



Bogren Svensson, Victor & Blomberg, Johan. 2026. Head movement and motion events in Takituduh Bunun. *Glossa: a journal of general linguistics* 11(1). pp. 1–34. DOI: <https://doi.org/10.16995/glossa.16570>

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Head movement and motion events in Takituduh Bunun

Victor Bogren Svensson, Centre for Languages and Literature, Lund University, victor.bogren_svensson@ling.lu.se

Johan Blomberg, Centre for Languages and Literature, Lund University, johan.b.blomberg@gmail.com

The aim of this paper is to explore the morphosyntactic and semantic properties of the Takituduh Bunun (Austronesian: Central Taiwan) motion prefix *u-*, glossed as MOT. One central function of this prefix is to encode translocative motion. It can attach to a general locative marker, location nouns, nouns that denote places, and place names to derive a verbal constituent that encodes translocative motion. We propose that these morphologically complex path verbs derived via the motion prefix *u-* are the result of extensive concatenation of syntactic heads, and that this analysis accounts for the word order and case marking patterns associated with these verbs. Furthermore, we show that these morphologically complex path verbs can occur together with manner-of-motion verbs to form serializing satellite-framed structures. We argue that the combination of extensive concatenation of syntactic heads together with satellite-framed clause structures is possible since Takituduh Bunun allows for multiple verbalizations (i.e. several iterations of the classifying head *v*) and that any attempts at deriving the distinction between Satellite-framed and Verb-framed languages via syntactic rules must also be able to account serializing languages such as Takituduh Bunun.



1 Introduction

Motion has garnered considerable interest in linguistics. Ever since the seminal work of Talmy (Talmy 1985), the main issue has been how to capture the constraints and variation across languages in their expression of motion events. Focusing on such events as a paradigmatic form of event, Talmy (1991; 2000) proposed idea that languages vary in their “framing”. On the one hand, the main verb root may conflate Motion with how something moves (Manner). This leaves the change in spatial location – Path – to be expressed by a “satellite” to the main verb root, encompassing grammatical categories like verbal particles and prefixes (see Imbert 2012; Blomberg 2014; Zlatev et al. 2021 for discussions of the term satellite). On the other hand, Motion may be conflated with Path in the main verb root, leaving Manner to be optionally expressed by for instance gerundive forms. These two patterns have formed the basis for an influential typology predicting all languages of the world to fall into either a S(atellite)-framed or V(erb)-framed type (Talmy 1991). We exemplify the patterns in (1) with two languages considered prototypical of each type: Swedish and French.

- (1) a. Peter sprang in i rummet
 Peter run.PST PRT PREP room
 ‘Peter ran into the room’ *Swedish*
- b. Pierre est entré dans la pièce en courant
 Pierre AUX enter.PST.PRTC PREP DEF room PREP RUN.PCTC
 ‘Pierre entered the room running’ *French*

In (1a), Path is expressed via the verbal particle *in*, with the Manner(-of-motion) expressed by the finite verb of the clause (*sprang* ‘run’). The French example differs in that the verb (*entré* ‘enter’) conflates Path and Motion whereas Manner is encoded via the optional non-finite participle (*courant* ‘running’). As can be seen from these examples, the typology is based on the expression of Path as “framing” the event. As more languages were investigated, the typology of motion has encountered extensive problems and critique, but a main contention is nevertheless that “any alternative account should illuminate why Talmy’s typology is so close to being right” (Beavers et al. 2010: 332).

In this paper, we discuss how motion events are encoded using the motion prefix *u-* in Takituduh Bunun (Austronesian: Taiwan). This prefix (and its allophone *un-*) can attach to a locative element to encode motion as in (2a)¹, and this morphologically complex verb can also combine with manner-of-motion verbs as in (2b) without any overt markers of subordination to form serial verb constructions. This pattern of expressing motion through a grammatical morpheme raises fundamental issues in relation to motion event typology which is based on

¹ Unless stated otherwise, all linguistic examples are from Takituduh Bunun and are taken from the first author’s field notes.

the lexicalization of Path in either a main verb root or in a element hierarchically dependent on the main verb.

- (2) a. m-un-can ca uvava'az sipulan
 AV-MOT-at NOM children school
 'The children went to school'
- b. m-alalia ca uva'az m-un-can kiukai
 AV-run NOM child AV-MOT-at church
 'The child ran to the church'

In recent years, several constructivist proposals have been applied to the distinction between the V- and S-framed languages (Folli & Harley 2020; Acedo-Matellán & Kwapiszewski 2024), both for resultative (i.e. change-of-state) and translocative motion (i.e. change-of-location) clauses. We also adopt a constructivist approach, but argue that previous proposals cannot do justice to the morphologically complex Path-verbs found in Takituduh Bunun. One of our central claims is that they challenge formal proposals attempting to employ syntactic constraints for deriving the distinction between Verb-framed and Satellite-framed languages. Instead, we propose that the patterns in Takituduh are the result of the concatenation of several syntactic heads that still allows for multiple verbalizations, resulting in serial verb structures with extensive head movement.

The rest of the paper is organized as follows: In Section 2, we summarize previous research within the constructivist approach before outlining the theoretical framework used throughout this paper. We then present how the data was collected and give an introduction to the relevant grammatical structures of Takituduh Bunun. In Section 3, we analyze the motion prefix *u-*, arguing that it is involved in successive head concatenation, and we also discuss how this structure can be causativized. We then move on to discuss how morphologically complex verbs derived via this prefix can be combined with manner-of-motion verbs and how these multiverbal clauses can be causativized. The typological and theoretical implications of our analysis are discussed in Section 4.

2 Background

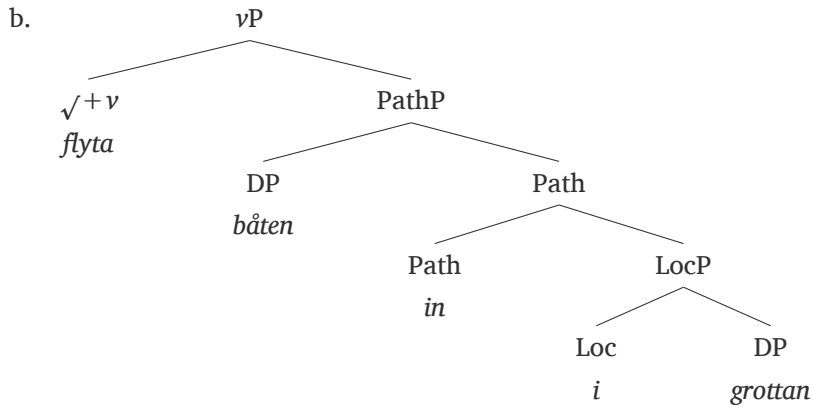
2.1 Theoretical framework

Constructivist approaches propose that argument structure is not determined by verbs or predicates, but by their hierarchical position in the syntactic structure (Borer 2005; 2013; Ramchand 2008; Marantz 2013). Recent work has applied this perspective to Talmy's typology of motion events, focusing on the distinction between Satellite- and Verb-framed languages, such as Folli & Harley (2020) and Acedo-Matellán & Kwapiszewski (2024). We briefly outline their respective approaches before situating our own analysis of Takituduh Bunun.

Folli & Harley (2020) argue that the distinction between S- and V-framing can be reduced to a head movement parameter. In V-framed languages, the Path-projection obligatorily moves to a verbalizing head v due to uninterpretable features on v . This blocks the insertion of Manner-roots as modifiers, since the head is already occupied. In S-framed languages, no such movement occurs, allowing for the co-occurrence of Manner and Path. In their framework, verbs lexicalize different bundles of syntactic heads. A motion verb like *entrare* (Italian) corresponds to [$v + \text{Path}$], while in a combination like *run into* (English) Path is spelled-out by an independent particle and the Manner is encoded by a lexical root licensed by the verbalizer ([$v + \sqrt{\text{run}}$]). The proposals adopt the view that head movement proceeds via Internal Merge followed by morphological merger (Matushansky 2006). An illustration of an S-framed structure within this analysis is given in (3), showing how the lexical root is concatenated with the verbalizer, while an illustration of a V-framed structure is given in (4), where instead the Path head is concatenated with the verbalizer.

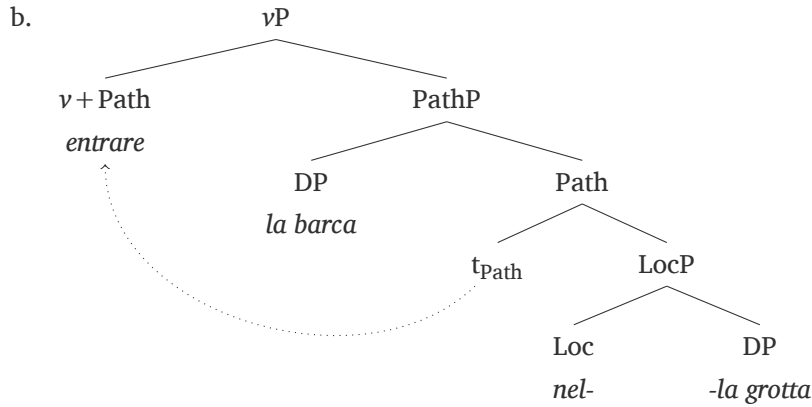
(3) Adopted from the English equivalent in Folli & Harley (2020: 430)

- a. Båten flöt in i grottan
 the.boat float.PST PRT PREP the.cave
 ‘The boat floated into the cave’ *Swedish*



(4) Adopted from Folli & Harley (2020: 430)

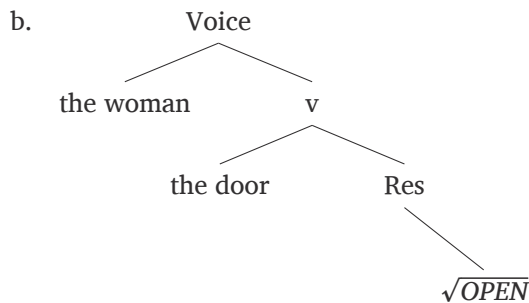
- a. La barca entrò nella grotta
 the boat enter.PST in.the cave
 ‘The boat entered the cave’ *Italian*



Acedo-Matellán & Kwapiszewski (2024) criticize Folli & Harley (2020) on both empirical and conceptual grounds. Working within Mirror Theory, they propose that V-framed languages lack a feature (w) that enables independent lexicalization of the Res(ult)/Path head. In S-framed languages, Res/Path carries additional features, allowing it to surface independently. They also employ a distinction between Strong and Weak S-framing languages. The latter incorporates Path as clitics or affixes, while the former lexicalizes Path as independent constituents. Their typology thus treats S-framing as the marked option, in contrast to Folli & Harley (2020). An illustration of their analysis for a resultative structure is given below, with a V-framed structure presented in (5) and an S-framed structure in (6). Since the Res-projection is situated in a specifier position in the S-framed structure, it must be receive a phonological realization from the rest of the verbal projections. It thus requires additional feature specification, marked with w and $@$ in the structure below, to allow it to be realized independently, thereby capturing the higher markedness of S-framed structures, since it requires additional feature specification.

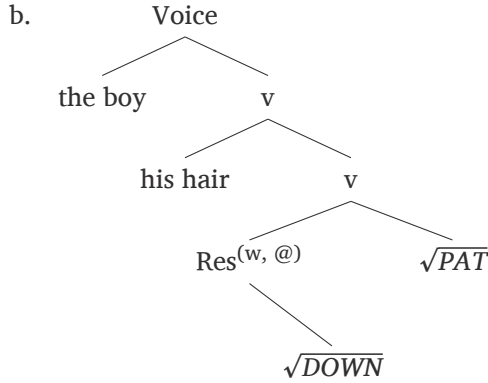
(5) Adopted from Acedo-Matellán & Kwapiszewski (2024: 12)

a. 'The woman opened the door.'



(6) Adopted from Acedo-Matellán & Kwapiszewski (2024: 12)

a. ‘The boy patted his hair down.’



The difference between Weak and Strong S-framed languages are captured based on the feature specification of the Res/Path-projection. For Strong S-framed languages, this projection carries both the features *w* and *@*, allowing it to linearize independently. In contrast, Weak S-framed languages lack the feature *@* on the Res/Path-projection, meaning that while it will be able to linearize, it will not be realized as a phonologically independent word, and will instead clitize to the lexical verb. An illustration of a weak S-framed languages is given below, where the Path-element (*ad-*) is realized as a prefix onto the manner-of-motion verb (*equitavit*).

(7) Qui ubi *(ad-)equitavit portis...

who.NOM.S as.soon.as *(at-)ride.PRF.3S doors.DAT

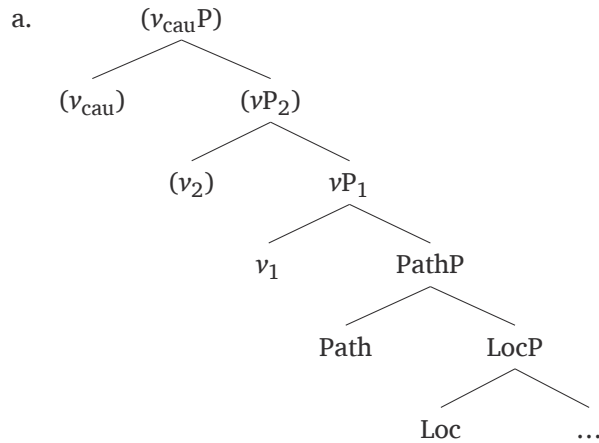
‘This one, as soon as he had ridden up to the gates...’ *Latin* (Acedo-Matellán 2016: 175)

In sum, while there are differences in the details of the analyses, an emerging consensus is that Path (or Result for change-of-state predicates) is introduced as a distinct syntactic head situated in a subordinate position in relation to the event-denoting verbal projection, *v*. In V-framed structures, the two syntactic heads (Path and *v*) are concatenated as spelled-out by a single exponent, while the two syntactic heads are not concatenated and spelled-out independently in S-framed languages.

Our discussion of Takituduh Bunun follows in the vein of previous proposals. The specific clause structure for Takituduh is outlined in (8), where the Path element is the complement of a verb head *v* responsible for encoding the event. Locative elements are introduced as complements of Loc, which constitutes an additional syntactic head. Takituduh Bunun differs from the monoverbal structure of prototypical S-/V-languages by allowing for serializing verbs, which can be captured by allowing for additional *v*P layers to be added to the structure, taking a lower *v*P as its complement (cf. Hopperdietzel 2022 for Mandarin Chinese and Samoan). Moreover, since

we also consider causativization of motion events, a causative element can be added to this structure (Pylkkänen 2008). As additional verb phrases and the causative prefix are not present in all translocative motion clauses in Takituduh Bunun, these are marked in parenthesis in the structure in 8.

(8) Clause Structure for Translocative Motion Events



We argue that translocative motion events in Takituduh Bunun with the motion prefix *u-* can be accounted for by assuming a high degree of concatenation of the syntactic heads outlined above and that constraints derived from non-serializing languages (e.g., Folli & Harley 2020; Acedo-Matellán & Kwapiszewski 2024) cannot straightforwardly account for patterns found in Takituduh Bunun. As Hopperdietzel (2022) suggests, verb serialization and framing must be treated as orthogonal dimensions. The framework outlined here accounts for both the multiple verbalizations, and the extensive head movement observed in Takituduh Bunun. The remainder of the paper develops this analysis empirically, focusing on how the motion prefix *u-* verbalizes motion via syntactic concatenation.

2.2 Methodology

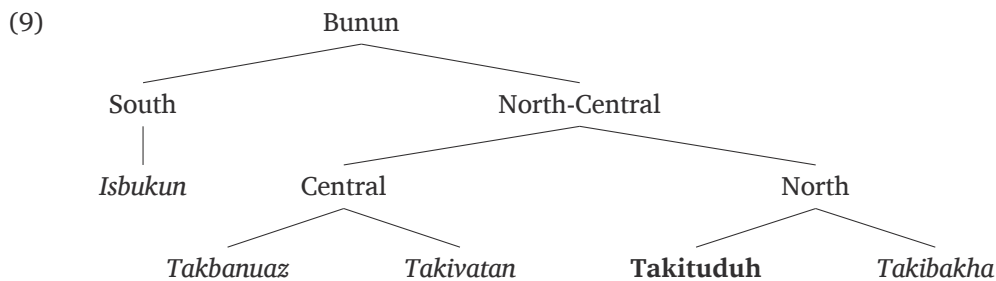
Data collection was conducted in 2022, in the Village of Zhongzheng, Nantou Country, Taiwan. Five native Takituduh Bunun speakers participated as informants (in the age span 60–80 years). They were all bilingual speakers of Takituduh Bunun and Mandarin Chinese, with some also exhibiting proficiency in Japanese and Southern Min. The first author conducted data collection in the homes of the participants. Data collection was carried out during short but frequent meetings, typically several times a week. These sessions were conducted in Mandarin Chinese.

To elicit motion event descriptions, we used video clips (Park 2020) and pictures (Mayer 1969) that are commonly used for elicitation in motion typology. Stimuli-elicited descriptions were complemented with translations and acceptability judgments. With respect to the former,

the informants were asked to translate words, phrases and sentences from Mandarin Chinese to Takituduh Bunun. For acceptability judgments, native speakers were presented with sentences in Takituduh Bunun orally and then asked to judge the acceptability of the sentence, and were asked to repeat them out aloud.

2.3 Takituduh Bunun

Bunun is mainly spoken in the central and eastern parts of Taiwan. It is divided into a Southern and a North-Central Branch, the latter further divided into a Central and Northern branch (see 9). The different varieties display varying degrees of mutual intelligibility (De Busser 2009; Huang & Shih 2018; Li 2018).



Estimates on the number of Bunun speakers remain conjectural. De Busser (2009) approximates 25 000–32 000 speakers, but acknowledges that this may be an optimistic estimate. Huang & Shih (2018) states that the Isbukun variety is by far the largest variety, comprising around half of the speakers. Takituduh Bunun is spoken mainly in three villages in Ren'ai Township in Nantou Province, central Taiwan: Wanfeng (Sima'un in Takituduh Bunun), Fazhi (Bukai) and Zhongzheng (Qatu). The data presented here were collected in Zhongzheng (Qatu).

In terms of grammatical structure, Takituduh is predicate-initial with some variation regarding the linear order of Subject and Object, although VSO is the unmarked alternative (10). The Austronesian voice system is used in Takituduh Bunun, where the voice morphology of the verb correlates with the argument structure of the clause and the thematic role of the clause pivot (the pivot marker is glossed as nominative in our analysis). The primary distinction is between Actor Voice (AV), where the external argument is the clause Pivot, and Undergoer Voice (UV, comprising Patient Voice, Locative Voice and Circumstantial Voice), where an internal argument acts as a clause Pivot. Examples illustrating the distinction between AV and UV are given in (10a-b), with Patient Voice as the Undergoer Voice relevant for the paper as we do not discuss Circumstantial or Locative Voice here.

- (10) a. ma-kal'ing azak qasu tulkuk
 AV-stir.fry 1S.NOM meat chicken
 'I stir-fry chicken meat.'

- b. kal'ing-un zaku ca qasu tulkuk
 stir.fry-PV 1S.AGT NOM meat chicken
 'I stir-fry the chicken meat.' (Bogren Svensson 2023: 156f)

In (10a), the finite verb is in AV, which is connected to the agent thematic role of the nominative argument. In contrast, (10b) illustrates a UV clause, with the finite verb in Patient Voice and with the nominative argument having a patient thematic role. The clause pivot is marked by the case marker *ca*, glossed as nominative throughout this paper. In contrast, the case marker *is* fulfills several functions, including marking the agent argument in non-actor voice clauses and arguments beyond the agent in AV-clauses, as well as possession. The latter function is illustrated in (11a), where *is* signals the possessive relationship between the possessor (mother) and the possessed (clothes)². Of relevance for the current paper is that the same possessive structure is also used to provide further specification of a Region, as illustrated in (11b).

- (11) a. huluc (is) tina
 house (OBL) mother
 'Mother's clothes'
 b. cungus (is) sipulan
 backyard (OBL) school
 'The backyard of the school'

The Austronesian voice system has been widely discussed (see Chen & McDonnell 2019 for a recent overview, and Teng 2023 and Tsukida & Zeitoun 2023 for discussions specific to the Austronesian languages of Taiwan), especially in relation to features such as transitivity, argument structure and morphosyntactic alignment. Since the data discussed here are compatible with several different analyses of the Austronesian Voice System, we do not discuss the technical details of the Austronesian Voice System further. However, voice marking is still relevant in our discussion on the hierarchical structure of serial verb constructions, so we will return to this topic in subsections 3.3 and 3.4.

The motion prefix *u-* is reconstructed by Blust (2009) to proto-Austronesian as **mu-*. However, we follow the proposal by Chen (2020) that the reconstruction is actually bimorphemic, consisting of the motion prefix *u-* and the Actor Voice prefix *m-*. This proposal is compatible with the Takituduh Bunun data, since the motion prefix *u-* can appear without *m-* (see sections 3.2 and 3.4 for examples and details). Reflexes of the motion prefix are found throughout the Formosan languages (The Austronesian languages of Taiwan), and it is only attested in one extra-Formosan Austronesian language (Cebuano) which is spoken in the Philippines (Chen 2020). The motion prefix is attested in other varieties of Bunun, including Takivatan (De Busser 2009) and Isbukun

² Since the form is the same for both functions, we consistently gloss *is* as OBL for oblique, regardless of function.

(Li 2018). In both varieties, the motion prefix can attach to both locative elements (*sia* in Isbukun, *han* in Takivatan) as well as nominal elements (De Busser 2009; Li 2018). However, to the best of our knowledge, the current paper constitutes the first attempt at a formal analysis of the clause and argument structure of this motion prefix.

3 Motion in Takituduh Bunun

We begin by presenting the basic grammatical properties of the motion prefix *u-* and how these structures can be captured in a constructivist framework. We then move on to show how the same framework can be expanded to capture the causative counterparts of these structures. Translocative motion events using *u-* can furthermore form multi-verb clauses together with manner-of-motion verbs and also be causativized with the same prefix. These patterns are discussed in Sections 3.3 and 3.4.

3.1 Motion encoded via the motion prefix *u-*

3.1.1 Categorical status and case-marking with *u-*

To encode translocative motion events, Takituduh Bunun frequently uses the motion prefix *u-*. This prefix alternates between *u-* and *un-*, without any observable differences in meaning. It attaches to the locative marker *han/can*, locative nouns and nouns that denote a location³. Example (12a) shows how the locative marker can be used to encode a static location, while (12b) shows how translocative motion is encoded when the motion prefix *un-* is added, thus being the sole element expressing translocation. In example (12c), we can see that Region can be additionally specified by a locative noun bound together with the Landmark via the oblique case marker *is*.

- (12) a. *han sipulan ca uvava'az*
 at school NOM children
 'The children are at school'
- b. *m-un-can ca uvava'az sipulan*
 AV-MOT-at NOM children school
 'The children went to school'
- c. *m-un-can ca uvava'az cungus is sipulan*
 AV-MOT-at NOM children backyard OBL school
 'The children went to the back of the school'.

The motion prefix can also attach to nouns, both locative nouns and those that broadly denote a location. These clauses may include a Landmark, as in (13a), or the verbalized locative noun

³ The locative marker can be realized as either *can* or *han* without any difference in meaning.

might appear without a Landmark, as in example (13b). Example (13c) illustrates that the prefix also can attach to a noun denoting a location to derive a finite verb encoding translocative motion. All locative nouns discussed in this paper can be verbalized via the motion prefix *u-*.

- (13) a. m-u-kumbu ca uva'az is sipulan
 AV-MOT-inside NOM child OBL school
 'The child entered the school'
- b. m-u-nata ca uva'az
 AV-MOT-outside NOM child
 'The child went out'
- c. m-un-kiukai anai
 AV-MOT-church 3p.NOM
 'They went to church'

The motion prefix derives a verbal stem (in line with Chen 2020). The verbal nature of the derived stem for locative nouns is illustrated in example (14) below, where it hosts the imperative suffix *-a*, providing morphological evidence that the derived stem is a verb⁴.

- (14) tupa-un=s tataqu masipul ca uva'az tu m-u-kumbu-a sapalan
 say-PV=OBL teacher study NOM child SUB AV-MOT-inside-IMP room
 'The teacher said to the child "Go inside the room!"'

There are important differences between the case marking in clauses where the motion prefix is attached to the locative marker *can/han*, and where it is attached to a locative noun. In (15a), the complement ('school') of the derived stem *muncan* cannot be marked with the oblique case marker *is*. This stands in contrast to the complement ('school') of the stem derived from a locative noun in (15b), where the oblique case marker is optional.

- (15) a. m-un-can ca uvava'az (*is) sipulan
 AV-MOT-at NOM children (OBL) school
 'The children went to school'
- b. m-u-kumbu ca uva'az (is) sipulan
 AV-MOT-inside NOM child (OBL) school
 'The child entered the school'

The difference in case marking between the two clauses reflects the externally merged structure of the locative marker and locative nouns, respectively, and both derived stems are the result of

⁴ Discussing Isbukun Bunun, (Huang & Shih 2018) propose that the suffix *-a* should be analyzed as a subjunctive in this context. Even if this analysis would be correct for Takituduh Bunun as well, this would still constitute additional morphological evidence of the verbal status of the derived stem.

concatenation of syntactic heads. As mentioned, the case marker *is* has several different functions, including marking objects in AV-clauses and possession. The oblique case marker is optional, as shown in (16). Example (16a) illustrates an AV-clause where the external argument is marked with the nominative case marker *ca*, and the internal argument is marked with the oblique case marker *is*. The possessive function of the case marker *is* is illustrated in (16b-c), for locative and animate nouns, respectively.

- (16) a. ma-kulut (ca) tama (is) qasu
 AV-cut (NOM) father (OBL) meat
 'Father cuts meat'
- b. cungus (is) sipulan
 backyard (OBL) school
 'The backyard of the school'
- c. tina (is) uva'az
 mother (OBL) child
 'The mother of the child'

These patterns stand in contrast to case-marking patterns for the locative marker *han/can* in (17). The locative complement is always unmarked, and any oblique case markers would make the structure ungrammatical. This is the case for intransitive AV-clauses (17a–b), and for transitive Patient Voice clauses (17c). When used as a transitive verb in Patient Voice clauses, it takes on the meaning corresponding to a placement verb like 'put' with the theme argument in the nominative case.

- (17) a. han (*is) sipulan ca uvava'az
 at (OBL) school NOM children
 'The children are at school'
- b. can-a (*is) lumaq tiang
 at-AV.IMP (OBL) house PN
 'Stay at Tiang's house!'
- c. han-un = cia (*is) pangka ca haqail
 at-PV = 3s (OBL) table NOM book
 'She put the book on the table'

3.1.2 Categorical status of *can/han*

Before moving on, a few words should be said about the categorical status of the locative marker *can/han*. A cognate of this is found in the Takivatan variety of Bunun, where it is analyzed as a locative verb by De Busser (2009). Its status as a verb is supported by example (17b), where it hosts imperative morphology, and (17c), where it hosts the Patient Voice morphology of the clause, both of which are criteria indicative of verbal status in Takituduh Bunun. However,

there are also good reasons to believe that *can/han* functions as a preposition as well. The basic word order for AV-clauses in Takituduh Bunun is Verb - Subject - Object, illustrated in (18a). However, when *can/han* functions as the main predicate of a clause, its complement must always precede any nominative agents, as illustrated in (18b). This is also true for clauses with *can/han* and a lexical verb (18c). Instead of analyzing it as a verb, we propose that in these clauses *can/han* is a preposition, and it forms a tightly bound unit with the prepositional object, so no full NPs can intervene in this position (see examples (21a–b) of different patterns for clitic pronouns).

- (18) a. ma-kulut ca tama is qasu
 AV-cut NOM father OBL meat
 ‘Father cuts meat’
- b. han sipulan ca uvava’az
 at school NOM children
 ‘The children are at school’
- c. han ngalan kiukai ca uvava’az ma-la-lalia
 at beside church NOM children AV-RED-run
 ‘The children are running around beside the church’

Another crucial piece of evidence for its prepositional status is the fact that when it linearly precedes the lexical verb in Undergoer Voice clauses, it does not host the distinctive voice morphology of the clause. This stands in contrast to multi-verbal clauses, where the initial verb in a sequence hosts the distinctive voice morphology, as shown in (19). In this example, it is the first verb that hosts the distinctive voice morphology of the clause, while the second verb must be in AV. It is clear that the clause is in Patient Voice, since the nominative argument has a patient role.

- (19) ludaq-un = ku ma-pulpul ca baluku
 hit-PV = 1s.AGT AV-shatter NOM bowl
 ‘I hit the bowl into pieces’

This pattern can also be extended to clauses where the initial verb has a modifying or functional role, for instance with adverbial verbs (Holmer 2012; Chang 2010), which can function as manner (20a) and aspectual modifiers (20b). Both clauses below are non-Actor Voice clauses, since the internal argument in all clauses is marked with the nominative case marker *ca*. The lexical verbs are all realized in the default AV, as is expected in these contexts (Chang 2017; 2023 for additional discussion on multi-verbal clauses in Formosan languages).

- (20) a. qait-un = cia ma-ludaq ca tuqas = cia
 hard-PV = 3s AV-hit NOM older.sibling = 3s
 ‘He hit his older sibling hard’

- b. ucqa-un =cia ma-qalqal ca uva'az
 suddenly-PV = 3s AV-fall NOM child
 'He suddenly made the child fall over'

The structure in examples (19) and (20) can be compared to clauses where the locative *can/han* appears in the clause-initial position. Here, *can/han* does not prevent the voice morphology from ending up on the lexical verb, in contrast to the examples outlined above. Note that while full NPs must follow the entire prepositional phrase (marked with square brackets), pronominal clitics attach to the clause-initial *can/han*.

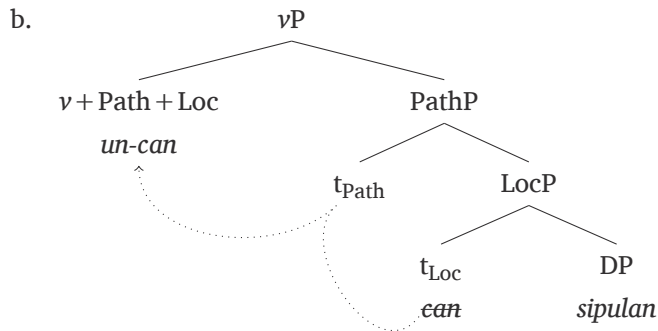
- (21) a. [han quma] ca tama sadu-an = ku
 [at field] NOM father see-LV = 1s.AGT
 'I saw father in the field'
- b. [han = as quma] sadu-an = ku
 [at = 2s.NOM field] see-LV = 1s.AGT
 'I saw you in the field.'

The examples above show that *can/han* differs from verbal elements in at least three ways: 1) it does not prevent the distinctive voice morphology from being realized on the lexical verb, 2) it has a different word order pattern from lexical verbs, and 3) it does not allow for the case marker *is* to appear before its complement in Actor Voice clauses. We take this observation to show that *can/han* is a prepositional element, which is relevant for our analysis of the motion prefix *u-*. We propose that the motion prefix can attach to either a preposition (i.e. the locative marker *can/han*) or to a nominal constituent (e.g. locative nouns), and that the difference between the two externally merged clause structures reflects the different case marking patterns.

3.1.3 Formal analysis *u-*

Having established our analysis of *can/han*, we are now in a position to move on to the formal analysis of the motion prefix *u-*. Since *can/han* by itself encodes a static location, we propose that it spells out the head Loc^0 of a Loc(ative) Phrase. The shift from locative to translocative is encoded via the motion prefix *u-*. Since it derives a verbal element that encodes translocative motion, we propose that it spells out the head of a Path phrase as well as the categorizing ν -head responsible to assigning verbal status and encoding the event. The three syntactic heads are concatenated via head movement, and the morphologically complex word *uncan* thus spells out ν Path and Loc to encode translocative motion. The derivation is illustrated in (22) below, showing how the three heads are concatenated via head movement. The theme argument and AV are omitted in the tree structure.

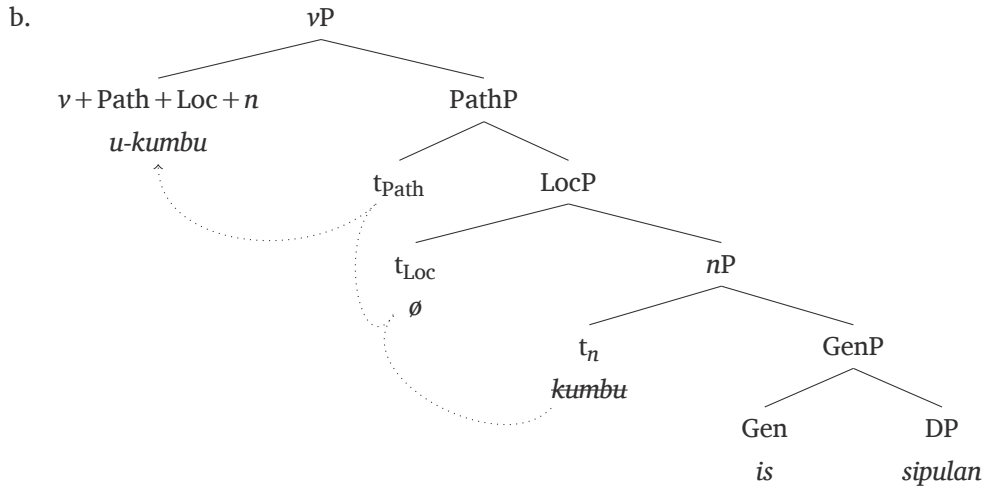
- (22) a. m-un-can ca uvava'az (*is) sipulan
 AV-MOT-at NOM children (*OBL) school
 'The children went to school'



On this view, the case marking patterns of *muncan* follow without any additional stipulations. The locative element of the clause is concatenated with the motion prefix *u-*. It is thus expected that its complement should not be able to be marked by a case marker since it is in fact not an argument of a verb, but rather the remnants of a locative prepositional phrase. This proposal likewise falls in line with the analysis of direction verbs in Mandarin Chinese developed by (Hu 2022), who argue that the prepositional elements responsible for encoding Location and Path can be verbalized by being concatenating with a categorizing head *v*.

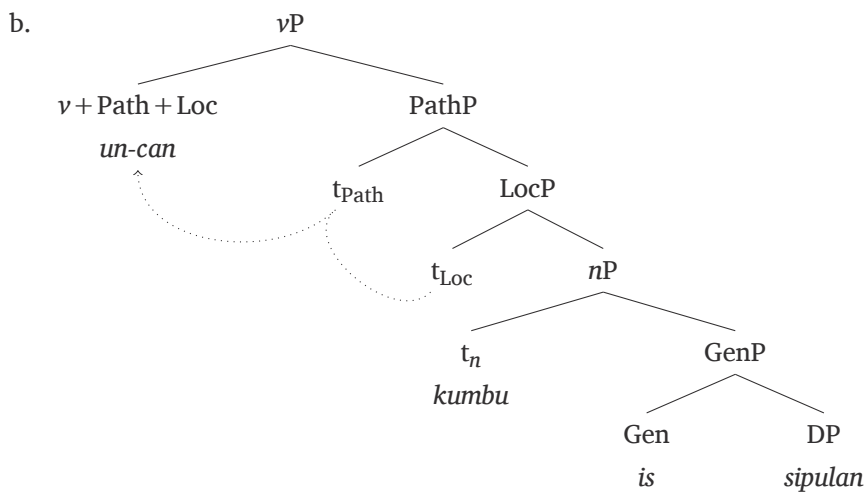
The same head movement analysis can be extended to the motion prefix attached to locative nouns. In order to maintain a consistent phrase structure, we keep the same three projections as in the other clauses (*v*, Path and Loc). However, a key difference between the two structures is that in clauses where the motion prefix is attached to a nominative element, the preposition that spells out Loc is not present in the structure. Instead, the locative nominal is raised to this empty head before it is concatenated with Path and *v* spelled out by the motion prefix *u-*. A simplified structure of this noun phrase is given in the tree structure below, with a genitive phrase introducing the nominal modifier 'school'. Here, we tentatively propose that the complement of the Locative element in the clause structure below is a noun phrase (presented as *nP* in the structure), rather than a full DP, with the locative noun as its head. This syntactic head then acts as the Goal for the motion prefix. This would place the derivation closer to much research of noun incorporation and verbalization (see Baker 2009; Johns 2009; Barrie & Mathieu 2016 for relevant discussions). Central to our claim is that the *nPs* allow for at least a genitive phrase to be present in the structure, beyond this we make no definite claims regarding the size or structure of the *nP*.

- (23) a. m-u-kumbu ca uva'az (is) sipulan
 AV-MOT-inside NOM child (OBL) school
 'The child entered the school'



The equivalent of the structure in (23) with the locative element *can/han* is illustrated in the tree structure below (24), with the complex noun phrase containing both a landmark (school) and additional specification thereof (inside). As in (23), the Locative head prevents the verbalizer from concatenating with elements within the noun phrase, instead verbalizing the locative head. Note that while an *is* is present in the structure, it is the genitive marker denoting the modifying relationship between ‘inside’ and ‘school’, which is also reflected in its linear position between the two nouns. As in (23), we adopt a tentative structure for the noun phrase in Takituduh Bunun, where the head noun *kumbu* takes a GenP as its complement, which functions to introduce the possessor modifying the head noun.

- (24) a. m-un-can ca uvava’az (*is) kumbu (is) sipulan
 AV-MOT-at NOM children (*OBL) side (OBL) school
 ‘The children went to the inside of (‘entered’) the school’



According to our proposal, the case marker *is* in (23) does not mark an object, but is rather a genitive case marker whose function is to introduce a possessor. Recall that the oblique and genitive case markers are not formally distinguished in Takituduh Bunun (see example (16) above). The difference in case marking for the complement of the motion prefix *u-* and the locative preposition on the one hand, and the locative noun on the other follow from this proposal without any additional stipulations; they are not really arguments of the morphologically complex derived verb, but rather the remnants of a prepositional phrase and a noun phrase, respectively.

The proposed analysis for the differences between the two structures appears to have a look-ahead problem, where the phonological form of Loc^0 has to be visible for the derivation. We propose that this issue can be solved via feature checking. The Loc^0 spelled out by *han/can* are marked with relevant features that act as the Goal of the Probe. Under relativized minimality (Rizzi 1990), Loc^0 intervenes between the Probe (Path^0) and the Nominative Argument, thus preventing the latter from concatenating with the verb. In essence, there are two Loc^0 in the language, one being phonologically null, and the other being spelled out by *can/han*, each carrying distinct feature specifications. This is thus reminiscent of an allophonic variation for the realization of the locative head; when it triggers movement of the subordinate nominal, it lacks an overt phonological realization, and when no such movement takes place, it will be realized as *can/han*. As such, the correlations between the two patterns are quite clear, i.e. when the locative incorporates the nominative complement it is realized as zero, and when it does not it carries an overt realization. However, analyzing this as a matter of allomorphy of the locative head still requires distinct feature specification to avoid a look-ahead problem.

An illustration of the differences between the two clause types is given in (25) below. For (25a), the Landmark ‘school’ is the remnant of the prepositional phrase *can sipulan* (‘at school’). It is therefore not possible to insert the case marker *is* here, since it cannot mark prepositional objects. For (25b), the Landmark (‘school’) is not a verbal object, but rather a genitive phrase, i.e. the remnants of a complex noun phrase containing two nominals. The case marker *is* in this example does not mark a verbal object, but rather is a genitive case marker, indicating the modifying function of the landmark towards the head noun (‘inside’). The square brackets mark the edges of the externally merged PP and NP, respectively⁵.

⁵ As pointed out by a reviewer, the Landmark (‘school’) and in (25a) (as a head noun) and (25b–c) (as a complement of Gen^0) are introduced in different positions, in apparent violation of basic constructivist assumptions. However, the Landmark does fulfill different syntactic roles in the two structures (Head Noun and Possessor, respectively), and might therefore justify having different syntactic structures. However, the central claim of our paper is that the event structure is the same across the different clause types (i.e. with our without *can/han*). Whether or not the same principles of uniformity can be extended to noun phrases is a question we leave for future research.

- (25) a. m-un-can_j ca uvava'az [_{PP} ean_j sipulan]
 AV-MOT-at_j NOM children [_{PP} at_j school]
 'The children went to school'
- b. m-u-kumbu_i ca uva'az [_{NP} kumbu_i (is) sipulan]
 AV-MOT-inside_i NOM child [_{NP} inside_i (OBL) school]
 'The child entered the school'
- c. m-un-can_j ca uvava'az [_{PP} ean_j kumbu (is) sipulan]
 AV-MOT-at_j NOM children [_{PP} at_j inside (OBL) school]
 'The children went to the inside of the school'

In clauses where the preposition *can/han* and a locative element are both present, as in example (25c) above, it is not possible for the motion prefix to attach to the locative nominal, but it is always realized on the preposition. These patterns likewise fall in line with the head movement analysis presented here, since this is exactly the pattern predicted under the Head Movement Constraint (Travis 1984): The Locative head intervenes between the Path and the nominative element, preventing the motion prefix from attaching to a nominal element. Furthermore, this analysis directly accounts for the divergent case marking patterns for the two types of clause patterns⁶.

3.2 Causation and the motion prefix *u-*

In the clauses we have discussed so far, no external causers were involved, and the subject in all motion clauses was the Figure. However, it is possible to add an external causer to motion prefix clauses with the causative prefix *p-*. This results in a clause structure with three actants, corresponding to Figure, Causer and Region (+ Landmark). This structure is crucial evidence in favor of treating the sequence *mu-* as bimorphemic (see also Li 2018 for a similar analysis for the Isbukun variety of Bunun), consisting of an Actor Voice prefix *m-* and the motion prefix *u-*. A minimal pair illustrating caused and non-caused motion is given below, where the caused equivalent of (26a) is found in (26b).

- (26) a. m-un-can (*is) cungus is sipulan ca uvava'az
 AV-MOT-at (OBL) backyard OBL school NOM children
 'The children went to the back of the school'
- b. p-un-han-un sinsi (*is) cungus is sipulan ca uvava'az
 CAU-MOT-at-PV teacher (OBL) backyard OBL school NOM children
 'Teacher made the children go to the back of the school'

⁶ While this analysis hinges on the claim that *can/han* is a preposition rather than a verb, it would still be possible to maintain the same analysis if we were to concede that it is a verb. The only necessary additional postulation is that *can/han* exhibits divergent case marking and word order patterns from other verbs. However, the advantage of analyzing it as a preposition is that no such item-specific exceptions to case marking and word order are necessary.

As shown in the translation, both clauses encode translocative motion. Since the causativized clause is in Patient Voice, the internal argument that undergoes movement (i.e., the Figure) is marked by the nominative case marker, and the external causer is optionally marked by the case marker *is*. The Ground *cungus is sipulan* ‘backyard of the school’ cannot be preceded by the case marker *is* in the causative clause. As such, the case marking of the noun expressing Region is the same for both the cause and non-caused clause structures.

It is also possible to causativize the structure when the motion prefix *u-* is hosted by a locative noun. The causative alternative of (27a) is given in (27b). Since the causative clause is in Patient Voice, the Figure is marked with a nominative case marker, and the external causer argument is marked with an optional case marker *is*. Note that the Landmark *sipulan* (‘school’) in the causative clause may be preceded by the case marker *is*, just as was shown for non-caused clauses with locative nouns in the previous section.

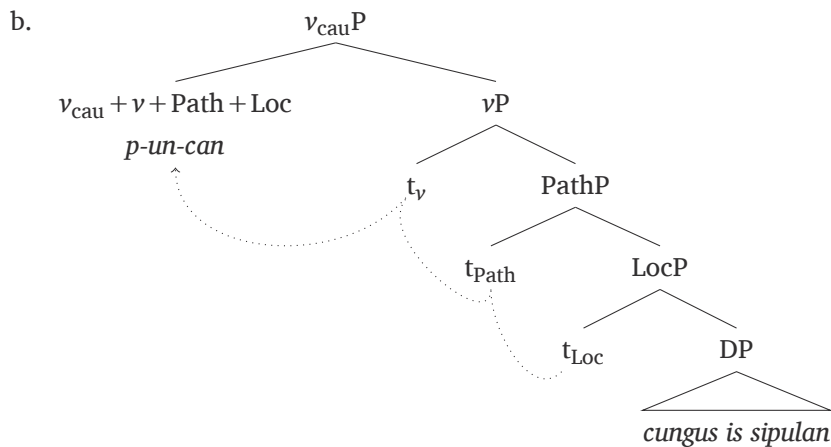
- (27) a. m-u-kumbu ca uva’az (is) sipulan
 AV-MOT-inside NOM child OBL school
 ‘The child entered the school’
- b. p-u-kumbu-’un=s sinisi (is) sipulan ca masisipul
 CAU-MOT-inside-PV=OBL teacher (OBL) school NOM student
 ‘Teacher made the students go inside the school’

As examples (26) and (27) show, the same case marking patterns for non-caused motion clauses carry over to their causativized counterparts. In clauses where it is the motion prefix together with the locative preposition that encodes translocative motion, its complement, the Ground, cannot be marked with the oblique case marker *is*, regardless if the clause structure is causativized or not. In contrast, in clauses where the motion prefix together with a locative noun encodes translocative motion, their complement (i.e., Landmark) can be preceded by the case marker *is*. We take this as evidence that the externally merged clause structures of the non-caused/caused pairs are the same, with the difference that the causative clause contains an additional projection that introduces causative semantics and the external causer argument. We begin by outlining the clause structure for example (26b), before moving on to discuss example (27b).

The presence of the causative prefix *p-* introduces both an additional argument (a causer argument) and causative semantics (causing the theme to undergo movement). Here we do not attempt to classify the causative prefix within the broader typology of causatives within generative constructivist frameworks (Pylkkänen 2008; Harley 2017, see also Nie 2020 for a relevant discussion on causatives in the related language Tagalog). Instead, we simply propose that the causative semantics are introduced via a separate verb head v_{cau} , and this head is spelled out by the causative prefix *p-*. Whether or not the Causer is introduced in the specifier of this projection or via a distinct Voice projection (i.e. Voice-Bundling vs. non-Voice-Bundling, Pylkkänen 2008) is not central to our main claim. As in the uncaused movement structures discussed in the previous

section, the motion prefix *u-* in causativized clauses is the overt realization of Path^0 and v^0 . The locative preposition *can/han* spells out a Path^0 , which is responsible for introducing the Ground. Both *p-* and *u-* are realized as prefixes, with the motion prefix situated closer to the locative preposition than the causative. The linear order of the prefixes thus directly reflects the syntactic order, where the syntactic head introduced higher in the structure (*p-*) is linearized further away from the “root” (*can* in this example) than syntactic heads introduced in a lower position (*u-*), thus falling in line with the head concatenation analysis developed here. The morphologically complex *p-un-can* illustrated in (28) is the overt realization of v_{cau} , v , Path and Loc where this complex head can be seen as the result of iterative head movement, illustrated by the dashed lines in the tree structure in (28)⁷.

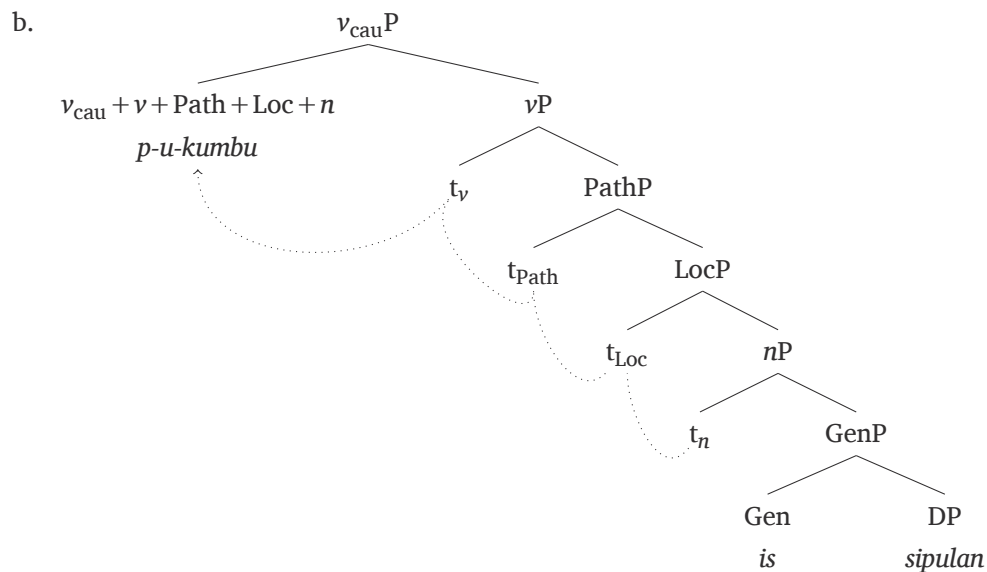
- (28) a. *p-un-han-un* *sinsi* (*is) *cungus* is *sipulan ca uvava'az*
 CAU-MOT-at-PV teacher (OBL) backyard OBL school NOM children
 ‘Teacher made the children go to the back of the school’



Through such an analysis, we can directly account for why the Ground cannot be marked with a case position. Like in the non-caused counterpart, the noun phrase denoting the Ground is actually not an argument of the motion verb, but rather the remnants of a prepositional phrase. The same analysis can be extended to clauses where the motion prefix is attached to a locative noun, illustrated in the tree structure in (29). The key difference is that the nominal also undergoes head movement. Thus, the morphologically complex word *p-u-kumbu* spells out v_{cau} , v , Path , Loc and n . As in the example in (28) above, the linear order of the two prefixes directly reflects the syntactic order.

- (29) a. *p-u-kumbu-'un=s* *sinsi* (is) *sipulan ca masisipul*
 CAU-MOT-inside-PV=OBL teacher (OBL) school NOM students
 ‘Teacher made the students go inside the school’

⁷ For the sake of simplicity, Causer and Figure arguments are omitted, as is Patient Voice. The same simplification is applied throughout for all caused motion examples.



As with non-caused clauses, the difference in the underlying structure is reflected by the case marking. As was shown for non-caused motion, the verbalized preposition cannot have the marker *is* before its complement, whereas for verbalized locative nouns the case marker is optional. We see the same pattern in the causativized counterparts, where the Region in clauses with *pucan/puhan* likewise cannot be preceded by *is*, whereas it can be preceded by an optional *is* in clauses with a verbalized locative nominal. We propose that this reflects the externally merged structure, where the Region in verbalized preposition clauses is the remnants of a PP, and the Landmark in verbalized locative noun clauses is the remnants of a noun phrase. Examples illustrating this with brackets and traces are given in (30), reproduced from (28) and (29), respectively.

- (30) a. p-un-han_j-un sinisi [_{PP} han_j cun_{gus} is sipulan] ca uvava'az
 CAU-MOT-at_j-PV teacher [_{PP} at_j back_yard OBL school] NOM children
 'Teacher made the children go to the back of the school'
- b. p-u-kumbu_i-un=s sinisi [_{NP} kumbu_i is sipulan] ca masisipul
 CAU-MOT-inside-PV=OBL teacher [_{NP} inside_i OBL school] NOM students
 'Teacher made the students go inside the school'

Like with the non-caused translocation motion clauses with the motion prefix *u-*, the distribution of the case markers follows automatically from such an analysis. Another argument in favor of our analysis comes from word order. In Patient Voice causativized clauses with three actants, the ordering of the causand and the causee is variable, so it is possible for the causee (marked with the nominative case marker *ca*) to both precede and follow the causand (optionally marked with the case marker *is*). In (31a), the causee precedes the causand, whereas it follows the causand in (31b).

- (31) a. pa-liqliq-un =ku haqail ca uva'az
 CAU-tear-PV = 1s.AGT paper NOM child
 'I made the child tear up the paper'
- b. pa-patas-un tina ca uva'az tingami
 CAU-write-PV mother NOM child letter
 'Mother made the child write a letter'

This type of variation in word order is not possible for the caused motion structures discussed here. These clauses exhibit the strict word order of Verb - Causer - Ground/Landmark - Figure. If the Figure were to be placed before the Ground/Landmark (as in 32a-b) with the same word order, then the structure would be ungrammatical.

- (32) a. *p-un-han-un sinisi ca uvava'az cingus is sipulan
 CAU-MOT-at-PV teacher NOM children backyard OBL school
- b. *p-u-kumbu-'un =s sinisi ca masisipulis sipulan
 CAU-MOT-inside-PV = OBL teacher NOM student OBL school

We take this difference in word order between regular causative clause structure and cause motion clause structure to provide further evidence in favor of our analysis. This means that the Ground/Landmark constituents in the examples above are not arguments of the verb, but rather the remnants of a PP or an NP, respectively. This stands in contrast to regular causative clauses, where all three actants (causer, causee and causand) are all arguments of the verb. It is therefore not surprising that we see different word orders in the two clause types.

To summarize, we have shown that the morphologically complex path-verb containing the motion prefix *u-* is the result of extensive concatenation of syntactic heads, at least containing v^0 , $Path^0$ and Loc^0 . This would make the structure characteristic of those found in a Verb-framed languages, as defined by Folli & Harley (2020) and Acedo-Matellán & Kwapiszewski (2024). However, in the next two sections, we show that these structures can combine with manner-of-motion verbs to form serial verb constructions that can be analyzed as a kind of satellite-framing.

3.3 Manner-of-motion and motion prefix *u-*

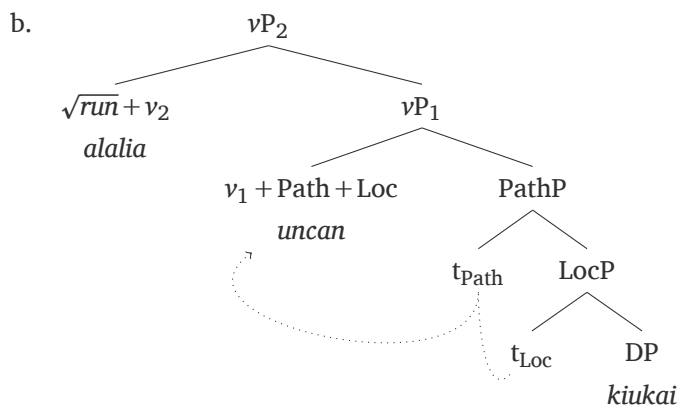
Manner-of-motion verbs can combine with constituents derived via the motion prefix *u-* in a productive way to encode translocative motion events. Manner-of-motion do not encode translocation motion when combined with a simple locative marker, as illustrated in (33a). This can be compared with example (33b), where a manner-of-motion verb combine with the motion prefix *u-* attached to the general preposition to encode translocative motion.

- (33) a. han ngalan kiukai ca uvava'az ma-la-lalia
 at beside church NOM children AV-RED-run
 'The children are running around beside the church'
- b. m-alalia ca uva'az m-un-can kiukai
 AV-run NOM child AV-MOT-at church
 'The child ran to the church'

In (33b), there are two verbal elements: The lexical manner-of-motion verb *malalia* 'run', and the derived path verb *muncan* 'go to'. This should thus be regarded as a multi-verbal clause. The ordering of these verbs is strict, with the manner-of-motion verb preceding the path verb. In clauses with two or more verbs, the first verbal element in the sequence is syntactically dominant, since it hosts the distinctive voice morphology of the clause, as well as imperative mood. These are two important criteria for identifying finite verbs in Takituduh Bunun (see examples (19) and (20) above, and examples below as well, illustrating this pattern). We return to this issue in the discussion and its implications for classifying Takituduh within motion typology.

Such multi-verb clauses are comprised of structurally higher vPs embedding structurally lower vPs. In the tree structures presented below, the different vPs are marked with subscript numbers to distinguish them. In these multi-verbal clauses, the same analysis of the motion prefix *u-* attached to the preposition as in clauses where it is the only verbal element. Thus, it spells out Path^0 and v^0 , while the locative preposition spells out Loc^0 . Since manner-of-motion verbs in Takituduh Bunun cannot encode translocative motion by themselves, they are proposed to be the overt realization of a root and a classifying head *v*. Both verbs (*malalia* and *muncan*) can function as independent dynamic verbal predicates, so it is necessary for both to independently lexicalize separate v^0 heads. The proposed analysis is illustrated in the tree structure in (34).

- (34) a. m-alalia ca uva'az m-un-can kiukai
 AV-run NOM child AV-MOT-at church
 'The child ran to the church'



It is also possible for a manner-of-motion verb to combine with a verbalized locative noun, illustrated in (35a) below, where the manner-of-motion verb ‘crawl’ is combined with the verbalized locative noun ‘go out’ and in (35b), where ‘jump’ is combined with ‘enter’. The compatibility of manner-of-motion verbs with verbalized locative nouns is particularly clear in example (35c) with the verb ‘dance’, which by itself does not encode any directedness meaning (cf. Folli & Ramchand 2005). The same analysis of the verbalized locative noun (34) can be applied here: The manner-of-motion verbs in (35) lexicalize a lexical root and a classifying head *v*, while Path⁰ and an additional classifying head *v* is spelled-out by the prefix *u-*.

- (35) a. *misna-can = cia lumaq kapakapa m-u-nata*
 from-at = 3s house AV.crawl AV-MOT-outside
 ‘S/he crawled out from the house.’
- b. *tidangkul = cia m-un-kumbu lumaq*
 AV.jump = 3s AV-MOT-inside house
 ‘S/he jumped into the house.’
- c. *iungi ca uva’az m-un-kumbu is lumaq*
 AV.dance NOM child AV-MOT-inside house
 ‘The child danced into the house.’

There are no overt markers of subordination present in these structures. Furthermore, such clauses share TAM-values, illustrated by the imperative mood marker in (36) below. When being the sole verb of a clause, it is possible for the Path verb to host the imperative suffix *-a*, as seen in (36a). However, in serial verb constructions with a path and a manner-of-motion verb, as in (36a) the imperative mood is only overtly marked on the leftmost verb, illustrating a syntactic hierarchy between the two verbs, while subsequent verbs lack any overt mood markers.

- (36) a. *m-un-can-a kiukai*
 AV-MOT-at-IMP.AV church
 ‘Go to church!’
- b. *tan’anak-a m-un-can kiukai*
 go-IMP.AV AV-MOT-at church
 ‘Walk to church!’

The structure also differs from subordinate modifier clauses, marked with *maca* and *a*, illustrated in (37). In this example, Path and Region are encoded in the subordinate ‘while’ clause, while the manner-of-motion verb is the sole verb of the main clause.

- (37) maca m-un-can kiukai = a, m-alalia ca uva'az
 SUB AV-MOT-at church = SUB, AV-run NOM child
 'While going to church, the child ran.'

In light of the framework developed by Folli & Harley (2020), this is an unexpected pattern since they consider V-framing to be characterized by obligatory Path-to-*v*-movement, which prevents *v* from licensing a Manner root in its specifier functioning as a modifier. As such, languages with obligatory Path-to-*v*-movement, as we argue is the case for Takituduh Bunun, should not exhibit satellite-framed structures. However, the Takituduh Bunun data do not directly contradict any of the predictions made by their framework. In our analysis, Path is concatenated with and licensed by v_1 while the manner root is concatenated and licensed by v_2 . As such, the data presented here do not contradict the predictions made by Folli & Harley (2020). However, it does show that obligatory concatenation of *v* and Path is possible for satellite-framed languages, provided that they are serializing languages, and that this cannot be the sole distinguishing feature between S-framed and V-framed languages.

Several criteria have been discussed for identifying verbs in Takituduh Bunun, including voice morphology and imperative mood. The morphologically complex verbs derived via *u-* exhibit both of these properties (examples (14) and (36a) show that they can host imperative mood, and in all mono-verbal examples with *u-* it hosts the distinctive voice morphology). As such, there are good reasons to believe that the morphologically complex words derived via the motion prefix *u-* are verbs. However, in multi-verbal clauses, neither of these diagnostics apply, since the clause-initial manner-of-motion verb would host both of these. This pattern is especially clear for the Patient Voice clauses discussed in 3.1, examples (19) and (20). Here, the distinctive voice morphology of the clause is clearly Patient Voice, as nominative argument is a Theme, not an external causer argument, as it would have been had they been AV clauses. As such, the voice morphology on the verb derived via *u-* is not distinctive voice morphology of the clause, but rather reflects a default value when no other voice form is assigned (Chang 2017). Multi-verbal clauses in Takituduh Bunun do not exhibit agreement or concord with the voice value. The fact that it is obligatory to mark all morphologically complex words derived via the motion prefix *u-* with a Voice value, either the distinctive voice morphology of the clause or the default Actor Voice, just like with lexical verbs (Bogren Svensson 2023), can be taken as a strong indication of their verbal status. We therefore conclude that the structures discussed here should be analyzed as containing multiple *v*Ps, and that our conclusions regarding the short-comings of previous frameworks remain valid.

3.4 Causation, Manner-of-motion and the motion prefix *u-*

Caused translocative motion in clauses with manner-of-motion verbs in Takituduh Bunun can also be encoded with the help of a causative prefix. Two examples of causativized manner-of-motion translocative motion clauses are given below, one with a verbalized preposition (38a), one with a verbalized locative noun (38b). The distinctive voice morphology of the clause (Patient Voice in both examples) is hosted by the manner-of-motion verb, which is the left-most verb in the linear order and the hierarchically dominant verb. The motion verb is in Actor Voice, even though it is an Patient Voice clause. Actor Voice here can thus be characterized as a “default voice”⁸ (cf. Chang 2017; Wu et al. 2023). The causative is hosted by the manner-of-motion verb. As in their non-caused counterparts, the ordering of the verbs is strict, with the manner-of-motion verb obligatorily preceding the morphologically complex path verb. Since both clauses are in the Patient Voice, the Figure marked with the nominative case marker *ca*, and the Causer is optionally marked by the oblique case *is* for full nouns, or in the agent case form for pronouns.

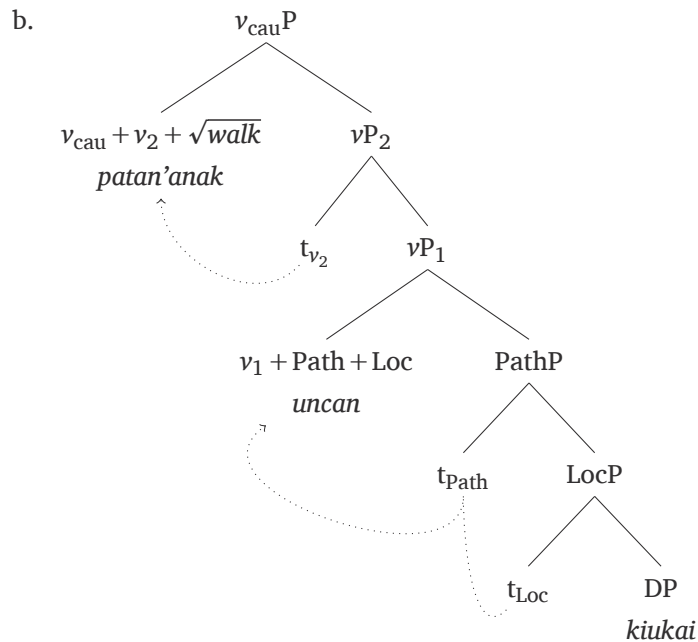
- (38) a. pa-tan'anak-un=s sinisi ca uva'az m-un-can kiukai
 CAU-walk-PV=OBL teacher NOM child AV-MOT-at church
 ‘Teacher made the child walk to church’
- b. pa-tidangkul-un=ku ca uva'az m-u-nata
 CAU-jump-PV=1s.AGT NOM child AV-MOT-outside
 ‘I made the child jump out’

The same analysis outlined in previous subsections can be applied to these examples. The manner-of-motion verb lexicalizes the hierarchically higher v^0 , while the motion prefix lexicalizes the hierarchically lower v^0 and the Path^0 , and encodes translocative motion. Thus, there are two vP in the clause since both the morphologically derived path verbs and the manner-of-motion verbs can function as independent predicates. This kind of structure is possible if the two v^0 are spelled-out by different constituents, as in the non-caused examples discussed in subsection 3.3 above. The v_{cau} , which is spelled-out by the causative, takes the entire multiverbal structure as its complement. This yields the correct scope and semantic interpretation, since the Figure (‘child’ in both examples) is caused to carry out both eventualities denoted by the verbs (both ‘walk’ and ‘go to church’, both ‘jump’ and ‘go out’, respectively). The tree structure below provides an illustration of the clause structure. The only difference between the multiverbal clauses discussed above is that a v_{cau} is added to the structure, above the structurally higher vP . This prevents the causative prefix from being realized on

⁸ A relevant question is then how the Actor Voice on the Path verb is introduced. One implementation is that Actor Voice is inserted under an Elsewhere Realization when C/T (in the framework here) is not available to provide the relevant features (see Wu et al. 2023 for an implementation of this idea).

the subordinate verb. The clause structure is illustrated in (39), with the example reproduced from (38a) above).

- (39) a. pa-tan'anak-un=s sinisi ca uva'az m-un-can kiukai
 CAU-walk-PV=OBL teacher NOM child AV-MOT-at church
 'Teacher made the child walk to church'



Example (38b) can be analyzed in the same way, as illustrated in (39), with the key difference between the two being that the Locative head is empty in such clauses, triggering movement of the (locative) nominal instead (as illustrated in (23) and (29) for non-caused and caused motion, respectively). As discussed for these examples, this is a necessary postulation because the motion prefix *u-* can alternate between being hosted by a preposition and a nominal.

4 Broader implications

We have shown that the motion prefix *u-* can combine with both nominal and locative stems to form a morphologically complex stems that encode translocative motion, either independently or in combination with manner-of-motion verbs. Our analysis of these patterns has considerable implications for different aspects of the already established motion typology, which we discuss in turn below.

4.1 Implications for the framing typology

Clauses containing both a manner-of-motion verb and a morphologically complex path verb can be understood as a kind of serial verb construction. Even though there are multiple verbs within

a single clause, the two verbs are hierarchically ordered, with the manner-of-motion verb being syntactically dominant. When these two types of verbs combine, the manner-of-motion verb will host i) Imperative morphology, ii) Causative morphology and iii) the distinctive voice morphology of the clause⁹. Taken together, these features provide solid evidence that these structures are hierarchically ordered.

Regarding imperative voice morphology, it can be hosted by the stem derived via *u-*, but it must be hosted by the Manner-of-Motion verb if one is present in the structure, as illustrated in the examples below, reproduced from (14).

- (40) a. m-un-can-a kiukai
 AV-MOT-at-IMP.AV church
 'Go to church!'
- b. tan'anak-a m-un-can kiukai
 GO-IMP.AV AV-MOT-at church
 'Walk to church!'

Just like the imperative voice suffix, the causative prefix can be hosted by the stem derived via *u-*, but it must be hosted by the manner-of-motion verb if one is present in the structure. Moreover, since the nominative argument (i.e. the clause pivot) is the theme argument and not the agent, it is possible to determine that Patient Voice is the distinctive voice morphology of the clause hosted by the manner-of-motion verb, reproduced from (38) above.

- (41) a. pa-tan'anak-un=s sinsi ca uva'az m-un-can kiukai
 CAU-walk-PV=OBL teacher NOM child AV-MOT-at church
 'Teacher made the child walk to church'

One proposal for dealing with serial verb constructions has been to extend to a tertiary typology for constructions where individual verbs have equal syntactic status, so-called "equipollently-framed languages"¹⁰ (Slobin 2004; Zlatev & Yangklang 2004). This proposed type has been exemplified with languages like Thai and Ewe that express motion events in serial verb constructions without any overt working marking of syntactic hierarchy. Together with the fact that all motion verbs can independently function as the sole verb of a clause, it has proven difficult to locate main verb status to one of the verbs, which, as we have argued, differs from serializing

⁹ Causative morphology is only visible in causative (and therefore transitive) clauses, and it is only possible to determine which verb hosts the distinctive voice morphology of the clause in non-Actor Voice clauses, since Actor Voice is the default form of the verb.

¹⁰ Note that equipollently-framed languages should not be equated with serializing languages, since the term was originally proposed to include other types as well.

constructions in Takituduh Bunun. This is shown in (42) and (43) with serial verb constructions containing three independent motion verbs (Thai) and two verbs (Ewe).

- (42) Prawat doen khâw pai hông
 Prawat run enter go room
 ‘Prawat ran into the room’. *Thai*
- (43) Akwadaa no tu-u mirika kɔɔ dan no mu
 child DEF move-PST course go-PST room DEF containing.region
 ‘The child ran into the room’. *Ewe* (Ameka & Essegbey 2013)

However, Talmy (2016) argues that languages utilizing serial verb constructions for encoding motion events should not necessarily be classified as equipollently-framed, since criteria based on semantics, morphology, syntax and phonology can be used to identify a main verb even in serial verb constructions. Hopperdietzel (2022) follows a similar line of argumentation, arguing that resultative serial verb constructions can be both Verb-framed and Satellite-framed, depending on the language. The arguments used here to establish that the manner-of-motion verb was morphosyntactically dominant verb fall in line with the morphological criteria outlined by Talmy (2016) for identifying main verb status in serial verb constructions. However, in the constructivist framework adopted here, the morphological properties used to determine main verb status are also indicative of a syntactic hierarchy. We thus side with Talmy (2016) and Hopperdietzel (2022) in arguing that having serial verb constructions (in the sense of multiple verbalizations in a single clause) in translocative motion events does not necessarily entail that the structures are equipollently-framed. However, whether or not equipollently-framed languages can be dispensed with entirely remains an open question, and we only argue that having multiple verbalizations within a single clause (as was shown for Takituduh Bunun) does not necessarily imply that the structure is equipollently-framed.

4.2 Implications for formal approaches

A central claim in this study is that if a language has more than one available verbalizing head within a single clause, there are no inherent obstacles to verbalizing Manner, Path and Motion within the same clause. This presents challenges to previous formal accounts as their constraint (Folli & Harley (2020) treating V-framed as the marked counterpart, Acedo-Matellán & Kwapiszewski (2024) treating S-framed as the marked counterpart) are centered around preventing all three categories from being lexicalized via a single simplex verb. As such, there still are strong constraints against lexicalizing path, manner and motion within the same verb, the same constraints cannot be used to derive the S-/V-framed dichotomy within a serializing languages as Takituduh Bunun.

Within this binary typology, Takituduh Bunun exhibits both V-framed and S-framed structures. The former are the structures where the morphologically complex verb derived via the prefix *u-* is the sole verb of the clause, and the latter are clauses that contain the verb derived via *u-* in addition to a manner-of-motion verb. In line with the argumentation of Acedo-Matellán & Kwapiszewski (2024), the structures in Takituduh Bunun represents an additional way in which the seemingly more marked S-framed structures can be licensed. In the framework developed by Acedo-Matellán & Kwapiszewski (2024), S-framed structures require additional feature specification (using the labels @ and *w*, and the label *w* for Strong and Weak S-framed languages, respectively), and in Takituduh Bunun the S-framed structures require an additional verbalizing head. As such, the S-framed structures in both serializing and non-serializing languages appear to be the more marked alternative, since both need additional specification, verbalization of the Path element in the former, and additional feature specification in the latter, both necessary for the independent realization of the Path element.

If the V-framed/S-framed distinction ultimately reflects a morphological constraint (limiting how many semantic categories can be lexicalized in a single verb) why should this binary apply to languages with serialization? In Takituduh Bunun, S-framing results from structural hierarchy rather than lexical restrictions, suggesting that the typology may not be uniform across language types. While our findings align with the idea that lexicalization constraints shape framing patterns, they also highlight gaps in current theories, namely the need to also develop constraints for languages that distribute semantic categories across multiple verbs. More generally, the findings suggest that the S-/V-contrast may mask a deeper heterogeneity in how languages partition motion semantics across lexical and functional material with distinct morphological, syntactic, and lexical configurations across languages. Addressing this will require comparative work on other serializing languages.

Abbreviations

1: First Person, 2: Second Person, 3: Third Person, AGT: Agent AUX: Auxiliary, AV: Actor Voice, CAU: Causative DEF: Definite, INCH: Inchoative IMP: Imperative, LV: Locative Voice MOT: Motion NOM: Nominative, OBL: Oblique, PCTC: Participle, PN: Personal Name, PREP: Preposition, PRF: Perfect Aspect PRT: Particle, PST: Past Tense, PV: Patient Voice RED: Reduplication, s: Singular, SUB: Subordinator.

Ethics and consent

An application for an ethical review was submitted to the Swedish Ethical Review Authority in 2022 before any data was collected. Swedish Ethical Review Authority determined that no ethical review was necessary for this project since no invasive research methods were used and since no sensitive personal data would be collected from the participants.

Funding information

The fieldwork was partially funded by the Center for Chinese Studies, National Library, Taipei via the Research Grant for Foreign Scholars in Chinese Studies 2022.

Competing interests

The authors have no competing interests to declare.

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