

# **Noun Incorporation, Doubling, and Predicate Restriction: The Case of Budai Rukai\***

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This paper examines a type of noun incorporation and its related patterns of doubling in Budai Rukai (Austronesian, Taiwan). An incorporated nominal root is indefinite and forms a close morphological bond with the incorporating verb. The nominal root modifies the predicate semantically and does not act as a direct object. The resulting forms describe various activities and exhibit properties of (in)transitivity and (a)telicity. Noun incorporation of such is formed by an array of verbal prefixes and nominal roots, while doubling is limited to a handful of complex verbs.

Key words: noun incorporation, doubling, predicate restriction, saturation, Austronesian language

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## 1. Introduction

In Budai Rukai (henceforth Rukai), a predicate of a sentence can be expressed by a stand-alone verb, as in (1a), or by a complex verb, as in (1b). The complex verb is formed by two components which exhibit a close morphological bond, one verbal and the other nominal, and as a whole displays typical properties of noun incorporation (NI). Notably, the verb cannot appear independently or host inflectional morphemes on its own, as shown in (1c). Verbs as such are affixes, and they do not have independent counterparts in Rukai.

- (1) a. wa-dreele=aku                      ku              daane.  
       NFUT-see=1.S.NOM              ACC              house<sup>1</sup>  
       ‘I saw the house.’
- b. tu-a-daane=aku.  
       make-NFUT-house=1.S.NOM  
       ‘I built a house/houses.’
- c. \*tu-a=aku                      ku              daane.  
       make-NFUT-1.S.NOM              ACC              house  
       (Intended) ‘I built a/the house.’

The type of verb formation exemplified by (1) is different from that of (2), in which a nominal root undergoes zero formation and functions as a verb without an overt verbalizer. Consider (2a-b), where *vai* ‘sun’ appears in a determiner phrase (DP) in (a), and as a denominal verb in (b).<sup>2</sup>

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<sup>1</sup> The abbreviations used in Budai Rukai glosses are: 1, first person; 2, second person; ACC, accusative; ART, article; COMP, complementizer; DEM, demonstrative; FUT, future; GEN, genitive; IMPFV, imperfective; MOD, modality; NEG, negation; NFUT, nonfuture; NOM, nominative; OBL, oblique; PASS, passive; PFV, perfective; PN, proper noun; PROG, progressive; RED, reduplication; REFLX, reflexive; S, singular.

<sup>2</sup> See Appendix A for more discussion of Rukai denominal verbs.

- (2) a. wa-dreele=aku                      ku            vai.  
           NFUT-see=1S.NOM                ACC        sun  
           ‘I see the sun.’
- b. wa-vai                                kay            kameane.  
           NFUT-sun                            DEM        today  
           ‘The sun shines today.’

A traditional view towards NI maintains a requirement regarding morphological independency, such that an incorporating verb and its associated incorporated noun, termed the *incorporee* (following Chung and Ladusaw 2020; see also Baker 1996; Wiltschko 2009), should be able to appear on their own, respectively. The criterion of morphological independency is used by Sapir (1911) to exclude certain derived verbs from being considered as instances of NI, such as *qani-ntcu-* ‘to build a house’ in Paiute (Uto-Aztecan). The reason is that since *-ntcu-* is a verb-forming affix and is thus similar to English *-ize* (as in *materialize*), the noun *qani-* ‘house’ is not incorporated (p. 254). Under this approach, NI is a morphological operation of independent forms (Johns 2017), which excludes constructions formed by verbal affixes (see also Mithun 1984; Mithun 1986; cf. Gerdtts 1998; Mithun 2009), and which is similar to compounding or cliticization (Massam 2017). This traditional view about NI would exclude an example like (1b).

In the typology of Mithun (1984), NI involves morphosyntactic phenomena such as transitivity and doubling, and it comes in four types: (i) Type I NI forms a complex lexical item, of which the derivation involves a reduction process of valence, from transitive predicates to intransitive ones; (ii) Type II NI involves advancement of oblique arguments to the direct object or subject positions; (iii) Type III NI appears in typical polysynthetic languages, in which the IN is used to background known or incidental information; and (iv) Type IV NI is classificatory, about which complex verbs can be accompanied by a separate nominal element which specifies the argument implied by the *incorporee*.

Examples (3)-(6) illustrate the four types of NI: In (3), the verb *tausi* ‘care’ can appear independently or be used as an incorporating verb; in (4), the oblique argument *in-kool* functions as a direct object of the resulting complex verb, which bears transitive marking in (b); in (5), the incorporated noun *-naka-* in (b) is interpreted as old information, as opposed to its independent counterpart in (a), which conveys a new entity; and in (6), the incorporated noun *-’ič’á-* has a broader meaning than its typical one, such that instead of meaning ‘eye’, it functions as a classifier for objects which are small and round, such as *kassi* ‘bead’.

(3) Type I: Samoan (Mithun 1984: 850)

- a. Po      ’o      āfea      e      tausi      ai      e      ia      tama?  
       Q      PRED    when    TNS    care    PRO    ERG    he    child  
       ‘When does he take care of children?’
- b. Po      ’o      āfea      e      tausi-tama    ai      ‘oia?  
       Q      PRED    when    TNS    care                PRO    ABS.he  
       ‘When does he baby-sit?’

(4) Type II: Yucatec Mayan (Mithun 1984: 858)

- a. k-in-č’ak-ø-k                      če’      ičil      in-kool.  
       INCOMP-I-chop-it-IMPF    tree    in      my-cornfield  
       ‘I chop the tree in my cornfield.’
- b. k-in-č’ak-če’-t-ik                      in-kool.  
       INCOMP-I-chop-tree-TR-impf    my-cornfield  
       ‘I clear my cornfield.’

(5) Type III: Huastla Náhuatl (Mithun 1984: 860-861)

- a. askeman              ti-’-kwa              nakatl.  
       never              you-it-eat            meat  
       ‘You never eat meat.’

- b. na' ipanima ni-naka-kwa.  
 I always I-meat-eat  
 'I eat it (meat) all the time.'

(6) Type IV: Caddo (Mithun 1984: 865)

- kassi' háh-'ič'á-sswí'-sa'.  
 bead PROG-eye-string-PROG  
 'She is stringing beads.'

In the case of Rukai, an example like (1b) indicates a close morphological bond between the verb and its associated noun, which strongly suggests a sort of NI in this language. Furthermore, incorporated nouns do not denote definite entities, and they can be doubled by independent nominal phrases. With these two properties, Rukai would be categorized as a Type III or IV language based on Mithun's typology. However, Rukai fits uneasily in this typology in one respect; whereas all incorporated nouns can be used independently, Rukai incorporating verbs are generally realized as affixes.

The requirement of an incorporating verb also functioning as an independent word has been under debate in the literature. See Johns (2017) and Chung and Ladusaw (2020) for an overview. Recent literature has considered NI to encompass constructions of various nature, and the focus has shifted away from emphasizing the morphological nature of NI (Massam 2009). For instance, Johns (2017) defines NI as constructions "where a bare or reduced nominal displays a close linear linguistic relation with a verb, through either morphology or strict adjacency, and where the head of this unit is clearly verbal in its distribution or marking." In this view, NI is not necessarily formed by independent verbs (see also Chung and Ladusaw 2020; Johns 2007; Massam 2009; Massam 2017; Mathieu 2013; among others; cf. Rosen 1989; Sadock 1980; Sadock 1986; Van Geenhoven 1998). Also, Chung and Ladusaw (2020) gives an overview of the properties of closeness and smallness, which are typical of NI, and focuses on

the connection between the morphosyntax and semantics-pragmatics of NI. The incorporee lacks syntactic-semantic independence and varies in size (at least a noun, but smaller than a DP), whose semantic effect on the interpretation of NI boils down to predicate restriction, which refers to a semantic operation local to the resulting complex such that an argument parameter of the predicate is related to nominal content (see also Chung and Ladusaw 2004). It is also noted that the availability of referentiality regarding an incorporee at the discourse level can vary across languages.

To account for various patterns which are usually attributed to typical NI, including morphological closeness and classificatory patterns, this paper builds on the more recent view and considers Rukai an NI language, noting that the Rukai verbs in discussion are only realized as affixes. The present paper aims to examine the morpho-syntactic and semantic properties associated with examples like (1b). It is argued that the incorporated nominal root involved in the process semantically modifies the predicate but does not function as a direct object. In a general pattern, an indefinite root incorporates and forms a close morphological bond with a verbal prefix. Descriptively speaking, complex verbs resulting from the process form predicates which describe a variety of activities (see Mithun 1984 for more discussion). Similar patterns can be found in other Rukai dialects and other Formosan languages. The resulting complex verbs can appear in intransitive or transitive constructions, which exhibit distinct properties in terms of transitivity and telicity. An incorporated root is doubled by an accusative-marked nominal phrase in a transitive sentence, which conveys a telic event, whereas an intransitive sentence is atelic and lacks an internal argument. Building on Chung and Ladusaw (2004), it is argued that the incorporated root semantically restricts the predicate and does not saturate the argument properties of the predicate, whereas the independent nominal phrase in constructions of doubling is a direct object, which saturates the argument properties of the predicate.

The remainder of this paper is organized as follows: Section 2 provides an overview of Rukai NI construction. Section 3 characterizes some general patterns

of doubling. Section 4 discusses general properties of Rukai NI and doubling, focusing on (in)transitivity and (a)telicity. Section 5 provides a semantic and syntactic account for Rukai NI and doubling within the framework of Chung and Ladusaw (2004). Section 6 concludes this paper. Appendix A provides a brief description of denominal verbs, and Appendix B gives a brief discussion of the marking pattern of the progressive aspect in NI constructions.

## 2. Noun Incorporation

Among the recent surveys, Johns (2017) identifies three properties of NI: (i) The morphological form of an incorporated nominal is bare or reduced; (ii) there is a linear relation between the nominal and the verb; and (iii) the resulting complex has verbal characteristics. Under the approach, not only an incorporating verb can be an affix (see also Chung and Ladusaw 2020), but also NI in effect encompasses standard NI, obligatory noun incorporation (also termed denominal verbs; see Gerdtz 1998; Gerdtz and Marlett 2008), and pseudo noun incorporation (see Massam 2001).<sup>3</sup> This section provides an overview of the morphological properties of Rukai complex verbs and describe NI patterns based on categories of activities.

### 2.1 General marking patterns of complex verbs in Budai Rukai

Rukai is a verb-initial language. In addition to that the incorporating verb and the incorporee cannot be separated, as in (1c), thus conforming to the typical property of linear adjacency, the resulting complex verb mirrors the surface word order of VO, since the two components cannot swap positions, as shown in (7).

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<sup>3</sup> According to Massam (2001), Niuean has three types of pseudo noun incorporation (PNI): general PNI, existential PNI, and instrumental PNI. PNI involves a phrasal element (NP), not an X<sup>0</sup> element (N<sup>0</sup>), and is not considered as NI in the normal sense.

- (7) a. tu-a-daane                      ka      Ripunu.  
       make-NFUT-house    NOM    PN  
       ‘Ripunu built a house/houses.’  
       b. \*daane-a-tu                  ka      Ripunu.  
       house-NFUT-make    NOM    PN

### 2.1.1 Morphological integrity and separability

Morphological closeness can be seen with respect to the marking of grammatical aspect. In Rukai, the progressive aspect (*-nga*) and imperfective aspect (*-ana*) are realized as verbal suffixes (see Chen 2008). They can only follow the incorporee, as in (8a-b), and cannot intervene between the two components, as in (8c).

- (8) a. tu-a-ngadra-nga                  kay      urasi.  
       make-NFUT-tuber-PFV      DEM    sweet potato  
       ‘The sweet potatoes have produced tubers.’  
       b. tu-a-ngadra-ana                  kay      urasi.  
       make-NFUT-tuber-IMPFV    DEM    sweet potato  
       ‘The sweet potatoes are still producing tubers.’  
       c. \*tu-a-nga-ngadra                  kay      urasi.  
       make-NFUT-PFV-tuber      DEM    sweet potato

The marking of nonfuture tense, however, indicates that the incorporating verb and the incorporee remain two separate components, since it is realized as an infix. As a comparison, nonfuture tense is marked as a prefix on non-incorporating verbs, such as *wa-dreele* ‘NFUT-see’ in (1) and (2), and *wa-senay* ‘NFUT-sing’ in (9).

Furthermore, Rukai nominative pronouns are attached to the main verb as enclitics in an affirmative sentence, and to the negative form in a negative sentence; contrast (9a) and (9b). When the verb is inflected for grammatical



aspect, the pronoun appears at the end of the inflected form; contrast (9a) and (9c).

- (9) a. wa-senay=aku            ku    senay    ki            Ngudradrekai.  
           NFUT-sing-1.S.NOM    ACC   song    GEN        Rukai  
           ‘I sang a Rukai song.’
- b. kai=su                wa-senay    ku    senay    ki    Ngudradrekai.  
           NEG=2.S.NOM    NFUT-sing    ACC   song    GEN   Rukai  
           ‘You didn’t sing a/the Rukai song.’
- c. wa-senay-nga=ku            ku    senay    ki    Ngudradrekai.  
           NFUT-sing-PFV-1.S.NOM    ACC   song    GEN   Rukai  
           ‘I have sung/finished singing a Rukai song.’

A complex verb maintains its morphological integrity with respect to the marking of pronominal enclitics. The pronoun is attached to the complex verb in the affirmative (10a), and to the sentence-initial negative particle in the negative (10b). As shown in (11), a pronoun does not appear between the verb and its incorporee.

- (10) a. tu-a-daane=aku.  
           make-NFUT-house-1S.NOM  
           ‘I built a house/houses.’
- b. kai=naku            tu-a-daane.  
           NEG-1S.NOM    make-NFUT-house  
           ‘I didn’t build a house.’
- (11) a. \*tu-a=ku-daane.  
           make-NFUT-1S.NOM-house  
           (Intended: I built a house/houses.)

- b. \*kai tu-a=ku-daane.  
 NEG make-NFUT-1S.NOM-house  
 (Intended: I did not build a house.)

The schema in (12) illustrates the inflected form of a Rukai complex verb in nonfuture tense. The incorporee is written as  $\sqrt{\text{root}}$ .

- (12) V-T(ense)<sub>NONFUT</sub>- $\sqrt{\text{root}}$ -Asp(ect)<sub>PFV/IMPV</sub>-Pronoun<sub>NOM</sub>

### 2.1.2 The progressive aspect

The progressive aspect is unique in terms of its marking pattern on complex verbs. It identifies an event as one which unfolds or takes place at the speech time, and is marked via morphological reduplication (Chen 2008). What appears interesting in NI constructions like (13a) and (13b) is, the spell-out of the progressive neither targets the entire complex verb nor the incorporating verb, but only has an effect on the incorporee. The incorporee *daane* undergoes partial reduplication, whereby the reduplicant copies the initial CV syllable from the stem (see Chen 2006). If the complex verb was one single unit at the word level, then the reduplicant should copy the initial CV, CVV, or CVCV syllable(s) of the complex verb, and produce a form out of these possibilities: *\*tu~tudaane*, *\*tua~tudaane*, or *\*tuda~tudaane*, which is evidently not the case. This is taken to indicate that the incorporating verb and the incorporee are morpho-phonologically close but not fused. The marking of the progressive aspect is sensitive to the V-N boundary at spell-out, just like nonfuture tense. See Appendix B for more details about NI and the progressive aspect.

- (13) a. tu-a-da~daane ka Retage.  
 make-NFUT-RED~house NOM PN  
 ‘Retage is/was building a house/houses.’

- b. la      tu-da~daane      ka      Retage.  
 COMP make-RED~house NOM PN  
 ‘And then Retage was building a house/houses.’

## 2.2 NI based on categories in Budai Rukai

Rukai complex verbs are formed by an array of verbal prefixes, among which some are semantically vague, while others are relatively predictable. The resulting verbs describe a variety of activities. The following description of Rukai NI is roughly based on these categories: (i) natural element, (ii) plants, (iii) agriculture and culinary, (iv) clothing, flower-wearing, and name-bearing, (v) music, (vi) tool implementation, and (vii) construction, hunting, and procreation.

### 2.2.1 Natural elements

Nominal roots which denote natural elements are frequently seen incorporated with the verb of creation/process *tu-*. This results in complex verbs whose meanings may not be compositional and show idiosyncrasies. The semantic relation between the verb and the incorporee varies, but the incorporee usually corresponds to an internal argument or an object. In (14a), the incorporee *adreme* ‘iron’ conveys an instrument which applies to an object, so as to sharpen that object. In (14b), *angatu* ‘wood’ expresses the purpose of the direct object being used as firewood. In (14e), *lrenege* ‘stone’ indicates that the process in discussion involves stones or stone slates. Only (14c) and (14d) involve some object which is created or produced (*acilay* ‘water; sap’ and *apwi* ‘fire’).

- (14) a. *adreme* ‘iron’ → *tu-√adreme* ‘to hone (something)’  
 b. *angatu* ‘wood’ → *tu-√angatu* ‘to use (something) as firewood’  
 c. *acilay* ‘water’ → *tu-√acilay* ‘to produce sap’  
 d. *apwi* ‘fire’ → *tu-√apwi* ‘to start fire’  
 e. *lrenege* ‘stone’ → *tu-√lrenege* ‘to extract stone slates’

A nominal element appears in its bare form when incorporated, which can be contrasted with its use as an argument in a sentence. As shown in (15a), *apwi* ‘fire’ is an internal argument of the verb and must be marked by a determiner, either an article (i.e., the accusative *ku*) or a demonstrative (e.g., the definite / deictic *kay*). When incorporated, *apwi* appears in its bare form, as in (15b), and cannot be accompanied by a determiner, as in (15c-d).

- (15) a. wa-dreele    ku/kay    apwi    ka    Rangeau.  
          NFUT-see    ACC/DEM   fire    NOM   PN  
          ‘Rangeau saw the/that fire.’
- b. Iri-tu-apwi    ka    Kuliusu.  
          FUT-make-fire   NOM    PN  
          ‘Kuliusu will start a fire.’
- c. \*Iri-tu-ku-apwi    ka    Kuliusu.  
          FUT-make-ACC-fire   NOM   PN
- d. \*Iri-tu-kay-apwi    ka    Kuliusu.  
          FUT-make-DEM-fire   NOM   PN

### 2.2.2 Plants

Plant-related roots incorporate with various verbs, such as *ki-*, *si-*, and *tu-*, in addition to the causative of manner *pu-*. As shown in (16) and (17), *ki-* involves an action of obtainment in some way, while *si-* conveys an action of carrying, especially on the back, or wearing.

- (16) angatu ‘wood; tree’
- a. ki-√angatu    ‘to chop wood’
- b. pu-√angatu    ‘to add firewood’
- c. si-√angatu    ‘to carry wood on the back’
- d. tu-√angatu    ‘to use (something) as firewood’ (= (14b))

- (17) bengelray ‘flower’  
 a. ki-√bengelray ‘to pick/pluck/gather flowers’  
 b. si-√bengelray ‘to wear flowers (as a headdress)’

Idiosyncrasies arise with respect to how an event conveyed by the complex verb is interpreted. For instance, example (18b) conveys a meaning similar to (18a), but unlike *calrigi*, *ki-* is underspecified for a precise way of action. In (18c), the event associated with the complex verb is obtaining flowers, which may involve picking, collecting, or plucking.

- (18) a. wa-calrigi                      ku                      angatu      ka                      Retage.  
           NFUT-chop/fell      ACC                      tree                      NOM                      PN  
           ‘Retage chopped down the tree.’
- b. ki-a-angatu    ka                      Retage.  
           obtain-NFUT-wood    NOM                      PN  
           ‘Retage chopped trees.’
- c. ki-a-bengelray    ka                      Kalazupu.  
           obtain-NFUT-flower    NOM                      PN  
           ‘Kalazupu picked flowers.’

### 2.2.3 Agriculture and culinary

Roots related to agriculture and culinary appear with general verbal prefixes like *tu-* and *ki-*. Additionally, they also incorporate with *paw-*, which can mean to grow, plant, sow, or propagate. Examples are given in (19) and (20).

- (19) a. *berathe* ‘grain’ → *tu-√berathe* ‘to grind grains’  
 b. *cubu* ‘husk’ → *tu-√cubu* ‘to produce/contain husk’  
 c. *ngadra* ‘bulb; tuber’ → *tu-√ngadra* ‘to produce a bulb’

- (20) a. lacenge ‘greens’ → (i) ki-√lacenge ‘to pick/gather/collect vegetables’  
→ (ii) paw-lacenge ‘to plant leafy vegetables’
- b. lapanay ‘corn’ → (i) ki-√lapanay ‘to harvest corns’  
(ii) paw-√lapanay ‘to plant corns’
- c. urasi ‘sweet potato’ → (i) ki-√urasi ‘to dig up/gather sweet potatoes’  
(ii) paw-√urasi ‘to plant sweet potatoes’

When incorporating food-related nominal roots, *tu-* conveys either production or process, as shown in (21).

- (21) a. abay ‘millet cake’ → tu-√abay ‘to make millet cakes’  
 b. damay ‘vegetable’ → tu-√damay ‘to cook vegetables’  
 c. lrubu ‘porridge’ → tu-√lrubu ‘to make porridge’

#### 2.2.4 Clothing, flower-wearing, and name-bearing

The root *laymay* ‘clothing; dress’ incorporates with the verb of creation *tu-* and the verb of wearing/bearing *si-*, as in (22a-b).

- (22) a. tu-a-laymay                      ka      Kalazupu.  
make-NFUT-clothing    NOM   PN  
'Kalazupu makes clothes.'
- b. si-a-laymay                      ka      Retage.  
wear-NFUT-clothing    NOM   PN  
'Retage wears clothes.'

*Si-* also incorporates plant-related roots, such as *bengelray* in (23), to express the meaning of wearing flowers as headdress; the verb incorporates the interrogative *aneane* ‘who’ and personal names to form questions and answers about identity,

as shown in (24a-b).

- (23) si-a-bengelray                      ka      Asiane.  
       wear-NFUT-flower                NOM   PN  
       ‘Asiane wears flowers (as a headdress).’

- (24) a. Q: si-a-aneane                ka      lrulay?  
       bear-NFUT-who        NOM   baby  
       ‘What is the baby’s name?’  
       b. A: si-a-Retage                ka      lrulay.  
       bear-NFUT-PN        NOM   baby  
       ‘The baby is called Retage.’

To express the removal of clothing, the incorporating verb *u-* is used, as shown in (25).

- (25) u-a-kipingi                      ka      Retage.  
       remove-NFUT-clothing        NOM   PN  
       ‘Retage took off clothes.’

### 2.2.5 Music

*Kulralru* is a kind of nose flute, which is a traditional Rukai musical instrument. This root incorporates with *ngi-* to describe an activity of playing a nose flute.<sup>4</sup> Examples (26a-c) show the use of the resulting complex verb and

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<sup>4</sup> The incorporating verb *ngi-* has the same form as the reflexive *ngi-*, which appears as a prefix when attached to a verb. Nonfuture tense is marked between the reflexive and the verb stem. Consider (i).

(i) ngi-a-lra~lrumay                ka      Retage.  
       REFLX-NFUT-RED~hit        NOM   PN  
       ‘Retage is hitting himself.’

its inflectional patterns with respect to tense and the first person pronominal enclitic *=(a)ku*.

- (26) a. *ngi-a-kulralru ka Retage.*  
           play-NFUT-nose flute NOM PN  
           ‘Retage plays the nose flute.’  
       b. *ngi-a-kulralru=aku.*  
           play-NFUT-nose flute-1S.NOM  
           ‘I play the nose flute.’  
       c. *\*ngi-a=ku-kulralru.*  
           play-NFUT-1.S.NOM-nose flute

The same root does not always incorporate. As can be seen in (27a), *kulralru* appears in an independent DP and does not incorporate with the verb *ngu* ‘bring’, but must do so with *ngi-*, as in (27b).

- (27) a. *ngu-a ku kulralru ka Retage.*  
           bring-NFUT ACC nose flute NOM PN  
           ‘Retage brought a nose flute.’  
       b. *\*ngi-a ku kulralru ka Retage.*  
           play-NFUT ACC nose flute NOM PN  
           (Intended) ‘Retage plays the nose flute.’

### 2.2.6 Tool implementation

Tool implementation can be expressed by *ara-* ‘use; with’. As shown in (28), *ara-* incorporates the bare root *alrima* ‘hand’, which appears in a DP when used as an argument.





- e. *tu-a-lalake*                      *ka*                      *Inagale*.<sup>5</sup>  
       make-NFUT-child        NOM            PN  
       ‘Inagale gave birth.’

On a related note, some independent verbs can be used to specify the meaning of creation or the way things are produced, such as *bekace* ‘create; make’ in (30), and *darepe* ‘make; fabricate; weave’ in (31a-b), both of which are not incorporating verbs.

- (30) *ku*    *Twaumase*    *sa*    *pathagili*    *bekace*  
       ART    God                      when    begin            create  
       *kay*    *subelebelenge* *si*            *kawmasane*.  
       DEM    sky                      and    earth  
       ‘In the beginning God created the heaven and the earth.’ (RB 2017, Gen. 1.1) (RB = Rukai Bible, by the Bible Society in Taiwan (2017))

- (31) a. *i-kay*    *ki*    *barange*    *ki*    *ina*    *wa-darepe=su nakwane*.  
       be-DEM OBL stomach        GEN    mother NFUT-make-2.S.NOM 1S.OBL  
       ‘In my mother’s stomach, you made me.’ (RB 2017, Ps. 139.13)  
       b. *wa-darepe*    *ku*    *karadrare*    *ka*    *Kalazupu*.  
       NFUT-make    ACC    basket            NOM    PN  
       ‘Kalazupu made a basket.’

The incorporating verb *tu-* is productive; it appears in various coined lexical items in the recent vocabulary project published by the Indigenous Languages Research and Development Center (ILRDC) (2019), as shown in (32a-b).

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<sup>5</sup> The nominal root *lalake* can be used for non-human offspring, as shown in (i).

(i) *tu-a-lalake*                      *ka*                      *beke*.  
       make-NFUT-offspring        NOM            pig  
       ‘The pig farrowed.’

- (32) a. ni-ara-vai-ane tu-dingki<sup>6</sup>  
 NI-use-sun-NMZmake-power  
 ‘solar power’  
 b. tu-a-pathagili<sup>7</sup>  
 do-NFUT-begin  
 ‘to start a business’

## 2.3 NI patterns in other Rukai dialects and Formosan languages

Similar NI patterns are attested in other Rukai dialects, as well as in some Formosan languages, including Amis, Bunun, Kanakanavu, Paiwan, Puyuma, Saisiyat, and Tsou.

### 2.3.1 Other Rukai dialects

As shown in Table 1, the verbs of making and wearing may be spelled out differently in some other Rukai dialects (cf. *tu-*; *te-*; *ti-*; *to-*, and *si-*; *se-*; *ŋi-*), but they all incorporate nominal elements and result in complex verbs comparable to those in Budai Rukai.

**Table 1. Verbs of *making* and *wearing* in Rukai dialects**

Dialects	<i>tu-</i> ; <i>te-</i> ; <i>ti-</i> ; <i>to-</i> ‘make’	<i>si-</i> ; <i>se-</i> ; <i>ŋi-</i> ‘wear’
Budai Rukai	a. <i>tu-lalake</i> ‘give birth’ b. <i>tu-daane</i> ‘build a house’	a. <i>si-laymay</i> or <i>si-kipingi</i> ‘wear clothes’ b. <i>si-Balenge</i> ‘named Balenge’
Taromak Rukai (Li 1973: 142, 19)	a. <i>tu-(a)-lalak</i> ‘had baby’ b. <i>tu-(a)-daan</i> ‘built a house’	a. <i>si-kiʔiŋ</i> ‘wear clothes’ b. <i>si-(a)-Ligiay</i> ‘named Ligiay’
Maga (Li 1997: 80-81)	a. <i>te-dani</i> ‘build a house’ b. <i>te-vlaki</i> ‘give birth’	<i>se-kpiŋi</i> ‘wear clothes’

<sup>6</sup> <http://ilrdc.tw/research/newwords/newword107.php> (Accessed Sep 11, 2020)

<sup>7</sup> <http://ilrdc.tw/research/newwords/newword108.php> (Accessed Sep 11, 2020)

Dialects	tu-; te-; ti-; to- ‘make’	si-; se-; ŋi- ‘wear’
Tona Rukai (Li 1997: 125-126)	ti-valakə ‘give birth’	si-kaavaθə ‘wear a headdress’
Mantauran (Zeitoun 2007)	a. to-alake ‘give birth’ b. to-dha’ane ‘build a house’	ŋi-kiپیŋi ‘wear clothes’

### 2.3.2 Amis

In Central Amis, the verbal prefix *ci* combines with *wawa* ‘child’ to form a verb which means to give birth. As indicated by the translations in both Jiang (2016) and Liu (2011), the incorporee is indefinite.

#### (33) Central Amis

- a. ci-wawa                      ci=panay. (Jiang 2016: 310)  
 AF.have-child    TOP.PSN=P.<sup>8</sup>  
 ‘Panay has {a child/children}.’
- b. caʔay ka-ŋalay                      cinra    Ø                      ciwawa.<sup>9</sup> (Liu 2011: 99)  
 NEG    KA.AT-want                      3S.T    LNK    AT.give.birth.to.a.baby  
 ‘She does not want to give birth to a baby.’

### 2.3.3 Bunun

In Takivatan Bunun, *ka-* is comparable to Rukai *tu-*, which forms complex verbs involving creation or construction, such as those in (34a-b). This morpheme is characterized as a classificatory prefix in De Busser (2009).

<sup>8</sup> The Central Amis abbreviations used in the two works are: AF, actor focus; TOP, topic; PSN, personal, in Jiang (2016); and AT, actor trigger; 3S, third person singular; T, trigger; LNK, linker, in Liu (2011).

<sup>9</sup> Some details are omitted for clarity.

(34) Takivatan Bunun (De Busser 2009: 344)

- a. kadan ‘construct a road’ < ka- + dan ‘road’
- b. kalumaq ‘build a house’ < ka- + lumaq ‘house’

Isbukun Bunun, another dialect of Bunun, has complex verbs in which different verbal prefixes are used to express house-making (i.e., *ka-* in (35a)) and giving birth (*tus-* in (35b)), as compared to one single form (*tu-*) used for both notions in Rukai.

(35) Isbukun Bunun (Li 1997: 308, 311)

- a. ka-lumah ‘build a house’
- b. tus-ʔuvað ‘give birth’

### 2.3.4 Kanakanavu

Kanakanavu uses *ka-* as a creation verb, and *ma-* as the verb of wearing, as shown in (36a-b).

(36) Kanakanavu (Ho 1997: 240)

- a. ka-(ta)-tanasa ‘build a house’
- b. ma-tikuru ‘wear clothes’

### 2.3.5 Paiwan

Northern Paiwan uses *pu-* to express the notion of giving birth. The verb is glossed as ‘have’ in Chang (2006), as shown in (37a-b).

(37) Northern Paiwan (Chang 2006: 431, 442)

- a. manu, pu-alak      tua      macidil      a      vavayan, [...].  
      INTEJ have.AV-child   OBL.CM   one.CLASF.C   LIN   female<sup>10</sup>

<sup>10</sup> The Paiwan abbreviations are: AV, actor voice; COM, completive aspect; CLASF.C, collocations of sortal classifiers and numerals; INTEJ, interjection; LIN, linker; OBL.CM, oblique case for common nouns.

‘Then, (they) gave birth to one daughter, [...]’

- b. [...] pu-alak=anga                      tua                      vavayan  
                  have.AV-child=COM      OBL.CM      female  
                  tua                      uʔalay      timadju.  
                  OBL.cm      male                      3SG.NOM  
                  ‘[...] she gave birth to daughters and sons.’

### 2.3.6 Puyuma

In Puyuma, the verb of having or bearing a child is formed by *mi-*, which is associated with a possessive or existential meaning (Teng 2008: 204). This same prefix appears in verbs which involving possession and wearing, as in (38a-c).

(38) Puyuma (Cauquelin 1991; Teng 2008)

- a. mi-wakak                      ‘to give birth’  
   b. mi-kiping                      ‘wear clothes; to dress’  
   c. mi-kataguin                      ‘to have a spouse; to be married’

### 2.3.7 Saisiyat

The notion of house-building in Saisiyat is expressed by a verbal form in which the nominal root *taew’an* ‘house’ seems to undergo denominalization or conversion, not because of any overt verbalizer, but due to voice marking, specifically the actor voice (See Zeitoun and Chu 2015). Verbs which express giving birth, however, do conform to an NI pattern, such that a noun root incorporates with the verbal prefix *pash-*. Consider (39) and (40).

(39) Saisiyat (Zeitoun and Chu 2015: 143)

- a. (h)aleb                      ‘bridge/to build a bridge’  
       → (h)om-aleb                      ‘to build a bridge (AV)’  
   b. (h)atash                      ‘hut/to build a hut’  
       → (h)om-atash                      ‘build a hut (AV)’

- c. taew'an                      'house/to build a house'  
     → t<om>aew'an    'build a house (AV)'

(40) Saisiyat (Zeitoun and Chu 2015: 575)

- a. pash-kilkilo'              'to give birth to a cub'  
 b. pash-korkoring        'to give birth to a child'

### 2.3.8 Tsou

Tung (1964) identifies verbal forms such as those in (41) as compound words. Some verbal expressions exhibit a distinction between a long form and a shortened form, such as that between (41c) and (41c'). These verbs conform to the general NI pattern as can be seen across Formosan languages.

(41) Tsou (Based on Tung 1964: 200, 201, 459)

- a. eaeósku              'to fish'                      < éa-eósku (search-fish)  
 b. eahíoa              'to work'                      < eáa-híoa (have-work)  
 c. moiarmána        'to build a house' < moeoeái-armána (make-house)  
 c'. e-émo              'to build a house'

Tsou has an array of morphemes which construct various verbs which show an NI pattern, such as *ai-iihósa* (put on-clothes) 'to put on clothes', *e-támaku* (make/take-tobacco) 'to smoke', *me-émi* (make/produce-wine) 'to make wine', *sou-púzu* (kindle-fire) 'to make a fire', and *tu-mʔúmʔu* (pluck-hair) 'to pluck the hair' (pp.205-207).

On a related note, Tung (1964) mentions a unique pattern in Tsou, such that an independent and a bound version of the same verb can coexist, as illustrated by /eáa híoa/ ('to work, to have work') and its compound counterpart /eahíoa/. The verb in the latter version is described as a shortened form of the former version (p. 205). It is noted in Tung (1964) that "[w]e have both [forms] occurring rather frequently in the texts and meaning the same." (p. 201) If this is

the case, then Budai Rukai behaves differently from Tsou, since all incorporating verbs in Budai Rukai have been found to be bound morphemes.

## 2.4 Summary

A comparison of incorporating verbs in Rukai and in other Formosan languages indicates a variation with respect to the morpho-phonological forms used to construct complex verbs in these languages. For instance, Budai Rukai (*tu-*) and Kanakanavu (*ka-*) use the same form to construct descriptions of house-building and giving birth, whereas Isbukun Bunun uses separate forms (i.e., *ka-* and *tus-*). Puyuma uses the same form (*mi-*) to convey child-bearing and dressing, whereas Budai Rukai uses separate verbs (*tu-* and *si-*). Section 2.3 has revolved around only a few comparable verbs and does not go beyond what NI may look like in other verbs or constructions. Nevertheless, the brief survey indicates that NI is a common pattern across Formosan languages, such that verbs in form of prefixes incorporate nominal elements to construct complex verbs.

## 3. Doubling

### 3.1 Doubling in the literature

According to Rosen (1989), the term *doubling* refers to a type of Classifier NI, in which a noun is incorporated into V and the object position is filled by an NP (p.297). The structural notion builds on classificatory NI in Mithun (1984). In the typology of Mithun (1984), classificatory NI is constructed by the co-occurrence of an incorporated generic noun, functioning to qualify the verb, and a semantically related nominal element. The nominal element usually identifies the patient and is more specific than the incorporated noun. The semantic relation is characterized as classificatory. For instance, in the Mohawk example (42a), the incorporated element *-itsy-* ‘fish’ functions as a classifier, as opposed to the independent noun *rabahbót* ‘bullhead’, which denotes a type of fish. In Mohawk,



however, the independent noun phrase does not need to contain a noun head; as (42b) shows, the nominal phrase only has an adjectival element.

(42) Mohawk (Iroquoian, North America) (Mithun 1984: 870)

- a. Tohka niyohserá:ke tsi nahe' sha'té:ku  
 several so.it.year.numbers so it.goes eight  
 nikú:ti rabahbót wahu-tsy-ahní:nu ki rake'níha.  
 of.them bullhead he-fish-bought this my.father  
 'Several years ago, my father bought eight bullheads.'
- b. Kanekwarúnyu wa'-k-akya'tawi'tsher-ú:ni.  
 it.dotted.dist PAST-I-dress-make  
 'I dress-made a polka-dotted one.' ('I made a polka-dotted dress.')

Similar patterns are found in Caddo and Gunwinggu. As in (43a-b), the incorporated nouns are accompanied by an independent noun phrase (i.e., -'iç'á- and *kassi'* in (a), and -*red-* and *redgereṇeni* in (b)).

(43) a. Caddo (Caddoan, North America) (Mithun 1984: 865, 867)

kassi' háh-'iç'á-sswí'-sa'.  
 bead prog-eye-string-prog  
 'She is stringing beads.'

b. Gunwinggu (Arnhem, Australia)

... bene-ṛed-naṇ ṛedgereṇeni.  
 they.two-camp-saw camp.new  
 '... They saw a camp which was freshly made.' ('They saw a new camp.')

Building on Mithun (1984), Rosen (1989) argues that NI comes in two types: Compound NI and Classifier NI. With Compound NI, the incorporated noun root satisfies the argument-taking properties of the verb, thereby detransitivizing the verb and affecting the argument structure. With Classifier NI, the noun root

does not satisfy an argument of the verb but only restricts the nature of the argument; it is the direct object that satisfies the argument (p. 296) (see also Johns 2017). Classifier NI is specifically related to doubling and is argued to show the following properties: (i) the incorporated noun places a selection restriction on the verb, which limits the class of a possible doubled object, (ii) the doubled object must be more specific than the incorporated noun, and (iii) pro-drop can be observed and is possible in various positions. Depending on whether a nominal head of the nominal double is pronounced, a construction of classifier NI can illustrate one of the structures in (44): (44a) has an NP double that is completely empty; (44b) indicates partially realized doubling, such that a modifier appears stranded due to an empty noun; and (44c) has a full NP double.

(44) Classifier NI (Based on Rosen 1989: 297-298)

- a. Empty NP: [VP [V N+V] [NP Ø]]
- b. Stranding: [VP [V N+V] [NP Spec [N' Ø]]]
- c. Doubling: [VP [V N+V] [NP Spec [N' N {PP,CP}]]]

Rosen (1989) uses data from Tuscarora and Rembarnga, as in (45a-b), to illustrate doubling. In noting that an incorporated element and its associated NP double in Tuscarora should be different (i.e., *-taskw-* ‘animal’ versus *tsi:r* ‘dog’), but can have the same root in Rembarnga (i.e., *kaʔaʔ* ‘paperbark’), Rosen attributes the property to a cross-linguistic difference that languages like Rembarnga do not require an object double to be more specific than its corresponding incorporee, whereas languages like Mohawk and Tuscarora make such a distinction.

(45) a. Tuscarora (Iroquoian, North America) (Williams 1976)

- ne-hra-taskw-ahkw-haʔ                      haʔ      tsi:r.  
 du-M-animal-pick.up-SERIAL      EMPH   dog  
 ‘He picks up domestic animals.’ (He is a dog catcher.)

b. Rembarnga (Arnhem, Australia) (McKay 1975)<sup>11</sup>

kaʔaʔ-ø                    par-kaʔaʔ-ta-ŋjɪ.

paperbark-NOM    3SG.OBJ. 3PL.TRANS.S-paperbark-stand-(CAUS)-  
PAST.CONT

‘They would spread paperbark (on the ground).’

In the literature, doubling has been considered within lexical and syntactic approaches, and languages may receive different analyses in distinct frameworks (cf. Baker et al. 2005; Baker 2009; Gerdts 1998; Mithun 1984; Rosen 1989; Sadock 1980; Sadock 1986; among others; see Johns 2017; Chung and Ladusaw 2020 for general overviews). Rosen (1989) treats doubling, as in (44c), as evidence for the syntactic independence of NI and the direct object NP position (p. 302). This stance is different from a syntactic view which identifies NI as a result of strict head movement, according to which the incorporee originates from a lower syntactic position and then undergoes movement to adjoin to the verb (see Baker 1996 and Baker et al. 2005). Baker (1996) treats stranding and doubling as two constructions with different structures; stranding is considered to be formed after a noun head undergoes head movement and adjoins to the verb, thus stranding its modifier, whereas doubling is formed with a DP double acting as a sentential adjunct. The head movement analysis is challenged in Barrie and Mathieu (2016), which argues for a phrasal movement analysis. Some studies consider the incorporee and its associated nominal double to originate from the same syntactic constituent. Chung and Ladusaw (2004) builds on the inaccessibility of movement of the extra DP object and considers it to be an adjunct adjoined to NP, which contains the incorporee, before head movement takes place (pp.146-148); Barrie (2012) argues that the incorporee and the double are merged as a constituent as a sister to the verb; and Gallego (2012) argues for

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<sup>11</sup> Glosses are based on Rosen (1989). The additional abbreviations are: PAST.CONT, past continuous tense; S, subject; TRANS, transitive.

a big NP/DP analysis which relates the phenomenon of cognate objects to clitic doubling.

In the following discussion, the term *doubling* is used in the sense that an incorporated noun and its DP double are semantically related, and that the DP double functions as the direct object of the complex verb.

### 3.2 General doubling patterns in Budai Rukai

As discussed in sections 2.1 and 2.2, Rukai NI results in various complex verbs which denote a range of culturally relevant activities, and which exhibit a close morphological bond between the incorporating verb and the incorporee. In terms of argument structure, some complex verbs only take one argument, such as *tu-apwi* ‘start a fire’ and *tu-ngadra* ‘produce tubers’. The thematic relation depends on both the predicate and the argument; the argument can denote an agent which carries out an action, as in (46a), or an undergoer which is involved with the action in a certain way, as in (46b). With respect to the conveyed action, the incorporee is usually associated with a theme, but not an agent.

- (46) a. *lri-tu-apwi*      *ka*      *ama*.  
           FUT-make-fire    NOM    father  
           ‘Father will start a fire.’
- b. *lri-tu-ngadra*    *kay*      *urasi*.  
           FUT-make-tuber DEM    sweet potato  
           ‘The sweet potatoes will produce tubers.’

Other verbs, such as *tu-daane* ‘build a house’, *tu-lalake* ‘give birth’, and *ngi-kulralru* ‘play a nose flute’, can take one more argument, which refers to a specific or identifiable entity that is associated with the incorporee. This argument is realized as an independent DP object; it can be marked by an article, as in (47a), or by a demonstrative, which fixes the reference of the DP, as in (47b). The DP object in (47a-b) is a cognate object, which contains the same

noun as the incorporee, but it can be expressed by a non-cognate noun, as in (47c).<sup>12</sup> These examples instantiate doubling, where the incorporee is doubled by an independent DP object. Example (47c) specifically instantiates classificatory NI and Classifier NI as discussed in Mithun (1984) and Rosen (1989), as the incorporee *daane* functions to classify the DP double.

- (47) a. tu-a-daane                ku    daane ka        Sula.  
           make-NFUT-house    ACC   house   NOM    PN  
           ‘Sula built a/the house.’
- b. tu-a-daane                kay   daane ka        Sula.  
           make-NFUT-house    DEM   house   NOM    PN  
           ‘Sula built this house.’
- c. tu-a-daane                ku    balrawbau        ka        Sula.  
           make-NFUT-house    ACC   tent                NOM    PN  
           ‘Sula built a/the tent.’

More examples are given in (48), where (48b) illustrates that the DP double can contain additional elements, such as a numeral.

- (48) a. tu-a-lalake                ku    lalake ka        KALAZUPU.  
           make-NFUT-child    ACC   child    NOM    PN  
           ‘Kalazupu gave birth to a/the child.’

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<sup>12</sup> A reviewer pointed out that examples like (47b) are considered by some native speakers to be fine but rarely used, who find examples like (i) to be more acceptable, in which a modifier (e.g., *matiasamali*) helps strengthen the specific reading. Thanks to the reviewer for providing this example. The glosses and translation are added by the author.

(i) tu-a-daane                ku    matiasamali        ku    daane ka        Baravisi.  
       make-NFUT-house    ACC   wonderful        ART   house    NOM    PN  
       ‘Baravisi built the wonderful house.’

- b. tu-a-lalake            ku    vaeva    ku    lalake    ka    Kalazupu.  
     make-NFUT-child    ACC   one       DET   child    NOM   PN  
     ‘Kalazupu gave birth to (this) one child.’

### 3.2.1 Accusative-marked direct object

The independent DP is an accusative-marked element. As shown in (49), the DP double can only be marked for accusative case, but not oblique case.<sup>13</sup>

- (49) a. \*tu-a-daane            ki    daane    ka    Sula.            (cf. (47a))  
         make-NFUT-house    OBL   house    NOM   PN  
     b. \*tu-a-lalake            ki    lalake    ka    Kalazupu.    (cf. (48a))  
         make-NFUT-child    OBL   child    NOM   PN

Like regular arguments which exhibit a flexibility in word order, the DP double does not need to be linearly close to the incorporee and can appear in other positions in a sentence, as in (50a-b).

- (50) a. tu-a-daane            ka    Sula    ku    daane.  
         make-NFUT-house    NOM   PN    ACC   house  
         ‘Sula built a/the house.’  
     b. tu-a-daane            ka    Sula    kay    daane.  
         make-NFUT-house    NOM   PN    DEM   house  
         ‘Sula built this house.’

As more data are needed for a detailed analysis, it seems that complex verbs can be passivized, as indicated by the passivized form *ki-tu-daane* in (51). This suggests that the DP double in examples like (50a-b) is a thematic object, which

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<sup>13</sup> See Chen (2008) for a discussion of case marking in Budai Rukai.

can appear as the subject in a passivized NI construction (see Massam 1990). It is thus taken that the accusative-marked DP is a direct object.

- (51) si-a-daane=su                      ki        laveke;  
       from-NFUT-house=2.S.NOM OBL    ocean  
       la            ki-tu-daane=su                      tu-mathaitaithariri.  
       COMP        PASS-make-house=2.S.NOM make-beautiful  
       (Lit. ‘The ocean is your (=the city of Tyrus) home; and you have been built  
       beautifully.’) (RB 2017, Ezek. 27.4)

### 3.2.2 Determiner and semantic information

DP objects in NI constructions with doubling are formed by common nouns. As opposed to their corresponding determiner-less incorporees, the objects are necessarily marked by an overt determiner, either by an article or a demonstrative. This indicates that common nouns in Rukai are essentially predicative, and only a determiner-marked DP can introduce a discourse referent (Chierchia 1998; see also Chung and Ladusaw 2004). Consider the ungrammaticality of (52a), where the object double is not marked by any determiner. As discussed in section 3.2.1, the article *ku* marks accusative case, but it also involves semantic information. A *ku*-marked DP is usually underspecified with respect to its reference; it can denote an indefinite, non-identifiable, entity, or identify a specific entity, as in (52b). In either case, the DP double is referential. The reference denoted by a DP double can be particularly fixed by a demonstrative, such as *kay* ‘the; this; that’ in (52c).<sup>14</sup>

<sup>14</sup> Patterns which look like doubling can be seen in other Formosan languages, such as Paiwan, Puyuma, and Saisiyat. In the Northern Paiwan examples in (i), repeated from (37), *alak* ‘child’ is accompanied by a DP argument marked by *tua*.

(i) Northern Paiwan (Chang 2006: 431, 442)

a. manu,	pu-alak	tua	macidil	a	vavayan, [...].
INTEJ	have.AV-child	OBL.CM	one.CLASF.C	LIN	female

‘Then, (they) gave birth to one daughter, [...]’

- (52) a. \*ngi-a-kulralru      kulralru      ka      Retage.  
          play-NFUT-NOSE flute   nose flute   NOM      PN  
       b. ngi-a-kulralru      ku      kulralru      ka      Retage.  
          play-NFUT-nose flute   ACC      nose flute      NOM      PN  
          ‘Retage plays a (specific) nose flute.’  
       c. ngi-a-kulralru      kay      kulralru      ka      Retage.  
          play-NFUT-nose flute   DEM      nose flute      NOM      PN  
          ‘Retage plays this nose flute.’

- 
- b. [...]      pu-alak=anga      tua      vavayan      tua      uʔalay      timadju.  
          have.AV-child=COM      OBL.CM      female      OBL.CM      male      3SG.NOM  
          ‘[...] she gave birth to daughters and sons.’

In the Puyuma example in (ii), the incorporee *walak* ‘child’ is accompanied by a full DP, which contains the same cognate root. Puyuma exhibits the same case marking pattern as Northern Paiwan, such that the DP is marked for oblique case. (The Puyuma abbreviations are: ID, indefinite; NOM, nominative; OBL, oblique; PRS, personal; SG, singular.)

(ii) Puyuma (Teng 2008: 203)

- mi-walak      dra      mia-pat      dra      walak  
          have-child ID.OBL      PRS-four ID.OBL      child  
          ‘She has four children.’

In the Saisiyat example in (iii), the denominalized incorporee *taew’an* ‘house’ is accompanied by an independent DP, which contains the same cognate root. Notably, the DP is marked for accusative case, as indicated by *ka*. (The Saisiyat abbreviations are: AGT.NMZ, agent nominalization; AV, actor voice; IRR, irrealis; PROP, property.)

(iii) Saisiyat (Zeitoun and Chu 2015: 143)

- yako      ’am=t<om>aew’an      ka      ’ima=kayzaeh-an      taew’an.  
          LS.nom      IRR=<AV>build a house      ACC      AGT.NMZ=good-PROP      house  
          ‘I will build a better house.’

These examples suggest that at least some Formosan languages can be characterized based on case marking patterns of the independent DP elements: Northern Paiwan patterns with Puyuma by having oblique DPs, whereas Saisiyat patterns with Budai Rukai in having accusative DPs. More data and research are required to determine whether these examples instantiate doubling.



## 4. Interim Discussion of NI and Doubling

### 4.1 Properties of Rukai doubling

While a more in-depth survey is needed, doubling is only found to be constructed by a few complex verbs in this research, such as *tu-lalake* ‘make-child’, *tu-daane* ‘make-house’, and *ngi-kulralru* ‘play-nose flute’.<sup>15</sup> NI, on the other hand, can be formed by an array of verbal prefixes and nominal roots. In evaluating the Rukai data against the discussion of doubling in the literature, the properties of Rukai doubling are summarized in (53).

#### (53) Properties of Rukai doubling

- a. As compared to its corresponding incorporee, the nominal double has the structure of DP, which is minimally marked by a determiner, either a case article or a demonstrative.
- b. The case of the DP double is accusative, which means that the double is a direct object, and that the involved complex verb is transitive.

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<sup>15</sup> A reviewer asks what properties these complex verbs have in common, whether there are other complex verbs also allowing doubling, and why doubling is restricted in this language. The complex verbs found to exhibit doubling all involve events common enough for native speakers to express them in this particular way. These forms are robust in the descriptive sense that they are frequently observed and easy to elicit. In terms of form-meaning correspondences, NI with a cognate double (e.g., (47a), (48a), and (52b)) especially exhibits a certain degree of redundancy, such that the same nominal root appears in the predicate and the object. Given that NI is formed by an array of verbal prefixes and nominal roots, it is possible that other verbal complexes also allow doubling in Rukai, but a definite answer requires further research when more data become available. If NI is also considered a process of lexicalization, by which new open-class elements are added to a repository of holistically processed linguistic units (Hilpert 2019), then NI is used to create new lexical items (verbs) in this language. The restriction of taking a DP double can be an indication of the extent of lexicalization. Complex verbs which allow doubling may be more lexicalized, such that semantically they act more like a single unit, than those which do not exhibit doubling. This conjecture also requires further research.

- c. The determiner of the DP double can convey semantic information. A case article can identify specificity, while a demonstrative fixes the reference of the denoted entity.
- d. Doubling can be constructed with non-cognate or cognate (i.e., root-identical) objects.

In Rukai, grammatical arguments are marked by a determiner, which specifies their syntactic functions (i.e., subject, object, oblique, possessor, etc.) or imposes semantic conditions (e.g., specificity, definiteness, or referentiality). Properties (54a-c) concern the morphosyntax and semantics of a DP double in this regard. The form of a double conforms to the general formation of a grammatical argument in Rukai, such that the double is a full DP, not a bare root or an NP. Furthermore, the article *ku* is unique in that it not only identifies accusative case, but can also convey semantic information, such as specificity and kind. For instance, in (54), *ku urasi* can refer to specific sweet potatoes, as the translation in (54a) shows, or identify this plant as a kind of crops being grown, as in (54b). While the verb is marked for nonfuture tense, marking of *ku* on the DP double gives rise to some interpretative possibilities, including an episodic or habitual reading. Regarding the former, specific sweet potatoes can be singled out as the result of the event(s); the latter involves a generalization about the growing activities carried out by *Asiane*, such that she grows sweet potatoes as a type of plant.

(54) wa-lredreke      ku      urasi              ka      Asiane.

NFUT-grow    ACC    sweet potato    NOM    PN

- a. 'Asiane grew the sweet potatoes.'
- b. 'Asiane grew/grows sweet potatoes (as a kind of plant).'

When incorporated, a nominal element appears in its root form. Being determinerless, the incorporee is neither marked for case nor specified for semantic conditions.



conceptual domain of man-made constructions delimited by the incorporee *daane* ‘house’, as in (56c). Additional data are given in (57), where example (a) contains a cognate object, whereas sentence (b) has a non-cognate object.<sup>16</sup>

(56) a. *tu-a-daane ka Baravisi.*

make-NFUT-house NOM PN

‘Baravisi built/builds houses.’

b. *tu-a-daane ku daane ka Baravisi.*

make-NFUT-house ACC house NOM PN

‘Baravisi built a (specific)/the house.’

c. *tu-a-daane ku balrawbaw ka Baravisi.*

make-NFUT-house ACC tent NOM PN

‘Baravisi built a tent.’

(57) a. *la tu-daane ku talalibi ka daane ka Ugusane.*

COMP make-house ACC stone slate ART house NOM PN

‘Then Ugusane built a stone-slate house.’

b. *la si-bengelray ku bariangalay ka Samelrenge.*

COMP wear-flower ACC lily NOM PN

‘Then Samelrenge wears lilies (as a headdress).’

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<sup>16</sup> Rukai is a pro-drop language, and a familiar object whose identity is known can be omitted. A reviewer raised the question whether (56a) can be alternatively treated as a structural reduction of (56b), such that it contains a DP object which is not realized due to argument ellipsis. The approach of the present paper is that the structural analysis depends on the interpretation of a sentence. In a simple scenario, no house needs to be identified when (56a) is uttered, in which case, the structure is unergative and does not have an object position. If in another scenario (56a) is interpreted in the way that a certain house has been identified, it has a transitive structure where the object position is filled by a null argument. See also section 4.2.1

## 4.2 General properties of Rukai NI and doubling

In considering the overall construction, the general properties of Rukai NI and doubling are argued to involve a distinction between unergativity and transitivity, and between atelicity and telicity, which are characterized in (58a-b).

### (58) Properties of Rukai NI and doubling

- a. Unergativity vs. transitivity: NI constructions without doubling mainly exhibit unergative properties, whereas those with doubling are transitive sentences.
- b. Atelicity vs. telicity: Sentences with doubling convey telic events, whereas sentences without doubling usually express atelic activities.

#### 4.2.1 Unergativity vs. transitivity

Unlike languages whose complex verbs show agreement with their arguments, such as Northern Iroquoian languages (Rosen 1989) and Chamorro (Chung and Ladusaw 2004), Rukai complex verbs resulting from NI are not marked for transitivity or inflected for agreement. Simple NI constructions, which are formed without doubling, resemble unergative constructions, such that the sole participant is a grammatical subject, which is marked for nominative case and usually identifies an agent which carries out the conveyed event. NI constructions with doubling, on the other hand, have an additional participant expressed by the DP double. It is realized as a direct object marked for accusative case, and usually identifies an entity which is acted upon, undergoes, or is affected by, the conveyed event.

The contrast between the two types of constructions may resemble the difference between Empty NP and Doubling in Rosen (1989) (i.e., between (44a) and (44c)), but the distinction of transitivity between the two need be addressed for Rukai. In Rukai, only transitive verbs license an accusative-marked argument, which is identified by *ku*. This means that NI constructions with accusative DP doubles are transitive constructions, as opposed to simple NI

constructions, which are without a DP object and are intransitive. This can be illustrated by contrasting (56a) and (56b). It follows that examples such as (56a) do not contain an empty NP/DP, as the structure does not contain an object in the first place, and that such examples are not instances of Classifier NI in the sense of Rosen (1989).

The Rukai data support an argument analysis, and not an adjunct analysis, of doubling (see Massam 1990; Matsumoto 1996 and references therein). When evaluated against the typology of Mithun (1984), it is taken that Rukai NI does not involve a reduction process of valence, in the sense that a DP double is removed from the structure to form simple NI constructions. The general properties of NI and doubling would characterize Rukai as a Type IV NI language, whose doubling constructions encompass classificatory (i.e., with non-cognate objects) and non-classificatory (i.e., with cognate objects) patterns.

#### 4.2.2 Atelicity vs. telicity

The appearance of a DP double has a distinct semantic effect on the interpretation of the resulting sentence regarding eventuality, as well as temporality. Simple NI constructions like (56a) generally describe atelic activities, which can have arbitrary endpoints (Smith 1997: 19), but have no inherent or intended endpoint (Depraetere 1995). When marked for nonfuture tense, they are compatible with the reading that they reach a terminal endpoint, but this interpretation is not part of the semantics of the complex verbs (see Depraetere 1995 for a discussion of (a)telicity and (un)boundedness). By contrast, NI constructions with a DP double are associated with an inherent endpoint as telic events. As with example (56b), when a house has been built, the situation reaches its endpoint and is naturally interpreted as a past event. While the nonfuture tense is underspecified for past or present, the appearance of the DP double identifies an inherent endpoint and facilitates a past reading.

The issue of (a)telicity can also be approached via the property expressed by the DP double. According to Smith (1997), telic events are specific and

countable, which is partly due to the nominal arguments of a telic sentence (p.20). In considering (56a) and (56b), the DP double does contribute to how an event can be interpreted, as an activity or an accomplishment. Whereas (56a) can denote a sum of separate house-building events involving different houses, (56b) usually involves a particular house. Under this approach, doubling in Rukai is basically a structural device which introduces a specific or unique object in an NI construction.

Based on the properties of (53) and (58), it is argued that the incorporee and the DP double do not form a syntactic constituent in Rukai. The incorporee is merged with the verb as part of the predicate, whereas a DP double is expressed to identify an internal argument, which has a semantic effect on eventuality. In section 5, it will be argued that Rukai NI instantiates predicate restriction, along the lines of Chung and Ladusaw (2004), but with some modifications, and that doubling is a case of argument saturation.

It should be noted that the discussion has not touched upon stranding, even though the incorporee and the DP double have been treated as separate syntactic elements. While more data are needed, examples indicate that stranding of a modifier or numeral is not allowed in Rukai. As examples in (59) show, when a modifier (e.g., *ma-kecenge* ‘sturdy’) or a numeral (e.g., *vaeva* ‘one’) appears, their noun head must be expressed. Examples (59b-c) suggest that the incorporee is not accessible to the modifier or numeral, and that incorporation is not a result of head movement, in which case the noun head (i.e., the to-be incorporee) and the modifier or numeral would be merged as a constituent.

- (59) a. tu-a-daane                      ku        ma-kecenge/vaeva        ku        daane  
           make-NFUT-house    ACC    NFUT-sturdy/one        DET    house  
           ka        Baravisi.  
           NOM    PN  
           ‘Baravisi built a sturdy/one house.’

- b. \*tu-a-daane            ku        makecenge    ka        Baravisi.  
       make-NFUT-house    ACC    sturdy            NOM    PN  
       (Intended) ‘Baravisi built a sturdy house.’
- c. \*tu-a-daane            ku        vaeva    ka        Baravisi.  
       make-NFUT-house    ACC    one        NOM    PN  
       (Intended) ‘Baravisi built one (house).’

The contrast between (60a) and (60b) illustrates a flexibility in word order among grammatical arguments. The DP double patterns like a regular argument; it immediately follows the complex verb in (60a), whereas it follows the subject in (60b). With the cognate noun *daane* also present in the DP object, the examples suggest that the incorporee does not form a syntactic constituent with the DP double in Rukai.

- (60) a. tu-a-daane            [ku        vaeva    ka        daane] [ka        umu].  
       make-NFUT-house    ACC    one        ART    house    NOM    grandfather  
       ‘Grandfather built one house.’
- b. tu-a-daane            [ka        umu]            [ku        vaeva    ka        daane].  
       make-NFUT-house    NOM    grandfather    ACC    one        ART    house  
       ‘Grandfather built one house.’

## 5. An Account for Rukai NI and Doubling

Along the lines of Chung and Ladusaw (2004), this section provides an account for the properties of Rukai NI and doubling, by arguing that the incorporee is a predicate modifier, and that the DP double is a complement of the complex verb, which saturates the predicate expressed. As the framework of Chung and Ladusaw (2004) builds on the idea that the incorporee and the DP double form a constituent in Chamorro, the account for Rukai will involve a different syntactic structure.



## 5.1 Predicate restriction and the case of Chamorro

Chamorro exhibits object incorporation, which is constructed by two verbs of possession, *gäi*- ‘have’ and *täi*- ‘not have’, as exemplified by (61a-b). They are morphologically related to their independent counterparts, *guäha* ‘exist’ and *taya* ‘not exist’, as illustrated by (62a-b).

(61) Chamorro (Malayo-Polynesian) (Chung and Ladusaw 2004: 82)

- a. *Gäi*-[*famagu’un*]                      *ädyu na palao’an*.                      (p.82, (12a))  
 AGR.have-children                      that      L woman  
 ‘That woman has children.’
- b. *Täi*-[*prublema*]                      *i próhimu*.                      (p.82, (12c))  
 AGR.not.have-problem                      the      fellow  
 ‘The guy had no problem [spelling Saipan].’

(62) Chamorro (Chung and Ladusaw 2004: 81-82)

- a. *Guäha famagu’un gi giput*.  
 AGR.exist children LOC party  
 ‘There were children at the party.’
- b. *Gi paingi taya’ guini ni únunu ha’*.  
 LOC last.night AGR.not.exist here not one EMP  
 ‘No one was here last night.’

Chamorro NI constructions allow doubling. As shown in (63a), the incorporee *ga* ‘pet’ is doubled by the DP *i ga’lagu* ‘the dog’, and in (63b), *guma* ‘house’ is doubled by a cognate object. According to Chung and Ladusaw (2004), incorporation clauses are intransitive, as the complex verb would be inflected for agreement from the intransitive paradigm (p.84). A DP double is considered an adjunct, and not a syntactic complement of the verb. Although the DP double is not a direct object, it is argued to participate in *multiple linking*, according to

which both the incorporee and the DP double are linked to the internal argument and composed with the argument of the predicate (p.110; 125).

- (63) a. Si Carmen gäi-[ga'] i ga'lagu. (p.109, (70))  
 UNM Carmen AGR.have-pet the dog  
 'Carmen has the dog as a pet.'
- b. Gäi-[guma'] yu' guma'. (p.121, (84a))  
 AGR.have-house I house  
 'I have a house (as a house).'

The semantic operation of composition involved in NI constructions with doubling in Chamorro, as put forward in Chung and Ladusaw (2004), is termed Restrict (for predicate restriction). With Restrict, the incorporee does not denote an entity, but a property argument, in relative to the incorporating verb as a predicate. Restrict acts as a binary operation which combines the predicate (i.e., the incorporating verb) and the property argument (i.e., the incorporee) by restricting the domain of the predicate to a subdomain to elements which have the added modifying property (p.5).<sup>17</sup> Take (63a) for example. The verb *gäi-* has the semantic type of a two-place predicate,  $\langle e, \langle e, t \rangle \rangle$ , the incorporee *ga'* is semantically incomplete and has the type of a property,  $\langle e, t \rangle$ , and *si Carmen* denotes an entity, thus with type  $\langle e \rangle$ , as shown in (64a-c), respectively. NI incorporation brings about Restrict, thereby composing *ga'* with the internal argument of *gäi-* and resulting in the complex verb *gäi-ga'*, whose degree of unsaturation is not affected, as in (64d). It is based on this operation that the

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<sup>17</sup> Restrict can be compared to Event Identification, a composition principle put forward by Kratzer (1996) to deal with Voice and the external argument. Both are conjunction operations; while Event Identification allows other elements to add conditions to the event being conveyed (e.g., Voice, which can identify the thematic role of an external argument as Agent), Restrict focuses on the internal argument of a two-place predicate, whereby the incorporee restricts the internal argument parameter of the incorporating verb (Chung and Ladusaw 2020).

complex verb can be further composed with a DP double, which in effect reduces the complex verb's degree of unsaturation, as in (64e). When the subject is composed, it saturates the remaining argument, and the calculation returns a truth value of type  $\langle t \rangle$ , as in (64f). The verb of possession *gäi-* is associated with a Davidsonian event argument and is considered to be inherently generic (p.108).

(64) Adopted from (Chung and Ladusaw 2004: 109-110)

- |    |  |           |  |
|----|--|-----------|--|
| a. | <i>gäi-</i> $\langle e, \langle e, t \rangle \rangle$    | 'have'    | = $\lambda y \lambda x \text{Gen}_e [\text{have}'(y)(x)(e)]$                       |
| b. | <i>ga'</i> $\langle e, t \rangle$                        | 'pet'     | = $\text{pet}'$  |
| c. | <i>i ga'lagu</i> $\langle e \rangle$                     | 'the dog' | = $d$  |
| d. | <i>gäi-ga'</i> $\langle e, \langle e, t \rangle \rangle$ |           | = $\lambda y \lambda x \text{Gen}_e [\text{have}'(y)(x)(e) \wedge \text{pet}'(y)]$ |
| e. | <i>gäi-ga' i ga'lagu</i> $\langle e, t \rangle$          |           | = $\lambda x \text{Gen}_e [\text{have}'(d)(x)(e) \wedge \text{pet}'(d)]$           |
| f. | <i>Si Carmen gäi-ga' i ga'lagu</i> $\langle t \rangle$   |           | = $\text{Gen}_e [\text{have}'(d)(c)(e) \wedge \text{pet}'(d)]$                     |

Since the resulting NI constructions exhibit intransitive morphosyntax, the DP double is not a direct object of the verb, but an adjunct to N. In the structure, the DP double is adjoined to the NP where the incorporee originates, as shown in (65a). Incorporation of N is considered a result of head movement and adjunction to V, as in (65b).<sup>18</sup>

(65) Chamorro (adopted from Chung and Ladusaw 2004: 147-148)

- |    |                       |   |
|----|-----------------------|---|
| a. | Before head movement: | $[V' V [_{NP} [_{NP} N] DP]]$           |
| b. | After head movement:  | $[V' [V V N_i] [_{NP} [_{NP} t_i] DP]]$ |

It is noted in Chung and Ladusaw (2020) that Restrict does not alter the valence of the predicate, and that Restrict provides an account of Classifier NI in the typology of Rosen (1989). Treating NI as a non-saturating operation allows

<sup>18</sup> See also Gallego (2012) and Barrie (2012) for similar approaches which consider an incorporee and its associated double to form a constituent.

the incorporee to be further restricted or specified by a DP double, which is essentially the approach being pursued in the present paper.

## 5.2 A comparison of Rukai and Chamorro

A comparison of Rukai and Chamorro shows that the two languages are distinct in several respects. First, with respect to the inventory of verbs, Chamorro only has two incorporating verbs (i.e., verbs of possession), whereas Rukai has an array of action verbs which incorporate (e.g., *ki-* ‘obtain’, *paw-* ‘plant; grow’, *si-* ‘wear; bear’, *tu-* ‘make; do’, *u-* ‘remove’, etc.; see section 2.2). Second, in terms of types of incorporable elements, Chamorro verbs are productive in the sense that they can incorporate various elements larger than N, including compound nouns, nouns with a modifier, nouns with a relative clause, nouns with complements, and coordinate structures, whereas Rukai verbs, as discussed in section 2.2, generally incorporate roots. Third, Chamorro NI constructions exhibit intransitive properties, such that the inflectional agreement between verb and subject is based on the intransitive paradigm (Chung and Ladusaw 2004: 84). By contrast, although complex verbs are not inflected for agreement in Rukai, its NI constructions with doubling show transitive properties, since the DP doubles are marked for accusative case and denote thematic objects which undergo, or are affected by, the conveyed events.<sup>19</sup>

On the other hand, Rukai and Chamorro NI have at least two characteristics in common. In both languages, incorporating verbs are realized as verbal prefixes attached to the nominal element, although the verbs in Chamorro, but not in Rukai, have independent counterparts. Also, Chamorro is similar to Rukai in that its incorporees cannot be headed by a determiner (Chung and Ladusaw 2004:

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<sup>19</sup> Other considerations are also discussed in Chung and Ladusaw (2004) in order to show that the extra object in Chamorro is not a complement of V, including its inaccessibility to movement and inability to be shared by conjoined verbs. Since the DP double in Rukai is considered a complement of the complex verb, it is predicted that the DP double can undergo movement and appear with conjoined verbs. More data, however, are needed to validate the prediction.

87), which indicates that D, the functional category of determiners, is commonly barred from being incorporated in both languages.<sup>20</sup>

### 5.3 Predicate restriction and the case of Rukai

Ignoring the sentential subject, simple Rukai NI constructions have the structure in (66a), while NI constructions with doubling have the structure in (66b). A complex verb (labeled as VP) is formed by an incorporating verb (V) merged with a nominal root ( $\sqrt{\text{root}}$ ). The structure of NI constructions with doubling contains a functional verbal layer ( $v$ ), which is responsible for the assignment of accusative case (Chomsky 1995). The syntactic analysis for Rukai is different from that of Chung and Ladusaw (2004) for Chamorro in (64). Specifically, the incorporee is merged with the verb in the first place, and the DP double is merged with the complex verb as a complement. Under this analysis, the incorporee and the DP double do not form one constituent, and Rukai NI does not result from head movement.

(66) Rukai NI and doubling

- a. Simple NI: [<sub>VP</sub> V- $\sqrt{\text{root}}$ ]
- b. NI with doubling: [<sub>VP</sub>  $v$  [<sub>VP</sub> [<sub>VP</sub> V- $\sqrt{\text{root}}$ ] DP<sub>ACC</sub>]]

(66a) illustrates simple NI constructions like (67a), and (66b) illustrates NI constructions with doubling like (67b-c).

- (67) a. tu-a-daane                      ka              Sula.  
           make-NFUT-house    NOM    PN  
           ‘Sula built/builds houses.’

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<sup>20</sup> It is assumed that, in Rukai, a determiner is specifically used to introduce a discourse referent (see Chierchia 1998).

- b. *tu-a-daane*                      *ku*        *daane ka Sula.*                      (= (47a))  
       make-NFUT-house    ACC        house    NOM    PN  
       ‘Sula built a/the house.’
- c. *tu-a-daane*                      *ku*        *balrawbau ka Sula.*                      (= (47c))  
       make-NFUT-house    ACC        tent                      NOM    PN  
       ‘Sula built a/the tent.’

The semantic representation of (67a) is given in (68). The DP subject *ka Sula* is a definite expression of type  $\langle e \rangle$ , as in (68c). The incorporating verb *tu-* is a function of type  $\langle e, \langle e, t \rangle \rangle$ , and the incorporee *daane* denotes a property of type  $\langle e, t \rangle$ ; when the two elements are merged, *daane* restricts *tu-* with its property, thereby resulting in a more specified predicate *tu-daane*, as in (68d). It is taken that Restrict is immediately followed by existential closure (Heim 1982), as in (68e), which brings about existential quantification that saturates the internal argument  $y$ . When the DP double (i.e., *ka Sula*) is merged with the complex verb, as in (68f), it saturates the remaining argument  $x$ . In (68g), the Davidsonian event argument  $e$  is saturated via existential closure, which is assumed to be associated with tense.

- (68) a.  $tu_{\langle e, \langle e, t \rangle \rangle}$         ‘make’        =         $\lambda y \lambda x \lambda e$  [make'(y)(x)(e)]  
       b.  $daane_{\langle e, t \rangle}$         ‘house’        =        house'  
       c.  $ka\ Sula_{\langle e \rangle}$         =        s  
       d.  $tu-daane_{\langle e, \langle e, t \rangle \rangle}$         =         $\lambda y \lambda x \lambda e$  [make'(y)(x)(e)  $\wedge$  house'(y)]  
       e. Existential closure        =         $\exists y \lambda x \lambda e$  [make'(y)(x)(e)  $\wedge$  house'(y)]  
       f. *tu-daane ka Sula*        =         $\exists y \lambda e$  [have'(y)(s)(e)  $\wedge$  house'(y)]  
       g. Existential closure        =         $\exists y \exists e$  [have'(y)(s)(e)  $\wedge$  house'(y)]

The semantic representation of (67c), an NI construction with doubling, is given in (69). The DP double *ku balrawbau* is taken to denote a specific entity with type  $\langle e \rangle$ . When merged with the complex verb, the DP double saturates the argument

$y$ , as in (69f). The subject then composes with the predicate and saturates the remaining thematic argument  $x$  in (69g). Existential closure then takes place, thereby saturating the event argument and completing the composition, as shown in (69h).

- (69) a.  $tu_{\langle e, \langle e, t \rangle \rangle}$  'make' =  $\lambda y \lambda x \lambda e$  [make'(y)(x)(e)]  
 b.  $daane_{\langle e, t \rangle}$  'house' = house'  
 c.  $ku$  balrawbau $_{\langle e \rangle}$  'a (specific) tent' =  $t$   
 d.  $ka$  Sula $_{\langle e \rangle}$  =  $s$   
 e.  $tu$ - $daane_{\langle e, \langle e, t \rangle \rangle}$  =  $\lambda y \lambda x \lambda e$  [make'(y)(x)(e)  $\wedge$  house'(y)]  
 f.  $tu$ - $daane$   $ku$  balrawbau =  $\lambda x \lambda e$  [make'(t)(x)(e)  $\wedge$  house'(t)]  
 g.  $tu$ - $daane$   $ku$  balrawbau  $ka$  Sula =  $\lambda e$  [make'(t)(s)(e)  $\wedge$  house'(t)]  
 h. Existential closure =  $\exists e$  [make'(t)(s)(e)  $\wedge$  house'(t)]

Other NI constructions with doubling, such as those in (70), can be accounted for under the present approach of predicate restriction, according to which all the incorporees are property-denoting expressions.

- (70) a.  $la$   $tu$ - $daane$   $kay$  talalibi  $ka$   $daane$   $ka$  Ugusane.  
 COMP make-house DEM stone slate ART house NOM PN  
 'Then Ugusane built the stone-slate house.'  
 b.  $la$   $si$ -bengelray  $ku$  bariangalay  $ka$  Samelreng.  
 COMP wear-flower ACC lily NOM PN  
 'Then Samelreng wore the lilies (as a headdress).'  
 c.  $tu$ - $a$ -angatu  $ku$  rugusu  $ka$  Tuku.  
 make-NFUT-firewood ACC branch NOM PN  
 'Tuku used a tree branch as firewood.'

## 5.4 Interim discussion

Before closing this section, it is worth of discussing some properties of the incorporees when they interact with other sentential elements, such as negation,

expressions of frequency and habit, the existential verb, and modality. The incorporees function as indefinites which take narrow scope with respect to negation, as shown in (71a-b). The sentences do not mean that there exists some carrying basket which was not made by the mother, or there was a certain child to whom Muni did not give birth.

- (71) a. kai      tu-a-karadrare                      ka      ina.  
           NEG    make-NFUT-carrying basket    NOM    mother  
           ‘Mother did not make a/any carrying basket.’  
       b. kai      tu-a-lalake                      kay      Muni.  
           NEG    make-NFUT-child    DEM    PN  
           ‘Muni didn’t give birth to any child.’

In Rukai, expressions of frequency and habit, such as *kingibekele* ‘rarely; occasionally’ and *kitunagame* ‘used to’, are used as the main predicate in the sentence. They attract personal enclitics and can be inflected for tense. When they appear in NI constructions, the incorporees take narrow scope. As examples (72a-b) show, no specific or individual piece of *kulralru* ‘nose flute’ is identified by the incorporees.

- (72) a. kingibekele=aku                      ngi-kulralru.  
           rarely=1S.NOM                      play-nose flute  
           ‘I rarely play a/any nose flute.’  
       b. kai=naku      ki-a-tunagame                      ngi-kulralru.  
           NEG=1S.NOM    used to-NFUT-used to    play-nose flute  
           ‘I am not used to playing a/any nose flute.’  
       (73) a. i-a-kay                      lu                      ngi-kulralru=aku.  
           be-NFUT-DEM    COMP                      play-nose flute=1S.NOM  
           ‘Once/there were times I played the nose flute.’



- |    |   |                  |          |
|----|---|------------------|----------|
| b. | tara-ngi-kulralru   | ka               | Retage.  |
|    | MOD.NFUT-REFLX-nose flute   | NOM              | PN       |
|    | ‘Retage always plays the nose flute (as a kind of musical instrument).’ |                  |          |
| c. | tara-tu-lrenege   | ka               | Ugusane. |
|    | specialized-make-stone slate  | NOM              | PN       |
|    | ‘Ugusane is a stone-gatherer.’  |                  |          |
| d. | tara-tu-ka~kange  | ka               | Retage.  |
|    | specialized-make-RED~fish   | NOM              | PN       |
|    | ‘Retage is a fisher.’   |                  |          |
| e. | tara-dramare=aku  | tu-uma.umaumase. |          |
|    | for-month-1S.NOM  | make-RED.human   |          |
|    | ‘I spent a month making human sculptures.’                              |                  |          |

In the existential sentence (73a), it is asserted that the activity of the speaker playing the nose flute as a type of musical instrument either holds true as a past event, or took place a few times in the past. No particular piece of nose flute is involved. A similar pattern of interpretation is also found in the following examples. In (73b), the combination of the complex verb with the epistemic modal *tara-* gives rise to the reading that an activity is done constantly or as a habit. (73c-d) show that *tara-* (glossed as ‘specialized’) appears with *tu-lrenege* ‘gather-stone slate’ and *tu-kange* ‘catch-fish’ to convey professions. In (73e), the complex verb *tu-umaumase* ‘create-human’ co-occurs with a temporal duration measured out by the combination of *tara-* and *dramare* ‘month; moon’. In these examples, no particular entity is asserted to exist by the incorporee.

## 6. Conclusion

This paper has provided an overview of some general patterns of NI and doubling in Budai Rukai. Complex verbs resulting from NI are found to describe various activities (section 2). For ease of discussion, they are roughly grouped

into these categories: nature, plants, agriculture and culinary, clothing, flower-wearing and name-bearing, music, tool implementation, as well as construction, fishing/hunting, and procreation. Whereas NI can be constructed by an array of verbal prefixes, doubling is found to be limited to some of the resulting complex verbs.

An examination of the syntax and semantics of NI constructions shows that NI is a mechanism of predicate formation in Rukai (sections 3 and 4). Simple NI constructions are intransitive and exhibit unergative properties, whereas NI constructions with doubling are transitive sentences where accusative case is assigned. The object double is necessarily a DP, which is associated with semantic information due to an article or demonstrative, thereby establishing its referentiality. Doubling can be constructed with non-cognate or cognate objects. Building on Chung and Ladusaw (2004), Rukai NI is argued to instantiate predicate restriction (section 5), whereby a nominal root restricts the denotation of an incorporating verb via merge, not head movement. The DP double is analyzed as a complement of the complex verb, which saturates the predicate. Under this approach, an incorporee does not denote an entity, but a property.

Typologically speaking, comparable verbal forms are found in a decent number of Formosan languages (section 2.3), including some Rukai dialects (e.g., Taromak Rukai, Maga Rukai, Tona Rukai, and Mantauran Rukai), as well as other Formosan languages (e.g., Amis, Bunun, Kanakanavu, Paiwan, Puyuma, Saisiyat, and Tsou). If their NI constructions, with and without doubling, exhibit syntactic and semantic patterns similar to Budai Rukai as discussed in this paper, NI could be considered to be a shared mechanism of predicate formation across Formosan languages.

## Appendix A: Denominal Verbs

In Rukai, besides simple verbs formed by a verbal root, such as *dreele* ‘see’ in (1a), and complex verbs formed via noun incorporation, such as *tu-daane* ‘build-house’ in (1b), there are also denominal verbs, which are formed by a nominal root without any overt verbal element. Nonfuture tense is marked as a prefix on denominal verbs, as exemplified by the verbs in (74).

(74)	Nonfuture form		Nominal root
a.	wa-aga	‘cook’	→ aga ‘meal; rice; food’
b.	wa-abulru	‘tell a story’	→ abulru ‘story’
c.	wa-dralrai	‘dance’	→ dralrai ‘dance’
d.	wa-senay	‘sing’	→ senay ‘song’
e.	wa-sipi	‘dream’	→ sipi ‘dream’
f.	wa-tamaku	‘smoke’	→ tamaku ‘cigarette’
g.	wa-zega	‘draw; paint’	→ zega ‘drawing’

When used as an argument, the nominal root is necessarily marked by a determiner and appears in a DP, as in (75a). Example (75b-c) show the regular verbal patterns of a denominal verb. It is tense-marked and appears in the sentence-initial position in a matrix clause, whereas it is zero-marked for tense when in a subordinate clause.

(75) a.	wa-kane	ku	aga	ka	Asiane.
	NFUT-eat	ACC	meal	NOM	PN
	‘Asiane ate the MEAL.’				
b.	wa-aga	(ku	lacenge)	ka	Asiane.
	NFUT-meal	ACC	vegetables	NOM	PN
	‘Asian cooked (vegetables).’				

- c. mu-a-balriw            la            aga    ka    Asiane.  
      go-NFUT-home        COMP        cook   NOM    PN  
      ‘Asiane went home and then cooked.’

Several weather-related nouns are used as denominal verbs, as given in (76).

- | (76) | Nonfuture form |            | Nominal root     |
|------|----------------|------------|------------------|
| a.   | wa-pasabu      | ‘snow      | → pasabu ‘snow’  |
| b.   | wa-udale       | ‘rain’     | → udale ‘rain’   |
| c.   | wa-vai         | ‘be sunny’ | → vai ‘sun’      |
| d.   | wa-valrigi     | ‘be windy’ | → valrigi ‘wind’ |

Like other denominal verbs, a weather-related noun is marked by a determiner when used as an argument, as in (77a). It is inflected for nonfuture tense and progressive aspect in a typical manner, as shown in (77b-c).

- (77) a. wa-dreele=aku        ku            vai.  
       NFUT-see=1S.NOM   ACC        sun  
       ‘I saw the sun.’
- b. wa-vai            kay    kameane.  
       NFUT-sun        DEM    today  
       ‘It is sunny (or the sun shines) today.’
- c. wa-vai~vai            sa            lrededepe=nay.  
       NFUT-red~sun        when        swim(RED)=1P.S  
       ‘It is sunny when we are swimming.’

Sentences which convey meteorological events, such as (77b-c), do not have a grammatical subject. In this respect, Rukai patterns with languages such as Choctaw (North America, Muskogean), as illustrated by (78a-b). See Clark and Clark (1979) for more discussion of denominal verbs, and Eriksen et al. (2012)

for a typological account for various types of meteorological expressions across different languages.

(78) Choctaw (from Eriksen et al. 2012)

- a. Oba-tok.  
rain-PST<sup>21</sup>  
'It rained.'
- b. Oba-cha                      oktosha-h.  
rain.LGRADE-SS   snow-TNS  
'It rained and snowed.'

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<sup>21</sup> The Choctaw abbreviations are: LGRADE, low grade; PST, past tense; SS, same subject; TNS, tense marker.

## Appendix B: NI and the Progressive

The progressive aspect is marked via morphological reduplication. As discussed in section 2.1.2, the generalization is that reduplication only involves the incorporee and excludes the incorporating verb. Consider (79a-c).

- (79) a. *tu-√daane*  
           make-house
- b. *tu-a-da~daane*                   ka     Sula.  
           make-NFUT-RED~house   NOM   PN  
           ‘Sula is building a house/houses.’
- c. *\*wa-tuda~tudaane*               ka     Sula.  
           NFUT-RED~make.house   NOM   PN

One exception to this generalization is the interrogative expression *tu-mane* ‘do-what’, which is formed by *tu-* incorporating the indefinite bound root *-mane* ‘what’ (see Chen 1999; Chen 2005). This complex verb is not discussed in the main text because the incorporee *-mane* is not considered to restrict the denotation of the predicate in the same way as other nominal roots like *daane* ‘house’ and *lalake* ‘child’ do. Morphologically speaking, *tu-* and *-mane* are distinctively fused, as the V-N boundary has evidently disappeared. Reduplication of this interrogative expression does not target only the incorporee, as in (80b), but the fused form, which results in *tuma~tumane*, as shown in (80c). Also, note that nonfuture tense is marked as a prefix, not an infix.

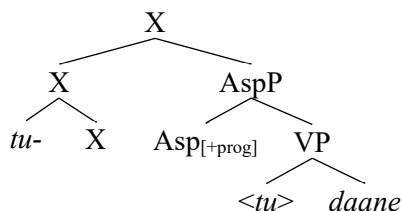
- (80) a. *tu-√mane*  
           do-what
- b. *\*tu-a-ma~mane=su?*  
           do-NFUT-RED~what=2.S.NOM

- c. *wa-tuma~tumane=su?*  
 NFUT-RED~do.what-2.S.NOM  
 ‘What are you doing?’

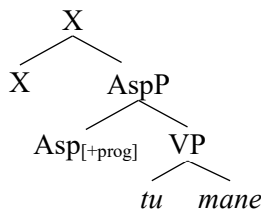
That the V-N boundary has dissolved is taken to be an indication of *tu-mane* being a lexicalized form. The morphological integrity sets *tu-mane* apart from other regular complex verbs, which maintain morphological separability between the two components, such as *tu-daane* ‘build house’ and *tu-lalake* ‘give birth’, and which are considered to be less lexicalized.

The distinct ways of realizing the progressive aspect between lexicalized complex verbs, and less lexicalized ones, can be accounted for syntactically, and the idea is that *tu-* is separated from the incorporee *daane* at some point, which leaves *daane* to be the only element reduplicated. The formulation is roughly sketched as follows. Assume a structure headed by a certain functional category X, possibly a *v*, as given in (81), and assume that the progressive aspect is identified by the functional category Asp, which is associated with the feature [+prog] and is located higher than VP. After the VP and Asp are merged, certain factors trigger movement. As *tu-* and *daane* in the VP are not fused, *tu-* undergoes head movement and adjoins to X, as in (81a). Ultimately, *daane* as the remaining element under VP is spelled out as a reduplicated form due to Asp<sub>[+prog]</sub>. By contrast, *tu-mane* as a whole is subject to reduplication, since *tu-* stays in VP and is not separated from its incorporee *-mane* at spell-out, as in (81b).

(81) a. Structure of *tu-a-da~daane*



b. Structure of *wa-tuma~tumane*



Reduplication of only the incorporee within a complex verb can be found in other Formosan languages, such as Takivatan Bunun (i.e., *la~lumaq*) in (82) and Kanakanavu (i.e., *manuu~manu*) in (83). It remains to be explored whether these languages, as well as other languages, also exhibit lexicalized complex verbs or different reduplicative patterns like Rukai as described in this section.

(82) Takivatan Bunun (De Busser 2009: 402)

haiða	mu-ka-lumaq-a	tudip,	ka-lumaq,
have	ALL-make-house-LNK	past.time	make-house
haiða	aupa ka-la~lumaq-a		
have	thus make-GNR~house-SUBORD <sup>22</sup>		

‘There were people that went to a place to build a house, and houses were built, and thus there was house-building [...]’

(83) Kanakanavu (Adopted from Wild 2018: 101)

ka-manuu~manu	’inia	sua	isua	manu-saronei
make-RED~child	U.3	RP	DIST	child-male
m-acei	cu	sua	nacin(a)-in.	
AV-die	COS	RP	ex.mother-POSS.3 <sup>23</sup>	

‘She gave birth to a baby boy, then the mother died.’

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<sup>22</sup> The Bunun abbreviations are: ALL, allative locative prefix; GNR, generic reduplication; LNK, linker; SUBORD, subordinator.

<sup>23</sup> The Kanakanavu abbreviations are: AV, actor voice; COS, change of state; DIST, determination (remote from deictic center); RP, referential phrase; U, undergoer.



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## 名詞併合、論元重複和謂語縮義：

### 以霧台魯凱語為例

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本文檢視霧台魯凱語（台灣南島語）中的一種名詞併合以及其相關的論元重複現象。在一般情況中，一個無定詞根會與一個動詞前綴併合，兩者間有緊密的構詞結合力。被併合的名詞詞根僅修飾併合謂語的語義，本身並非直接受詞。名詞併合現象所產生的複雜動詞描述不同類型的行為或活動（參照 Mithun 1984）。這些併合句式牽涉到及物性和完事性的特點。名詞併合加上論元重複會產生及物句，其描述的事件通常已完事；相對來說，非及物句則非完事，而且缺乏內在論元。根據 Chung and Ladusaw (2004)的理論架構，本文主張併合名詞詞根的功能乃為限縮謂語的語義，並未造成論元飽和，而併合句中的重複論元才是能造成論元飽和的直接受詞。此外，霧台魯凱語的名詞併合可由一系列的動詞前綴和名詞詞根構成，而論元重複則僅限於少數的複雜動詞。

關鍵詞：名詞併合、論元重複、謂語縮義、飽和、南島語