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## FUNCTIONAL ASPIRATION IN TAIWANESE\*

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### ABSTRACT

The aspirated voiceless initials (ph-, th-, kh-, and tsh-) with the lower (陽) tone classes (tones 5 to 8) in Taiwanese originated from the aspirated voiced initials (\*bh-, \*dh-, \*gh-, \*dzh-). Previous studies identified several word families comprising unaspirated and aspirated forms of the historically voiced initials in Taiwanese and other Coastal Min languages. They argued that those aspirations are causative or volitional but did not analyze the causativity and volitionality in detail. This study discovers more word families with aspiration contrast by searching through Taiwanese dictionaries. Also, this study confirms the causativity of most of those aspirations by analyzing the semantics of example sentences in Taiwanese and finds a few volitional, denominal, and deverbal cases. Furthermore, this paper infers that the causative aspirations originated from the Old Chinese causative prefix \*s-, which made its following voiced obstruent initial aspirated in Coastal Min but unaspirated in Inland Min. In addition, this paper proposes a strategy of morphological instruction for reinforcing students' understanding of causative aspiration words and causative sentence construction, which may benefit Taiwanese language education.

Keywords: morphological derivation, consonant mutation, predicate valence, spirant approach, Old Chinese reconstruction, Southern Min

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\* I thank two anonymous reviewers for their comments. I did this research for recreation while successively affiliated with the University at Albany, State University of New York and University of California, Davis. I used the library of the University of California, Davis in preparation for this manuscript. I am employed by Argonne National Laboratory.

## 1. INTRODUCTION

Understanding how words formed from morphological derivation can benefit language education. Teaching language learners about meaningful units within words can overall improve literacy skills (Bowers et al. 2010). Especially, such instruction helps students use their knowledge about basic words to learn derived words (Bowers and Kirby 2010). In addition, comparison of morphology between languages can reveal their history and even reconstruct their common ancestor. This study aims to analyze the derivational pattern of aspiration in Taiwanese<sup>1</sup> and provide useful material for instruction of Taiwanese and reconstruction of Old Chinese.

In Taiwanese, some derivational patterns are productive and explicitly taught in education, such as the suffix *-á* (仔), the prefix *a-* (阿), etc. A few derivational patterns are no longer productive but alternated the consonant or tone class of many words. For example, what has become *Tuàn* (斷, tone 3, to decide) was derived from what has become *Tuán* (斷, tone 2, to sever). Such historical alternations are usually semantically opaque for modern speakers, which poses a challenge to learners. A prominent but ambiguous derivational pattern is alternating into the departing (去) tone classes (tones 3 and 7), which can be nominalizing, verbalizing, causative, etc. (Downer 1959). The ambiguity is likely due to a merger of several Proto-Sino-Tibetan<sup>2</sup> suffixes into the Old Chinese final *\*-s*, which evolved into the departing tone in Taiwanese and other Sinitic languages (Jacques 2016).

On the other hand, some historical alternations have semantically transparent functions, from which modern Taiwanese learners can benefit. For example, the suffix *-n* in a personal pronoun derives the plural or genitive from the singular. Also, Table 1 lists some verb pairs where a transitive verb becomes intransitive when its tone alternates from an upper (陰) class to the corresponding lower (陽) class (tone 1 into 5, 2 and 3 into 7<sup>3</sup>, and 4 into 8). In Table 1, this pattern is clear in the literary reading

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<sup>1</sup> Taiwanese is also known as *Tâi-gí*, Taiwanese Hokkien, Taiwanese Southern Min, etc.

<sup>2</sup> Sino-Tibetan is also known as Trans-Himalayan.

<sup>3</sup> Tone 6 merged into tone 7 in most Taiwanese variants.

(hereafter capitalized), originating from a Middle Chinese superstratum, while the colloquial reading (lowercased) is consistent despite being scarce. This tone alternation reflects voicing of obstruent initials in Middle Chinese. Multiple lines of evidence suggest that voiceless initials became voiced after the Old Chinese passive nasal prefix \*N- (Baxter and Sagart 2014; Sagart 2003).

Table 1. Examples of passive conjugations in Taiwanese.

Transitive (upper tone)	Tone	Intransitive (lower tone)
<i>Tiong</i> (張) stretch	1 vs. 5	<i>Tiōng</i> or <i>tṅ</i> (長) be long
<i>Tuán</i> or <i>tṅ</i> (斷) sever	2 vs. 7	<i>Tuān</i> or <i>tṅ</i> (斷) be severed
<i>Tiòng</i> (中) hit (the center)	3 vs. 7	<i>Tiōng</i> (仲) be in the middle
<i>Kiàn</i> or <i>ki</i> (見) see		<i>Hīān</i> (現) be seen
<i>Piat</i> (別) separate	4 vs. 8	<i>Piát</i> (別) be separated
<i>Tsiat</i> (折) break		<i>tsih</i> (折) be broken
<i>Hik</i> or <i>heh</i> (嚇) frighten		<i>Gòk</i> or <i>khèh</i> (愕) be frightened

In Taiwanese and other Coastal Min languages, several words with an aspirated initial and a lower tone were derived from their unaspirated counterparts (Norman 1991; Lien 1999; Baxter and Sagart 2014; Kwok 2018; Smith 2021). Norman (1991) listed six pairs of such aspiration mutation and characterized their function as “generally transitive or causative.” Norman (1991) used this list as auxiliary evidence supporting the reconstruction of aspiration contrast in Proto-Min voiced initials, which gave rise to the lower tone classes and became devoiced. Lien (1999) listed five such pairs in their typological study of causative formation in Taiwanese. Baxter and Sagart (2014) proposed that the aspiration in voiced initials reflects the Old Chinese prefixes \*m- or \*s-. Along with other functions, the prefix \*m- “changed a nonvolitional verb into a volitional one, at times with causative overtones”, and the prefix \*s- was transitive or causative (Baxter and Sagart 2014). Both Kwok (2018) and Smith (2021) expanded the list of the aspiration mutation word pairs. Coastal and Inland Min share many reflexes of the Proto-Min aspirated voiced initials (Norman 1974, 1991; Smith 2021), but functional

aspiration in voiced initials is far more prominent in Coastal than Inland Min (Kwok 2018; Smith 2021). These previous studies made little effort in analyzing the causativity or volitionality.

It is important to analyze the causativity and volitionality of the Taiwanese aspiration mutation word pairs in detail for two reasons. First, such analysis can determine whether Taiwanese learners can benefit from teaching about the aspiration mutation. The learners will benefit more if the teachers can demonstrate the meaning of the aspiration mutation using example sentences. Second, such analysis can provide clues for proto-language reconstruction. If the function of the aspiration mutation is both causative and volitional, it will provide supporting evidence for the reconstruction of the Old Chinese prefix \*m- by Baxter and Sagart (2014). If its function is either causative or volitional, we shall explore alternative explanations, e.g., distinguishing the reconstruction of the prefix \*s- from \*m- by the causativity.

The rest of this paper is organized as follows. Section 2 describes the methods of searching for Taiwanese aspiration mutation word pairs and analyzing their causativity and volitionality. Section 3 categorizes the word pairs and presents the analysis results. Section 4 discusses the implications for Taiwanese language instruction and proto-language reconstruction. Section 5 summarizes the paper.

## 2. METHODS

This study searched the ‘ChhoeTaigi’ (2018) Taiwanese dictionary database for aspiration contrast word pairs<sup>4</sup>. Regarding every single-syllable word with an initial of *ph-*, *th-*, *kh-*, or *tsh-*, I sought its minimal counterpart with the corresponding unaspirated initial for different but related meaning<sup>5</sup>. In addition, I checked whether the word’s Han (漢) character can be pronounced with an unaspirated initial. I found 33 pairs, covering all the 21 pairs presented in at least one of the previous studies (Norman 1991; Lien 1999; Baxter and Sagart 2014; Kwok 2018; Smith

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<sup>4</sup> This search was done during the fall of 2022.

<sup>5</sup> I exclude same-meaning pairs.

2021). Among the 33 pairs, 29 pairs are minimal. Of all the 33 pairs, both members are in the lower tone classes. This search also covered the upper tone classes, but I found no pairs there<sup>6</sup>. I double-checked the meaning of the words by consulting Douglas (1873). Moreover, to enable further discussion on proto-language reconstruction, this study examined the geographic distribution of the aspiration contrast word pairs. Hereafter, the word pairs are found in only Southern Min unless otherwise specified.

This study analyzes the causativity of verb phrases (VPs) using the following sentence template with two noun phrases (NPs) and two VPs:

(0) NP1 + *kā* + NP2 + VP1 + *hōo* + VP2

For example,

(1) 直 (*tít*) / 直 (*thít*)<sup>7</sup>  
 咱 *kā* 理路 *thít* *hōo* *tít*  
 1IN PM reasoning straighten make straight  
 ‘We straightened the reasoning.’

Lee (2009) analyzed this resultative sentence structure in detail. Figure 1 illustrates the structure. The predicate of the sentence, VP1 *thít* (直), governs an agent, a patient, and a resultative complement. NP1 ‘咱’ (first-person inclusive, 1IN) is the agent. Following the patient marker (PM) *kā*, NP2 ‘理路’ is the patient. Following the resultative marker *hōo*, the dependent clause is the resultative complement<sup>8</sup>. The predicate of the clause, VP2 *tít* (直), governs a subject, NP2 ‘理路’.

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<sup>6</sup> I do not count the upper tone *píō* (javelin) and *phiau* (label) as a word pair. Though they share the same Han character ‘標’, their semantic relation does not seem close.

<sup>7</sup> Han characters in this paper reflect written Taiwanese but not necessarily etymology.

<sup>8</sup> Taiwanese dynamic verbs need a complement to express achieving the/an endpoint. Thus, *thít* needs a resultative complement to match the telicity of ‘straighten.’

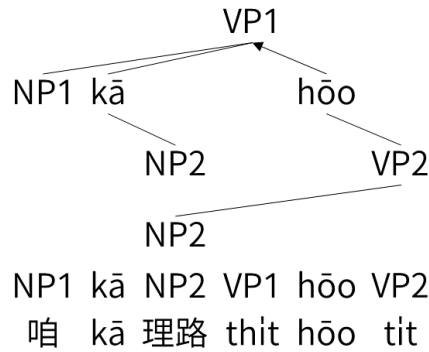


Figure 1. Dependency structure of Template 0 and Example 1.

In Template 0 and Figure 1, NP2 alternates from the subject of VP2 to the patient of VP1, and VP1 introduces NP1 as the agent. Thus, VP1 is causative to VP2. Hence, we can test the causativity of VPs by substituting them into Template 0 along with reasonable NPs<sup>9</sup>. If the substitution can form a valid sentence, the causativity is true. Example 1 proves that *thit* is causative to *tit*. This analysis complements previous studies about this pair (Norman 1991; Lien 1999; Kwok 2018; Smith 2021). This pair can also be found in Eastern Min (Norman 1991; Kwok 2018; Smith 2021).

Now we have 33 aspiration contrast word pairs and a causativity test of VPs. Regarding causativity of the word pairs, we need to build the VPs using the word pairs. VP1 must be the word itself, and VP2 must be one of the following types. (A) If the word is an adjective or a stative verb, VP2 can be the word as is. (B) If the word is a dynamic verb, VP2 can be a compound of ‘verb + complement.’ (C) If the word is a noun, VP2 can be a compound of ‘verb + noun’ expressing a change of state. This study considers a definition of causativity extending from VPs to words and bounded by the above rules for forming words into VPs.

On the other hand, this study tests the volitionality of a verb using the following expressions: ‘*sī tshûn beh ... --ê*’ (did so and meant to do so)

<sup>9</sup> Inspired by the examples in the ‘ChhoeTaigi’ (2018) Taiwanese dictionary database, I made the example sentences in this study and judged their validity as a Taiwanese native speaker. The reviewers also offered their judgement on the validity, which helped me revise or add caveats to some of the example sentences.

and ‘*m̄ sī tshûn beh ... --ê*’ (did so but did not mean to do so). A verb is nonvolitional if ‘*sī tshûn beh ... --ê*’ contradicts it and is volitional if ‘*m̄ sī tshûn beh ... --ê*’ contradicts it. If a verb is compatible with both these expressions, its volitionality is undefined.

The volitionality test shows that all the Taiwanese causative verbs found in this study have undefined volitionality. For example, modified by ‘*[m̄] sī tshûn beh ... --ê*’, Example 1 remains valid as ‘咱 [*m̄*] *sī tshûn beh thit* 理路--ê.’<sup>10</sup> (We straightened the reasoning [un]intentionally.). These analyses suggest that the derivation of the aspirated ‘直’ (*thit*) from the unaspirated ‘直’ (*tit*) is causative but not volitional.

### 3. RESULTS

Among the 33 aspiration contrast word pairs, the analysis characterizes 18 pairs as causative, where nine, seven, and two pairs are based on (A) adjectives, (B) dynamic verbs, and (C) nouns, respectively. Further analysis categorizes the 15 non-causative pairs as volitional (three), instrumental denominal (two), similitive denominal (two), deverbal (three), and miscellaneous (five). Section 2 demonstrates an adjective-based causative pair, ‘直’ (*tit*) / ‘直’ (*thit*), in detail. This section shows the other 32 pairs analyzed with the same methods.

#### 3.1 Type A Causative: Adjective-Based

- (2) 平 (*pê<sup>n</sup>*) / 平 (*phê<sup>n</sup>*)<sup>11</sup>  
 咱 *kā* 塗跣 *phê<sup>n</sup>* *hōo* *pê<sup>n</sup>*  
 1IN PM ground make even make even  
 ‘We made the ground even.’

<sup>10</sup> The predicative expression ‘*tshûn beh thit* 理路’ (means to straighten the reasoning) is marked by ‘*[m̄] sī + predicative + --ê*’, where ‘--ê’ is a predicative suffix (PRED).

<sup>11</sup> Unless otherwise noted, the Taiwanese spelling in this paper is based on the *Ko-hiông* (高雄) variant, which is predominant in Taiwan and is my native tongue. The ‘平’ (*pê<sup>n</sup>*) / ‘平’ (*phê<sup>n</sup>*) pair is also spelled as *pî<sup>n</sup>* / *phî<sup>n</sup>* based on some other common variants.



Examples 1 and 2 are comparable. The causativity analysis suggests that the derivation of the aspirated ‘平’ (*phê<sup>n</sup>*) from the unaspirated ‘平’ (*pê<sup>n</sup>*) is causative. This analysis complements some previous studies about this pair (Norman 1991; Lien 1999; Kwok 2018; Smith 2021). Further analysis suggests that the volitionality of ‘平’ (*phê<sup>n</sup>*) is undefined, which does not agree with the reconstruction of the volitional prefix \*m- for the aspirated ‘平’ (*phê<sup>n</sup>*) by Baxter and Sagart (2014). Eastern Min also uses this pair (Norman 1991; Kwok 2018; Smith 2021).

- (3) 定 (*tiā<sup>n</sup>*) / 佷 (*thiā<sup>n</sup>*)  
 咱 *kā* 楹仔 *thiā<sup>n</sup>* *hōo* *tiā<sup>n</sup>*  
 IIN PM girder stabilize make stable  
 ‘We stabilized the girder.’

Example 3 complements Smith’s (2021) interpretation of this pair as causative. Also, the volitionality of *thiā<sup>n</sup>* (佷) is undefined, which does not agree with the interpretation of this pair by Baxter and Sagart (2014).

- (4) 窮 (*kîng*) / 窮 (*khîng*)  
 \*咱 *kā* 金庫 *khîng* *hōo* *kîng*  
 IIN PM vault exhaust make extremely poor  
 ‘We exhausted the vault.’

This pair appears in Kwok (2018) without discussion of its function. Baxter and Sagart (2015)<sup>12</sup> reconstructed the volitional prefix \*m- for the aspirated ‘窮’ (*khîng*), with which the volitionality test does not agree. This example sentence may read odd to some native speakers (marked with an asterisk) since semantic changes occurred in ‘*khîng*’ (窮). As a metonymy, *khîng* (窮) also means to gather up. When exhausting a warehouse (*khîng* 倉庫), one would gather up the goods in the warehouse (*khîng* 倉庫內底 貨). Moreover, like ‘to exhaust’ in English, *khîng* (窮)

<sup>12</sup> This is the supplementary material of Baxter and Sagart (2014).

in Taiwanese also means ‘to explore thoroughly.’ With this metaphor, ‘*khîng* 倉庫’ also means ‘to make an inventory of the warehouse.’ As another example, I sought for word pairs by ‘*khîng* 字典’ (explore dictionaries thoroughly).

Table 2. ‘下’ word family in *Tsuân-tsiu* (TT)<sup>13</sup> and Taiwan (TW) variants.

TT	TW	Gloss
<i>kě</i>	<i>kē</i>	Low
<i>khě</i>	<i>hē</i>	To put down (causative to <i>kě</i> , volitionality undefined)
<i>hě</i>	<i>hē</i>	To ‘put’ volitionally, e.g., ‘下本’ (put capital) = to invest
<i>ě</i>	<i>ē</i>	Below
<i>è</i>	<i>ē</i>	Time (classifier for the number of occurrences)
<i>Hǎ</i>	<i>Hā</i>	Literary reading (all the above meanings and ‘to descend’)

(5) 下 (*kě/kē*)/ 下 (*khě/hē*)

咱 *kā* 物件 *hē* *hōo* *kē*  
 1IN PM thing put down make low  
 ‘We put the thing down.’

In *Tsuân-tsiu* variant (Huang 2012), there are six members in the ‘下’ word family (Table 2). The causative *khě* and the volitional *hě* merged into *hē* in most Taiwanese and *Ē-mîng*<sup>14</sup> variants, and *ě* and *è* merged into *ē*. In Example 5, ‘下’ (*hē*) is causative to ‘下’ (*kē*) with undefined volitionality. This analysis complements Lien’s (1999) interpretation of the ‘下’ word family. Baxter and Sagart (2014) reconstructed the volitional prefix \*m- for ‘下’ (to descend) in Old Chinese using ‘下’ (*hē*) from *Ē-mîng* as a part of evidence. However, ‘下’ (*hē*) does not refer to ‘to descend.’ The *k-/h-/0-* contrast is wide-spread among Coastal Min languages, but the *k-/kh-/h-/0-* contrast is limited to *Tsuân-tsiu* variant<sup>15</sup>.

<sup>13</sup> *Tsuân-tsiu* (泉州) is also known as Zuan-ziu, Chinchew, Quanzhou, etc.

<sup>14</sup> *Ē-mîng* (廈門) is also known as Amoy, Xiamen, etc.

<sup>15</sup> According to ‘漢典’ (Handian) accessed on 23 August 2023 at <https://www.zdic.net/>.

Taiwanese sometimes reflects cognates of Middle Chinese ‘匣母’ (*h-*) initial as *kh-*; ‘下’ (*khē*), ‘環’ (*khuân*), and ‘虹’ (*khīng*) are three examples.

- (6) 糲 (*kit*) / 熨 (*khít*)  
 咱 *kā* 糊仔 *khít* *hōo* *kit*  
 1IN PM paste make porridgy make porridgy  
 ‘We made the paste porridgy.’

This word pair has not been found in previous studies to my knowledge. The adjective *kit* originated from a non-Sinitic substratum; its cognates can be found in many Kra–Dai and Southern Sinitic languages (Li 2005). However, I found the causative verb *khít* in Southern Min only.

- (7) 齊 (*tsiâu*) / 摠 (*tshiâu*)  
 咱 *kā* 份額 *tshiâu* *hōo* *tsiâu*  
 1IN PM allotment adjust make regular  
 ‘We adjusted the allotment.’

The ‘*Tâi-jī Chhân*’<sup>16</sup> online dictionary recognizes this word pair and explains that *tsiâu* is intransitive and unaspirated while *tshiâu* is transitive and aspirated. Example 7 complements their explanation. The etymology of the basic word *tsiâu* is a matter of debate (e.g., Tung 2011; Tu 2012<sup>17</sup>), but such debate does not diminish the relation in this word pair.

- (8) 全 (*Tsuân*) / 攢 (*tshuân*)  
 咱 *kā* 材料 *tshuân* *hōo* *tsuân*  
 1IN PM material prepare make complete  
 ‘We prepared the material.’

<sup>16</sup> ‘*Tâi-jī Chhân*’ is undated. I accessed it on 20 January 2023. Word pairs found here do not count toward the 21 previously found aspiration contrast word pairs.

<sup>17</sup> Tu (2012) argued that *tsiâu* originated from Old Chinese ‘周’ (to pack) with thorough evidence-based discussions.

The ‘*Tâi-jī Chhân*’ online dictionary regards this word pair as a coincidence, but Example 8 clearly shows the causativity. Unlike Examples 1 to 7 based on the colloquial reading, ‘全’ (*Tsuân*) is the literary reading reflecting the Middle Chinese superstratum, and the corresponding colloquial reading is ‘攢’ (*tsn̂g*). The etymology of ‘攢’ (*tshuân*) merits further discussion (see Section 4.2).

- (9) 在 (*tsāi*) / 在 (*tshāi*)  
 咱 *kā* 柱仔 *tshāi* *hōo* *tsāi*  
 1IN PM pillar firmly place make firm  
 ‘We placed the pillar firmly.’

To my knowledge, no previous study has mentioned this word pair. The ‘*Tâi-jī Chhân*’ online dictionary discussed whether *tshāi* (firmly place) originated as a metonymy of ‘祀’ (*tshāi*, ‘worship’) but did not reach a conclusion. This study does not rule out such a possibility. Nevertheless, Example 9 shows that *tshāi* (firmly place) is causative to *tsāi* (firm) and could be morphologically derived. The morphologic theory gives a more direct explanation than the metonymic theory.

### 3.2 Type B Causative: Dynamic-Verb-Based

- (10) 咧 (*piát*) / 咧 (*phiát*)<sup>18</sup>  
 咱 *kā* 手巾 *phiát* *hōo* *piát* --一聲  
 1IN PM handkerchief flap<sup>19</sup> make ONOM a sound  
 ‘We flapped the handkerchief.’

<sup>18</sup> To my knowledge, no Han character has been used to record these words. I hereby recommend using ‘咧’ since this phono-semantic compound fits this onomatopoeia.

<sup>19</sup> The English glosses here, ‘flap’ and ‘flick’ are onomatopoeias and can undergo morphological changes as well.

The basic dynamic verb ‘咧’ (*piát*) is an onomatopoeia (ONOM) imitating the sound of flapping, and the causative conjugate ‘咧’ (*phiát*) can be interpreted as to make something sound *piát*. This word pair is new to the literature.

- (11) 擗 (*piák*) / 擗 (*phiák*)  
 咱 *kā phiák-á phiák hōo piák --一聲*  
 1IN PM slingshot flick<sup>19</sup> make ONOM a sound  
 ‘We flicked the slingshot.’

Examples 10 and 11 are parallel. This paper presents this word pair for the first time. The noun *phiák-á* (slingshot) is derived from the verb *phiák* (flick) by the instrumental nominal suffix *-á*.

- (12) 墜 (*tūi*) / 墜 (*thūi*)  
 咱 *kā tūi 繩 thūi hōo tūi --落去*  
 1IN PM plumb line plumb make fall down  
 ‘We plumbed the plumb line.’

Note that the corresponding noun is the unaspirated ‘墜’ (*tūi*) as in ‘*tūi 繩*’ (plumb line) and ‘*鉛 tūi*’ (plummet). Kwok (2018) noticed the noun-verb contrast, but Example 12 shows that the aspiration contrast can be ambiguously interpreted as causative or instrumental denominal (cf. Section 3.5 and see Section 4.2). Many other Coastal Min languages use this contrast<sup>20</sup> (cf., Kwok 2018).

- (13) 成 (*tsiâ<sup>n</sup>*) / 晟 (*tshiâ<sup>n</sup>*)  
 咱 *kā 囡仔 tshiâ<sup>n</sup> hōo tsiâ<sup>n</sup> 儂*  
 1IN PM child make proper make be proper (wo)man  
 ‘We made the child a proper (wo)man.’

<sup>20</sup> According to ‘漢典’ (Handian) accessed on 23 August 2023 at <https://www.zdic.net/>.

The word ‘晟’ (*tshiâ<sup>n</sup>*) generally means to make a semantic patient proper. In detail, it means to rear and educate for ‘囡仔’ (child), and it means to arrange for ‘隔’ (compartment). Example 13 complements the interpretation of this pair by Norman (1991), Lien (1999), Smith (2021), and the ‘*Tâi-jī Chhân*’ online dictionary. The volitionality test does not agree with the reconstruction of the volitional prefix \*m- for the aspirated ‘晟’ (*tshiâ<sup>n</sup>*) by Baxter and Sagart (2015). Kwok (2018) claimed that ‘晟’ (*tshiâ<sup>n</sup>*) is volitional in ‘女子 (woman) *tshiâ<sup>n</sup>* 儂.’ (A woman is married to a man.), but here I offer an alternative interpretation. We shall consider the traditional culture in which this saying formed. A man was valued by his marital status and became a proper man when getting married. Married to a man, a woman made him a proper man regardless of her willingness to make him proper. This saying is not politically correct in modern society, but it shows again that the aspiration is causative with undefined volitionality. This contrast is common to Coastal Min languages (Norman 1991; Kwok 2018; Smith 2021).

- (14) 坐 (*tsē*)            /            坐 (*tshē*)  
       \*咱 *kā* 濁滓        *tshē*        *hōo*        *tsē* 底  
       1IN PM dregs        settle        make        sit        bottom  
       ‘We settled the dregs.’

The volitionality test does not agree with Baxter and Sagart (2015), where the aspiration in ‘坐’ (*tshē*) reflected the volitional prefix \*m-. The example sentence reads odd (marked with an asterisk) since *tshē* (坐) can replace *tsē* (坐) in ‘濁滓 *tsē* 底’ (The dregs settled). Also, the two forms merged into the unaspirated form in some variants (e.g., *Tsuân-tsiu*). However, considering the semantic relation, the aspiration probably reflects a causative prefix. Besides, like ‘to settle’ in English, *tshē* (坐) in Taiwanese also means ‘to resolve something conclusively.’ In this metaphor, *tshē* ‘*m-tiōh* (mistake)’ means ‘to apologize for a mistake,’ and *tshē* ‘*siâu* (account)’ means ‘to pay an account.’

- (15) 上 (*tsiū<sup>n</sup>*) / 上 (*tshiū<sup>n</sup>*)  
 咱 *kā* 魚 *tshiū<sup>n</sup>* *hōo* *tsiū<sup>n</sup>* 水  
 1IN PM fish make ascend make ascend water  
 ‘We pull the fish up from the water.’

Example 15 complements some previous studies about this pair (Norman 1991; Lien 1999; Kwok 2018; Smith 2021)<sup>21</sup>. In Baxter and Sagart (2014), the aspiration in ‘上’ (*tshiū<sup>n</sup>*) was a reflex of the volitional prefix \*m-, which does not agree with the volitionality test. The causative aspirated ‘上’ can be found in Coastal Min languages and Kienou<sup>22</sup> variant of Inland Min (Tu 2013; Kwok 2018).

Further analysis shows that the aspirations in Examples 13 to 15 are causative but does not increase valence. The following focuses on Example 15 while Examples 13 and 14 are comparable. The unaspirated form has two valences, namely a subject (the fish) and a goal or location (the water). The aspirated form also has two valences, namely an agent (we) and a patient (the fish). The causativity is evident given that the subject of the unaspirated form becomes the patient of the aspirated form. However, while the aspirated form introduces the agent, the goal or location becomes optional, leaving the valence unchanged.

- (16) 食 (*tsiáh*) / 飼 (*tshī*)  
 咱 *kā* 嬰仔 *tshī* , *hōo* *tsiáh* 奶  
 1IN PM baby feed , make eat milk  
 ‘We fed the baby with milk.’

Example 16 is not only causative but also valence-increasing. The basic ‘食’ (*tsiáh*) governs an agent and a patient, and the causative ‘飼’ (*tshī*) governs an agent, a recipient, and a patient. To fit this ditransitive verb, the comma before *hōo* separates two independent clauses. The first

<sup>21</sup> Yang (2016) argued that ‘*tshīng*’ (to put on) reflects ‘上’ in a Late Old Chinese dialect.

<sup>22</sup> Kienou (建甌) is also known as Jian’ou.

independent clause specifies only the agent (we) and the recipient (baby) and omits the patient of 飼 (*tshī*). The second independent clause is ‘agent (we, omitted) + *hōo* + resultative complement.’ The resultative complement is ‘agent (baby, omitted) + 食 (*tsiáh*) + patient (milk).’ The causativity is evident since the agent of ‘食’ (*tsiáh*) becomes the recipient of ‘飼’ (*tshī*). This word pair is not minimal. In a recent debate about Old Chinese prefix \*s- (Baxter and Sagart 2014; Sagart and Baxter 2012; Mei 2012), both sides agree on reconstructing ‘飼’ with a prefix \*s- (causative or transitivity) and a suffix \*-s (perhaps causative, see Downer 1959). The suffix \*-s altered the tone into a departing tone (tone 8 into 7). The initial aspiration in ‘飼’ (*tshī*) is widely found in Coast Min languages but absent in Inland Min (Kwok 2018), which may be a reflex of the prefix \*s- (see Section 4.2).

### 3.3 Type C Causative: Noun-Based

- (17) 逝 (*tsuā*) / 𤝵 (*tshuā*)  
 咱 *kā* 學生 *tshuā* *hōo* 上 *tsuā*  
 1IN PM student lead make go on way  
 ‘We led the student on track.’

Example 17 is suitable for morphological instruction, but it does not properly reflect etymology. The Taiwanese ‘𤝵’ (*tshuā*) reflects the Old Chinese ‘𤝵’ or ‘𤝵’ (Tu 2020). The Taiwanese noun ‘逝’ (*tsuā*) ‘way’ is likely innovated from the Old Chinese verb ‘逝’ ‘to go’ (Yang 2000). This study joins these words in a word family for the first time. However, Example 17 is somewhat misleading since the later-formed ‘逝’ (*tsuā*) ‘way’ cannot be the basic of the earlier-formed causative ‘𤝵’ (*tshuā*). To reconcile this problem, we shall assume that the Old Chinese verb ‘逝’ ‘to go’ was the basic form. The basic ‘逝’ ‘to go’ was conjugated as the causative ‘𤝵’ ‘to lead’ in Old Chinese, which is reflected as ‘𤝵’ (*tshuā*) in Taiwanese (Tu 2020). Then, ‘逝’ shifted from the verb ‘to go’ to the



noun ‘way’ in a branch from which Taiwanese inherited (Yang 2000). Supposedly, Example 17 is dynamic-verb-based in etymology. Hinghwa Min uses the aspirated ‘搵’ (tshyɔ̃) in a similar sense<sup>23</sup>.

- (18) 陣 (*tīn*) / 侷 (*thīn*)<sup>24</sup>  
 咱 *kā* 男女 *thīn* *hōo* 鬥 *tīn*  
 1IN PM man and woman match make join group  
 ‘We matched the man and woman as a group.’

The ‘*Tâi-jī Chhân*’ online dictionary lists this word pair as one of the transitivity pairs in the entry of ‘晟’ (*tshîâ<sup>n</sup>*). Example 18 presents ‘侷’ (*thīn*) in a sense causative to ‘陣’ (*tīn*); ‘to make a group’ or ‘to match.’ Besides, ‘侷’ (*thīn*) means ‘to balance up,’ probably a metaphor of the causative sense. In addition, ‘侷’ (*thīn*) means ‘to be a part or the counterpart of’ like in ‘男女相侷’ (The man and woman match each other). Here, both parties are the agent and the patient of ‘侷’ (*thīn*). In comparison, a third party is the agent in Example 18.

### 3.4 Volitional

- (19) 存 (*tsûn*) / 存 (*tshûn*)  
 \*咱 *m̄ sī* *tshûn beh* *tshûn* 好意 --ê  
 1IN not be mean to retain (in mind) good will PRED  
 \*‘We meant well unintentionally.’

<sup>23</sup> According to ‘莆仙乡音’ (Po-seng Hiong-ing) accessed on 23 August 2023 at <http://dict.hinghwa.cn/>. Hinghwa Min is also known as Pu-Xian Min.

<sup>24</sup> The newsletter ‘臺灣閩南語按呢寫’ (*Tâi-uân Bân-lâm-gí án-ne siá*) in Dictionary of Frequently-Used Taiwanese Taigi (<https://sutian.moe.edu.tw/>) mentions that *thīn* was thought to be originated from ‘騰’ (to escort). However, the initial of ‘騰’ is ‘以母’ (y-) or ‘船母’ (zy-) in Middle Chinese, which does not correspond to Taiwanese initial *thi-* in other cases.

The aspirated ‘存’ (*tshûn*) is the core of the expression ‘[*m̄*] *sī tshûn beh ... --ê*’ used to test the volitionality. The ‘*Tâi-jī Chhân*’ online dictionary presents this word pair along with the causative pairs in our Examples 1, 2, 5, 7, 13, 15, and 18. However, the unaspirated ‘存’ (*tsûn*) can refer to ‘to remain’ (intransitive) or ‘to retain’ (transitive causative). Here the aspiration yields a volitional sense of ‘to retain.’

- (20) 殘 (*Tsân*) / 殘 (*Tshân*)  
 \*咱 *m̄ sī tshûn beh hiah tshân --ê*  
 1IN not be mean to so fiercely determined PRED  
 \*‘We were so fiercely determined unintentionally.’

To my knowledge, the morphology of this word pair is new to the literature. The unaspirated ‘殘’ (*Tsân*) means ‘damaging’ or ‘damaged.’ Both ‘殘’ (*Tsân*) and ‘殘’ (*Tshân*) can form compound words that mean ‘fierce’; e.g., ‘*tsân 忍*’ and ‘*粗 tshân*’. The aspirated ‘殘’ (*Tshân*) alone means ‘fiercely determined.’ The aspiration is associated with volition. The aspirated ‘殘’ can be found in Coastal Min languages and Kienou variant of Inland Min<sup>25</sup> (cf., Tu 2013).

- (21) 忌 (*kī*) / 忌 (*khī*)  
 \*咱 *m̄ sī tshûn beh khī --ê*  
 1IN not be mean to practice avoiding taboos PRED  
 \*‘We practiced avoiding taboos unintentionally.’

Kwok (2018) mentioned this pair without discussing its function. The unaspirated ‘忌’ (*kī*) means ‘death anniversary.’ The aspirated ‘忌’ (*khī*) means ‘to practice avoiding something’ in observance of a death anniversary, societal or personal belief, or medical advice. In any sense, ‘忌’ (*khī*) involves volition.

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<sup>25</sup> According to ‘漢典’ (Handian) accessed on 23 August 2023 at <https://www.zdic.net/>.

### 3.5 Instrumental Denominal Transitive Verb

- (22) 毒 (*ták*) / 毒 (*thāu*)  
poison (noun) / poison (verb)

The verb ‘毒’ (*thāu*) means to use poison (‘毒’ *ták*). Taiwanese often uses ‘毒’ (*ták*) as an adjective, and its noun sense is not as productive as its literary reading *Tók*. Previous studies interpreted the function of the aspiration differently. Kwok (2018) stated that the aspiration makes a non-verb into a transitive verb, which is more generalized than here. Norman (1991) described the function as “generally transitivizing or causative,” which is even more generalized. Note that ‘毒’ (*thāu*) is not causative to ‘毒’ (*ták*) since it does not mean to make something poisonous. Baxter and Sagart (2014) reconstructed ‘毒’ (*thāu*) with the suffix \*-s (perhaps verbalizing, see Downer 1959) for its departing tone and the volitional prefix \*m- for its aspiration. However, the analysis here suggests undefined volitionality. Min languages share this aspiration contrast (Kwok 2018; Smith 2021).

- (23) 鋤 (*tî*) / 鋤 (*thî*)<sup>26</sup>  
hoe (noun) / hoe (verb)

The noun ‘鋤’ (*tî*) refers to a tool we use to hoe (‘鋤’ *thî*). This study adds the instrumental property to Smith’s (2021) interpretation of ‘鋤’ (*thî*) as a denominal transitive verb. Many Min languages distinguish the noun ‘hoe’ from the verb ‘to hoe’ (Kwok 2018; Smith 2021). Taiwanese and other Southern Min variants contrast this word pair by reflexes of Proto-Min \*d- / \*dh-, but many other Min languages differentiate them by reflexes of Proto-Min \*dh- / \*-d- (Kwok 2018; Smith 2021). Clearly, this word pair is not reconstructable to Proto-Min.

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<sup>26</sup> The ‘鋤’ (*tî*) / ‘鋤’ (*thî*) pair is also spelled as ‘tû’ / ‘thû’ based on some other common Taiwanese variants.

### 3.6 Similitive Denominal Verb

- (24) 盤 (*puân*/*Puân*) / 盤 (*Phuân*) / 盤 (*phuân*)<sup>27</sup>  
plate or similar / cross (legs) / climb over

The meaning of ‘盤’ has been widening since the Old Chinese period. The unaspirated ‘盤’ (*puân* or *Puân*) has several denominal verb senses. The aspirated ‘盤’ (*Phuân* or *phuân*) is particularly associated with denominal verbs in similitive senses (Smith 2021)<sup>28</sup>, mostly considering the shape of circular plates. ‘盤’ (*Phuân*) can mean ‘to cross’ legs, especially when sitting on the ground, so the legs are shaped like a plate. The original meaning of ‘盤’ (*phuân*) was probably ‘to wind up’ a mountain, which was then generalized to ‘to climb over.’

- (25) 球 (*kiû*) / 蚪 (*khiû*)  
ball / curl

Smith (2021) found Example 25 semantically parallel to Example 24. However, the aspirated forms in Example 24 are transitive verbs, and the aspirated ‘蚪’ (*khiû*) takes the intransitive sense of ‘to curl,’ which can be interpreted as ‘to become’ like ‘球’ (*kiû*) ‘ball.’ Besides, ‘蚪’ (*khiû*) can be an adjective meaning ‘curled’ or its metaphor ‘penurious’ (curled hands seem close and poor). Eastern Min also uses this contrast<sup>29</sup>.

### 3.7 Deverbal Noun

- (26) 縫 (*pāng*) / 縫 (*phāng*)  
sew / seam

<sup>27</sup> Many Taiwanese variants simply use ‘*puân*’ instead of ‘*phuân*’.

<sup>28</sup> In Smith’s (2021) words, the function is “causative/similitive.”

<sup>29</sup> According to ‘漢典’ (Handian) accessed on 23 August 2023 at <https://www.zdic.net/>.

In Example 26, the aspiration corresponds to the derivation of a noun from a verb as opposed to Examples 18 and 22 to 25 (cf. Kwok 2018). Min languages have this aspiration contrast in common (Smith 2021). Here the noun ‘縫’ (*phāng*) is the patient of the verb ‘縫’ (*pāng*). Baxter and Sagart (2014) reconstructed ‘縫’ (*phāng*) with the suffix \*-s (perhaps nominalizing, see Downer 1959) for its departing tone and an unknown consonant prefix for its aspiration.

(27) 搥 (*túi*) / 槌 (*thúi*)  
 beat / hammer

This aspiration contrast is common to Min languages (Smith 2021) and yields a deverbal noun like Example 26 (cf. Kwok 2018). However, there is a notable semantic difference. The noun ‘槌’ (*thúi*) is an instrument for the verb ‘搥’ (*túi*) but not the patient.

(28) 斷 (*tñg*) / 斷 (*thñg*)  
 be severed / remaining limb after being severed

To my knowledge, previous studies have not reported this word pair. The noun ‘斷’ (*thñg*) is the result of the verb ‘斷’ (*tñg*).

### 3.8 Miscellaneous

(29) 讀 (*tāu*) / 讀 (*thák*)  
 comma / read

This paper is the first to discuss the aspiration contrast in this word pair to my knowledge. The basic word is ill-defined in Example 29. The departing tone of ‘讀’ (*tāu*) reflects a suffix -s, and the aspiration of ‘讀’ (*thák*) reflects an unknown prefix (Baxter and Sagart 2014). If ‘讀’ (*tāu*) had been derived from ‘讀’ (*thák*), we could not explain the removal of the prefix. If ‘讀’ (*thák*) had been derived from ‘讀’ (*tāu*), we could not

explain the removal of the suffix. Maybe both were derived from ‘牘’ (*Tók*) ‘document’; the verb ‘讀’ (*Thók*) ‘to read’ expresses the use of the noun ‘牘’ (*Tók*) ‘document.’ However, the earliest use of ‘讀’ in Old Chinese probably referred to ‘to recite’ (see Sagart 1999 for more discussion on the etymology of ‘讀’). The aspirated ‘讀’ (*thák*) can be found in both Coastal and Inland Min<sup>30</sup>.

(30) 傳 (*Tuān*) / 傳 (*Thuân/thhng*)  
 historical records / transmit

Example 30 is miscellaneous because the basic word is ill-defined. The aspiration in ‘傳’ (*Thuân/thhng*) likely reflects a functional prefix (Baxter and Sagart 2014). Here I argue that the unaspirated ‘傳’ (*Tuān*) is unlikely a reflex of the basic word of the aspirated ‘傳’ (*Thuân/thhng*), as implied by Norman (1991) and Kwok (2018). Regarding only the semantics, ‘傳’ (*Tuān*) is an instrument for ‘傳’ (*Thuân/thhng*). However, we could not explain the removal of the suffix \*-s for the departing tone if ‘傳’ (*Tuān*) reflected the basic word. This word pair is a part of a word family related to recurring motion, including ‘轉’ (*Tsuán/thng*) ‘transfer / turn around’ and perhaps ‘團’ (*Thuân/thhng*) ‘group / round items’ and ‘搏’ (*Thuân*) ‘make round.’ Nevertheless, my current knowledge cannot deduce the basic word of ‘傳’ (*Thuân/thhng*). This contrast can also be found in Eastern Min (Norman 1991; Kwok 2018).

(31) 含 (*kâ<sup>n</sup>*) / 含 (*khâ<sup>n</sup>*)  
 contain / mutually hold

Both mean to hold, and their distinction is not completely clear. The unaspirated ‘含’ (*kâ<sup>n</sup>*) is often unilateral. For example, ‘喙內有 *kâ<sup>n</sup>* 物件.’ (The mouth contains something.) implies that the thing does not hold back. We do not conjugate the verb ‘含’ (*kâ<sup>n</sup>*) when using the passive voice; ‘物

<sup>30</sup> According to ‘漢典’ (Handian) accessed on 20 January 2023 at <https://www.zdic.net/>.

件 *kâ<sup>n</sup> ī* 喙內.’ (Something is contained in the mouth.). With the aspirated ‘含’ (*khâ<sup>n</sup>*) in comparison, ‘物件 *khâ<sup>n</sup> ī* 喙內.’ (Something clings to the mouth.) implies mutual holding. We use the same verb form ‘含’ (*khâ<sup>n</sup>*) in the active voice; ‘喙內有 *khâ<sup>n</sup>* 物件.’ (The mouth holds something clinging to it.). These analyses do not agree with Smith’s (2021) interpretation of this word pair as “consisting of unaspirated transitive verb ~ aspirated intransitive”. Example 31 is the only case where the aspiration seems to change a verb from unilateral into mutual. Following regular sound laws, ‘*kâ<sup>n</sup>*’ can be traced back to Old Chinese ‘銜’ (horse bit) (Wu 2018).

- (32) 糊 (*kôo*) / 糊 (*khôo*)  
 paste / improperly paste

Kwok (2018) and Smith (2021) noticed the noun-verb contrast in this word pair. However, the unaspirated ‘糊’ (*kôo*) can be used as a noun ‘paste,’ an adjective ‘pasty,’ or a verb ‘to paste.’ The verb sense often implies the proper use of paste. For example, ‘*kôo* 壁’ means to plaster a wall (‘壁’), and ‘*kôo* 藥’ means to apply a poultice (‘藥’). When expressing ‘to improperly paste,’ we can still use the unaspirated ‘糊’ (*kôo*), but the aspirated ‘糊’ (*khôo*) is specialized for this expression and often emphasizes the impropriety. For example, ‘*khôo* 喙’ means to unpleasantly adhere to the mouth (‘喙’), and ‘*khôo*--儂’ is a metaphor for attributing one’s own responsibility (like paste) to others (‘--儂’). Like Example 14 (‘坐’ *tsē* / ‘坐’ *tshē*), the aspirated form in Example 32 seems to refer to a particular sense of the unaspirated form.

Table 3. Selection of ‘夾’ word family with senses of ‘to press between’.

夾	<i>ngeh</i>	To pinch as to pick up with chopsticks or pincers
挾	<i>ngèh</i>	To pinch as to hold by pressing between something
曠	<i>kheh</i>	To crowd
挾	<i>khèh</i>	To crush
狹	<i>èh</i>	Narrow

- (33) 挾 (*ngèh*) / 挾 (*khèh*)<sup>31</sup>  
 pinch / crush

Example 33 is miscellaneous because each is closely related to another member of the ‘夾’ word family (see Table 3 for a selection). The unaspirated ‘挾’ (*ngèh*) is phonemically and semantically more similar to ‘夾’ (*ngeh*) as is the aspirated ‘挾’ (*khèh*) to ‘𠵼’ (*kheh*). Smith (2021) interpreted Example 33 as “consisting of unaspirated transitive verb ~ aspirated intransitive”. However, like Example 31, all the verbs in Table 3 are transitive and can alternate between active and passive voices without conjugation. The only passive conjugation here is from ‘夾’ (*ngeh*, originally with the \*k- initial) to ‘狹’ (*èh*) following the derivational pattern in Table 1 (Baxter and Sagart 2014; Sagart 2003). We do not know the functions of the alternations between the first four words in Table 3.

#### 4. DISCUSSION

These results can help us improve Taiwanese language instruction and proto-language reconstruction.

##### 4.1 Taiwanese Language Instruction

This section proposes an instructional strategy using the 18 causative aspiration word pairs (Examples 1 to 18). The aim is to help Taiwanese learners master the causative ‘*kā...hōo*’ (共...予) construction (Template 0) and advanced causative words. The approach is by spiraling between these two subjects when building the curriculum. The causative aspiration morphology plays a pivotal role in bridging these two subjects. The following elaborates prerequisites and steps of this strategy.

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<sup>31</sup> Other Taiwanese variants spell the ‘挾’ (*ngèh*) / ‘挾’ (*khèh*) pair as *nguèh/khuèh*, *guèh/khuèh*, *kuèh/khuèh*, etc. I count it as one of the 29 minimal pairs since it is minimal in some variants.



The prerequisite is the understanding of beginner-level vocabulary. This study uses the 5429 words selected by Ko and Tân (1956)<sup>32</sup> to exemplify the beginner level, and advanced words refer to other Taiwanese vocabulary. Among the 18 causative aspiration word pairs, eight pairs have an unaspirated beginner-level member and an aspirated advanced member. There are six pairs of advanced words (Examples 4, 6, 7, 10, 11, and 12) and three pairs of beginner-level words (Examples 8, 16, and 17). Example 5 (*kē* / *hē*) is the only pair where the aspirated member was selected by Ko and Tân (1956) for beginners while the unaspirated member was not<sup>33</sup>. This account shows that the aspirated members tend to be more advanced for Taiwanese learners. In practice, teachers should pre-evaluate students' vocabulary before implementing this strategy.

The first step is to revisit the beginner-level causative aspiration word pairs when introducing the causative '*kā...hōo*' construction. Here, teachers demonstrate Examples 8, 17, or similar by explicitly mentioning the role of aspiration in *Tsuân* / *tshuân*, *tsuā* / *tshuā*, or similar. Students are expected to learn the causative construction using their knowledge about the word pairs.

The second step is to revisit the causative '*kā...hōo*' construction when introducing an advanced word given its counterpart in Examples 1 to 18 already known by students. Here, teachers reuse Template 0 to illustrate the advanced word and reemphasize the role of aspiration. Students are expected to learn the advanced word using their knowledge of the causative aspiration morphology. Meanwhile, this process reinforces their understanding of the causative construction and the known word.

I hypothesize that students treated with this strategy will have the following advantages. When writing Romanized characters or speaking, the students will show a higher rate of choosing the correct word form. Also, when reading passages written in Han characters, the students will be more capable of predicting the correct *kau-phuà-im* (勾破音)<sup>34</sup>.

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<sup>32</sup> I accessed Ko and Tân (1956) via the 'ChhoeTaigi' (2018) on 20 January 2023.

<sup>33</sup> Arguably, the unaspirated '下' (*kē*) 'low' fits the beginner level since it is often used to contrast '懸' (*kuân*) 'high,' which was selected by Ko and Tân (1956) for beginners.

<sup>34</sup> In Taiwanese, '勾破音' refers to different pronunciations of a Han character due to

## 4.2 Proto-Language Reconstruction

This section proposes a revision to the Old Chinese reconstruction by Baxter and Sagart (2014) regarding the prefixes \*s- and \*m- and briefly discusses the implications for Proto-Coastal-Min, Proto-Min, and Proto-Sino-Tibetan. This revision aims to resolve two criticisms on this reconstruction. First, the results of this study suggest that causative and volitional are distinct functions instead of a function of volitional with causative overtones. Second, Kwok (2018) and Smith (2021) argued that aspiration contrast word pairs found only in Coastal Min are innovations in Coastal Min and are neither reconstructable to Proto-Min nor further to Old Chinese. Kwok’s (2018) and Smith’s (2021) argument of locally innovated aspiration contrast can explain pairs like Example 24 (鋤), where the noun-verb contrasts of ‘hoe’ in different Min languages reflect different Proto-Min initial contrasts.

Kwok (2018) pointed out that Example 16 (食) can be traced back to Old Chinese since both the basic sense ‘to eat’ and the causative sense ‘to feed’ are well-attested in Old Chinese. The causative verb ‘to feed’ was reconstructed with a prefix \*s- by many recent studies (Baxter and Sagart 2014; Sagart and Baxter 2012; Mei 2012). In this pair, the prefix \*s- is reflected by changing the initial place of articulation from ‘船母’ (zy-) to ‘邪母’ (z-) in Middle Chinese and many of its descendants. Also, Taiwanese and all the other Coastal Min languages reflect the prefix \*s- by changing the initial from unaspirated to aspirated. However, none of the Inland Min languages shows any initial aspiration contrast in this pair.

I hypothesize that Old Chinese pre-initial \*s- made voiced obstruent initials aspirated in Coastal Min but not in Inland Min to better explain the evolution of Example 16 (食):

(34) *s-D-	>	*s-D-	>	*Dh-	>	Th- (L)
Old Chinese		Proto-Min		Proto-Coastal-Min		Coastal Min

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morphology. Those due to stratum are called *bûn-pêh-im* (文白音).

(35) \*s-D- > \*s-D- > \*D- > T- (L)  
 Old Chinese Proto-Min Proto-Inland-Min Inland Min

The notations are defined as follows: D, unaspirated voiced obstruents; Dh, aspirated voiced obstruents; T, unaspirated voiceless obstruents; Th, aspirated voiceless obstruents; L, lower tone. In contrast, Old Chinese pre-initial \*m- made voiced obstruent initials aspirated in all Min:

(36) \*m-D- > \*m-D- > \*Dh- > Th- (L)  
 Old Chinese Proto-Min Min

Middle Chinese dropped \*s- and \*m- (\*C-) before voiced obstruents:

(37) \*C-D- > D-  
 Old Chinese Middle Chinese

Note that the place of articulation of D, Dh, T, and Th in Laws 34 to 37 is subject to changes, for example, due to palatalization. In an environment where the pre-initial \*s- does not affect the place of articulation of \*D-, \*s-D- would be traceable only by the initial aspiration in Coastal Min languages.

For pairs like Example 2 (平), the causative sense (make even) could not be an innovation in Coastal Min because it is attested in Old Chinese as well as its basic sense (even). The same is true for Examples 3 (定), 4 (窮), 5 (下), 13 (成), 14 (坐), 15 (上), and 16 (食). Therefore, I agree with Baxter and Sagart (2014) that a prefix is reconstructable to Old Chinese for the aspirated member in these Examples. Nevertheless, their prefix should be the causative \*s- following Example 16 (食) instead of the volitional \*m- as the others. This revision frees the volitional \*m- from ‘causative overtones’ and explains the absence of causative aspiration in Inland Min<sup>35</sup> given Laws 34 and 35. In addition, following Example 17,

<sup>35</sup> Except the causative aspirated ‘上’ can be found in Kienou (建甌 or Jian’ou) variant

‘曳’ (to lead) was derived from ‘逝’ (to go) likely with the Old Chinese causative \*s- prefix.

The causative aspirations in Examples 1 (直), 6 (韃), 7 (齊), 8 (全), 9 (在), 10 (咧), 11 (擗), 12 (墜), and 18 (陣) are comparable to the derivation with the \*s- prefix, but they may be locally innovated. The following discusses these pairs with decreasing reconstructability to Old Chinese. Example 8 (全) is seemingly based on the Middle Chinese superstratum. However, we cannot rule out the possibility that the aspiration in Example 8 (攢) was due to substratum influence reflecting the Old Chinese causative \*s- prefix. Then, the causative sense of Examples 1 (直), 9 (在), 12 (墜), and 18 (陣) seems not well attested in Old Chinese. Last, the origin of the whole pair may not be Sinitic for Examples 6 (韃), 7 (齊), 10 (咧), and 11 (擗). These examples more or less imply that the causative morphology remained productive after the Min group branched out from other Sinitic groups. As a side note, ‘墜’ (*thūi*) in Example 12 can be interpreted as either causative or instrumental denominal, but its absence in Inland Min hints that it was derived from the causative \*s- prefix.

Handel (2012) pointed out the unnatural scarcity of the pre-initial \*s- before some initials by Sagart and Baxter (2012), which was left unresolved in Baxter and Sagart (2014). The above-mentioned revision also fills a few gaps of initials to which Baxter and Sagart (2014) had never affixed the pre-initial \*s-. The filled gaps include \*br- (平), \*N-tʰ- (定), \*gʰr- (下), [g](r) (窮), \*[dz]-<sup>36</sup> (坐). Examples 13 (成) and 15 (上) add the prefix \*s- to the initial [d]-, which needs reconciliation with the reconstruction of \*s-[d]- for ‘象’ (*tshiuʰ*) ‘elephant’ for their different reflexes in Middle Chinese; ‘常母’ (*dzy-*) for the former and ‘邪母’ (*z-*) for the latter. Future studies may use this contrast to constrain the uncertainty in reconstructing the \*s-[d]- initial in these cases. A caveat is that the distribution of the pre-initial \*s- remains vastly uneven after filling those gaps.

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of Inland Min (Tu 2013; Kwok 2018) and may be a loanword from Coastal Min.

<sup>36</sup> In Baxter and Sagart (2014), the brackets denote uncertainty.

Laws 34 and 35 should naturally apply to pre-initial \*s- regardless of its function. These laws not only explain the geographic distribution of causative aspirations but also accurately predict the isogloss of the colloquial reading of ‘象’ (*tshiu̯n*) ‘elephant,’ reconstructed as \*s-[d]- (Baxter and Sagart 2014). According to ‘漢典’ (Handian)<sup>37</sup>, its reflex is aspirated ‘*tsh-* (L)’ in all 24 Coastal Min variants but unaspirated ‘*s-* (L)’ in all nine Inland Min variants. Searching the data compiled by Tu (2013)<sup>38</sup>, I discovered more lower-tone words that show a similar isogloss pattern (aspirated in Southern and Eastern Min but unaspirated in Northern Min), including ‘倚’ (*khiā*) ‘stand,’ ‘琴’ (*khîm*) ‘string instrument,’ ‘蓆’ (*tshio̯h*) ‘mat’ (\*s-m-t- in Baxter and Sagart 2014), and ‘牆’ (*tshiu̯n*) ‘wall.’ Such aspiration contrast between Coastal and Inland Min would be taken as exceptions based on Norman’s (1974) Proto-Min reconstruction. However, given the five words mentioned in this paragraph and Examples 2 to 5 and 13 to 17, it is more likely that many of them underwent regular sound changes following Laws 34 and 35. In other words, Norman’s (1974) Proto-Min initial \*Dh can be divided into \*s-D and other \*Dh (including \*m-D). Supposedly, a thorough search for Coastal-Inland Min aspiration contrast may reveal more words with pre-initial \*s- in Old Chinese.

Comparison to other Sino-Tibetan languages yields interesting results. Matisoff (2003) related ‘平’ (our Example 2) to a set of Sino-Tibetan words that share a semantic core of “a complete or ideal realization of a quality appropriate to a particular dimensionality in space.” I searched the Sino-Tibetan Etymological Dictionary and Thesaurus (STEDT 2015) for this set and selected a subset of words that show causative morphology (Table 4). Table 4 lists the languages in the order of phylogenetic closeness to Taiwanese according to Blench and Post (2014). The results imply that the causative aspiration in ‘平’ (*phê̯n*) may be traced back to a sibilant prefix in the most recent common ancestor of Taiwanese and Jingpho. Supposedly, the reflex is initial aspiration in Taiwanese, Eastern Min, and Burmese, but initial devoicing in Kanauri and Bodo. Jingpho

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<sup>37</sup> Accessed on 20 January 2023 at <https://www.zdic.net/>.

<sup>38</sup> These data include only 43 words with ‘Th- (L)’, which is not complete.

retains a prefix *džə-*. Dimasa selectively devoices and aspirates the initial while retaining a prefix *si-*. Further reconstruction to Proto-Sino-Tibetan seems implausible for the sibilant prefix to this etymon since other subgroups of Sino-Tibetan languages show different causative morphology (below Jingpho in Table 4).

Table 4. Selection of Sino-Tibetan words related to ‘平’ (*pê<sup>n</sup>/phê<sup>n</sup>*).

Language	Word 1	Gloss 1	Word 2	Gloss 2
Taiwanese	pěʌ	flat/even	p <sup>h</sup> ěʌ	make even
Eastern Min	paŋʌ	flat/even	p <sup>h</sup> aŋʌ	make even
Old Chinese <sup>39</sup>	*breŋ	flat/even	*s-breŋ	make even
Burmese	prañ	Full	p <sup>h</sup> rañ	fill
Kanauri	böŋ	Full	pöŋ	fill
Bodo	beŋ	straight	peŋ	straighten
Dimasa	beleŋ	erect/straight	si-p <sup>h</sup> leŋ	straighten
Jingpho	p <sup>h</sup> rīŋ	Full	džə-p <sup>h</sup> rīŋ	fill
Bokar	biŋ	Full	fi:-biŋ	fill
Bengni	biŋ	Full	luk-biŋ	fill
Damu	piaŋ-duŋ	straight	piəŋ-dan-la	straighten
Lotha Naga	p <sup>h</sup> yang-a	Full	p <sup>h</sup> yang	fill
Taraon	bla:ng-a:	Full	bla:ng	fill
Karbi	pleŋ	Full	pe-pleŋ	fill

## 5. CONCLUSION

Taiwanese and other Coastal Min languages exhibit many lower-tone aspiration mutation word pairs, where words with an aspirated initial were derived from their unaspirated counterparts (Norman 1991; Lien 1999; Baxter and Sagart 2014; Kwok 2018; Smith 2021). Some previous studies took this derivational pattern into account in the reconstruction of Proto-Min (Norman 1991) and even Old Chinese (Baxter and Sagart 2014). All these studies proposed some possible functions of the aspiration but did not analyze the functions in detail. Detailed semantic analyses of the

<sup>39</sup> According to Baxter and Sagart (2014) except \*m- revised as \*s-.

aspiration are important for Taiwanese language education and proto-language reconstruction.

This study analyzes 33 pairs of words with aspiration contrast found by searching through the ‘ChhoeTaigi’ (2018) Taiwanese dictionary database. The ‘*kā...hōo*’ construction (Lee 2009) and the ‘*[m̄] sī tshûn beh ... --ê*’ expression are used to test the causativity and volitionality, respectively. The results show that most aspirations yield causative verbs (18), and others yield volitional words (three), instrumental denominal verbs (two), similitive denominal verbs (two), deverbal nouns (three), and miscellaneous (five).

Using the causative aspiration morphology, this study further proposes a Taiwanese instructional strategy. This strategy spirals between the causative ‘*kā...hōo*’ construction and the causative aspiration word pairs. This approach is expected to reinforce students’ understanding of the ‘*kā...hōo*’ construction using their knowledge about the aspiration word pairs and vice versa.

Considering the undefined volitionality of the causative aspirations and their absence in Inland Min languages, this study proposes a revision to the Old Chinese reconstruction by Baxter and Sagart (2014). This revision hypothesizes that the Old Chinese \*s- before voiced obstruent initials is reflected as aspiration in Coastal Min but not in Inland Min. Some of the causative aspiration word pairs in Taiwanese may reflect the Old Chinese causative prefix \*s-, and others might be locally innovated when the causative morphology was still productive. Some other words that are aspirated in Coastal Min but unaspirated in Inland Min may also be reconstructed with \*s-.

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## 台語中帶功能之送氣

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台語中陽(第五到八)聲調的清送氣聲母(ph、th、kh與tsh)源自濁送氣聲母(\*bh-, \*dh-, \*gh-, \*dzh-)。在台語與其他沿海閩語史上曾讀濁聲母的詞彙中, 近期研究辨出數組由不送氣型與送氣型所組成的詞族。他們提出那些送氣型多為使動或意向用法, 但是並未詳細分析其使動性與意向性。本研究從幾部台語辭典中搜出更多以送氣分別功能的詞族。本研究又分析台語例句中的語義角色關係, 以此確認那些送氣型多帶使動性, 而少數詞例則帶意向性、去名詞化或去動詞化。本文更推論此使動送氣源自上古漢語的使動前綴\*s-, 其後的濁聲母在沿海閩語變送氣音、內陸閩語變不送氣音。另外, 本文提出一套構詞原理教學策略, 用以加強學生對使動送氣詞與使動句型的理解, 或可增進台語教育。

關鍵字：派生構詞、輔音變化、論元配價、螺旋式教學、上古漢語構擬、閩南語