\ɥbl ᐅ ΩlΩ /ʃΩ'\nnᵠln

Jbl, the language of *Nŋln*

uruwi

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A complete grammar

12 January 2018

Dedicated to Mareck.

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0.1 | Introduction

0.1.1 | Synopsis

Jbl /jbl/ is the official language of *Nŋln*, and it is also widely spoken across the world. Unusually, it allows speakers to interchange consonants with their corresponding vowels at will. In other words, the name of the language can be pronounced as [jyl], [ipɯ], [iyl] or so on. (The author prefers to pronounce it [jyl].) Because text is written with only the consonant glyphs, it carries the illusion that the language has no vowels. Airflow direction is also phonemic.

Grammatically, Jbl is an analytic SVO or VSO language, but the distinction between nouns and verbs is less clear than another line of division: that between *concretes* and *abstracts*. It marks concretes for five noun classes, as well as *number mutability*, which indicates how likely the quantity of an item is to change.

Jbl is also well-known for allowing speakers to use any numerical base they please, even allowing them to change it on the fly, as well as having a number of nonconservative determiners.

0.1.2 | External history

Work on Jbl began on 12 November 2017 (ɹΔ µəs ɑɹu), when it was tentatively known as leucınΔ (literally *8th conlang*), and the files were committed to the Git repository two days later. The official name of the language was decided on 20 December 2017 (ɹL ɷcı ɷcn). Fun fact: this is the only paragraph where hacm digits will appear! All this, despite the fact that Jbl uses hacm!

The official name of the language was decided when Uruwi called it the "yellow paper language", after the colour of the paper used for it. Mareck suggested abbreviating it to "ypl" (which would be transcribed ⟨ɥdl⟩), but since there is no ⟨d⟩ in the language, it was replaced with a ⟨b⟩.

1 | Phonology and orthography

1.1 | Phoneme inventory

Synopsis: *Consonants are in free variation with vowels.*

In Jbl, each consonant is interchangeable with a corresponding vowel. Consonants may also have an ingressive pronuniation.

Table 1.1: Phonemes of Jbl.

#	Hacm	Roman	Consonant (Egre)	Consonant (Ingr)	Vowel
0	ſ	t	t’	!	e˥
1	n^{φ}	ŋ	ŋ	ɠ	ã
2	b	b	p	p	y
3	ᴅ	m	m	ɓ	ũ
4	ȷ	s	s	s	ɨ
5	ɥ	j	j	j	i
6	ɭ	ċ	tɬ’	ǁ	ʌ˥
7	o	w	w	w	u
8	φ	g	k	k	o
9	l	l	l	l	ɯ
10	ʅ	k	k’	ǂ	o˥
11	n	n	n	n	ẽ
12	ɲ	ř	r	ɹ	ḛ
13	Ω	d	t	t	e
14	h	h	ħ	h	a
15	s	ż	ɬ	ɬ	ʌ

When pronounced ingressively, the tones of vowels are inverted. That is, [ʌ˥↑] becomes [ʌ˩↓]. Nasal vowels also gain a characteristic hissing sound from air entering through the nose.

1.2 | Airflow

Synopsis: *Change of airflow direction has a morphosyntactic basis.*

There are two types of airflow: *ingressive* and *egressive*. The direction of airflow is reversed:

- at the beginning of a descriptor
- at certain affixes
- in the middle of certain roots

On a proper noun, the direction is switched to egressive and remains so until it is changed by one of the above methods.

In hacm, switching the direction of airflow is marked by ⟨/⟩ (to ingressive) and ⟨\⟩ (to egressive). In dictionaries, a switch in airflow direction (without regard to the final state) is marked using ⟨>⟩.

1.3 | Phonotactics

The only phonotactic restriction is that two identical instances of a phoneme may not occur consecutively. If this rule is violated by affixation or interleaving, then the violation is resolved by:

- replacing the earlier instance with an instance of its predecessor (e. g. /w/ (7) → /tɬ’/ (6), wrapping when necessary), and
- replacing the later instance with an instance of its successor (e. g. /w/ (7) → /k/ (8), wrapping when necessary).

1.4 | Allophony

The following changes are made:

$$\begin{aligned} \text{lm} &\to \text{p} \\ \text{nl} &\to \text{r} \\ \text{ɬ} &\to \text{t'} \quad (\blacklozenge\neg\{\square, \text{t'}, \text{k'}\}) \end{aligned}$$

(Here, the symbols for the egressive versions of the consonants are used, but these rules apply during ingressive airflow as well.)

Thus, for instance, /ħswlmŋ/ would be resolved to [ħswpŋ], which could, for instance, be pronounced [asupã].

1.5 | The biting affix

A frequent type of affix encountered in Jbl is the *biting affix*, which has the syntax ⟨–>δ:ω⟩. To apply this affix onto a word α:

- Take the last length(δ) phonemes of α, and xor them with δ itself using the indices of the phonemes.
- In addition, switch the airflow at the start of the altered phonemes.
- Then append ω.
- Resolve any phonotactic violations.

For instance, if we wanted to use ⟨–>ɥ:ʃn⟩ on ⟨ᴅΩl⟩, then we would:

- Take the last letter of ⟨ᴅΩl⟩, namely ⟨–l⟩ (9), and xor it with ⟨–ɥ⟩ (5). $9 \veebar 5 = 12$ so we now have ⟨–ɾl⟩.
- Append ⟨–ʃn⟩. We now have ⟨ᴅΩ>ɾlʃn⟩.

1.6 | Vocalisation

Vocalisation is the process of determining which phonemes to pronounce as vowels, and which as consonants. In usual speech, speakers tend to use convenient pronunciations; for instance, ingressive nasal vowels are generally avoided, as are complex consonant or vowel clusters. A speaker who is unable to pronounce [r] will usually set things up so any egressive ⟨ɾl⟩s will be pronounced as vowels instead of consonants. Nonetheless, formal vocalisation patterns are used more often in chants or songs.

- Vowel-only (⟨ɹlʃ⟩): in strong forms of this vocalisation pattern, all phonemes are pronounced as vowels. Weaker versions of this pattern might pronounce ingressive nasal phonemes as consonants.
- CV (⟨nbnᵠl⟩): alternates between consonants and vowels, starting with a consonant. Words with odd numbers of phonemes will have the last one pronounced as a consonant. Words with one phoneme are pronounced as vowels.
- VC (⟨ɹʃbl⟩): alternates between vowels and consonants, starting with a vowel. Words with odd numbers of phonemes will have the last one pronounced as an extra consonant. Words with one phoneme are pronounced as vowels.

Thus, here are some vocalisations for a sentence:

\φ ᴅφɹ/nᵠΩsl ɹnᵠ \ʃφl /\blΩ φl\nᵠᴅh ɹφᴅ ɹΩ/bᴅɥ\lʃn nɥ /\lΩ \ɾlᴅ /ᴅl.
/↑k mks↓ŋtjk’ sŋ ↑t’kl ↓k’plt kl↑ŋmħ skm st↓pmj↑tɬ’t’n nj ↓k’lt ↑rk’m ↓mtɬ’k’/
Common (one possibility):
[↑o mos↓ɠeiǂ ɨɠ ↑t’ol ↓ǂule ol↑ŋũa som se↓ymi↑tɬ’e˥n ni ↓ǂɯt ↑ro˥m ↓mʌ˩ǂ]
/r/-less (one possibility):
[↑o mos↓ɠeiǂ ɨɠ ↑t’ol ↓ǂule ol↑ŋũa som se↓ymi↑tɬ’e˥n ni ↓ǂɯt ↑ḛk’ũ ↓mʌ˩ǂ]
Vowel-only:
[↑o ũoɨ↓ãeio˩ ɨã ↑e˥oɯ ↓o˩yɯe oɯ↑ãũa ɨoũ ɨe↓yũi↑ʌ˥e˥ẽ ẽi ↓o˩ɯe ↑ḛo˥ũ ↓ũʌ˩o˩]
CV:
[↑o mos↓ãtiǂ sã ↑t’ol ↓ǂule kɯ↑ŋũħ som se↓pũj↑ʌ˥t’ẽ ni ↓ǂɯt ↑ro˥m ↓mʌ˩ǂ]
VC:
[↑o ũkɨ↓ɠejk’ ɨɠ ↑e˥kl ↓o˩pɯt ol↑ãmħ ɨkm ɨt↓ymi↑tɬ’e˥n ẽj ↓o˩lt ↑ḛk’m ↓ũtɬ’k’]

2 | The statement space

2.1 | Conceptualisation

Synopsis: *Jbl makes a distinction not between nouns and verbs, but rather between concretes and abstracts.*

Table 2.1: Distinction between concretes and abstracts.

Concretes	Abstracts
Describe concrete objects and actions	Describe abstract concepts, processes and relations
Inflected for gender and number mutability	Not inflected
Mutual order in parameter list is usually significant	Mutual order in parameter list is insignificant

Thus, if $C_1, C_2, \ldots, C_n$ are concretes, $A_1, A_2, \ldots, A_n$ are abstracts, and X is either a concrete or an abstract, then

$$X(A_1, \ldots, A_n, C_1, \ldots, C_n) \tag{2.1}$$

means that X has the properties $A_1, \ldots, A_n$ and involves $C_1, \ldots, C_n$.

For instance, take the sentence *The sun shines.* This can be translated to Source(Sun, Light). In this case, Source is an abstract, and Sun and Light are concretes. Literally, the translation says that the sun and light are involved in sourcing, or the sun is a source of light.

As a more complex example, *On a Sunny morning after the [summer] solstice we started for the mountains* can be translated as:

```
Time(
 Morning(Weather(Sun), After(Summer_Solstice)),
 Walk(We, Destination(Mountain), Start))
```

2.2 | Application

The top level of the statement tree is treated differently from the lower levels. The syntax of the top level is

$$\text{Topic Operator Arguments} \ldots \equiv \text{Operator}(\text{Topic}, \text{Arguments}) \tag{2.2}$$

$$\text{Topic Operator Args}_1 \bigtriangleup \text{Args}_2 \ldots \equiv \text{Operator}(\text{Args}_1, \text{Topic}, \text{Args}_2) \tag{2.3}$$

$$\blacktriangleright \text{ Operator Arguments} \ldots \equiv \text{Operator}(\text{Arguments}) \tag{2.4}$$

Note that in (2.2) and (2.4), all of the components of the syntax can be concretes or abstracts. In (2.3), Topic must be a concrete, but all other arguments may be concretes or abstracts.

The lower levels use the following syntax:

$$X^{\ulcorner} \text{ Arguments } \ldots \lrcorner \equiv X(\text{Arguments}) \tag{2.5}$$

Inside the topic, the following is used instead:

$$\llcorner \text{ Arguments } \ldots X^{\urcorner} \equiv X(\text{Arguments}) \tag{2.6}$$

At the end of the sentence, any number of ⌟s can be omitted.

Finally, here are the morphemes that Jbl assigns to the special symbols:

Table 2.2: Names of syntactic markers in Jbl.

△	ȷs
▶	h
⌜	−>ɥːʃn
⌟	b
⌞	φ
⌝	−>ɗːbh

2.3 | Concrete inflections

2.3.1 | Season class

Synopsis: *There are five classes open to new concretes, as well as a closed class of season-neutral words.*

In general, if C is of class y, then the processed form of C will be of class $y + 1$ (or 1 if $y = 5$).

Table 2.3: Classes in Jbl.

#	(° from VE) Start	End	Name	Archetypes
1	24	96	Late Spring / Early Summer	decorative flora such as flowers, honey, bees
2	96	168	Late Summer / Early Autumn	raw plant-based crops, milk, trees, grass, hot things, rain, most aquatic creatures and insects

#	(° from VE) Start	End	Name	Archetypes
3	168	240	Mid Autumn / Early Winter	processed plant-based food, wood
4	240	312	Mid Winter	(meat of) wild animals, frozen or cold things, metals
5	312	24	Late Winter / Early Spring	decorative flora such as flowers, arachnids

2.3.2 | Number mutability

Number mutability describes how likely the quantity of a concrete is to change. Note that a concrete can only take either a time mutability or a space mutability, not both.

Table 2.4: List of number mutabilities.

Symbol	Name	Description
Ω	Multiversal time-constant	The quantity cannot change *under any circumstances*, or quantity is meaningless or irrelevant in this context.
Ψ	Universal time-constant	The quantity does not change within the current universe, but might be different in other universes.
X	Lifetime-constant	The quantity is unlikely to change to a significant degree within one's lifetime.
Z	Lifetime-enumerable	The quantity is likely to change one or more times during one's lifetime, but such a change would be a significant life event.
Ξ	Continually mutable	The quantity is likely to change within a short time span (usually within seconds or minutes, but can be up to about a month).
Φ	Continuously mutable	The quantity is continuously changing across time.
$\vec{\Omega}$	Multiversal space-constant	The quantity is currently the same across all universes.
$\vec{\Psi}$	Universal space-constant	The quantity is currently the same within the current universe, but might be different in other universes.
$\vec{\mathrm{X}}$	Domain space-constant	The quantity is unlikely to be different within the current domain.
$\vec{\Xi}$	Continually space-mutable	The quantity is likely to change across a short span of space (usually a few metres, but can exceed hundreds of kilometres).
$\vec{\Phi}$	Continuously space-mutable	The quantity is continuously changing across space.
Σ	Situational	(in programming) The quantity might depend on the implementation.

Table 2.5: List of number mutability affixes.

S#	Affix 1
1	–>nᵠ:
2	–>ȷ:
3	–>l:
4	–>b:
5	–>n:
0	–>h:

Sym	Affix 2
Ω	lbᴅ
Ψ	lɒnᵠ
X	bɒȷ
Z	lʃɥ
Ξ	ᴅɥᴅ
Φ	ɒsl
$\vec{\Omega}$	lᴅɥ
$\vec{\Psi}$	lhᴅ
$\vec{X}$	bhl
$\vec{\Xi}$	ᴅlɥ
$\vec{\Phi}$	ɒʃɥ
Σ	lnᵠo

When a concrete acts as a verb, it inherits the number mutability of its first argument.

If the mutability equals that of the previous concrete mentioned in the same sentence, then both the class affix and the mutability affix can be omitted.

2.4 | A simple example

Take the sentence *Fish eat flowers*, which would be treed into Eat(Fish, Flower).

The roots we need are:

- ⟨boφ⟩ *c2* (0) eats (1)
- ⟨φnlʃ⟩ *c2* fish
- ⟨ɒsn⟩ *c1* flower

The number of fish that exist change whenever a fish is born or dies. This is quasi-continuous, but technically continual. We can choose either option but we will use Ξ in this example. We use the same mutability for flowers.

Fronting the topic, we get:

\φnl/ȷᴅɥᴅ bo\ɥᴅɥᴅ ɒs/lᴅɥᴅ
φnlʃ–>ȷ:ᴅɥᴅ boφ–>ȷ:ᴅɥᴅ ɒsn–>nᵠ:ᴅɥᴅ
fish-2-Ξ eat-2-Ξ flower-1-Ξ
Fish eat flowers.

However, we can omit the affixes on all but the first word, leaving:

\φnl/ȷᴅɥᴅ boφ ɒsn
φnlʃ–>ȷ:ᴅɥᴅ boφ ɒsn
fish-2-Ξ eat flower
Fish eat flowers.

Now take the earlier sentence *On a Sunny morning after the [summer] solstice we started for the mountains*, whose tree representation is:

```
Time(
  Morning(Weather(Sun), After(Summer_Solstice)),
  Walk(We, Destination(Mountain), Start))
```

Morning(Weather(Sun), After(Summer_Solstice)) (in topic position) can be translated as:

\φ φ ſo/lbɑȷ ᴅφȷ\nᵠɑs/lbh φ ˥bφ\˥bɑȷ ȷ/ɑbh φl\nᵠᴅh
φ φ ſφl–>nᵠ:bɑȷ ᴅφȷs–>h:ɑs˥–>ɗ:bh φ ˥blɑ–>ȷ:bɑȷ ȷnᵠ–>ɗ:bh φlh–>ɗ:bh
⌞ ⌞ sun-1-$\vec{X}$ weather-0-Φ-⌝ ⌞ summer_solstice-2-$\vec{X}$ after-⌝ morning($\vec{X}$)-⌝

The rest of the sentence is thus:

ȷφᴅ ȷɑ/bᴅɥ\lſn ˥lɑ ns/nᵠn ɗ/\φᴅlɥ b ᴅl˥
ȷφᴅ ȷɑᴅ–>nᵠ:ᴅɥᴅ–>ɥ:ſn ˥lɑ nɥ–>ɥ:ſn ɗſᴅ–>n:ᴅlɥ b ᴅl˥
time walk-1-Ξ-⌜ speaker(Ξ) destination-⌜ mountain-5-$\vec{\Xi}$ ⌟ start

2.5 | Modifiers

Synopsis: *Modifiers can be divided into two categories: descriptors and quantifiers.*

Table 2.6: Distinction between descriptors and quantifiers.

Descriptors	Quantifiers
General category	Modifiers such as “every”, “some” and “most” that signify a relationship
Open class (derived from concretes and abstracts)	Closed class
Follow the separation rule	Do not follow the separation rule

2.5.1 | Descriptors

Semantically, descriptors act like expression trees that are covered by their antecedents. For instance, if Weather was modified by a descriptor acting like Sun, then the resulting tree would be Weather(Sun).

Descriptors can modify only proper expression trees below the top level and not other descriptors.

Descriptors follow the separation rule, which states that:

- A descriptor must fall somewhere after what it modifies.
- A descriptor may not be adjacent to what it modifies, or to any other descriptor modifying the same antecedent.
- A descriptor must fall as early as possible under the above two rules.
- Given D_1 and D_2 which can both occupy a certain position, D_1 is prioritised before D_2 if the antecedent of D_1 falls before that of D_2.

This yields the following algorithm for getting the next word:

- If there are no eligible outstanding descriptors, then print the next non-descriptor word.
- If there are any eligible outstanding descriptors, then print the one whose antecedent falls the earliest and remove it from the list of outstanding descriptors.

The archetypal form of the descriptor is a straight derivation from an abstract or a concrete whose expression tree is the same word. This avoids the ⌜⌟-overhead that usually applies. In this form, the direction of airflow is switched at the beginning of the descriptor:

⟨φlh⟩ Morning → ⟨›φlh⟩ D(Morning)
⟨ȷφᴅ⟩ Time → ⟨›ȷφᴅ⟩ D(Time)

Note that descriptors are not inflected, even if they come from concretes. Thus the previous example can also be translated as:

\φ ᴅφȷ/nᵠΩsl ȷnᵠ \ʃφl /\blΩ φl\nᵠᴅh
φ ᴅφȷs–›h:Ωsl ȷnᵠ ›ʃφl ›lblΩ φlh–›ɗ:bh
⌞ weather-0-Φ after D-sun D-summer_solstice morning-⌝

ȷφᴅ ȷΩ/bᴅɥ\lʃn nɥ /\lΩ \ɗlᴅ /ᴅll
ȷφᴅ ȷΩᴅ–›nᵠ:ᴅɥᴅ–›ɥ:ʃn nɥ ›llΩ ›ɗlᴅ ›ᴅll
time walk-1-Ξ-⌜ destination D-speaker D-mountain D-start

Other descriptors are possible:

Table 2.7: Other descriptors.

Prefix	Input	Output
›ʃ'	C	Inalienable_Possession(C)
›ʃΩ'	C	Association(C)
›φb'	C	Property(C)
›ll'	C	Borrow(C)
›ȷh'	C	Destination(C)

2.5.2 | Quantifiers

Quantifiers narrow their antecedents, and include words such as *all* or *some*:

$$\text{All Xs are Ys} \equiv X \subseteq Y \tag{2.7}$$
$$\text{Some Xs are Ys} \equiv (X \cap Y) \neq \varnothing \tag{2.8}$$
$$\text{No Xs are Ys} \equiv (X \cap Y) = \varnothing \tag{2.9}$$

Table 2.8 lists the *conservative* quantifiers of Jbl. These quantifiers satisfy $Q(X, Y) \iff Q(X, X \cap Y)$. Quantifiers where this is not the case are listed in table 2.9.

Unlike descriptors, quantifiers are not subject to the separation rule. In fact, *they must immediately follow what they quantify, even if doing so means that a descriptor must be delayed.* This means that the algorithm in subsection 2.5.1 must be modified to read as such:

Table 2.8: Conservative quantifiers.

Quantifier (Q)	Translation	Meaning of Q *Xes are Y* ($Q(X, Y)$)
ɿhɥ	All	$X \subseteq Y$
ɥnᵠɿ	Not all	$X \not\subseteq Y$
ɷɥφ	Some	$(X \cap Y) \neq \varnothing$
bɿo	None	$(X \cap Y) = \varnothing$
ᴅɥo	Most	$\|X \cap Y\| \geq \|X - Y\|$
φɿh	At least two	$\|X \cap Y\| \geq 2$
onφ	One	$\|X \cap Y\| = 1$
ᴅnnᵠ	Half of	$\|\|X \cap Y\| - \|X - Y\|\| \leq 1$
blꝉ	A finite number of (sometimes “many”)	$\|X \cap Y\| < \aleph_0$
sȷh	A countable number of	$\|X \cap Y\| \leq \aleph_0$
ɷlꝉ	An infinite number of	$\|X \cap Y\| \geq \aleph_0$
ʃnnᵠ	An uncountable number of	$\|X \cap Y\| > \aleph_0$
lȷl	Almost all	$\|X - Y\| < \aleph_0 \wedge \|Y\| \geq \aleph_0$ $\|X - Y\| \leq \aleph_0 \wedge \|Y\| > \aleph_0$

Table 2.9: Nonconservative quantifiers.

Quantifier (Q)	Meaning of Q *Xes are Y* ($Q(X, Y)$)
oφbɿ	$Y \subseteq X$
ɥɷoφ	$Y \not\subseteq X$
φlȷh	$\|X\| = \|Y\|$
dȷɷɗ	$\|X\| < \|Y\|$
sȷᴅꝉ	$\|X \cap Y\| \geq \|Y - X\|$

- If the next word is a quantifier, print that word.
- Otherwise, if there are no eligible outstanding descriptors, then print the next non-descriptor word.
- Otherwise, print the one whose antecedent falls the earliest and remove it from the list of outstanding descriptors.

2.6 | Pro-forms

Synopsis: *Pro-forms are words that replace a statement tree, and there are multiple kinds.*

2.6.1 | Pro-forms of the zeroeth kind

Strictly speaking, these are not a separate class of words, but rather a set of classless concretes:

- ⟨ɿlɷ⟩ the speaker or writer
- ⟨ᴅɗȷ⟩ the listener or reader

Usually, these would mean *I* and *you*, respectively, but that does not always have to be the case.

2.6.2 | Pro-forms of the first kind

A previously mentioned concrete may, instead of receiving the usual class / mutability suffix, be referred by its first two segments plus the suffix ⟨–Ω⟩: ⟨φnʅſ⟩ → ⟨φnΩ⟩. These pro-forms can be descriptored as with an ordinary concrete.

2.6.3 | Pro-forms of the second kind

This category is the most general of pro-concretes. Pro-forms of the second kind combine:

- A backref number: how many words deep? 0 means the previous concrete said by the same speaker, 1 the concrete before that and so on.
- A relation: describes the relation to the item referred to:
  - self
  - adversary
  - friend
  - parent (child)
  - teacher (student), and so on

The backref number is a single digit (which means that pro-forms of the second kind can look at only the previous 32 concretes). The relation can be one of the following:

Table 2.10: Relations for pro-forms of the second kind.

Root	Forward	Reverse
sſoʅ	self	
ysnᵠΩ	adversary	
ɗᴅhy	friend, ally	
φȷΩʅ	parent	child
oblʅ	teacher	student

If the forward relation is desired, then the backref number *follows* the relation. If the reverse relation (if applicable) is desired, then the backref number *precedes* the relation.

For instance, ⟨oblʅΩᴅ⟩ refers to a teacher of the previously-referred concrete, and ⟨Ωᴅoblʅ⟩ refers to a student of the previously-referred concrete.

2.6.4 | Pro-forms of the third kind

Unlike the other forms of pro-forms, this category deals with abstracts. There are only two:

- ⟨s⟩ refers to a temporal abstract (not necessarily the one that was mentioned the latest)
- ⟨no⟩ refers to a non-temporal abstract

The exact definition of a “temporal abstract” varies from person to person, but it is almost universally understood to include all of ⟨ȷφᴅ ȷnᵠ ɗl ᴅ() φΩh⟩.

Because pro-forms of the third kind are so short, they are seldom used with biting affixes attached. If biting affixes are needed, the abstract is almost always spelt in full.

2.6.5 | Pro-forms of the fourth kind

The phrase ⟨hol) ɥφo⟩ is an abstract that refers to a sentence previously said by the listener, and it is usually used alone. It can also modify a sentence that disambiguates what was referred to.

This phrase is commonly used either to show agreement or attach a connector to a sentence that previously did not admit any.

Note that this pro-form is composed of two words. A descriptor or connector can fall between the individual words of the phrase.

2.7 | Seasonal cycles

Some words are part of a quintuplet $(X_1, X_2, X_3, X_4, X_5)$ such that their meanings are rotated depending on the current season. They can represent concrete or abstract words, or even a mix of both.

Table 2.11: Seasonal cycling visualised for $(X_1, X_2, X_3, X_4, X_5)$ meaning $(m_1, m_2, m_3, m_4, m_5)$ in season 1.

Season	X_1	X_2	X_3	X_4	X_5
1	m_1	m_2	m_3	m_4	m_5
2	m_2	m_3	m_4	m_5	m_1
3	m_3	m_4	m_5	m_1	m_2
4	m_4	m_5	m_1	m_2	m_3
5	m_5	m_1	m_2	m_3	m_4

Perhaps the most well-known quintuplet is ⟨(ʃȷφ, ΩSȷ, ᴅΩnᵠ, h)ɥ, olɗ)⟩ which, in season 1, correspond to the five seasons in order. Thus, to refer to the second season, one would say:

- ⟨ΩSȷ⟩ during the first season
- ⟨h)ɥ⟩ during the fourth season

A cycled concrete with its meaning currently m_i of some quintuplet of meanings $(m_1, \cdots, m_5)$ will have a class of i.

2.8 | Questions

In Jbl, questions are asked by placing an interrogative marker where the answer is desired and starting the sentence with the corresponding interrogative particle:

This replaces the top-level ►, so there is no topic-fronting.

Note that interrogative markers are grammatically abstracts, even when a concrete answer is desired.

Responses are usually given using the particle followed by the answer:

Table 2.12: Interrogative words in Jbl.

Particle	Marker	Definition
hɾȷ	ɾȷh	what, who
ſob	obſ	when, where
sln	lns	why, how
φɥn	ɥnφ	how many, how much
ʅhΩ	hΩʅ	to what extent

\hɾȷ bo/ɾlbᴅ ɾȷh ᴅΩ\ſᴅɥᴅ
hɾȷ boφ–>ȷ:lbᴅ ɾȷh ᴅΩl–>l:ᴅɥᴅ
P-what eat-2-Ω Q-what bread-3-Ξ
Who ate the bread?

\hɾȷ ʅl/ᴅlbᴅ
hɾȷ ʅlΩ–>h:lbᴅ
P-what speaker-0-Ω
Me.

However, ⟨sln–lns⟩ questions are usually answered with full sentences.

⟨ʅhΩ⟩ and ⟨hΩʅ⟩ are special – they request a number, usually between 0 and 1, inclusive[1], that states to what degree the hypothesis is true. In that sense, they can be used to ask polar questions.

2.9 | Conjunctions

Synopsis: *A conjunction take the two nodes around it and returns a single node.*

Some common conjunctions are:

- ⟨ns⟩ *and* (for items), *or* (for predicates)
- ⟨slȷ⟩ *or* (for items), *and* (for predicates)
- ⟨nsnȷ⟩ *xor* (for both items and predicates)

Sometimes, it might be necessary to attach a node or descriptor to the conjunction and both of its arguments. In order to attach a node, the ⌜ (⌝) is attached to the end of a conjunction instead of the second (first) argument. Similarly, such descriptors are said to modify the conjunction itself.

\φ ᴅhφᴅ ɾſ/φᴅlɥ \ſφ/φbhl n\ᴅbh ɾᴅ/ɥᴅlɥ
φ ᴅhφᴅ ɾſᴅ–>n:ᴅlɥ >ſφl–>n^{φ}:bhl ns–>ɾ:bh ɾᴅh–>n:ᴅlɥ
⌞ below mountain-5-$\vec{\Xi}$ DESC-sun-1-$\vec{X}$ and-⌝ valley-5-$\vec{\Xi}$

hnſ lᴅſh n\ʅſn hn^{φ}ſ bſ/ɾhsʅ ʅhɥ
hnſ lᴅſh ns–>ɥ:ſn hn^{φ}ſ bſᴅ–>h:Ωsʅ ʅhɥ
create hope and-⌜ life person-0-Φ all

The mountains and valleys below the sun creates hope and life for all.

[1] A value less than 0 or greater than 1 can be interpreted as an emphatic answer.

Conjunctions are evaluated with left associativity but can be grouped using ⟨ɔɥɔ … ɔɔnᵠ⟩.

2.9.1 | Appositives

The conjunction ⟨ɒ⟩ = joins the two nodes around it and returns a single node that equates its arguments and refers to the entity in question.

\\ll/ȷɒɥɒ ȷΩɒ ɥɒ\\ȷlb/lʃn Ωȷ\\Ωʃn ʃnᵠȷ b /ʃΩˀllΩ b ɒ
ˀllΩ–>h:ɒɥɒ ȷΩɒ ɥɒΩ–>l:lbɒ–>ɥ:ʃn Ωȷφ–>ɥ:ʃn ʃnᵠȷ b >ʃΩˀllΩ b ɒ
speaker-0-Ξ walk village-3-Ω-⌜ association-⌜ uncle ⌟ assocation.DESC-speaker ⌟ =

ɥɒ\\ȷbh/ɒʃn bnɒb h \\ɒhφ
ɥɒΩ–>l:bhl–>ɥ:ʃn bnɒb h >ɒhφ
village-3-$\vec{X}$-⌜ large DUMMY DESC-superlative

We visited my uncle's village, the largest village in the world.

2.10 | Subordinate clauses

Subordinate clauses are conceptually questions embedded as nodes. These are content clauses by default, but combined with appositives, they can act as relative clauses. In subordinate clauses, the airflow direction is changed immediately before the question word and the clause is closed with the particle ⟨b⟩ (if there is anything afterward):

\\ll/ȷɒɥɒ ȷΩɒ ɒhɗo \\ʃob nΩ ˀllΩ ɗb/ɗɒɥɒ ˀlh h \\obʃ
ˀllΩ–>h:ɒɥɒ ȷΩɒ ɒhɗo >ʃob nΩ ˀllΩ ɗbΩ–>nᵠ:ɒɥɒ ˀlh h >obʃ
speaker-0-Ξ walk again SUB-where see speaker rdkbe$_5$-1-Ξ existence DUMMY DESC-Q-where

We went back to the place where we saw the roses. (said in second season)

\\lɗɒ/nɒɥɒ bll ɒ \\hɗȷ ˀlh ɒnΩ ɒΩʃonᵠ /Ωsn \\ll'ɗȷh b
ˀlɗɒl–>nᵠ:ɒɥɒ bll ɒ >hɗȷ ˀlh ɒnΩ ɒΩʃonᵠ >Ωsn >ll'ɗȷh b
young_person-1-Ξ finite = SUB-who existence wreath head DESC-flower borrow.DESC-Q.who ⌟

ɒlbȷʃ ˀllȷl h /bhɥ
ɒlbȷʃ ˀllȷl h >bhɥ
dance environs DUMMY DESC-fire

Many little girls with wreaths of flowers on their heads danced around the bonfire.

2.11 | Connectors

Synopsis: *Connectors are free-floating particles that establish relationships between sentences.*

Connectors are special particles that can be placed anywhere in the sentence *(other than at the beginning)* and exist independently from the rest of the sentence. In other words:

- A connector alone cannot separate a descriptor from its antecedent.
- A connector can separate a quantifier from its antecedent, as long as no non-connectors separate the two.

Connectors x and y are part of the same *set* S iff all of the following conditions hold:

- x and y are identical (and are of the same parity)
- they belong to sentences α and β, respectively (NB: it is possible that $\alpha = \beta$)
- if x is the ith word of α, then y is the ith word of β
- there are no sentences between α and β whose ith word is a connector different from x and y (or is of different parity)

For the purposes of positioning connectors, two consecutive instances of ⟨b⟩ ⌟ within the same sentence is treated as one word.

Note that "belonging to the same connector set" is an equivalence relation.

Table 2.13: Connectors.

Name	Arity	Jbl	Explanation
Sequential	n	ɥȷʃ	A sequence of events. An event α is said to happen before β if the sentence describing α is uttered before that describing β.
Parallel	n	ɥsʅȷ	Two or more events happening simultaneously.
Analogous	2	ɥhΩ	"For the same reason α is true, β is also true." Also used as an "and" without stating any order.
Subversive	n	ɥlo	"θ_1 but θ_2 but θ_3 but etc."
Augmentative	n	ɥφb	Later statements apply to a greater extent than earlier statements.
Explanatory	n	ɥls	"θ_1 causes θ_2 causes θ_3 etc."
Conditional	2	ɥȷʅ	"If α, then β."

Sentences of a connector set are joined by the relation of the connector used therein:

\φnʅ/ȷᴅɥᴅ boφ ɥȷʃ Ωsn.
φnʅʃ–>ȷ:ᴅɥᴅ boφ ɥȷʃ Ωsn
fish-2-Ξ eat SEQUENTIAL flower
The fish ate the flower.

\ʅɦᴅ/φlbᴅ ᴅlbȷʃ ɥȷʃ ʅlȷʅ \ᴅoʅ.
ʅɦᴅl–>nᵠ:lbᴅ ᴅlbȷʃ ɥȷʃ ʅlȷʅ >ᴅoʅ
young_person-1-Ω dance SEQUENTIAL surroundings DESC-tree
Then the child danced around the tree.

\ʅɦΩ boφ ɥȷʃ φnΩ.
ʅɦΩ boφ ɥȷʃ φnΩ
young_person#PF1 eat SEQUENTIAL fish#PF1

Then the child ate the fish.

Note that ⟨ɥȷſ⟩ is the third word of all of the sentences above.

The polarity of a connector can be flipped by flipping the least significant bit of the rightmost segment.

2.12 | Proper words

Because many foreign languages use only egressive airflow, all proper words in Jbl switch to egressive at the beginning.

Sometimes, the status of a word as proper might be ambiguous without hints. Optionally, the prefix ⟨φɥ–⟩ can be prefixed (*before the airflow change*) to show that this should be treated as a proper word.

Note that ⟨ɥbl⟩ *Jbl* is not a proper word.

3 | Numerals

Synopsis: *Jbl supports a variety of bases, and even mixed bases as with Lek-Tsaro numerals up to 4199. However, nonrectangular number systems are unsupported.*

The basic digits are as follow:

Table 3.1: Basic digits.

#	#	Word	#	#	Word
⊦	0	ΩD	⊦	16	sȷ
ᒪ	1	sſ	ᒪ	17	ɲȷ
ƽ	2	sn^{φ}	ƽ	18	sn
ʕ	3	sɥ	ʕ	19	ɲn
ʔ	4	sb	ʔ	20	ɲՈ
Ƹ	5	ɲɭ	Ƹ	21	ɲn^{φ}
Ↄ	6	sɭ	Ↄ	22	Ωl
˥	7	ɲo	˥	23	Ωɥ
ᒥ	8	sD	ᒥ	24	sφ
ᑕ	9	sɿ	ᑕ	25	ɲh
S	10	ɲφ	S	26	Ωh
ϛ	11	Ωφ	ϛ	27	sh
ɼ	12	so	ɼ	28	Ωn
ɂ	13	Ωo	ɂ	29	Ωh
ᒧ	14	ɲl	ᒧ	30	ɲb
⊣	15	ɲſ	⊣	31	Ωſ

Note that if a segment starts the name of any digit, it cannot end the name of any digit, and vice versa, allowing for chaining without triggering phonotactic violations.

Thus a numeral is parsed as such:

- Set $r := 1, n := 0, c := 1$.
- For each two-segment chunk, let a be the digit represented by the segments. Then:
  - If airflow is opposite of starting airflow, then:
    - If this is the first chunk, then reject.
    - Otherwise, set $r := 32$ if $a = 0$, else $r := a$.
  - Otherwise, if $r = 1$ and this is not the first chunk, reject.

  - Otherwise, set $c := r \cdot c$ then $n := n + a \cdot c$.

- Return n.

For instance, ⟨\ɾl/sȷ\sɥso⟩ represents $C35_{16} = 3125_{10}$. This number can also be written:

\ɒᴅ/ɾh\ɒᴅɾl
ƻɦɕɦ
50_P0

Note that the numeral is spelled out in little-endian order, but displayed using figures in big-endian.

An instance of ⟨ɾᴅ⟩ followed by a digit d is equivalent to a series of d zeroes, so the same number can be written ⟨\ɒᴅ/ɾl\ɾᴅsbsʃ⟩.

Gramatically, cardinal numerals are considered quantifiers. Ordinal numerals look the same, but are considered descriptors and bear an airflow switch at their beginning.

3.1 | Fractional numerals

Fractional parts of a numeral are set off after the integral part (if present), separated by a fractional point ⟨◦⟩, read ⟨ɒȷ⟩. Then the fractional part is parsed as follows:

- Set $r := 1, n := 0, c := 1$.
- For each two-segment chunk, let a be the digit represented by the segments. Then:
  - If airflow is opposite of starting airflow, then set $r := 32$ if $a = 0$, else $r := a$.
  - Otherwise, if $r = 1$, reject.
  - Otherwise, set $c := r \cdot c$ then $n := n + a/c$.
- Return n.

For instance, $2 \cdot \pi$ can be approximated as $6.487ED5_{16}$, which is read:

\slɒȷ/sȷ\sbsᴅɾoɾlɒoɾl
Ͻ◦ɦʔſ˥ɹƙƻ
$6._G487ED5$

In both the spelled-out version and the version using the figures, the digits after the decimal point are in big-endian order.

3.2 | Mathematical operators

Shown in 3.2. Because of separate abstract forms of operators, it is rather uncommon to group them using ⟨ɒɥɒ ... ɒoɳᵠ⟩.

Note that ⟨lᴅlɾ⟩ can be used to represent rational numbers.

Table 3.2: Mathematical operators in Jbl.

Conjunction	Abstract	Definition
b˥φʃ	ʃφ˥b	$a + b$
ʃlᴅɷ	sɭɲb	$a - b$
nnᵠhs	shnᵠn	$a \cdot b$
ɭᴅ˥ɲ	lɲᴅy	a/b
ɲonb	loφb	a^b
ynɷȷ	nbȷ˥	$a + bi$

3.3 | Mathematical constants

Some numbers have their own names (shown in 3.3).

Table 3.3: Mathematical constants in Jbl.

Abstract	Definition
snᵠʃȷl	1/2 (identical to ⟨ɷȷ›snᵠ›sʃ⟩)
nʃlφ	$2 \cdot \pi$
φholɲ	e
oφɲoh	$\sqrt{2}$
ᴅo˥yȷ	$\sqrt{3}$
bynɷȷ	$i = \sqrt{-1}$
ɭɲnlɷ	$\zeta(3)$

3.4 | Figures in signage

In signage, single-digit integers are not displayed alone due to possible confusion with digits in other writing systems. Instead, a filler ".0" is added, so, for instance, ⟨ϟ⟩ is displayed as ⟨ϟ∘ͱ⊦⟩. This happens even in contexts in which fractional numbers do not make sense.

If other languages are used on a sign alongside Jbl (i. e. seldom within Nŋln), then these languages receive similar treatment.

4 | Word formation

4.1 | Compounding

Synopsis: *Compounding in Jbl is done by interleaving the segments between the base words.*

Jbl distinguishes between *coördinating* and *subordinating* compounds. Coördinating compounds place both of their constituents at the same level – for instance, in *flint and steel*, *flint* and *steel* are represented equally. Subordinating compounds place one of their constituents as a dependent of the other – an *elderberry* is a type of berry, not a type of elder. Quite naturally, subordinating compounds are more common than coördinating compounds.

(Another way to describe this division is that, in terms of more conventional terminology, coördinating compounds usually cover copulative and appositional compounds, and subordinating compounds usually cover endocentric and exocentric compounds.)

A list of words is said to be *trivially interleavable* if one of the following holds:

- All words have an equal number of segments (eq).
- All words but one have an equal number of segments, and the one remaining has one more segment than the others (aug).
- All words but one have an equal number of segments, and the one remaining has one fewer segment than the others (dim).

If a list of words S is not trivially interleavable, then the following steps are taken:

- Initialise S' to S.
- While S' is not trivially interleavable:
  - Find the shortest word in S' and its index i.
  - Append a copy of $S[i]$ to $S'[i]$.

Obviously an (eq)-interleavable list of words can be interleaved in that order, so ⟨φlh, ɷsn, ſφl⟩ can be interleaved into ⟨φɷſlsφhnl⟩.

In an (aug)-interleavable list of words, the longest word must be interleaved first, as to have its last segment end the compound. In order to disambiguate the order of the consitutents, if the longest word is not also the first, then its index is prefixed: ⟨ȷɷᴅ, φlh, φlɦᴅ⟩ makes ⟨sn^{φ}φȷφlɷlɦᴅhᴅ⟩.

Similarly, in a (dim)-interleavable list, the shortest word must be interleaved last. If the shortest word is not also the last, then its index *from the end* is prefixed: ⟨ᴅhɦo, ᴅhφ, bnᴅb⟩ makes ⟨sſᴅbᴅhnhɦᴅφob⟩.

4.1.1 | Coördinating compounds

It is natural that coördinating compounds can involve any number of constituents, which can usually be reordered at will. A compound from a (eq)-interleavable list of words receives no marking; other coördinating compounds receive the ⟨−φn⟩ suffix.

4.1.2 | Subordinating compounds

Unlike in cöordinating compounds, the constituents of a subordinating compound is order-dependent. In particular, the constituents are put in head-initial order with right-associativity. For instance, ⟨φlh, Ωsn, ſφl⟩ *morning*, *flower*, *sun* means *morning of sunflowers* (not *flower-morning of the sun*).

A subordinating compound from a (eq)-interleavable list of words receives the ⟨−φn⟩ suffix; other compounds receive no marking.

A | Dictionary

An entry looks like this:

ᴅꞁl *a* loan (1) is borrowing (0) [from (2)] (modifying) (0)'s (*) (borrowed)

From left to right:

1. The entry – the Jbl term listed.
2. The part of speech of the corresponding entry:
   - *c* – a concrete
     - *c1* – *c5* – of one of five season classes
     - *c0* – season-neutral concrete
   - *a* – an abstract
3. The definition – the gloss for the corresponding entry.
   (a) (0) – the first argument when used as a stem in an expression tree
   (b) (1) – the second argument, and so on
   (c) (*) – parent (antecedent) of expression tree
4. If applicable, any special grammatical or semantic notes for this term.
5. Optionally, examples of usage.

| (

(ʃȷφ, ɷsȷ, ᴅɷnᵠ, hꞁɥ, olᖹ) *qccccc* the five seasons (LSp-ESu, LSu-EAu, MAu-EWi, MWinter, LWi-ESp)

(ᴅȷφ, ȷhᴅ, sꞁb, ɷnl, hnᵠʃ) *qcccaa* (asparagus, cucumber, carrots, perception, life)

(ȷsb, ɥꞁɥ, ȷꞁ, bφl, ᖹbɷ) *qccccc* (rose, dandelion, kosmos, beetroot, elderberry)

(φꞁɷ, blȷ, ɷlh, nᵠoɷ, snᴅ) *qccccc* (strawberry, peach, pumpkin, icefruit, citrus fruit) The icefruit is an unusual fruit that grows partially underground during the winter. It has a moderately thin skin and its flesh has the consistency of apples, but tastes slightly bitter when raw.

| ʃ

ʃnᵠȷ *c0* uncle, aunt

ʃbɷ *a* finish (modifying) terminative, perfect ʃφl *c1* sun

b

bʃᴅ *c0* person, entity
boφ *c2* food (0) eats (1)
bnᴅb *a* size, large
bhɥ *c3* fire

ᴅ

ᴅȷᴅΩᴅ *a* equality, (0) equals (1)
ᴅlꞁ *a* start (modifying) inceptive, inchoative
ᴅoꞁ *c2* tree
ᴅφȷs *c0* weather
ᴅlbȷʃ *c2* dance
ᴅꞁl *a* loan (1) is borrowing (0) [from (2)] (modifying) (0)'s (*) (borrowed)
ᴅnΩ *c1* wreath
ᴅɲȷ *c0* the listener or reader, you
ᴅΩʃonᵠ *c5* head
ᴅΩl *c3* bread
ᴅhφ *a* edge, boundary, extremity, superlative (of (0))
ᴅhφᴅ *a* below, underside (modifying) (*) is under, below (0); downward
ᴅhɲo *a* again, repeat

ȷ

ȷʃbꞁ *c3* VC vocalisation
ȷnᵠ *a* after
ȷlʃ *c1* wind, vowel-only vocalisation
ȷφᴅ *a* time when (0), (1) (modifying) (*) happened at the time (0)
ȷΩᴅ *c1* walk (toward (1))

ɥ

ɥbl *a* the Jbl language
ɥᴅΩ *c3* village, town

φ

φlɲᴅ *c4* dark, dim
φlh *c0* morning
φnꞁʃ *c2* fish

φΩh *a* absence it is not true that (0)

l

lᴅʃh *a* hope

ꞁ

ꞁblΩ *c1* summer solstice
ꞁlȷꞁ *a* environs, (0) surrounds (1) (modifying) (*) surrounds (0), around (0)
ꞁlΩ *c0* the speaker or writer, I
ꞁɲᴅꞁ *c1* young person
ꞁh *a* existence, (0) is at (1) (modifying) (*) is at (0)

n

nbnᵠl *c2* CV vocalisation
nɥ *a* destination (0) intends to go to (1) (modifying) to (0)
nΩ *a* sight (0) sees (1)

ɲ

ɲʃᴅ *c5* mountain
ɲᴅh *c5* valley, crease
ɲl *a* before

Ω

Ωȷφ *a* association, relationship (0) is related to (1) [by (2)], (0) is (1)'s (2) (by association) (modifying) (0)'s (*) (associated)
ΩlΩ *a* language
Ωsn *c1* flower

h

hφb *a* property, belongings (1) is the owner of (0) (modifying) (0)'s (*) (owned)
hnʃ *a* creation (0) creates (1) (modifying) (*) created by (0)