Abstract

This paper discusses relative clauses (RCs) in Marori, showing that this language unusually has almost all of relative clause types, from headed/headless, externally/internally headed, single-/double-headed, to pre-/post-head, to attached/detached RCs. Special attention is given to internally headed relative clauses (IHRC). It is argued that Marori IHRCs are of the restrictive or non-maximalising type, which accounts for certain intriguing properties, such as their indefiniteness constraints and the possibility for RC stacking.

1 Introduction

Marori (ISO 639-3: mok; a subgroup-level isolate, TNG/Papuan, highly endangered, around a dozen of fluent speakers) is perhaps unusual as far as its relative clause typology (RCs) is concerned.* It has almost all of relative clause types: headed and headless RCs, externally and internally headed RCs, pre- and post- head RCs, as well as detached RCs or co-relatives. In addition, all grammatical relations (subject, objects, obliques and adjuncts) are relativisable. Internally headed relative clauses (IHRCs) are highly constrained and may give rise to ambiguity, if out of context. Thus either the patient 'bench' or the instrument 'club' can be understood as the relativised noun in the following example of IHRC in Marori:

(1). [Keme na **njaj**=i **samagau** ngge terme-ben]$_{IHRC}$
REL   1SG   bench=U club   with 3SG.U.M.hit-1SGNrPST

tamba   keiwei   nggu-f
PERF   damaged   3SG.M.U.AUX –NrPST
a) 'The **bench** that I hit with the club was damaged.'
b) 'The **club** with which I hit the bench was damaged.'

However, there is an intriguing definiteness constraint, which can disambiguate them. For example, if one were a proper name (further discussed later in section 4), such ambiguity would not arise. This definiteness constraint of IHRCs in Marori can arguably be accounted for in terms of Grosu's (2012) semantic typology of RCs; that is, IHRCs in Marori are essentially of the restrictive type, having non-specific indefinite intersective force. Proper names are nominal with unique and inherently definite referents, incompatible with the intersective force of the restrictive RC type. The findings on RCs reported in this paper provide a good empirical basis for the typological and theoretical study of RCs.

The paper is organised as follows. After an overview of the clausal structure and RC marking in Marori (section 2), the basic facts and the salient properties of RCs are outlined in section 3. The discussions given in section 4 provide an explicit analysis of Marori RCs in terms of their c-str properties (4.1), lexical entries and functional annotations involved (section 4.2), and the demonstration of how the analysis works (section 4.3). That IHRCs in Marori belong to the non-maximalising type is discussed in section 4.4. Finally, the conclusion is given in section 5.

2 Clausal structure and marking RCs in Marori

The morphosyntax of the finite clausal structure in Marori is depicted in (2).. It captures the following salient properties of Marori morphosyntax: (i) it is non-configurational (i.e. no VP); (ii) clausal word order is typically verb-final, but it allows post verbal arguments; (iii) argument NPs are freely ordered subject to certain information structure constraints (Arka 2016); (iv) the grammar shows a clear verb-noun distinction with the verb being the clausal head and inflected, (v) the predicate can be complex with the NP preceding the inflected (light/auxiliary) functions as a lexical predicate; (vi) argument marking is semantically transparent, with core NPs flagged for the U role with the clitic =i; and (vii), verb inflections shows TAM information and agreement with the prefix and suffix indexing U and A arguments respectively. Illustrative examples are given in (3).-(4)..

(2).   DP*(=i)   ,   [PREF:U-V.Root- SUFF:A]ᵥ
         ARG(=U)/PRED   (inflected)

(3). a. *mbe=na   kundo-ru*   b. *pa=na   ter=∅-me-ru*
         PART=1SG   run-1SG.FUT   soon=1SG hit=3-AUX-1SG.FUT
         'I will run'   'I will hit him/her.'

(4). a. *pa=ka=i   kara   ku-nggo*
         soon=2SG=U   sick   2SG-AUX.3NPL.FUT
         'You will be sick.'

     b. *tat,   tamba   kwon   k-imb-ra–f*
         grandfather already misquito 2SG-bite-PL-3.NrPST.PERF
         ("you")   OBJ   SUBJ
         'Granpa, you're bitten by misquitos.'

A relative clause (RC) is an adjunct within NP, which itself is part of the nominal structure (DP) whose structure is shown in (5).. The D (Determiner) comes before or after the NP. The adjunct RC and other elements are freely ordered within the NP. Sentence (6). exemplifies a post nominal RC in Marori.

(5).   DP → NP, D.   b. NP →   PossP, NUM, XP:ADJUNCT, N.

(6).   *efi moipur ki=kwundo-f   tamba   soron*
         that child   SG.REL=run-NrPST   PERF   fall.NrPST
         'The child who just ran away already fell off.'

The RC marker in (6). is *ki=*, the shortened form of *kei/kefi,* which is also used as a spatial proximal (PROX) deictic in Marori.[1] The full set of RC markers in Marori is given in (7).. These markers consist of the PROX formative *k-*, with the stems *efi/em(nd)e,* which are actually the third person pronouns in Marori. The same forms are also used as demonstratives.

(7).   RC markers in Marori: SG   NSG   GENERAL
                                   kefi/ kei/ki   *kemnde*   *keme*

3   Defining RCs and the salient RC properties in Marori

3.1   Definition and challenges
         There are three important related aspects in the definition of RCs: syntactic, semantic and pragmatic. Syntactically, a RC is a subordinate clause, functionally an adjunct within a nominal structure. Semantically, it delimits the reference of the nominal by specifying the role of the referent of that NP in the situation described by the RC (Andrews 2007). This defining semantic function of the RC is, however, true only for the RC of the restrictive type. A close scrutiny of the semantics of RCs, however, reveals a complex constellation when other types of RCs are taken into account (further discussed in 4.4). Closely linked to its semantics is the information structure aspect of the RC: a RC introduces a contrast set into the discourse and the referent of the relativised nominal is being focused, in contrast to other referents in the set. For example, in a sentence like (8)., the relative clause (within the angle brackets) singles out one soldier (implying that there were other soldiers in the discourse). This is done by referring the agentive-subject role of the solder in the event (i.e. firing the shot). The relativised nominal is therefore analysed as bearing the discourse function of FOCUS in the proposed LFG-based analysis (further discussed in sections 4.2-4.3).

(8).   The soldier [who fired the shot]$_{RC}$ was suspended until completion of the Military Police investigation

         Properties of relative clauses have been of typological and theoretical interest. Typologically, RCs provide a good window to how languages differ in the typological space of complex clause formation. The topics of intense research include, among others, (i) complexity in structure and marking, investigating questions such as headedness in RC (headed vs. headless, externally vs. internally headed); (ii) strategies to encode RC dependency (gapping vs. pronominal copy) and the related restriction showing which grammatical roles are possibly relativised (cf. the accessibility hierarchy (Keenan and Comrie 1977, Comrie and Keenan 1979, Keenan and Comrie 1979), and (iii) RC semantics, investigating the different meanings associated with different RC types (restrictive, vs. non-restrictive/appositive vs. maximalising), which may account the different behaviours of RCs (Arnold 2007, Grosu 2012).
         RCs pose a challenge to any theory of grammar, as their complexities involve constraints across all components of the grammar, from semantics to

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1 Marori has a complex deictic system, showing a four-way spatial opposition (speaker-proximal, hearer-proximal, semi-distal, and distal) which cross-cuts a three-way number distinction (SG vs. NSG vs. neutral).

morphosyntax and information structure. This is particularly true for a language that has complex morphology, which also shows different types of RC within same grammatical system. In this paper, it is demonstrated that LFG (Dalrymple 2001, Bresnan et al. 2015, among others) is well equipped to handle the complexities of RCs in such a language, namely Marori. The different types of RC in Marori are outlined in the next subsection. The LFG-based analysis, given in section 4, can be straightforwardly captured in other lexically-based frameworks such as HPSG (Sag, Wasow, and Bender 2003).

3.2   *Basic facts: different faces of RCs in Marori*

Marori appears to be unusual in that it shows different types of RC. Almost all types are attested in this language: headed/headless, externally/internally headed, pre-/post-head, attached/detached. Clear cases of these types are presented in this section. There is an issue of the identification of double-headed RC, to be addressed later in section 5.

The externally headed relative clause (EHRC) exemplified in (6). is straightforward and needs no further comment. Of particular interest is the internally headed relative clause (IHRC) given in (1).. Recall that this IHRC is ambiguous: the patient object and the instrument can be equally relativised. This ambiguity effect is an important issue to be discussed in considerable depth in this paper.

When the referent is clear from the context, the relativised noun is often unexpressed. This gives rise to a headless relative clause, exemplified in (9).. The relativiser itself, e.g. *keme* in (10).a can be also dropped, giving rise to a structure shown in (10).b. The syntactic status of this structure is unclear, and ambiguous between IHRC without a relativiser (reading i) or simply two juxtaposed free clauses (reading ii). Further investigation is needed for this.

(9).   kefi   kwara   keswemi   tentara=te
         REL   drum   3SG.M.hit.3SG.PRES REL   soldier=BE.3NPL.PRES
         'the one who is playing the drum is a soldier'

(10).   a.   Koro [keme   na   ife-ben]_{EHRC}   tamba   kundo-f
                 dog   REL   1SG   see-1.NrPST   PERF   run-NrPST
                 'The dog that I saw ran off.'

          b.   [Koro —   na   ife-ben]   tamba   kundo-f
                 dog   1SG   see-1.NrPST   PERF   run-NrPST
                 i) 'The dog that I saw ran off.'
                 ii) 'I saw the/a dog (and it) ran off.'

RCs in Marori can appear within or outside their nominal structures. Within the nominal structure, they can be pre- or post-head RCs. Examples given so far are of the post-head RC type. Example (11).a shows a pre-head RC inside its nominal structure whereas example (11).b shows a detached post verbal RC. This is not unique to RCs in Marori; an ordinary adjunct in Marori can float away from its NP too, as seen in (11).c.

(11).   a.   [keme   na   fis   ndon-du]   ujif]
                 REL   1SG   yesterday   3SG.F.bring.here-1SG.PRES   bird

                 tamba   yaba   nggwo-f
                 already   dead   AUX3SG.F-NrPST

'The female bird that I brought here yesterday already died.'

b. Efi   purfam nam   nuron   nggaku umam
   DET person POSS   wife=U here   come.3SG

   [keme   fis   duet   njomo-bon]_{RC}
   REL   yesterday money   3SG.F.give-1SG.NrPST
   'The person whose wife I gave money yesterday has come here.'

c. *Na   mara=i   pemje-ben*   **kwebu-wen**
   1SG stone=U   step.on-1.NrPST   sink–SG.MOD
   'I stepped on the submerged stone.'

Another salient property of Marori grammar is that all grammatical relations, arguments and adjuncts, are relativisable. The previous examples show the relativisation of subject in (6). and (9)., patient object in (1)., stimulus object in (10)., theme object in (11).a, possessor in (11).b and instrumental adjunct in (1).. The following examples illustrate the relativisation of other roles: recipient object (12). and a locative oblique (13)..

(12). *Maria=i   keme njomo-bon   bosik, tamba kurye-f*
       maria=U REL give.FUT -1PST pig   PERF return-NrPST
       'Maria who I gave a pig has gone back (home) taking it with her.'

(13). *Efi   njaj   [fis   **keme=na kufamon**]*
       DET bench   yesterday REL=1SG sleep-1SG.DUR.NrPST

       tamba   rafonngin
       PERF   broken
       'The table on which I slept yesterday is already broken.'

An important empirical point with a theoretical implication worth mentioning here is the marking and relativisation of obliques and adjuncts. Obliques and adjuncts in Marori must be flagged by their relevant postpositions when they are not relativised. For example, the postpositional clitic *=ku* is obligatory in (14).a, marking the locative-goal. When relativised as in (14).b , *=ku* is not present, either inside or outside the RC. Therefore, this dependency in the RC cannot be accounted for in terms of a filler-gap analysis, as the category of the filler (NP) and that of the gap (PP) are distinct. It must be accounted for in terms of referential identity at the level of f-str, further discussed in the next section.

(14). a. *John   mara=i sour=ku   monjo-f*
         John   stone=U house=LOC   throw-3NPL.NrPST
         'John threw a stone to the house.'

      b. *Efi   sour=e   [keme John __ mara=i   monjo-f]*
         that house=part REL   John   stone =U throw-3NPL.NrPST

         tamba   kewei   nggu-f.
         PERF   damaged   AUX-NrPST
         'The house to which John threw a stone has been damaged.'
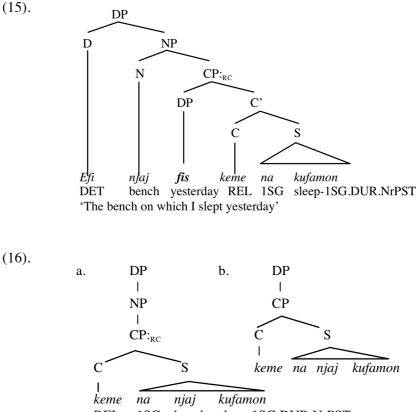
4   Discussion and LFG analysis

In this section, I propose an LFG analyis to account for the RCs in Marori. The analysis consists of the c-str analysis (4.1) and the functional constraints captured by the lexical entries of the relativisers and the annoations in the c-str (4.2). The demonstration of how the analysis works is given in 4.3. Finally, intriguing facts about IHRCs with their possible ambiguity and disambiguation is discussed with reference to the semantic constraints of IHRCs 4.4.
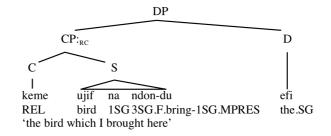
4.1   Structural properties

As mentioned in section 2, the RC is an adjunct, part of an NP within DP. Internally there is good evidence to support that the RC is a CP, with the relativiser in C position, and [Spec, CP] filled in by an XP, e.g. adjunct modifying the RC. This is exemplified in (15). below. Thus, the adjunct *fis* 'yesterday', while showing up before the relativiser *keme*, modifies the RC.

The structure in (15). is for EHRC. Likewise, the IHRC has a CP structure but the mother nodes (NP and DP) are not branching (i.e., without their respective heads). Structure (16).b is the abbreviated version of (16).a.

Our c-str rule can correctly capture the empirical point of the IHRC where the determiner (*efi*) modifying the noun head *ujif* 'bird' shows up outside the relative clause CP, as shown in (17)..

(15).

	Efi	njaj	fis	keme	na	kufamon
	DET	bench	yesterday	REL	1SG	sleep-1SG.DUR.NrPST

'The bench on which I slept yesterday'

(16).

	keme	na	njaj	kufamon
	REL	1SG	bench	sleep-1SG.DUR.NrPST

'The bench on which I slept.'

(17).

```
                                    DP
                   CP:ᵣ𝒸                              D
            C            S
            |          ╱‾‾‾‾‾‾╲
          keme     ujif  na  ndon-du              efi
          REL      bird 1SG 3SG.F.bring-1SG.MPRES  the.SG
          'the bird which I brought here'
```

4.2 *Lexical entries and CP annotations*

The second part of the analysis deals with the information specified in the lexical entry of the relativiser and the associated annotations on the c-str of the RC to ensure that both EHRC and IHRC are correctly parsed or generated.

The entries of the general relativiser *keme* and the singular relativiser *kefi* are given in (18).. Each carries a set of equations by which the information associated with the selected relativised NP in the RC, which bears a particular GF (grammatical function), is shared by the matrix DP. *Keme* and *kefi* differ only in the INDEX specification that regulates the agreement: unspecified for *keme* vs. specified for singular for *kefi*, indicated by [ ]α and [SG]α respectively. The alpha subscript means that the exact value of the index is yet to be determined, depending on the referential features of the nominal in a given RC. This index equation imposes an agreement constraint as to whether or not more than one noun is possibly relativised, e.g. as in example (1)..

(18).a. *keme* C (↑GF INDEX)= [ ]α b. *kefi* C (↑GF INDEX)= [SG]α
              ((↑GF PRED)='pro')   ((↑GF PRED)='pro')
              (↑TYPE)=relative   (↑TYPE)=relative
              (↑GF PRED)=   (↑GF PRED)=
                (↑FOCUS PRED)   (↑FOCUS PRED)

The specifications ((↑GF PRED)='pro') and (↑TYPE)=relative together mean that the relativiser is a relative pronoun and that its pronominal function is optional. This is to capture the fact that in the absence of any overt noun, the relativiser itself is referential; see the case of headless RCs, example (9).. When an overt relativised head noun is present (either inside or outside the RC), however, this pronominal meaning is not used. Instead, the PRED value of the head noun is used.

The last line in (18)., (↑GF PRED)=(↑FOCUS PRED), says that the relativised GF also bears the discourse function of FOCUS. This equation and the index equation (e.g., (↑GF INDEX)= [ ]α) in the entry (which imposes agreement) determine that the specific GF of a particular relativised NP is identified within the embedded RC. In example (1)., for instance, there are three GFs (SUBJ, OBJ and instrumental ADJUNCT) eligible to be picked up by the equations of *keme*. However, the matrix auxiliary (*ngguf*) requires '3SG.M' agreement. This excludes the possibility of picking up the

embedded SUBJ '1SG' as the relativised nominal. (Being a pronoun also excludes it from the relativisation; further discussed in the next subsection.) Given their compatible referential features, OBJ and ADJUNCT are then possibly relativisable, giving rise to ambiguity, as expected.

In addition to the functional equation in the entry of the relativiser, we need a set of equations on the CP (relative clause) node, shown in (19).. The equations regulate the function of the RC and the flow of information, in particular to ensure that the mother node DP picks up its referential information available from the embedded IHRC. The equation ↓∈(↑ADJUNCT) says that the RC is a member of the ADJUNCT set, associated with the mother's GF. The optional ((↑PRED)=(↑ADJUNCT GF* PRED)) means that the functional head of the DP (i.e. the relativised nominal PRED) is supplied by the RC when the mother DP does not have its head PRED. In this way, we capture the essence of an IHRC, where the relativised PRED comes from an NP internal to the embedded clause. If no NP supplies the PRED internally from the embedded RC, given the entry of the relativiser specified in ((18)., then the relativiser itself will supply the functional head of the nominal, namely (↑GF PRED)='pro'. In this way, we capture how the headless RC gains the pronominal interpretation translatable as 'the one (who/which)...' in spite of the missing head. Finally, the selection of the relativised NP is highly constrained by the agreement system. This is imposed by the equation (↑INDEX)=(↑ADJUNCT GF* INDEX).

(19).

$$
\begin{array}{c}
\text{DP} \\
(\uparrow\text{GF})=\downarrow \\
| \\
\text{CP} \\
\downarrow\in(\uparrow\text{ADJUNCT}) \\
((\uparrow\text{PRED})=(\uparrow\text{ADJUNCT GF PRED})) \\
(\uparrow\text{INDEX})=(\uparrow\text{ADJUNCT GF INDEX})
\end{array}
$$

4.3   Accounting for RC properties in Marori

Having outlined the lexical entries and c-str annotations, we are now ready to account for RC intricacies in Marori. We start in this section with the straightfoward case of an IHRC, exemplified by (20).. The partial c-str of this sentence is shown in (21).a. Its f-str is shown in (21).. Note that the matrix verb *nggwof* requires [3.SG.F] agreement (not shown in the c-str but shown in the f-str as index *j*).

(20). [[keme na fis **ujif** ndon-du]RC]NP   **efi**
        REL   1SG yesterday bird   3SG.F bring.here-1SG.PRES that.SG

        tamba   yaba   nggwo-f
        already   dead   AUX3SG.F-NrPST

        'The female bird that I brought here yesterday already died.'

(21). a.

```
                            DP
                       (↑SUBJ)=↓
          ┌──────────────────────────────────┐
         CP                                   D
   ↓∈(↑ADJUNCT)                               │
 ((↑PRED)=(↑ADJUNCT GF PRED))                 │
 (↑INDEX)=(↑ADJUNCT GF INDEX)                 │
     ┌──────────┐                            efi
     C          S                         (↑DEF)=+
     │     ┌────┼──────────┐
   keme   na   fis   ujif   ndon-du
```

keme	na	fis	ujif	ndon-du
(↑GF INDEX)=*j*	(↑INDEX)=	(↑PRED)=	(↑PRED)=
((↑GF PRED)= 'pro')	[1SG]*i*	'bird'	'bring<(↑SUBJ)(↑OBJ)>'
(↑GF PRED)=		(↑INDEX)=	((↑SUBJ PRED)= 'pro')
(↑FOCUS PRED)		[3SG.F]*j*	(↑SUBJ INDEX)= [1SG]*i*
(↑TYPE)=relative			((↑OBJ PRED)= 'pro')
			(↑OBJ INDEX)= [3SG.F]*j*

b.

$$
\begin{bmatrix}
\text{PRED} & \text{'die<(SUBJ)>'} \\
\text{TNS} & \text{NrPST} \\
\text{SUBJ} & \begin{bmatrix}
\text{PRED} & \text{[1]:'bird'} \\
\text{INDEX} & j: \text{3SG.F} \\
\text{DEF} & + \\
\text{ADJUNCT} & \begin{bmatrix}
\text{TYPE} & \text{relative} \\
\text{FOCUS} & \text{[2]} \begin{bmatrix} \text{PRED} & \text{[1]} \\ \text{INDEX} & j \\ \text{N-TYPE} & \text{common} \end{bmatrix} \\
\text{PRED} & \text{'bring<(SUBJ)(OBJ)>'} \\
\text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'pro'} \\ \text{INDEX} & i: \text{1SG} \\ \text{N-TYPE} & \text{pronoun} \end{bmatrix} \\
\text{OBJ} & \text{[2]} \\
\text{ADJUNCT} & \text{'yesterday'}
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

What is special about the IHRC above is that the definite determiner *efi* 'that.SG' modiying the noun inside the RC is external to the RC. The proposed analysis, as seen in the f-str, correctly captures that the [DEF +]

information ends up specifying the nominal head PRED 'bird', thanks to the equations on the CP node. These equations in effect spread the PRED and INDEX values (tag [1], j) from inside the embedded relative clause (S) to higher nodes in the DP, allowing them to be specified by the determiner carrying [DEF +]. The same mechanism in our analysis accounts for the Marori fact that the quantifier *usindu* 'all' or numeral *yanadu* 'two' can also quantify a relativised NP inside the RC from a position external to the RC:

(22). [keme   na   fis   **ujif** kein-du]_{RC}   **usindu**
        REL   1SG   yesterday bird 3NSG.bring.here-1SG.PRES all

        tamba   yaba   nggorforo-f
        already   dead   AUX.3PL-NrPST

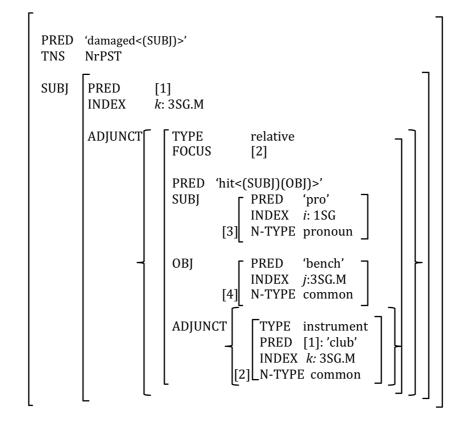'All of the birds that I brought here yesterday already died.'

IHRCs lead to ambiguity, a phenomenon also known in IHRCs in other languages. The ambiguity can be now straightforwardly accounted for in our analysis. The relevant example, repeated as (23)., is the case where two or more NPs inside the RC whose index features are not in clash with those imposed by the agreement in the matrix predicate. They are therefore eligible to be picked up as the functional head of the nominal. These are 'bench' and 'club' (readings (a)-(b)), but not the pronoun *na* '1SG' (reading (c), which is excluded due to a feature clash).

(23). [Keme na **njaj**=i **samagau** ngge   terme-ben]_{IHRC}
       REL   1SG bench=U club   with   3SG.U.M.hit-1SGNrPST

       tamba   keiwei   nggu-f
       PERF   damaged   3SG.M.U.AUX –NrPST
       a) 'The **bench** that I hit with the club was damaged.'
       b) 'The **club** with which I hit the bench was damaged.'
       c) *'I, who hit the bench with a club, was damaged.'

The f-str for reading (b) is given in (24). As seen, the nominal PRED 'club' (tag [1], INDEX k) is inside the RC as an adjunct. The postpositional *ngge* 'with' is treated like a prepositional case marker flagging the ADJUNCT TYPE of instrument (i.e. carrying no PRED attribute). The whole ADJUNCT value is shared by FOC, due to the relativisation enforced by the specification in the entry of *keme* (cf. (24), tag [2]).

Given the [3SG.M] SUBJ agreement of the matrix structure required by the verbal auxiliary *ngguf*, the value specifications of OBJ 'the bench' (tag [4], i.e. 'bench', index j) also satisfy the requirement. Hence, OBJ [tag [4] is predicted to be possibly selected as FOC (i.e. relativised) and matrix SUBJ. The embedded SUBJ, carrying an index of [1SG] is expected to cause a clash in agreement and cannot be selected as the matrix SUBJ, as predicted.

(24).

$$
\begin{bmatrix}
\text{PRED} & \text{'damaged<(SUBJ)>'} \\
\text{TNS} & \text{NrPST} \\
\text{SUBJ} & \begin{bmatrix}
\text{PRED} & [1] \\
\text{INDEX} & k\text{: 3SG.M} \\
\text{ADJUNCT} & \left\{ \begin{bmatrix}
\text{TYPE} & \text{relative} \\
\text{FOCUS} & [2] \\
\text{PRED} & \text{'hit<(SUBJ)(OBJ)>'} \\
\text{SUBJ} & [3]\begin{bmatrix} \text{PRED} & \text{'pro'} \\ \text{INDEX} & i\text{: 1SG} \\ \text{N-TYPE} & \text{pronoun} \end{bmatrix} \\
\text{OBJ} & [4]\begin{bmatrix} \text{PRED} & \text{'bench'} \\ \text{INDEX} & j\text{:3SG.M} \\ \text{N-TYPE} & \text{common} \end{bmatrix} \\
\text{ADJUNCT} & \left\{ [2]\begin{bmatrix} \text{TYPE} & \text{instrument} \\ \text{PRED} & [1]\text{: 'club'} \\ \text{INDEX} & k\text{: 3SG.M} \\ \text{N-TYPE} & \text{common} \end{bmatrix} \right\}
\end{bmatrix} \right\}
\end{bmatrix}
\end{bmatrix}
$$

4.4 Semantic constraints and IHRC typology

This section addresses the definiteness constraint of IHRC in Marori, a phenomenon also observed in other languages such as Lakhota (Williamson 1987, Culy 1990), Dàgáárè (Bodomo and Hiraiwa 2010), Kobon and Wappo (Dixon 2009:331). We have seen that two NPs are equally relativised, giving rise to ambiguity. However, when one of NPs in the IHRC is a proper name, no ambiguity arises, as seen in example (25).. The proper name cannot be relativised in IHRCs in Marori.

(25). [Keme Markus bosik =i ife -f]$_{\text{IHRC}}$
       REL   Markus   pig=U   3SG.M.see-3NPL.NrPST

       tamba kundo -f
       PERF   run-3SG.NrPST

       i)   'The pig that Markus saw ran off.'
       ii) * 'Markus who saw the pig ran off.'

The effect of the definiteness constraint in Marori is also observed with quantification. Recall that the NP relativised in the IHRC can have its quantifier *usindu* 'all' outside the RC; example (22).. The universal quantifier *usindu* presupposes definite referents, and when it quantifies a noun internally within the IHRC it resists relativisation. Thus we have no ambiguity in the following example:

(26). [Kemde usindu meninggon=i purfam paar]_{IHRC}
      REL   all   child.PL=U   person money

    njemba-b   tamba   sra-f
    3.give-3PL.NrPST   already   go.PL-NrPST
    i)'The people who gave money to all the children already went away.'
    ii) * 'All the children who were given money by the people already
        went away.'

I argue that the definiteness constraint, as observed in the preceding examples, is a logical consequence of the typological property of the Marori IHRC, which is essentially a restrictive type. The restrictive RC is known to have the salient features of non-specific indefinite and intersective force at the level of the RC (Grosu 2012). A highly definite or unique referent like a proper name does not allow the intersective interpretation and is therefore inconsistent with the restrictive RC. Evidence for Marori IHRCs as restrictive is given below, but I will first outline Grosu's (2012) typology of (IH)RC briefly.

Grosu (2012) distinguishes three semantic types of RCs: restrictive, appositive and maximalising. The first two are exemplified from English RCs shown in (27).a-b. In (27).a, there were more than three boys at the party, and only three of them had beards; thus, the RC imposes a further restriction to the denotation of 'boys'. The RC information is essential for the identification of the referent of the head noun. In (27).b, there were only three boys in the party; all of them had beards. The RC imposes no referential restriction, and the RC can therefore elide without affecting the identification of the referent of the relativised noun.

(27). a. At the party, I saw only [[three boys [*who had beards*]_{RC}]_{NP} (restr.)

     b. At the party, I saw only [[three boys, [*who had beards*]_{RC}]_{NP} (apps.)
       (Grosu 2012:452, ex. (6))

The maximalising RC is like the appositive RC, in that the denotation is already specific/definite. They are different in the locus of the specificity/definiteness. In the appositive RC, it is fully defined in the matrix NP, as seen in the meaning of (27).b above. In the maximalising RC, the definiteness is fully defined within the RC itself, exemplified by (28).. The maximalising RC is, in a way, like the restrictive RC, in that its information is highly essential. It is 'super restrictive', making the referent of the relativised noun maximally definite; e.g. when the noun is referentially plural it gives rise to the totality of plural meaning, as seen in the example from Japanese in (29).b below. In short, maximalising relatives have the characterisisation of having strong definite import, presupposing the relativised noun to be maximally definite; hence, dropping *the* in (28). would degrade its acceptability.

(28). I suddenly noticed [the three books [that there were on your desk]_{RC}]
(i.e. 'there were exactly three books on your desk and I suddenly
noticed them')
(Grosu 2012: 453)

Japanese provides a good illustration involving a maximalising IHRC. It should be noted that Japanese has both EHRC and IHRC, but the IHRC is of the maximalising RC. The EHRC is exemplified in (29).a and its IHRC counterpart is in (29).b (Grosu's (18) and (20)). Note the difference in meaning as seen in the free translation. The maximalising relative encodes the definite totality of the cookies to be brought by Taro to the party, which is not the case in(29).a.

(29). a. Taro-wa   [[Yoko-ga   reezoko-ni __ irete-oita]
         Taro-TOP   Yoko-NOM   fridge-Loc   put-AUX

   hotondo-no   kukkii-o]   paatii-ni   motte   itta
   almost-all-Gen cookie-Acc   party-to   brought

   'Taro brought to the party almost all the cookies that Yoko had put in the fridge.

   b. Taro-wa   [[Yoko-ga   reezoko-ni   **hotondo-no   kukkii-o**
      Taro-TOP   Yoko-NOM   fridge-Loc   almost-all-Gen cookie-Acc

   irete-oita]-no-o   paatii-ni   motte   itta
   put-AUX-NML-Acc   party-to   brought

   'Yuko put almost all the cookies in the fridge and Taro brought {them, *some} to the party.

Turning to Marori, I argue that IHRCs in this language are restrictive, not maximalising. That is, they do not presuppose definite/specific denotation of the relativised nominal. First evidence for this comes from the fact that the IHRC in Marori can have the full range of quantificational forces, including an existential force, a salient property of the restrictive relative. This is shown in example (30)., where the referent of the relativised noun 'boy' is indefinite. It should be noted that, while not presupposing definiteness, the IHRC does provide specifications which make the referent of the relativised noun definite, with the possibility of the (strong) determiner overtly present at the matrix level; see example (20)..

(30). Ka einda   kefi   meipur di   nie=fi   kuye-den
      2SG 3.search.2PL REL   child.SG FUT   1NSG=with stay-1DU.PRES
      'You look for a child who wants to stay together with me.'

Other evidence that IHRCs are restrictive comes from the fact that they have intersective import, providing a restriction to the denotation of the associated noun in the same way as an ordinary adjunct. To understand this, first consider the restrictive relative clause in English in (31).. The denotation of the object bought in (31). is the one in the intersection of sets of 'books', 'cheapest things', and 'things which are not paperbacks'.

(31).   I bought the cheapest book which was not a paperback.
         (Arnold 2007, ex. (1b))

(32). a. I've never spoken to Kim, who plays poker.

    b. *I've never spoken to Kim who plays poker.
      (Arnold 2007, ex. (1b))

In contrast to (31)., applying a restrictive RC to the proper name Kim i n (32). results in downdgraded acceptability as seen in (32).b. This is attributed to the the referential uniqueness of a proper name which is inconsistent with the intersective interpretation of restrictive RC, which requires a set of referents. Thus, it is not suprising to see why a restrictive RC is not possible with a proper name.

Arguably, the same semantic constraint accounts for why proper names are not relativisable in the IHRC type in Marori, as seen in (25)., giving rise to no ambiguity. The same is true for NPs by the universal quantifier *usindu* 'all', which requires definite referents; see example (26)..

Another related effect of this intersective import is the introduction of contrast set into the discourse by the restrictive RC. Then, this contrast set can be accessed anaphorically. In English, this is done by an expression like *others*, as in (33).a. Non-restrictive RCs do not introduce such a set; hence the downgraded acceptability of sentence b. The equivalent example in Marori is (34)., where the contrast set introduced by the IHRC in the first clause is accessed by *now* in the second IHRC. The possibility of clauses like in (34). provides supports that Marori IHRC is of the restrictive type.

(33). (a) I like puzzles which require imagination and creativity, and others that just depend on knowledge. [Restrictive]

    (b) #I like puzzles, which require imagination and creativity, and others that just depend on knowledge. [Non-restrictive]
    (Arnold 2007, examples (4a-b))

(34). Keme=na ujif kein-du,   keme Jhon **now** kein
    REL=1SG bird bring-1SG.MPRES REL John other bring.NPST

    tamba yaba nggorforof
    PERF dead AUX.PLURAL-NrPST
    'The bird which I brought, (and) the other ones which John brought
    were dead.'

Given the interceptive interpretation, it is therefore possible, and indeed natural, to stack restrictive RCs to provide further intersective specifications to make the denotation more specific. Crucially, both restrictive and appositive RCs can have the stacking, exemplified by (35). and (36).. This is not, however, possible with the maximalising RCs (Grosu 2012), example (37).. In (35)., the depicted (three) referents are on the intersection of sets of individuals who are 'boys', 'bearded', and 'wearing no shoes'. The boldfaced RC further restricts the individuals picked up by the italicised RC, leaving open the possibility that the speaker may have seen additional bearded boys who wore clothes. In the appositive RC (36)., the boldfaced RCs provide additional information but the referent of the relativised noun ('the Hononouble member') remains unique (without any possibility of others). In (37)., the boldfaced RC is unacceptable in its full version. That is,

according to Gorsu (2012:454), the denotation of the construction is already fully determined by the italicised relative, leaving no interpretation for it.

(35).   At the party, I saw only [three boys *who had beards* **who wore no clothes**]. (Grosu 2012: example 8a)

(36).   I fear the Honourable Member, *who nobody trusts*, **who nobody believes, who not even his own supporters listen to,** has finally run out of time. (Arnold 2007: example 56; bold and italics added)

(37).   I suddenly noticed [the three books *that there were on your desk* **that (*there) had earlier been on my desk**]

In Marori, stacking of IHRCs is possible, as seen in (38).. This supports the analysis that IHRCs in Marori are restrictive, not maximalising in nature. Lakhota also has a restrictive IHRC, and is expected to allow RC stacking, as seen in example (39).:

(38).   Na   fis   purfam=i   eyew=nda-mon
          1SG   yesterday person=U   eye=3.AUX-1SG.NrPST

          [*kefi   koro   imbirif   **kefi   kundo-f**]
          REL   dog   bite-NrPST   REL   run-3NrPST

          'Yesterday I was looking for (the/a) person [that dog bit that ran away.]

(39).   [Ogle eya šapšapa cha] agli   pi   wachi   ki   lena e
          shirt some dirty   indef take-home Pl   1-want   the   these be
          'These are the shirt that are dirty that I want them to take home.
          (Grosu 2012: 455):

5   Final remarks and further research

In this final section, I will provide a brief summary of the facts and analysis, and then point out further research needed.

This paper has demonstrated the different types of relative clauses in Marori. The paper hopefully contributes to the empirical basis for the typological and theoretical studies of RCs. Marori is unusual in that it has almost all of the relative clause types: headed and headless; if headed, both externally and internally headed; if externally headed, either attached in the nominal structure or detached from it; if attached, either pre- or post-nominal. Of particular interest is the morphosyntax and semantics of the IHRC. It has been demonstrated that LFG formalism is well equipped to capture the structural intricacies and intriguing properties of IHRCs, such as the possibility for ambiguity/non-ambiguity, which relates to nominal types and definiteness. Nominals with unique and definite referents, such as proper names and pronouns, cannot be relativised in the IHRC. It has been argued that this is due to the fact that IHRCs in Marori are of the restrictive type, not the maximalising one, in Grosu's typology. The salient semantic feature of the restrictive RC is that it has non-specific indefinite and intersective import. As such, it provides some specification to a referent of a set, introducing a contrast to the set. This intersective import is therefore semantically incompatible with a unique definite referent where no contrast (set) is

possible. As outlined in this paper, salient properties of IHRCs in Marori, such as the possiblility of stacking IHRCs or the inability of proper names and pronouns to be internally relativised, have a good semantic basis.

Most of the data presented in this paper was elicited. Future studies on RCs in Marori must therefore include an investigation of the distribution of different types of RCs in natural texts. The corpus-based study is expected to further reveal and illuminate the semantic-discourse constraint of specificity/definiteness in RCs. It has been mentioned in this paper that a pronoun and a proper name cannot be relativised in single-headed RCs in Marori (and also other languages such as Lakota (Culy 1990:168)). However, there is a surprising twist, which shows that such a pronoun can be relativised, provided that it is expressed in a double-headed RC. That is, the pronoun is expressed twice, internally within the RC and also externally in the matrix position as shown in (40).. This kind of nominal doubling, giving rise to a double-headed RC, is attested in other Papuan languages with IHRCs for disambiguation, e.g. as seen in the contrast in examples in (41). from Kobon (Dixon 2009:331). It is not completely clear at this stage of our research whether structure (40). in Marori and (41).b in Kobon are in fact two juxtaposed free clauses, rather than complex structures with embedded RCs. This could be the case for Kobon, for which the alternative translation would be 'the boy hit the girl (and) I know the girl.' A similar two-free-clause analysis in Marori, however, would have a problem in accounting for the presence of the RC marker *keme*. Dropping *keme*, which is possible in Marori, would indeed make the structure analysable as two juxtaposed free clauses. In the presence of *keme*, the structure in (40). can perhaps be analysable as belonging to a double-headed RC. Further investigation is needed what happens if proper names, and even common nouns, are forced to appear in double-headed RCs in Marori.

(40). keme **na**   *bosik=i ife-ben*   *tamba=**na***
       REL 1SG   pig=U   3SG.M.see-1SG.NrPST PERF=1SG

   kundo-bon
   run-1SG.NrPST

   'I, who saw the pig, ran off.'

(41). a. [n̄a   pai   pak-öp]_RC   yad   nöŋ-bin
         boy   girl   hit-PERF.3SG   1SG   perceive-PERF.1SG
         i. 'I know the girl who the boy hit.'
         ii.'I know the boy who hit the girl.'

      b. [n̄a   **pai**   pak-öp]_RC   **pai**   yad   nöŋ-bin
         boy   girl   hit-PERF.3SG   girl   1SG   perceive-PERF.1SG
         i. 'I know the girl who the boy hit.'
         ii.* 'I know the boy who hit the girl.'

Finally, a RC-related issue which is of particular interest and needs further investigation is the connection between (clausal) nominalisation and the nature of structural embedding with its constraints in head-final (OV) languages like Marori. There is an intriguing behaviour of IHRCs in Marori with the preference for discontinuous post-verbal RCs. This is perhaps what

is expected for an OV language, in line with the finding reported in the literature that the reduction of preverbal arguments in SOV languages is a compensatory strategy to reduce the heavy cost in production and comprehension (Hawkins 2004, Ueno and Polinsky 2009, and the references therein). Further research in this area will include an in-depth corpus investigation of Marori, preferably including comparison with (OV/VO) languages with IHRCs, to gain further empirical evidence for any analysis proposed.

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