𐑤𐑧𐑒-𐑑𐑕𐑭𐑮𐑴 𐑓 𐑮𐑲𐑥𐑩𐑒𐑴

lel–\ʃɹɪɲɔ–ɒɪ ɹcl lel–ɒɪ ɹcl ɹeᶝʃle–\ɲcᵊɒɪlɔ

Lek-Tsaro, the language of *Rymako*

uruwi

𐑩ʰɔᵉ.ɔnᵠ–ɒebc–delbeᶝ ʃlelcᵊ

A complete grammar

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Dedicated to Isoraḳatheð.

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0.1 | Introduction

1 | Phonology and orthography

1.1 | Phoneme inventory

Table 1.1: The consonants of Lek-Tsaro.

	Bilabial	Alveolar	Palatal	Velar	Glottal
Nasal	m	n	ɲ	ŋ	
Plosive	p b	t d	c ɟ	k g	ʔ
Fricative	f	s	ʃ	x	
(coarticulated)	θx	fx		fʃ	
Affricate		ts	tʃ		
Lateral fricative		ɬ			
Approximant		ɹ	j	w	
Lateral approximant		l			
Trill		r			

Table 1.2: The vowels of Lek-Tsaro.

Spread	Half-rounded	Rounded
i	ɣ̟	y
ɯ	ʊ̟	u
ɛ		œ
ʌ		ɔ
ä		

In addition to consonants and vowels, Lek-Tsaro has rod signals, represented by numbers. Rod A is blue and held by one's dominant hand and B is red and held by one's non-dominant hand.

1. Rod A is raised to one's chest, while B is pointed down.
2. Rods A and B are crossed in the front.
3. Rod B is raised upwards in front of the nondominant arm, while rod A is lowered.
4. Rod A is pointed sideways near one's nondominant arm, while rod B is lowered.
5. Rods A and B are extended to the sides.

6. Rods A and B are extended, facing forward.
7. Rod A is raised forward, while B is pointed to the side.
8. Rod B is raised forward, while A is pointed to the side.

Lowering both rods is interpreted as an absence of a rod signal.
If the use of rods are unavailable, the numerals of the positions may be pronounced.

1.2 | Hacmisation

Lek-Tsaro uses the hacm script with superscript letters to indicate phonemes not found in Arka. The transcriptions can be found in Tables 1.3 and 1.4.

Table 1.3: The consonants of Lek-Tsaro.

	Bilabial	Alveolar	Palatal	Velar	Glottal
Nasal	ɒ	ɲ	ɲ^{ɥ}	ɲ^{ɸ}	
Plosive	d b	ɾ ɑ	ʃ^{ɥ} ɑ^{ɥ}	ɭ ɸ	.
Fricative	ɑ	ɻ	ɭ	h	
(coarticulated)	ɻ^{h}	ɑ^{h}		ɑ^{l}	
Affricate		ʃɻ	ɬ		
Lateral fricative		s			
Approximant		ɥ	ɥ	o	
Lateral approximant		l			
Trill		ɳ			

Table 1.4: The vowels of Lek-Tsaro.

Spread	Half-rounded	Rounded
c	c^{ə}	c^{ɔ}
ə^{c}	ə	ə^{ɔ}
e		e^{ɔ}
ɔ^{e}		ɔ
ɪ		

Rod signs are represented by the hacm digits ⟨1 ɹ ʔ ɱ ɬ ʕ ɋ ð⟩ attached to the end of the verbs they encompass. Proper words are preceded by a backslash ⟨\⟩.

Vowels that are inferrable from context are sometimes omitted. For example, /ɹɛfan/ (to speak) is written ⟨ɥeɑn⟩, but /ɹɛfin/ (to spread), which is less common, is written ⟨ɥeɑcn⟩, with the second vowel. Most of this grammar will leave all vowels written.

1.3 | Phonotactics

An onset consists of one of the following:

- any single consonant other than /l/ (the exceptions are ⟨le⟩ [lɛk] and related words),

- any obstruent followed by an approximant other than /l/,
- or any plosive followed by /r/,
- or any nasal followed by /j/ or /w/.

A nucleus consists of one vowel.
A coda consists of one of the following:

- nothing,
- a nasal,
- a voiceless plosive (excluding /ʔ/),
- /ɹ/, /s/ or /l/

1.4 | Stress

Stress falls on the last syllable with a coda, or otherwise the second-to-last syllable.
See table 1.5 for examples.

Table 1.5: Examples of stress locations.

Orthography	Location of stress (# from last)
ᴅɪjɪ	2
nɪ.cn	1
.əᵓʃəlɔ	2
⟆ɪjnedcᵊ	3

1.5 | Vowel harmony

For the purposes of vowel harmony, vowels are divided into front and back vowels. /a/ is neutral. A root with neither front nor back vowels acts as if it has front vowels.

If by some odd chance a word has both front and back vowels, it is treated as either by random chance.

1.6 | Allophony

The following changes are made:

$$\begin{aligned} \mathrm{s} &\to \mathrm{ʂ} && (\blacklozenge\{\mathrm{w},\mathrm{j},\mathrm{u},\mathrm{y}\}) && \textit{NB this is a whistled sibiliant.} \\ C_1\{\mathrm{n},\mathrm{ŋ}\}C_2\{\mathrm{k},\mathrm{g}\} &\to \mathrm{ɴ}C_2[+uv] && [2 \mid \#\sigma] \\ C_1[+av] &\to C_1[+rt] && \left[\sum_{n\in\chi} n^2 \in \mathbb{P}\right] \end{aligned}$$

Some examples:

- ⟨joclʃ⟩ *turning from turquoise to blue* /swit/ [s̪wit]
- ⟨jʰcnlle⟩ *does not go* /θxinkɛ/ [θxiɴqɛ] because the number of syllables is even
- ⟨nɪ.cnlɬ⟩ *but was waiting* /naʔin{16}/ [ɳaʔiɳ{16}] because $1^2 + 6^2 = 37$ is prime

1.7 | The script of Lek-Tsaro

Lek-Tsaro also uses its own script, inspired by one of Uruwi's old childhood cyphers.

The consonants within a word are divided into pairs (plus one single consonant at the end if applicable). Thus, ⟨dənᵠɪdɔᵉ–ɲɪ⟩ would have ⟨dnᵠ dɲ⟩. These pairs then get a glyph that combines the glyphs for their constituent consonants.

Table 1.6: Single consonants in the script.

d	ɾ	l	ɟ	ɑ
n	ɒ	h	jʰ	ɥ
ɳ	ʔ l/s	ɭ	o	ɸ
nᵠ	ɑ	b	ɑˡ	ɑʰ
ɑɥ	ɲɥ	ɲ	nɥ	.

The full table of consonant pairs can be found at tables 1.7 and 1.8. There are some general rules:

- Double consonants get their single-consonant glyphs with a ring below.
- d-coloured glyphs bear the characteristic middle bar of ⟨d⟩⟨d⟩: d + ɭ → dl.
- l-coloured glyphs rest under the characteristic arrow of ⟨l⟩⟨l⟩: l + ɾ → lɾ.
- ɾ-coloured glyphs rest under the characteristic hilt of ⟨ɾ⟩⟨ɾ⟩: ɾ + ɳ → ɾɳ.
- ɟ-coloured glyphs bear the characteristic bar-and-circle of ⟨ɟ⟩⟨j⟩: ɟ + b → jb.
- ɑ-coloured glyphs bear the characteristic double-swash of ⟨ɑ⟩⟨ɑ⟩: ɑ + nᵠ → ɑnᵠ.
- ɒ-coloured glyphs bear the characteristic brook of ⟨ɒ⟩⟨ɒ⟩: ɒ + d → ɒd.
- jʰ-coloured glyphs bear the characteristic arc of ⟨jʰ⟩⟨jʰ⟩: jʰ + ɒ → jʰɒ.
- ɥ-coloured glyphs rest under the characteristic triangle of ⟨ɥ⟩⟨ɥ⟩: ɥ + ɸ → ɥɸ.
- ɳ-coloured glyphs rest under the characteristic overring of ⟨ɳ⟩⟨ɳ⟩: ɳ + ɑˡ → ɳɑˡ.

Table 1.7: Consonant pairs in the script.

- ⟨l⟩-coloured glyphs rest to the left of the characteristic vertical line of ⟨ʔ⟩⟨l⟩ : ʔ l + p ɑʰ → p lɑʰ.
- ⟨o⟩-coloured glyphs are superimposed with a copy rotated either π or, in the case of a few glyphs, $\pi/2$: t o + d n → r ol; t o + s h → x oh.
- ⟨ɑ⟩-coloured glyphs are superimposed with ⟨X⟩⟨ɑ⟩ : X ɑ + v ɾʰ → x ɑɾʰ. In some cases, the cross might be rotated $\pi/4$: X ɑ + z n → x ɑn.
- ⟨b⟩-coloured glyphs rest inside the characteristic room of ⟨ɐ⟩⟨b⟩ : ɐ b + ɜ μ → ɞ bμ.
- ⟨ɑˡ⟩-coloured glyphs rest under the characteristic flare of ⟨z⟩⟨ɑˡ⟩ : z ɑˡ + ☾ . → ɣ ɑˡ..
- ⟨ɑʰ⟩-coloured glyphs rest under the characteristic P-shape of ⟨p⟩⟨ɑʰ⟩ : p ɑʰ + v jʰ → p ɑʰjʰ.
- ⟨μ⟩-coloured glyphs rest to the left of the characteristic flare of ⟨ɜ⟩⟨μ⟩ : ɜ μ + A nʰ → Aɜ μnʰ.

Table 1.8: Consonant pairs in the script.

- ⁿʸ-coloured glyphs bear the characteristic inner circle of ⟨𐑨⟩⟨ⁿʸ⟩: 𐑨 ⁿʸ + 𐑭 ᵃʰ → 𐑮 ⁿʸᵃʰ.
- If all else has failed, the two consonants are superimposed. The default order is the same as the ordering used in table 1.6.
- In coloured-consonant pairs, the colourant is assumed to occur first unless the order is switched by an order reversal mark.
- A negative-sloping mark below a glyph means that the order of consonants is switched.

Thus in our case, we would have ⟨𐑯𐑧⟩. The next step is to add vowels. In our case, they would be paired as ⟨ə–ı ɔᵉ–ı⟩. Note that it is possible for a pair to not have both vowels. The diacritics for the vowels are quite irregular, and they are shown in table 1.9.

Thus, after adding vowels we get ⟨𐑯̂𐑧̂⟩.

Table 1.9: Vowel pairs in the script.

	Ø	ɪ	ɕ	ɕᵊ	ɕᵓ	e	eᵓ	əᶜ	ə	əᵓ	ɔᵉ	ɔ
Ø												
ɪ												
ɕ												
ɕᵊ												
ɕᵓ												
e												
eᵓ												
əᶜ												
ə												
əᵓ												
ɔᵉ												
ɔ												

Table 1.10: Miscellaneous symbols.

⁝	⁝ period (circumfix)
⁖	comma
⁘	name mark (equiv. to ⟨\⟩)

2 | Syntax

2.1 | Basic word order

The basic word order is VSO. Descriptors follow what they modify.

2.2 | Questions

Binary questions have the interrogative polarity marker and no change to syntax.

In wh-questions, the wh-word is pulled to the front (i. e. before the verb). This requires case marking for the wh-word:

ɾlen ɥeɑcᵊʝhɪ nc͡ɔɣ
who-ACC speak-FAR.PAST-Q PR.FAR.SG
Whom did you speak to?

This applies only to questions, not interrogative-mood clauses that act as relative clauses:

ɥeɑcᵊʝhɪ nc͡ɔ ɾlel, ɥɪɾ ɥɔ.
speak-FAR.PAST-Q PR.FAR.SG who, see-NEAR.PAST PR.ANAPH_OBJ.INT
I saw the person whom you talked to.

2.3 | Multiple clauses

A sentence might have multiple clauses. Each clause in a sentence follows the basic VSO order, and clauses are separated with commas.

3 | Nouns

Nouns are declined for number, case and definiteness.

3.1 | Number

Lek-Tsaro has many grammatical numbers:

Table 3.1: The discrete grammatical numbers of Lek-Tsaro.

Number	Constraint on $x \in \mathbb{Z}$
Integral	none
Nullary	$x = 0$
Singular	$\lvert x \rvert = 1$
Dual	$\lvert x \rvert = 2$

Table 3.2: The continuous grammatical numbers of Lek-Tsaro.

Number	Constraint on $x \in \mathbb{R}$
Nullary	$x = 0$
Subsingular	$\lvert x \rvert < 1$
Supersingular	$1 \leq \lvert x \rvert < 2$
Plural	$\lvert x \rvert \geq 2$ or x is unknown

3.2 | Case

In a clause with both the subject and object directly expressed in that order, both the subject and object are declined in the nominative case (and their roles are inferred through word order). In a clause where only one is present, or where both are expressed in the opposite order, the subject will receive the nominative case and the object will receive the accusative case.

3.3 | Noun classes

There are three overarching groups of noun classes.

3.3.1 | Countable

Nouns in these classes are declined for a discrete number.

1. Sentient – such as humans, AIs, deities.
2. Animate – nonsentient animals.
3. Inanimate – anything else.

3.3.2 | Measurable

Nouns in this class are declined for a continuous number.

4. Measure – all measurable nouns, especially units of measurement.

3.3.3 | Uncountable

Nouns in these classes are not declined for number, and require compounding with a countable or measurable noun in order to be quantified.

5. Fluid – liquids and gases.
6. Edible – edible (to humans) non-fluids.
7. Inedible – inedible (to humans) non-fluids.
8. Abstract – abstract ideas.

3.4 | Definiteness

The definite form of a noun is formed regularly by reduplicating the first syllable (without the coda): ⟨ᴅɪjɪj⟩ “a person” becomes ⟨ᴅɪᴅɪjɪj⟩ “the person”.

3.5 | Declension table

3.5.1 | Countable classes

Note that noun declensions respect vowel harmony. For nouns with back vowels, replace the front vowels with the back vowels of the same height and rounding, and vice versa.

Table 3.3: Declensions for countable nouns.

	Integral	Nullary	Singular	Dual
Sentient: ⟨ᴅɪjɪ⟩ “person”				
Nominative Accusative	ᴅɪjɪ ᴅɪjɪn	ᴅɪjɪˈle ᴅɪjɪnᵠˈle	ᴅɪjɪj ᴅɪjɪnc͡ʝ	ᴅɪjɪl ᴅɪjɪnɪl
Sentient: ⟨ʝʰɪ.en⟩ “magician”				
Nominative Accusative	ʝʰɪ.en ʝʰɪ.ɐɥcn	ʝʰɪ.eɾe ʝʰɪ.enᵠˈle	ʝʰɪ.eʝ ʝʰɪ.ɐɥc͡ʝ	ʝʰɪ.el ʝʰɪ.ɐɥcl
(Note that the final consonant is preserved only in the integral nominative form.)				
Animate: ⟨ᴅənᵠɔ⟩ “rabbit”				

	Integral	Nullary	Singular	Dual
Nominative	ɒənᵠɔ	ɒənᵠɔlɔᵉ	ɒənᵠɔȷ	ɒənᵠɔ.əᶜ
Accusative	ɒənᵠɔn	ɒənᵠɔnʃɔᵉ	ɒənᵠɔn	ɒənᵠɔnəᶜ
Animate: ⟨ȷcᵊl⟩ “fox”				
Nominative	ȷcᵊl	ȷcᵊʃe	ȷcᵊȷ	ȷcᵊ.c
Accusative	ȷcᵊɥcn	ȷcᵊnᵠle	ȷcᵊɥcȷ	ȷcᵊɥc
Inanimate: ⟨hɪɾdəᵓ⟩ “statue”				
Nominative	hɪɾdəᵓ	hɪɾdəᵓlɔᵉ	hɪɾdəᵓl	hɪɾdəᵓȷ
Accusative	hɪɾdəᵓɒ	hɪɾdəᵓɒdɔᵉ	hɪɾdəᵓdɔᵉ	hɪɾdəᵓɑəᶜ
Inanimate: ⟨.cɒen⟩ “house”				
Nominative	.cɒen	.cɒeʃe	.cɒel	.cɒeȷ
Accusative	.cɒeɥcɒ	.cɒeɥcɒde	.cɒeɥcde	.cɒeɥcɑc

3.5.2 | Measurable classes

Table 3.4: Declensions for measurable nouns.

	Plural	Nullary	Subingular	Supersingular
Measure: ⟨ɥəɒəᶜ⟩ “day (continuous)”				
Nominative	ɥəɒəᶜ	ɥəɒəᶜɥəᵓ	ɥəɒəᶜʃ	ɥəɒəᶜn
Accusative	ɥəɒəᶜn	ɥəɒəᶜɥəᵓn	ɥəɒəᶜnʃɔᵉ	ɥəɒəᶜnəᶜn
Measure: ⟨ɒel⟩ “volume” (in expressions such as ⟨ɒel–ɥəȷɔᵉ⟩ “cupful”)				
Nominative	ɒel	ɒeɥcᵓ	ɒeɥcʃ	ɒeɥcn
Accusative	ɒeɥcn	ɒeɥcᵓn	ɒeɥcnʃe	ɒeɥcncn
(Note that the final consonant is preserved only in the plural nominative form.)				

3.5.3 | Uncountable classes

Notably, uncountable-class noun declensions do not respect vowel harmony.

Table 3.5: Declensions for measurable nouns.

	Mass
Fluid: ⟨ɑˡəɥəᵓ⟩ “water”	
Nominative	ɑᵉɥəᵓ
Accusative	ɑᵉɥəᵓn
Fluid: ⟨ɑelɒ⟩ “nitrogen”	
Nominative	ɑelɒ
Accusative	ɑelɒcn
(Here, the coda is preserved in the accusative as well.)	
Edible: ⟨ʃeɥ.cᵓ⟩ “beef”	
Nominative	ʃeɥ.cᵓ
Accusative	ʃeɥ.cᵓn
Edible: ⟨ɒɪn⟩ “rice”	
Nominative	ɒɪn
Accusative	ɒɪncn
Inedible: ⟨ɥəᵓʃɔ⟩ “gold”	
Nominative	ɥəᵓʃɔ
Accusative	ɥəᵓʃɔbe

	Mass
Inedible: ⟨lɪnɪj⟩ “stone”	
Nominative	lɪnɪj
Accusative	lɪnɪjde
Abstract: ⟨ɑʰəᵓɒɔ⟩ “empathy”	
Nominative	ɑʰəᵓɒɔ
Accusative	ɑʰəᵓɒɔnᵠ
Abstract: ⟨ɸcj⟩ “[the number] five”	
Nominative	ɸcj
Accusative	ɸcjcnᵠ

3.6 | Pronouns

Personal pronouns are not divided into first, second and third persons as in most languages. Instead, they fall into four categories which exhibit different behaviour depending on whether they occur as the first or second noun in the clause:

Table 3.6: Pronoun persons and their functions.

Person	Role in first position	Role in second position
Near	The speaker.	The first argument of the sentence.
Far	The listener.	If the first argument is the speaker, then the listener. Otherwise, the speaker.
Other	A third entity.	An entity that is neither the speaker, the listener nor the first argument.
Generic	A generic entity (akin to “one”).	
Anaphoric Subject	The subject of the previous clause.	
Anaphoric Object	The object of the previous clause.	

In wh-questions, the wh-word assumes the second position and the other argument becomes the first.

If a clause has no explicit arguments, the first argument is understood to be the subject.

Table 3.7: Personal pronouns. ⟨–n⟩, ⟨–en⟩ or ⟨–ɔᵉn⟩ is suffixed for the accusative case.

(continuous) (discrete)	Pl. / Sub. / Sup. Integral	Nullary Nullary	Singular	Dual
Near	ɾɪ	lelɪ	ɒe	ɑcɥc
Far	dɔ	lɔᵉdɔ	nəᶜ	bɥɪ
Other	nc	lenc	scᵓ	lɪɥc
Anaph. Sub.	ɥɪ	leɥɪ	.cɒ	nᵠcɥc
Anaph. Obj.	ɥɔ	lɔᵉɥɔ	.əᶜɒ	nᵠəᶜɥɔ
Generic	.əᵓ			

(For the observant readers: notice the similarity to Kavinan's system.)

3.6.1 | Last-clause pronouns

The anaphoric pronoun ⟨bejˌ⟩ (accusative: ⟨bejenˌ⟩) is grammatically an other pronoun, and it refers to the previous clause said. Likewise, ⟨bedcjˌ⟩ (accusative: ⟨bedcnˌ⟩) refers to the clause before the previous one.

3.7 | Compounding

Nouns can be compounded together in a head-initial manner. When that happens, only the leftmost noun is the one to be declined.

ᴅel–ɲəjɔᵉ–ɑˡəɻəᵓ–ɸcj
volume-cup-water-five
five cupfuls of water

Note that integral pronouns can modify other nouns, in which personal possession is indicated:

ᴅel–ɲəjɔᵉ–ɑˡəɻəᵓ–ɸcj–ʃɪ
volume-cup-water-five-PR.NEAR.INTEGRAL
(arg1)'s five cupfuls of water

Descriptors can also compound on nouns. This compounding is productive in Lek-Tsaro.

ᴅɪjɪ–ɭəᵓʃɪ
person-old
old people
(Compare to ᴅɪjɪ ɭəᵓʃɪ "person old-SENTIENT".)

3.8 | Possession

"X's Y" is translated as ⟨Y=ᴅɪ ɟclˌ Xˌ⟩. The possessive construction is also used to create appositives.

Observe that possession marks the head, and ⟨–ᴅɪˌ⟩ is a clitic, not an affix, as in the following example:

ᴅəᴅənᵠɔj–ɑˡəɻəᵓ–ᴅɪ ɟcl ɟʰɪ.ej
DEF~rabbit-SING-water=GEN POS magician-SING
the magician's water rabbit

In more casual speech, ⟨ɟclˌ⟩ may be dropped.

4 | Verbs

Verbs are conjugated for person of the subject, tense, polarity and tellicity, in two paradigms. Conjugation respects vowel harmony.

Table 4.1: Person-tense conjugations for verbs, using ⟨ɒlɪn⟩ "(S) eats (O)".

	Nonpast	Past
Near	ɒlɪn	ɒlɪɾ
Far	ɒlɪn	ɒlcᵊj
Other	ɒlɪ	ɒlcᵊ
Anaph. Sub.	ɒle	ɒlel
Anaph. Obj.	ɒlc.e	ɒlc.el
Generic	ɒlcᵓ	ɒlcᵓ

Table 4.2: Person-tense conjugations for verbs, using ⟨ɥɐɑcn⟩ "(S) spreads (O)".

	Nonpast	Past
Near	ɥɐɑcn	ɥɐɑcɾ
Far	ɥɐɑɪn	ɥɐɑcᵊj
Other	ɥɐɑɪ	ɥɐɑcᵊ
Anaph. Sub.	ɥɐɑe	ɥɐɑel
Anaph. Obj.	ɥɐɑc.e	ɥɐɑc.el
Generic	ɥɐɑcᵊ	ɥɐɑcᵊ

to which a suffix is added:

Table 4.3: Polarity-tellicity suffixes for verbs. The interrogative affix can also follow a negative affix.

	Positive	Negative	Interrogative
Telic	–˙	–le / –lɔᵉ	–hɪ
Atelic	–ɒc / –ɒəᶜ	–jɪ	–lcᵊ / –lə

Notes:

- "Negative atelic" means something akin to "unsuccessfully tried to avoid doing X".

- The interrogative polarity, in addition to marking questions, is used to mark clauses that may or may not be true but are referred to later in the sentence.

Some examples:

ɒɪlɪn sɪɾe ɾɔɲɔ.
eat-NEAR.NONPAST fish flower
Fish eat flowers.

ɒɪlɪn sɪɾe ɾɔɲɔ, ɒɪlɪn nɥɪɲɪ ɲɪ.
eat-NEAR.NONPAST fish flower, eat-NEAR.NONPAST cat PR.ANAPH_SUB
Fish eat flowers, and cats eat fish.

ɒɪlɪn sɪɾe ɾɔɲɔ, ɒɪle ɲɪɾíbe.
eat-NEAR.NONPAST fish flower, eat-ANAPH_SUB.NONPAST grass-ACC
Fish eat flowers, and they eat grass.
(Grass is inedible to humans, but edible to fish.)

ɒɪlɪnɭe ɾɔɲɔ sɪɾe.
eat-NEAR.NONPAST-NEG flower fish
Flowers don't eat fish.

dɥcn sc^{ɔ} hɥchɥcɑel, jenɪn ɾɪ bej.
carry-NEAR.NONPAST PR.OTHER.SG DEF~book-SG, worry-NEAR.NONPAST PR.NEAR.INT PR.LAST_CLAUSE
He has the book; that worries me.
or: That he has the book worries me.

dɥcnhɪ sc^{ɔ} hɥchɥcɑel, jenɪn ɾɪ bej.
carry-NEAR.NONPAST-INTERROGATIVE PR.OTHER.SG DEF~book-SG, worry-NEAR.NONPAST PR.NEAR.INT PR.LAST_CLAUSE
He might have the book; that worries me.
or: That he might have the book worries me.

4.1 | Aspect

Verbs can also be marked for aspect, either using a rod sign directly on the verb, or a particle with a rod sign, placed anywhere between the verb it modifies and the next verb.

Table 4.4: Aspect markers. Those with hyphens are attached to verb. Those without hyphens are placed as separate particles anywhere after the verb.

Aspect name	Marking	Meaning
Imperfect	–1	An action that is currently going on. Also used to distinguish static actions as opposed to dynamic (e. g. *wear* as opposed to *put on*).
Interrupted	ɾcl1	An action that was interrupted.

Aspect name	Marking	Meaning
Perfect	–ɹ	An action that has already finished. Changes present tense to immediate past. Also used to distinguish dynamic actions as opposed to static (e. g. *put on* as opposed to *wear*).
Gnomic	–ʔ	A general truth or aphorism, or an action done habitually.
Gnomic dubitative	ɾlcl̩ʔ	A general truth or aphorism that the speaker considers to be false.
Deontic necessity	–ɱ	An action that the speaker insists on happening.
Epistemic necessity	ɭəᶜɒɱ	An action that the speaker infers is happening.
Deontic potential	–ɬ	An action that the speaker permits to occur.
Epistemic potential	ɭəᶜɒɬ	An action that the speaker infers that might happen.
Unexpected	–ʕ	An action that is unexpected (akin to using "but").
Comparative	deʕ	Indicates an action of greater intensity than what was described in the previous clause.
Nonexclusive subject	ɭcɭ	Indicates that the subject comprises not only of what is explicitly mentioned, but also other things.
Nonexclusive object	ɭcʔ	Indicates that the object comprises not only of what is explicitly mentioned, but also other things.
Nonexclusive argument	ɭcɱ	Combination of both nonexclusive subject and nonexclusive object.

An example:

ɾlnlɪɾɒcɭ ɒe nc, lcnc.elʕ dənᵠɪdɔᵉ–ɥɪ.
fight-NEAR.PAST-ATELIC-IMPERFECT PR.NEAR.SG PR.OTHER.INT, shoot-ANAPH_OBJ.PAST-UNEXPECTED knee-SG.ACC-PR.ANAPH_SUB.INT
I tried to fight them, but they shot my knee.

4.2 | Obliques

Lek-Tsaro lacks oblique arguments. Instead, equivalent expressions employ serial verb constructions. For instance, "he ate soup with a spoon" would be reduced to "he held a spoon and ate soup":

dɥcᵊ scᵓ ɑɔᵉɭɔᵉl, ɒɪɭel sɪdjcn.
INST-OTHER.PAST PR.OTHER.SG spoon-SG, eat-ANAPH_SUB.PAST soup-ACC
He held a spoon and ate soup.
or: He ate soup with a spoon.

Likewise:

ɲɪ.ɪ nc jəjəl–hɪ.ɪɥ, ncɒe hɪhɪɾdəᶝdɔᵉ.
TEMPORAL-OTHER PR.OTHER.INT DEF~day-SG-spring, dance-ANAPH_SUB DEF~statue-SG.ACC
They will wait until the spring equinox and dance around the statue.
or: They will dance around the statue on the spring equinox.

A similar construction can be used for the negation of obliques:

dɥcᵊle scᶝ ɑɔᵉlɔᵉl, ɒɪlelʕ sɪdjcn.
INST-OTHER.PAST-NEG PR.OTHER.SG spoon-SG, eat-ANAPH_SUB.PAST-UNEXPECTED soup-ACC
He did not hold a spoon, but ate soup.
or: He ate soup without a spoon.

4.3 | Conjunctions

Conjunctions such as "and" are treated like obliques. For instance, "and" is represented by the verb ⟨ɑcn⟩, and precedes the clause in which the two are used:

ɑcᵊ \ɥcᵊje \ʃɪɥəl, ɒɪlel ʃeɥ.cᶝn.
and-OTHER.PAST Ryse Tarul, eat-ANAPH_SUB.PAST beef-ACC
Ryse and Tarul ate beef.

Sufficiently complex nesting may be unrepresentable using only anaphoric referents. The easiest way to resolve this issue is to use definite nouns in place of anaphoric referents.

ɑcᵊ \ɥcᵊje \ʃɪɥəl, ɑcᵊ ʃeɥ.cᶝ sɪdjc, ɒɪlcᵊ ɒɪɒɪjɪl ɥɪ.
and-OTHER.PAST Ryse Tarul, and-OTHER.PAST beef soup, eat-OTHER.PAST DEF~person-DU PR.ANAPH_SUB.CONT
[They,] Ryse and Tarul ate beef and soup.

4.4 | Subordinate clauses

Ideas such as "if" or "because" are also expressed with verbs. For example, ⟨ɲɪ.cn⟩ "wait, when" is also used for "if":

ʃeɥɪlehɪ, ɲɪ.cn ʃɪ bej, ɑehcn.
rain-OTHER-NEG-Q, wait-NEAR PR.NEAR.INT ANAPH_CLAUSE, play-NEAR
If it doesn't rain, we will play.

Note the clausal argument to ⟨ɲɪ.cn⟩, since our condition is an entire clause instead of a noun.

4.4.1 | Conditions

Conditional ideas whose English translations contain "if" can also be expressed in a more concise way, but this usage can sometimes sound colloquial:

ɾɐɥɪlehɪ, ɑehcn.
rain-OTHER-NEG-Q, play-NEAR
If it doesn't rain, we will play.

4.5 | Comparatives

The comparative is a function $\text{cmp} : A \times A \times (A \to \mathbb{R}) \times (A \times A \to \{0,1\}) \to \{0,1\}$, where $\text{cmp}(a, b, f, \sqsupset) = f(a) \sqsupset f(b)$.

Consider the following sentences:

Fish eat flowers more than cats.
More fish eat flowers than cats.

Semantically, they can be translated to:

$$\text{cmp}(\text{fish}, \text{cats}, a \mapsto (\#\text{ of flowers eaten by } a), >) \tag{4.1}$$
$$\text{cmp}(\text{fish}, \text{cats}, a \mapsto (\#\text{ of } a \text{ that eat flowers}), >) \tag{4.2}$$

The heart of comparatives in Lek-Tsaro is the quadrivalent verb ⟨ɑɔɥɪn *a b f* ⊐⟩. Thus:

ɒɪlcᵓhɪ ɾlɔɥɔɒ–jʰcn, ɑɔɥɪn sɪɾde nɥɪɥɪ ɥɔ neɾ.
eat-GENERIC-Q flower-ACC.INT-how_many, CMP-NEAR fish cat PR.ANAPH_OBJ.INT >
Fish eat more flowers than cats.

ɒɪlcᵓhɪ .əᵓ–jʰcn ɾlɔɥɔ, ɑɔɥɪn sɪɾde nɥɪɥɪ ɥɪ neɾ.
eat-GENERIC-Q PR.GENERIC-how_many flower, CMP-NEAR fish cat PR.ANAPH_SUB.INT
>
More fish eat flowers than cats.

Note that we place a clause whose argument is the generic pronoun before the comparative clause. From the doran-clause, we refer to the function using the anaphoric pronoun referring to the position of the return value.

4.6 | Ditransitive-like constructions

In English, some verbs such as *give* take two objects: the item being given and the recipient of the item. Since clauses in Lek-Tsaro can take only one object, translating such verbs requires multiple clauses:

ɾɪɸɪɾ ɒe hɥchɥcɑen, nebel \ɥcᵊjen.
lose-NEAR.PAST PR.NEAR.SG DEF~book, give_to-ANAPH_SUB.PAST Ryse-ACC
I gave the book to Ryse.

Table 4.5: Comparators in Lek-Tsaro.

⊐	Comparator
$>$	neʃ
$<$	ɑɔᵉˀ
$=$	ʃeᵓnᵠ
$\geq$	ʃɥıl
$\leq$	ɒcɟ
$\neq$	.cᵊɟ
$\approx$	ɥeɟ
$\gg$	ɑʰe
$\ll$	ɾıɲ

4.7 | Transitivisation

Verbs that are used intransitively (i. e. have no object passed at this time) can be turned into a causative form with the prefix ⟨ɸc–⟩:

ʃlcɾdcʃ ɑɥeɑɥenɥe.
fall-NEAR.PAST DEF~coin
The coins fell.

ɒe ɸcʃlcɾdcᵊ ɑɥeɑɥenɥe.
PR.NEAR.SG TRANS-fall-OTHER.PAST DEF~coin
I dropped the coins.

Note that the word order changes to SVO. In addition, the verb is conjugated for its object, rather than the subject as expected. If the following clause uses an anaphoric subject, it refers to the object of the current clause.

Moreover, the verb does not need to be one that can never take an object. In the above example, ⟨ʃlcɾdcn⟩ means "(S) falls on (O)". However, if the verb in question is taking an object, it cannot be transitivised directly and a more roundabout way is required:

ʃlcɾdcʃ ɑɥeɑɥenɥe ɥıʃı.
fall-NEAR.PAST DEF~coin grass
The coins fell on the grass.

ɒe ɸcʃlcɾdcᵊ ɑɥeɑɥenɥe, ʃlcɾdel ɥıʃıbe.
PR.NEAR.SG TRANS-fall-OTHER.PAST DEF~coin, fall-ANAPH_SUB.PAST grass-ACC
I dropped the coins; they fell on grass.
or: I dropped the coins on grass.

4.8 | Clauses with nullary arguments

A clause with one or more arguments that are nullary or modified by nullary-number nouns (either through compounding or possession) will have a negative verb as well:

ɒəʃınʖe ɒıɟıʖe.

recall-NEAR-NEG person-NULL
No one knows.

ʃɟclʃɪnɬe ɒe ɟɪɸʃɪɒɪ ɟcl ɟʰɪ.eɬe.
want-NEAR-NEG PR.NEAR.SG ring=GEN POS magician-NULL
I don't want the rings of any magician.

4.9 | The copula

The copula ⟨ɟcn⟩ can take a noun as an object, in which case it can mean identity or membership. (Location is expressed with ⟨lɪn⟩ "be at".) With no object at all, it is used to denote existence.

It can also accept a descriptor, in which case the descriptor is attached before ⟨ɟcn⟩ in the dictionary form.

5 | Descriptors

Descriptors act as adjectives or adverbs. They follow what they modify, and are inflected for the noun class or verbal person of their antecedents.

Table 5.1: Descriptor declensions, using the descriptors ⟨hɐɒʃi⟩ “large” and ⟨ləᵊʃi⟩ “old”.

Class or person	Declined form	
Sentient	hɐɒʃi	ləᵊʃi
Animate	hɐɒʃi	ləᵊʃi
Inanimate	hɐɒʃe	ləᵊʃɔᵉ
Measure	hɐɒʃiȷ	ləᵊʃiȷ
Fluid	hɐɒʃeȷ	ləᵊʃɔᵉȷ
Edible	hɐɒʃc	ləᵊʃəᶜ
Inedible	hɐɒʃeᵊ	ləᵊʃɔ
Abstract	hɐɒʃcᵊ	ləᵊʃə
Near	hɐɒʃiɯ	ləᵊʃiɯ
Far	hɐɒʃiɯ	ləᵊʃiɯ
Other	hɐɒʃeɯ	ləᵊʃeɯ
Anaph. Sub.	hɐɒʃiɯ	ləᵊʃiɯ
Anaph. Obj.	hɐɒʃeɯ	ləᵊʃeɯ
Generic	hɐɒʃcᵊɯ	ləᵊʃəᵊɯ

5.1 | Conversion

A noun can be converted to a descriptor by appending ⟨–ɪɹ⟩.

A descriptor can be converted to an abstract noun meaning “the nature of being ~” by replacing the final ⟨–ɪ⟩ with ⟨–cnel⟩.

6 | Tree mode

As mentioned in section 4.3, anaphoric referents in a linked-list sentence are sometimes insufficient for expressing even simple sentence structures. While the easiest method of resolving this issue is using definite nouns, Lek-Tsaro also provides a mode where sentences are not linked lists of clauses, but rather (binary) trees.

6.1 | Activation

Tree mode is enabled automatically when the treeing particle 〈nʸıϥ〉 is used, and disabled at the end of a sentence.

6.2 | Branch-switching

The aforementioned particle 〈nʸıϥ〉 marks the beginning of the right branch of the tree. The right branch is ended by the particle 〈nʸıΔ〉, which causes the next clause to join the left and right branches.

(N. B. 〈nʸıϥ〉 and 〈nʸıΔ〉 can occur only between clauses. If the particles are represented by left and right brackets, respectively, then the brackets should match.)

6.3 | Anaphoric pronouns in joiner clauses

In clauses that join two branches, anaphoric pronouns require marking whether the antecedent occurs in the left predecessor 〈nʸıϥ〉 or the right predecessor 〈nʸıΔ〉. This is done by marking the pronoun with 〈–ϥ〉 or 〈–Δ〉.

Likewise, verbs can be modified with 〈–ϥ〉 or 〈–Δ〉 to indicate which branch the subject came from.

6.4 | Errors

The following are ungrammatical:

- Using the particle 〈nʸıΔ〉 or the branched anaphoric pronouns when tree mode is disabled
- Using the particle 〈nʸıΔ〉 other than to close a corresponding 〈nʸıϥ〉
- Using the unbranched anaphoric pronouns in clauses with two predecessors

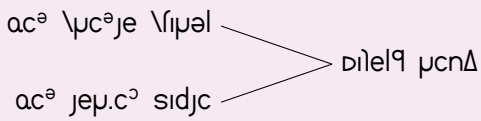
- Using the branched anaphoric pronouns in clauses with one predecessor
- Starting a new branch with ⟨nʸɪɋ⟩ when the current branch is empty

6.5 | Example

The second example in section 4.3 can be expressed as follows:

ɑcᵊ \ɥcᵊɟe \ɾɪɥəl, nʸɪɋ ɑcᵊ ɟeɥ.cᵓ sɪdɟc, nʸɪΔ ɒɪlelɋ ɥcnΔ.

The resulting tree is shown below:



7 | Numerals

Lek-Tsaro uses a mixed-base system for its numerals. Numerals are abstract nouns. A Perl 6 program to convert numerals can be found in Section A.3.

7.1 | Single-digit numerals

Here are the numerals for $n < 17$:

Table 7.1: The cardinal numbers from 0 – 16.

base 10	base v	word
0	0	ɲəɒ
1	1	ɑcᵊl
2	ɻ	ʃɪȷ
3	ʔ	ɷʰeᶝn
4	₥	ɑˡɪɲ
5	₰	ɸcȷ
6	ʕ	ɒɥe
7	٩	ʃȷcȷ
8	Δ	dəᶝn
9	L	ɦed
10	F	bənᵠ
11	ⅎ	nəᶜ
12	₤	leᶝ
13	♯	ȷʰcd
14	A	ɥɪn
15	∀	⅂el
16	Ψ	.ɪɲ

Note that digits above 9 use capital hacm letters.

7.2 | Numerals up to $19 \cdot 17$

These are represented by two digits. The multiples of 17 are shown below:

Table 7.2: Multiples of 17, up to $18 \cdot 17$.

base 10	base v	word
17	10	selcᵊ
34	20	ɒɪlcᵊ
51	ʔ0	ɷʰeᶝlcᵊ
68	ᙢ0	ɾɪɒlcᵊ
85	ᚼ0	ɸcɻʃcᵊ
102	ʕ0	ɒɥelcᵊ
119	٩0	ɾɻcɻʃcᵊ
136	Δ0	dəᶝnə
153	L0	helcᵊ
170	F0	bənᵠə
187	ⅎ0	nəᶜlə
204	ⱹ0	leᶝlcᵊ
221	ⱡ0	jʰcdlcᵊ
238	A0	ɥɪncᵊ
255	∀0	]elɥcᵊ
272	Ψ0	.ilɥcᵊ
289	Ɵ0	ɻɪlscᵊ
306	Ψ0	heɒdcᵊ

Thus $y \cdot 17 + x$ is written ⟨*x*-*y*⟩.

7.3 | Numerals up to $13 \cdot 19 \cdot 17 = 4199$

These are represented by three digits. The multiples of $19 \cdot 17$ are listed below:

Table 7.3: Multiples of $19 \cdot 17$, up to $12 \cdot 19 \cdot 17$.

base 10	base v	word
323	100	hɪɻɪɾɪn
646	200	ɾɪɻɪɾɪn
969	ʔ00	ɷʰeᶝɻeɾɪn
1292	ᙢ00	ɑᶫɪɸɪɾɪn
1615	ᚼ00	ɸcɻɪɾɪn
1938	ʕ00	ɒɥeɻɪɾɪn
2261	٩00	ɾɻcɻɪɾɪn
2584	Δ00	dəᶝnɪɾɪn
2907	L00	heɑɪɾɪn
3230	F00	bənᵠɪɾɪn
3553	ⅎ00	nəᶜɻɪɾɪn
3876	ⱹ00	leᶝɻɪɾɪn

Thus $(z \cdot 19 \cdot 17) + (y \cdot 17) + x$ is written ⟨*z*-*x*-*y*⟩.

7.4 | Numerals up to and including $4199 \cdot (4199 + 1)/2 = 8817900$

The numeral for 4199 is ⟨ləᶝɔləᶜ⟩, written as ⟨1:000⟩.

Likewise, two ⟨ləɔləᶜ⟩ is written as ⟨ꞖːOOO⟩ and pronounced ⟨ləɔləᶜ–ɪŋ⟩, but the second ⟨ləɔləᶜ⟩ is one smaller than the first. In other words, ⟨ꞖːOOO⟩ = 4199 + (4199 − 1) = 8397.

Table 7.4: "Multiples" of ⟨ləɔləᶜ⟩.

"Multiple"	Difference from last	Total
(0)		0
1ːOOO	4199	4199
ꞖːOOO	4198	8397
ʔːOOO	4197	12594
ᛗːOOO	4196	16790
ᚦːOOO	4195	20985
...		
ⱭⱮ∀ːOOO	3	8817897
ⱭⱮΨːOOO	2	8817899
1ːːOOOːOOO	1	8817900

Thus the nth "multiple" differs from the $(n-1)$th multiple by $(4199+1-n)$ (given $1 \leq n \leq 4199$), and the sum of the first n "multiples" is

$$\begin{aligned} y(n) &= \sum_{i=1}^{n} (4200 - n) \\ &= \frac{1}{2} \cdot (8399 \cdot n - n^2) \end{aligned} \tag{7.1}$$

And likewise, for some given y, the largest "multiple" of ⟨ləɔləᶜ⟩ not smaller than y has the index

$$N(y) = \left\lfloor \frac{1}{2} \cdot \left(8399 - \sqrt{70543201 - 8 \cdot y}\right) \right\rfloor \tag{7.2}$$

In other words, for any numeral $\langle n_1{:}n_2 \rangle$, $n_1 + n_2$ must be less than 4199.

7.5 | Higher numerals

The *bases* of higher numerals b_i can be derived from the recurrence relation

$$b_i = \begin{cases} 4199 & \text{if } i = 1 \\ \dfrac{b_{i-1} \cdot (b_{i-1} + 1)}{2} & \text{otherwise} \end{cases} \tag{7.3}$$

Then b_i acts as a new triangular base. Equations 7.1 and 7.2 can be generalised to the following:

$$y(n, b_i) = \sum_{i=1}^{n} (b_i + 1 - n) \tag{7.4}$$

$$= \frac{1}{2} \cdot (n \cdot (2 \cdot b_i + 1 - n)) \tag{7.5}$$

$$N(y, b_i) = \left\lfloor \frac{1}{2} \cdot \left(2 \cdot b_i - \sqrt{4 \cdot b_i^2 + 4 \cdot b_i + 1 - 8 \cdot y} \right) \right\rfloor \tag{7.6}$$

It follows that $y(n_1, b_i) + n_2$ is represented as $\langle n_1 :^{i} n_2 \rangle$ (i colons), and such a numeral must satisfy $n_1 + n_2 < b_i$.

Here are the names of the bases themselves:

Table 7.5: Names of higher bases.

Base	base v	word
b_1	1:000	ɭəˈɔləᶜ
b_2	1::000:000	ɒɐɥcᵓʃɪ
b_3	1:::000:000::000:000	ʃɪlɥəᵓ
b_4		ɷencoɪ

7.6 | Cardinal and ordinal numerals

Cardinal numerals compound to their antecedents; ordinal numerals use the possessive ⟨–ɒɪ ɟcl⟩ construction:

ɒcɑɪ–ɷᑫeᵓn
child-three
three children

ɒcɑɟɒɪ ɟcl ɷᑫeᵓn
child-SG=GEN POS three
the third child

8 | Derivational morphology

The following methods are used to derive related terms from existing ones.

8.1 | Abstraction

Abstraction is a derivation that takes a non-abstract noun and returns the abstract noun representing the concept of the argument. This formation appends ⟨–ne⟩ or ⟨–nɔᵉ⟩ to the noun.

Examples:

- ⟨hɥcɑen⟩ *book* → ⟨hɥcɑene⟩ *literature*
- ⟨hɔlɪ⟩ *cart* → ⟨hɔlɪnɔᵉ⟩ *transportation*

Note that any double letters collapse into a single.

8.2 | Dematuration

Dematuration is a derivation that takes a noun and returns a noun of the same class that represents an immature form of the argument (not necessarily a diminuitive). ⟨ʃc–⟩ or ⟨ʃəᶜ–⟩ are prepended to nouns that begin in ⟨j⟩ or ⟨l⟩, or ⟨jc–⟩ or ⟨jəᶜ–⟩ otherwise.

Examples:

- ⟨ɒɪjɪ⟩ *person* → ⟨jcɒɪjɪ⟩ *child*
- ⟨ʃjɔɥəᵓ⟩ *fruit* → ⟨jəᶜʃjɔɥəᵓ⟩ *unripe fruit*
- ⟨jɐrlɪlcn⟩ *essay* → ⟨ʃcjɐrlɪlcn⟩ *draft*

8.3 | Verb-to-noun conversions

Verb-to-noun conversions involve an operation called *inversion*; this operation swaps certain phonemes of a word:

- front vowels ↔ back vowels
- voiceless plosives ↔ voiced plosives (in any position other than in a coda)
- ʃ ↔ l, d ↔ ɻ (in coda position)

- ɑ ↔ ɟʰ
- ɟ ↔ ɑʰ (in any position other than in a coda)
- h ↔ ɑˡ
- ɻ ↔ ɳ (in any position other than after a fricative in an onset or in a coda)
- ʂ ↔ l (in any position other than in a coda)
- ɻ ↔ l (in coda position)
- ɥ ↔ o

For instance, ⟨ɻɪ.cʃɪn⟩ would be inverted to ⟨ɳɪ.əᶜɑɪn⟩.

All other phonemes are unchanged.

Since all of the conversions below are straightforward, only their names will be mentioned.

Table 8.1: Verb-to-noun conversions, from the inversion of the verb stem.

Name	Affix
Agent	–eᶽnᵠ / –ɔnᵠ
Patient	–eᶽd / –ɔd
Location	–eᶽɻ / –ɔɻ
Instrument	–ɪʃɟ

Table 8.2: An example with ⟨nəᶽbɪn⟩ *to steal*.

Name	Derivation	Meaning
Agent	ncᶽdeᶽnᵠ	thief
Patient	ncᶽdeᶽd	stolen goods
Location	ncᶽdeᶽɻ	site of theft
Instrument	ncᶽdɪʃɟ	tool used for theft

9 | Names

Names fall into two grammatical categories:

- *Nominal names* act as nouns. They are usually single words.
- *Clausal names* are entire clauses. These names usually refer to places, although a few people have clausal names. In extreme cases, such a name can span multiple clauses.

9.1 | Nominal names

These names act as nouns, and they are preceded by a backslash ⟨\⟩. If the name spans multiple words (as common in foreign names), spaces are escaped by backslashes. No distinction is made between native and foreign names.

Only personal names can stand on their own, and even then, only given or full names. Other names must modify a common noun describing the nature of what is named, in the integral number without definiteness.

Table 9.1: Some examples of nominal names.

Name	Type
\ɥcᵊjɐ	Personal (native)
\ʃɪɥəl	Personal (native)
\ɥɐɒcn	Personal (foreign)
dɥeᶥɒɐ–\oɪlɪ.c	Place (foreign)

Native names will usually respect vowel harmony. Children of parents who work in professions demanding physical labour (e. g. bricklaying) will usually have names with back vowels. In contrast, those born to parents of professions that do not demand physical strength (e. g. computer programming) will usually bear names with front vowels.

9.2 | Clausal names

These names comprise of one or more clauses. Due to the nature of clausal names, they are all considered native. Most of these names refer to places; personal clausal names are almost always nicknames or such. Orthographically, they are put into square brackets ⟨[]⟩.

Clausal names are used by saying them as their own clauses, then using an anaphoric pronoun to backreference the entity described by the name in question. The type of anaphoric pronoun used varies from name to name. It might be the anaphoric subject pronoun, the object pronoun or the last-clause pronoun.

We call the *referent* the subject, the object or the verb of the last clause, respectively depending on the type of anaphoric pronoun used to refer to the name. If the referent is a noun, it must be declined in the integral number without definiteness.

Here, as common in maps and such, the referent will be capitalised. However, other contexts that make the type of anaphoric pronoun to use clear do not use this type of capitalisation.

Table 9.2: Some examples of clausal names.

Name	Type	Literal meaning
[AEɤΨϵᵌ dɳlʃɹ ʃɔɑɔl]	Place	The trees *covered* the ground
[ɒəʃɪ ɸɤEᵓÐE ɥcᵊl–\lɐɳɥcᵓ]	Place	The *city* remembers the Šedrŷ star
[ɑcᵊ lɥɪʃə–ɒɪ ɟcl ɟəɥ ɟʰɪ.en–ɒɪ ɟcl lɪɳcᵓ, ɸoeɟc.el ɸɤEᵓÐEÐ]	Place	The *city* was founded by the warrior of the sun and the wizard of the moon
[ɒeɟɪ \ΨƎTF϶ ɟcᵊl–selcᵊ]	Personal	*Gulto* takes care of 17 foxes

An example of usage:

nɪ.ɪ bɪnen–bəɟ, [ɒəʃɪ dɥeᵓɒe ɥcᵊl–\lɐɳɥcᵓ], ɟʰɪ DIDIJIJ .CD.
wait-OTHER year-future, (name), go-OTHER DEF~person-SG PR.ANAPH_SUB.SG
He will go to Muta Pröme Ryk-Šedrŷ next year.

10 | Calendar

Domain II, which contains *Rymako*, has a day that is 26.99410 hours long. Other figures are given in terms of local days:

Table 10.1: Astronomical measures for Domain II.

Period	Length in local days
Local (synodic) day	1.00000
Sidereal day	0.99699
Tropical year (l_y)	301.94714
Sidereal year	302.03719
Synodic month (l_m)	30.80152
Sidereal month	27.95032

10.1 | Tides

In Domain II, the offset of the sea level due to the tide can be modeled by the following equations:

$$y = y_s + y_m \tag{10.1}$$

$$y_s = A_s \cdot (1 + A_{sa} \cdot \cos(\tau \cdot t)) \cdot \cos(2 \cdot \tau \cdot t) \tag{10.2}$$

$$y_m = A_m \cdot \left(1 + A_{ma} \cdot \cos\left(\frac{\tau \cdot t}{l_m}\right)\right) \cdot \cos\left(\frac{2 \cdot \tau \cdot (1 - l_m) \cdot t}{l_m}\right) \tag{10.3}$$

where:

$$\begin{aligned} \tau &= 2 \cdot \pi \\ A_s &\approx 0.675 \\ A_{sa} &\approx 0.0532 \\ A_m &\approx 1.267 \\ A_{ma} &\approx 0.176 \\ y &= \text{offset of sea level in metres} \\ t &= \text{time since HAT in local synodic days} \end{aligned}$$

An exact solution to $dy/dt = 0$ is not known to exist. However, the solutions to this equation can be found numerically. Consult Section A.1 for a Sage program to do so.

As the calendar used by Lek-Tsaro uses the high and low tides to count time, it is not synchronised even with days. The basic unit of time in the calendar is the *tidal day* ⟨ɥəɒəᶜ⟩ (l_t) – the amount of time between a high tide and the second high tide thereafter, which is, on average, 1.03356 local synodic days, but can vary considerably. Thus:

$$l_m/l_t \approx 29.80148 \tag{10.4}$$
$$\approx 4053/136 \tag{10.5}$$
$$l_y/l_m \approx 9.80299 \tag{10.6}$$
$$\approx 7215/736 \tag{10.7}$$

This suggests that:

1. most months will have 30 days, but every 136 months, 27 months will have only 29.
2. most years will have 10 months, but every 736 years, 145 years will have only 9.

10.2 | Months

Months follow a 136-month cycle wherein the $5n+2$-numbered months (zero-indexed, $n \in \mathbb{N}$) have 29 days and the other months have 30.

The names of months, on the other hand, are determined from their positions relative to the first month of the year:

Table 10.2: The months of the year.

#	Name
0	ɑəᵓbəᵓ
1	ɥcᵉ.eɒ
2	ʃɹɪɸɔl
3	ɒəɥəɹɪ
4	lʁeɥɪɒ
5	ʃɔᵉɒəʃ
6	nᵠəɥəᶜʃ
7	lcbclɪ
8	bɔɒəᵓl
9*	.cɹeᵓɥɪ

Days within a month are indexed from one.

10.3 | Years

The lengths of the year follow a 736-year cycle as specified in Figure 10.1. The code used to generate this table can be found in Section A.2.

10.4 | Eras

Years are grouped further into *eras* ⟨lɪɥɪ⟩, which change on major historical events. The start of a new era resets the month and year cycle. Eras can also start in the middle of a year of the previous era; thus, the start of the year is different for each era. The *crossover date* of an era is the date of the era that coincides with the first day of the next; in other words, it is the date immediately after the last day of the era.

Table 10.3: The months of the year.

Name	Crossover date	Days between	Cumulative
lɪɥɪ–ɥəlɔᵉ	0 lʁeɥɪɒ LΔJ	889726	889726
lɪɥɪ–ləᵓʃɪ	1J ʃɹɪɸɔl ϛΛϛ	642508	1532234
lɪɥɪ–lɪɹnedcᵊ	Δ lcbclɪ ɹʔɬ	207366	1739600
lɪɥɪ–nchel	(to present)		

The first day of ⟨lɪɥɪ–nchel⟩ coincides with the founding of the (not yet named).

10.5 | Subdivisions of the day

Lek-Tsaro has two systems for subdividing the day.

Figure 10.1: Table of year lengths in a cycle.

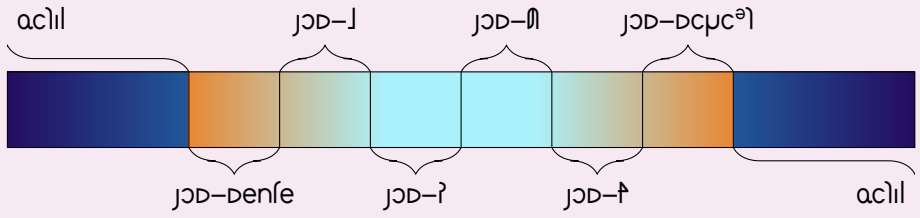
```
   0123456789 |     0123456789 |     0123456789 |     0123456789
 0 XXXXX9XXXX |  19 XX9XXXX9XX |  38 9XXXX9XXXX |  57 XXX9XXXX9X
 1 9XXXX9XXXX |  20 XXX9XXXX9X |  39 9XXXX9XXXX |  58 XXX9XXXX9X
 2 9XXXX9XXXX |  21 XXX9XXXX9X |  40 9XXXXX9XXX |  59 XXX9XXXX9X
 3 9XXXX9XXXX |  22 XXX9XXXX9X |  41 X9XXXX9XXX |  60 XXXX9XXXX9
 4 9XXXX9XXXX |  23 XXX9XXXX9X |  42 X9XXXX9XXX |  61 XXXX9XXXX9
 5 9XXXX9XXXX |  24 XXX9XXXX9X |  43 X9XXXX9XXX |  62 XXXX9XXXX9
 6 9XXXX9XXXX |  25 XXX9XXXX9X |  44 X9XXXX9XXX |  63 XXXX9XXXX9
 7 X9XXXX9XXX |  26 XXX9XXXXX9 |  45 X9XXXX9XXX |  64 XXXX9XXXX9
 8 X9XXXX9XXX |  27 XXXX9XXXX9 |  46 X9XXXX9XXX |  65 XXXX9XXXX9
 9 X9XXXX9XXX |  28 XXXX9XXXX9 |  47 XX9XXXX9XX |  66 XXXX9XXXXX
10 X9XXXX9XXX |  29 XXXX9XXXX9 |  48 XX9XXXX9XX |  67 9XXXX9XXXX
11 X9XXXX9XXX |  30 XXXX9XXXX9 |  49 XX9XXXX9XX |  68 9XXXX9XXXX
12 X9XXXX9XXX |  31 XXXX9XXXX9 |  50 XX9XXXX9XX |  69 9XXXX9XXXX
13 X9XXXXX9XX |  32 XXXX9XXXX9 |  51 XX9XXXX9XX |  70 9XXXX9XXXX
14 XX9XXXX9XX |  33 XXXXX9XXXX |  52 XX9XXXX9XX |  71 9XXXX9XXXX
15 XX9XXXX9XX |  34 9XXXX9XXXX |  53 XX9XXXXX9X |  72 9XXXX9XXXX
16 XX9XXXX9XX |  35 9XXXX9XXXX |  54 XXX9XXXX9X |  73 9XXXX9
17 XX9XXXX9XX |  36 9XXXX9XXXX |  55 XXX9XXXX9X |
18 XX9XXXX9XX |  37 9XXXX9XXXX |  56 XXX9XXXX9X |

9: 9 months
X: 10 months
```

10.5.1 | Traditional timekeeping

The traditional system of timekeeping relies on subdivisions of the solar day. As shown in Figure 10.2, the period between sunrise and sunset are divided into six equally-sized parts ⟨ɟɔɒ⟩, and the night is considered a separate category. This implies that the length of the "hours" depends on the seasons.

Figure 10.2: Hours in traditional timekeeping.



The traditional timekeeping system is vague – typically, the most precise interval used is a quarter or eighth of an "hour".

10.5.2 | Modern timekeeping

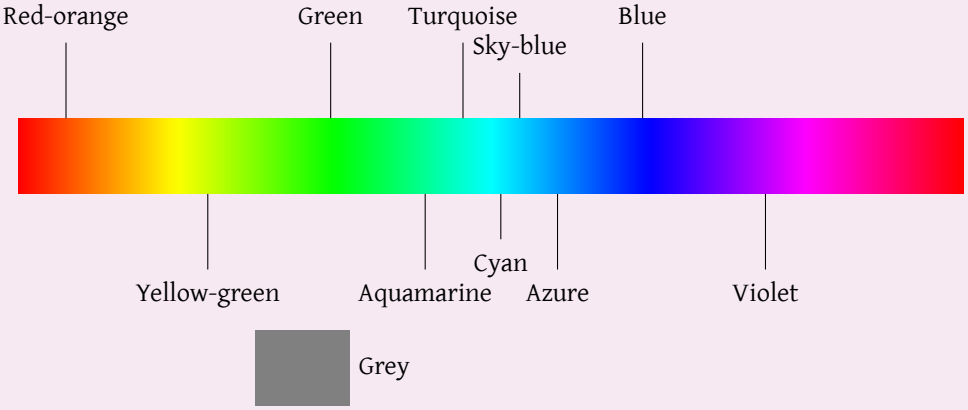
The need for precise schedules necessitated another standard for subdividing the day. The modern system is based on the tidal day, rather than the solar day. In theory, each tidal day is divided into 23 equal parts ⟨lin⟩, each of which is divided into 80 equal parts ⟨jcne⟩, which are each divided into 40 equal parts ⟨bɪɳəl⟩.

Of course, having 23 ⟨lin⟩ per tidal day requires predicting the next two high tides. For that reason, each day's ⟨lin⟩ are based on the length of the *previous* tidal day, such that each day might have more or less than 23 ⟨lin⟩.

11 | Miscellanea

11.1 | Colour

Lek-Tsaro has eleven non-derived colour terms:



Note that “grey” refers generically to a loss of chroma. There is no distinction between a decrease in saturation and a decrease in value.

Lek-Tsaro works with colour *transitions*, not static colours, and uses abstract nouns to represent them. See table 11.1.

Table 11.1: Colour transitions in Lek-Tsaro. Each row represents a different starting colour; each column represents a different ending colour.

	RO	YG	Gn	Aq	Tu	Cy	SB	Az	Bl	Vi	Gy
RO	hɪȷ	ɒel	ɷʰen	ɑɪl	ȷʰcɻ	dəl	beᶝɾ	ɒɪl	ɑˡɔᵉd	ɾenᵠ	ɒc
YG	ɒɔᵉɾ	ɻəᶝɒ	hɔᵉd	ɷcᵊl	nᵠcᶝȷ	ɾel	nʰɪɻ	ɑʰeɾ	ɾjeᶝnʰ	ɥed	dəᶝ
Gn	ɾʰɔᵉn	ɑˡeɾʰ	sel	ɾəɒ	ɸɔᵉɾ	nəᶜl	bɔnʰ	leᶝɾʰ	ȷcᵊl	ȷʰəᶝȷ	ɭɔ
Aq	ȷʰɪɻ	ɾəɻ	ɻcᵊɒ	ocl	ɾʰəl	.əᶜl	ɾlɔɻ	ɭɻɔȷ	noed	ɾɾɪd	beᶝ
Tu	ɑəᶜl	nᵠəᶝȷ	ɭel	ɷʰcᵊɻ	ɒɥen	ɻcȷ	hɔɒ	ɾɥel	ȷocɾ	ɷəᶝɻ	ɾə
Cy	bcᵊɻ	ɷɔᵉɾ	ncᶝɻ	.cɾ	ɾəᶜȷ	bɾel	ɾlcᶝl	nʰɪl	qɻcn	bəᶜɾ	nɔ
SB	dɔl	nʰɪl	deᶝnʰ	ɾleᶝl	ɑˡeᶝɒ	ɾləᶝɻ	oɪd	ȷʰɻɔd	den	ɾcd	ɾȷcᵊ
Az	ɒɪɻ	ȷɔᵉl	lɔd	ɸɾdeᶝȷ	ɷoɔᵉɻ	nʰɪɾ	qɻeᶝɾʰ	ɑcȷ	ɾcɻ	ɻəd	oɪ
Bl	heɾʰ	ɾȷɔnʰ	ɑʰəɻ	nɥɔᵉɾʰ	ɑʰɥəᶜl	ȷʰɻəᶜn	bɔᵉn	ɷəᶜl	hɪl	lcᵊnᵠ	ɥəᶝ
Vi	ɷɔᵉnᵠ	oɔᵉɾʰ	ɑcᶝȷ	ɷɻɪɾʰ	ɾcᶝl	dcᶝl	ɻəᶜɾʰ	ɾdcᵊɾʰ	ɸənᵠ	hɔn	ɑɪ
Gy	ɷɔ	bcᵊ	le	də	ɻe	ȷc	ɾȷɪ	ɥɪ	ɑʰe	ȷʰc	.cȷ

A | Listings of programs

A.1 | workfiles/7/tides.sage

```
# How many values to output

limit = int(sys.argv[1]) if len(sys.argv) > 1 else 1000

# :P

tau = 2 * pi

t = var("t")

# Constants

A_s = 0.675; A_sa = 0.0532; A_m = 1.267; A_ma = 0.176; l_m = 30.80152

# Solar component
y_s2 = A_s * (1 + A_sa * cos(tau * t)) * cos(2 * tau * t)
# Lunar component
y_m2 = A_m * (1 + A_ma * cos(tau * t / l_m)) * cos(2 * tau * t / l_m -
    2 * tau * t)
y = y_s2 + y_m2
yp = diff(y, t)

# High and low tides occur at values of t where dy/dt = 0.

i = 0
time = 0
print(0)
while i < limit:
  try:
    time2 = find_root(yp == 0, time + 0.000000001, time + 0.35)
    print(time2)
    time = time2
    i += 1
  except:
    time += 0.01
```

workfiles/7/tides.sage

A.2 | workfiles/7/bins.pl6

```
# CONSTANTS

constant \MONTHS_PER_YEAR_CYCLE = 7215;
constant \YEARS_PER_YEAR_CYCLE = 736;
constant \AVG_MONTHS_PER_YEAR = MONTHS_PER_YEAR_CYCLE /
    YEARS_PER_YEAR_CYCLE;

# COMPUTATION
# For each year, take as many months as are needed
# in order to cycle to the next.

my $c = 0;
my @k;

for 0 ..^ YEARS_PER_YEAR_CYCLE -> $i {
  my $need = 1 - ($c - floor($c));
  my $objs = ceiling($need * AVG_MONTHS_PER_YEAR);
  @k[$i] = $objs;
  $c += $objs / AVG_MONTHS_PER_YEAR;
}

# DISPLAY

my \cols = 4;
my $len = @k.elems;

say ("    0123456789" xx cols).join(" | ");

my \total-rows = ceiling($len / 10);
my \rows = ceiling(total-rows / cols);

for 0 ..^ rows -> $j {
  for 0 ..^ cols -> $p {
    print(" | ") if $p != 0;
    my $q = $j + rows * $p;
    next if $q >= total-rows;
    printf("%3d ", $q);
    for 0 ..^ 10 {
      my $i = 10 * $q + $_;
      if $i >= $len { print " "; }
      else {
        print "0123456789XE".substr(@k[$i], 1);
      }
    }
  }
  say "";
}
```

workfiles/7/bins.pl6

A.3 | workfiles/7/conno.pl6

```
my $digits-str = "0123456789TKXSNVFMD";
my @digits = $digits-str.comb;

```

```
sub convert-small-fwd($n, $pad = False) {
  die "$n must be < 4199" if $n >= 4199;
  my $a = $n div (19 * 17);
  my $b = ($n div 17) % 19;
  my $c = $n % 17;
  return
    (!$pad && $a == 0 ?? "" !! @digits[$a]) ~
    (!$pad && $b == 0 && $a == 0 ?? "" !! @digits[$b]) ~
    @digits[$c];
}

sub convert-small-back($s) {
  die "$s must be 3 chars or fewer" if $s.chars > 3;
  my $c = $digits-str.index($s.substr(* - 1, 1) // "0");
  my $b = $digits-str.index($s.substr(* - 2, 1) // "0");
  my $a = $digits-str.index($s.substr(* - 3, 1) // "0");
  return $c + 17 * ($b + 19 * $a);
}

sub triangle($n, $p) {
  return ($n * (2 * $p + 1 - $n)) div 2;
}

sub sqrt-floor($y) {
  die "$y is negative" if $y < 0;
  return $y if $y < 2;
  my $small = sqrt-floor($y +> 2) +< 1;
  my $large = $small + 1;
  return $small if $large * $large > $y;
  return $large;
}
sub sqrt-ceil($y) {
  my $n = sqrt-floor($y);
  return $n if $n * $n == $y;
  return $n + 1;
}

sub untriangle($y, $p) {
  return (2 * $p + 1 - sqrt-ceil(4 * $p * $p + 4 * $p - 8 * $y + 1))
    div 2;
}

my @powers = (4199);

for 0 .. 10 {
  my $p = @powers[* - 1];
  @powers.push: $p * ($p + 1) div 2;
}

sub convert-large-fwd-h($n, $i, $pad = False) {
  # base case
  if $i == 0 {
    return convert-small-fwd($n, $pad);
  }
  # recursive
  my $super = untriangle($n, @powers[$i - 1]);
  my $infra = $n - triangle($super, @powers[$i - 1]);
  if $super == 0 && !$pad {
    return convert-large-fwd-h($infra, $i - 1, False);
  }
  return
    convert-large-fwd-h($super, $i - 1, $pad) ~
```

```
    (":" x $i) ~
    convert-large-fwd-h($infra, $i - 1, True);
}

sub convert-large-fwd($n, $pad = False) {
  my $i = 0;
  ++$i while @powers[$i] <= $n;
  convert-large-fwd-h($n, $i, $pad);
}

sub convert-large-back($s) {
  # Find the longest run of colons
  my @matches = ($s ~~ m:g/":"+/); #/"
  if (!@matches) {
    return convert-small-back($s);
  }
  my $longest-match = @matches.max(*.chars);
  my $i = (~$longest-match).chars;
  my $left = $s.substr(0, $longest-match.from);
  my $right = $s.substr($longest-match.to);
  my $sup = convert-large-back($left);
  my $inf = convert-large-back($right);
  return triangle($sup, @powers[$i - 1]) + $inf;
}

multi MAIN(Int :$fwd) {
  say convert-large-fwd($fwd);
}
multi MAIN(Str :$back) {
  say convert-large-back($back);
}
```

workfiles/7/conno.pl6

A.4 | workfiles/7/count-days.pl6

```
# Count the number of days between 1/0/0 and D/M/Y, inclusive.

# CONSTANTS

constant \MONTHS_PER_YEAR_CYCLE = 7215;
constant \YEARS_PER_YEAR_CYCLE = 736;
constant \AVG_MONTHS_PER_YEAR = MONTHS_PER_YEAR_CYCLE /
    YEARS_PER_YEAR_CYCLE;
constant \MONTHS_PER_MONTH_CYCLE = 136;
constant \DAYS_PER_MONTH_CYCLE = 4053;

# COMPUTATION
# For each year, take as many months as are needed
# in order to cycle to the next.

my $c = 0;
my @k = (0);

for 0 ..^ YEARS_PER_YEAR_CYCLE -> $i {
  my $need = 1 - ($c - floor($c));
  my $objs = ceiling($need * AVG_MONTHS_PER_YEAR);
  @k[$i + 1] = $objs;
  $c += $objs / AVG_MONTHS_PER_YEAR;
```

```
}

my @cumk = [\+] @k;

sub months-before-year($year) {
  my $whole-cycles = $year div YEARS_PER_YEAR_CYCLE;
  my $remainder = $year % YEARS_PER_YEAR_CYCLE;
  return $whole-cycles * MONTHS_PER_YEAR_CYCLE + @cumk[$remainder];
}

my @m = (0);

for 0 ..^ MONTHS_PER_MONTH_CYCLE -> $i {
  @m.push: ($i % 5 == 2) ?? 29 !! 30;
}

my @cumm = [\+] @m;

sub days-before-month($month) {
  my $whole-cycles = $month div MONTHS_PER_MONTH_CYCLE;
  my $remainder = $month % MONTHS_PER_MONTH_CYCLE;
  return $whole-cycles * DAYS_PER_MONTH_CYCLE + @cumm[$remainder];
}

sub days-before-date($d2, $m, $y) {
  my $d = $d2 - 1; # d is 0-indexed
  my $bm = months-before-year($y) + $m;
  return days-before-month($bm) + $d;
}

sub MAIN($d2, $m, $y) {
  say days-before-date($d2, $m, $y);
}
```

workfiles/7/count-days.pl6

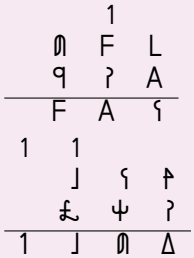
B | Arithmetic in base *v*

This chapter describes algorithms for performing arithmetic operations in Lek-Tsaro's number system.

B.1 | Operations on small numbers

B.1.1 | Additions

If both addends are smaller than 4199, then it is sufficient to use mixed-base addition:



B.1.2 | Subtraction

If both of the operands are smaller than 4199, then it is sufficient to use mixed-base subtraction.

B.1.3 | Determining parity

A number less than 4199 is even iff the sum of its digits in base *v* is even – that is, either none of its digits are odd, or if exactly two are.

B.1.4 | Dividing by two

If a number's base-*v* representation contains only even digits, then divide each digit by two.

If the representation has two odd digits, then take advantage of the identities

$$11_v/2 = 9_v$$
$$101_v/2 = 99_v$$
$$110_v/2 = T0_v$$

This operation is written as ⟨ᗡ⟩, short for ⟨ᗡყιnε⟩ "one half". Thus, in hacm:

- ᗡ11 = L
- ᗡ101 = LL
- ᗡ110 = F0

B.1.5 | Multiplication

With the previous two operations, it is now possible to use peasant multiplication to multiply small numbers.

B.2 | Operations on larger numbers

B.2.1 | Addition

For some $i \in \mathbb{N}$, and two numbers number $a = x_a :^i y_a$ and $b = x_b :^i y_b$, we take advantage of the fact that

$$x_a :^i y_a + x_b :^i y_b = (x_a + 1) :^i y_a + (x_b - 1) :^i y_b + (x_a - x_b + 1) \tag{B.1}$$
$$x_a :^i y_a + x_b :^i y_b = (x_a + x_b) :^i y_a + 0 :^i y_b + x_a \cdot x_b \tag{B.2}$$
$$= (x_a + x_b) :^i (y_a + y_b) + x_a \cdot x_b \tag{B.3}$$

Romanisation

In this text, the romanisation is used only to transcribe names into English. Whenever possible, the hacmisation should be used.

Table B.1: The consonants of Lek-Tsaro.

	Bilabial	Alveolar	Palatal	Velar	Glottal
Nasal	m	n	ñ	ŋ	
Plosive	p b	t d	ť ď	k g	’
Fricative	f	s	š	h	
(coarticulated)	þh	fh		fš	
Affricate		ts	tš		
Lateral fricative		ł			
Approximant		r	j	w	
Lateral approximant		l			
Trill		ř			

Table B.2: The vowels of Lek-Tsaro.

Spread	Half-rounded	Rounded
i	y	ŷ
ï	u	û
e		ö
ë		o
a		

Rod signs are represented by the Arabic digits ⟨1 2 3 4 5 6 7 8⟩ attached to the end of the verbs they encompass. Proper words are preceded by a backslash ⟨\⟩.

⟨ŋ⟩ should be capitalised as ⟨Ŋ⟩ only if one can depend on the majuscule glyph appearing like an N with a hook. Otherwise, it should be spelled ⟨Ng⟩.

C | Dictionary

.

.ᴄᴅᴇɴ *ninanim* house
.ᴄᵊʜᴄᵊ.ᴄɴ *v* (S) perceives, detects, finds (O)
.ᴇʜᴇ.ᴄ *nabst* perception, detection
.ᴇᵓʃᴇlɔ *nabst* sadness, grief

ʃ

ʃʟɪᴘᴄᴊ *ninanim* river
ʃʟɪᖶɪɴ *v* (S) fights (O)
ʃʟᴄʜᴄɴ *v* (S) falls on (O)
ʃʟɔᴘɔ *ninanim* flower
ʃʟɔᵉᴅɪ *desc* sufficient, wanted, wished-for
ʃʟᴇ⟩ɪ *desc* complete, full, mature
ʃʟᴇl *nsent* who?
ʃɟɪdɔ *nabst* power, magic, motivation
ʃɟᴄ⟩ᴄɴ *v* (S) stabs, stings (O)
ʃɟᴄlʃɪɴ *v* (S) wants (O), benefactive
ʃɟɔᴘəᵓ *ninanim* fruit
ʃʜɪɟᴄɴ *v* (S) answers to (O)
ʃʜᴇɟᴄ *nsent* child (young person)
ʃɪᵩɪɴ *v* (S) loses, frees (O); (O) escapes
ʃɪbᴘɪ *desc* heavy
ʃɔɑɔ⟩ *ninanim* tree
ʃɔɑɔ⟩ *nined* wood
ʃᴇdᴄɴ *v* (S) buys (O)
ʃᴇᴘ.ᴄᵓ *nedib* beef
ʃᴇᴘɪɴ *v* rain (S = other)
ʃəᖶɪ *nsent* coward, knave
ʃəᶜᴘɔ *nined* blood vessels

⟩

⟩ᴘɪᖴʏəᵓ *nsent* warrior
⟩oɔᵉlɪ *desc* potent, powerful not in a physical sense
⟩ɪ.ᴄdɪ *nabst* south
⟩ɪ⟩ɪɴ *v* (S) makes a loud noise
⟩ɪɟnedᴄᵊ *ninanim* mirror
⟩ɪɴ *v* (S) is at (O), locational verb
⟩ɪɴ *nmeas* subdivision of the day cf Grammar / Calendar / Subdivisions of the day / Modern timekeeping
⟩ɪɑᴄᵓ *ninanim* moon
⟩ɪʏɪ *ninanim* era
⟩ɪʜɪᴊ *nined* stone
⟩ᴄ⟩ɪ *desc* all, every
⟩ɔɴ *desc* whole, entire
⟩əᵓ.ɪɴ *v* (S) needs (O)
⟩əᵓʃɪ *desc* old

⟨

⟨ᴘᵉᵓnᴄɴ *v* (S) hunts for (O)
⟨ᴄnɪɴ *v* (S) shoots an arrow to (O)
⟨ᴄl *nabst* nature, disposition

ᴊ

ᴊɪᴘʃɪ *ninanim* ring
ᴊᴄɴ *v* (S) is (O)
ᴊᴄnᴄɴ *v* (S) attaches to, loves (O)

ɟcne *nmeas* subdivision of the day cf Grammar / Calendar / Subdivisions of the day / Modern timekeeping
ɟcᵊl *nanim* fox
ɟɔɒ *nmeas* subdivision of the day cf Grammar / Calendar / Subdivisions of the day / Traditional timekeeping
ɟɔᵉɷɥɪ *ninanim* table
ɟe.ɪn *v* (S) knows (O) answers (last clause)
ɟe.ɪn *v* (S) describes (O)
ɟenɪn *v* (S) is worried by (O)
ɟeɑˡc *nabst* daytime
ɟeɾlɪlcn *ninanim* essay
ɟeᶥʃɭe *ninanim* land, country
ɟəʃɪ *desc* many, again
ɟəɥ *ninanim* day, sun

ɟʰ

ɟʰɪ.en *nsent* magician
ɟʰɪn *v* (S) goes toward (O)
ɟʰɪɥcn *v* (S) creates (O)
ɟʰcn *nabst* how many?
ɟʰeᶥncn *v* (S) befriends (O)
ɟʰən *nabst* how much?

n

nɥɪɥɪ *nanim* cat
nɪ.cn *v* (S) waits for/until (O), temporal verb, if
nɪ.eɥcn *v* (S) covers, spans (O)
ncɒcn *v* (S) dances around (O)
nchel *ninanim* group, organisation, order
ncᶥ *ninanim* point ncᶥ–ɒɥɪne halfway point
nelcn *v* (S) swims in (O)
neɒ *desc* male
nebɪn *v* (S) gives something to (O)
neɥɑcn *v* (S) hides from (O)
neɥcʃɪ *desc* sudden
nel *nabst* nature, temperament, disposition
neldɪ *nsent* mind, brain
nəᶥnɪn *v* (S) kills (O), (O) dies
nəᶥbɪn *v* (S) steals from (O)
nəᶥbɪɥɔᵉn *nsent* thief

nᵠ

nᵠcɥɪn *v* (S) thinks, ponders about (O)

u

uɔᵉɥɔ *nfluid* poison

ɑ

ɑɥenᵘe *ninanim* coin
ɑcɟcn *v* (S) obeys (O)
ɑcn *v* (S) joins (O), and
ɑcnɷɪ *desc* early
ɑcɥcn *v* touch
ɑcɥe *nabst* what
ɑcᵊl *desc* female
ɑɔᵉlɔᵉ *ninanim* spoon
ɑehcn *v* (S) plays with (O)
ɑeocn *v* stand, get up
ɑᵉɔᵉ.ɔnᵠ *nabst* description
ɑəᶥ *ninanim* event, occurrence

ɑˡ

ɑˡɪɥe *nabst* quote, words, speech
ɑˡe *ninanim* what
ɑˡəɥəᶥ *nfluid* water

ɑʰ

ɑʰəᶥɒɔ *nabst* empathy

ɒ

ɒɥɪne *nabst* one half
ɒɪlɪn *v* (S) eats (O)
ɒɪɟɪ *nsent* person
ɒɪn *nedib* rice
ɒcɑɪ *nsent* child (offspring)
ɒcɥɒeᶥ *nanim* tongue
ɒcɥcᵊl *nabst* evening
ɒɔʃɪn *v* (S) produces (O)
ɒɔʃɪn *v* (S) is destroyed to make, for (O)

ɒɔᵉɥəɒ *nanim* scorpion
ɒelcn *v* (S) gives birth to (O), (O) is born (S) is not necessarily the mother; this can be either parent
ɒejcn *v* (S) raises, takes care of, tends to (O)
ɒenɾe *nabst* morning
ɒeɑɥın *v* (S) stands on, is on (O)
ɒeɸın *v* (S) drowns in (O), (O) fills (S)
ɒedı *desc* in return
ɒedcn *v* (S) succeeds at (O), (S) does something to (O)
ɒebc *nabst* shape, structure
ɒebc–delbeɔ *nabst* grammar
ɒeɥcᵊ *ninam* opposite side
ɒel *nmeas* volume in expressions such as ɒel–ɥəjɔᵉ "cupful"
ɒelʃı *desc* similar
ɒelʃcn *v* (S) imitates (O)
ɒəɾın *v* (S) recalls (O)
ɒənᵠɔ *nanim* rabbit

ɑ

ɑınɾın *v* (S) is inside (O)
ɑıɑɔ *ninanim* back (body part)
ɑıbə *nabst* life, existence
ɑeleɒ *nfluid* nitrogen
ɑeɒın *v* (S) sleeps
ɑəɔɥɔ *ninanim* pathway

ɸ

ɸɥəɔnın *v* (S) laughs at (O)
ɸoejın *v* (S) founds (O)
ɸcɾlı *desc* well (not sick)
ɸcj *nabst* five

d

dɾlɾjı *nabst* ground, floor
dɾen *nanim* owl
dɥcn *v* hold, carry, instrumental verb
dɥeɔɒe *ninanim* city
dıɾɥın *v* (S) sits at (O)
dıɾın *v* (S) dislikes, objects to, disapproves of (O)
dırle *ninanim* landmass, domain
dɔɾın *v* (S) chases away (O), (O) flees from (S)
deɥın *v* (S) wears, experiences (O)
deɥeɔ *nedib* noodles
delbeɔ *nabst* sentence, utterance
də.ɔn *nanim* large animal
dənᵠı *ninanim* knee

b

bıne *ninanim* year
bırləl *nmeas* subdivision of the day cf Grammar / Calendar / Subdivisions of the day / Modern timekeeping
bcjcn *v* (S) walks to (O)
bəj *nabst* future, next (time period)
bəɔnᵠın *v* (S) succumbs to their impulses
bəɔɒɔ *nsent* adult person

h

hɥcɑen *ninanim* book
hı.ıɥ *nabst* spring (season)
hıjnɔ *ninanim* nose
hıjde *ninanim* leaf
hırləɔ *ninanim* statue
hcn *v* (S) claims that (O)
hcɥcn *v* (S) is named (O)
hcᵊɒı *nedib* food
hɔlı *ninanim* cart
heɑın *v* (S) asks for, requests (O)
heɒɾı *desc* large
həɔɒı *desc* evil, malicious

ɥ

ɥın *v* (S) sees (O), because ɥın[O=jəɥ] ("see the sun") = "wish"

ɾ

ɾıjın *v* discipline, punish, constrain
ɾcn *v* (S) allows (O)

ɥ

ɥɪ.cʃɪn *v* (S) is beside (O)
ɥɪʃɪ *nined* grass
ɥɪʃɪbɪ *ninanim* blade of grass
ɥɪɲɪn *v* (S) climbs, rises in (O)
ɥcʃjcn *v* (S) is (O) old
ɥcᵊl *ninanim* star
ɥeɑɪn *v* (S) speaks to (O), (S) asks (O)
ɥeɑcn *v* (S) spreads (O)
ɥelɲɪ *ninanim* place
ɥeᵊjɪ *desc* friendly, kind, considerate, nice
ɥəlɪ *desc* late
ɥəlɔᵉ *nabst* nighttime
ɥəjɔᵉ *ninanim* cup
ɥəɒəᶜ *nmeas* tidal day
ɥəᵊʃɔ *nined* gold

ʂ

ʂɪdjc *nfluid* soup
ʂɪɾe *nanim* fish
ʂeɷᵸɪn *v* (S) perceives (O) non-visually

o

oeljɐ *nined* forest

l

leɭ *nabst* language
leɭebɪ *ninanim* a language