier crosslinguistic comparison. Van Hoey's semantic map is shown in Figure 3.

Figure 3 - Semantic map for ideophones (Van Hoey, 2022)



Van Hoey's semantic map is the primary tool used in this thesis to investigate the semantic domains expressed through Wenzhounese ideophones.

Chapter 3. Language background

This chapter aims to provide the background information required to understand Wenzhounese both in terms of its relationship to other Sinitic languages and in terms of its salient features. The chapter also describes aspects of its structure that are particularly relevant to the present study. Section 3.1 explains the relationship between the Sinitic languages and their common ancestor - Middle Chinese. Section 3.2 explains relevant terminology related to Sinitic languages and Mandarin. Sections 3.3, 3.4 and 3.5 examine the geographical distribution and salient features of the sub-branch and group to which Wenzhounese belongs. Finally, sections 3.6 and 3.7 provide background on the Wenzhounese language itself as well as its sociolinguistic situation.

3.1. Sinitic languages and Middle Chinese

Wenzhounese is a Sino-Tibetan language and member of the Sinitic branch. The Sinitic languages are spoken in mainland China, Taiwan and Hong Kong, as well as by diaspora groups around the world. They form one of the two major branches of the Sino-Tibetan language family. The Sinitic languages are typified by basic vocabulary linking them genetically to the Tibeto-Burman languages to the north and an isolating morphosyntactic profile typical of Southeast Asian languages (DeLancey, 2013). Although some Sinitic languages occasionally

display fusional characteristics such as allomorphy and non-linear exponence, the family as a whole is typified by clear morphological boundaries and a lack of infixation (Arcodia, 2015).

Proto-Sinitic likely originated from contact between an archaic Tibeto-Burman language and languages from southeast Asian families such as Austroasiatic, Tai-Kadai, and Hmong-Mien. This contact may have precipitated tonogenesis and a shift toward isolating morphology. Many modern typologies of Sinitic agree that all contemporary Sinitic languages are descended from Old Chinese, the literary standard of the Spring and Autumn period (roughly 770-480 BC) (Handel, 2015; Norman, 1988). Other studies do not discuss the historical Sinitic languages but appear to mirror these conclusions based on the typologies presented (LaPolla, 2017; Shafer, 1955).

In his article titled *The classification of Chinese*, Handel (2015) posits that all modern Sinitic Languages except for the Min languages are descended from Middle Chinese, a language spoken around the time of the Tang dynasty (618-907 AD). As Min languages are not discussed in this thesis, their inclusion or exclusion as a descendant of Middle Chinese is not relevant. All modern Sinitic languages discussed herein are treated as descending from Middle Chinese.

Although the term *Chinese* is often used to refer to the Sinitic languages as a group, many Sinitic languages are not mutually intelligible (Handel, 2015; Norman, 1988; Tournadre et al., 2008).

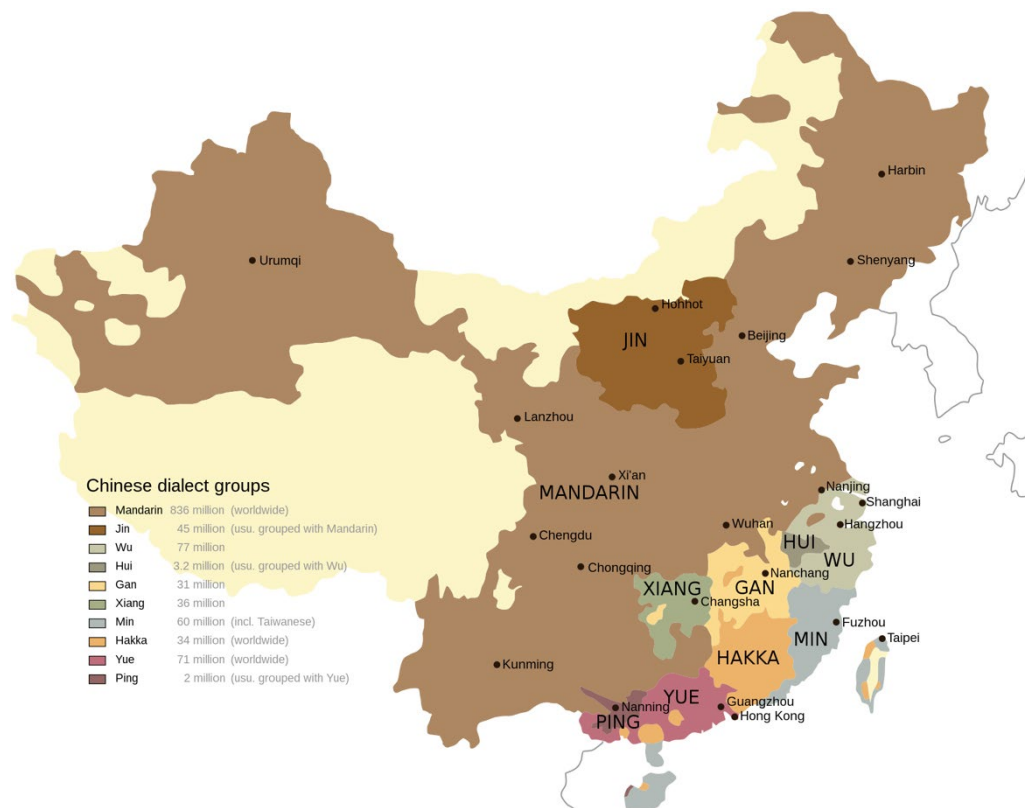
Accordingly, I refer to various Sinitic languages as such rather than as dialects of a single language throughout this thesis. The geographical distribution of various sub-branches of Sinitic can be seen in Figure 4.

Other than an isolating morphological profile, tone is perhaps the most typical feature of Sinitic languages. Almost all monosyllabic morphemes in Sinitic languages have an associated tone – a specific phonemic pitch, pitch contour and/or vocal register. This tone, audible when the syllable is produced in isolation, is referred to as a morpheme's *Citation tone* (Chen, 2007). Sinitic languages vary in their number of citation tones – Wenzhounese has eight while Modern Standard Mandarin has only four (Norman, 1988; Rose, 2006).

Tone in contemporary Sinitic languages is best understood in reference to the tones present in Middle Chinese. Middle Chinese had four contrastive tones, known as ping (level), shang (rising), qu (falling), and ru (abrupt). Each of these tonal categories had two registers based on the voicing of initial consonants. Tones following voiced consonants developed lower pitch while those following voiceless consonants developed higher pitch. These variations were allophonic but became phonemic in Sinitic languages in which the initial voicing distinction was lost. Although the names given to these tones at the time provide clues as to their acoustic characteristics, their exact phonetic realisations are not known (Norman, 1988). Sinitic languages have variously undergone mergers and splits in their tone categories since Middle Chinese was spoken leading to the different numbers of citation tones observable

today. The realisations of Middle Chinese tone categories also vary, meaning the same etymological tone may have drastically different pitch contours in different languages (Cheng, 1973).

Figure 4 - Map showing the distribution of Sinitic sub-branches



5, 6

3.2. Mandarin and the modern standard vernacular

Given the international recognition of Mandarin and its status as the most widely spoken Sinitic language, many other Sinitic languages are

⁵ Jin is treated in various typologies as either a variant of Mandarin or as a sub-branch of Sinitic.

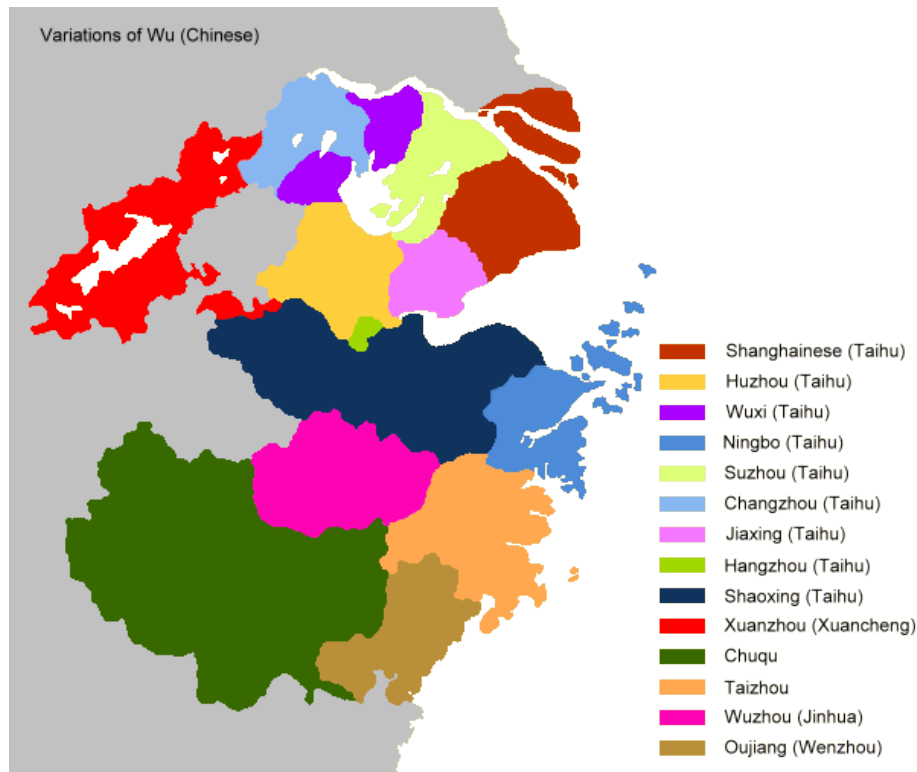
⁶ Author: Wyunhe. Licence: <https://creativecommons.org/licenses/by/3.0/deed.en>

defined according to their similarity to it. *Mandarin* is used variously to refer to a large group of related and mutually intelligible variants spoken mostly by Han Chinese people north of the Yangtze river or to the modern standard vernacular of China (Norman, 1988). In this thesis, *Mandarin* refers to the previously mentioned group of related dialects, coloured light brown in Figure 4. The modern standard vernacular, Modern Standard Mandarin (henceforth MSM), is the result of extensive language reform in the Republic of China and later in the Peoples' Republic of China between 1919 and 1964. MSM is a standardised form of Mandarin - however, the two terms are not interchangeable. MSM is based on the phonetics and phonology of Beijing, the lexicon of Mandarin, and the morphosyntax of post-1920s Chinese literature (P. Chen, 1999, 2015). Summaries of the grammar of MSM are provided in the books *Mandarin Chinese: a functional reference grammar* and *A grammar of spoken Chinese* (Chao, 1970; Li & Thompson, 2009).

3.3. Wu languages

Wenzhounese is a Wu language. The Wu languages are a sub-branch of Sinitic spoken by approximately 70 million people, mostly in the provinces of Zhejiang and Jiangsu. The Wu languages are known for their eccentricity and lack of mutual intelligibility both with one another and with other Sinitic languages (Chao, 1967; Pan et al., 1991). Figure 5 shows the geographical distribution of the Wu languages.

Figure 5 - Map showing the distribution of Wu languages



As is the case in most sub-branches of Sinitic, Wu languages diverge from MSM in three main ways. Firstly, the main distinguishing phonetic characteristic of the Wu languages is their retention of a three-way voicing distinction in initial stops found in Middle Chinese. The Wu languages distinguish voiceless aspirated, voiceless unaspirated, and voiced initials. Other Sinitic languages distinguish only voiceless aspirated and voiceless unaspirated stops (Cao & Maddieson, 1992). Secondly, the Wu languages retain the Middle Chinese 'entering' tone category no longer present in Mandarin (Chao, 1967). Finally, the Wu languages are characterised by their complex tone sandhi system, considered in more detail in the following section.

3.4. Tone sandhi

Even among the Wu languages, Wenzhounese is known for its opaque and complex system of tone sandhi. Tone sandhi is a process of morphotonemic⁷ alteration in which the pitch and contour of adjacent tones are modified in connected speech. The process of tone sandhi predictably modifies the tone of any combination of two or more syllables based on their citation tones. The resulting tones in connected speech are referred to as *sandhi tones*.

Tone sandhi is distinct from several other types of tone change. These other tone changes include declination, assimilation, morphological derivations, and alternative tones (Ballard, 1984; Lyu, 2021). Declination refers to the tendency for pitch to become lower throughout an utterance. Assimilation refers to the assimilatory differences in tone due to features of surrounding syllables, for example, a tone will tend to have a lower onset following a voiced initial than a voiceless initial (Chen, 2007). Morphological derivation involves the use of tone to encode morphological information. For example, in Wenzhounese, a change in tone indicates deixis (Bao, 1999). This is demonstrated in Example 1 and Example 2.

Example 1 - Morphological derivation in Wenzhounese

Character	N/A
-----------	-----

⁷ *Tonetic, tonemic, tonetics*, and *tonology* are used to describe tone analogously to the way *phonetic, phonemic, phonetics*, and *phonology* are used to describe sounds.

IPA	kai
Tone	42
Meaning	one

Example 2 - Morphological derivation in Wenzhounese

Character	N/A
IPA	kai
Tone	323
Meaning	this one

Alternative tones are usually explained by an older etymological variant of a morpheme's tone being retained in a polysyllabic compound (Norman, 1988). These four examples of tone changes are distinct from tone sandhi in that they are generally not informed by the tone of the surrounding syllables. In the case of Catathesis, the resulting tone is only slightly different from the citation tone. Tones slightly modified in this manner are referred to as 'citation targets' (Rose, 2000). In the case of Sandhi tones, the tonal realisation may be entirely different from the citation tone.

An often-cited example of tone sandhi involves the concave [214] tone in MSM and is shown in Example 3.

Example 3 - Tone sandhi in MSM

Characters	你	好
------------	---	---

IPA Transcription	ni	hau
Citation tones	214	214
Sandhi tones	35	214
Gloss	you	good
Translation	Hello	

This tone sandhi pattern can be generalised to all disyllabic pairs with the citation tones 214.214 and can be represented with the following generative rule:

Example 4 - Tone Sandhi in MSM

214 → 35 / _ 214

Unlike the MSM example above, many Wu languages have tone sandhi rules which occur over larger polysyllabic segments. The segments, or Tone Sandhi Units (henceforth TSU) over which these rules operate may be lexical or syntactic and are generally two to six syllables long (Ballard, 1984). Tone sandhi operating over larger segments is generally characterised as focus-left/right.⁸ Focus-left tone sandhi involves retention of values based on citation tones in the leftmost syllables of the TSU, while the tones on the syllables to the right are altered or become atonal. Focus-right tone sandhi involves the inverse (Ballard, 1984).

⁸ Also called left/right dominant.

Northern Wu languages, including the more widely studied language Shanghainese, typically display focus-left tone-sandhi. Southern Wu languages such as Wenzhounese typically display focus-right tone sandhi (Ballard, 1984). In Shanghai Wu, the citation tone of the first syllable is distributed across the first two to three syllables of the TSU and the subsequent tones are usually realised as L (low) (Lyu, 2021).

This phenomenon is demonstrated in Example 5 and Example 6 below.

Example 5 - Disyllabic sandhi in Shanghai Wu

Characters	巴	黎
IPA transcription	pa	li
Citation tones	HL	LH
Sandhi tones	H	L
Gloss	Transliteration	Transliteration
Translation	Paris	

Example 6 - Trisyllabic sandhi in Shanghai Wu

Characters	巧	克	力
IPA transcription	tʰɕo	kaʔ	liʔ
Citation tones	LH	LH	LH

Sandhi tones	L	H	L
Gloss	Transliteration	Transliteration	Transliteration
Translation	Chocolate		

The focus-right tone sandhi of Wenzhounese is discussed in more detail in section 7.1 as part of the chapter on marking.

3.5. Oujiang group

The Wu sub-branch is divided into several distinct groups.

Wenzhounese is a member of the Oujiang group. The Oujiang group is a dialect group spoken in and around Wenzhou, China. The group is named after the Oujiang river, which runs through the southeast corner of Zhejiang and bisects the area in which the dialect group is located.

The Oujiang group is established on the basis of unusual development of two proto-Wu tones - IVa* and IVb*.⁹ In other Wu languages, these tones are usually short and end in a glottal stop. In the Oujiang group they are long and display complex pitch contours. The Oujiang group displays relative uniformity in citation tones and lexicon but differs in the way tones are realised in sandhi (Rose, 2006, 2008).

3.6. Wenzhounese

Wenzhounese is the most widely spoken and representative variety of the Oujiang group, spoken in the central Lucheng district of Wenzhou

⁹ See Appendix 1.

(Scholz, 2012). It has similarities to Middle Chinese in its higher prevalence of older monosyllabic lexical items and its retention of all eight etymological tone categories (Rose, 1994; Scholz, 2012). Wenzhounese tone sandhi is extremely complex and has been the subject of considerable study in recent years. It also forms the basis for the analysis in section 7.1. The following paragraphs provide a brief background on Wenzhounese tonal phenomena.

The citation tones of Wenzhounese are described in several recent works (Chen, 2007; Rose, 1994, 2008; Scholz, 2012). These descriptions are similar, although the two most recent describe changes in the level tones (Ia and IIIa) of younger speakers. Rose states that the tones are undergoing a merger, while Scholz posits that their distinction is maintained through lengthening in the lower register tone (IIIb). Appendix 2 shows the pitch description and Chao numerals for each of the eight citation tones in Wenzhounese. The data in this table is based on Phil Rose's tonetic descriptions (1994, 2000).

Wenzhounese has one of the most complex tone sandhi systems in the world. Tone sandhi in Wenzhounese is, broadly speaking, focus-right. In the case of polysyllabic words, the rightmost two syllables undergo change while the syllables to the left either take the inverse value to the antepenultimate syllable or become atonal. The domain of applicability of tone Sandhi in Wenzhounese (the size of the TSU) means that it is sometimes possible to distinguish between a compound word and a phrase phonologically (Chao, 1967). This is because tone

sandhi is thought to apply only to compound nouns. More recent study has shown that while the distinction posited by Chao is sometimes possible, adjective-noun and adverb-verb combinations may undergo tone sandhi.¹⁰ The chance of these combinations undergoing tone sandhi increases with frequency and lexicalisation of the concatenation (Scholz, 2012). For a full discussion of Wenzhounese tone sandhi, see section Chapter 7 and Appendix 2.

Although a complete grammar of Wenzhounese is not available in English, there are several useful resources. One is the dictionary *Wēnzhōuhuà cíyǔ Kǎoshì (a study of Wenzhounese words and expressions)* (Shen & Shen, 2009). Another is *the Wenzhou spoken corpus*, a small online corpus of transcriptions of spoken Wenzhounese (Newman et al., 2007). These resources are used as part of the data collection in this thesis, to be discussed in Chapter 5.

3.7. Wenzhou culture and sociolinguistics

The Wenzhounese language has a reputation for eccentricity throughout China due to its low levels of mutual intelligibility with other Sinitic languages. This is illustrated by a saying in MSM which translates to ‘fear not the heavens, fear not the earth, fear the Wenzhounese man speaking Wenzhounese’. Wenzhounese is also sometimes called ‘devil language’.

¹⁰ Sinitic languages generally do not distinguish between adjectives and adverbs. Often, Sinitic verbs can also function as adjectives and the existence of ‘adjective’ as a separate word class is disputed. The word adverb is used in this context for clarity.

The city of Wenzhou, after which the language is named, has remained relatively unintegrated from the mainstream Chinese political economy through history due to its geographical isolation and linguistic opacity. The relative isolation of Wenzhou is likely linked to its retention of many tonal and lexical features of Middle Chinese. The idea of Wenzhounese as a particularly conservative variant has led to it being dubbed a 'living fossil'. This linguistic opacity was utilised when Wenzhounese speakers were used as code talkers during the second Sino-Japanese war (Cao, 2011). Wenzhounese people are known for being entrepreneurial, often migrating inter and intranationally to pursue business ventures. Wenzhou also has the highest level of religiosity of any Chinese urban centre (Cao, 2008, 2011).

Wenzhounese, like many other Sinitic languages, is undergoing levelling and is becoming increasingly endangered due to the dominance of MSM and the language policies of the PRC. This is compounded by the fact that many people regard Wenzhounese and other Sinitic languages as mere 'dialects' and the fact that the written standard for Sinitic languages is very similar to MSM (Li, 2014).

Chapter 4. Situating the study

While there has been increased interest in ideophones in Sinitic languages, there has been no dedicated study of ideophones in Wenzhounese. There have, however, been several studies of ideophones in other Sinitic languages which could serve as a point of comparison. Given the unique place of Wenzhounese in the Sinitic branch, an investigation of ideophones in the language could provide important insight into the nature and evolution of these words both synchronically and diachronically. Van Hoey's typology of ideophones in Middle Chinese is the perhaps the most relevant study (Van Hoey, 2015). This typology uses data from a Tang dynasty poetic corpus and explores the semantic domains and marking of ideophones in the language. Van Hoey's thesis explains the reduplication patterns (AAB, ABB etc) and types (full reduplication, rhyme, alliteration etc) used to mark ideophones in Middle Chinese. This study is particularly relevant given the purported similarities between Wenzhounese and Middle Chinese. Van Hoey's semantic map (see section 8.2) has been applied to both Middle Chinese and MSM (Van Hoey, 2022). Van Hoey also identifies specific reduplication patterns as markers of ideophones in MSM (Van Hoey, 2023).

Thompson and Do's 2019 study finds evidence for phonosemantic correlations in another Sinitic language, Chaoyang (Thompson & Do, 2019). They also demonstrate that ideophones in

Chaoyang do not undergo tone sandhi as is expected for all prosaic words. This serves as the basis for comparison in the elicitation-based experiment in section 7.1.

Also noteworthy is the finding that tone may play a part in the Sinitic ideophonic lexicon. In his 2018 paper, Thompson identifies that high tones are overrepresented in ideophones of three Sinitic languages, although it remains unclear if this is due to their inherent iconicity or as part of the method by which ideophones are marked (Thompson, 2018). Section 7.3 investigates similar phenomena in Wenzhounese.

Finally, there have been several studies of ideophones in Mandarin (Meng, 2012; Mok, 2001; Van Hoey, 2018, 2023). These range in focus from morphology to sound symbolism to iconicity, serving as an important point of comparison to Wenzhounese.

This thesis has the potential to contribute to several areas of linguistic inquiry related to the Wu languages and the study of ideophones through its investigation of three key research questions:

- 1) How do ideophones in Wenzhounese employ mimesis to depict sensory imagery?
- 2) How are ideophones in Wenzhounese marked?
- 3) What semantic domains do ideophones in Wenzhounese depict?

Firstly, and perhaps most importantly, this thesis demonstrates that Wenzhounese does in fact have an ideophonic lexicon worth of scholarly attention.

The investigation of phonosemantic biases in Wenzhounese ideophones will complement findings from other Sinitic languages and increase understanding of iconicity at the level of the sound. Study of other types of iconicity involving suprasegmental features and the relationship between syllables will also provide insight into how ideophones depict sensory imagery more broadly.

The findings regarding marking in Wenzhounese ideophones may increase understanding in several areas of study. These include the relative importance and potential realisations of reduplication, tone and semantic radicals in the marking of ideophones as well as the differences in tone sandhi between ideophones and the prosaic lexicon.

The semantic domains expressed using Wenzhounese will add another point of comparison to Middle Chinese and illuminate areas where the existing typological tools could be re-evaluated.

Thus, the remainder of the thesis focuses on answering the previously stated three questions. Before specifically addressing each of these, I explain the various methods of data collection used to create a database for analysis in Chapter 5.

Chapter 5. Data collection and database

Before addressing the major research questions in this thesis, it is necessary to create a database of ideophones for analysis. This chapter details initial data collection using elicitation tasks with two native speakers, supplementation of this data using lexicographical resources and the application of criteria to either accept or reject the potential ideophones.

5.1. Initial elicitation tasks

Research on ideophones is frequently conducted using in-person elicitation tasks, allowing the researcher to elicit words in a naturalistic context and make note of relevant information such as gesture and facial expression. Initial elicitation tasks were conducted with two native speakers in Melbourne. One speaker was male, the other female. They were both in their mid-80s and were born and raised in Wenzhou. Both speakers lived in other cities in China for some of their adult life and moved to Australia approximately 15 years ago. Both speakers were fluent in MSM and Wenzhounese. The male speaker was also fluent in Cantonese. Neither could speak English.

The speakers were provided with 18 images of sensorially immediate scenes, designed to elicit responses describing various semantic domains. Appendix 3 shows the images used. The speakers were asked to describe the images and any potentially ideophonic

words were noted. After the speakers had described all of the images, they were asked to explain the meaning of the potentially ideophonic words. This elicitation task was conducted in Mandarin.

These elicitation tasks produced two potential ideophones. These are the final two entries in Appendix 4. As the data collected through elicitation tasks was insufficient for any meaningful analysis, it was supplemented using data from lexicographical resources, detailed in the following section.

5.2. Lexicographical resources

Words in the lexicographical resources were identified as potential ideophones based on their depiction of sensorially immediate scenes.

The first resource surveyed was the Wenzhou spoken corpus (Newman et al., 2007). This survey produced no potential ideophones.

The second resource surveyed was a comprehensive Wenzhounese to MSM dictionary – *A study of Wenzhounese words and expressions* (Shen & Shen, 2009). This survey produced 73 potential ideophones. These, along with the two tokens elicited from the native speakers were compiled into an initial list. Any English translations of definitions from this dictionary are my own.

5.3. Criteria for inclusion

Each word in the initial list was assessed against several criteria. A good starting point in determining which criteria to use is Dingemanse's 2012 definition, used as a working definition in most recent publications on ideophones. According to Dingemanse, an ideophone is "a member of an open lexical class of marked words that depict sensory imagery" (Dingemanse, 2019, p. 16). From this, the following criteria can be inferred:

- 1) An ideophone must be a word. Although ideophones resemble their referents in some way due to their iconicity, they are lexicalised and tend to bend rather than entirely break the phonological and phonotactic rules of their languages. An example demonstrating this distinction is the difference between someone saying the word 'meow' – an onomatopoeic representation of the sound of a cat – and the same person imitating to the best of their abilities the actual sound of a cat. The word 'meow' follows English phonological rules and could plausibly be inflected for number, person and tense. A genuine attempt to replicate the sound of a cat does not fit in with English phonology and could not undergo inflection.
- 2) An ideophone must be a member of an open lexical class. Ideophones may be nouns, verbs, adjectives or adverbs. They are not pronouns, determiners or members of any other closed lexical class.

- 3) Ideophones must be marked. The marking may differ cross-linguistically, but often includes prosodic foregrounding, gesture or bending of phonological/phonotactic rules. A particularly common marking strategy is reduplication (Dingemanse, 2015). Reduplication has been used as the primary criterion to identify ideophones in other Sinitic languages including Middle Chinese, Old Chinese, Mandarin and Cantonese (Meng, 2012; Mok, 2001; Van Hoey, 2015). As such, it is used in this paper as the primary criterion with which to identify Wenzhounese ideophones. Significantly, this marking strategy includes full reduplication as well as rhyme, alliteration and pararhyme.
- 4) Ideophones must depict sensory imagery. They must not only describe sensorially immediate scenes, but also in some way resemble or feel like their referent. The second part of this criterion is subjective, difficult to quantify – but nevertheless important. The difference between the phrase ‘ear splitting explosion’ and the onomatopoeia ‘bang’ is obvious, but it is difficult at first glance to explain exactly what is ‘bang-like’ about the word ‘bang’. Practically, in Sinitic languages, this means that ideophones must be at least in part non-compositional. If the word in question has a meaning which is logically derivable from its constituent morphemes then it likely does not depict sensory imagery, rather describing it in a way that is auditorily similar to an ideophone. The distinction between ideophones and quasi

ideophones is explained in more detail in the PhD thesis *Chinese sound symbolism, a phonological perspective* (Mok, 2001). One way of identifying such words is the presence of multiple possible sets of characters used to express the same word, indicating the characters are used for their phonetic value rather than to express a particular underlying morpheme. See Glossing conventions and abbreviations for details on how these syllables are presented in examples.

In summary, in order to be accepted as an ideophone for the purposes of this paper, a word in Wenzhounese must belong to an open lexical class, display reduplication or some other reduplication like phenomenon, refer to sensorially immediate scenes, and be at least in part non-compositional.

Example 7 shows a word identified as a potential ideophone but not included in the final database. This ideophone was identified as a potential ideophone because of its depiction of sensory imagery and reduplication. Closer consideration, however, reveals that the meaning of the word as a whole is the sum of the meaning of its three constituent morphemes ‘white’, ‘snow’ and ‘snow’. As such, there is no reason to believe that this word is imitative rather than just an emphatic reduplicated adjective.

Example 7 - Potential ideophone not included in the final database

白	雪	雪
bba8	xv7	xv7

white snow snow
White as snow

A total of 18 potential ideophones were rejected because they failed to meet one of the criteria described above. This left 60 ideophones, which make up the database to be analysed in the remainder of this thesis. This database can be seen in Appendix 4.

5.4. Other data collection

Other elicitation tasks were conducted to determine the degree to which tone sandhi is involved in the marking of ideophones in Wenzhounese. These elicitation tasks are only relevant to Chapter 7 and as such are detailed in that chapter rather than here.

Chapter 6. Phonosemantic mapping

This chapter aims to answer the first of the three major research questions: how do ideophones in Wenzhounese use mimesis to depict sensory imagery? Based on the working definition of ideophones used in this thesis, ideophones must depict rather than simply describe sensory imagery (Dingemanse, 2019, p. 16). To depict sensory imagery, ideophones must contain some form of iconicity. This iconicity may be imagic or diagrammatic, as discussed in section 2.2. One of the most common ways to quantify iconicity is through investigation of phonosemantic mapping. In phonosemantic mapping, certain sounds are probabilistically associated with certain meanings due to mimesis. This chapter investigates 11 of the most common sound to meaning correlations documented in the crosslinguistic literature. Other types of iconicity are also investigated, particularly those involving suprasegmental features and the relationship between syllables.

6.1. Methodology

The statistical analysis in this chapter is based on the methodology presented in the recent article *Articulatory features of phonemes pattern to iconic meanings: evidence from cross-linguistic ideophones* (Thompson et al., 2021). Each ideophones was coded according to nine binary semantic features. These features, along with their descriptions are shown in Table 1.

Table 1 - Description of semantic features (Thompson et al., 2021)

Semantic feature	Description of positive value
sound	Depicts auditory information
loud	Auditory information of an inherently high amplitude
human	Sounds made by people
animal	Sounds made by animals
motion	Depicts active movement
wind	Depicts movement of air, bodily or otherwise
appearance	Depicts visual information
friction	Depicts rubbing together or rough contact of surfaces
telic	Depicts an event which reaches completion

Three examples of definitions coded according to these semantic features are shown in Table 2.

Table 2 - Examples of coded semantic features

Definition	Sound	Loud	Human	Animal	Motion	Wind	Appearance	Friction	Telic
Used to describe a crisp and melodious voice.	1	0	1	0	0	0	0	0	0
Wander around, slack off.	0	0	0	0	1	0	0	0	0
Describes a short, fat and strong figure.	0	0	0	0	0	0	1	0	0

The coding of phonetic features involves a similar approach. Each phoneme in Wenzhounese was coded according to seven binary phonetic features for consonants and five binary phonetic features for vowels. The features for consonants were [+ labial], [+ tongue resting],

[+- tongue root], [+- airflow], [+- nasal], [+- oral contact] and [+- vocal folds]. Many of these features are self-explanatory, but a few are somewhat unusual. Tongue resting refers to phonemes in which the tongue is not actively involved in articulation. Tongue root refers to the use of the dorsum, as with velars. Airflow refers to phonemes in which the air is forced out through a narrow channel in the mouth, as is the case with fricatives. Oral contact refers to phonemes in which active contact is made with the place of articulation, either by the tongue or the lips. Vocal folds refers to phonemes in which there is active movement of the vocal folds, as is the case in phonemes with modal voicing (Thompson et al., 2021). The phonetic features for vowels were [+- high], [+- low], [+- front], [+- back] and [+- round].

This approach, using binary articulatory features instead of simply creating contingency tables for each individual phoneme, is advantageous because it reduces the amount of work required in interpretation of the results, especially in a crosslinguistic context. A correlation between, for example, ideophones with the [+wind] semantic value and phonemes with the [+airflow] value could be realised in one language with a more specific correlation between wind and the alveolar fricative. Another language may realise this correlation with a more specific correlation between [+wind] and a velar fricative. This methodology accurately captures both relationships, allowing us to understand how iconicity manifests at the level of the sound without too much language-specific granularity.

In my investigation, contingency tables were created for 11 pairs of semantic and phonetic features. Three of the pairs ([+friction]/[+airflow], [+motion]/[+labial] and [+friction]/[+high] were chosen based on predictions made in the article due to their inherent perceptuomotor analogy. The remaining eight pairs were chosen because they display strong crosslinguistic correlations based on the results in the article (Thompson et al., 2021). Vowels and consonants were analysed separately. Each contingency table for a phonetic feature of consonants includes every consonant phoneme in the database, sorted into rows and columns based on whether they contain the phonetic feature being investigated and whether they are part of a word depicting a meaning with the particular semantic feature under consideration. Every contingency table for a phonetic feature of vowels contains every vowel phoneme in the database sorted in the same manner.

The contingency tables for each of the pairs of phonetic and semantic features investigated can be seen in Appendix 5. The contingency tables were tested for statistical significance using Fisher's exact test.

6.2. Results

The Fisher's exact test result for each pair of semantic and phonetic features investigated can be seen in Table 3. Of the 11 pairs of semantic and phonetic features investigated, four displayed a

statistically significant correlation. These pairs were [+friction]/[+airflow], [+motion]/[+vocal folds], [+loud]/[+vocal folds] and [+friction]/[+high].

Table 3 - Fisher's exact test results for 11 pairs of semantic and phonetic features

Sound meaning pair	Fisher's exact test result	Significant?
Friction/airflow	0.0218	Yes
Motion/labial	0.6446	No
Motion/Tongue resting	1	No
Telic/Tongue root	0.5637	No
Motion/Vocal folds	0.0407	Yes
Motion/airflow	0.2391	No
Telic/Labial	0.2197	No
Loud/Vocal folds	0.0166	Yes
Unround/Motion	1	No
Low/Loud	0.7571	No
High/Friction	0.0367	Yes

The predicted correlation between friction and airflow was made due to airflow sibilance being analogous to the sibilance of friction or rubbing (Thompson et al., 2021). The predicted correlation was found to be correct in Thompson et al.'s paper. These results are confirmed by the data from Wenzhounese.

The predicted correlation between high vowels and friction was made by Thompson et al. on similar grounds. High vowels are also characterised by a narrower opening in the oral cavity, meaning the increased airflow sibilance is analogous to the sibilance of friction or rubbing. This prediction is again borne out in the data from Wenzhounese.

The correlation between a depiction of loud sounds and voiced consonants ([+ vocal folds]) is not discussed in terms of perceptuomotor analogy in Thompson et al.'s article or any of the other literature surveyed in this thesis. I propose that a logical perceptuomotor analogy does, however, exist based on the sonority hierarchy. Given that voiced fricatives and stops are higher in the sonority hierarchy than their voiceless counterparts, they are less subject to interference from background noise and are perceived as louder. Their use in ideophones to depict louder sounds, then, makes sense in terms of perceptuomotor analogy.

The correlation between motion and vocal folds is the only one seen in Wenzhounese for which there is not a proposed perceptuomotor analogy. This correlation, however, has one of the tightest linear regression models in Thompson et al.'s study. This, along with the data from Wenzhounese suggest that this correlation represents some form of iconicity and warrants further study.

Although this section has demonstrated four phonosemantic mappings representing iconicity at the level of the sound in Wenzhounese ideophones, many of the correlations observed by Thompson et al. were not found in the Wenzhounese data. Some of these correlations may exist in Wenzhounese but were not observable due to limitations in the data set.

The two sound and meaning pairs involving telicity ([+telic]/[+tongue root] and [+telic]/[+labial]) are likely not a good representation of ideophones in Wenzhounese as a whole because the database in this thesis only contains one ideophone depicting a scenario with inherent telicity. The pair involving unrounded vowels and motion is also unlikely to be very revealing because of the relative infrequency of rounded vowels in Wenzhounese (two round phonemes compared to eight unround phonemes) and the fact that the database analysed in this thesis includes just two examples of rounded vowels.

Besides potentially containing more phonosemantic mappings than revealed in this analysis, Wenzhounese ideophones also depict sensory imagery with iconicity that does not manifest at the level of the sound. This is discussed in the next section.

6.3. Other sources of iconicity

Many of the ideophones in Wenzhounese contain fairly transparent perceptuomotor analogy which is not at the level of the sound. While a full analysis of how each ideophone in the database ‘feels’ like its referent is outside the scope of this thesis, this section includes several examples and seek to explain how sensory imagery is depicted in each.

Example 8 shows an ideophone which means ‘very long winded’. The first thing to note in terms of iconicity is the length of the word itself. Quadrisyllabic ideophones are relatively uncommon in the corpus, and the use of a longer word to depict a meaning related to a longer

duration is iconic. Further, the fact that three of the syllables in the word are joined by reduplication and alliteration gives the impression of superfluousness or mocking someone who is using an unnecessary number of words.

Example 8 - Ideophone meaning 'long winded'

leu3	lei3	leu3	so1
id.	id.	id.	id.

Very long winded.

Example 9 shows an ideophone which means ‘walking unsteadily due to drunkenness’. This ideophone appears to display iconicity in several ways, the first is similar to the English example ‘zig-zag’, discussed in section 2.2.2. This word, through the relationship between its syllables, feels somehow unsteady or uneven. This may be because of its asymmetry. One syllable followed by two reduplicated syllables calls to mind an unsteady action such as taking one step to the left followed by two steps to the right. The second potential source of iconicity is the word’s mixed voicing. Words containing mixed voicing are rated as slower than those containing all voiced or all voiceless consonants (Cuskley, 2013). The combination of these two sources of iconicity gives the impression of a slow and unsteady movement typical of drunkenness.

Example 9 - Ideophone related to drunkenness

ddu4	su2	su2
------	-----	-----

id.	id.	id.
Walking unsteadily due to being drunk		

Example 10 shows an ideophones depicting dryness. Previous research has demonstrated that people tend to associate words rich in fricatives with meanings related to dryness or roughness (Falcón et al., 2019). Importantly, this research did not test for iconicity at the level of the sound, but rather demonstrated that the perceived meanings of words are influenced by the most common place or manner of articulation in a given word.

Example 10 - Ideophone depicting dryness

se5	fei1	fei1
dry	id.	id.
Describes the feeling of dryness.		

6.4. Conclusion

This chapter demonstrates that ideophones in Wenzhounese do display iconicity, both at the level of the sound and in larger linguistic units. Of the 11 pairs of phonetic and semantic features investigated, four were significantly correlated. Further investigation may reveal more phonosemantic mappings, as this experiment was constrained by a relatively small data set. Further, examples demonstrate that iconicity also manifests due to the relationship between syllables, the length of a word and the dominant manner of articulation of consonants in a given word.

Chapter 7. Marking

This chapter aims to answer the second major research question: how are ideophones in Wenzhounese marked? According to Dingemanse's definition, ideophones are marked words (Dingemanse, 2019, p. 16). This marking may be morphological, tonal, phonetic or prosodic. This chapter describes the various ways ideophones are marked in Wenzhounese. First, section 7.1 assesses the role of tone sandhi in marking. Next, in sections 7.2, 7.3 and 7.4 the roles of reduplication, tone and semantic radicals respectively are assessed.

7.1. Tone sandhi

In their recent paper, Thompson and Do state that ideophones in Chaoyang (Sinitic) do not undergo tone sandhi, although this is obligatory for prosaic words (Thompson & Do, 2019). They go on to explain that this sets ideophones in Chaoyang apart from other words and is a significant part of their markedness in the language. As Chaoyang is closely related to Wenzhounese, this suggests Tone Sandhi may also be employed as part of the marking system for ideophones in Wenzhounese. This section details an elicitation-based experiment used to investigate whether this is the case. In this experiment, a native speaker was asked to read a list containing polysyllabic ideophones and prosaic words, allowing the way ideophones and prosaic words undergo tone sandhi to be compared.

In order to understand the data provided by this experiment, it is necessary to first conduct an initial tonetic study. This study aims to describe any idiosyncrasies in the informant's citation tones, allowing the results from the tone sandhi experiment to be understood in a fuller context. This study aims to provide explanatory data for one speaker rather than general information about changes in the language.

7.1.1. Initial tonetic study

Many of the studies of Tone Sandhi and citation tones in Wenzhounese are several decades old and were conducted using data from relatively elderly informants (Chen, 2007; Rose, 1994, 2002b, 2002a, 2004, 2008, 2011). Tone shifts are relatively rapid compared to other diachronic changes in language (Yang & Xu, 2019). This means the data on tone and tone sandhi in Wenzhounese may no longer accurately describe the language of younger people. To address this complication, an initial study of citation tones was conducted in addition to the main experiment on tone sandhi.

The informant for this chapter is a woman in her early 20s, living in Sydney. She was born and raised in Liushi, Yueqing; a town in Yueqing immediately adjacent to Wenzhou. She is a native speaker of Wenzhounese and still uses it regularly to communicate with her parents and grandparents.

The informant was given a list containing eight rows of 12 characters. Each row contained characters from one of the eight

Middle-Chinese etymological tone categories. A table of the characters in the list can be found in Appendix 6. This method allows for easy analysis of tone splits, mergers and redistribution. For example, if two of the rows are pronounced with similar tones, they may have merged and will warrant further investigation. The informant was asked to read the characters aloud, repeating each one three times with a slight pause in-between.

The Rhyme for each syllable was isolated and the fundamental frequency modelled using an eight-degree polynomial. In Appendix 7, the individual tokens are represented by dotted lines and the arithmetical mean of the tokens in each tonal category is represented by a solid line.

The tonal acoustics for all citation tones observed are shown in Figure 7. The tones do differ somewhat from the values previously given in the literature. The following paragraphs will provide a brief description of each tone in turn.

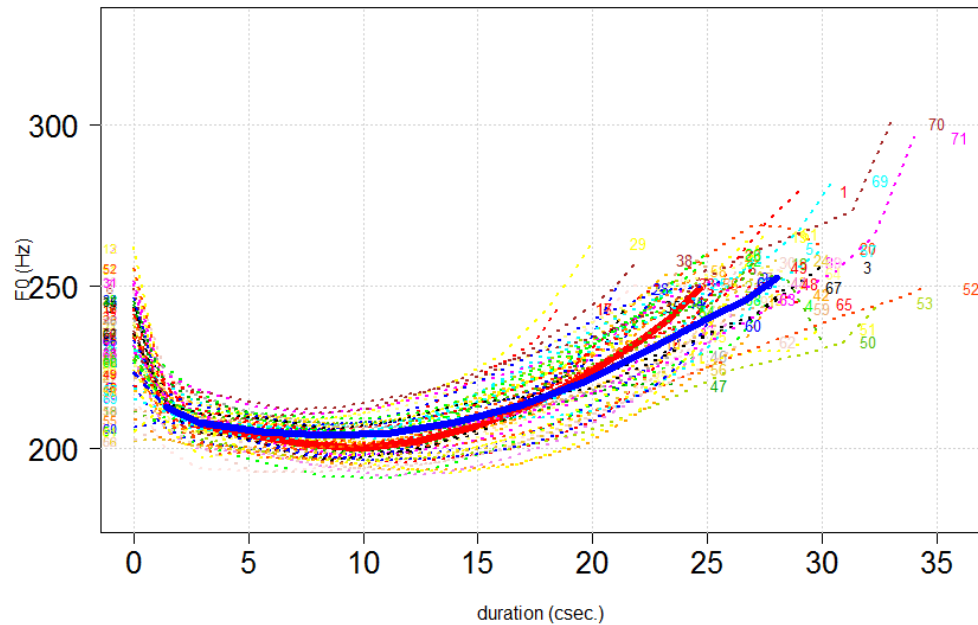
Tone Ia is a mid-level tone. It is very similar tonetically to previous descriptions. It is still a level tone in the middle of the pitch range. It does appear to have shifted down slightly, becoming more similar in pitch to the lower register level tone – IIIb. The two tones are nonetheless auditorily distinct, and do not appear to have merged for this speaker as was expected based on previous findings (Rose, 2008; Scholz, 2012)

Tone Ib is a mid-falling tone and does not appear to have changed in terms of its pitch or contour when compared to previous descriptions. The one notable difference is that the informant's Ib tokens appear to be slightly shorter than those previously observed.

Tones IIa and IIb are delayed low-rising tones and appear to have merged. In previous descriptions, tone IIa was a mid rising tone whereas IIb was a delayed low rising tone. In terms of register, contour and length the informant's tones for both IIa and IIb appear more similar to the previously described values for IIb. The main difference is that the informant's tones are slightly longer than those previously described for IIb. Figure 6 shows the tokens and arithmetical means for tones IIa and IIb on the same axes. It is clear that the length, pitch and contours for the two tones are almost identical and definitely not dissimilar enough to be phonemically contrastive. There does not appear to be a bimodal distribution and there is a high chance of any token from one group being more similar to the arithmetical mean of the other group.

The contour of the new merged tone IIa/IIb is very similar to that of the Mandarin 3rd tone. The influence of Mandarin/Wenzhounese bilingualism among younger speakers is a potential explanation for the merge in Wenzhounese citation tones.

Figure 6 - Comparison of tones IIIa and IIIb



Tone IIIa is a high falling tone and is very similar in pitch, length and contour to the values given in previous descriptions.

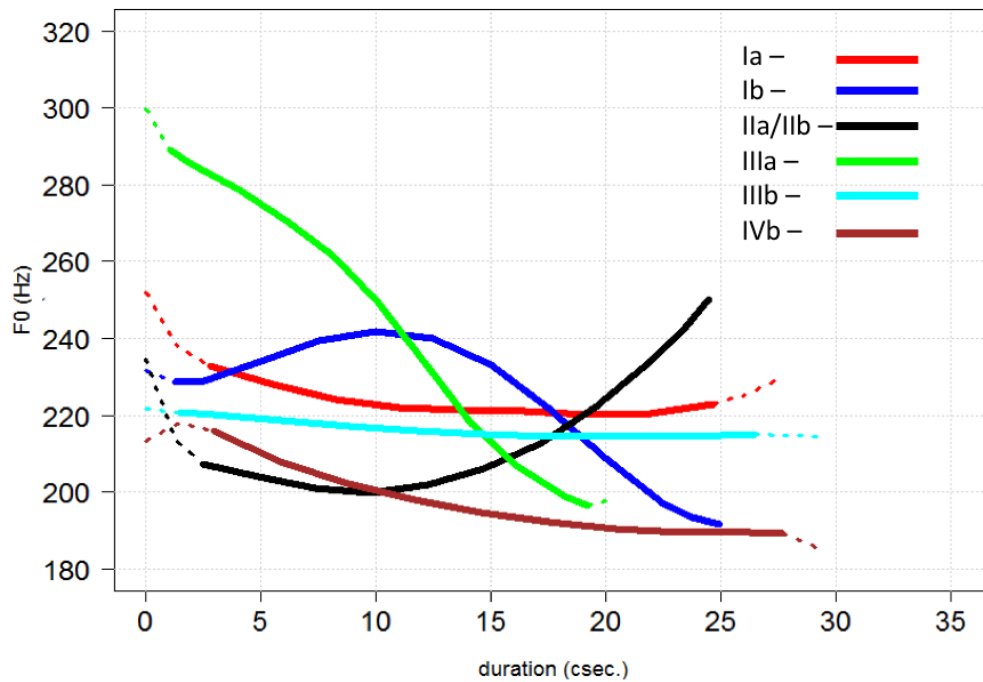
Tone IIIb is a lower-mid level tone and is very similar in pitch, length and contour to the values given in previous descriptions.

Tone IVa was not observed in the data collected from the informant. The tokens expected to be realised as IVa have redistributed to either Ia or IIa. This split appears to be unconditioned as there is no clear phonetic, semantic or morphological criterion governing the new categories of the tokens.

Tone IVb appears to be in the process of being redistributed to other tones. All of the tokens except for one morpheme were realised as IIIb. The one token which was realised as IVb was a low fall-rise tone

very similar in contour and pitch to previous descriptions. It differed slightly in length, lacking some of the characteristic length of previously described IVb tones.

Figure 7 - Tonal acoustics for Wenzhounese citation tones



Overall, the citation tones produced by the informant are reminiscent of those described in the literature, but differ in several key ways. There are only six distinct citation tones compared to a previous eight. This is due to the redistribution of tone IVa and the merge in tones IIa and IIb. The tones also appear to be slightly more compressed in the lower register, with less space between, for example, tones Ia and IIIb.

Although tonal merges and changes are common in Sinitic languages, the implications on the realisations of the modified tones in

sandhi are not clear. Tones in sandhi may retain more distinctions than citation tones, and citation tones which have merged may nonetheless be realised differently according to their etymological category in sandhi (Chan, 1988). This means that although the citation tones in Wenzhounese differ from those described in the literature, these differences may not be clearly reflected by analogous changes in tone Sandhi. This initial analysis of citation tones, does, however provide a potential explanation for any differences in Sandhi tones in the following analyses in this chapter. Before presenting the methodology and results of this experiment, it is necessary to summarise the tone sandhi rules in Wenzhounese based on previous analyses.

7.1.2. Wenzhounese tone sandhi rules

This section will provide a brief overview of Wenzhounese tone sandhi as described in the literature. This will allow predicted sandhi values to be created for each of the words provided to the informant in the elicitation-based experiment.

Tone sandhi in Wenzhounese occurs at the level of the word, with monosyllabic words retaining their citation tones and longer words undergoing morphotonemic alternation (Chen, 2007). Wenzhounese tone sandhi is right dominant, meaning the rightmost two syllables in a polysyllabic word undergo changes based on their citation tones. Figure 8 shows the tone sandhi values for all possible disyllabic combinations in Wenzhounese. This table is based on data compiled in the thorough

analyses undertaken by Phil Rose (2000, 2002b, 2002a, 2004, 2011).

The pitch values for both citation and sandhi tones are given using Chao's tone numerals.

Figure 8 - Wenzhounese disyllabic tone sandhi

	σ1							
σ2	Ia	Ib	IIa	IIb	IIIa	IIIb	IVa	IVb
Ia	32.33	21.11	52.2	232.2	52.2	232.33	1.33	1.33
Ib	32.33	21.11	52.1	232.1	32.1	232.1	31.11	21.11
IIa	53.23	343.23	52.23	232.23	52.23	232.23	1.34	1.34
IIb	53.23	343.23	52.23	232.23	52.23	232.23	1.114	1.114
IIIa	22.4	11.4	52.1	232.1	52.1	232.1	3.52	2.52
IIIb	22.4	11.4	52.2	232.11	52.1	232.1	3.33	12.33
IVa	45.311	35.311	45.311	35.311	45.311	35.311	4.311	23.211
IVb	45.311	35.311	45.311	35.311	45.311	35.311	4.311	23.211

For words longer than two syllables, there are three more relevant rules to consider. These will be addressed in turn.

- 1) Substitution rule: in words longer than two syllables, tones IVa and IVb undergo tone sandhi according to the above table as if they were tone Ib (M. Y. Chen, 2007).
- 2) Polarity rule: the antepenultimate tone takes the opposite pitch to the sandhi value of the penultimate tone (Chen, 2007).
Antepenult → Low / __ High
→ High / __ Elsewhere
- 3) Deletion rule: Any syllable further left than the antepenult becomes atonal and is low and short by default (Chen, 2007).

7.1.3. Methodology

The Wenzhounese tone sandhi rules described in section 7.1.2 were used to create predicted sandhi values for 30 words. This word list contained 15 ideophones and 15 prosaic words. This list was then provided to the informant who was asked to read each of them aloud three times, pausing slightly between each repetition. The sandhi values produced by the speaker were then compared to the predicted values. This methodology allows differences between the behaviour of tone sandhi in ideophones and prosaic words to be described, as well as differences in tone sandhi in the informant compared to the values predicted in the literature.

7.1.4. Results and discussion

The informant was unfamiliar with some words but was able to read 18 aloud. Of these 18 words, 13 were ideophones and five were prosaic. Figure 9 shows the 18 words for which sandhi tones were successfully elicited.

Figure 9 - Word list for tone sandhi elicitation

Number	Characters	Pronunciation	Word type	Citation tones	Predicted sandhi values
1	遍地炮	ddangddeipuo	Ideophone	IIIb.IIIb.IIIa	232.1.L
2	东叭啦腔	dongbalaqi	Ideophone	Ia.Ia.Ia.Ia	33.32.33.2
3	矮登登	aedangdang	Ideophone	IIa.Ia.Ia	H.32.33
4	半边风	bubiefeng	Prosaic	IIIa.Ia.Ia	h.32.33
5	淡滋滋	daziizii	Prosaic	IIb.Ia.Ia	H.32.33
6	倒倒落	dedello	Ideophone	IIIa.IIIa.Ivb	L.45.311
7	倒落赖	dellolla	Ideophone	Iia.Ivb.IIIb	L.52.1
8	嘎嘎响	ggaggaxi	Prosaic	Iva.Iva.Iia	52.3.1
9	光溜溜	guoleuleu	Ideophone	Ia.Ia.Ia	H.32.33
10	圆卵卵	yyvlanglang	Ideophone	Ib.Ia.Ia	H.32.33
11	红东东	hhongdongdong	Ideophone	Ib.Ia.Ia	H.32.33
12	吭吭声	hhonghhongseng	Ideophone	Ib.Ib.Ia	21.11.L
13	红蜡蜡	hhongllalla	Ideophone	Ib.Ivb.Ivb	H.23.211
14	硬是硬	ngazzizhe	Prosaic	IIIb.IIb.IIb	H.232.23
15	臭烘烘	qieuhonghong	Ideophone	IIIa.Ia.Ia	h.32.33
16	塌塌动	tataddong	Ideophone	IVa.IVa.IIb	L.52.23
17	涿涿滚	tataguang	Prosaic	Ivb.Ivb.Iia	L.52.23
18	温温痛	wangwangtong	Ideophone	Ia.Ia.IIIa	H.22.4

Figure 10 shows the predicted sandhi values compared with the values observed in the recordings. An attempt was made to visualise the observed sandhi values using the extracted F0 data from the recording, however, given the extremely short duration of some of the sandhi syllables, the effect of onset and offset perturbations meant the visualisations were not an accurate representation of the auditory pitch for many tokens.

All of the five prosaic words recorded matched their predicted sandhi values. Of the 15 ideophones recorded, 10 matched their predicted sandhi values. Four of the ideophones did undergo tone sandhi but differed from the sandhi values predicted. Number 6 had sandhi values with the expected contours in the final disyllabic pair but in the opposite registers – low-rising followed by high-falling instead of

high-rising followed by low-falling. Numbers 12 and 13 and have sandhi values which mirror those predicted in terms of the register of each syllable but differ in terms of contour. Number 1 has the same final syllable as predicted but a different first two syllables. Finally, number 18 is the one word which does not undergo tone sandhi at all.

Figure 10 - Predicted and observed sandhi values

Number	Word type	Predicted sandhi values	Observed sandhi values
1	Ideophone	232.1.L	3.4.L
2	Ideophone	33.32.33.2	33.33.33.2
3	Ideophone	H.32.33	H.33.33
4	Prosaic	h.32.33	H.32.33
5	Prosaic	H.32.33	H.32.33
6	Ideophone	L.45.311	2.23.52
7	Ideophone	L.52.1	L.52.1
8	Prosaic	52.3.1	52.3.1
9	Ideophone	H.32.33	H.32.33
10	Ideophone	H.32.33	H.32.33
11	Ideophone	H.32.33	H.32.33
12	Ideophone	21.11.L	2.3.L
13	Ideophone	H.23.211	H.3.2
14	Prosaic	H.232.23	H.232.32
15	Ideophone	h.32.33	H.32.33
16	Ideophone	L.52.23	L.52.23
17	Prosaic	L.52.23	L.52.23
18	Ideophone	H.22.4	3.3.51

All four of the ideophones which differed from their predicted tone sandhi values contain at least one of the tones found to be involved in merging or redistribution in section 7.1.1. Based on this evidence, and the fact that the citation tones of the informant differ significantly from those previously described, there is not enough evidence to suggest that these differences in tone sandhi are due to the

words in question being ideophones. Instead, it appears more likely that these differences reflect a more widespread difference in this speaker's production of tone sandhi. If this were the case, one would expect to find examples of tone sandhi differing from predicted values among prosaic words as well as ideophones. Unfortunately, given the informant was only familiar with five of the prosaic words, there is also not enough evidence to determine whether some prosaic words differ in similar ways.

Number 18 is very unusual because it retains its citation tones and does not undergo tone sandhi at all. Tone sandhi is generally understood to be obligatory in every polysyllabic noun in Wenzhounese, meaning that none of the previous literature on the language would predict this word not undergoing sandhi. This one token is not enough to conclude that tone sandhi is involved in the marking of ideophones in Wenzhounese, however, it does suggest that further study in this area is warranted.

A study in which ideophones are elicited in a naturalistic environment rather than being read from a list and in which a much larger number of tokens are collected would provide better insight into the role of tone sandhi. Unfortunately, due to limited access to informants a study of this nature could not be undertaken as part of this thesis.

7.2. Reduplication

Although not a sufficient criterion for identification, one of the most prevalent crosslinguistic similarities in the form of ideophones is reduplication (Dingemanse, 2015). More specifically, in Sinitic languages, reduplication or reduplication-like phenomena have been observed as part of the marking process in every language studied thus far (Van Hoey, 2015). Given that the presence of reduplication and reduplication-like phenomena was one of the conditions by which ideophones were identified in Chapter 5, all of the ideophones analysed in this thesis contain at least one of these phenomena. This section, then, is concerned with describing the types of phenomena observed in the data, analysing their domain of applicability and comparing these results to those in other Sinitic languages.

For the purposes of this section, ‘reduplication-like phenomena’ refers to all phenomena in which all or part of a syllable is the same as another syllable in the same word. This means that not every syllable need be reduplicated. The phenomena included by this definition are described in Figure 11.

Figure 11 - Description of reduplication and reduplication like phenomena

Phenomenon	Description
Full reduplication	Syllables are identical
Rhyme	Syllables differ only in their initial consonant
Alliteration	Syllables have the same initial consonant
Assonance	Syllables have the same vowel
Consonance	Syllables have the same final consonant
Pararhyme	Syllables differ only in their vowel

Of all the phenomena listed above, the Wenzhounese ideophones analysed in this thesis only contain full reduplication, rhyme and alliteration. The vast majority contain full reduplication. This is a stark contrast to Middle Chinese, in which all of the above phenomena are found in the marking of ideophones. The absence of consonance is partially explained by the fact that Wenzhounese only has one available coda – the velar nasal. This means that a string of syllables ending in the same sound is likely less noticeable than in a language with multiple codas. The more restricted reduplication phenomena in Wenzhounese likely mean that reduplication is a stronger tool for marking. Although reduplication and similar phenomena are widespread in Wenzhounese more generally, the fact that full reduplication is present in the majority of ideophones suggests that its presence, along with clues from non-compositionality and the referent of the word, are likely sufficient to alert speakers that a given word is an ideophone rather than a prosaic word.

Figure 12 - Frequency of reduplication, rhyme and alliteration

Phenomenon	Frequency
Full reduplication	50
Rhyme	10
Alliteration	5

11

¹¹ The numbers in this table add to more than the number of ideophones in the database because some display multiple phenomena.

The data collected contain ideophones of two, three and four syllables. Each length has distinctive features in terms of their reduplication phenomena. Each length will be examined in turn in the following paragraphs.

There are three examples of disyllabic ideophones in the data. One contains full reduplication and the other two contain alliteration. Because these examples contain only two syllables, they all display the AA pattern by default. Given the small sample size it is difficult to infer any sort of generalisation from these tokens.

Of the 48 trisyllabic ideophones, 43 display full reduplication, four display rhyme and two display alliteration. One ideophone is both rhyming and reduplicated. In terms of the patterns of reduplication, the rhyming and alliterative ideophones are skewed towards ABB. There are 30 trisyllabic ideophones displaying full reduplication with the pattern ABB compared to only 13 with the pattern AAB. Of the four trisyllabic alliterative ideophones, three have the pattern ABB and only one has the pattern AAB. Of the two trisyllabic rhyming ideophones, one has the pattern ABB and one has the pattern AAB. This aligns with previous findings in MSM, in which ABB was identified as the most prominent prototype for ideophones (Van Hoey, 2023).

Also mirroring the results from Van Hoey's study of MSM, many of the trisyllabic ideophones in Wenzhounese contain one non-reduplicated prosaic syllable and two reduplicated iconic syllables. The

prosaic syllable often indicates the category of meaning being depicted, while the iconic syllables, unsurprisingly, mimic the specific meaning in some way. This construction consisting of both prosaic and iconic syllables occurs in trisyllabic ideophones with both AAB and ABB patterns. One of each can be seen in Example 11 and Example 12.

Example 11 - AAB ideophone with prosaic syllable

𠵿	𠵿	声
hhong2	hhong2	seng1
id.	id.	sound
The sound of a bell		

Example 12 - ABB ideophone with prosaic syllable

臭	烘	烘
qieu5	hong1	hong1
smelly	id.	id.
A very stinky smell		

The one trisyllabic ideophone which is both rhyming and reduplicated displays the pattern AAB in terms of reduplication and AAA in terms of rhyme. This can be seen in Example 13.

Example 13 - Trisyllabic ideophone displaying reduplication and rhyme

躔	躔	动
qiong5	qiong5	ddong4
id.	id.	move
The appearance of stumbling		

Quadrissylic ideophones in Wenzhounese are somewhat more complex in their reduplication phenomena. Of the 10 quadrissylic

ideophones, half contain multiple phenomena. Two contain reduplication and alliteration, two contain reduplication and rhyme and one contains rhyme and alliteration. One of each combination is shown in the following examples.

Example 14 - Quadrisyllabic ideophone displaying reduplication and alliteration

嚕	哩	嚕	瞭
leu3	lei3	leu3	so1
verbose	id.	verbose	id.

Very long winded.

Example 15 - Quadrisyllabic ideophone displaying reduplication and rhyme

疙	里	疙	瘩
ga7	llei4	ga7	da7
id.	id.	id.	id.

Someone is very picky.

Example 16 - Quadrisyllabic ideophone displaying rhyme and alliteration

花	里	斑	拉
ho1	llei4	ba1	la1
flower	id.	id.	id.

Spotty, dark and mottled.

These examples are reflective of a broader trend among quadrisyllabic ideophones, in which more than two of the syllables are usually involved in the reduplication phenomena. There are a number of patterns, including ABBC, AABB, ABCB and ABAB. All the quadrisyllabic ideophones along with the reduplication patterns for each phenomenon and the total number of syllables involved are shown in Figure 13.

Figure 13 - Reduplication phenomena in quadrisyllabic ideophones

Ideophone	Full reduplication	Rhyme	Alliteration	Number of syllables involved
dong1ba1la1qi1		ABBC		2
ji7ji7ga7ga7	AABB			4
ji7lei4gu1lleu4			ABCB	2
leu3lei3leu3so1	ABAB		AAAB	3
ho1lleu4ba1la1		ABCC	ABCB	3
cai7cai7bo7bo7	AABB			4
yyv2gu3llang2dang1		ABCC		2
la7lleu4la7ta7	ABAC		ABAA	4
ga7lleu4ga7da7	ABAC	ABAA		3
uo5cie5bo7cie5	ABCB	ABAB		4

Figure 13 shows that the patterns and combinations of reduplication and similar phenomena are more varied in quadrisyllabic than in trisyllabic or disyllabic ideophones. This increased complexity likely sets ideophones apart from prosaic words and serves as an important part of the marking strategy for ideophones in Wenzhounese. This may offset the fact that quadrisyllabic ideophones are much less consistent in their reduplication phenomena than trisyllabic ideophones and lack a dominant prototype similar to ABB.

Studies of crosslinguistic ideophones have shown that in naturalistic settings, speakers often spontaneously vary the reduplication phenomena found in ideophones, adding extra syllables for emphasis (Dingemanse, 2015). This may also be the case in Wenzhounese, however, a full investigation of the production of ideophones in naturalistic contexts was not possible in this thesis due to limited availability of informants.

Overall, Wenzhounese ideophones display a complex and varied array of reduplication phenomena, although not as broad as is found in Middle Chinese. These phenomena, along with the effects of tone and the subject matter depicted by ideophones are more than satisfactory in marking them as different from prosaic words.

7.3. High-level tone

Recent study has shown that the high-level tone is overrepresented in the ideophonic lexicons of Cantonese, Taiwanese and Mandarin (Thompson, 2018). This finding is particularly interesting because the tones realised as high in modern Sinitic languages are often from different etymological tone categories, suggesting the overrepresentation of high tones is a new innovation rather than a phenomenon inherited from middle Chinese.

In this section I aim to determine whether the high tone is also overrepresented in Wenzhounese ideophones, and to assess whether this is more likely the result of inherent iconicity due to pitch or a part of the marking system.

7.3.1. Methodology

The database of ideophones was surveyed, and the number of high-level tones (tone 1a) and other tones was counted. A random sample of the same number of syllables from prosaic words in Wenzhounese was collected and counted in the same manner. The frequency of high-level

vs other tones was then compiled into a contingency table and tested for statistical significance.

7.3.2. Results and discussion

Figure 14 shows the frequency table for tone la and other tones in ideophones and the prosaic lexicon.

Figure 14 - Frequency table for tone la and other tones

	Ideophones	Prosaic	Row totals
Tone la	59	28	87
Other tones	131	162	293
Column totals	190	190	380

The data were tested for statistical significance using Fisher's exact test and tone la was found to be overrepresented in ideophones ($p=0.0002$). Although it is clear that the high tone is overrepresented in Wenzhounese ideophones, the reason for this is still unclear. If tone la is overrepresented because it is part of the marking strategy for ideophones, then we would expect to see high tones in ideophones regardless of the meanings they depict. If it is overrepresented due to inherent iconicity then we would expect to see it in ideophones depicting high pitches, high spatial position, small sizes or pointedness (Perlman et al., 2015).

A survey of the database in Appendix 4 shows that there is only one example in which an ideophone with high tone depicts meanings of this nature. Example 17 shows this example, in which an ideophone with all high-level tones depicts ‘flying’, a meaning related to a high spatial position.

Example 17- High tones depicting high spatial position

翩	翩	飞
pie1	pie1	fei1
id.	id.	fly
The appearance of flying, running fast.		

The database also contains several counterexamples in which ideophones with high tones depict referents with either a large size or rounded/smooth shape. Example 18 shows an ideophone in which the two iconic syllables have a high-level tone and the meaning – fatness – is clearly associated with a larger size. Example 19 shows an ideophone in which all three syllables are high-level and the meaning is associated with a smooth (non-pointed) shape.

Example 18 - High tones depicting large size

壮	膨	膨
jiuo5	nai1	nai1
robust	id.	id.
Describes fatness.		

Example 19 - High tones depicting smoothness

光	溜	溜
guo1	leu1	leu1
light	id.	id.
Smooth appearance.		

Finally, there are many examples in the database of ideophones with high tones which appear completely unrelated to any of the expected iconic meanings associated with a high pitch. Example 20 shows one of these.

Example 20 - High tones depicting an unrelated referent

东	叭	啦	腔
dong1	ba1	la1	qi1
id.	id.	id.	id.
Used to describe a person who is difficult to understand.			

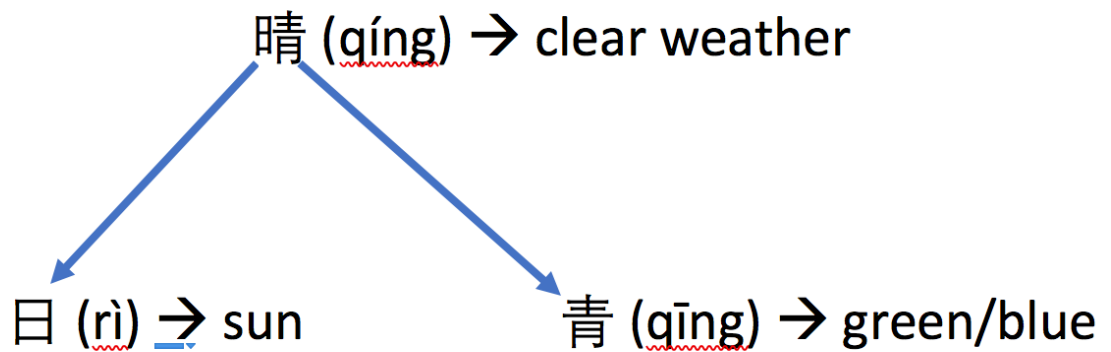
Based on this evidence, there is no reason to conclude that the high-level tone is overrepresented in Wenzhounese ideophones due to its inherent iconicity. Instead, a more likely explanation is that the high-level tone is part of the marking system and its overrepresentation in ideophones serves to set them apart from prosaic words.

7.4. Semantic radicals

The Chinese writing system is generally morphosyllabic, with each character corresponding to a single morpheme and syllable. There are several types of Chinese character, including simple pictograms, simple

non pictorial graphs, and composite characters whose meaning is made up of a combination of their components' meanings (Norman, 1988). By far the most common type of character, however, is the semantic-logographic compound (Chen, 1996; Norman, 1988). These characters are composed of a semantic radical, indicating something of the meaning of the character and a phonetic component, indicating something of the sound of the character. As the sounds and meanings indicated by radicals may be derived from archaic or literary readings, their correspondence to the meaning and sound of the relevant morpheme is sometimes opaque. Nonetheless, they serve as important sub-lexical units and assist in the processing of written Chinese (Feldman & Siok, 1999). Figure 15 shows a relatively transparent compound character, in which the semantic radical on the left indicates the meaning relates to the sun and the phonetic radical on the right indicates that the pronunciation is similar to {qīng}. In this case the only difference is that the resultant character has a different tone to the phonetic radical.

Figure 15 - Example of a semantic-logographic compound



Recent scholarship has indicated that ideophones in Sinitic languages are often identifiable due to their semantic radicals. In his 2015 PhD Thesis, Thomas Van Hoey notes that most of the ideophones representing sound in Middle Chinese are marked with a mouth radical (口) (Van Hoey, 2015). The aim of this section is to determine whether mouth radicals are also overrepresented in sound ideophones in Wenzhounese, and to determine whether this is part of the marking system for ideophones in the language.

7.4.1. Methodology

Ten sound ideophones were identified in Wenzhounese. These are shown in Figure 16 below.

Figure 16 - Sound ideophones

Characters	Number in appendix
邊地炮	5
东叭啦腔	9
嘎嘎	10
𠵼𠵼声	18
豁刺刺	23
唧唧嘎嘎	24
唧哩咕嚕	25
叫绷绷	27
嚕哩嚕瞭	30
嘖嘖声	39

A random number generator was used to select 30 Wenzhounese dictionary entries for comparison (Shen & Shen, 2009). The number of mouth radicals in each data set was tallied and compiled into contingency tables.¹² The frequency of mouth radicals at the level of the word and the level of the individual character in ideophones vs the prosaic lexicon was then tested for statistical significance.

7.4.2. Results and discussion

Of the 10 ideophones, eight contained at least one mouth radical. Of the 30 random entries, five contained at least one mouth radical. The contingency table for these values can be seen in Table 4. The contingency table was tested for statistical significance using Fisher's exact test. The mouth radical was found to be overrepresented in ideophones at the level of the word ($p=0.0006$).

¹² The dictionary entries used have the same proportion of disyllabic, trisyllabic and quadrisyllabic words as the ideophones being investigated. This negates the impact caused by longer words having a higher chance of containing a mouth radical.

Table 4 - Radical frequency at the level of the word

	Mouth radical	Other radical	Row totals
Sound ideophones	8	2	10
Random lexical items	5	25	30
Column totals	13	27	40

The ten ideophones contained a total of 21 mouth radicals. The 30 random entries contained a total of seven mouth radicals. The contingency table for these values can be seen in Table 5. The contingency table was tested for statistical significance using Fisher's exact test. The mouth radical was found to be overrepresented in ideophones at the level of the individual character ($p < 0.00001$).

Table 5 - Radical frequency at the level of the character

	Mouth radical	Other radical	Row totals
Characters from sound ideophones	21	12	33
Characters from random lexical items	7	89	96
Column totals	28	101	129

Although mouth radicals are significantly overrepresented at the level of the word and the character, not every single ideophone

depicting sound contains a mouth radical. This differs from the findings in Middle Chinese (Van Hoey, 2015). In middle Chinese, every ideophone depicting sound contained at least one mouth radical. One possible explanation for this is the fact that Wenzhounese is often used as a spoken language, whereas MSM is used as the written standard (Li, 2014). Often, in written Wenzhounese, characters are used purely for their phonetic value rather than to denote the morpheme the character is traditionally used for. The lack of mouth radicals in some sound ideophones may be because the characters used are purely phonetic loans.

Ideophones depicting meanings other than sound also display relatively transparent semantic radicals. An example of this is shown in Figure 17.

Figure 17 - Semantic radical in visual ideophone

Radical	Characters	Pronunciation	Definition
氵	淅淅响	zzai8zzai8xi3	The appearance of falling rain.

This does not appear to be the same phenomenon as in the ideophones depicting sound. In the example above, the semantic radical for water “氵” corresponds with a definition relating to water. This indicates that the radical is used to provide specific clues about the character or expression’s meaning rather than indicate which sensory

domain it is depicting. As this is the same as the way radicals are used in much of the prosaic lexicon, it does not appear that radicals form part of the marking strategy for Wenzhounese ideophones apart from in those depicting sound.

7.5. Conclusion

This section has demonstrated the involvement of reduplication, tone and semantic radicals in the marking of ideophones in Wenzhounese. Reduplication is involved in the marking of every ideophone in the database, whereas radicals and tone are only involved in some. Interestingly, given that tone is a purely auditory phenomenon and semantic radicals are a purely visual phenomenon, this means that there are two types of marking for both the written and spoken modality. Although reduplication is the most significant method for marking, it is supplemented by one other method in each modality. Further, the marking strategies for ideophones in Wenzhounese may be broader than those discovered in this thesis. Although there is not enough evidence to suggest tone sandhi is used to mark ideophones based on the results of the elicitation-based experiment detailed above, some of the results appear abnormal, suggesting that this may be a fruitful area for further study. Free variation in reduplication may also be involved in marking, however, due to limited access to informants and the naturalistic setting required to elicit this type of data, an investigation of this phenomenon is outside the scope of this thesis.

Chapter 8. Semantic domains

The semantic domains expressed by ideophones are different in various languages. There are, however, some generalisations based on the types of iconicity required to express certain meanings. The relevant types of iconicity are imagic iconicity and diagrammatic iconicity, discussed in section 2.2. In the case of imagic iconicity, the signifier resembles the signified by virtue of sensory characteristics or perceptuomotor analogy. This is the type of iconicity in onomatopoeic words such as ‘bang’ and ‘swish’. Given that spoken language is transmitted through sound, the most readily available perceptuomotor analogy is the use of words which sound like their referents. In the case of diagrammatic iconicity, relations between parts of the signified are represented by similar relations between parts of the signifier. Important to note is that the individual parts in each side of the linguistic sign need not resemble one another in isolation (Dingemanse et al., 2015).

Several tools exist to quantify and compare the semantic domains of ideophones. The first relevant tool is Mark Dingemanse’s implicational hierarchy, visible in Figure 18 (Dingemanse, 2012). Dingemanse proposed that languages with ideophones requiring more opaque forms of iconicity will also have ideophones requiring more transparent kinds.

The implicational hierarchy represents a cline between imagic iconicity on the left and diagrammatic iconicity on the right. It posits that

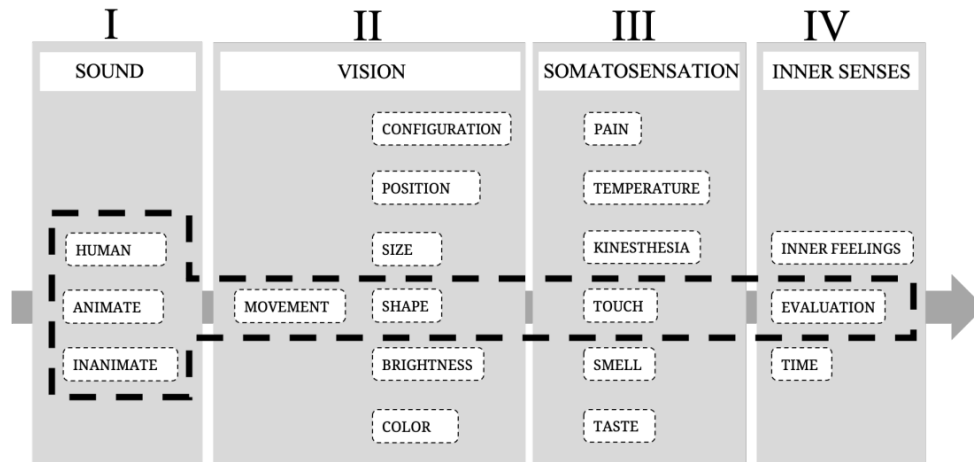
a language containing ideophones depicting any of the categories listed will also contain ideophones depicting all the categories to its left. For example, a language with ideophones depicting visual patterns will also contain ideophones depicting movement and sound. This tool is useful for initially gauging how broad the semantic domains expressed by ideophones in a given language are, however, it is not granular enough to support easy crosslinguistic comparison. The hierarchy was revised by Bonnie Mclean, however, given her system's special reference to Japonic languages it will not be used to examine the Wenzhounese ideophones in this thesis (B. McLean, 2021).

Figure 18 - Implicational hierarchy for ideophones (Dingemanse 2012)

(1) SOUND < MOVEMENT < VISUAL PATTERNS < OTHER SENSORY PERCEPTIONS < INNER FEELINGS AND COGNITIVE STATES

The second relevant tool is a semantic map for ideophones created by Thomas Van Hoey (Van Hoey, 2022). The semantic map is still implicational from right to left along its main axis, shown in Figure 19. Unlike Dingemanse's hierarchy though, each sensory domain is split into several sub-domains. This tool allows unique maps to be drawn for each language. These maps may then be used for crosslinguistic comparison.

Figure 19 - Semantic map for ideophones (Van Hoey, 2023)



13

The purpose of this chapter is threefold. First, to determine which semantic domains are expressed using ideophones in Wenzhounese. Second, to compare these domains to other languages. Finally, to determine if there are any multisensory ideophones depicting multiple semantic domains simultaneously.

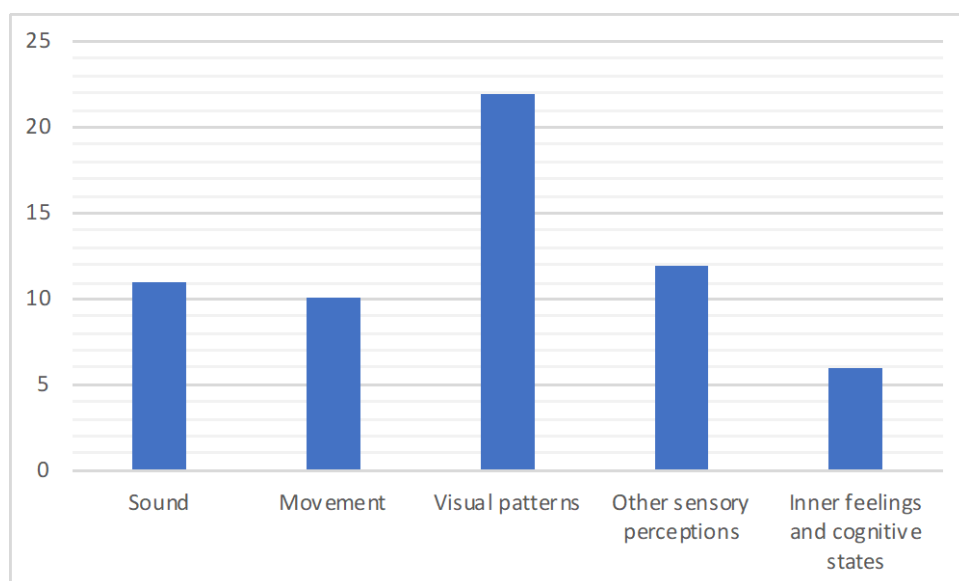
The Wenzhounese data are assessed using Dingemanse's implicational hierarchy in section 8.1. The same data are assessed using Van Hoey's semantic map in section 8.2. Finally, in section 8.3, the nature of multisensoriality in Wenzhounese ideophones is described and an amendment to the semantic map is proposed.

¹³ Reproduced with permission of the author.

8.1. Implicational hierarchy

Dingemanse's implicational hierarchy contains six semantic domains representing a cline from imagic iconicity on the left to diagrammatic iconicity on the right. Each of the ideophones in the database in Appendix 4 were assigned to one of the six categories in the hierarchy. The Wenzhounese data contain examples of all categories in Dingemanse's implicational hierarchy. The frequency of ideophones depicting each category can be seen in Figure 20. It is important to note that the implicational hierarchy is agnostic regarding the frequency of ideophones in any given language. The hierarchy only makes predictions about the types of ideophones languages will display, not how many of each type there will be. This is exemplified by the data in Wenzhounese, as there are more vision ideophones than sound ideophones, although these are less immediate in terms of the type of iconicity required. Further, the most common semantic domain is evaluation, although this falls squarely in the domain of diagrammatic rather than imagic iconicity.

Figure 20 - Frequency of each semantic domain in Dingemanse's implicational hierarchy



One example of an ideophone depicting each semantic domain can be seen in Table 6.

Table 6 - Example of each area from Dingemanse's implicational hierarchy

Characters	Pronunciation	Definition	Semantic area
邊地炮	ddang6ddei6puo5	A type of firecracker that rings when thrown on the ground.	Sound
倒倒落	de5de5llo8	Describes something falling down (rain etc).	Movement
花里斑拉	ho1llel4ba1la1	Spotty, dark and mottled.	Visual patterns
糯漆	nnong6dong3	Soft and jelly like.	Other sensory perceptions
浑淘淘	wwang6dde2dde2	Dizzy and confused.	Inner feelings and cognitive states

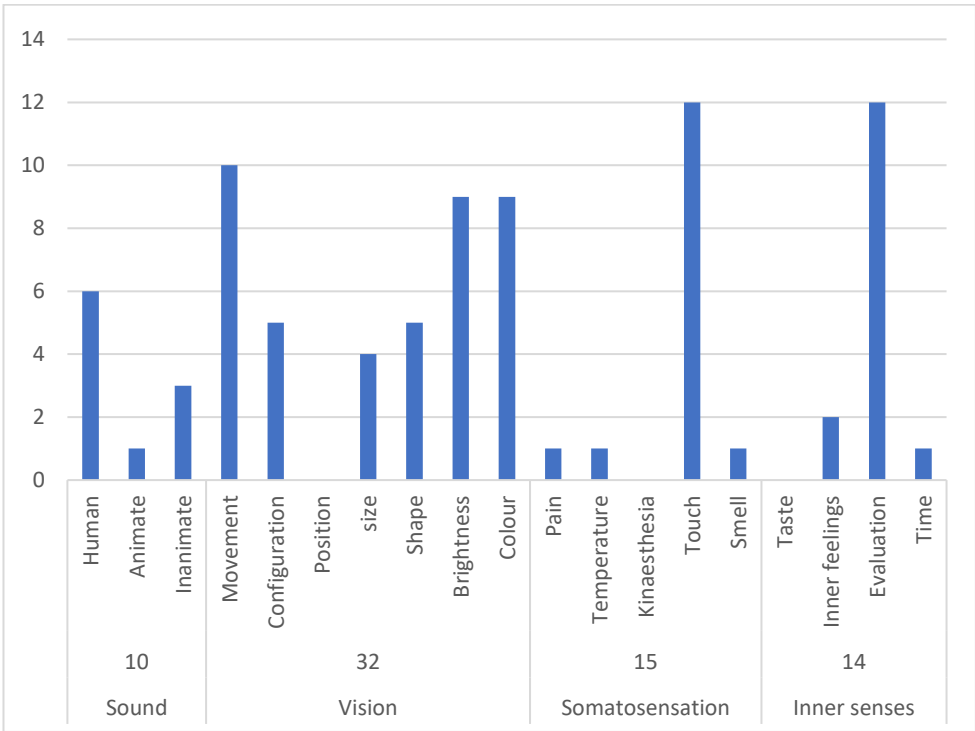
The results from Wenzhounese confirm the hypothesis made by Dingemanse in that Wenzhounese contains ideophones depicting inner feelings and cognitive states as well as all of the semantic domains

further to the left in the implicational hierarchy. This provides another point of evidence confirming the efficacy of the hierarchy.

8.2. Semantic map

Each of the ideophones in the database in Appendix 4 were assigned to at least one of the categories in Van Hoey’s semantic map. Each ideophone was again assigned to at least one of the sub-categories. Figure 21 shows the frequency of each semantic domain and sub-domain in the database.¹⁴

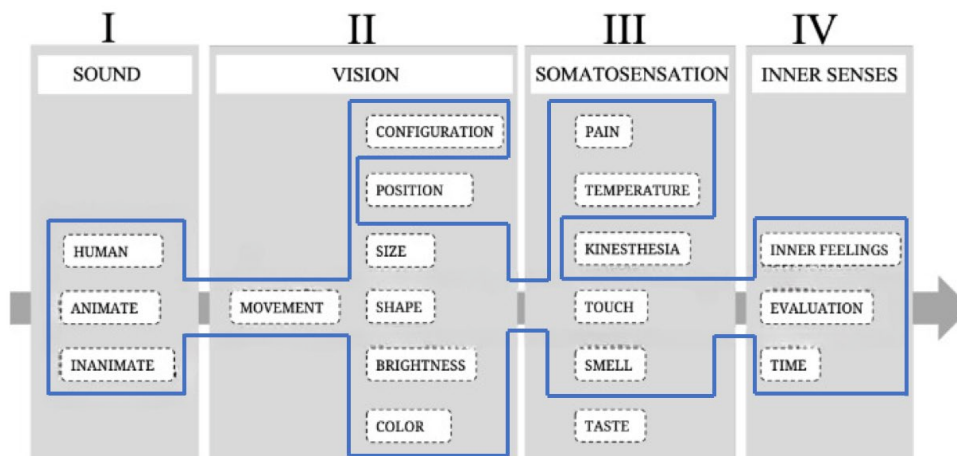
Figure 21 - Frequency of Van Hoey’s semantic domains



¹⁴ The numbers in this chart add up to more than the total number of ideophones due to multisensoriality, discussed in section 8.3.

The same data were used to create a completed semantic map for ideophones in Wenzhounese, shown in Figure 22.

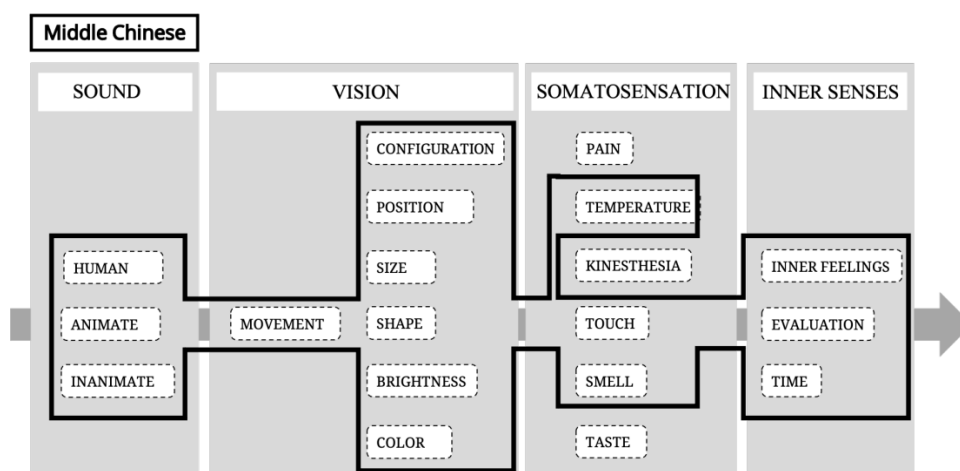
Figure 22 - Semantic map of ideophones in Wenzhounese



The semantic domains depicted by ideophones in Wenzhounese are broad compared to other languages. Wenzhounese ideophones depict a broader range of semantic domains than five of the nine languages for which a semantic map has been created (Van Hoey, 2022). Two languages – Middle Chinese and Siwu – have ideophones depicting the same number of semantic domains as Wenzhounese. Only two languages – Korean and Japhug – contain a have ideophones depicting a broader range of semantic domains than Wenzhounese.

Although the semantic maps of ideophones in Wenzhounese and Middle Chinese show that the languages depict the same number of semantic domains, they are not identical. Figure 23 shows the semantic map of ideophones in Middle Chinese.

Figure 23 - Semantic map of ideophones in Middle Chinese (Van Hoey, 2022)



Each of the two maps contains three semantic domains not expressed by ideophones. In Wenzhounese these are position, kinaesthesia and taste, whereas in Middle Chinese they are pain, kinaesthesia and taste. Each language contains one semantic domain not found in the other. Given that these languages are closely related, it seems that this may be due to limitations in each of the studies. It is possible Wenzhounese does in fact contain ideophones depicting position which were not found due to the relatively small size of the database analysed in this thesis. Similarly, Middle Chinese may have contained ideophones depicting pain which were not discovered in Van Hoey's study due to the register effect associated with drawing data from a poetic corpus.

8.3. Multisensoriality

Multisensoriality occurs in ideophones when they refer to multiple semantic domains or senses simultaneously. This is not the same as polysemy, where an ideophone has two definitions, each of which may refer to different semantic domains. Multisensoriality, also referred to as synaesthesia, is observed in the ideophonic lexicons of many languages (Thompson et al., 2021; Van Hoey, 2022) Table 7 shows the frequency of Wenzhounese multisensory ideophones in each of the categories in Van Hoey's semantic map. Each multisensory ideophone is tallied in all of the semantic categories to which it belongs.

Table 7 - Frequency of multisensoriality by semantic domain

Human	2
Animate	0
Inanimate	0
Movement	2
Configuration	3
Position	0
Size	3
Shape	4
Brightness	5
Colour	6
Pain	0
Temperature	0
Kinaesthesia	0
Touch	4
Smell	0
Taste	0
Inner feelings	0
Evaluation	8
Time	1

Although all the examples illustrated in Figure 24 involve some aspect of multisensoriality, those that occur between separate sections of the semantic map are more noteworthy. These involve multisensoriality or synaesthesia between truly different senses rather than between different aspects of the same sense. There are two major paths for multisensoriality in Wenzhounese ideophones. The first is the combination of evaluation with any other semantic domain, discussed above. The second involves the cooccurrence of colour, brightness and touch. In fact, these three semantic domains cooccur in four of the available ideophones, shown in Table 8.

Table 8 - Examples of multisensory ideophones

Characters	Alternative characters	Pronunciation	Definition
光溜溜		guo1leu1leu1	Smooth appearance.
光溜头	光郎头	guo1leu1ddeu2	Smooth head, monk's head.
汗滋滋	汗渍渍	yyv6zzi1zzi1	Describes a slightly sweaty appearance.
硬壳壳		nngie6ko7ko7	The appearance of hard objects.

These ideophones are notable in that rather than depicting both vision and touch, they depict the appearance of something with a particular textural characteristic. Research suggests that both vision and touch are recruited in the sensory perception of texture, with the two senses complementing each other but nonetheless operating independently (Whitaker et al., 2008). Further, adjacent but non-overlapping areas in the brain are used in the visual and haptic perception of texture (Podrebarac et al., 2014). This phenomenon is

exemplified by the fact that responses to tactile samples are altered by different visual stimuli (Yanagisawa & Takatsuji, 2015).

The data from Wenzhounese along with the psychological literature suggest that the ideophones depicting colour, brightness and touch are not multisensory, but are depicting a semantic domain not accounted for in the semantic map. This semantic domain is 'visual texture' or 'surface appearance'. 'Surface appearance' is also expressed using ideophones in Siwu, possibly forming a coherent domain (Dingemanse, 2011b). Korean also has ideophones depicting meanings such as 'sleek and glossy' and 'rough', although it is unclear if these make up a coherent domain (Lee, 1992).

Whether ideophones depicting visual perception of texture exist as a distinct class crosslinguistically remains unclear. It is, however, clear that in Wenzhounese these do not represent multisensory ideophones, but rather ideophones in a semantic domain not available in Van Hoey's semantic map. This could be addressed by adding a semantic domain for visual perception of texture or including texture as a category both in the vision and somatosensation areas. Whether this is necessary would again depend on the crosslinguistic prevalence of these ideophones, as a semantic map of this kind must strike a balance between being so general it provides no meaningful information and being so granular it becomes unwieldy.

8.4. Conclusion

This chapter demonstrates that Wenzhounese contains a broad and varied mimetic lexicon. The language contains ideophones depicting a wider range of semantic domains than many other languages and a similar range to Middle Chinese. Wenzhounese ideophones display multisensoriality, especially in ideophones where evaluation is combined with other sensory domains. The data suggest that consideration should be given to a new semantic domain – visual perception of texture. A full consideration of the applicability of this category would require further crosslinguistic inquiry.

Chapter 9. Conclusion

This thesis serves as an initial description of ideophones in the Wenzhounese language. Given that ideophones in Wenzhounese have not been previously addressed, its purpose is to show that ideophones do indeed constitute a word class worthy of study and to describe their main characteristics. The three main characteristics explored correspond to the three major research questions. How do ideophones in Wenzhounese depict sensory imagery? How are ideophones in Wenzhounese marked? What kinds of sensory imagery do ideophones in Wenzhounese depict?

In order to answer these three major questions, a database of Wenzhounese ideophones was first created. This major data collection, detailed in Chapter 5, identified ideophones using elicitation tasks and lexicographical resources. Potential tokens were assessed against several criteria, each of which corresponds either to an element of the definition of ideophones or to universal features of Sinitic ideophones identified in the literature. The identification of 60 tokens, although likely far from a complete picture of the breadth of ideophones in the language, demonstrates that there is a significant class of sound symbolic words in Wenzhounese. This database also formed the basis for answering the three research questions detailed above.

The first major research question is addressed in Chapter 6 and relates to how Wenzhounese ideophones depict sensory imagery

through iconicity. Results indicate that Wenzhounese ideophones display iconicity at the level of the sound, with four of the 11 crosslinguistically common correspondences also occurring in Wenzhounese. This investigation of phonosemantic mapping was somewhat limited by a relatively small data set in which some of the phonetic or semantic features being investigated occur infrequently. With possible further scholarly interest in Wenzhounese ideophones in the future, it is likely that more of the phonosemantic correlations observed crosslinguistically will also be found in Wenzhounese. Results also indicate that Wenzhounese ideophones display iconicity in other areas, such as the length of the word, the relationship between syllables in the word and the dominant phonation type in a word.

The second major line of inquiry relates to the marking of ideophones in Wenzhounese. Many of the results confirm what is expected of Sinitic ideophones based on the existing literature. Wenzhounese ideophones are marked using reduplication, with different patterns occurring based on syllable length. The types of reduplication phenomena are, however, narrower than those in other Sinitic languages such as Middle Chinese. As is the case in other Sinitic languages, the high-level tone is overrepresented in Wenzhounese ideophones. Results indicate that this is also part of the marking of ideophones rather than due to the inherent iconicity of high pitch. Again mirroring results in related languages, semantic radicals are found to play a part in the marking of ideophones depicting sound. Contrary to

findings in closely related languages, results indicate that there is not enough evidence to suggest tone sandhi is involved in the marking of ideophones in Wenzhounese. All except one of the ideophones tested in the elicitation-based experiment underwent tone sandhi, with most undergoing tone sandhi in exactly the way predicted in the literature. This result would be better understood if confirmed by elicitation-based experiments involving multiple participants and more naturalistic data. Experiments of this sort, due to limited time and lack of consistent access to informants, were not possible within this thesis. The results of the tone sandhi experiment provide other avenues for future research, relating to how flexible tone sandhi in various languages is and the degree to which adherence to tone sandhi rules is required for sentences to be perceived as correct.

The final line of inquiry aims to describe the semantic domains depicted by ideophones in Wenzhounese. Results indicate that ideophones in Wenzhounese are used to depict a crosslinguistically broad range of semantic domains. These were assessed using Dingemanse's implicational hierarchy and Van Hoey's semantic map (Dingemanse, 2019; Van Hoey, 2022). Ideophones in Wenzhounese are used to depict all of the meanings in the implicational hierarchy and most of those in the semantic map. The semantic domains in Wenzhounese ideophones were compared to those in Middle Chinese, again using the semantic map, revealing that the two languages have ideophones depicting similar but not identical domains. Finally, an

investigation of synaesthesia reveals a group of ideophones in Wenzhounese depicting a semantic domain - visual texture - not accounted for in either of the typological tools. The results in this chapter add one data point to confirm the validity of Dingemanse's implicational hierarchy. The slight differences between the semantic maps created for Wenzhounese and Middle Chinese suggest an interesting area for future research: how do the mimetic lexicons of languages evolve over time? Finally, the description of a semantic domain not found in either typological tool will warrant crosslinguistic inquiry to determine if this semantic domain is specific to Wenzhounese or more widespread. If it is found in a significant number of other languages, this suggests the semantic map itself should be updated to better account for the new data.

Overall, this thesis has shed light on an understudied linguistic phenomenon in an understudied language, which nonetheless is central to how millions of people express humour and describe the most vibrant and immediate scenes in the world around them. I hope this thesis contributes to continued interest and inquiry into what is a fascinating and creative part of linguistic expression.

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Appendices

1. Conversion tables for Shen romanisation system and IPA

Figure 25 - Conversion table for Wenzhounese initials

Initials	Shěn system	IPA
Plosives	p	[pʰ]
	b	[p]
	bb	[b]
	t	[tʰ]
	d	[t]
	dd	[d]
	k	[kʰ]
	g	[k]
	gg	[g]
Affricates	c	[tsʰ]
	z	[ts]
	zz	[dz]
	q	[tɕʰ]
	j	[tɕ]
	jj	[dʒ]
Fricatives	f	[f]
	w	[v]
	s	[s]
	ss	[z]
	x	[ɕ]
	h	[h]
	hh	[ɦ]
Nasals	m	[m]
	n	[n]
	ny	[ɲ]
	ng	[ŋ]
Approximants	i,y	[j]
	u	[u]
Lateral approximants	l	[l]

Figure 26 - Conversion table for Wenzhounese rhymes

Rhymes	Shěn system	IPA
Monophthongs	a	a
	ae	ɛ
	e	ɜ
	ee	e
	i	i
	ii	ɪ
	o	o
	œ	ø
	u	u
	v	y
Diphthongs	ai	ai
	au	au
	ei	ei
	eu	ɶu
	ia	ia
	ie	iɛ
	ov	øɥ
	uo	uo
	uo	yo
Triphthongs	iai	iai
	uie	uiɛ
Monphthong + nasal	ang	aŋ
	eng	eŋ
	ong	oŋ
Nasals	n	n
	ng	ŋ

Figure 27 - Conversion table for Wenzhounese tones

Shen system	Etymological category
1	la
2	lb
3	lia
4	lib
5	IIIa
6	IIIb
7	Iva
8	Ivb

2. Wenzhounese tonal descriptions

Table 9 - Wenzhounese citation tones

Etymological I tone	Ia	Ib	IIa	IIb	IIIa	IIIb	IVa	IVb
Traditional Chinese name	Yinping	Yangping	Yinshang	Yangshang	Yinqu	Yangqu	Yinru	Yangru
Pitch description	mid- level	mid-falling	high-rising	low-rising	high- falling	low-level	mid- dipping	low- dipping
Chao numeral	33	331	34	114	51	222	3312	2212

Table 10 - Wenzhounese disyllabic tone sandhi

	$\sigma 1$							
$\sigma 2$	Ia	Ib	IIa	IIb	IIIa	IIIb	IVa	IVb
Ia	32.33	21.11	52.2	232.2	52.2	232.33	1.33	1.33
Ib	32.33	21.11	52.1	232.1	32.1	232.1	31.11	21.11
IIa	53.23	343.23	52.23	232.23	52.23	232.23	1.34	1.34
IIb	53.23	343.23	52.23	232.23	52.23	232.23	1.114	1.114
IIIa	22.4	11.4	52.1	232.1	52.1	232.1	3.52	2.52
IIIb	22.4	11.4	52.2	232.11	52.1	232.1	3.33	12.33
IVa	45.311	35.311	45.311	35.311	45.311	35.311	4.311	23.211
IVb	45.311	35.311	45.311	35.311	45.311	35.311	4.311	23.211

3. Elicitation images for ideophones

Figure 28 - Elicitation image 1



Figure 29 - Elicitation image 2



Figure 30 - Elicitation image 3



Figure 31 - Elicitation image 4



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Figure 32 - Elicitation image 5



¹⁵ Author: vector portal. Licence: <https://creativecommons.org/licenses/by/4.0/>

Figure 33 - Elicitation image 6



Figure 34 - Elicitation image 7



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Figure 35 - Elicitation image 8



¹⁶ Author: James St. John. Licence: <https://creativecommons.org/licenses/by/2.0/>

Figure 36 - Elicitation image 9



17

Figure 37 - Elicitation image 10



18

Figure 38 - Elicitation image 11



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¹⁸ Author: Oregon State University. Licence: <https://creativecommons.org/licenses/by-sa/2.0/>

¹⁹ Author: pqgw. Licence: <https://creativecommons.org/licenses/by-nc-sa/2.0/>

Figure 39 - Elicitation image 12

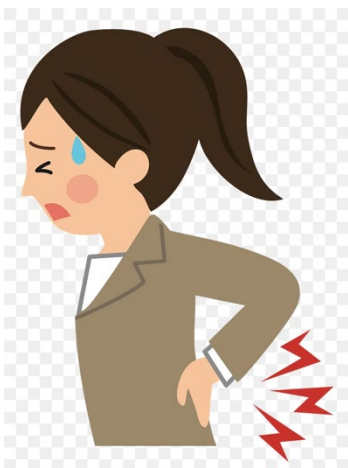


Figure 40 - Elicitation image 13



Figure 41 - Elicitation image 14



Figure 42 - Elicitation image 15



Figure 43 - Elicitation image 16

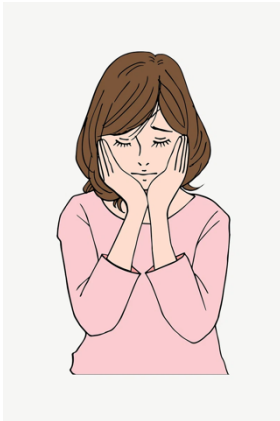


Figure 44 - Elicitation image 17



Figure 45 - Elicitation image 18



4. Ideophone database

Table 11 - Database of Wenzhounese ideophones

No.	Characters	Alternative characters	Pronunciation	Meaning
1	矮登登	矮墩墩	a3dang1dang1	Describes a short, fat and strong figure.
2	暗洞洞		oe5ddong6ddong6	Describes dim light.
3	暗駿駿		oe5zzoe6zzoe6	Dark but not pitch black.
4	拗撑八撑	拗里八撑, 拗里八撑	uo5cie5bo7cie5	Things don't go how someone wants
5	邊地炮		ddang6ddei6puo5	A type of firecracker that rings when thrown on the ground.
6	倒倒落		de5de5llo8	Describes something falling down (rain etc).
7	倒落赖		de3llo8lla6	To have one's heart set on something.
8	倒散赖		de3sa5lla6	Wander around, slack off.
9	东叭啦腔	多板拉腔, 多板兰腔	dong1ba1la1qi1	Used to describe a person who is difficult to understand.
10	嘎嘎	嘎嘎啰	gga8gga8	Children's name for a duck.
11	嘎嘎啰		gga8gga8dau3	Trembling.
12	光溜溜		guo1leu1leu1	Smooth appearance.
13	光溜头	光郎头	guo1leu1ddeu2	Smooth head, monk's head.
14	光闪闪	光烁烁	guo1xia7xia7	Describes a flashing light.
15	汗滋滋	汗渍渍	yyv6zzi1zzi1	Describes a slightly sweaty appearance.
16	红东东	红童童	hhong2dong1dong1	Very red.
17	红蜡蜡		hhong2lla8lla8	Describes a colourful and wealthy atmosphere.
18	𠵼𠵼声		hhong2hhong2seng1	Describes the sound of a bell.
19	糊瞎瞎		wwu6dduo2dduo2	Blurry appearance.
20	𠵼冻冻	糊冻冻	wwu6dong5dong5	Sticky.
21	花里斑拉	花里斑烂	ho1llei4ba1la1	
22	浑淘淘	混淘淘, 浑陶陶	wwang6dde2dde2	Dizzy and confused.
23	豁刺刺	豁辣辣	ho7lla8lla8	Onomatopoeia, the referent is unclear but the

				dictionary states it is used to describe a 'spicy sound'
24	唧唧嘎嘎		ji7ji7ga7ga7	Describes non-stop talking.
25	唧哩咕噜		ji7lei4gu1lleu4	An onomatopoeia used to describe someone talking excitedly.
26	淅淅响		zzai8zzai8xi3	The appearance of falling rain.
27	叫绷绷		jie5bie1bie1	The sound of chatter, competing voices.
28	邋里邋遢	pa	la7lei4la7ta7	Sloppy.
29	澜浪	烂沦	lla2llang2	Messy, unrestrained.
30	噜哩噜嘹	噜哩噜苏	leu3lei3leu3so1	Very long winded.
31	辘辘动	落落动	lleu8lleu8ddong4	The appearance of spinning.
32	绿鹦鹦		llo8ae1ae1	A little bit green.
33	慢腾腾	慢吞吞	mma6tang1tang1	Describes a slow appearance.
34	耨耨动		nne6nne6ddong4	Swinging up and down.
35	暖芬芬	暖氛氛	nnang4fang1fang1	Describes the feeling of warmth.
36	糯漆	糯保	nnong6dong3	Soft and jelly like.
37	糯烘烘	糯烘烘	nnong6hong1hong1	Very soft.
38	糯粳粳	糯粳粳	nnong6zzei4zzei4	Sticky and slippery.
39	嘭嘭声		bbie2bbie2seng1	Sound of drums, sound of things hitting.
40	翩翩飞		pie1pie1fei1	The appearance of flying, running fast.
41	破衰衰		pa5sai1sai1	Used to describe something that looks broken.
42	七七八八		cai7cai7bo7bo7	Fragments, bits and pieces, also describes nagging.
43	散花花	散麻花	sa3ho1ho1	Scattered, not grouped together.
44	塌塌动		ta7ta7ddong4	The structure of an object is loose (e.g. in elderly people), someone is hesitant.
45	温温痛		wang1wang1tong5	A dull pain.
46	影灯光		iang3dang1guo1	Very thin, very swollen.
47	硬绷绷	硬梆梆, 硬帮帮	nngie6bie1bie1	The feeling of something hard.

48	硬硌硌	硬摺摺	nngie6ggo8ggo8	The feeling of touching hard objects.
49	硬壳壳		nngie6ko7ko7	The appearance of hard objects.
50	圆鼓囡敦		yyv2gu3llang2dang1	Describes things that are round and full.
51	圆卵卵		yyv2lang1lang1	Describes something with a round appearance.
52	燥飞飞		se5fei1fei1	Describes the feeling of dryness.
53	踵踵动		qiong5qiong5ddong4	The appearance of stumbling.
54	重登登		jjiuo4dang1dang1	Heavy.
55	壮胛胛		jiuo5nai1nai1	Describes fatness.
56	黑漣漣		hee7ta7ta7	Describes something very black.
57	臭烘烘	臭嗅嗅	qieu5hong1hong1	Describes a very stinky smell.
58	疙里疙瘩		ga7llei4ga7da7	Someone is very picky.
59			ddu4su2su2	Walking unsteadily due to being drunk.
60			di4di3ku2	Baby crying.

5. Contingency tables for phonosemantic mapping

Table 12 - Contingency table for friction and airflow

Friction/airflow	[+friction]	[-friction]	Row totals
[+airflow]	3	12	15
[-airflow]	3	109	112
Column totals	6	121	127
P = 0.0218 (significant)			

Table 13 - Contingency table for motion and labial

Motion/labial	[+motion]	[-motion]	Row totals
[+labial]	2	8	10
[-labial]	17	100	117
Column totals	19	108	127
P = 0.6446 (not significant)			

Table 14 - Contingency table for motion and tongue resting

Motion/Tongue resting	[+motion]	[-motion]	Row totals
[+tongue resting]	2	14	16
[-tongue resting]	17	94	111
Column totals	19	108	127
P = 1 (not significant)			

Table 15 - Contingency table for telic and tongue root

Telic/Tongue root	[+telic]	[-telic]	Row totals
[+tongue root]	0	34	34
[-tongue root]	3	90	93
Column totals	3	124	127
P = 0.5637 (not significant)			

Table 16 - Contingency table for motion and vocal folds

Motion/Vocal folds	[+motion]	[-motion]	Row totals
[+vocal folds]	12	39	51
[-vocal folds]	7	69	76
Column totals	19	108	127
P = 0.0407 (significant)			

Table 17 - Contingency table for motion and airflow

Motion/airflow	[+motion]	[-motion]	Row totals
[+airflow]	4	11	15
[-airflow]	15	97	112
Column totals	19	108	127
P = 0.2391 (not significant)			

Table 18 - Contingency table for telic and labial

Telic/Labial	[+telic]	[-telic]	Row totals
[+labial]	1	9	10
[-labial]	2	115	117
Column totals	3	124	127
P = 0.2197 (not significant)			

Table 19 - Contingency table for loud and vocal folds

Loud/Vocal folds	[+loud]	[-loud]	Row totals
[+vocal folds]	6	45	51
[-vocal folds]	1	75	76
Column totals	7	120	127
P = 0.0166 (significant)			

Table 20 - Contingency table for unround and motion

Unround/Motion	[+motion]	[-motion]	Row totals
[+unround]	23	112	135
[-unround]	0	2	2
Column totals	23	114	137
P = 1 (not significant)			

Table 21 - Contingency table for low and loud

Low/Loud	[+loud]	[-loud]	Row totals
[+low]	4	55	59
[-low]	7	71	78
Column totals	11	126	137
P = 0.7571 (not significant)			

Table 22 - Contingency table for high and friction

High/Friction	[+friction]	[-friction]	Row totals
[+high]	6	72	78
[-high]	0	59	59
Column totals	6	131	137
P = 0.0367 (significant)			

6. Word list for citation tone elicitation

IA	IIA	IIIA	IVA	IB	IIB	IIIB	IVB
香	酒	汽	北	梅	被	用	肉
东	手	四	作	年	旱	面	实
西	草	背	竹	田	坐	共	学
风	表	酱	国	平	肚	地	月
关	好	跳	出	茶	上	自	白
分	海	蒜	粥	糟	雨	树	六
灯	土	醋	笔	坎	码	大	十
汤	等	羹	八	羊	五	回	绿
低	抵	到	尺	蛇	老	碰	值
高	分	羹	哭	逃	抱	盗	鹿
糠	小	盖	雪	提	拌	恨	别
刀	岛	怕	一	头	稻	亮	木

7. Wenzhou citation tones

Figure 46 - Tonal acoustics for Wenzhounese citation tone 1a

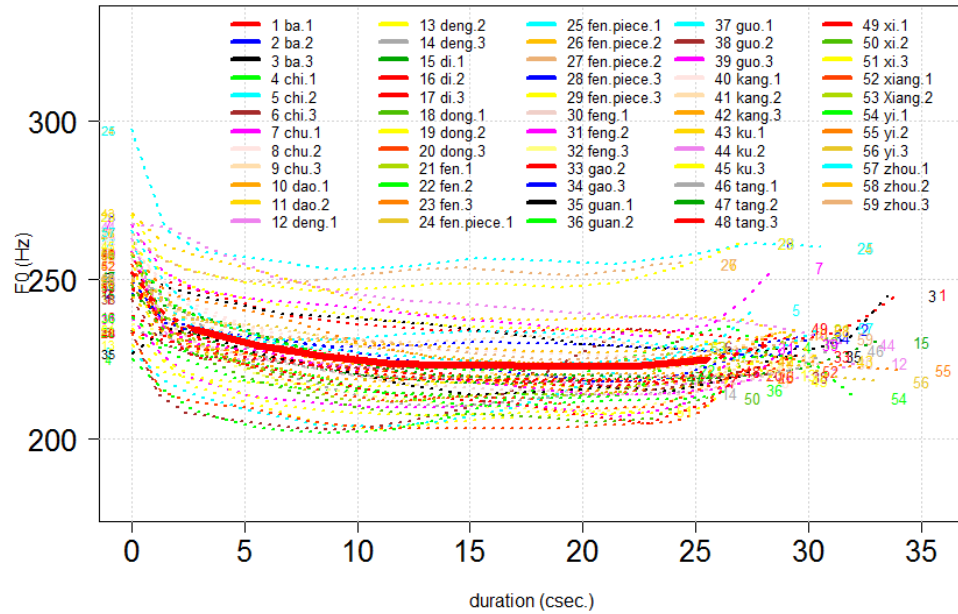


Figure 47 - Tonal acoustics for Wenzhounese citation tone 1b

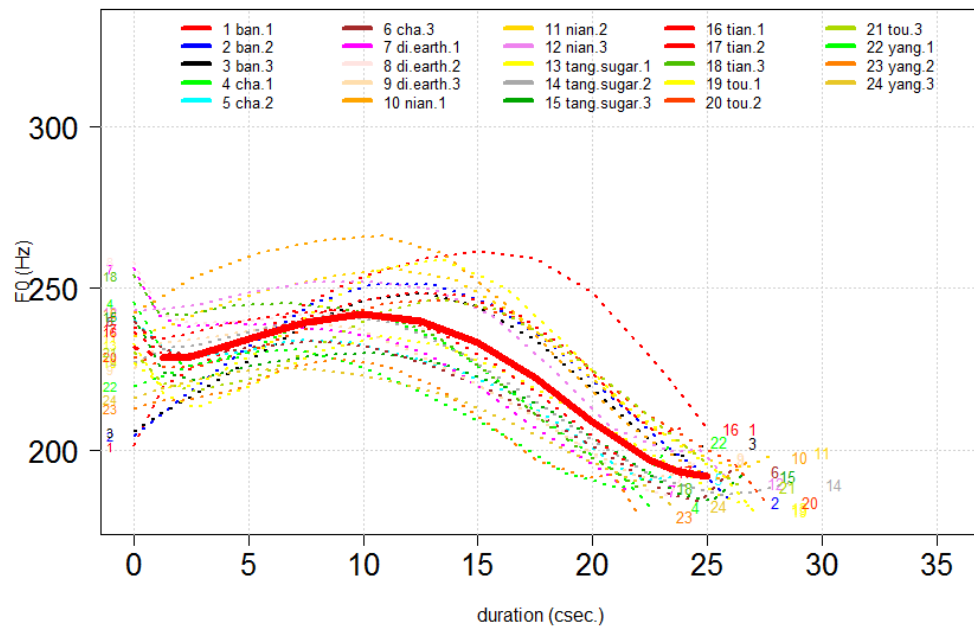


Figure 48 - Tonal acoustics for Wenzhounese citation tone 1la

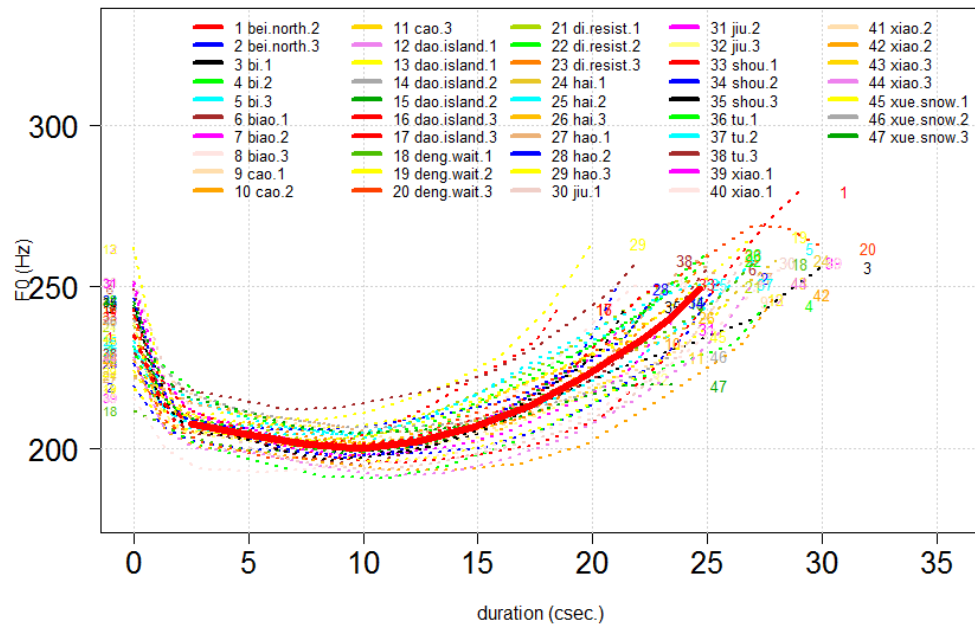


Figure 49 - Tonal acoustics for Wenzhounese citation tone 1lb

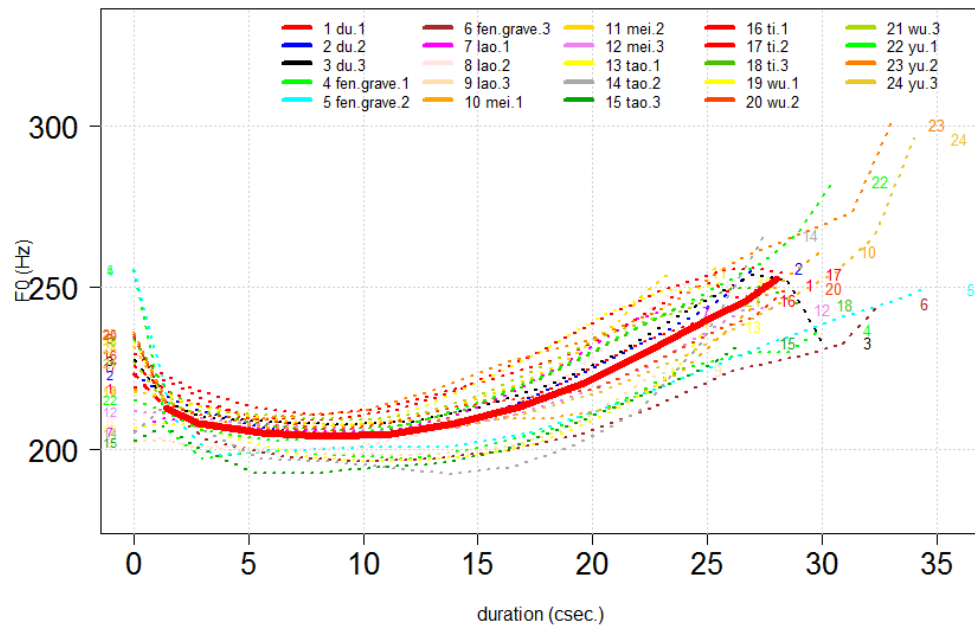


Figure 50 - Tonal acoustics for Wenzhounese citation tone IIIa

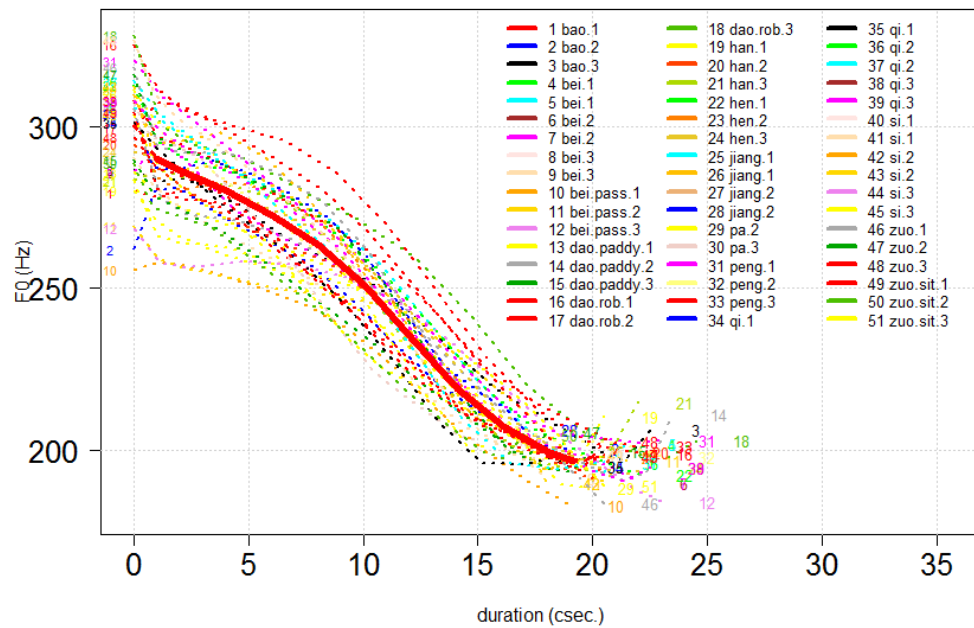


Figure 51 - Tonal acoustics for Wenzhounese citation tone IIIb

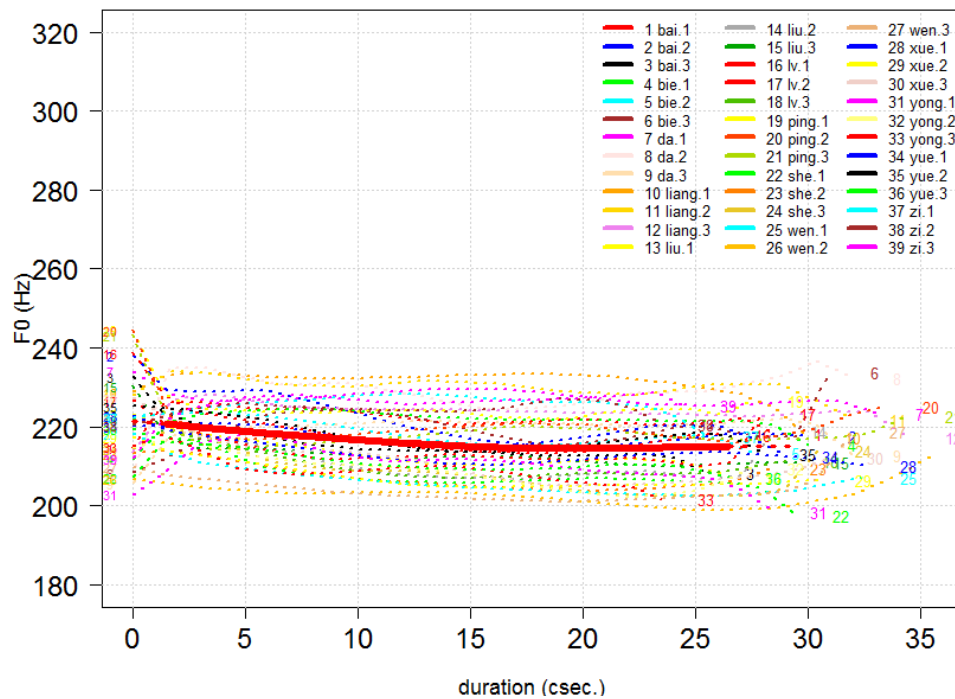


Figure 52 - Tonal acoustics for Wenzhounese citation tone IVb

