Topography and frame of reference in the threatened ecological niche of the atoll

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Outline

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1. Introduction and hypotheses

1.1   Project overview

- Report on project investigating spatial language in atoll-based languages:

    Thinking and talking about atolls: the role of environment in shaping language and our understanding of physical space

- Acknowledgement: Australian Research Council Discovery Project grant DP120102701

- Objective: test hypotheses about the role of the physical environment in shaping spatial language.

1.2   Physical environment in language

- The physical environment of a language locus may emerge in language as:
  - Reference to landmarks
  - Frame of Reference choice
  - Structure and semantics of systems in absolute Frame of Reference

- Assumption: grammatical systems provide a window on what is conceptually 'important' to speakers, on what is frequently mentioned, and on structure of conceptual representations (see e.g. Talmy 1983; Heine 1997; Enfield 2002; Lucy 2011).

- Grammaticalized FoR systems crucial.

- However, non-grammaticalized reference to landmarks also reveal aspects of conceptual structure.

- Extensive evidence of correlations between linguistic and non-linguistic spatial behaviour (e.g. Majid et al. 2004; Pederson et al. 1998; Levinson 2003).

- Suggests compatible cross-modal conceptual representations of space, or underlying representation(s) accessed by diverse modalities.

- At issue: interplay of factors in conceptual representations of space:

  - response to salient features in external environment

  - cultural interaction with environment

  - linguistic expression of space

- Pilot studies (below) found correspondences between spatial systems in diverse languages spoken in similar "topographic" environments.

- "Topography" broadly construed as features of the natural world, including mountains, rivers, coasts etc, but also including path of sun, wind direction etc.

- Hypothesis: linguistic spatial systems are constructed in part in response to salient features of the external environment (boundary between land and sea, flow direction of large watercourses, location of dominant mountains, path of sun, etc).

1.3   Frames of Reference

- Frames of Reference are strategies for imposing an asymmetry on a scene in order to project a search domain or path off a ground object or location (Levinson 2003; Palmer 2015).

- Intrinsic: asymmetry assigned on basis of perceived intrinsic features of ground (e.g. *front* projects off facet perceived as intrinsic front).

- Relative: asymmetry imposed on basis of viewpoint (e.g. *front* projects off facet facing viewer).

- Absolute: asymmetry imposed on basis of anchoring phenomenon in external world (e.g. *seaward* projects off facet facing sea) (Palmer 2015).

- Absolute systems vary widely, invoking a wide range of external anchoring phenomena.

- Many such systems invoke prominent features of the physical language locus.

- Evidence also that some correlation may exist between environment and choice of absolute or relative FoR – e.g. rural vs. urban (Majid et al 2004:112; Pederson 1993, 2006:429-434).

1.4   Preliminary study – mountains and rivers

- Closely related languages in diverse environments displaying commensurately diverse absolute systems: South Sulawesi subgroup, Austronesian (Palmer 2005, 2015):

  - Makassarese (coastal):

raya	'landward'	*wara'*	'clockwise around peninsula'
lau'	'seaward'	*timboro'*	'anticlockwise around peninsula'

  - Embaloh (riverine interior):

urait	'upriver'	*anait*	'away from river', 'upwards'
kalaut	'downriver'	*indoor*	'towards river', 'downwards'
suali	'across' (away from bank across river)		

  - Aralle-Tabulahan (highlands):

Riverine		Elevational	
tama	'upriver', 'inwards'	*dai'*	'uphill', 'upwards'
sau	'downriver', 'outwards'	*naung*	'downhill', 'downwards'
		pano	'along' (same altitude along hillside)
bete'	'across' (same altitude on far side of river/valley)		

- Unrelated languages in similar environments displaying similar absolute systems (Palmer 2005, 2015):

- Aralle-Tabulahan (Austronesian, Sulawesi highlands):

tama	'upriver', 'inwards'	*dai'*	'uphill', 'upwards'
sau	'downriver', 'outwards'	*naung*	'downhill', 'downwards'
		pano	'along' (same altitude along hillside)
bete'		'across' (same altitude on far side of river/valley)	

- Florutz German (Indo-European, Italian Tyrol):

/in/	'upriver', 'inwards'	/ao/	'uphill', 'upwards'
/aos/	'downriver', 'outwards'	/o:/	'downhill', 'downwards'
		/um/	'along' (same altitude along hillside)
/du:r/, /he:r/		'across' (same altitude on far side of river/valley/mountain)	

- Samo (Trans New Guinea, New Guinea highlands):

to-	'upriver'	*fo-*	'uphill', 'upwards'
ya-	'downriver'	*mun-*	'downhill', 'downwards'
sou-		'across' (same altitude on far side of river/valley)	

- Dyirbal (Australian, Great Dividing Range, Queensland):

-dawa	'upriver'	*-daya*	'uphill', 'upwards'
-balba	'downriver'	*-bayja*	'downhill', 'downwards'
-guya		'across' (same altitude on far side of river/valley)	

1.5   Preliminary study – atolls

- Study of four atoll-based Austronesian languages: Marshallese (Micronesian), Kiribati (Micronesian), Tokelauan (Polynesian), Iaai (New Caledonian) (Palmer 2005, 2007, 2015)

- Cardinals (associated with path of sun and tradewinds): open ocean

- Landward-seaward (excluding Kiribati): inshore maritime

- Unique atoll-based terrestrial system:

	Marshallese	Kiribati	Tokelauan	Iaai
oceanward	*lik*	*-rake*	*tua*	*cöu*
lagoonward	*ar*	*-rio*	*namō*	*gööny*
wildernessward	*o̦o̦j*	-	*vua*	*hnyoot*

1.6   Topographic Correspondence Hypothesis

- These findings and similar observations prompted Topographic Correspondence Hypothesis (Palmer 2002, 2015).

- Correlations exist between a language's system of absolute spatial reference and the topography of the language locus.

- Implication: features of absolute spatial systems are conceptual responses to environment.

1.6   Topographic Correspondence Hypothesis

- TCH predicts:

  - similarities in spatial systems of languages spoken in similar environments

    (linguistic similarities expected to correlate with environmental similarities)

  - differences in spatial systems of languages spoken in different environments

    (linguistic differences expected to correlate with environmental differences)

1.7   Environment Variable Method

- Objective: test TCH by comparing diverse languages for correlations between spatial language and environmental similarities and differences.

- Pilot studies were opportunistic and untargeted.

- Essential to introduce rigour by making environment a controlled variable.

- Proposed Environment Variable Method (Palmer 2002, 2015).

- EVM tests TCH by:

  - comparing closely related languages (ideally a single language) in diverse environments

  - comparing genetically and areally unrelated languages in highly similar environments

- Employ same elicitation and experimental methodologies in all field sites for maximal comparability.

- Essential to reduce/eliminate similarities arising from phylogenetic relatedness or areal influence.

- Ideal to test unrelated languages in same location but unviable as unable to exclude areal influence.

- Iaai (Southern Oceanic)

- Faga Uvea (Polynesian)

- Distantly related

- Spoken on same atoll

- Extensive contact prohibits inferring similar responses to environment.

- Necessary to target separate loci as similar as possible.

1.8   Present project

- Project targeted atoll-based languages

- Atolls have highly unusual topography

- Preliminary atoll study found grammaticized terminology unique to atoll-based languages and operationalizable only in atoll topography

- Atoll environment highly endangered due to climate change so opportunities for testing spatial language in this kind of environment in future will be reduced

- Project targeted Marshallese (Austronesian, Marshall Islands) as baseline language, on atoll as baseline environment.

- On first dimension, compare use of spatial language in Marshallese in three environments:

  - Atoll

  - Singleton island

  - Urban community in continental USA

- On second dimension, compare atoll Marshallese with phylogenetically and areally unrelated language spoken on topographically similar atoll.

- Dhivehi (Indo-Aryan, Maldives)

- Additional data from urban Dhivehi

2. Languages and field sites

2.1   Marshallese

- Oceanic language spoken in the Marshall Islands (N Pacific).
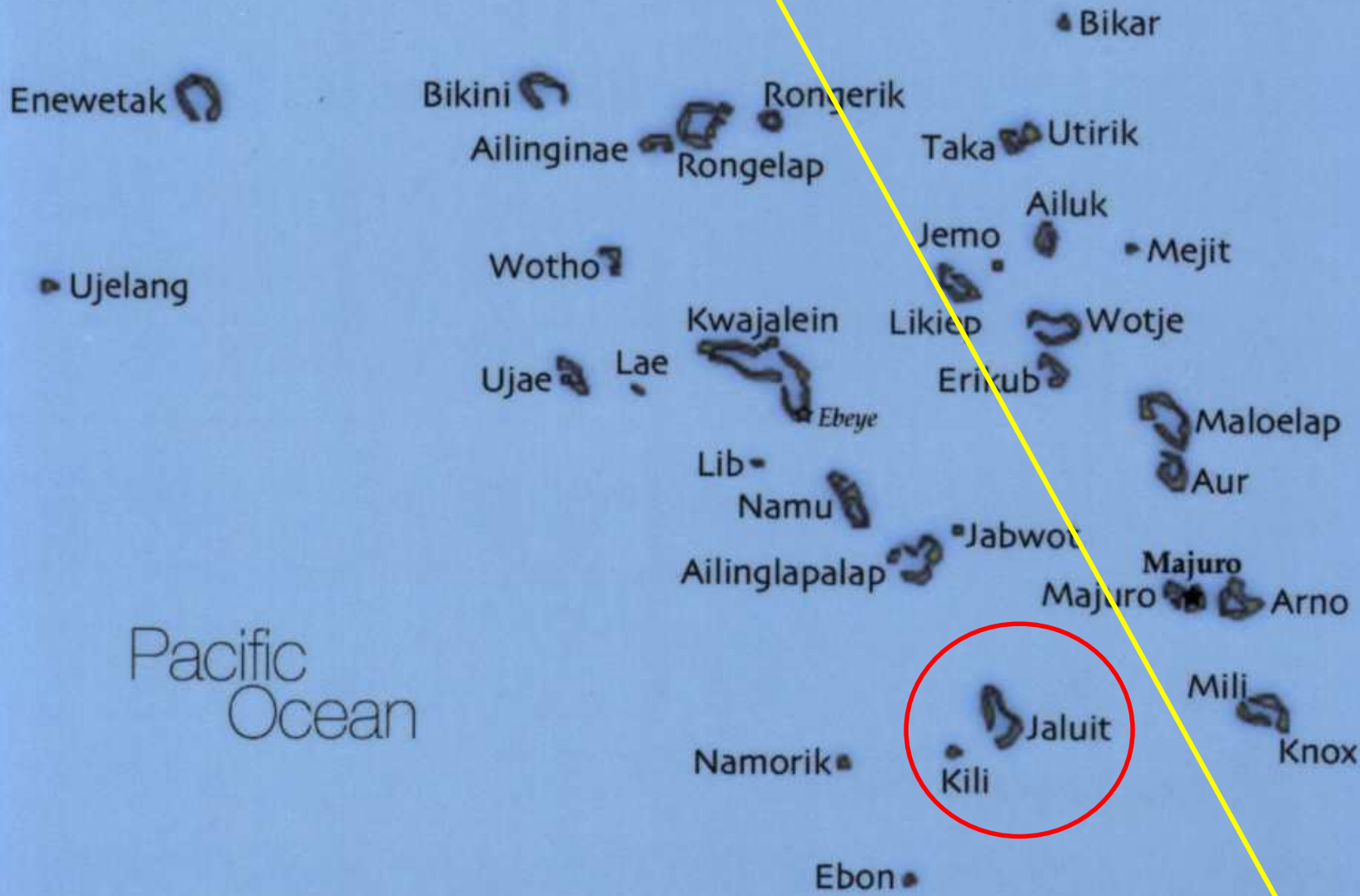- Approx. 100,000 speakers, primarily in the RMI and the USA.

2.1.1   Marshallese field sites

- Following the Environment Variable Method, data were collected from three locations, corresponding to three different topographical environments:

  - Atoll: Jaluit

  - Non-atoll island: Kili

  - Urban inland environment: Springdale, Arkansas

Marshall Islands

2.1.2   Jaluit Atoll

- Former capital of the Marshalls and regional sub-centre.

- Data collected over 4 months from two 'islands' within Jaluit Atoll: Jabor in the west, and Jaluit Island in the south.

- Jabor is the main island with higher levels of urbanisation and education. Has 24/7 electricity, a high school, and a Catholic primary school.

- Jaluit Island 12km away from Jabor by rough road. Less educated, less urban.

2.1.2   Jaluit Atoll

2.1.3   Kili Island

- Roughly 3km^2 island located approx. 50km west of Jaluit Atoll.

- Only recently settled during the 20th century by refugees from Bikini Atoll where atomic testing took place.

- More educated/urbanised than Jaluit Island, less than Jabor.

- Data collected over 1 month period.

2.1.3   Kili Island

2.1.4   Springdale, Arkansas

- Marshallese migration began in the late 70s and took off in the late 90s.

- Largest concentration of Marshallese in the US (15,000+, approx. 15% of city's population).

- Data collected over 2.5 month period.

2.1.4   Springdale, Arkansas

2.2   Dhivehi

- Indo-Aryan language spoken throughout the Maldives (Indian Ocean).

- Approx. 340 000 speakers, mostly in the Maldives.

2.2.1   Dhivehi field sites

- Primary field site in the Maldives was Laamu Atoll:

  - Similar in size, shape and topography to Jaluit Atoll, though Laamu has more islands.

  - Relatively far from the capital, Malé.

  - Relatively untouched by tourism.

- Some data also collected from capital Malé and from Addu, the second largest city.

2.2.2   Laamu Atoll

- Population of 14 000 in 12 inhabited islands (now 11).

- Many men are fishermen, though some work as farmers or in other jobs (e.g. civil servants, teachers, factory staff).

- Women mostly work in the home, but sometimes as farmers, civil servants, teachers, etc. Women do not fish.
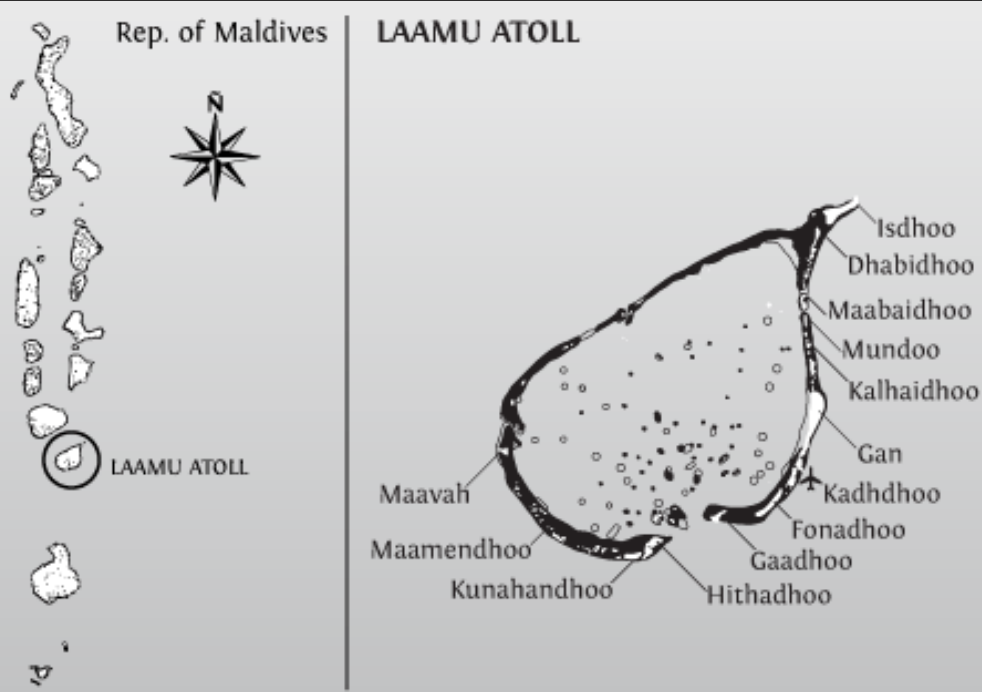
2.2.2   Laamu Atoll

- Urbanized to an extent:

  - Streets are arranged in grids and often cover the width of an island.

  - Most buildings are one-storey with enclosed backyards/courtyards.

- 9 months fieldwork in 2013-2014 and 2014-2015 focused on:

  - Fonadhoo: atoll capital, population ~1800, mostly indoor workers

  - Dhanbidhoo: population ~900, fishing community with some farmers

- Some data also collected from the other inhabited islands.

2.2.2   Laamu Atoll

2.2.3   Malé

• The 'Manhattan of the Maldives'

2.2.3   Malé

- Densely populated (154 000 people in 5.8 km^2).

- No skyscrapers, but most buildings between 3-12 stories.

- Narrow streets.

- Visual difference between lagoon and ocean has been lost due to land reclamation on all sides.

- Levels of education and English proficiency are higher than in the outer atolls.

- Residents work in white-collar jobs.

3. Methodology

3.1 Overview

- MPI-style 'director-matcher' elicitation tasks:
  - Rich in spatial descriptions
  - Maximally comparable across samples
- Object Placement Task:
  - Reveals how speakers interpret spatial terms
- Non-linguistic spatial reasoning tasks:
  - Tests for possible Whorfian effects of language upon thought
- Other:
  - Narratives
  - Participant observation
  - Reports from native speakers

3.2 Man and Tree

3.2 Man and Tree

- **'**Director' describe photos for 'matcher' to identify.

- Ann Senghas version (Terrill & Burenhult 2008).

- 16 photos show a man and a tree in various configurations:

  - Man can face left, right, towards or away from the players.

  - Man can be to the left, right, front or back of the tree.

  - Complete set of distinctions, unlike some other versions of the game.

  - In analysis, descriptions of man's <u>orientation</u> coded separately to descriptions of the <u>location</u> of man or tree.
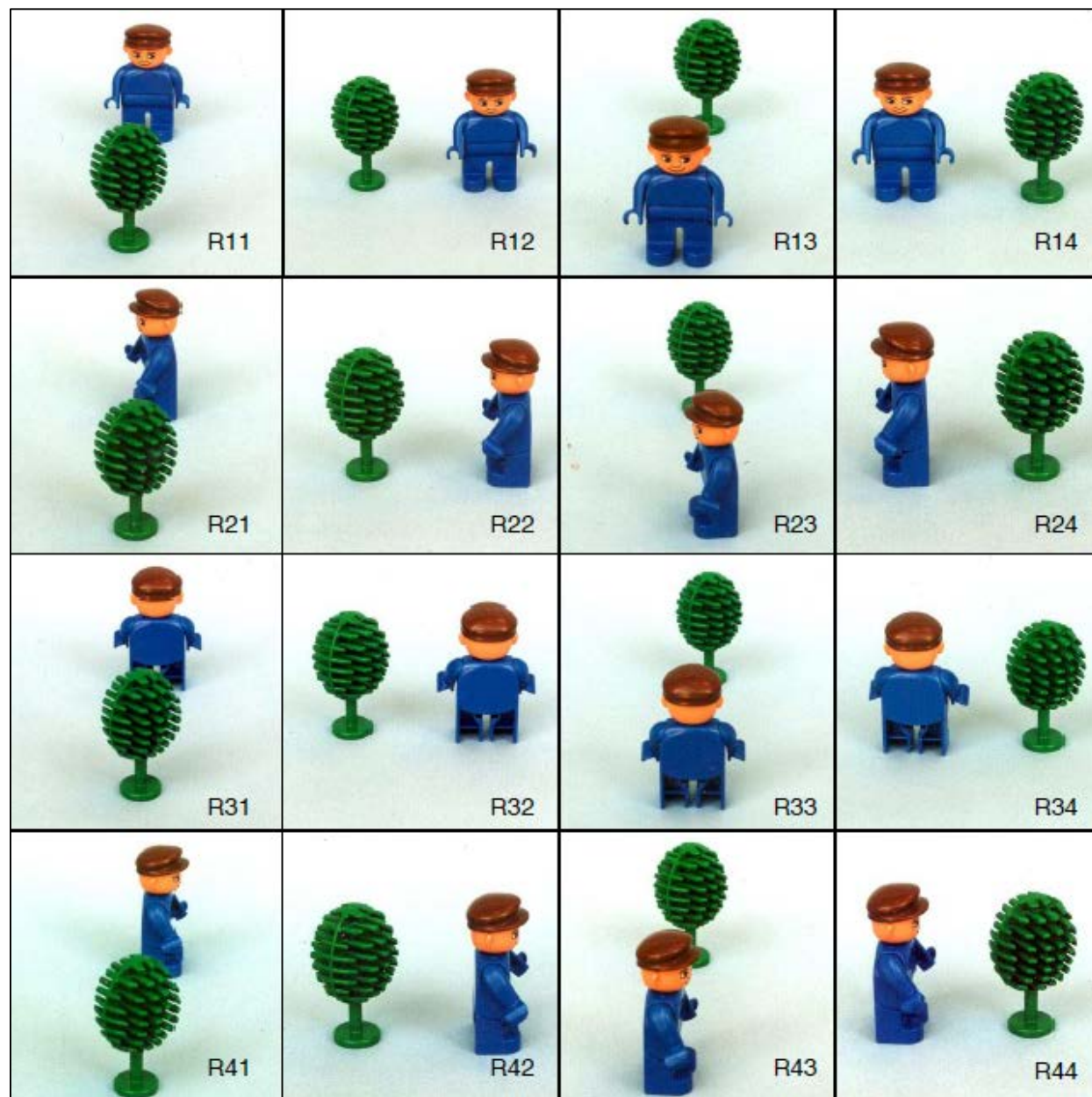
3.3 Route Descriptions

- Participants describe paths through a Lego array:

3.4 Verbal Animals-in-a-row

- Participants describe arrays of toy animals:

3.5 Virtual Atoll Task

• Participants navigate through a virtual atoll environment (see Lum & Schlossberg 2015).

3.5 Virtual Atoll Task

3.6 Object Placement Task

- Participants respond to linguistic stimuli such as "put the cube in front of the car" to ascertain FoR interpretation, and preference between intrinsic and subtypes of relative).

3.6 Object Placement Task

- Takes advantage of the fact that intrinsic and relative FoR share common vocabulary.

- Responses can be noted with pen and paper, no transcription or translation of data required – data is therefore easier to collect, process and analyse (Schlossberg et al. 2015).

3.7 Methodological issues

- Stimulus materials were sometimes problematic:
    - Vertical descriptions in Man & Tree game
    - Virtual Atoll Task could only be used with young speakers
- Everyday usage vs. task-specific usage:
    - Tasks forced speakers to give highly precise descriptions, and to avoid pointing. But this is unusual in many communities.
    - Speakers sometimes resorted to strategies they would not ordinarily use – e.g. relative 'left' and 'right' in Springdale Marshallese.
- However, tasks were still useful in eliciting comparable data, and revealing differences between and within communities.

4. Spatial language in Marshallese & Dhivehi

4.1   Spatial reference in Marshallese

- Like other Oceanic languages, Marshallese nouns encode a local/common distinction.

  - Local construction omits preposition *ilo* 'at'

  - Local nouns do not take demonstratives.

  - Local nouns can take bound locative prepositions *i-* and *tu-*

(1)   *E=j*   *pād*   ***ilo***   ***wōjke***   *ŋe*
       3SG=TAM   be.located   at   tree   that
       "He is at that tree."

(2)   *E=j*   *pād*   ***(i-/tu-)lik***   *l *wojke*   *ŋe*
       3SG=TAM   be.located   (LOC-)ocean.side   / tree   that
       "He is at the ocean side/*that tree."

4.1.1   Directionals in Marshallese

• Unusually, many local nouns have also grammaticalised as directional enclitics.

(3)   *E=j*   *rei=**lik**=ḷo̗k*

   3SG=TAM   look=oceanward=thither

   "He is looking oceanward."

Topographic		Cardinal		Vertical/horizontal		In/outward	
ar	lagoonward	*nin̄a*	northward	*lōn̄*	upward	*nabōj*	outward
lik	oceanward	*rōn̄a*	southward	*laḷ*	downward	*deḷo̗n̄*	inward
meto	seaward	*ta*	eastward	*m̧aan*	forward		
āne	landward	*to*	westward	*lik*	backward	**Interrogative**	
o̗oj	wildernessward					*ia*	where?

4.1.2   Space in the Marshallese landscape

- Marshallese has a geocentric directional system adapted to the unique atoll environment, resembling other languages spoken on atolls (Tokelauan, Kiribati, Iaai) (see Palmer 2007).

- This geocentric system is one of three distinct subsystems operating in different domains (Ozanne-Rivierre 1997; Palmer 2002; François 2004):

  - Terrestrial domain (locations/directions on land)

  - Inshore maritime domain (locations/directions at in lagoon or at sea in sight of land, e.g. travel between neighbouring islands, fishing trips, etc.)

  - Navigational domain (locations/directions on the open ocean, e.g. long distance travel out of sight of land)

4.1.3   Space in the navigational domain

- On the open ocean, Marshallese employs cardinal directions.

	Directional	**Nominal**
North	*=ninā*	*iōn̄*
South	*=rōnā*	*rōk*
East	*=ta*	*rear*
West	*=to*	*rilik*

- Diachronically, this system is derived from a wind-based system.

  - *=ta, =to* reflexes of POc **sake* 'up(wind)' and **sipo* 'down(wind)' (see François 2004). Synchronically associated with rising and setting of sun.

  - *rōk* from POc **raki* 'dry season when the southeast tradewinds blow' (Ross 1995).

4.1.4   Space in the inshore maritime domain

- Used on both the lagoon and the ocean in sight of land.

- Primary axis is *āne – meto* 'landward-seaward'.

- Cardinals may be used as well, but are secondary to the landward-seaward axis.

- Cardinals generally only used if greater specificity is required, or the cardinal direction is significant for some reason.

4.1.5   Space on land (terrestrial domain)

- *(i)ar–lik* axis traditionally described as a lagoonward-oceanward axis, both by speakers and linguists (Abo et al. 1976; Zewen 1977:130; Palmer 2007).

- Nearest cardinals axis commonly rotate to form a perpendicular cross-axis (common in Austronesia) (e.g. Wassman & Dasen 1998, Palmer 2002, François 2004).

- *Ǫoj* 'towards the interior, wildernesswards' is used on less urbanised islands. Often coincides with *lik* as settlement tends to be on the lagoon side.

- Salient landmarks are commonly used too (e.g. the high school on Jabor).

4.1.6   The *(i)ar – lik* axis

- *lik* also means 'back', suggesting cultural association between the ocean side of an atoll and the side less interacted with.

- *ar* reflects PMc **aro-* 'shore, beach, vicinity' (Bender et al. 2003) cognates e.g.:
  - Puluwatese *yero-*, Carolinian *aro-,* Woleian *yaro-(li)* 'near'
  - Ponapean (volcanic island) and Mokilese (atoll) *ɔrɔɔr*: 'land near the ocean, landing place for boats'.
  - Bender et al. (2003) lists Marshallese reflex as *iar* 'lagoon side'.

- (*i*)*ar–lik* axis also used on Kili:
  - *iar*: calm less rocky side of the island, where ships dock
  - *lik*: choppy, rockier shore of the island.

iar on Jaluit (lagoon side)

iar on Kili (calm side)

4.1.7   The *(i)ar – lik* axis

- *(i)ar-lik* axis on Mejit (another singleton island) used in same way as on Kili. Unlike Kili, Mejit has long history of settlement.

- This suggests that Marshallese *iar* has same underlying meaning as in Ponapean and Mokilese: the "calm side" of the island, where ships dock and people live.

- Suggests the most accurate translation of *iar-lik* is 'near/calm side-back side'.

4.1.7   The *(i)ar – lik* axis – Conclusion

- *Iar-lik* findings suggest Marshallese speakers on singleton islands apply an underlying meaning to that specific environment, rather than reconfigured a lagoonward-oceanward axis to a non-atoll island.

- The corollary therefore also applies – speakers on atolls apply the same underlying meaning to that specific environment.

- Traditional translation of *iar* as lagoonward privileges a more concrete superficial association over the more abstract conceptual underlying meaning.

4.1.8 Cardinals: Jabor

	Directional	Nominal
North	=nīnā	iōn̄
South	=rōnā	rōk
East	=ta	rear
West	=to	rilik

- Rotated to form a make-shift cross-axis to the primary *iar-lik* axis on the local scale.

4.1.8   Cardinals: Kili

4.1.9   Conceptualising cardinals in Marshallese

- On Kili, cardinal N-S and E-W axes are parallel (though *iōn̄-rōk* 'north-south' rarely used).

- Many Jaluit speakers cannot derive the direction of one cardinal from the direction of another (e.g. knowing 'east', speakers cannot derive 'west').

- Implies that many speakers do not perceive cardinals as pair of crossed axes, but four individual independently anchored directions (see Terrill & Burenhult 2008 for this in Lavukaleve).

- Men, who fish and sail, generally stronger with cardinals than women, who never fish or sail.

- Older speakers generally better than younger speakers, perhaps because of decline of sailing and fishing.

4.2   Spatial reference in Dhivehi

- Dhivehi has intrinsic, relative and absolute FoRs.

- Subtypes in absolute FoR include:

  - Cardinal directions

  - Sidereal compass directions

  - Inland-beachward axis

  - Landmarks (artificial as well as natural/topographical)

- *Uturu* 'north' and *dekunu* 'south' have cognates in many Indo-Aryan languages

- Probably came to Maldives with Pre-Dhivehi speakers.

- *Huḷangu* 'west' and *iru(mati)* 'east' probably emerged in 17th–19th centuries, from terms for 'wind' and 'sun' respectively (prevailing monsoon wind is from south-west).

- Sidereal compass terms are from Arabic

- Probably borrowed from Arab seafarers in medieval period.

- Traditionally very important for maritime navigation, but now seldom used.

- Some evidence for a grammaticized inland-beachward axis, distinct from other landmarks

- In Dhivehi, FoR terms are expressed as nouns which take usual Dhivehi case marking (e.g. *utur-aṣ* 'north-DAT').

- FoRs expressed with five main types of constructions:

  - Relative clause + 'side'

  - Bare noun + 'side'

  - *dimā(lu)* construction

  - Gernal dative construction

  - Locative dative construction

4.2.1   Dhivehi: relative clause + 'side'/'end' construction

- A noun meaning 'side'/'end' is modified by a relative clause.

- Relative clause anchors the relation in an array-external feature, typically a landmark.

- Any noun may appear in such relative clauses**:**

(4)   *mīhā*   *hurī*   *gahu-ge*
       person   stand.PST.FOC   tree-GEN

       [*eggam-āi*   / *dor-āi*   / *Kurugam-āi*   / *Mataresmāge-āi*
       inland-COM / door-COM / Kurugamu-COM / Mataresmaa.House-COM

       vī]   *farātu-gai*
       be.PST.PTCP   side-LOC

"The person is **on the inland/door/Kurugamu/'Matharesmaa House' side of the tree.**" (lit. "…at the tree's with-the-inland-being side")

4.2.2   Dhivehi: bare noun + 'side'/'end' construction

- A noun meaning 'side' or 'end' is modified by a bare noun.

- In theory any noun can participate if well established in the discourse, but more natural for:

  - LRFB terms
  - Cardinal directions
  - Certain topographical terms (e.g. *eggamu* 'inland')

(5)   *mīhā*   *hurī*   *gahu-ge*   ***kanāť***   **/ *uturu* / *eggamu***   ***farātu-gai***

    person   stand.PST.FOC   tree-GEN   **right.hand** **/ north** **/ inland**   **side-LOC**

    "The person is on the **right-hand/north/inland side** of the tree."

4.2.3   Dhivehi: *dimā(lu)* construction

- The relational noun *dimā(lu)* 'direction, towards' assigns comitative case to the preceding noun.

- Preceding noun normally a landmark (not compass direction).

- Typically expresses motion/orientation towards a goal:

(6)   *mīhā*   *hurī*   ***dor-āi***   ***/ eggam-āi***   ***dimāl-aṣ̌***

     person   stand.PST.FOC   **door-COM / inland-COM   direction-DAT**

        kurimati   *lai-gen*

        front   put.CVB-SUC

"The person is facing **towards the door/inland**."

4.2.3   Dhivehi: *dimā(lu)* construction

- Occasionally used to express location:

(7)   *mīhā*   *hurī*   ***dor-āi***   ***/ eggam-āi***   ***dimāl-aṣ***

person   stand.PST.FOC   **door-COM / inland-COM   direction-DAT**

"The person is (located) towards the door/inland (e.g. from the tree)."

4.2.4 Dhivehi: general dative construction

- Used for general descriptions of path or orientation (with verbs like 'go', 'turn', 'face', etc.).

- Goal is expressed by a noun in dative case.

- Any noun referring to a direction or goal can be used naturally in this construction:

(8)   *mīhā*   *hurī*   ***dor-aṣ*   / *eggam-aṣ* / *utur-aṣ*   / *kanāt-aṣ***

      person   stand.PST.FOC   **door-DAT / inland-DAT / north-DAT / right.hand-DAT**

         kurimati   *lai-gen*

         front   put.CVB-SUC

      "The person is facing **the door/inland/north/right**."

4.2.5   Dhivehi: locative dative construction

- Dative sometimes expresses location, but only with some spatial nouns:

  - LRFB terms (e.g. *kanāťˠ* 'right hand')
  - Cardinals (e.g. *uturu* 'north')
  - *eggamu* '(in)land' and *atiri* 'beach (on either side of the island)'
  - Terms meaning 'side', 'end' or 'direction' (e.g. *farāťˠ* 'side')
  - Topological relations (e.g. *mati* 'top')

(9)   *mīhā*   *hurī*   *gahu-ge*   **kanāt-aṣ̊ / utur-aṣ̊   / eggam-aṣ̊**

       person   stand.PST.FOC   tree-GEN   **right-DAT / north-DAT / inland-DAT**

       "The person is **to the right/north/inland** of the tree."

(10)   *mīhā*   *hurī*   *gahu-ge*   ***gē-aṣ̊**

        person   stand.PST.FOC   tree-GEN   **house-DAT**

        Intended: "The person is **towards the house** from the tree."

4.2.5   Dhivehi: locative dative construction

● Dhivehi has terms for atoll topography:

- *daṣē* 'lagoon shore', *matifuṣ* 'ocean shore', *fuṭṭaru* 'reef (on ocean side)', *vilu* 'shallow patch in lagoon', *eterevari* 'lagoon'

● But, unlike 'inland' and 'beachward', these terms cannot be used in the locative dative construction:

(11)   *mīhā*   *hurī*   *gahu-ge*   ***eggam-aṣ   / atiri-aṣ***

  person   stand.PST.FOC   tree-GEN   **inland-DAT / beach-DAT**

  "The person is **inland/beachward** of the tree."

(12)   *mīhā*   *hurī*   *gahu-ge*   ****daṣē-aṣ   / *fuṭṭar-aṣ***

  person   stand.PST.FOC   tree-GEN   **lagoon.shore-DAT / reef-DAT**

  Intended: "The person is **lagoonward/oceanward** of the tree."

4.2.5   Dhivehi: locative dative construction

- This suggests that a beachward vs. inland distinction may be conceptually significant.

- Not surprising for an island language, but not sensitive to a lagoon vs. ocean distinction as predicted by the TCH.

4.2.6   Dhivehi FoR constructions: summary

	rel. clause + 'side'	bare noun + 'side'	*dimā(lu)*	general dative	locative dative
LRFB terms	?	✓	?	✓	✓
Compass directions	(✓)	✓	(✓)	✓	✓
atiri 'beach' *eggamu* 'inland'	✓	✓	✓	✓	✓
Other landmarks	✓	✓	✓	✓	*

5. Man and Tree: quantitative data

5.1 The Marshallese corpus

- 11 hours 40 mins of M&T games recorded, 5 hrs 21 mins selected for analysis (~21 000 words)

- 27 pairs in Jaluit Atoll:

  - 15 male pairs, 7 female pairs, 5 mixed pairs

  - Average age 26.5, range 16-52

  - 16 pairs in Jabwor, 11 pairs on Jaluit Island

  - Setting (indoors/outdoors) and facing direction varied

  - Total 1130 location descriptions, 881 orientation descriptions

- 12 pairs on Kili (singleton island)

- 7 pairs Springdale, USA

5.2 The Dhivehi corpus

- 12hrs of M&T games recorded, ~6hrs selected for analysis (~31 000 words)

- 50 pairs in Laamu Atoll:

  - 29 male pairs, 21 female pairs

  - 16 pairs aged **<34**; 17 pairs aged **35-49**; 17 pairs aged **50+** (average age 41.8, range 17-71)

  - 28 pairs from **fishing islands**, 22 pairs from **non-fishing islands**

  - Setting (indoors/outdoors) and facing direction also varied

  - Total 2450 location descriptions, 1655 orientation descriptions

- 4 pairs in Malé

- 5 pairs in Addu Atoll

5.3   Laamu Atoll vs. Jaluit Atoll

Location descriptions

5.3   Laamu Atoll vs. Jaluit Atoll
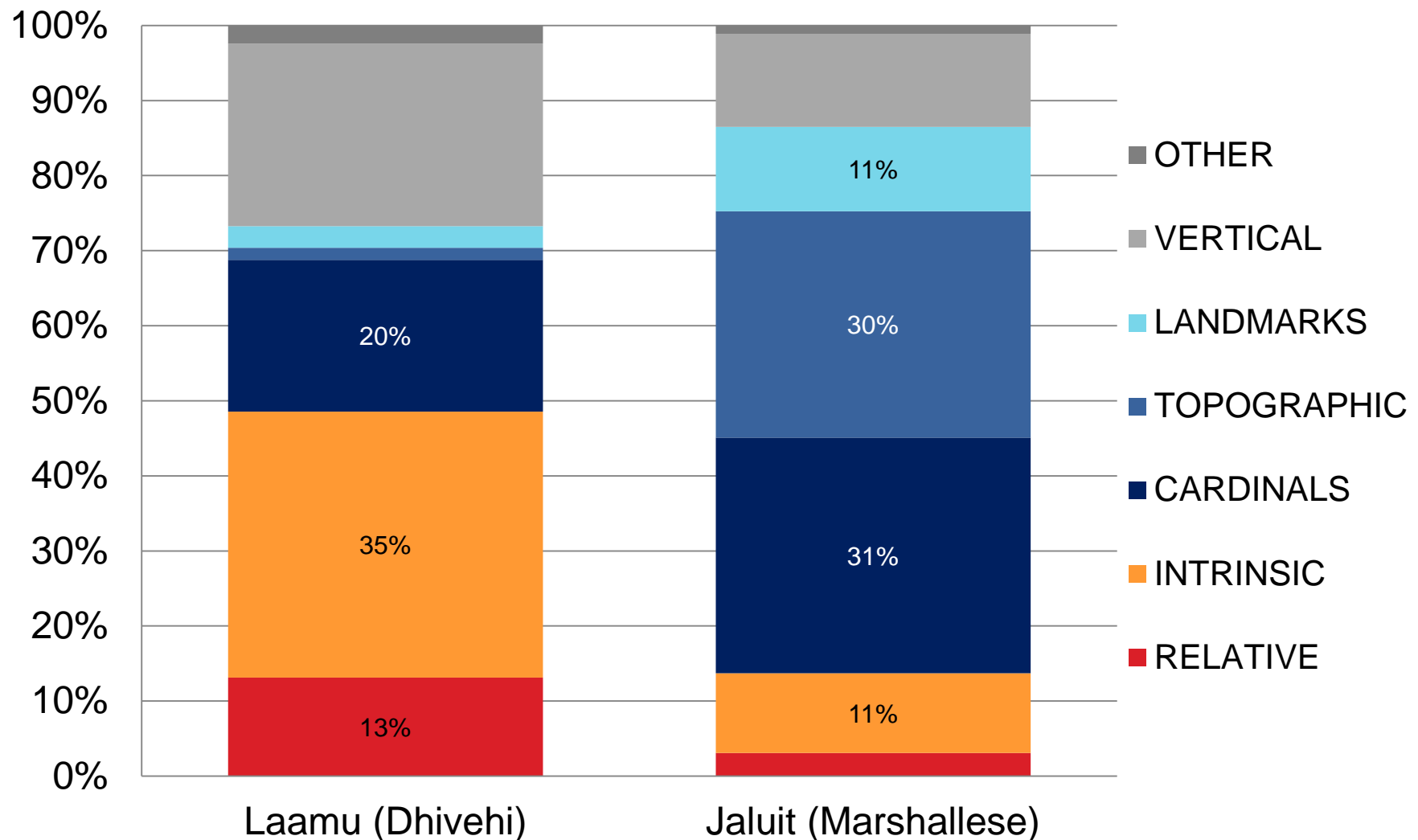
Orientation descriptions
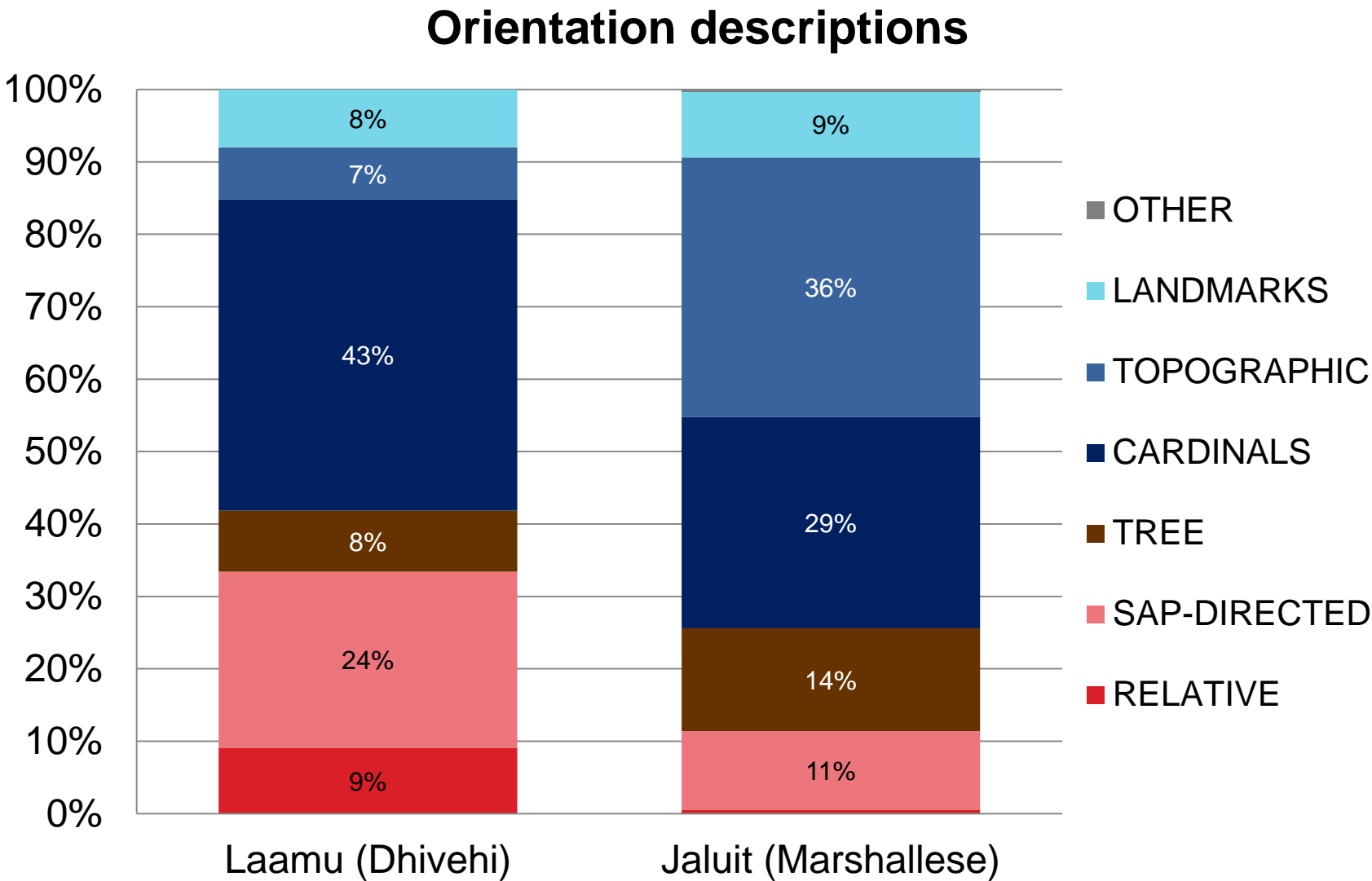
5.3   Laamu Atoll vs. Jaluit Atoll

- All FoRs represented in both samples.

- Relative extremely marginal in Marshallese.

- Intrinsic is a major category in Laamu location descriptions.

- Geocentric FoRs prevail in Jaluit, and in Laamu orientation descriptions.

- BUT geocentric descriptions in Laamu are almost always cardinals – the topographic category is rare.

- In contrast, the 'lagoonward-oceanward' axis is preferred in Jaluit Marshallese.

5.4   Comparison of different environments

5.4.1   Marshallese: Jaluit Atoll vs. Springdale

Location descriptions

Legend:
- VERTICAL
- LANDMARK
- TOPOGRAPHIC
- CARDINAL
- INTRINSIC
- SAP-BASED
- RELATIVE

Jaluit: LANDMARK 11%, CARDINAL 30%, (blue) 31%, INTRINSIC 11%, RELATIVE 3%

Springdale: CARDINAL 4%, INTRINSIC 18%, SAP-BASED 18%, RELATIVE 35%
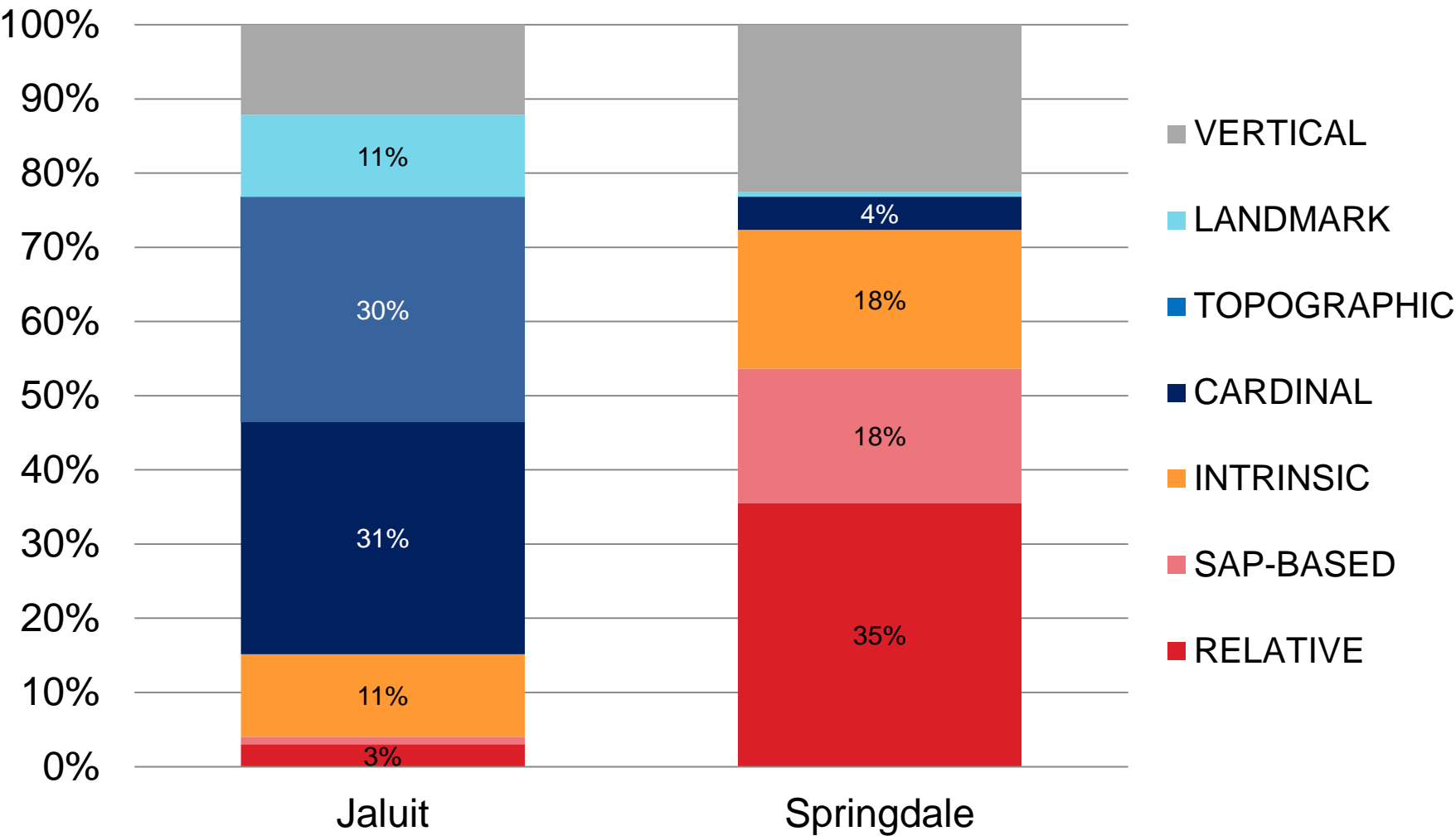
5.4.1   Marshallese: Jaluit Atoll vs. Springdale

Orientation descriptions
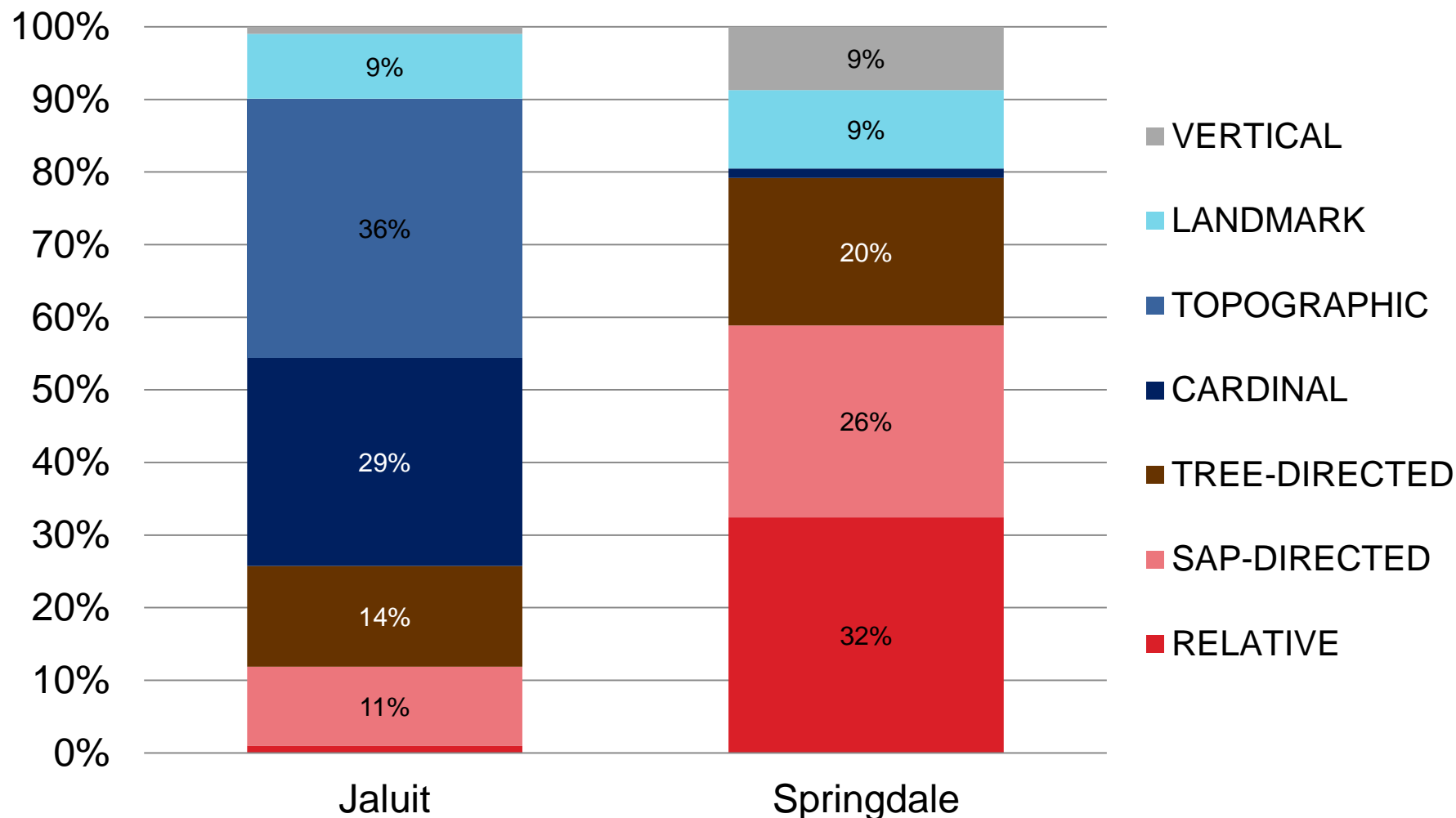
5.4.1   Marshallese: Jaluit Atoll vs. Springdale

- On Jaluit and Kili *a(l,n)m̧iin̄* 'left' and *anbwijmaron̄, a(l,m̧)oon* 'right' rarely used.

- In Springdale used for 34.4% of location descriptions in Man & Tree games (22.6% relative + 11.8% intrinsic) – but considerable confusion: many participants unable to confidently identify *anmiin̄* from *anm̧oon* sides.

- On Jaluit, landmarks were entirely large scale (high school, airport, houses, etc).

- In Springdale, landmarks were generally *ad hoc* objects in the immediate environment (television, wall, window, etc.) – primarily used for orientation.

5.4.2   Dhivehi: Laamu Atoll vs. Malé

Location descriptions
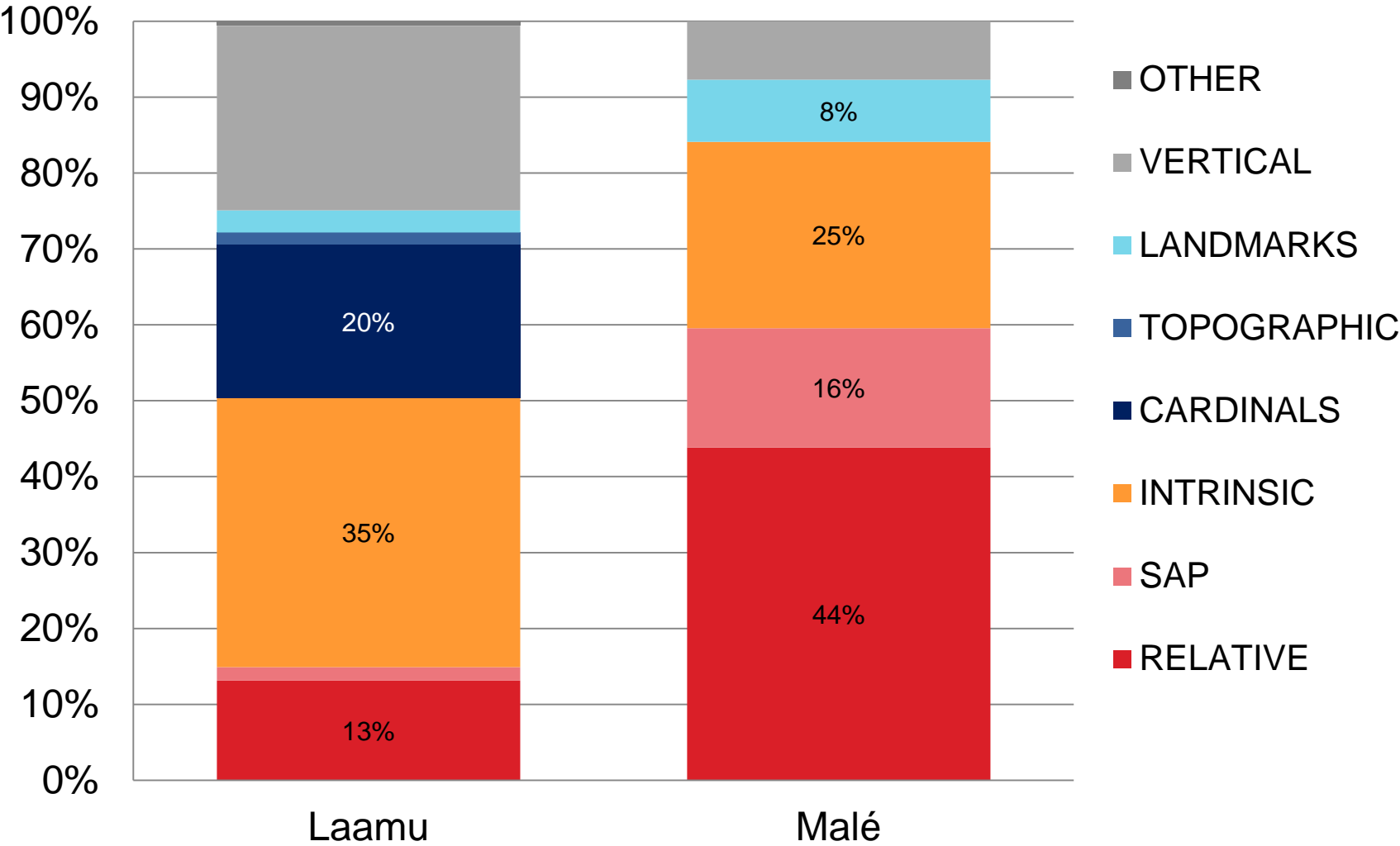
5.4.2   Dhivehi: Laamu Atoll vs. Malé
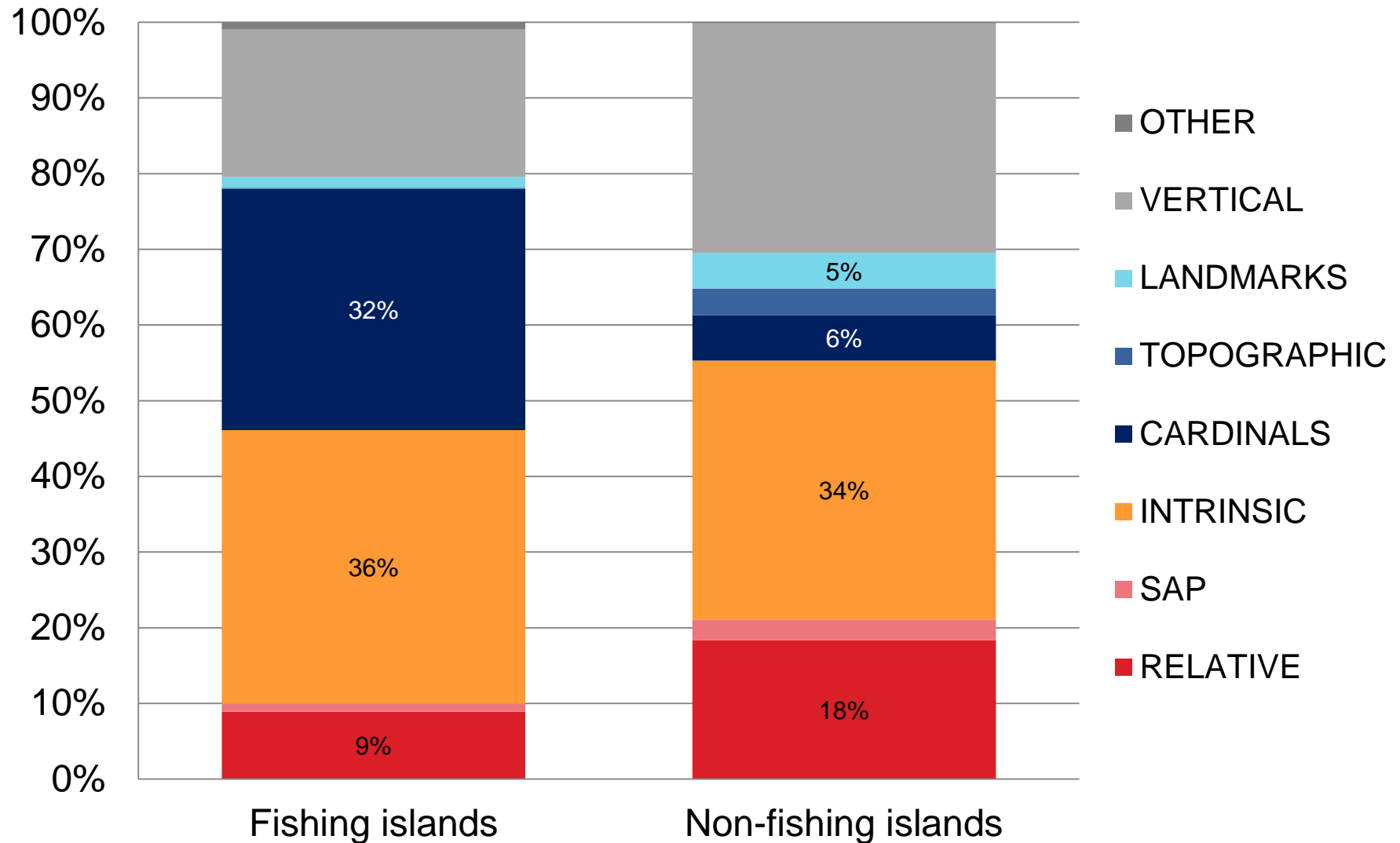

Orientation descriptions
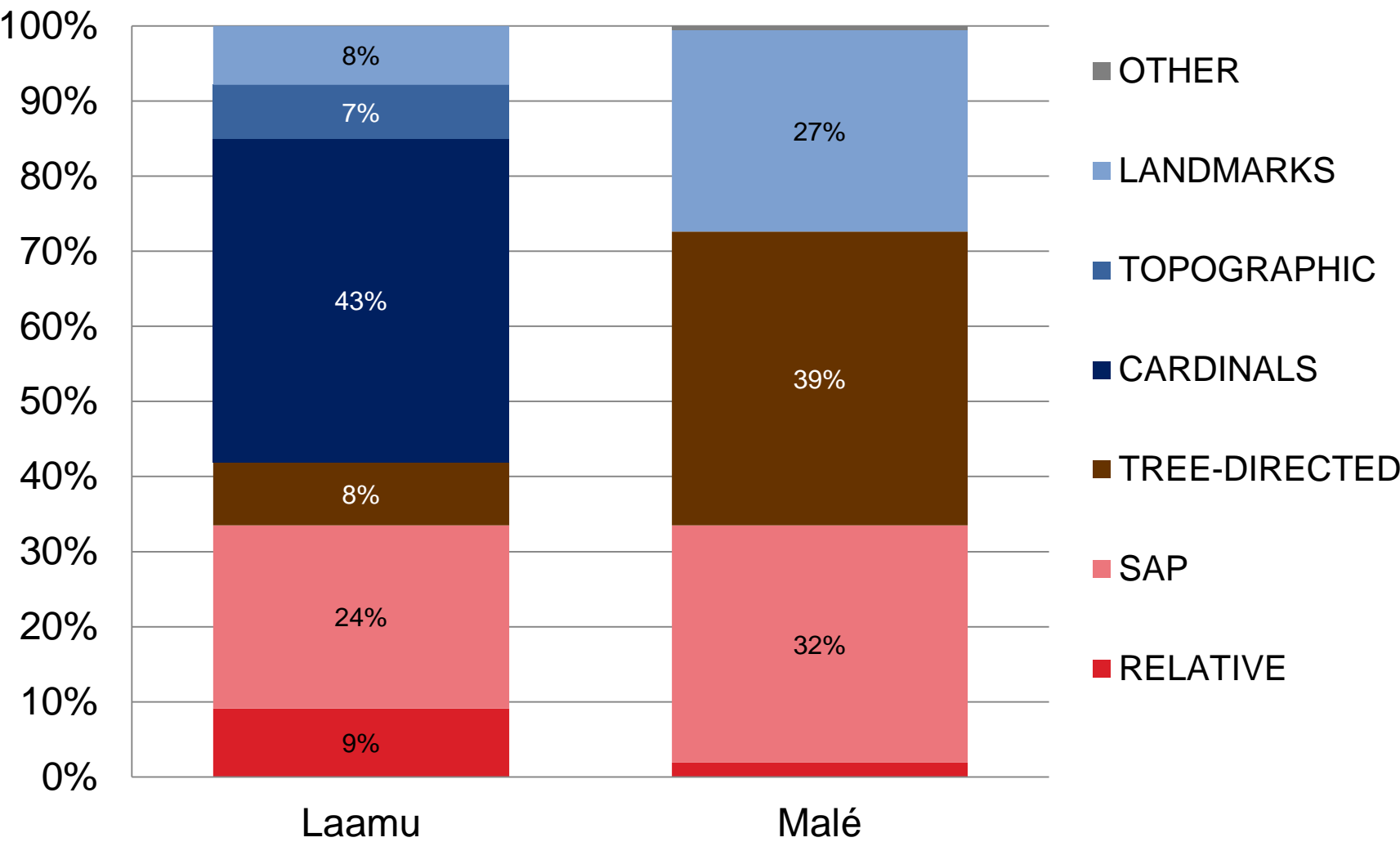
5.5   Demographic variation

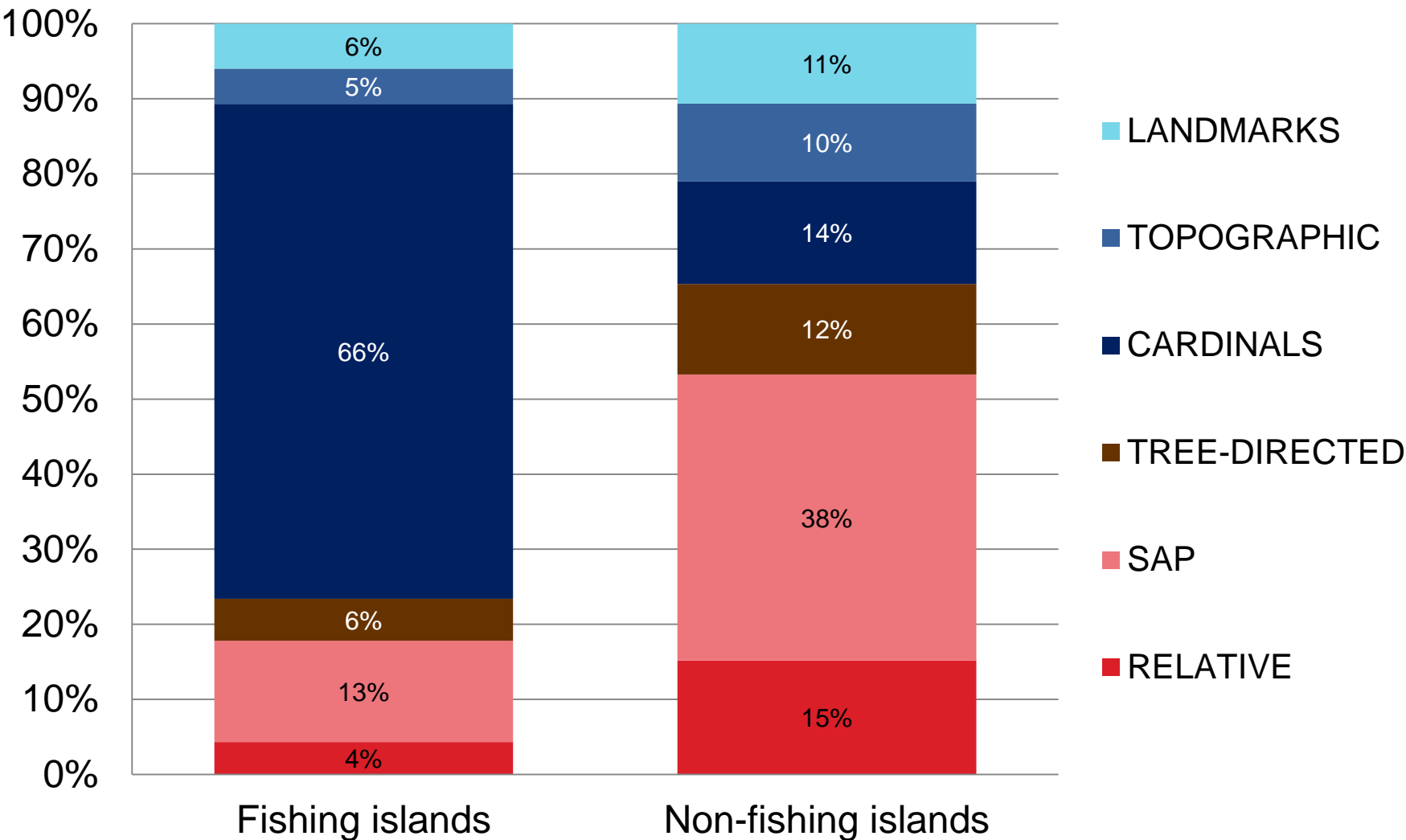- Choice of FoRs varies according to certain variables in Laamu, and to some extent also in Jaluit.

5.5.1   Fishing vs. non-fishing communities in Laamu
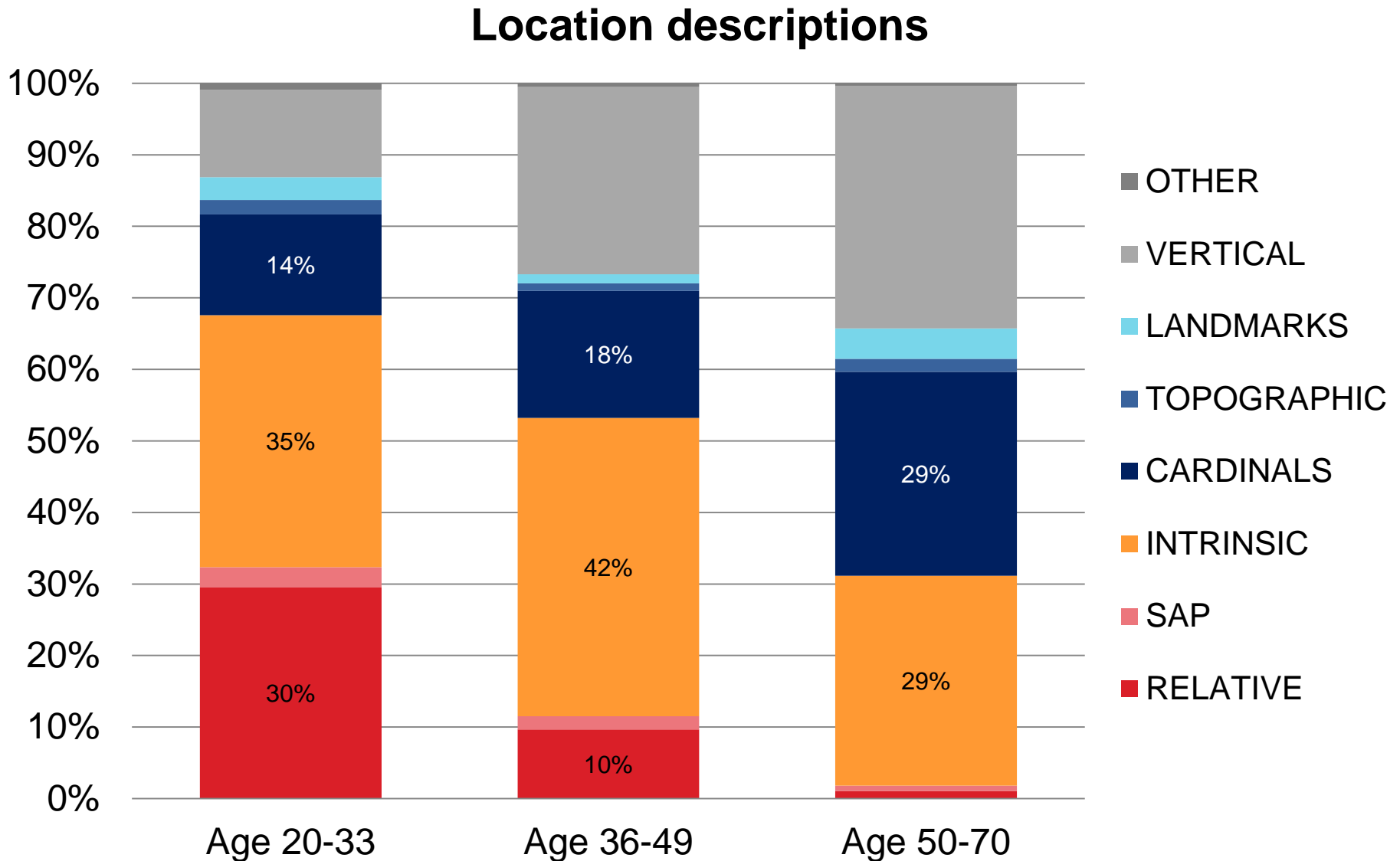
Location descriptions

5.5.1   Fishing vs. non-fishing communities in Laamu
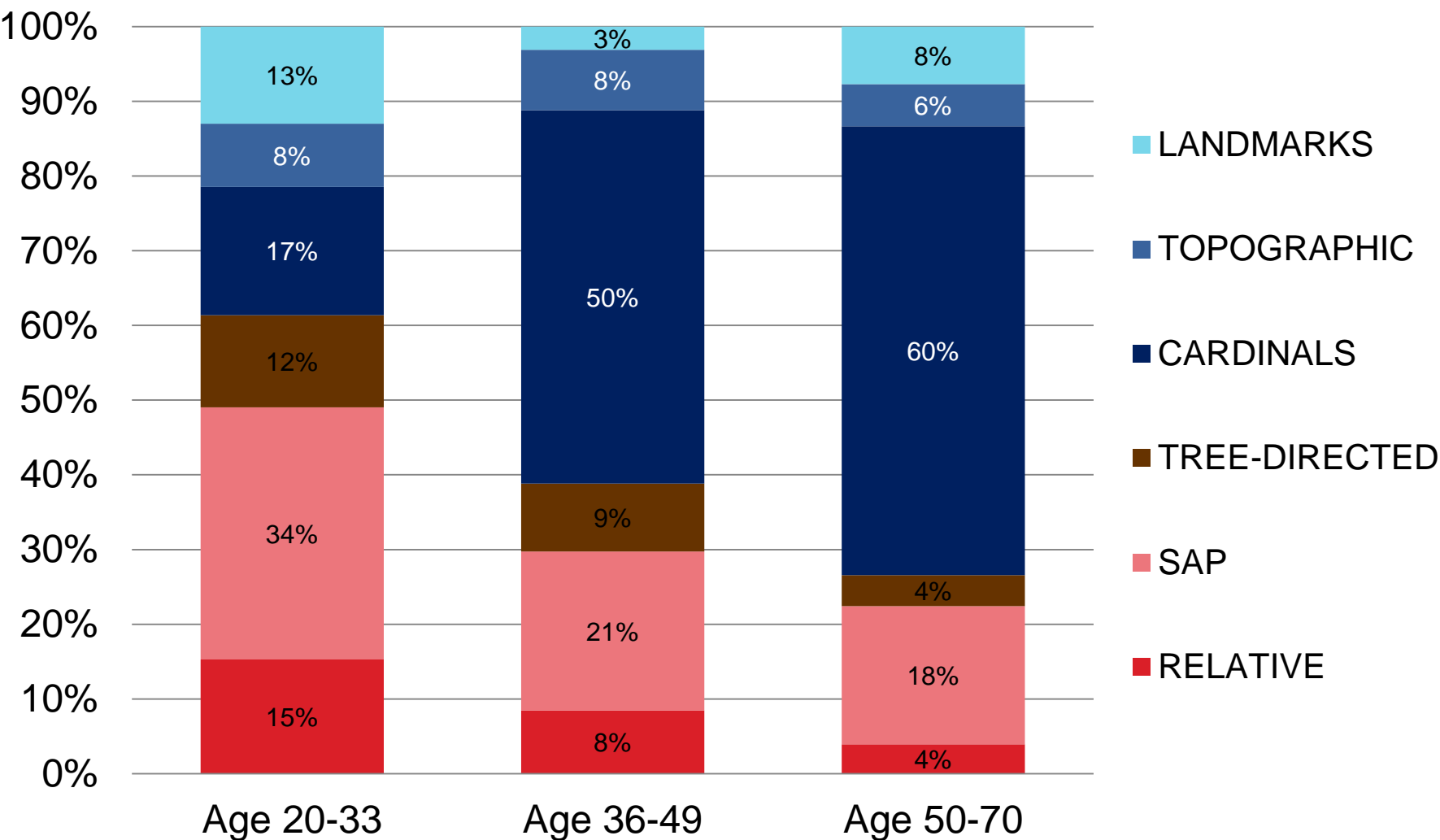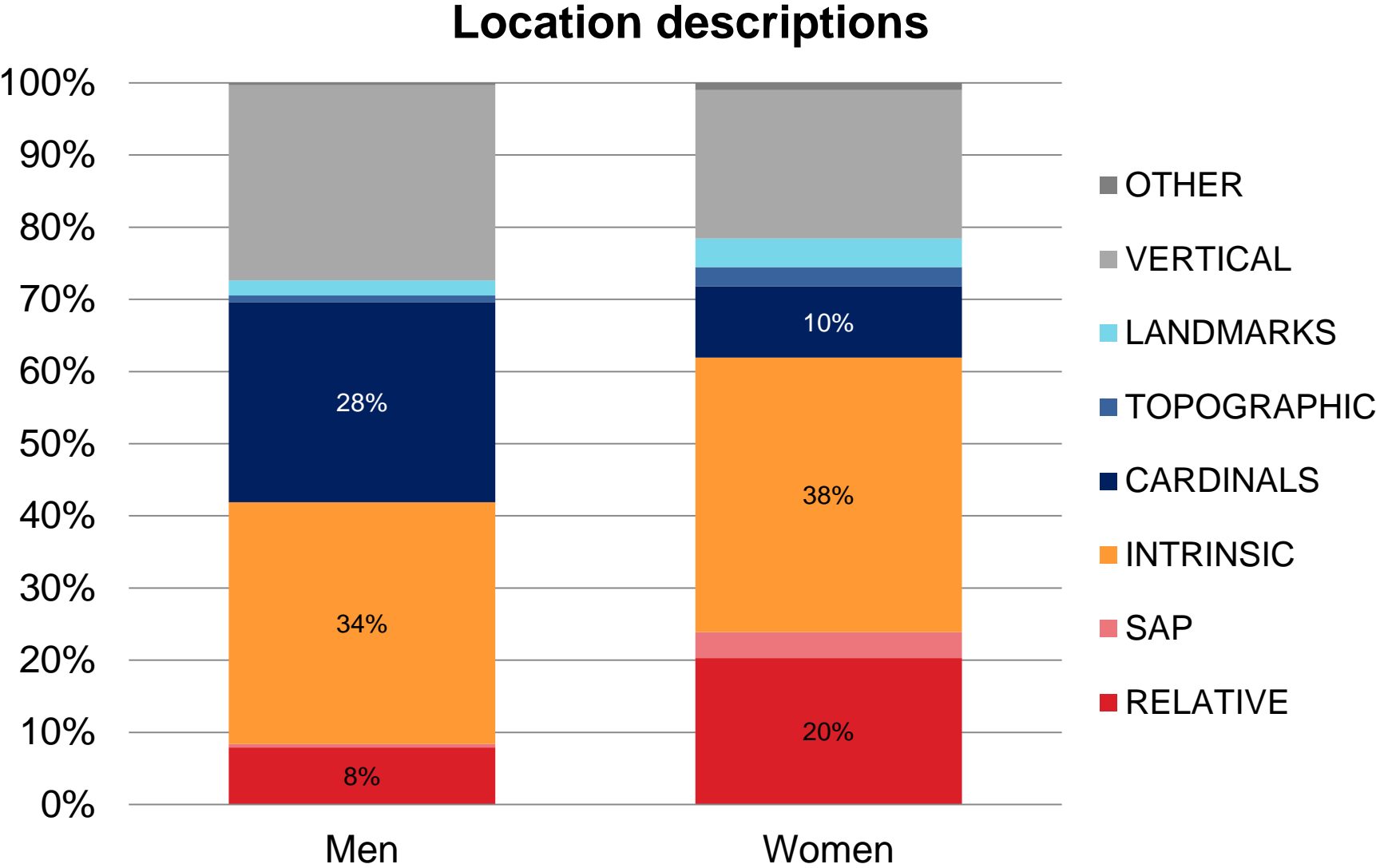

Orientation descriptions

5.5.2   Age variation in Laamu

Location descriptions

5.5.2   Age variation in Laamu

Orientation descriptions

5.5.3   Men vs. women in Laamu

Location descriptions

Legend:
- OTHER
- VERTICAL
- LANDMARKS
- TOPOGRAPHIC
- CARDINALS
- INTRINSIC
- SAP
- RELATIVE

Men: RELATIVE 8%, INTRINSIC 34%, CARDINALS 28%
Women: RELATIVE 20%, INTRINSIC 38%, CARDINALS 10%

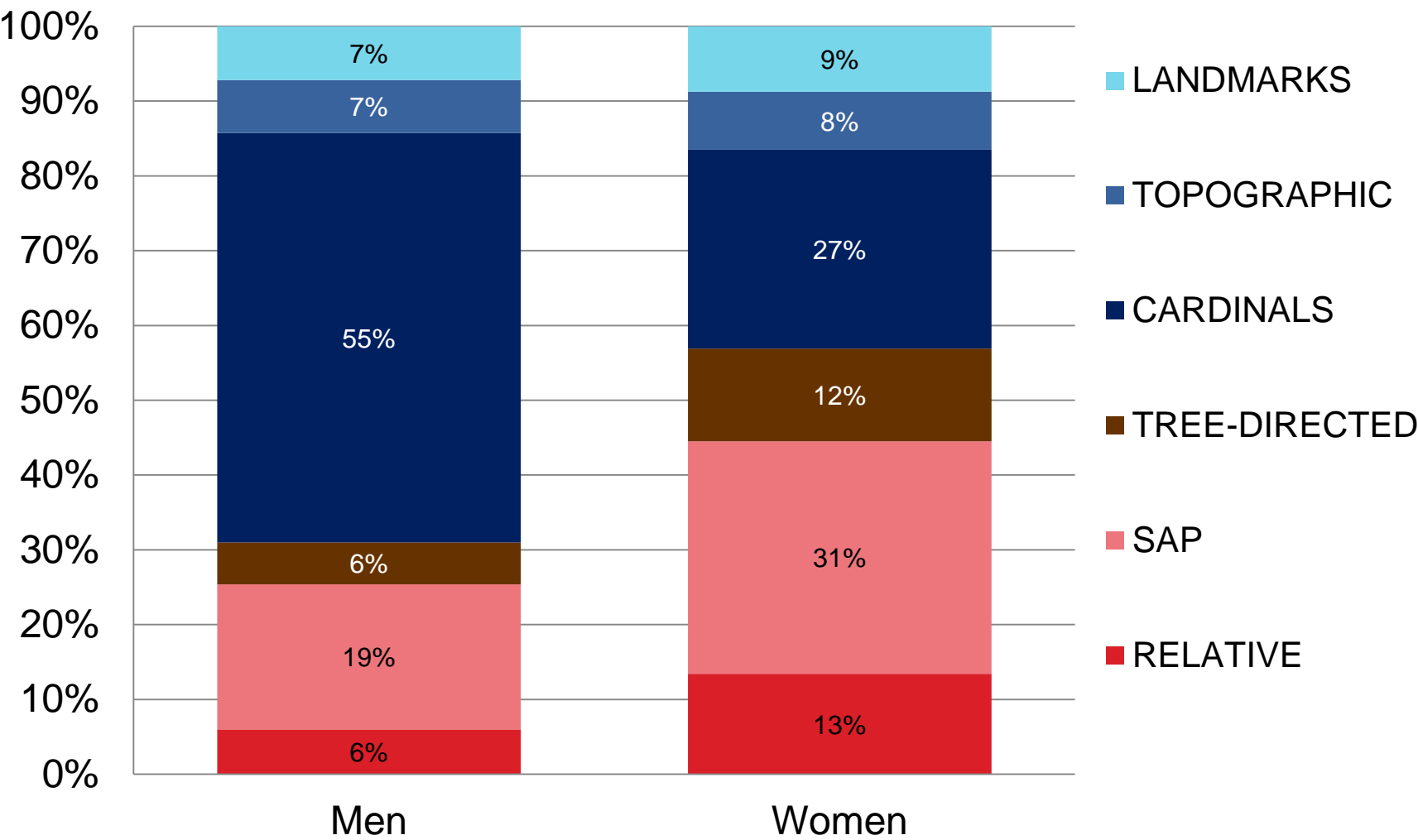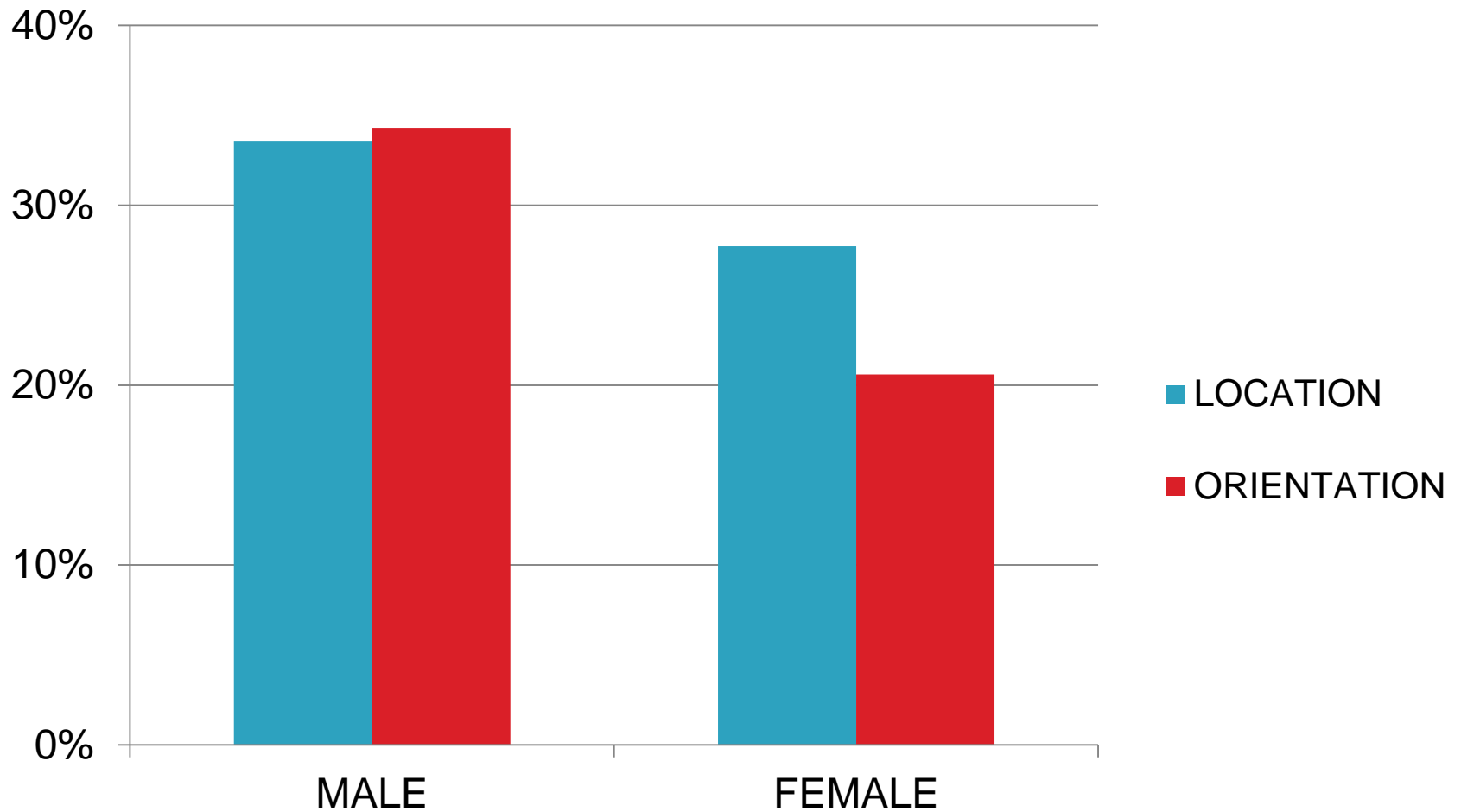## 5.5.3   Men vs. women in Laamu

Orientation descriptions

5.5.4   Gender variation in Jaluit Atoll: cardinal directions

6. Discussion

6.1 Summary

- Both languages spoken in similar topographies, both have grammaticized ways of expressing some geocentric directions.

- But several differences.

  - Cardinal directions in both languages

  - 'Lagoonward-oceanward' in Marshallese only

  - Vector orthogonal to land-sea boundary only on sea in Marshallese (landward-seaward), only on land in Dhivehi (inland-beachward) with one exception: Marshallese and Dhivehi overlap only in 'landward' on sea

6.1 Summary

- Quantitative differences in FoR selection on atolls:

  - Cardinals a major category in both languages

  - 'Lagoonward-oceanward' a primary category in Marshallese, but not present in Dhivehi.

  - 'Inland-beachward' exists but is infrequent in Dhivehi.

  - Intrinsic and egocentric frames more common in Dhivehi than Marshallese.
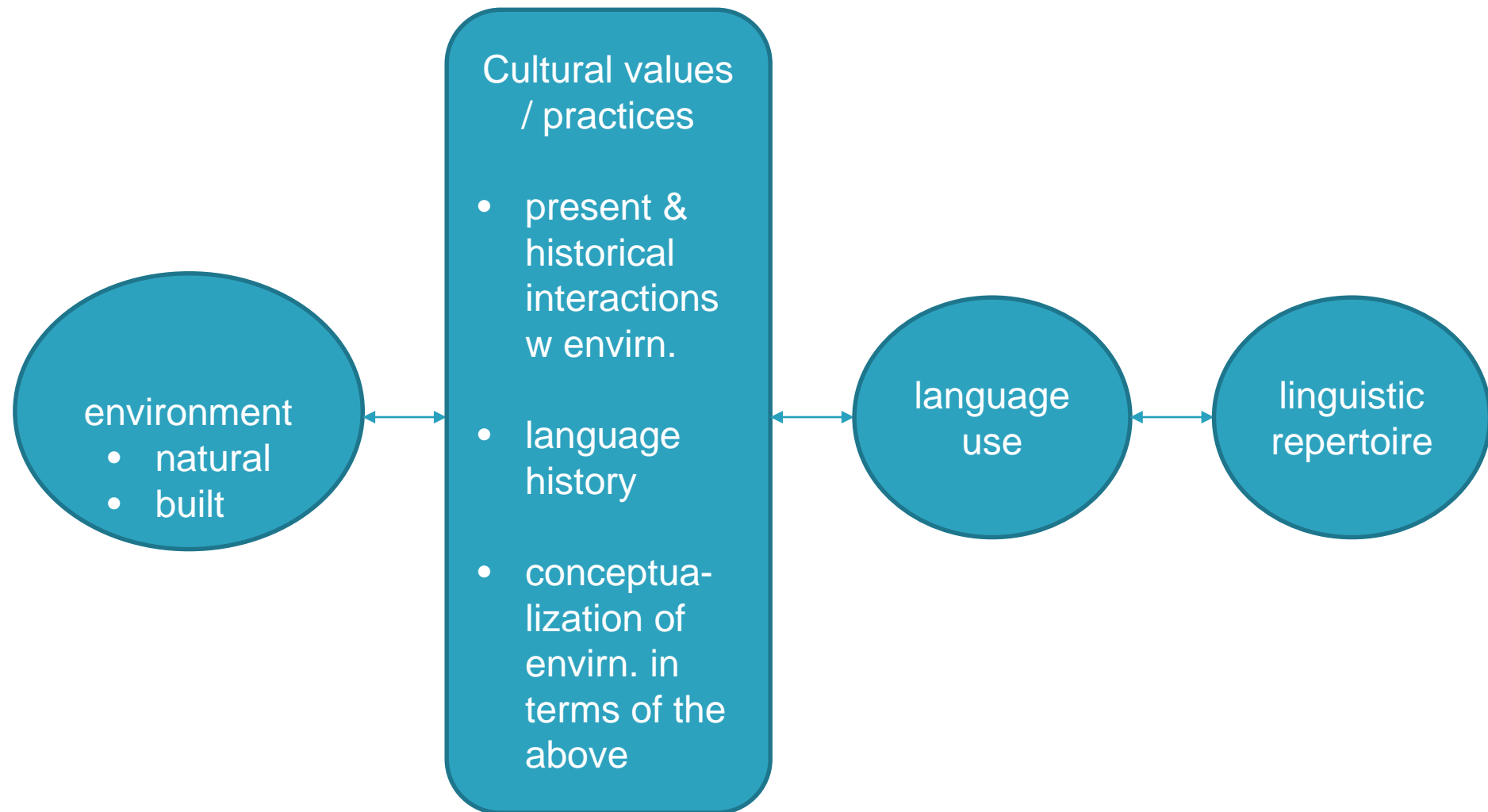
6.1 Summary

- Some evidence that urban environments correspond with greater use of egocentric FoRs (relative and SAP) at the expense of geocentric ones (especially cardinals and topographic directions) (see Majid et al. 2004). Though other factors are also in play here.

- Evidence from Dhivehi (fishing vs. non-fishing, old vs. young, men vs. women) and Marshallese (men vs. women) that <u>interaction</u> with environment is crucial – groups that spend time on the open sea tend to use cardinals much more.

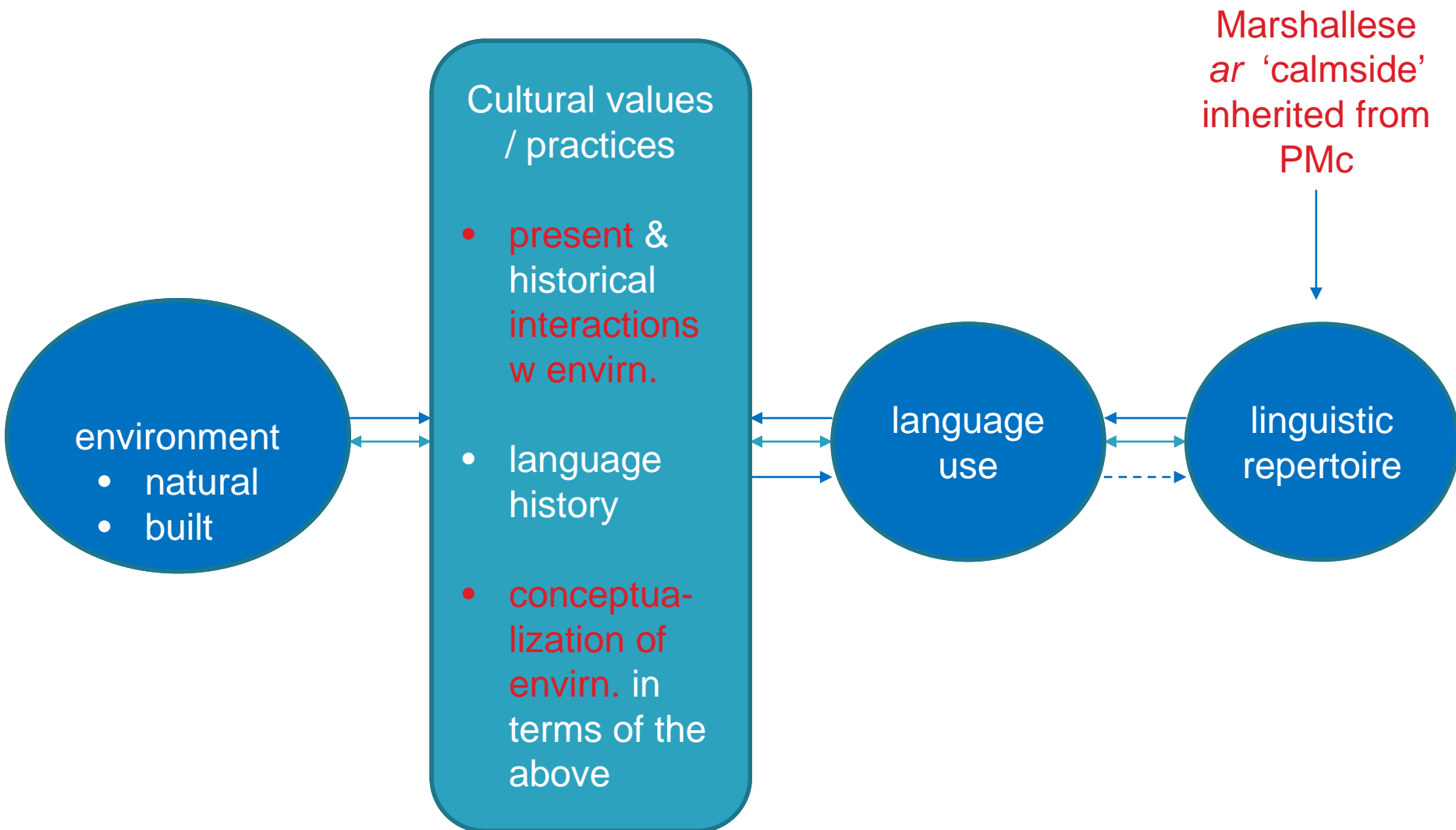- Topography is important, but is mediated by socio-cultural interaction.
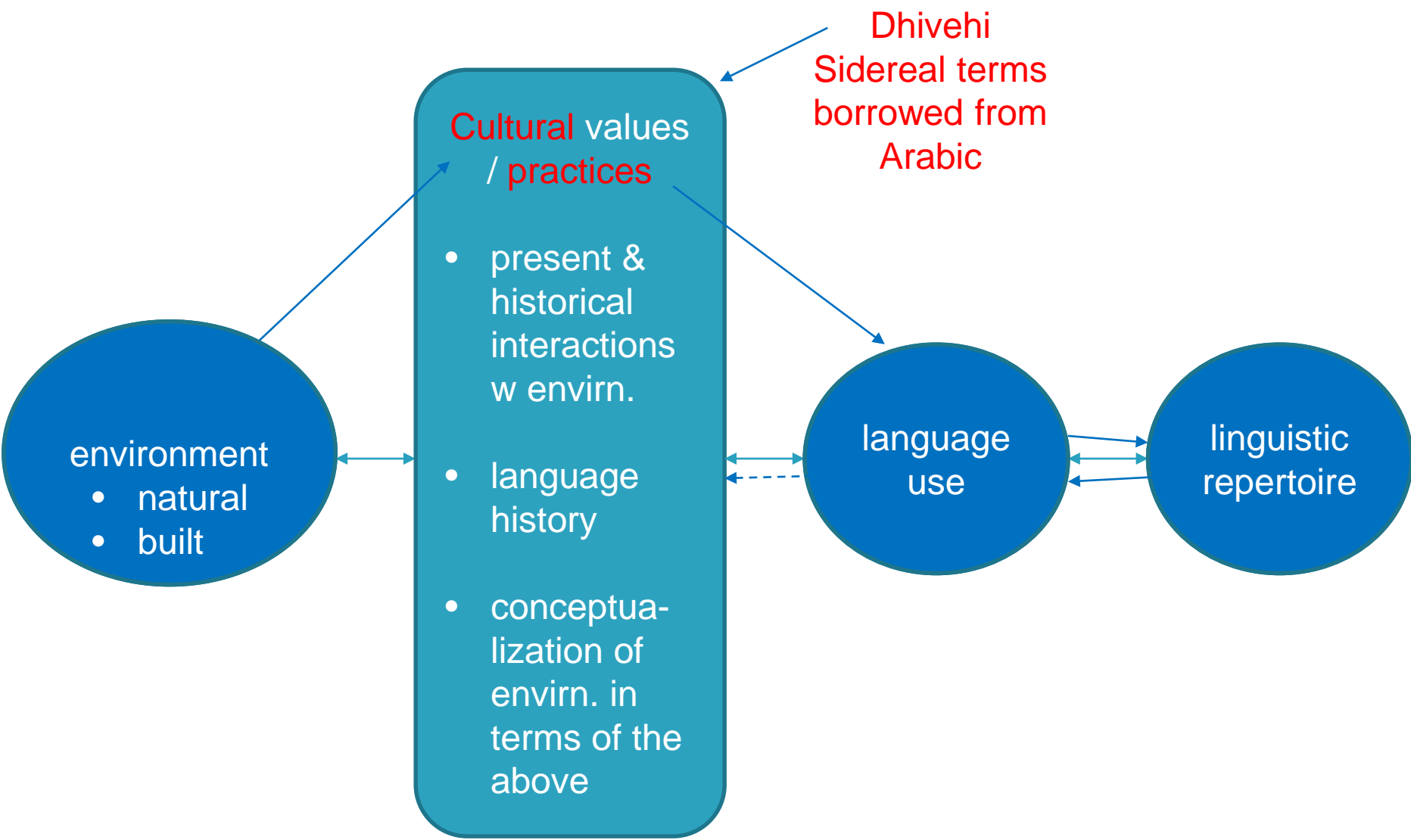
6.2 Socio-topography

- In response to these findings we have developed the Socio-Topographic Correspondence Model (STCM):

- Major features of landscape tend to be salient to humans and may play a role in constructing conceptual representations of space, that then interact with linguistic spatial expressions

- However, cultural and social factors mediate the relationship between humans and landscape.

- Socio-Topography defined in terms of:

  - natural topography (incl. path of sun, prevailing winds etc)

  - built environment

  - affordance and socio-cultural interaction with the above

6.2 Socio-topography

- Socio-Topography is culturally 'constructed'

    - humans modify their environment.

    - humans conceptualise existing topography in terms of use, associations and meanings attached to it.

    - elements of the local landscape that are not attended to by some cultures will be prominent to others.

Cultural values / practices

- present & historical interactions w envirn.

- language history

- conceptua-lization of envirn. in terms of the above

environment
- natural
- built

language use

linguistic repertoire

Dhivehi Sidereal terms borrowed from Arabic

Cultural values / **practices**

- present & historical interactions w envirn.

- language history

- conceptua-lization of envirn. in terms of the above

environment
- natural
- built

language use

linguistic repertoire

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5.3.1   Topography and landmarks in Dhivehi

- Of the 167 'topographic' descriptions in Laamu:

  - 58 *atiri* 'beach', 32 *eggamu* 'inland', 16 *fuṭṭaru* 'reef on ocean side', 14 *mūdu* 'sea', 14 *daṣē* 'lagoon shore', 13 *vilu* 'shallow pool in lagoon', 12 *matifuṣ*° 'ocean shore', 6 *raṣ̊-koḷu* 'end of the island', 1 *lonaga^{n}ḍu* 'seawater', 1 *ossi ira* 'sunset'.

- In terms of frequency, 'beachward' and 'inland' again more important than 'lagoonward' and 'oceanward' in Dhivehi.

5.3.1   Topography and landmarks in Dhivehi

- Laamu data also included 218 references to other landmarks:
  - Houses/buildings
  - Other villages
  - Other islands
  - More occasionally: doors, streets, nearby people, football field, trees
- Malé and Addu speakers referred to houses/buildings too, but also frequently referred to objects in their immediate vicinity (e.g. furniture, household objects, etc.).
- Topographic features are not invoked more than other kinds of landmarks in Dhivehi.

5.3.2   Relative and intrinsic FoRs

- Data coded for sagittal axis (front/back) and transverse axis (left/right).

- Dhivehi relative descriptions almost all on the transverse axis 87% for location (n=317); 93% for orientation (n=147).

  - Vertical and SAP-directed strategies compete with relative FoR on sagittal axis.

- Marshallese intrinsic descriptions almost all on the sagittal axis (79% sagittal, n=87).

  - Left/right terms rarely used in Marshallese (only 19 tokens in whole Jaluit Man & Tree corpus, 11 from one speaker).