Chapter 14. Space and Time

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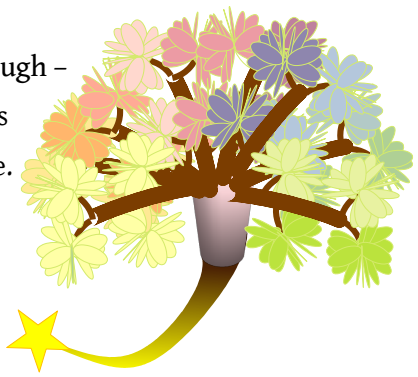


We humans conceive of ourselves as beings located in – and moving through – space and time, so it's not surprising how much human communication is concerned with the space around us and the time through which we move. Most of the Nwehu Nuswei (NN) words representing these concepts are located in the ⅄--- S--- FAMILY.

14.1. Features of Space and Time Represented in NN

Words beginning with ⅄ ***S*** are used to refer to some type of relationship: either in space, in time, or in discourse. (Family and interpersonal relations are represented in FAMILY Ⅎ--- M---.) This chapter serves as a background and introduction to NN's expression of relations between entities in space and time.[16]

NN represents the features of space and time as shown in 𝔇ρ 14.1a.

Features	Details	Notes
Perspectives	CARTESIAN, SPHERICAL, ENCLOSURE, TIME, DISCOURSE	Five ways of considering relationships. The first three are ways of representing space; DISCOURSE represents language and communication relationships; this is discussed in §§8.2.17-23

16 Words in the GENUS *Su-*- are not ncluded in this chapter. SPECIES *Suh-* is duscussed the the chapter, "Language, cognition, and Logic"; SPECIES *Sun-*, *Sum-*, *Suk-*, *Sut-*, and *Sup-* are explained in the chapter on "Functional Words".

Features	Details	Notes
Dimensions	*CARTESIAN:* • *VERTICAL* • *PROGRESSIONAL* • *LATERAL* *SPHERICAL:* • *LATITUDE* • *LONGITUDE* • *RADIAL* *TIME* *ENCLOSURE*	The CARTESIAN perspective represents spaces as cubes with the three dimensions listed here. The SPHERICAL perspective represents spaces as spheroids described by their axis, circumference, and radius. ENCLOSURE represents the seemingly universal need of humans to enclose spaces for security and control; many common language expressions use enclosures as conceptual models, so ENCLOSURE is seen as important for human communication. (TIME is assumed to be self-evident.)
States	STATIC, DYNAMIC	This feature mirrors the distinction in verbs between WAVE and FIELD verbs (§6.3.2). STATIC space-time words refer to places and time-periods, representing locations as either FIELDS or PARTICLES; their DYNAMIC counterparts refer to motions.
Aspects	COMPLETE, INCOMPLETE, CONTINUAL, GENERAL	The meaning of aspects depends on whether a space-time word is STATIC or DYNAMIC. This distinction will be discussed below (§14.2.2).
Distance	NEAR, MID, FAR	Physical distance from the speaker or focal entity; not measured distance, rather relative distance in the context of the discussion.
Direction	TO, FROM, TO-AND-FROM, GENERAL	This feature also varies according to whether the word is STATIC or DYNAMIC, and is dicsussed in §14.2.1.2.
Frame	FIRST, SECOND, THIRD	NN recognises that the space-time continuum is often discussed in varying contexts within a single DISCOURSE. To provide clarity, three sets of reference FRAMES are allocated by assigning different core vowels in the first syllable of words which are otherwise the same (§14.10).

Dp 14.1a: Features of Nwehu Nuswei space-time words.

14.2. How NN Organizes Space and Time Concepts

As outlined above, NN expresses space and time in terms of DIMENSIONS, each of which has parallel sets of words expressing STATIC and DYNAMIC concepts.

14.2.1. Primary Concepts

14.2.1.1. Dimensions

NN provides 8 quasi-physical DIMENSIONS, representing four PERSPECTIVES. Each is identified by the 2nd consonant of the word, with the DIMENSION identified by position of articulation and voicing, while the STATIC concepts have stop consonants and dynamic concepts have continuants. (𝔇ρ 14.1b)

𝔇ρ 14.1b : Static and Dynamic Dimensions

Perspective	Dimension	Static		Dynamic	
Cartesian Space	VERTICAL (Up-Down)	𐑕𐑧𐑒-	sec-	𐑕𐑧𐑒𐑕-	sex-
	PROGRESSIONAL (Front-Back)	𐑕𐑧𐑑-	set-	𐑕𐑧𐑑𐑕-	ses-
	LATERAL (Right-Left)	𐑕𐑧𐑐-	sep-	𐑕𐑧𐑐𐑓-	sef-
Spherical Space	AXIAL (North-South)	𐑕𐑧𐑡-	sej-	𐑕𐑧𐑡𐑰-	sey-
	ROTATIONAL (East-West)	𐑕𐑧𐑚-	seb-	𐑕𐑧𐑚𐑥-	sem-
	RADIAL (Centering)	𐑕𐑧𐑜-	seg-	𐑕𐑧𐑜𐑼-	ser-
Enclosure	ENCLOSURE (In-Out)	𐑕𐑧𐑒-	sek-	𐑕𐑧𐑣-	seh-
Time	TIME	𐑕𐑧𐑛-	sed-	𐑕𐑧𐑛𐑟-	sen-

Non-dimensional space concepts can be expressed using *Swd-* and *Swn-* SPECIES (§14.6), and complex spaces can be described using **coordinate-system words** beginning with *Sw-* (§14.7).

14.2.1.2. State: Static and Dynamic

In general terms, **STATIC** STATE **refers to location** and **DYNAMIC** STATE **refers to movement**. So using the words from SPECIES shown in 𝔇ρ 14.1b above, STATIC 𐑕𐑧𐑒𐑾 *seki* refers to a location in the center of an enclosure – usually the speaker's location, 'here'; DYNAMIC 𐑕𐑧𐑣𐑾 *sehi* refers to movement toward the speaker – archaic English 'hither' or 'toward, approach'. Likewise, STATIC 𐑕𐑧𐑒𐑿 *sekw* is a location 'out' or DYNAMIC 𐑕𐑧𐑣𐑿 *sehw* 'move away from, go away'.

14.2.1.3. Distance and Associated Meanings in Space Words

Of course, within each DIMENSION there are degrees of distance and various associated concepts. These are represented by the final vowel. Within the S--- *S*--- family, the final vowel's meaning differs depending on the genus – and in some cases, depending on the species. They are discussed in the indicated sections:

ⱈ𐑌--	*Su*--	Grammatical and logical relations.....§§8.2.17 – 8.2.23
ⱈ𐑊--	*Si*--	Spaces.....§14.10
ⱈ𐑍--	*Sw*--	Non-dimensional .....§14.6
ⱈ𐑍--	*Sw*--	Coordinate systems.....§14.7
Time words		Species not mentioned above with pattern ⱈ-𐑗- *S-n-* or ⱈ-𐑘- *S-d-*.....§14.8
Space words		All other words in the ⱈ--- *S*--- family.....§14.2

Dp 14.2a : Meanings of the Final Vowel in Space Words

Numeric	Roman	Definition	Note
0	u	The DIMENSION	The name of the DIMENSION. Thus *sebu sebu* is 'SPHERICAL LONGITUDE, the East-West DIMENSION'
1	i	POSITIVE DIRECTION: up, front, right, north, east, in, future	Within each DIMENSION, a positive and negative DIRECTION is defined. For example, in the VERTICAL DIMENSION, POSITIVE is defined as 'up' and NEGATIVE as 'down'. Thus *seci seci* is 'up' and *secw secw* is 'down'.
2	e	My[17] sides in the DIMENSION	"Side" refers to the physical side or sides of the foreground entity. Of a house, sekwei *sekwei* is the outer side of the wall
3	ei	My POSITIVE side	For example, *sepei sepei* 'the right side of my body'.
4	a	My side in the DIMENSION	"Area" is the space extending outward from "me" in a specific DIRECTION; or, with *-a* and *-wei,* in both directions. Example: *setai setai* 'in front of me', *setwa setwa* 'behind me'.

17 In this list, "my" is used as a convenient abbreviation for "the speaker or whatever other entity or object (the FOCUS of the sentence) is under discussion". Speaker is the default, but context is expected to make the FOCUS clear.

Numeric	Roman	Definition	Note
5	ai	My POSITIVE area in the DIMENSION	For example, *secai secai* 'overhead'
6	o	Limits of the DIMENSION	"Limits" and "boundaries" may refer either to a specific limit (*setoi setoi* could refer to 'the end of the road'), or generally far-distant (*seboi seboi* 'out west').
7	oi	POSITIVE DIMENSION boundary	*secoi* 'ceiling'
8	w	NEGATIVE DIRECTION: down, back, left, south, west, out, past	(By definition)
9	wi	Line (axis) or path in the DIMENSION	"Line", "axis", or "path": Each DIMENSION is conceptualized as having a straight line running through "me" in either direction to infinity or to some cotextually understood limit. This is the "line" or "axis". But we often want to refer to physical "paths" (which may be roads, tracks, or routes) which run generally in the direction of a particular dimension. Context should make this clear.
10	we	My NEGATIVE side	*sebwe* 'the west wall (e.g. of a house)'
11	wei	Area immediately adjacent to me in the DIMENSION	*sebwei* 'the area (e.g. yard) east and west (e.g. of a house)' *secwei* 'the seat (or cushion) I'm sitting on'
12	wa	Area on my NEGATIVE side	*sebwa* 'the neighboring (e.g. property) west (of my property)'
13	wai	MID-DISTANCE in the DIMENSION	*sepwai* 'my elbow-room'; 'space on either side between my vehicle and the edges of my lane'
14	wo	DIMENSION boundary on NEGATIVE side	*setwo* 'the south pole'
15	woi	Total space within DIMENSION	*sekwoi* 'volume of space of a spheroid'

14.2.2. Aspects of Space Words

The first vowel of most words in the ⋏--- *S*--- family have the option of indicating ASPECT. The exceptions are words in geni ⋏ɪ-- *Su*--, ⋏ᒐ-- *Si*--, and ⋏ㄐ-- *Sw*--. The semantics of ASPECT is closely related to the STATE expressed in the word – STATIC or DYNAMIC.

14.2.2.1. Dynamic Aspects of Space Words = Direction of Motion

Words expressing DYNAMIC STATE indicate movement. The first vowel of a word with ᓀ-ᐣ-ᓂ *e-a-o* combined with ᑊ-ᖧ-ᖻ *i-wi-w* indicates the DIRECTION of motion (𝔇ρ 14/2b):

𝔇ρ14.2b: ASPECT with DYNAMIC STATE in physical space words

Frame 1	Frame 2	Frame 3	
ᓘᓇ-- *sei--*	ᓘᑲ-- *sai--*	ᓘᓈ-- *soi--*	motion TO
ᓘᖹ-- *swe--*	ᓘᖽ-- *swa--*	ᓘᖿ-- *swo--*	motion FROM
ᓘᖺ-- *swei--*	ᓘᖾ-- *swai--*	ᓘᖼ-- *swoi--*	motion TO-AND-FROM
ᓘᓀ-- *se--*	ᓘᐣ-- *sa--*	ᓘᓂ-- *so--*	motion in general, without regard to DIRECTION

What DYNAMIC ASPECTS means:

- Motion TO: spacial words refer to locations within the various DIMENSIONS (including time). **Motion TO indicates movement is toward the indicated location, without regard to where the movement started.**
- Motion FROM: **movement is from the indicated location, without regard to any ending point.**
- Motion TO-AND-FROM: **repeated or oscilating movement with repect to the indicated location**

Here are some examples. (Recall that STATIC location words have stop-consonants at the start of the second syllable, while DYNAMIC location words have continuants with the same place and manner of articulation in that position. 𝔇ρ 14.1)

- *seki* – ENCLOSURE DIMENSION – 'in' (inner part of an enclosure)
  - *sehi* 'movement within' (within an enclosure)
  - *seihi* 'into' (movement into an enclosure)
  - *swehi* 'out from' (movement out from an enclosure)
  - *sweihi* 'entering and leaving' (coming and going from an enclosure)
- *secei* – VERTICAL DIMENSION – 'top' (in the VERTICAL DIMENSION, the area immediately above the FOCAL entity)
  - *sexei* 'on the top' (walking around on a roof; an insect walking on the top of someone's head)
  - *seixei* 'to the top' (cup filled to the top; climbing to the top of a mountain)
  - *swexei* 'from the top' (a lamp fell from the ceiling; climbing down from the top of a mountain)
  - *sweixei* 'movement to and from the top' (elevator in a building; chairlift to and from the top of a ski run)
- *sepw* – LATERAL DIMENSION – 'left' (the left side of a person or object)
  - *sefw* 'toward the left' (moving around on the left side of a vehicle; pointing to the left)

- *seifw* 'to the left' (make a left turn; move a painting to the left on a wall)
- *swefw* 'from the left' (take the apple from the left; my car was T-boned from the left)
- *sweifw* 'movement to the left and back' (dance to the left and back again; a left-right vibration)

14.2.2.2. Static Aspects of Space Words = Nature of Placement

Static space words indicate the nature of places. The first vowel of a word with ᔨ-ᑭ-ᔭ *e-a-o* combined with ᑊ-ᓀᑊ-ᓀ *i-wi-w* indicates the ASPECT of placement (ᗞᑭ 14.2c):

ᗞᑭ14.2c: ASPECT with STATIC STATE in physical space words

Frame 1	Frame 2	Frame 3	
ᓵᐞ-- *sei--*	ᓵᐃ-- *sai--*	ᓵᐄ-- *soi--*	PERMANENT placement
ᓵᐣ-- *swe--*	ᓵᐢ-- *swa--*	ᓵᐤ-- *swo--*	PARTIAL placement
ᓵᐠ-- *swei--*	ᓵᐧ-- *swai--*	ᓵᐅ-- *swoi--*	TEMPORARY placement
ᓵᐨ-- *se--*	ᓵᐱ-- *sa--*	ᓵᐩ-- *so--*	location without regard to placement ASPECT

What STATIC ASPECTS mean:

- PERMANENT placement: **The location of something is fixed to and cannot be changed**
- PARTIAL placement: **The position of something is approximate or doesn't fit neatly into one dimension**
- TEMPORARY placement: **The entity described can easily move, or is currently moving**

Examples:

- sego – RADIAL DIMENSION – 'center of a spheroid; at the center of a sphere; deep within the Earth'
  - *seigo* 'a spheroid's center; inner core of the Earth'
  - *swego* 'material surrounding the center of a spheroid; outer core of the Earth'
  - *sweigo* 'the center (eye) of a hurricane; the blastocele (temporary cavity in early embryonic development)'
- *sebi* – LONGITUDE DIMENSION – 'east; area to the east'
  - *seibi* 'the east wall (of a building); the eastern provinces'
  - *swebi* 'the sun rises in the east (but precise direction varies seasonally)'
  - *sweibi* 'the enemy force is (currently) east of the city'
- *sekwe* – ENCLOSURE DIMENSION – 'outer perimeter of a land area; outside wall of a building'
  - *seikwe* 'the house wall is faced with brick; the island is bounded by the Pacific Ocean'
  - *swekwe* 'the weeds need to be removed around much of the property; paint on most of the house walls has faded'

- *sweikwe* 'the house wall has been prepped for painting; the perimeter is being patrolled'

Because NN treats time as uni-dimensional, their aspect meanings are somewhat different; Aspect in time words is discussed in §14.8.5.

14.2.3. Space-Time Lexicon

Meanings of space-time words are determined formulaically, with the exception of non-dimensional, coordinate-words, and of course grammatical relationship words. That is, the meaning can be determined by rule from the letters in each word. For that reason, an exhaustive listing of all space-time words has not been made as part of the NN lexicon. Instead, spreadsheet "2 S Dimensions.ods" has been provided, allowing interactive querying by DIMENSION, STATE, FRAME, and ASPECT.

We turn now to discussion of each dimension.

14.3. Enclosure

Most humans create or occupy enclosed spaces in which to operate. Thus ENCLOSURE is one of the primary means we have for locating ourselves in space. At any given time, many people don't know which way is "north", but practically everybody knows whether they are "inside" or "outside". An "enclosure" can be physical or conceptual: a building, a clearing in a forest, a state or country, or a set of principles within which the speaker and hearer operate. Metaphors using enclosure are common in many languages to express more abstract concepts, such as English "out of touch", "in the know", "insider", and many more. Recognizing the importance of the enclosure concept, NN treats it as a separate dimension.

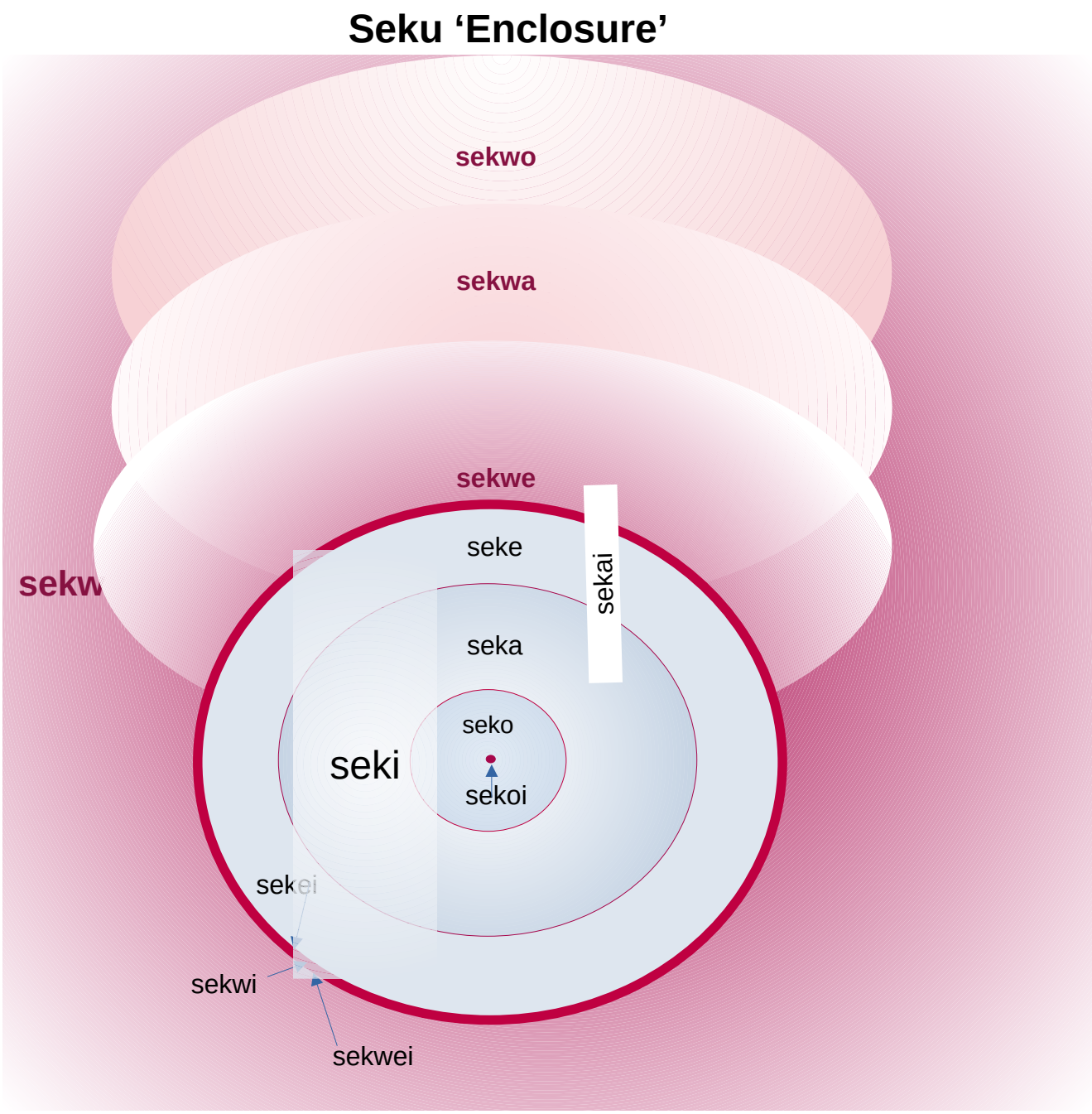
Physical enclosures come in all shapes and sizes, but the NN ENCLOSURE invokes a 2-dimensional space, of no particular shape, with an imprecise conceptual center and circumferance, and an axis which is simply "in-out". As such, it is similar to the Spherical group's RADIAL (Axial) dimension. There are two important differences: first, the RADIAL dimension is explicitly part of a three-dimensional group, whereas the ENCLOSURE dimension is not contextualized with other dimensions; and second, the starting part of the RADIAL axis is the surface of a spheroid, and that of the Enclosure dimension is the perceived center of an enclosure, the "hearth" of the home.

Enclosure is illustrated with three displays:

- 𝔇ρ 14.3 lists the vocabulary of STATIC and DYNAMIC enclosure
- 𝔇ρ 14.4 illustrates STATIC ENCLOSURE SPECIES 𐑕𐑓𐑙𐑢 *Seku*
- 𝔇ρ 14.5 illustrates DYNAMIC ENCLOSURE SPECIES 𐑕𐑓𐑦𐑢 *Sehu*

	Static		Dynamic	
0	*Seku*	Enclosure	*Sehu*	Movement relative to an enclosure
1	*Seki*	In	*Sehi*	Inward motion
2	*Seke*	Enclosing structure, wall	*Sehe*	Movement within an enclosure
3	*Sekei*	Inner side of enclosing structure	*Sehei*	Movement inside toward enclosing structure
4	*Seka*	In-out direction	*Seha*	Entering or leaving an enclosure
5	*Sekai*	Within	*Sehai*	Entering an enclosure, into
6	*Seko*	Inner and outer limits	*Seho*	Movement outside periphery of enclosure
7	*Sekoi*	Center of circle; inmost part of enclosure	*Sehoi*	Movement inside enclosure toward center
8	*Sekw*	Out	*Sehw*	Outward motion
9	*Sekwi*	Radius; exit path from enclosure	*Sehwi*	Movement along entry/exit path of enclosure
10	*Sekwe*	Outer side of enclosure	*Sehwe*	Movement inside toward boundary
11	*Sekwei*	Circumference of circle; Outer wall of enclosure	*Sehwei*	Movement along a boundary
12	*Sekwa*	Outside the circle or enclosure	*Sehwa*	Outward motion, leaving
13	*Sekwai*	Area of circle; area of enclosure	*Sehwai*	Movement relative to center vs circumference
14	*Sekwo*	Far outside	*Sehwo*	Movment away from an enclosure
15	*Sekwoi*	Total space inside and out, the enclosure in its context	*Sehwoi*	Orbiting, circling

Dp 14.3: Enclosure Vocabulary



Dp 14.4: Static Enclosure Dimension, *Seku*

The primary directions are *Seki* ‘in’ and *Sekw* ‘out’.
The concentric circles filled with shades of blue represent an enclosure or circle showing three degrees of “in-ness”; the magenta areas represent “out”, with three degrees of “out-ness” stacked (due to space constraints) above the enclosure.
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2021-06-12

𝘋ρ 14.5: Dynamic Enclosure Dimension Illustration, *Sehu*

The primary directions are *Sehi* 'inward' and *Sehw* 'outward'.
The concentric circles filled with shades of blue represent an enclosure or circle showing three degrees of "in-ness"; the magenta areas represent "out".
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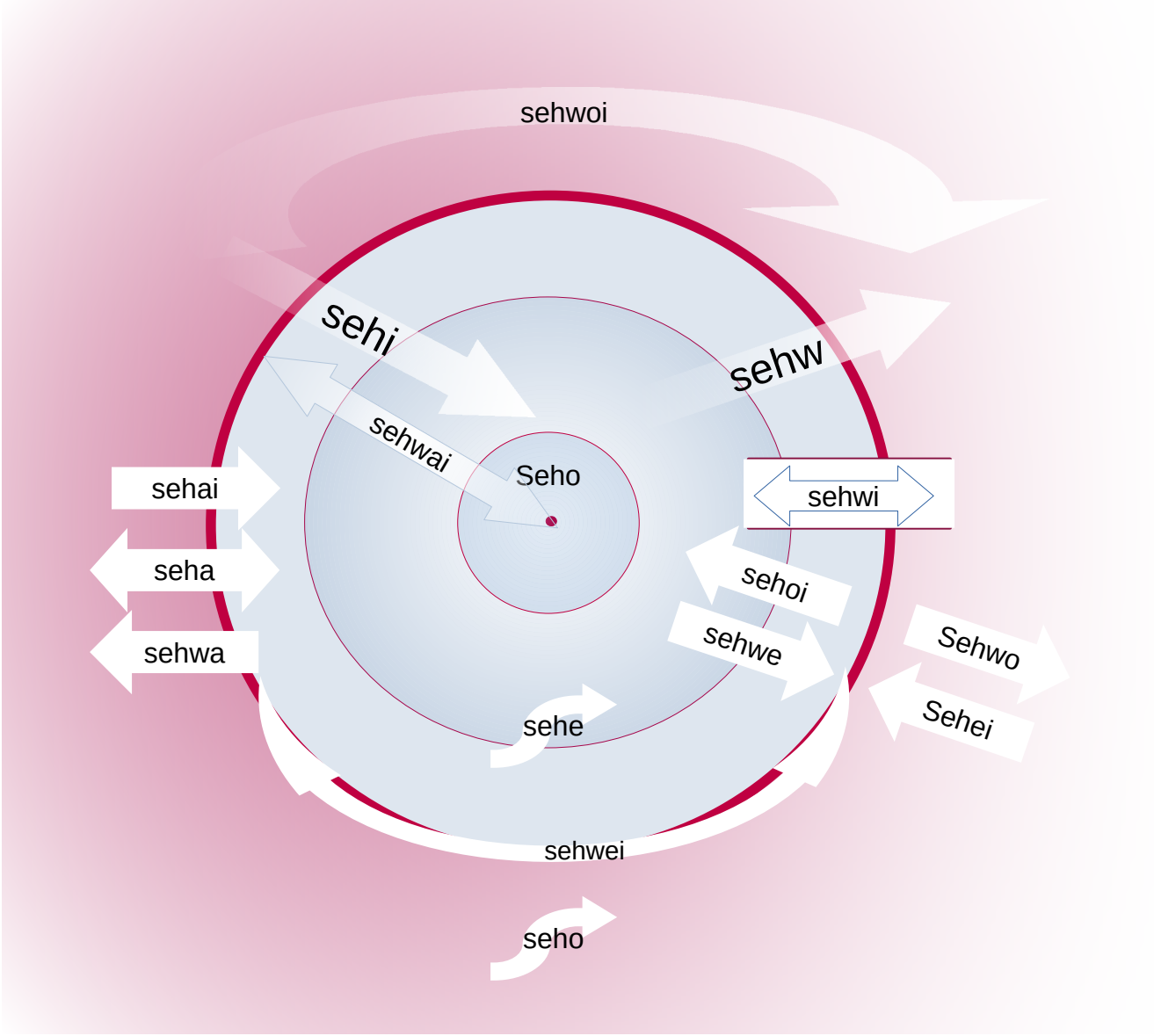


14.4. Cartesian Dimensions

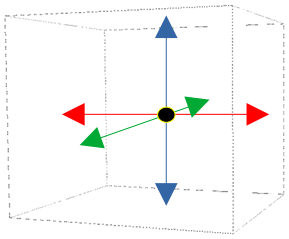
The "Cartesian" dimensions are those most people think of when we say "the three dimensons". In NN they are represented by:

𐑕𐑧𐑒𐑿 *Secu* VERTICAL – up-down

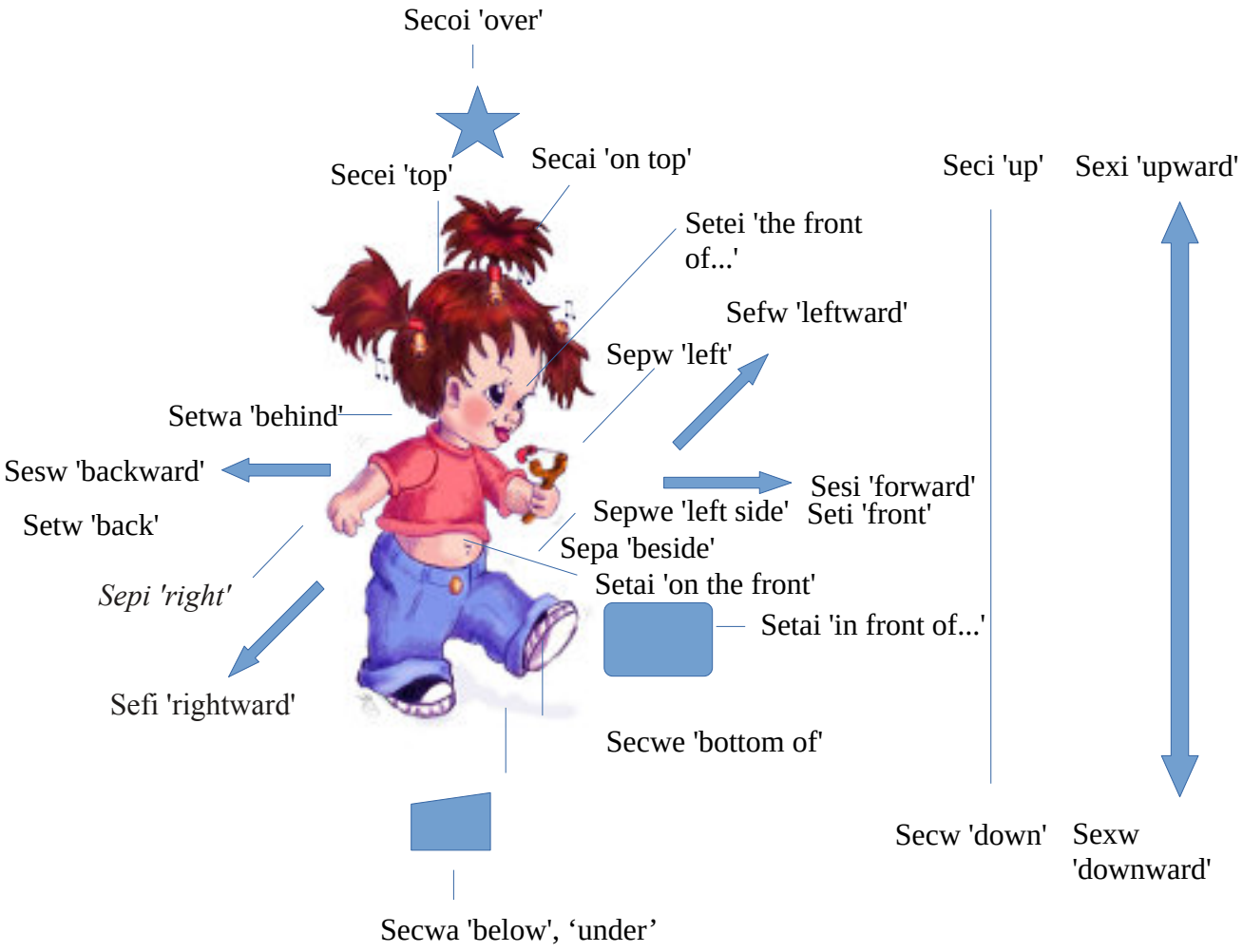
𐑕𐑧𐑑𐑿 *Setu* PROGRESSIONAL – front-back

𐑕𐑧𐑐𐑿 *Sepu* LATERAL – left-right

After ENCLOSURE, these are likely the most familar and widely used dimensional representations. (𐑛𐑐 14.6-7)



𐑛𐑐 14.6 : Cartesian Dimensions



𐑛𐑐 14.7: Cartesian Vocabulary Illustrated

14.4.1. Vertical

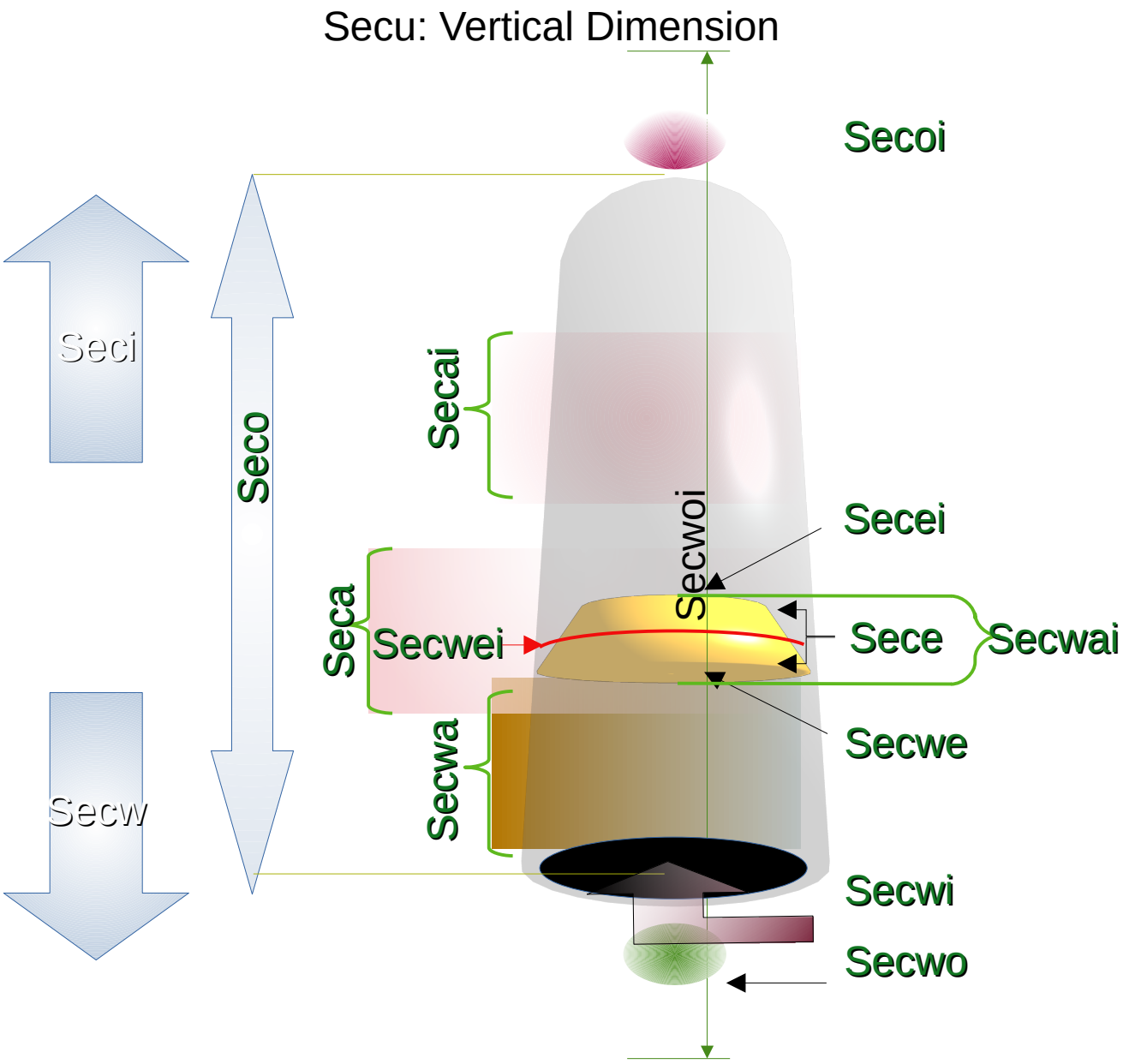
The first of the Cartesian DIMENSIONS is VERTICAL. This represents space and movement above and below the speaker or focal entity.

- 𝔇ρ 14.8 lists the vocabulary representing VERTICAL space and movement.
- 𝔇ρ 14.9 illustrates STATIC vertical space terms.

	Static		Dynamic	
0	*Secu*	Vertical Dimension	*Sexu*	Vertical Movement
1	*Seci*	Up	*Sexi*	Upward motion, climbing
2	*Sece*	Top or bottom of focal object	*Sexe*	Oscilation up and down
3	*Secei*	Top of focal object	*Sexei*	Movement up to the top of focal object
4	*Seca*	Vertical area	*Sexa*	Climbing up or down from focal object
5	*Secai*	Above	*Sexai*	Short upward move
6	*Seco*	Upper and lower limits	*Sexo*	Moving above and/or below focal object
7	*Secoi*	Far above	*Sexoi*	Ascent to the heights
8	*Secw*	Down	*Sexw*	Downward motion, descending
9	*Secwi*	Vertical line or way	*Sexwi*	Ascending and descending
10	*Secwe*	Bottom of something	*Sexwe*	Movement down to the bottom of focal object
11	*Secwei*	Area immedately above and below	*Sexwei*	Moving along a vertical line
12	*Secwa*	Below	*Sexwa*	Short downward move
13	*Secwai*	Vertical mid-distance	*Sexwai*	Changing vertical position, altitude
14	*Secwo*	Deep below	*Sexwo*	Descent to the depths
15	*Secwoi*	Vertical space, top to bottom	*Sexwoi*	Movement below something

𝔇ρ 14.8: Vertical Vocabulary

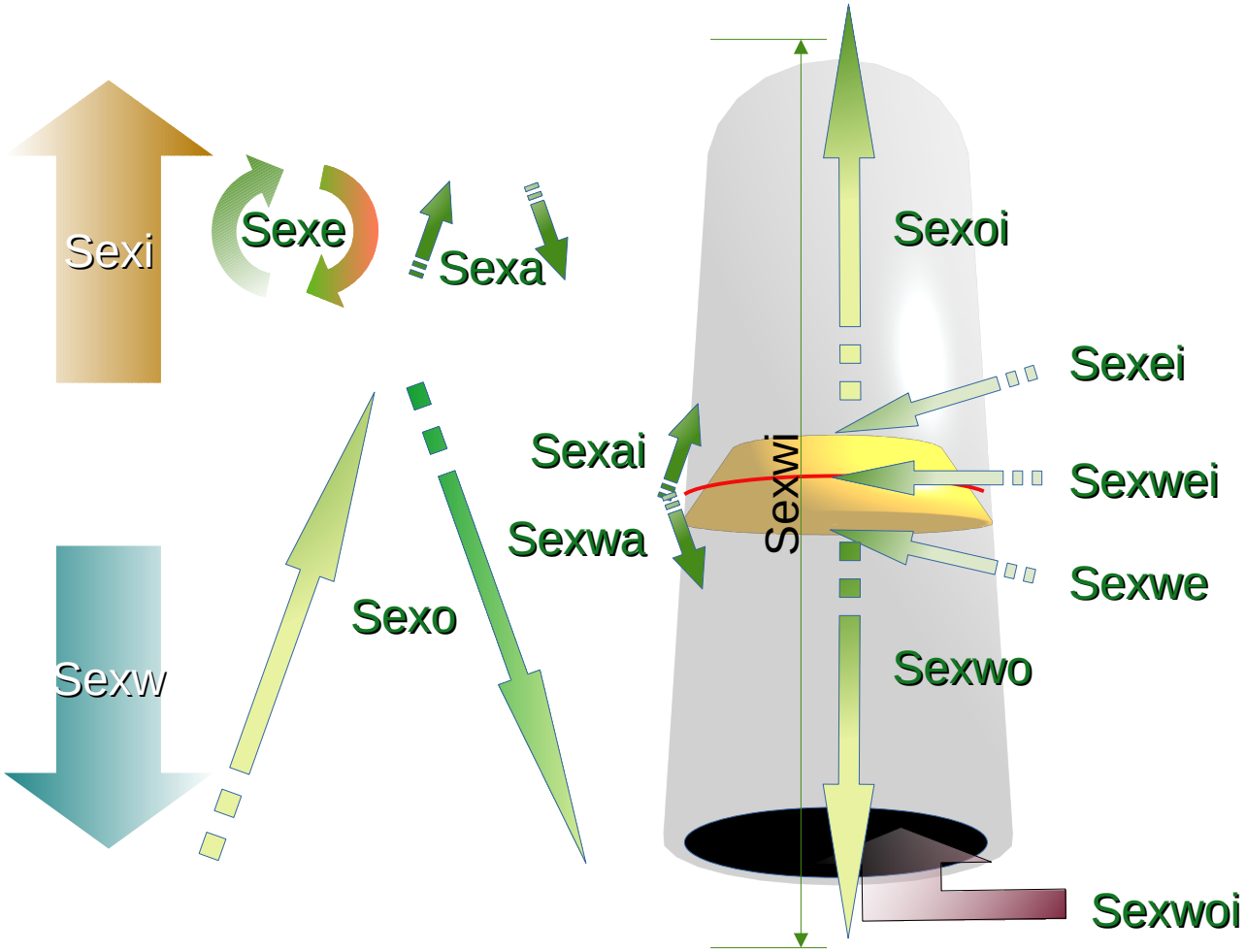
- 𝔇ρ 14.10 illustrates DYNAMIC vertical space words.



$\mathcal{D}_P$ 14.9: Static Vertical Dimension Illustration

The primary directions are *seci* 'up' and *Secw* 'down'.
The gray cyllinder illustrates a vertical tube or shaft, within which the yellow shape represents the focal object, or "me" (intended to represent an elevator or platform in the shaft).

Sexu: Vertical Movement



$\mathcal{D}_\rho$ 14.10: Dynamic Vertical Dimension Illustration

The primary directions are *Sexi* 'upward' and *Sexw* 'downward'.
The gray cyllinder illustrates a vertical tube or shaft, within which the yellow shape represents the focal object, or "me" (intended to represent an elevator or platform in the shaft).

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14.4.2. Progressional

The second of the Cartesian DIMENSIONS is PROGRESSIONAL. This represents space and movement to ahead and behind the speaker or focal entity.

- 𝔇ρ 14.11 lists the vocabulary representing PROGRESSIONAL space and movement.
- 𝔇ρ 14.12 illustrates STATIC PROGRESSIONAL space terms.
- 𝔇ρ 14.13 illustrates **DYNAMIC PROGRESSIONAL** space words.

	Static		Dynamic	
0	*Setu*	Progressional (Front-Back) Dimension	*Sesu*	Progressional movement (forward or backward)
1	*Seti*	Front	*Sesi*	Forward movement
2	*Sete*	My Front or back	*Sese*	Front-back oscilation
3	*Setei*	My Front	*Sesei*	Move to my front
4	*Seta*	Front-back area	*Sesa*	Short move forward or backward, hop
5	*Setai*	In front, ahead	*Sesai*	Short forward move, local
6	*Seto*	Forward-backward limits	*Seso*	Long route or road
7	*Setoi*	Far ahead	*Sesoi*	Long forward move, journey
8	*Setw*	Back	*Sesw*	Backward or return move
9	*Setwi*	Path, way, route	*Seswi*	Moving back and forth on a route
10	*Setwe*	My Back	*Seswe*	Move to my back
11	*Setwei*	Area immediately before and behind	*Seswei*	Short go and return
12	*Setwa*	Behind	*Seswa*	Short rearward move, retreat
13	*Setwai*	Forward-backward mid-distance	*Seswai*	Change position en route
14	*Setwo*	Far behind	*Seswo*	Long backward or return move

𝔇ρ 14.11: Progressional Vocabulary

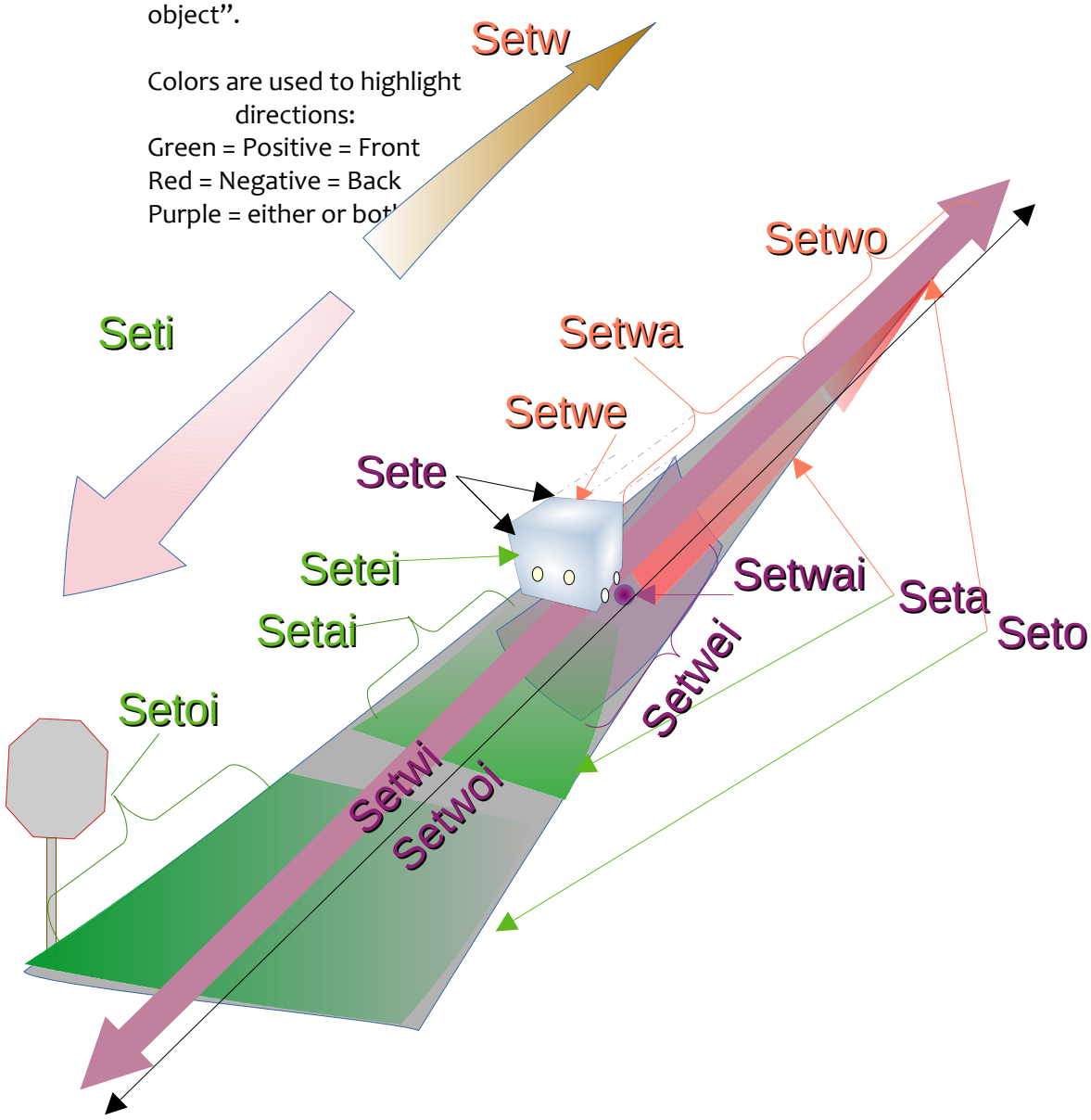
Setu: Progressional Dimension

𝔇ρ 14.12: Static Progressional Dimension Illustration

The Progressonal "front-back" dimension represents directions in relation to gaze or travel.
The primary directions are *Seti* 'front, ahead' and *Setw* 'back, behind'.

In this illustration, the Progressional axis runs from upper right to lower left, shown as a "road" with a small, purple object running roughly toward the viewer. This object represents a vehicle, which in this illustration is the "focal object".

Colors are used to highlight directions:
Green = Positive = Front
Red = Negative = Back
Purple = either or bot

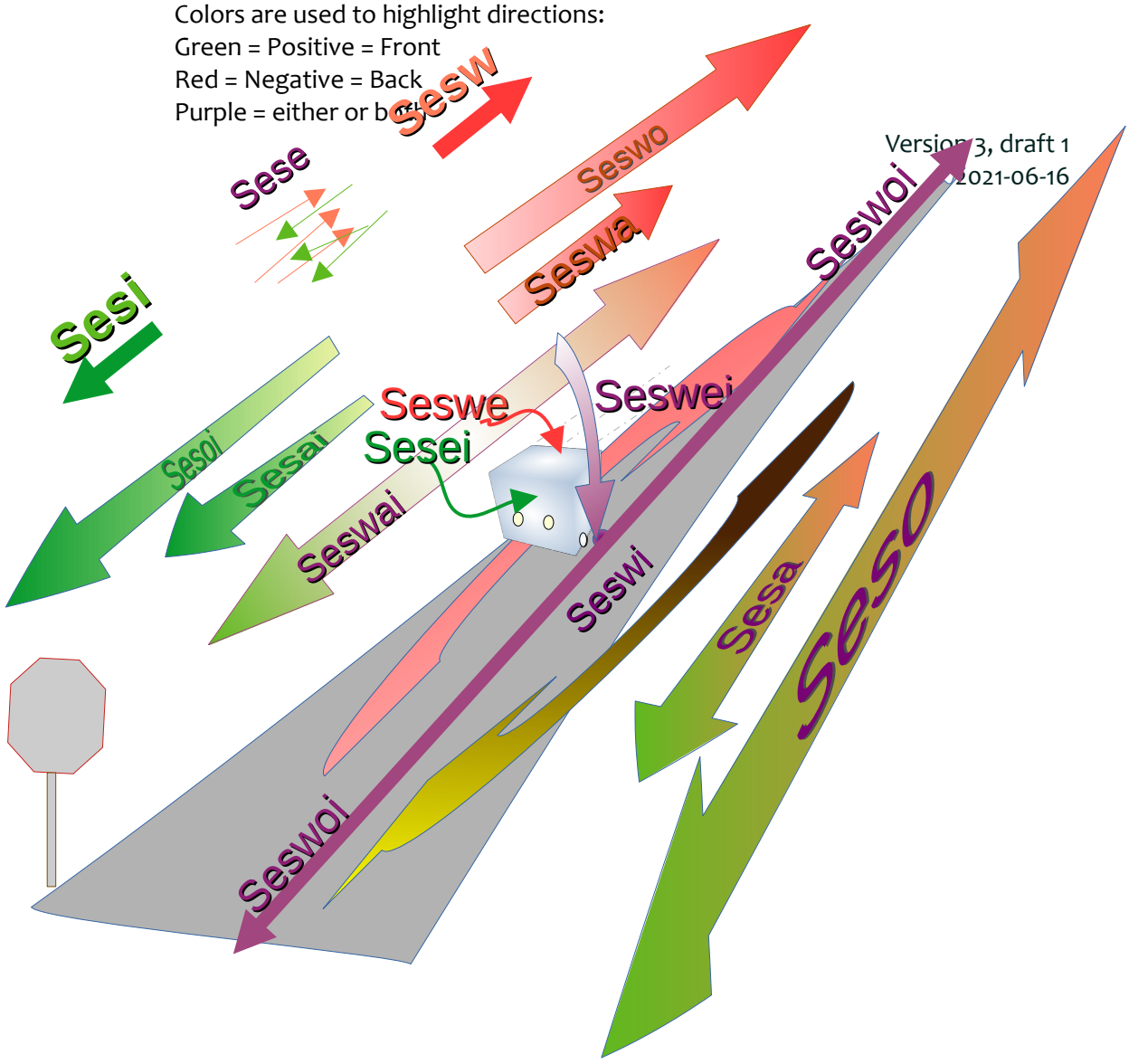


Sesu: Progressional Movement

𝔇ρ 14.13: Dynamic Progressional Dimension Illustration

The Progressonal "front-back" dimension represents directions in relation to travel or gaze.
The primary directions are *Sesi* 'forward' and *Sesw* 'backward'.

In this illustration, the Progressional axis runs from upper right to lower left, shown as a "road" with a small, purple object running roughly toward the viewer. This object represents a vehicle, which in this illustration is the "focal object".
Colors are used to highlight directions:
Green = Positive = Front
Red = Negative = Back
Purple = either or b



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14.4.3. Lateral

The third of the Cartesian DIMENSIONS is LATERAL. This represents space and movement to the sides (left and right) the speaker or focal entity.

- 𝔇ρ 14.14 lists the vocabulary representing LATERAL space and movement.
- 𝔇ρ 14.15 illustrates STATIC LATERAL space terms.
- 𝔇ρ 14.16 illustrates DYNAMIC LATERAL space words.

	Static		Dynamic	
0	*Sepu*	Lateral (Left-Right) Dimension	*Sefu*	Lateral (Left-Right) Movement
1	*Sepi*	Right	*Sefi*	Movement rightward
2	*Sepe*	My Sides	*Sefe*	Side-to-side oscilation
3	*Sepei*	My Right side	*Sefei*	Move to my right side
4	*Sepa*	Side-to-side area	*Sefa*	Side-to-side short Movement
5	*Sepai*	Area to the right	*Sefai*	Short rightward Movement
6	*Sepo*	Left-right limits	*Sefo*	Long sideways Movement
7	*Sepoi*	Far to the right	*Sefoi*	Long rightward Movement
8	*Sepw*	Left	*Sefw*	Movement leftward
9	*Sepwi*	Line or route crossing speakers' route	*Sefwi*	To my sides
10	*Sepwe*	My Left side	*Sefwe*	Move to left side
11	*Sepwei*	Area immediately beside me	*Sefwei*	Short move side to side
12	*Sepwa*	Area to my left	*Sefwa*	Short Leftward Movement
13	*Sepwai*	Right-Left mid-distance	*Sefwai*	Change side-to-side position
14	*Sepwo*	Far to the left	*Sefwo*	Long leftward Movement
15	*Sepwoi*	Right-Left Horizon	*Sefwoi*	Move to left or right limit

𝔇ρ 14.14: Lateral Vocabulary

Sepu: Lateral Dimension

𝔇ρ 14.15: Static Lateral Dimension Illustration

The Lateral "left-right" dimension represents directions to the sides of the reference object ("me"). The primary directions are *Sepi* 'right' and *Sepw* 'left'.

Directions are shown in relation to the DaVinci man (his right is your left).

Colors clarify directions:
- Sepi = right = teal
- Sepw = left = gold
- Sepwi = either or both = purple

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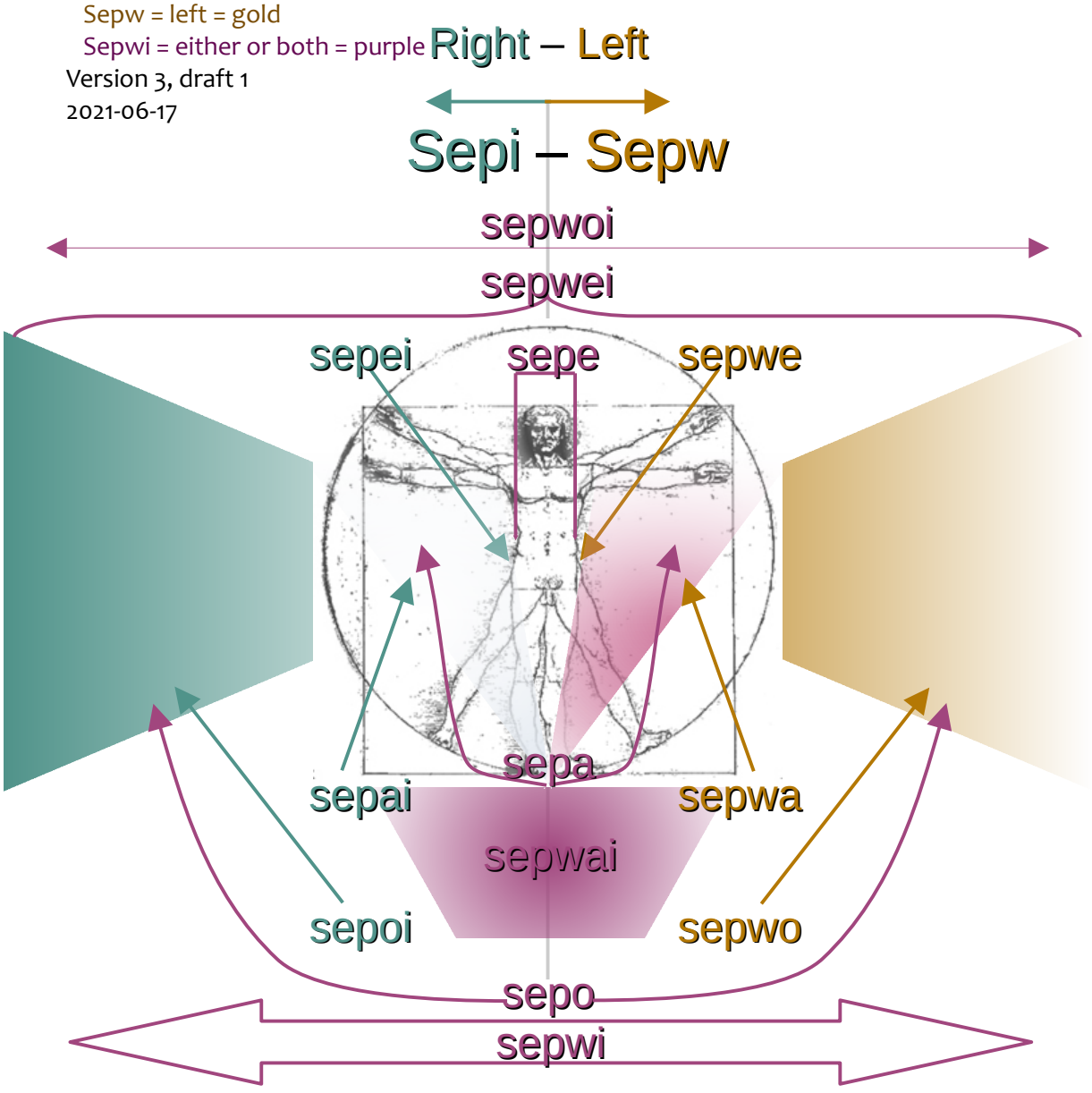

Sefu: Lateral Movement

𝔇ρ 14.16: Dynamic Lateral Movement Illustration

The Lateral "left-right" dimension represents directions to the sides of the reference object ("me"). The primary directions are *Sepi* 'right' and *Sepw* 'left'.

Directions are shown in relation to the DaVinci man (his right is your left).

Colors clarify directions:
Sefi = right = teal
Sefw = left = gold
Sefwi = either or both
= purple
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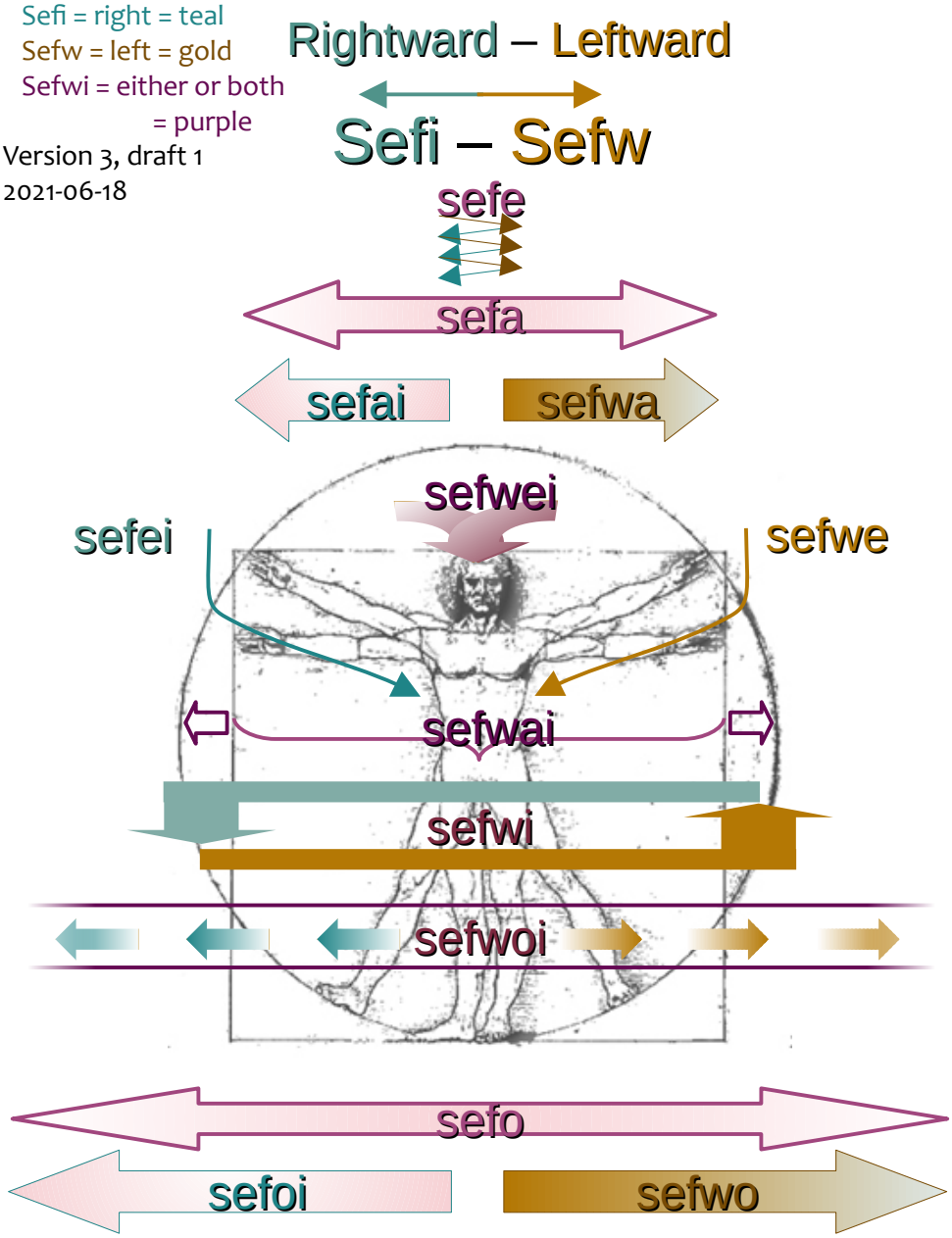
2021-06-18



14.5. Spherical Dimensions

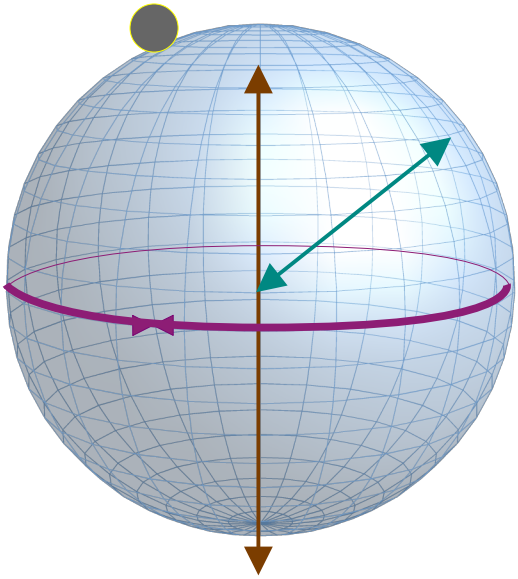
The SPHERICAL DIMENSIONS describe space related to spherical objects. Most prominent is the earth on which we live, and of course other celetial bodies. Not so immediately obvious, spherical dimensions are useful in describing the anatomy of living creatures in a consistent manner. For although these are called "spherical" dimensions, they are intended to be flexible enough to describe elongated and somewhat distorted spheroids.

The spherical dimensions are:

𐑕𐑓𐑾 *Seju* – AXIAL (North-South)

𐑕𐑓𐑿 *Sebu* – ROTATIONAL (East-West)

𐑕𐑓𐑜 *Segu* – RADIAL (In-Out)



𝔇𝔭 14.17: Spherical Dimensions

14.5.1. Axial (North-South) Vocabulary

"North" is determined by rotation and/or magnetism of celetial bodies; in other bodies, some other (logical or arbitrary) factor determines *Seji* 'North'.

	Static		Dynamic	
0	*Seju*	Spherical Latitude	*Seyu*	Movement on a spherical surface
1	*Seji*	North	*Seyi*	Northward movement
2	*Seje*	My North or South side	*Seye*	North-south oscilation
3	*Sejei*	My North Side	*Seyei*	Move to north side
4	*Seja*	North-South area	*Seya*	Short move to north or south
5	*Sejai*	Northward	*Seyai*	Short northward move
6	*Sejo*	North and South limits	*Seyo*	Long move north or south
7	*Sejoi*	Far North	*Seyoi*	Long northward move
8	*Sejw*	South	*Seyw*	Southward movement
9	*Sejwi*	Latitudinal line	*Seywi*	Move along north-south line
10	*Sejwe*	My South side	*Seywe*	Move to south side
11	*Sejwei*	Area immediately North and South	*Seywei*	North-south movement
12	*Sejwa*	Southward	*Seywa*	Short southward move
13	*Sejwai*	Equator; between North and South	*Seywai*	Move toward equator
14	*Sejwo*	Far South	*Seywo*	Long southward move
15	*Sejwoi*	North-South space, horizon	*Seywoi*	Move to(ward) north or south pole

Dp 14.18: Axial Vocabulary

14.5.2. Rotational (East-West) Vocabulary

	Static		Dynamic	
0	*Sebu*	Spherical Longitude	*Semu*	Spherical rotation
1	*Sebi*	East	*Semi*	Movement Eastward
2	*Sebe*	My East or West side	*Seme*	East-West oscilation
3	*Sebei*	My East Side	*Semei*	Move to my East side
4	*Seba*	East-West area	*Sema*	East-West short Movement
5	*Sebai*	Eastward	*Semai*	Short Eastward Movement
6	*Sebo*	East-West limit, meridian	*Semo*	Long East-West Movement
7	*Seboi*	Far to the East	*Semoi*	Long Eastward Movement
8	*Sebw*	West	*Semw*	Movement Westward
9	*Sebwi*	Line of longitude	*Semwi*	East-West movement
10	*Sebwe*	My West side	*Semwe*	Move to West Side
11	*Sebwei*	Area beside East and West sides	*Semwei*	Short move East-West
12	*Sebwa*	Westward	*Semwa*	Short Westward Movement
13	*Sebwai*	East-West mid-distance	*Semwai*	Change East-West position
14	*Sebwo*	Far to the West	*Semwo*	Long Westward Movement
15	*Sebwoi*	East-West space, horizon	*Semwoi*	Move to East or West limit

𝔇ρ 14.19: Rotational Vocabulary

Sebo 'prime meridian' is determined logically if possible, or arbitrarily if not.

14.5.3. Radial (Spherical In-Out) Vocabulary

Segoi 'positive extreme' is the center of the spheroid (which may be pragmatically determined in irregular bodies); the zero-point of the radius is the (mean) surface of the spheroid. RADIAL *segi* 'in' is POSITIVE, following the force of gravity and similar to *seki* 'in' of the ENCLOSURE DIMENSION; however, for those of us living on a spheroid, *segw* 'out' is our 'up' – the NEGATIVE direction – while CARTESIAN VERTICAL *seci* 'up' is the POSITIVE direction.

Segwo 'negative extreme' could logically be either infinity or the same distance above the surface as the positive extreme is below the surface; however, other pragmatic considerations may be used on a case-by-case basis – for example, the upper extreme of a planet's atmosphere (as determined by practical measures).

	Static		Dynamic	
0	*Segu*	Spherical distance from surface	*Seru*	Movement relative to surface of sphere
1	*Segi*	In, surface to center	*Seri*	Inward / Downward movement
2	*Sege*	Surface of sphere	*Sere*	In-Out / Up-down oscilation
3	*Segei*	Inner side of surface	*Serei*	Move to center of sphere
4	*Sega*	Radial direction	*Sera*	Short in-out movement
5	*Segai*	Inward	*Serai*	Short inward movement
6	*Sego*	Far toward surface or toward center	*Sero*	Long in-out movement
7	*Segoi*	Center of sphere	*Seroi*	Long inward movement
8	*Segw*	Out, away from surface	*Serw*	Movement outward
9	*Segwi*	Radius or diameter line	*Serwi*	Movement along radius of sphere
10	*Segwe*	Area immediately above surface	*Serwe*	Move away from center of sphere
11	*Segwei*	On the surface	*Serwei*	Short up-down movement
12	*Segwa*	Above the surface	*Serwa*	Intermediate outward movement
13	*Segwai*	Position along radius	*Serwai*	Short outward movement
14	*Segwo*	Far beyond surface of sphere	*Serwo*	Intermediate outward movement
15	*Segwoi*	Total area inside and out, in context of sphere; the environment	*Serwoi*	Movement far away from surface of sphere

𝔇ρ 14.20: Radial Vocabulary

14.6. Non-directional Space-words

There are two groups of words related to space and time that parallel those described in previous sections of this chapter:

- GENUS 𐑕𐑤-- *Si*--: Words relating to spaces, as contrasted to directions or movements. These are described in §14.10.
- Within GENUS 𐑕𐑺-- *Sw*--: non-dimensional spaces and movements. These are described in the following section, §14.6.1.

14.6.1. Non-Dimensional Space Concepts

The original purpose of these words was to provide a quick, easy way to indicate general location and movement ideas without being more specific than necessary. The majority of space-time relational words are fairly precise, but people often have only a vague, general notion of where something is or where things are going. To use a precise word to refer to a vague idea can be misleading to the hearer. Words which are more general are also easier to recall and use when one is in a hurry, tired, or distracted.

In addition, location-words are useful in metephorical speech. Common expressions in many languages are based on the human propensity to use spacial analogies to clarify more abstract concepts. In English, expressions like “finish up”, “inside information”, and “downright disgusting” illustrate the use of spacial concepts to illuminate non-spacial situations. Since the “space” referred to is other than physical, the precise spacial terms of NN don’t lend themselves well to this purpose; hence, non-specific *Swn-* and *Swd-* space-words.

To visualize non-specific locations and motions, imagine a person in total darkness or thick fog. Unable to see locations, they refer to space according to their body. The “positive” direction is generally the direction in which the person is facing; or if they are moving, in the direction they are going. Distances are very personal: “near”, “mid”, and “far” are determined by what can be touched, what seems an easy distance away, or what is unreachable. Of course, this is not the only way to conceptualize non-specific space, but it provides a useful analogy.

𐑛𐑹 14.23-24 are tables of the STATIC *Swd-* and DYNAMIC *Swn-* SPECIES, with notes about possible application of the words.

Roman	IPA	NN	Semantics	Notes
swdu	su'də	s wd u	Location	*Somewhere, anywhere*
swdi	su'di	s wd i	Direction positive	*Generally, the positive direction is ahead; could be in the direction of motion*
swde	su'de	s wd e	Distance: near	*Close*
swdei	su'dɛj	s wd ë	My positive surface	*Upper or forward side of skin or body shell*
swda	su'da	s wd a	Space extending a moderate distance from my surface	*Within easy reach*
swdai	su'daj	s wd ä	Space extending a moderate distance from my positive surface	*Just ahead or above*
swdo	su'dɔ	s wd o	Far	*Far in any direction*
swdoi	su'dɔj	s wd ö	Far in a positive direction; positive boundary if there is one	*"boundary" could be abstract or physical*
swdw	su'du	s wd w	Direction negative	*Generally, the negative direction is behind*
swdwi	su'dwi	s wd ï	A path, route, way, or channel	*A space through which to move*
swdwe	su'dwe	s wd é	My negative surface	*A person's back; on object's rear end*
swdwei	su'dwɛj	s wd ê	Space close around me	*within reach*
swdwa	su'dwa	s wd á	Space moderately close around me	*Short movement involved to reach it*
swdwai	su'dwaj	s wd â	Space occupied or required by me	*My personal space; a vehicle's safety zone*
swdwo	su'dwɔ	s wd 1 ó	Far in a negative direction; negative boundary if there is one	
swdwoi	su'dwɔj	s wd 1 ô	Line indicated by me	*Indicated by pointing, gazing, going, or context*

𝔇ρ 14.23: Non-Specific Static Locations

Roman	IPA	NN	Semantics	Notes
swnu	su'nə	𞤎𞤋𞤕𞤤	Movement	*Movement in any direction*
swni	su'ni	𞤎𞤋𞤕𞤦	Positive movement	*Go (forward or upward from)*
swne	su'ne	𞤎𞤋𞤕𞤨	Moving a very short distance; oscilation or vibration	*General vibration; indecisive movement*
swnei	su'nɛj	𞤎𞤋𞤕𞤪	Movement to my positive side	*Generally toward my front*
swna	su'na	𞤎𞤋𞤕𞤢	Short or mid movement in any direction	*Go*
swnai	su'naj	𞤎𞤋𞤕𞤣	Short or mid positive movement	*A step forward*
swno	su'nɔ	𞤎𞤋𞤕𞤮	Long movement in any direction	*Going far away*
swnoi	su'nɔj	𞤎𞤋𞤕𞤯	Long positive move	*Going far in a planned direction*
swnw	su'nu	𞤎𞤋𞤕𞤤	Negative movement	*Return (go back)*
swnwi	su'nwi	𞤎𞤋𞤕𞤦	Movement along a line; shuttling	*Shuttling; traveling a route back and forth; line need not be straight*
swnwe	su'nwe	𞤎𞤋𞤕𞤬	Movement to my negative side	*Generally toward my back; go behind*
swnwei	su'nwɛj	𞤎𞤋𞤕𞤭	Movement toward me from any direction	*Come*
swnwa	su'nwa	𞤎𞤋𞤕𞤫	Short-Mid distance negative move	*Backward or downward*
swnwai	su'nwaj	𞤎𞤋𞤕𞤰	Movement of the area occupied or required by me	*My personal space changes position*
swnwo	su'nwɔ	𞤎𞤋𞤕¬𞤮	Long negative move	*Far backward or downward*
swnwoi	su'nwɔj	𞤎𞤋𞤕¬𞤯	Moving in a channel or predefined route	*Following a route, either direction*

𞤃𞤢 14.24 Non-Specific Dynamic Movements

14.7. Coordinate-System Words

Another kind of special location word is the set that provides a way to quickly refer to specific locations in a defined area of two- or three-dimensional space. These can be applied to **any type of space** where locational zones would be useful, such as:

- Planets or other celestial bodies
- Anatomy of living things
- Geographical subdivision of areas
- Air or sea traffic control
- A game board with up to 16×16 squares, or three-dimensional game space up to 16×16×16

It must be noted that the locations are relative to the size of the space; they do not represent specific measurements. They are roughly proportioned to the area of the defined space. Like many NN word-systems, they divide space into 16ths. When applied to an entire planet, each 16th zone is vastly larger than when applied to a basketball.

14.7.1. Modes of Reference

As discussed in previous sections, NN provides three MODES for referring to spaces, each with its own DIMENSIONS. Each MODE provides words for STATIC locations and DYNAMIC movement.

𝔇𝔭 14.25: Modes of Spatial Reference

Mode	Dimensions		
ENCLOSURE *2-syllable words*	DEPTH *In-Out*		
CARTESIAN *4-syllable words*	LATERAL *"X", left-right*	PROGRESSIONAL *"Z", front-back*	VERTICAL *"Y", up-down*
SPHERICAL *4-syllable words*	ROTATIONAL *East-West*	AXIAL *North-South*	RADIAL *Core-Sky*

14.7.2. Coordinate Word Pattern

Notice that CARTESIAN and SPHERICAL words require four syllables. This is unusual within the NN word system. The usual two-syllable limit is broken here in order to provide relatively compact expression of three-dimensional spaces. The ENCLOSURE mode, having only one dimension, does not break the usual pattern of words. The CARTESIAN and SPHERICAL modes follow this pattern:

𝔇𝔭 14.26: Coordinate Word Pattern

Syllable 1	2	3	4
ID syllable	DIMENSION 1	DIMENSION 2	DIMENSION 3
Sw	CV	CV	CV

The first syllable of coordinate words is always 𐑕𐑢 *Sw* to identify them as special location-words. In the followinig syllables, the consonant (C) identifies the DIMENSION and whether STATIC or DYNAMIC. The vowels (V) indicate distances from a point of origin, which is defined as either the center or one end, depending on the DIMENSION (see below).

Normal NN words are stressed on the second syllable, while FUNCTIONALS appended to them receive secondary stress. It is suggested that coordinate words receive primary stress on the second syllable with secondary stress on both the third and fourth syllables for clarity.

Initial consonants for each syllable are the same as the consonants used for the same dimension in other *S---* words.

𝔇ρ 14.27: Coordinate words' syllable-initial consonants

			Voiceless		*Voiced*	
			STATIC	DYNAMIC	STATIC	DYNAMIC
			Obstruant	*Continuant*	*Obstruant*	*Continuant*
Velar	ENCLOSURE	**DEPTH**	k-	h-		
	SPHERICAL	**RADIAL**			g-	r-
Palatal	CARTESIAN	**VERTICAL**	c-	x-		
	SPHERICAL	**AXIAL**			j-	y-
Alveolar	CARTESIAN	**PROGRESIONAL**	t-	s-		
	TEMPORAL (see note)	**Time**			d-	n-
Labial	CARTESIAN	**LATERAL**	p-	f-		
	SPHERICAL	**ROTATIONAL**			b-	m-

Note: NN does not have a coordinate system for time, because time is treated as one-dimensional. Instead, the vocabulary words beginning *Swn-* and *Swd-* that would have been used for time-coordinates are used, as described in §14.6 (this chapter), for non-specific spacial reference, and consist of only two syllables, like most other NN words. ENCLOSURE also has only 1 dimension, so its coordinate words require only 2 syllables. Words beginning with *Sw* + any consonant other than *h, k, n* or *d* are expected to be four-syllable coordinate-system words.

𝔇ρ 14.28 sets out the meaning and initial consonant of each syllable in coordinate words. (Vowels follow the same pattern as all other spacial reference words.)

𝆑𝆐 14.28: Coordinate words: meanings of syllable-initial consonants

Mode	Syllable 1	Syllable 2			Syllable 3			Syllable 4		
		Dimension	Static / Dynamic	C2	Dimension	Static / Dynamic	C2	Dimension	Static / Dynamic	C2
Enclosure	*sw-*	Depth	Static	***k-***						
			Dynamic	***h-***						
Cartesian	*sw-*	Lateral	Static	***p-***	Vertical	Static	***c-***	Progressional	Static	***t-***
			Dynamic	***f-***		Dynamic	***x-***		Dynamic	***s-***
Spherical	*sw-*	Axial	Static	***j-***	Rotational	Static	***b-***	Radial	Static	***g-***
			Dynamic	***y-***		Dynamic	***m-***		Dynamic	***r-***

14.7.3. Coordinate Words

14.7.3.1. Enclosure Coordinate Words

Enclosure is a one-dimensional, In-Out space, so the coordinates consist of only two syllables (𝔇ρ 14.29-31).

14.7.3.1.1

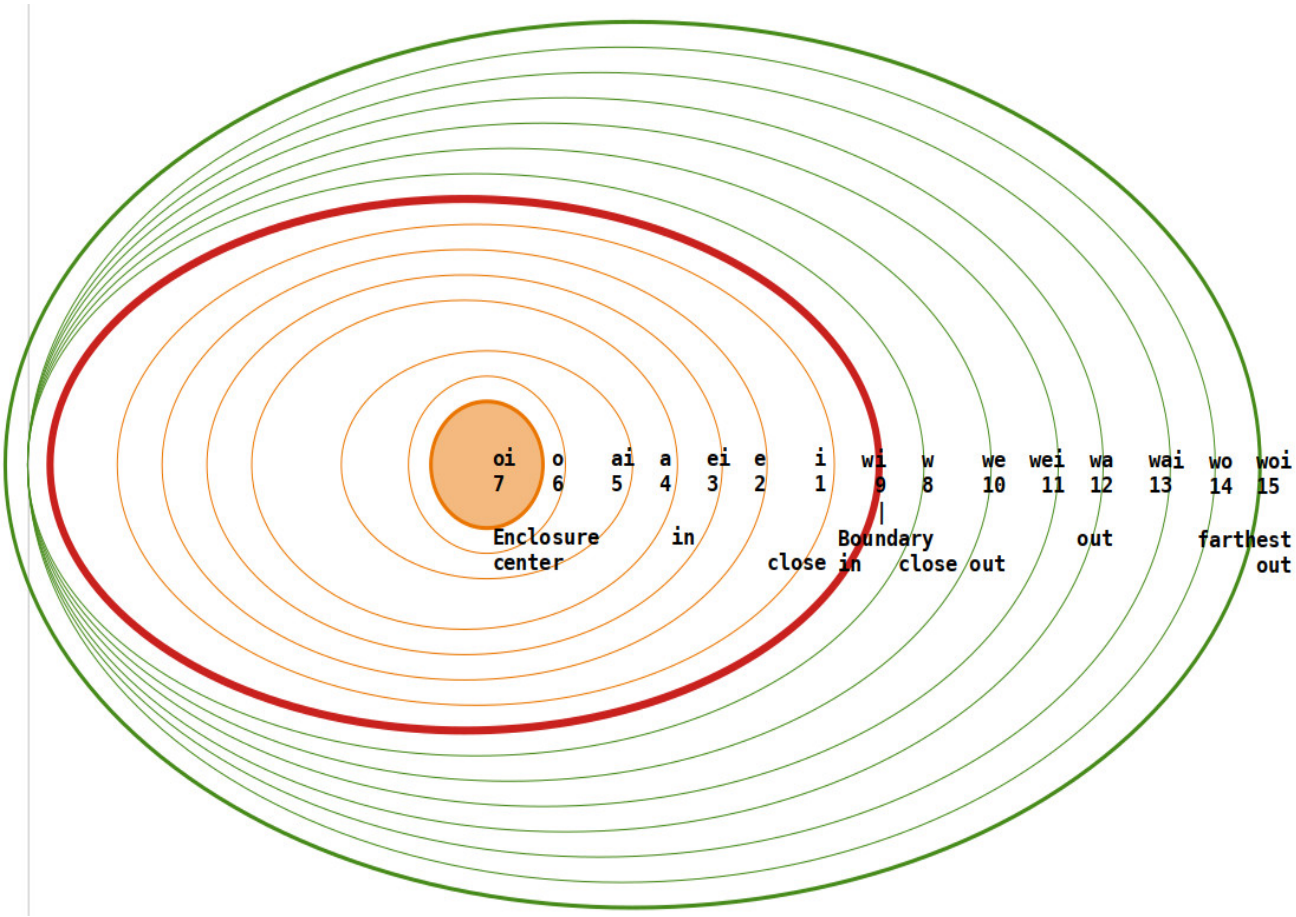
Roman	IPA	NN	Semantics
swku	su'kə	s wk u	In 0
swki	su'ki	s wk i	In 1
swke	su'ke	s wk e	In 2
swkei	su'kɛj	s wk ë	In 3
swka	su'ka	s wk a	In 4
swkai	su'kaj	s wk ä	In 5
swko	su'kɔ	s wk o	In 6
swkoi	su'kɔj	s wk ö	In 7
swkw	su'ku	s wk w	Out 0
swkwi	su'kwi	s wk ï	Out 1
swkwe	su'kwe	s wk é	Out 2
swkwei	su'kwɛj	s wk ê	Out 3
swkwa	su'kwa	s wk á	Out 4
swkwai	su'kwaj	s wk â	Out 5
swkwo	su'kwɔ	s wk ó	Out 6
swkwoi	su'kwɔj	s wk ô	Out 7

𝔇ρ 14.29: Static Enclosure Coordinate Words

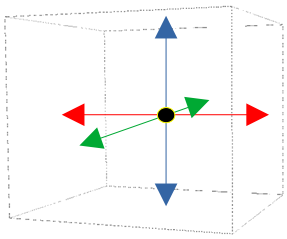
Static Enclosure		Dynamic Enclosure	
Roman	IPA	NN	Semantics
swhu	su'hə	s whu	Inward 0
swhi	su'hi	s whi	Inward 1
swhe	su'he	s whe	Inward 2
swhei	su'hɛj	s whë	Inward 3
swha	su'ha	s wha	Inward 4
swhai	su'haj	s whä	Inward 5
swho	su'hɔ	s who	Inward 6
swhoi	su'hɔj	s whö	Inward 7
swhw	su'hu	s whw	Outward 0
swhwi	su'hwi	s whï	Outward 1
swhwe	su'hwe	s whé	Outward 2
swhwei	su'hwɛj	s whê	Outward 3
swhwa	su'hwa	s whá	Outward 4
swhwai	su'hwaj	s wâ	Outward 5
swhwo	su'hwɔ	s whó	Outward 6
swhwoi	su'hwɔj	s wh1 ô	Outward 7

𝔇ρ 14.30: Dynamic Enclosure Coordinate Words

𝔇ρ 14.31: Encolosure Zones



14.7.3.2. Cartesian Coordinate Words



𝔇ρ 14.32: Cartesian Coordinates

CARTESIAN space is visualized as a cube centered on a focal object or location (𝔇ρ 14.32). The FOCUS is assumed to be the speaker unless some other object is specified.

The size of the cubic space depends entirely on the context, and may be precisely defined in advance, or roughly approximated according to context.

	Positive	Origin	Negative	
		wi		9
1	i		w	8
2	e		we	10
3	ei		wei	11
4	a		wa	12
5	ai		wai	13
6	o		wo	14
7	oi		woi	15
0		u	unspecified	

𝔇ρ 14.33: Coordinate Distance Vowels

With the FOCUS as the center, 8 POSITIVE and 8 NEGATIVE distances can be indicated in each of the three dimensions (𝔇ρ 14.33). In effect, this divides the original cubic space into 512 smaller cubic areas.

In DYNAMIC coordinates, movement is assumed to originate in the center unless a previously defined location is specified, or the FOCUS itself is the destination.

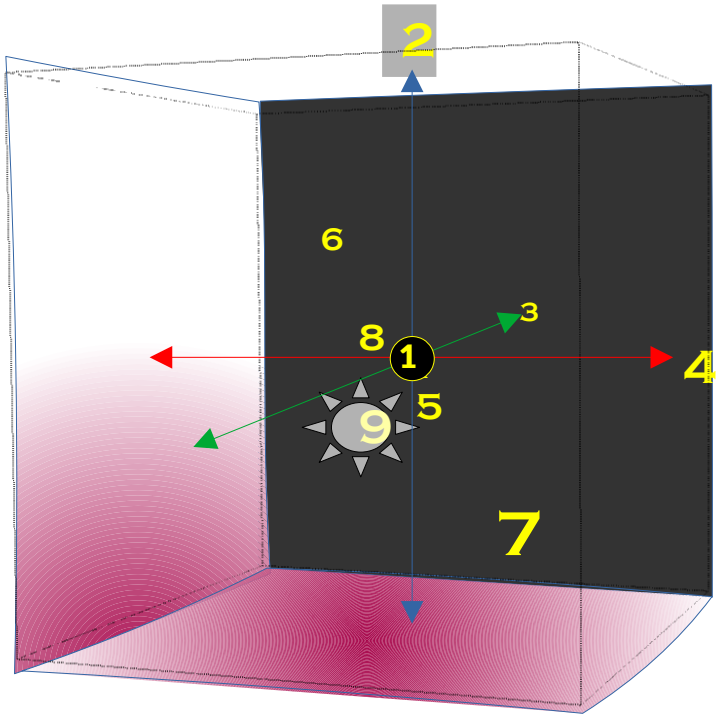
Each of the three DIMENSIONS uses an ORDINAL representation of distances (𝔇ρ 14.33).

𝔇ρ 14.34: Coordinate Consonants

	Syllable 1	2	3	4
	ID	Lateral	Vertical	Progressional
Static	*Sw*	p-	c-	t-
Dynamic	*Sw*	f-	x-	s-

Each static and dynamic set of coordinates consists of 8,192 four-syllable words. These are all listed in spreadsheet "28 Sw-" sheets "--k-" (STATIC) and "--h-" (DYNAMIC). Examples of each are listed and illustrated in 𝔇ρ 14.35-38 (next pages).

14.7.3.2.1 Cartesian Coordinates: static example

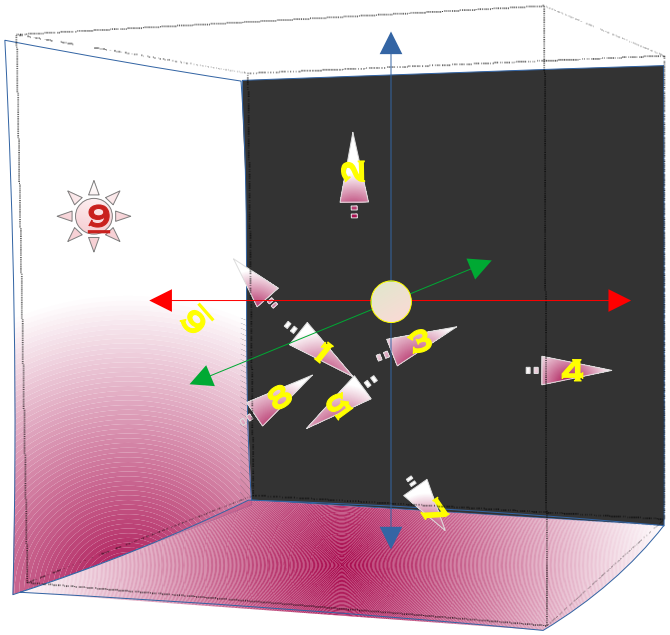


Dp 14.35: Cartesian Coordinates: Static

NN (latin)	NN (IPA)	Position	Ref #
Swpwicwitwi	su'pwi,ʧwi,twi	Location of focus	1
Swpoicwitwi	su'poi,ʧwi,twi	Farthest above focus	2
Swpwicoitwi	su'pwi,ʧwɔi,twi	Farthest ahead of focus	3
Swpwicwitoi	su'pwi,ʧwi,twɔi	Farthest to right of focus	4
Swpwcwtw	su'pu,ʧu,tu	Closest to left, down,ahead	5
Swpwacata	su'pwa,ʧa,ta	Midway upper left ahead	6
Swpacwatwa	su'pa,ʧwa,twa	Midway lower right behind	7
Swpwocwetei	su'pwo,ʧwe,tej	Left 6 down 2 ahead 3	8
Swpucutu	su'pəʧə,tə	Location unspecified	9

Dp 14.36: Cartesian Static

14.7.3.2.2 **Cartesian Coordinates:** dynamic **example**



Dp 14.37: Cartesian Coordinates: Dynamic Example

NN (latin)	NN (IPA)	Move to Position	Ref #
Swfwixwiswi	suˈfwiˌʃwiˌswi	Location of focus	1
Swfoixwiswi	suˈfoiˌʃwiˌswi	Farthest above focus	2
Swfwixoiswi	suˈfwiˌʃwoiˌswi	Farthest ahead of focus	3
Swfwixwisoi	suˈfwiˌʃwiˌswoi	Farthest to right of focus	4
Swfwxwtw	suˈfuˌʃuˌsu	Closest to left,down,ahead	5
Swfwaxasa	suˈfwaˌʃaˌsa	Midway upper left ahead	6
Swfaxwatwa	suˈfaˌʃwaˌswa	Midway lower right behind	7
Swfwoxwesei	suˈfwoˌˌʃweˌsej	Left 6 down 2 ahead 3	8
Swfuxusu	suˈfəˌʃəˌsə	Location unspecified	9

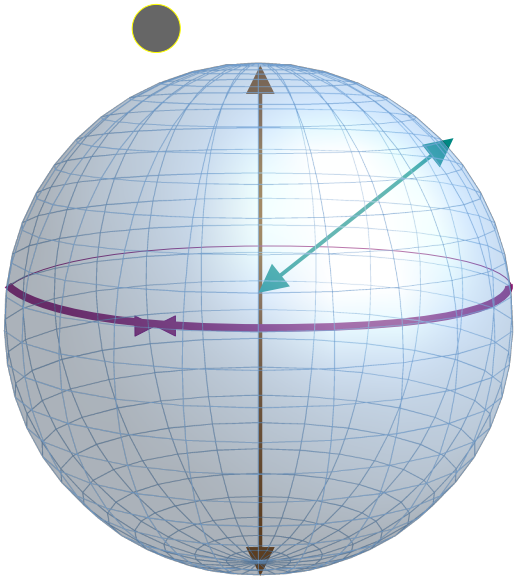
Dp 14.38: Cartesian Dynamic

14.7.3.3. Spherical Coordinate Words

Spherical descriptor words are based on a variant to "Local Tangent Plane Coordinates"

The most similar variant is that used in avionics, sometimes known as "NED" (North-East-Down); see https://en.wikipedia.org/wiki/Local_tangent_plane_coordinates

Like Cartesian space, Spherical space is divided into 512 three-dimensional spaces based on the center of a sphere (𝔇ρ 14.36). As with Cartesian coordinates, the spaces are not of a fixed size, particularly since they are tapered and are naturally smaller close to the center. Each axis is numbered differently, and is discussed below.



𝔇ρ 14.39: Spherical Space

Syllable pattern is shown in 𝔇ρ 14.40:

𝔇ρ 14.40: Spherical space syllable-initial consonants

	Syllable 1	2	3	4
	ID	AXIAL	ROTATIONAL	RADIAL
STATIC	*Sw*	j-	g-	b-
DYNAMIC	*Sw*	y-	r-	m-

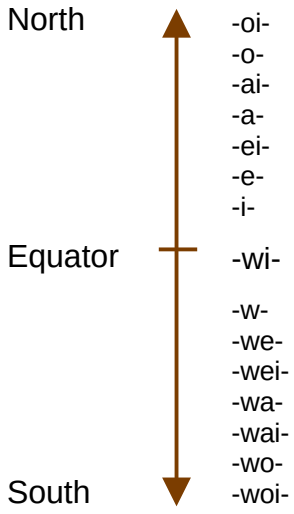
14.7.3.3.1 Ordinal Representation of Axial (North-South) Dimension

With zero fixed with *wi* at the equator, numbers run upward to *oi* at the North Pole, while southward numbers run up to *woi* at the South Pole (𝔇ρ 14.41-42) .

𝔇ρ 14.41: Vowels of Axial Dimension

	North	Center	South	
0		wi		0
1	i		w	8
2	e		we	10
3	ei		wei	11
4	a		wa	12
5	ai		wai	13
6	o		wo	14
7	oi		woi	15
unspecified		u		

𝔇ρ 14.42: Vowels of Axial Dimension



14.7.3.3.2 Ordinal Representation of Rotational (East-West) Dimension

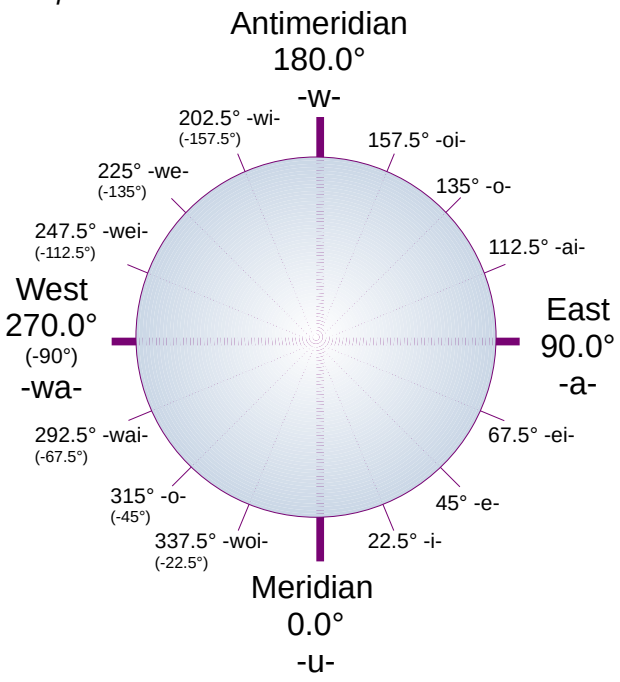
East is positive, west is negative . The base-meridian is arbitratily defined on a case-by-case basis. Each gradation is 22.5 degrees of arc (360 / 16).

Gradations of RADIAL and AXIAL distances depend on the size and physical characteristics of the spherical object; they need not be uniform sizes, but can represent layers or arbitrary zones.

Dp 14.43: Vowels of Rotational Dimension

Degrees	East			West	Degrees
0.0	u	0	8	w	180.0
22.5	i	1	9	wi	202.5
45.0	e	2	10	we	225.0
67.5	ei	3	11	wei	247.5
90.0	a	4	12	wa	270.0
112.5	ai	5	13	wai	292.5
135.0	o	6	14	wo	315.0
157.5	oi	7	15	woi	337.5

Dp 14.44: Vowels of Rotational Dimension



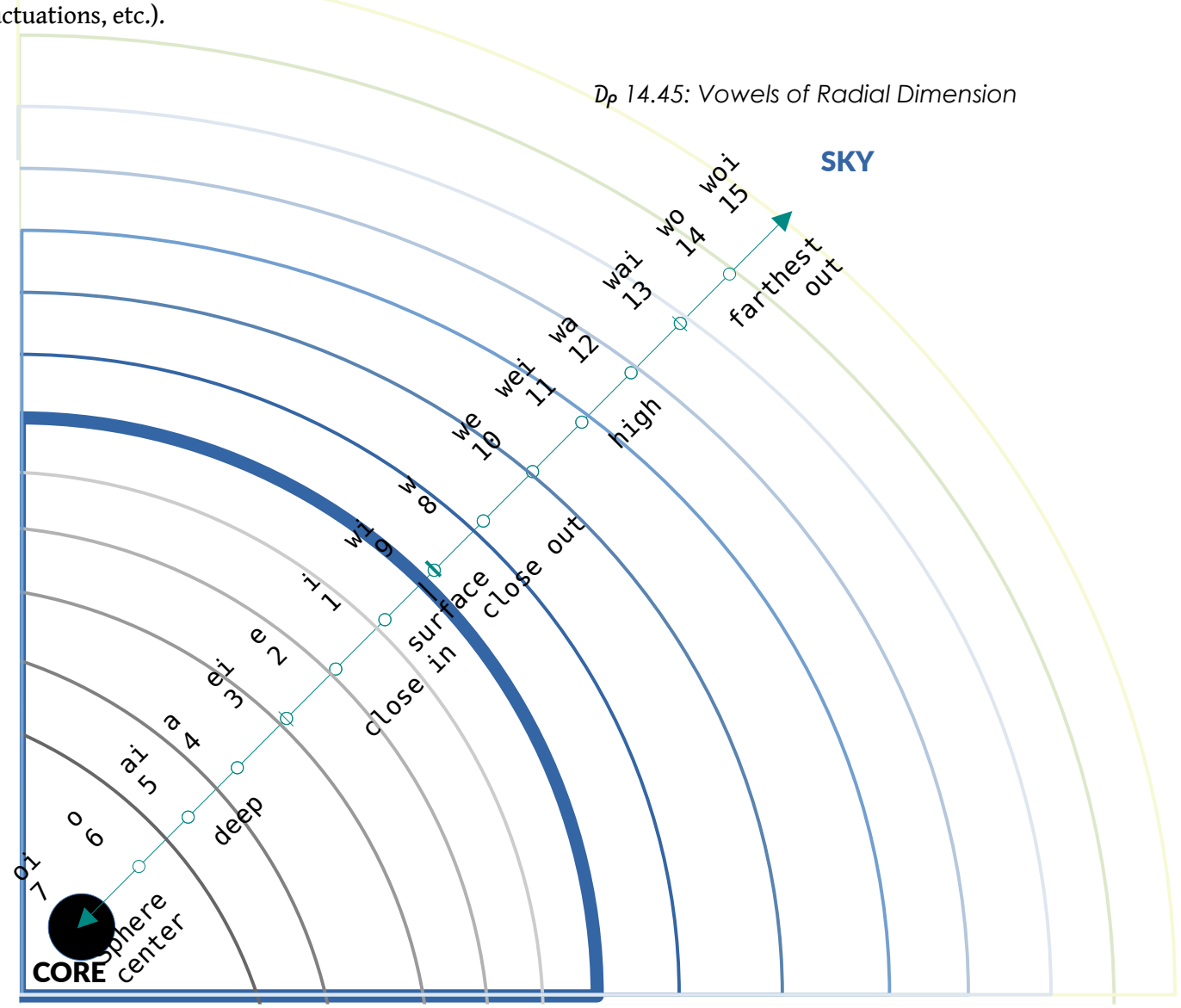
14.7.3.3.3 Ordinal Representation of Radial (Core-Sky) Dimension

RADIAL is the direction from the surface to the center of a sphere; in large spheres (planets) it is the direction of the force of gravity. Though radial measures are anchored at the spheroid's center, the surface of the spheroid is the zero-point.

Numbers following the force of gravity (toward the center) are positive in a positive sequence; those against the force of gravity (toward the sky) are considered negative and begin with *w-*.

spheroids with irregular surfaces, like planets, need to define an arbitrary, consistent "surface level". By custom on Earth, that is "sea level" (acknowledging that "sea level" changes with tides, climate fluctuations, etc.).

Dp 14.45: Vowels of Radial Dimension

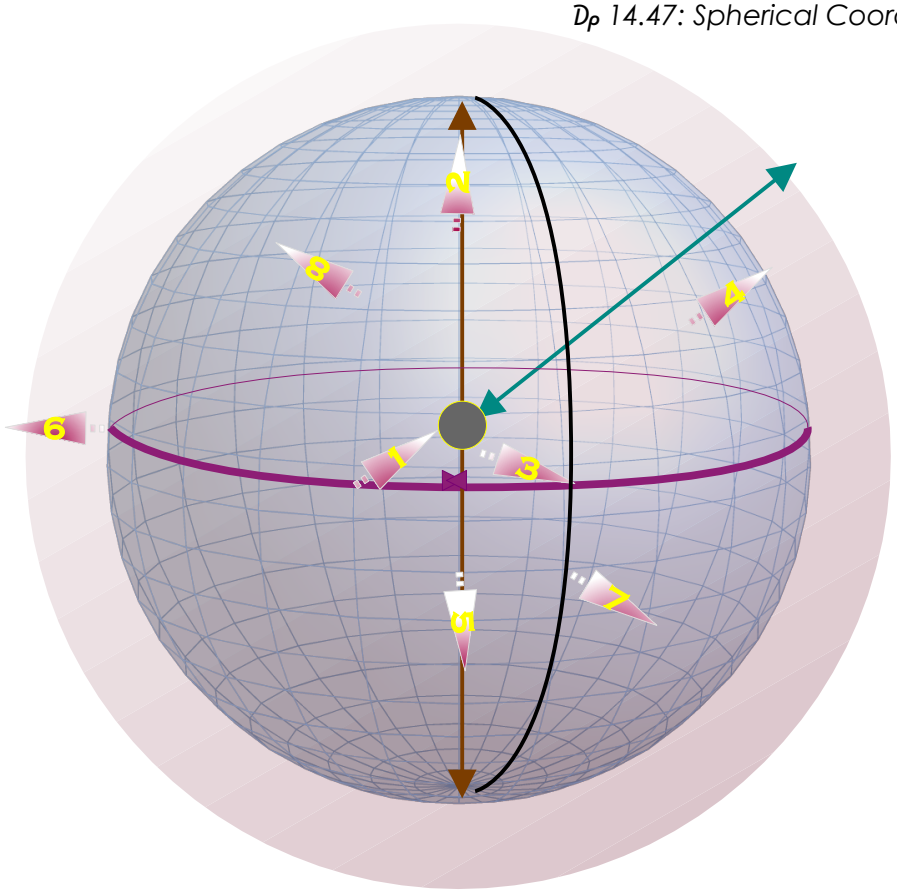


14.7.3.3.4 **Spherical** Coordinates: **dynamic example**

𝔇ₚ 14.46: Spherical Coordinates, Dynamic Example

Swyamwiroi	suˈʒa˛mwi˛ʁoi	Base meridian (arbitrarily defined) at surface	3
Swyamari	suˈʒa˛ma˛ʁi	Northeastern hemisphere just above surface	4
Swywamwiroi	suˈʒwa˛mwi˛ʁoi	Central axis half way to south end centered inside	5
Swywimwarwoi	suˈʒwi˛mwi˛ʁwoi	Far above equator over longitude -90 (west)	6
Swywamiri	suˈʒwa˛mi˛ʁi	South -45 east 22.5 close below surface	7
Swyomwairi	suˈʒo˛mwai˛ʁi	North 6 points west –67.5 low altitude above surface	8
Swyumuru	suˈʒə˛mə˛ʁə	Location unspecified (not shown)	

𝔇ₚ 14.47: Spherical Coordinates, Dynamic Example



14.8. Time

Within the *S---* FAMILY of 4,096 words, 512 express TEMPORAL relations. These words enable speakes to express several aspects of time relations:

- **Simple time**: past, present and future;
- **Distance in time**: NEAR, MID, and FAR;
- STATIC and DYNAMIC **aspects**: a point in time versus a movement through time;
- FRAMES **of reference**: whether the temporal relationship is based on the time at which the speaker is speaking, or some other reference-point.

14.8.1. Word Identification

TEMPORAL words are distinguished from other relationals by having a voiced apical consonant as the third letter – the consonants *n* or *d* starting the second syllable. The voiced apical stop ɾ *d* signals STATIC mode, and the voiced apical nasal continuant ɾ *n* marks DYNAMIC mode words.

14.8.2. Time Vocabulary

Static		Dynamic	
Sedu	Temporal Dimension	*Senu*	Progression of time
Sedi	Future	*Seni*	Movement toward the future
Sede	Immediate present	*Sene*	Toward the Immediate present
Sedei	Near Future	*Senei*	Toward the Near Future
Seda	Present in general	*Sena*	Toward the Present in general
Sedai	Mid Future	*Senai*	Toward the Mid Future
Sedo	Present broadly	*Seno*	Toward the Present broadly
Sedoi	Distant Future	*Senoi*	Toward the Distant Future
Sedw	Past	*Senw*	From the Past
Sedwi	Sometime	*Senwi*	To/From Sometime
Sedwe	Recent past	*Senwe*	From the Recent past
Sedwei	Short time	*Senwei*	To/From a Short time
Sedwa	Mid Past	*Senwa*	From the Mid Past
Sedwai	Moderate time	*Senwai*	To/From a Moderate time
Sedwo	Distant Past	*Senwo*	From the Distant Past
Sedwoi	Long time	*Senwoi*	To/From Eternity

Dp 14.49: Time Vocabulary

14.8.3. Simple Time

The simplest expression of time is the three “tenses”:

- past: ᒧᐦᒣᐟ *sedw*
- present: ᒧᐦᒣᐢ *seda*
- future: ᒧᐦᒣᒡ *sedi*

In these words, here's what the letters indicate:

- ᒧ *s* : this is a relational word;
- ᐦ *e* : this is the default FRAME (§4.11 below) indicating that "now" is the speaker's present;
- ᒣ *d* : this is a STATIC temporal word;
- ᒡ *i* : indicates POSITIVE direction from the present, defined as future.
- if neither *i* nor *w* is included in the final vowel, the present (now) is indicated;
- ᐟ *w* : in SPATIAL and TEMPORAL relationals, an *w* in the final vowel indicates NEGATIVE direction; in TEMPORAL words, that is defined as the past;
- ᐢ *a* in the final vowel : the present is indicated by leaving out any indicator of direction (*w* for past and *i* for future) while *a* refers to the present in general.
- if both *w* and *i* are included, a time period encompassing past, present, and future is meant.

14.8.3.1. Dynamic time vocabulary:

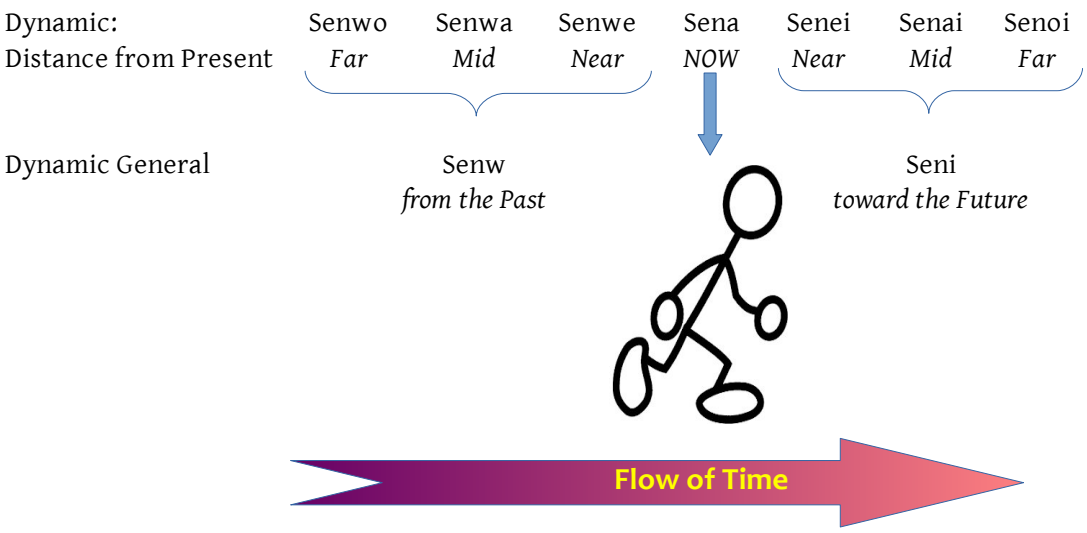
Normally, people don’t have control over movement through time; we move through time together at a speed of 24 hours per day. Whether time travel is actually possible or not, it is a subject of speculation and fiction for which NN provides vocabulary fairly consistent with movement in other DIMENSIONS.

The most common use of DYNAMIC time vocabulary is expected to be “looking” toward different periods in time. Looking at the recent past or the distant future is a reasonable application of DYNAMIC time vocabulary.

14.8.4. Temporal Distance

As in SPATIAL relation words, NN allows (but does not require) the speaker to indicate three DEGREES of distance in each direction: NEAR, MID, and FAR. The central vowels *e-a-o* indicate relative (not measured) distance from the speaker’s time:

- *e* : near the speaker's "now";
- *a* : a moderate distance from the speaker's "now", often within the context of the narration;
- *o* : distant from the speaker's "now";
- if none of these vowels is used, the distance is indeterminate.



Dp 14.48a: Simple Time

In past and future usage, DISTANCE refers to the speaker's perception of how far an event or situation is from the present, the time at which he or she is speaking. Context and usage will determine how they are employed. Because they are options, speakers may elect to use simple time relations whenever they prefer.

14.8.4.1. Time Distance in the Present

A reasonable question: how can the present be distant? "The present" is sometimes defined as "the point in time dividing the past from the future". While discussing the present, a speaker may refer to that point as near-present, *sede* – the instant "right now". In everyday speech, however, the "present" is used more broadly. NN allows clarification by using the MID-present form, *seda* – the general context of the narration; or the FAR-present, *sedo* – beyond the narrative, a larger general present. In addition, a timeless process or situation may be expressed using *w_i* – past+future, in NEAR – *wei*, MID – *wai*, FAR – *woi*, or indeterminate

distance – *wi*. And finally, the zero-vowel *u* can be used to refer to time in general – *sedu*, or process through time in general – *senu.*

14.8.4.2. Time Distance examples

These sentences illustrate how DISTANCE can be used in various temporal contexts. The speaker may choose either to use a time-indicator in the verb, or a verb without time indicator plus a RELATIONAL for more precision (see §4.9). The final vowel means the same in both the verb and the RELATIONAL word.

14.8.4.2.1 Time Distance Example 1

The Gospel of John opens with this sweeping vision of the beginning of all things, and continues to describe the mission of John the Baptist and his encounter with Jesus (all in Chapter 1).

- Far: "In the beginning was the Word, and the Word was with God, and the Word was God."
  was : far past *sedwo* (RELATIONAL) or *xofwo* (Verb) if the narrator's focus is on the origin of all things; *sedwoi* or *xofwoi* if the focus is on the eternal nature of God and the Word. (The verb's first vowel *o* is the EVIDENTIAL aspect indicating the writer's certainty of what he is telling.)
- Mid: "There was a man sent from God, whose name was John."
  was (1) : (STATIC) *sedwa* or *xokwa*
  sent : (DYNAMIC) *senwa* or *xobwa*
  was (2) : (past+future) *sedwai* or *xohwai* – because his name continued being John throughout the narrative; however, another optional NN usage would be to omit a time-reference altogether and use the verb in the STATIVE IMPERFECT without temporal indication, *xohu*.
- Near: "The next day, he saw Jesus coming toward him..."
  saw, coming : *senwe* or *xojwe* – near-past because the seeing and coming occurred immediately before the events related in the subsequent narrative (even though the narrative itself was written in the distant past, from the contemporary readers' view).

14.8.4.2.2 Time Distance Example 2

- Cosmologists have evidence to believe that the universe was created in a "big bang", has expanded, and will continue expanding indefinitely.
  Have evidence : *seda* or *xora* – present mid-distance stative – this belief has been current for several decades, but not throughout the history of science. The Verb's first vowel *o* indicates the certain existence of evidence.
  believe : *sena* or *xara* – mid-present. The Verb's first vowel *a* indicates REASONABLE BELIEF as opposed to

CERTAINTY (*o*) or UNCERTAINTY (*e*).

was created : *senwo* or *xajwo* – far-past DYNAMIC

has expanded: *senwoi* or *xamwoi* – far-past+future DYNAMIC

will continue: *senoi* or *xamoi* – far-future DYNAMIC

14.8.5. Aspect in Time Words

Because time is considered to be uni-directional in NN, the role of ASPECT is somewhat different from ASPECT of space RELATIONALS, and is discussed in this section.

14.8.5.1. ASPECT in DYNAMIC Temporal RELATIONALS = Beginning or Ending

In SPACIAL RELATIONALS, ASPECT is associated with direction: movement toward or away from a reference point. Although "movement" in time is limited to one direction (past → future), we often need to communicate when something **starts** and/or when it **ends**. This is represented in the ASPECT of temporal RELATIONALS (𝔇ρ14.2d).

𝔇ρ14.48b: Aspect with DYNAMIC STATE in temporal RELATIONALS

Frame 1	Frame 2	Frame 3	
sein-	*sain-*	*soin-*	event ENDING at the time or period indicated by the final vowel
swen-	*swan-*	*swon-*	event BEGINNING at the indicated time or period
swein-	*swain-*	*swoin-*	event CONTAINED within (beginning and ending in) the indicated time or period
sen-	*san-*	*son-*	event OCURRING in the indicated time period, without regard to specific beginning or ending

What DYNAMIC temporal RELATIONALS, ASPECTS mean:

- ENDING: something existed or happened (or will) **until** the time period indicated by the final vowel of the time word.
- BEGINNING: something existed or happened (or will) **since** (or **starting in**) the time period indicated.
- CONTAINED: something existed or happened (or will) **only during** the time period indicated.
- OCURRING: **during** the time period indicated, something existed or happened (or will), but may also happen during other time periods.

Examples:

- *sene* – time dimension – 'immediate present' (underlined words are English equivalents of the NN example word)
  - *seine* 'I <u>just</u> finished my homework'; 'The plane <u>just</u> landed'
  - *swene* 'The race <u>just</u> started (and continues)'; 'The train <u>just</u> left (and keeps going)'
  - *sweine* 'I'm taking that pill <u>now</u>'; 'Put it down <u>right now</u>!'
  - *sene* 'I'm eating supper <u>now</u>; You're doing great <u>now</u>'

14.8.5.2. *Aspect in Static Temporal Relationals = Continuity*

Aspect in static temporal relationals is conceptually similar to continuity in verbs (§6.5.3). However, the concepts are represented differently: in verbs, continuity is represented in the second consonant, while the first vowel carries this information in temporal relationals.

Dp14.48c: Aspect with STATIC STATE in temporal RELATIONALS

Frame 1	Frame 2	Frame 3	
-seid-	*-said-*	*-soid-*	punctual in the time period indicated by the final vowel
-swed-	*-swad-*	*-swod-*	progressive in the time period
-sweid-	*-swaid-*	*-swoid-*	durative-repetitive in the time period
-sed-	*-sad-*	*-sod-*	in the time period without regard to continuity

What static time aspect means:

- Punctual: a single action or brief state
- Progressive: a process or continuing state
- Durative-Repetitive: long-lasting state or repetitive action

Examples – note that these example can be expressed in NN either using verb tenses or time relationals (§14.9). Expressions in English like "some time ago" and "back then" can be expressed with the single NN words illustrated here.

- *sedwo* – time dimension, static state – the 'distant past'; *sedwa* – 'mid-past'
  (underlined words are English equivalents of the NN example word)
  - *seidwo* 'The wall collapsed <u>some time ago</u>'; 'The Romans defeated the Carthaginians <u>long ago</u>'
  - *swedwo* 'The wall was slowly crumbling <u>back then</u>'; 'The Romans conquered most of Europe <u>a long time ago</u>'
  - *sweidwa* 'The light was flashing red <u>then</u>'; 'The *Queen Mary* plied between Southampton and New York <u>back in those days</u>'

- *sedw* 'That was then, this is now (*seda*)'; 'Those were the good old days'

14.9. Using Time Relationals with the Verb

The verb in NN is a FAMILY (*X*---) of 4,096 words expressing many shades of meaning, similar in concept to a very rich verb "to be" + "to do". It is discussed in detail in its own chapter (6). The verb includes tense (time) indicators, so there is overlap with temporal RELATIONALS.

The verb expresses the following time-related concepts that are also expressed in RELATIONALS:

- Past, present, future, timeless, and unspecified time
- NEAR, MID, FAR, and unspecified distance in time
- STATIC (FIELD) and DYNAMIC (WAVE)

Additionally, the verb expresses many concepts that are not included in the TEMPORAL RELATIONALS. The verb can be used to express many time-related concepts without falling back on the RELATIONALS. The same vowel combinations in the last syllable are used to express time in both verbs and RELATIONALS, so learning their use and interpretation is relatively easy. On the other hand, time relationals express concepts that are no expressed in verbs: FRAMES (§14.11.1), and more precise beginning and ending times (§14.8.4.1).

A complete discussion of the use of TEMPORAL RELATIONALS with the verb is included at the end of the chapter on the verb (§6.6).

Time measurements, days, dates, seasons, clock and calendar are expressed in FAMILY *T*---, along with other numbers and measurements (§12.5).

14.10. Refering to Spaces

GENUS ⋏⋃-- *Si*-- referes to spaces – physical locations, times periods, and places. This GENUS stands in contrast to other space-time words which are relational in nature. That is to say, other space-time words represent the relationship in space or time between one thing (a focal entity) and something else. GENUS ⋏⋃-- *Si*-- provides words for various types of spaces and time-periods themselves.

14.10.1. Spaces and Times

The first distinction within the GENUS is between the two SPECIES that represent time, and the rest, which represent space. GENI ⋏⋃⌐- *Sin*- and ⋏⋃⌙- *Sid*- provide words for time periods, while all the others provide words for spaces.

14.10.2. Bounded and Unbounded

The first eight GENI (𐑕𐑦- *Sih-* through 𐑕𐑟- *Sim-*) have words for spaces that are considered UNBOUNDED, while the rest (𐑕𐑒- *Sik-* through 𐑕𐑚- *Sib-*) are for BOUNDED spaces.

BOUNDED vs. UNBOUNDED: Space is considered "enclosed" or BOUNDED if it is physically enclosed with walls or partations; and also if it is defined by law or custom as having boundaries, whether physical or not.

Time is BOUNDED when referring to predefined measures like hours and minutes, as well as class-periods, terms-of-office, or other scheduled stretches of time.

14.10.3. Dimensions

This GENUS actually uses the same DIMENSIONAL naming pattern as the other space-time words. See 𐑛𐑹 14.1b for the detailed listing. The exceptions are the 𐑕𐑦- *Sih-*, 𐑕𐑒- *Sik-*, 𐑕𐑮- *Sir-*, and 𐑕𐑑- *Sig-* SPECIES, which refer to space in general (rather than to the ENCLOSURE DIMENSION). 𐑕𐑦- *Sih-* and 𐑕𐑒- *Sik-* refer to space without distinction between two-dimensional 'area' and three-dimensional 'volume'. But since GENI 𐑕𐑮- *Sir-* and 𐑕𐑑- *Sig-* are used to refer specifically to 3-D spaces or 'volumes', the use of 𐑕𐑦- *Sih-* and 𐑕𐑒- *Sik-* tends to imply 2-D 'area'. The other GENI are defined to represent single CARTESIAN and SPHERICAL DIMENSIONS, such as spaces oriented in PROGRESSIONAL (Fore-Aft) or AXIAL (North-South) DIMENSIONS.

Note that this GENUS does not implement the FRAMES concept (§14.11 below), which does not seem relevant to specific locations and times.

14.10.4. Size and Contents of Spaces and Times

The final vowel of words in each SPECIES denotes the relative size of the space or time, and whether it is FILLED, EMPTY, or PARTIALLY FILLED. The distinction between FILLED and EMPTY is purely pragmatic, according to the context. The filling could be gas (as opposed to vacuum), furniture, people, liquid, solid matter, or whatever the situation implies.

Also, FILLED need not be 100% full – just full enough for practical purposes; similarly with EMPTY. This distinction is made the 𐑩 - 𐑿-𐑩 - 𐑿 *i – w-i – w* sounds; when none of these sounds is present in the final vowel, the 'unspecified' option is represented, the option to say nothing about whether the space is filled or not.

Three size options are available, as elswhere in NN vocabulary: small, medium, and large; with the 'unspecified' option also available, and the context determining which size choice is most appropriate. These distinctions are made with the 𐑸 - 𐑪 - 𐑷 *e – a – o* sounds of the last vowel, 𐑵 *u* being the 'unspecified' choice.

14.10.5. Space Species

𝔇ρ14.48d lays out the GENUS 𐑕𐑩-- *Si*-- in its DIMENSIONAL organization structure.

𝔇ρ14.48d: Genus Si-- Si-- Dimensional Organization

𐑕𐑩--	Indefinite, unbounded (Continuant)				Bounded, enclosed (Obstruant)			
Si--	Cartesian (Voiceless)		Planetary, Time (Voiced)		Cartesian (Voiceless)		Planetary, Time (Voiced)	
Core value								
velar	h	Space, Area	r	Three-dimensional Space	k	Enclosed Space or Area	g	Enclosed three-dimensaional Space
palatal	x	Vertical Space	y	Spheroid Axial Space	c	Enclosed Vertical Space	j	Enclosed Planetary Axial Space
apical	s	Fore-Aft Space	n	Periods of Time	t	Enclosed Fore-Aft Space	d	Bounded Periods of Time
labial	f	Side-to-Side Space	m	Spheroid Rotational Space	p	Enclosed Side-to-Side Space	b	Enclosed Spheroid Rotational Space

14.10.6. Example Space Lexicon

Of the sixteen SPECIES of GENUS 𐑕𐑩-- *Si*--, four may serve as examples here: 𐑕𐑩𐑦- *Sih* - 'open space' (Ɒρ14.48e), 𐑕𐑩𐑜- *Sik* - 'bounded space' (Ɒρ14.48f), 𐑕𐑩𐑛- *Sin* - 'open time period' (Ɒρ14.48g), and 𐑕𐑩𐑛- *Sid*- 'bounded time period' (Ɒρ14.48h).

14.10.6.1. Species 𐑕𐑩𐑦- *Sih*- 'open space'

Ɒρ14.48e: Species 𐑕𐑩𐑦- Sih- Dimensional Lexicon

𐑕𐑩𐑦-		General		Positive		Negative, diminished		Complex	
Sih-		'open space'		***i***		***w***		***w-i***	
Core value		Space		Filled		Empty		Partially Filled	
	u	*sihu*	Space, Area	*sihi*	Filled space, Filled Area	*sihw*	Empty Space, Empty Area	*sihwi*	Partially Filled Space, Area
small	***e***	*sihe*	Space, small	*sihei*	Filled, small	*sihwe*	Empty, small	*sihwei*	Partially Filled, small
medium	***a***	*siha*	Space, medium	*sihai*	Filled, medium	*sihwa*	Empty, medium	*sihwai*	Partially Filled, medium
large	***o***	*siho*	Space, large	*sihoi*	Filled, large	*sihwo*	Empty, large	*sihwoi*	Partially Filled, large

14.10.6.2. Species 𐑕𐑦𐑒- Sik- 'enclosed space'

Dp14.48f: Species 𐑕𐑦𐑒- Sik- Dimensional Lexicon

𐑕𐑦𐑒-		General		Positive		Negative, diminished		Complex	
Sik-	'enclosed space'		***i***		***w***		***w-i***	
Core value	Bounded space		Filled		Empty		Partially Filled	
	u *siku*	Enclosed Space or Area	*siki*	Filled Enclosed Space or Area	*sikw*	Empty Enclosed Space or Area	*sikwi*	Partially Filled Enclosed Space or Area
small	***e*** *sike*	small Enclosed Space	*sikei*	Filled small Enclosed Space	*sikwe*	Empty small Enclosed Space	*sikwei*	Partially Filled small Enclosed Space
medium	***a*** *sika*	medium Enclosed Space	*sikai*	Filled medium Enclosed Space	*sikwa*	Empty medium Enclosed Space	*sikwai*	Partially Filled med-ium Enclosed Space
large	***o*** *siko*	large Enclosed Space	*sikoi*	Filled large Enclosed Space	*sikwo*	Empty large Enclosed Space	*sikwoi*	Partially Filled large Enclosed Space

14.10.7. Example Time Lexicon

14.10.7.1. Species 𐑕𐑦𐑯- Sin- Open Time Periods

𐑕𐑦𐑯- *Sin-* words refer to periods of time that are not formally defined. For example, "I'll be busy for just a few moments" is 𐑕𐑦𐑯𐑲 *sinei* ("filled" with busyness).

Dp14.48g: Species 𐑕𐑦𐑯- Sih- Dimensional Lexicon

𐑕𐑦𐑯- *Sin-*	General			Positive		Negative, diminished		Complex	
	'open time period'			***i***		***w***		***w-i***	
Core value	Periods of Time			Filled		Empty		Partially Filled	
	u	*sinu*	Periods of Time	*sini*	Filled Periods of Time	*sinw*	Empty Periods of Time	*sinwi*	Partially Filled Periods of Time
small	***e***	*sine*	small Periods of Time	*sinei*	Filled small Periods of Time	*sinwe*	Empty small Periods of Time	*sinwei*	Partially Filled small Periods of Time
medium	***a***	*sina*	medium Periods of Time	*sinai*	Filled medium Periods of Time	*sinwa*	Empty medium Periods of Time	*sinwai*	Partially Filled medium Periods of Time
large	***o***	*sino*	large Periods of Time	*sinoi*	Filled large Periods of Time	*sinwo*	Empty large Periods of Time	*sinwoi*	Partially Filled large Periods of Time

14.10.7.2. *Species ᓭᑦ- Sid- Bounded Time Periods*

There are many examples of periods of time bounded by definition: seconds, minutes, hours, days, weeks, months, years, and so forth.

In addition, periods of time are bounded for convenience and scheduling into class periods, quarters, fiscal years, and many other useful periods.

Dp14.48h: Species ᓭᑦ- Sid- Dimensional Lexicon

ᓭᑦ-		General		Positive		Negative, diminished		Complex	
Sid-	'bounded time period'			***i***		***w***		***w-i***	
Core value				Filled		Empty		Partially Filled	
	u *sidu*	Bounded Periods of Time	*sidi*	Filled Bounded Periods of Time	*sidw*	Empty Bounded Periods of Time	*sidwi*	Partially Filled Bounded Periods of Time
small	***e*** *side*	small Bounded Periods of Time	*sidei*	Filled small Bounded Periods of Time	*sidwe*	Empty small Bounded Periods of Time	*sidwei*	Partially Filled small Bounded Periods of Time
medium	***a*** *sida*	medium Bounded Periods of Time	*sidai*	Filled medium Bounded Periods of Time	*sidwa*	Empty medium Bounded Periods of Time	*sidwai*	Partially Filled medium Bounded Periods of Time
large	***o*** *sido*	large Bounded Periods of Time	*sidoi*	Filled large Bounded Periods of Time	*sidwo*	Empty large Bounded Periods of Time	*sidwoi*	Partially Filled large Bounded Periods of Time

14.10.8. Other Spaces: notes and clarifications

- ᓯᒪ- *Six-* **Vertical space:** Vertical space is oriented up-and-down in the mind of the speaker. For example, if a room has a a low ceiling, it is ᓯᒪᓕ *sixe* . If the low-ceiling room is a packed storage space, it is ᓯᒪᓕᐞ *sixei* , if it has a few boxes scattered around, it is ᓯᒪᓕᐤ *sixwei*, and if it is functionally empty is is ᓯᒪᓕᐤ *sixwe*.

- 𐑕𐑦𐑕- *Sis-* **Fore-and-Aft space**: Fore-Aft is front-back space. For example, on a road or railway: 𐑕𐑦𐑕𐑵 *sisu* is the space before and behind a vehicle. If there is enough empty space for safe movement, it is 𐑕𐑦𐑕𐑦 *sisi* and a 'procede' signal would be appropriate if it is a railroad. If the vehicle is dangerously close to an obstacle it is 𐑕𐑦𐑕𐑩 *sisw* and a 'halt' signal would appear. If the vehicle is safe slow movement is required the space is 𐑕𐑦𐑕𐑢 *siswi* and an 'caution' signal would indicate this. Safe distance depends on speed, so if a vehicle is moving fast, even a large distance may be unsafe: 𐑕𐑦𐑕𐑝 *siswo*. Vehicles are the most obvious application for this species, but there are many others as well.

- 𐑕𐑦𐑓- *Sif-* **Side-to-Side space**: Side-to-side space is room beside something. For example, the space on the side of a road or railway is 𐑕𐑦𐑓𐑵 *sifu*; the setback required by zoning ordinance between a building and its property line, etc.

- 𐑕𐑦𐑮- *Sir-* **Three-dimensional space:** Spherical space does not need to be a perfect circle; especially if it is UNBOUNDED, as in this GENUS. 𐑕𐑦𐑮𐑵 *siru* is personal space, or the vicinity of an attraction or activity. For example, if houses are built close enough to an airport that noise is a problem, residents might say the airport's space is 𐑕𐑦𐑮𐑤 *sirwe*. People who enjoy hiking in large nature-parks may say they enjoy the feeling of 𐑕𐑦𐑮𐑭 *siroi*.

- 𐑕𐑦𐑪- *Siy-* **Planetary axial space**: oriented along the axis of a spheroid body. On an actual planet, it corresponds to north-south orientation. Spaces that are identified in a north-south direction, like "the tropics" or the "temperate zone"are example of 𐑕𐑦𐑪𐑵 *siyu*. As with the other 'unbounded' terms in this genus, the space refered to need not be regular; the term is chosen by the speaker based on perceived general applicability.

- 𐑕𐑦𐑡- *Sim-* **Spherical Rotational space**: On a rotating spheroid, "rotational space" is oriented in the direction of rotation – on an actual planet, this is the east-west direction. Some arbitrary definition of a "prime meridian" for each type of body needs to be made if this concept is to be used. This species is unbounded, so the space is based on orientation rather than specific boundaries.

- 𐑕𐑦𐑒- *Sik-* **Enclosed space:** Each type of space represented in the first eight species has a corresponding BOUNDED space. The 𐑕𐑦𐑒- *Sik-* SPECIES is the first and most general of these, referring to any BOUNDED space regardless of orientation. In all eight BOUNDED types of space, the enclosure can be physical (a wall, fence, or space inside a building) or conceptual. A conceptually enclosed space is anything like a political jurisdiction, a piece of property, or a region delimited by natural features, like rivers or mountains.

- 𐑕𐑩𐑒- *Sic-* **Enclosed Verital space** examples – Physically enclosed: an elevator shaft; a vertical mine-shaft. Conceptually enclosed: air-rights over a property.
- 𐑕𐑩𐑑- *Sit-* **Enclosed Fore-and-Aft space**. Examples – Physically enclosed: hallway, tunnel, horizontal mine shaft or "drift". Conceptually enclosed: right-of-way of a road or railway.
- 𐑕𐑩𐑦- *Sip-* **Enclosed Side-to-Side space**. Space considered from the perspective of width. Examples – Physical: width of a corridor or tunnel. Conceptual: width of territorial waters along a coastline.
- 𐑕𐑩𐑜- *Sig-* **Enclosed Three-Dimensioinal space**. Often irregular or even rectangular; the 𐑕𐑩𐑜- *Sig-* SPECIES can be used like 𐑕𐑩𐑒- *Sik-* to refer to many BOUNDED spaces, but carries an emphasis on the space as a specific 3-D shape, where 𐑕𐑩𐑒- *Sik-* terms refer to and area or space without regard to its shape. For example – Physical enclosures: a football or other playing field generally has clearly marked bounds, located on a piece of property that may or may not have physical boundaries. 𐑕𐑩𐑜𐑿 *sigu* would be more appropriate to refer to the playing field itself, while 𐑕𐑦𐑒𐑿 *siku* would could be applied either to the property on which the field is located, or the field itself. Conceptual enclosures: property may have unmarked lines, and there are even open (disputed or not surveyed) stretches of national boundaries, but the boundaries are real in law, making these properties and nations 𐑕𐑦𐑜𐑿 *sigu*, 'enclosed space'
- 𐑕𐑩𐑡- *Sij-* **Enclosed Planetary Axial space**: on a planet like ours whose rotation is tilted with respect to its axis, the "tropics" of Cancer and Capricorn define north-south areas astronomically.
- 𐑕𐑩𐑚- *Sib-* **Enclosed Planetary Rotational space**: Time zones could be referred to as 𐑕𐑦𐑚𐑿 *sibu* since they are defined by their east and west edges (albeit irregularly).

14.11. FRAMES

Nwehu Nuswei acknowledges that the space-time continuum is perceived and discussed from a variety of perspectives, often in the same discourse. To provide clarity, three sets of reference FRAMES are allocated by assigning different vowels in the first syllable of RELATIONALS which are otherwise the same. Although there is an obvious similarity between NN FRAMES and the concept of **frames of reference** in physics and atronomy, there is no direct correlation between these two types of "frames". NN is not concerned with precise or mathematical measurement of time and distance by means of "frames". Rather, NN FRAMES are provided as an informal convenience for clarifying the speaker's perspective on spacial and temporal relationships. The examples given below will illustrate their intended use.

FRAME 1, denoted by 𐑓 *e* in the first vowel, is oriented to a "close" position, most often the speaker. This is the default FRAME. If speakers wish to clarify the referece, FRAME 2, denoted by 𐑮 *a* can be introduced as a

"MID" orientation, and FRAME 3 with 𐤏 *o* for the most general or broadest. (However, leaving the center vowel out of the first syllable does not result in a "frameless" equivalent, because those words represent other concepts. In DISCOURSE where time and distance relationships do not distinguish between perspectives, NN uses FRAME 1.)

Here are some examples of possible uses for FRAMES of reference in spatial relationships. (Time relations are discussed in the following section.)

Actual usage: FRAMES are not pre-defined in the language for any specific situation. In actual usage, context and custom would determine which FRAME to use.

For a Mechanic,
FRAME 1 could relate to him or her;
FRAME 2 could relate to the vehicle on which he or she is working;
FRAME 3 could relate to the garage building

On a river boat,
FRAME 1 could relate to the speaker
FRAME 2 could relate to the vessel (cf. 'port' and 'starboard')
FRAME 3 could relate to the river

In a space ship,
FRAME 1 could related to the speaker
FRAME 2 could relate to the ship
FRAME 3 could relate to the nearest gravity field

MODES and FRAMES

MODES and FRAMES are differentiated by the vowel of the first syllable. The center vowel, *e a* or *o*, identifies the three FRAMES, while the *i-* and *w-* distinguish the four MODES. Note that *Su*, *Si*, *Sw*, and *Swi* are not part of this group; they are relational words of discourse, discussed in their own chapter.

	Mode			
Frame	*General*	*Complete*	*Incomplete*	*Continual*
Frame 1:	Se–	Sei–	Swe–	Swei–
Frame 2:	Sa–	Sai–	Swa–	Swai–
Frame 3:	So–	Soi–	Swo–	Swoi–

𐤃𐤏 14.50: Modes and Frames

14.11.1. Time FRAMES

Time FRAMES allow a speaker to clarify relative time relations. In simple time references, the "now" is usually assumed to be the time at which the speaker is speaking or the writer is writing. In other words, past and future are presumed to be relative to the speech or writing itself.

This is not universally true, however. In some languages and traditions, story-telling uses the present tense, so that "now" follows the protagonist of the story or the thread of the narrative. This is often the case in French narrative style, for example. For those not accustomed to the style, it can cause confusion or a sense of mild disorientation.

Nwehu Nuswei FRAMES are used to distinguish the use of past, present, and future in different contexts. Three FRAMES are available. The first, or default FRAME, is always used relative to the speaker's "now". The other two can be used flexibly according to the context of the discourse.

14.11.1.1. Time-Frame Words

The "central" vowel – *e, a,* or o – of the first syllable of a temporal word indicates the FRAME. 𝔇ρ 14.51 charts this out:

𝔇ρ 14.51: Time-Frame words in simple past, present, and future

FRAME	Simple Past	Simple Present	Simple Future
1	𐑧𐑛𐑡𐑣 *Sedw*	𐑧𐑛𐑡𐑛 *Sede*	𐑧𐑛𐑡𐑤 *Sedi*
2	𐑧𐑟𐑡𐑣 *Sadw*	𐑧𐑟𐑡𐑛 *Sade*	𐑧𐑟𐑡𐑤 *Sadi*
3	𐑧𐑞𐑡𐑣 *Sodw*	𐑧𐑞𐑡𐑛 *Sode*	𐑧𐑞𐑡𐑣 *Sodw*

In each FRAME, distance indication can be added as desired in the same way – by adding a "central" vowel to the final syllable: 𐑛 *e* for near, 𐑟 *a* for mid, and 𐑞 *o* for far.

14.11.1.2. Time-FRAME Uses

As mentioned above, "narrative present" is a fairly common instance where a FRAME can clarify relative time.

14.11.1.2.1 Frame Example 1: Narrative style

1. FRAME 1 is the speaker's "now". 'I will tell you a story.'
   will tell: 𐑧𐑛𐑡𐑤 *seni*
2. FRAME 2 is relative to "now" in the thread of the narrative. 'Sir Lancelot rides forth to rescue the maiden.'
   rides forth: 𐑧𐑟𐑡𐑛 *sane*
3. FRAME 3 is relative to another narrative thread – a story within a story, for example. 'My Lord Lancelot, I will tell you the tragic story of the maiden. It is a dark night as I stand watch on the castle wall. I see a glow as of fire in the distance. The Black Dragon comes, breathing smoke and

flame! ...'
will tell: 𐑕𐑨𐑯𐑦 *sani*
is a dark night : 𐑕𐑴𐑛𐑧 *sode*
see a glow: 𐑕𐑴𐑯𐑧 *sone*
comes, breathing smoke: 𐑕𐑴𐑯𐑧 *sone*

(These examples also illustrate the use of STATIC and DYNAMIC aspects of time, discussed below.)

14.11.1.2.2 Frame Example 2: Literary history

In relating the history of a literary work's development, FRAMES can be used to distinguish between time in the author's life and time in the narrative he or she is developing. The development of J. R. R. Tolkien's Middle-earth took place over some sixty years, during which, as Christopher Tolkien writes in *The History of Middle-earth* series, the characters and story lines change frequently as they are developed. The anonymous authors of the Tolkiengateway wiki (http://tolkiengateway.net/wiki/The_Silmarillion) explain: "Due to Christopher's extensive explanations (in *The History of Middle-earth*) of how he compiled the published work, much of *The Silmarillion* has been debated by the hardcore fans. Christopher's task is generally accepted as very difficult given the state of his father's texts at the time of his death: some critical texts were no longer in the Tolkien family's possession, and Christopher's task compelled him to rush through much of the material. Christopher reveals in later volumes of *The History of Middle-earth* many divergent ideas which do not agree with the published version."

As he discusses the complex interrelations between versions of his father's story, the use of FRAMES would have been helpful to clarify the difference between:

1. Christopher's changing understanding of the development process;
2. The actual process by which the senior Tolkien developed the world of Middle-earth in 20th century chronology;
3. Events related in various versions of Tolkien's history of Middle Earth.

14.11.1.2.3 Frame Example 3: Time-travel

A popular theme in science fiction and fantasy is travel to different periods of time. In fact, travel through time has been a feature of literature as early as the ancient *Mahabharata* of India. In NN, FRAME 1 can be used for the time-period in which the narrative begins or is primarily based. Activities within other time-periods visited by the characters can be told using FRAMES 2 and 3, as seems best to the author.

In one contemporary example, Ann and Todd McCaffrey's tales of the Dragonriders of Pern – a total of more than twenty-three novels – deals throughout with time-travel in complex and interesting ways. The first story published, *Dragon Flight* (1968, Ann McCaffrey), tells of Lessa's return through time to call dragon riders from the past to fight a deadly menace. This relatively simple time-excursion requires only two FRAMES for clarification.

By 2008, when Todd McCaffrey's *Dragonheart* was published, the time -travel narrative had become much more complex, with dragons and their riders hopping backward and forward in ways that bewildered the characters of the story and its readers equally, and put the characters in peril because, in this literary universe, people who encounter themselves in the same time-period are drained of their life-force energy. Here, full use of NN FRAMES would have helped all involved understand what was transpiring and – perhaps – avoid the perils of self-encounter.

14.11.1.2.4 Frame Example 4: Special Relativity

The Theory of Special Relativity shows that the measurement time differs according to the speed at which the observer is moving. For observers traveling at speeds which are close to the speed of light, measured time passes at a significantly different rate than those moving at smaller fractions of the speed of light. Such observers are said to be in different time frames. NN's three time FRAMES can be used to clarify discussion of this phenomenon, assigning a different FRAME to explaining how time flows for each observer.

Suppose a starship carrying people at nearly light-speed travels to a destination ten light-years away, then returns to its point of origin. Special Relativity says this trip would seem to the travelers to have taken only a few hours, depending on how close to light-speed the ship traveled. A narrative from their perspective could use FRAME 1 to describe their past, present, and future. Meanwhile, ten or more years have passed from the perspective of any people they encounter at their first destination. From their perspective, past, present, and future can be described in NN using FRAME 2. Meanwhile, the travelers' families at their point of origin have experienced twenty or more years, and their story could be told using FRAME 3.

14.12. Syntax of Spatial Relations

There are no special rules for putting spacial and temporal references into sentences. Often, times and places are treated as physical PARTICLES (entities), and behave like nouns.

In some contexts, dynamic space and time words can be used as WAVES (verbs), when doing so is made clear by context.

In other cases, times and locations are treated as FIELDS (descriptions) of objects or spaces, so would be put either:

- after the PARTICLE (noun) being described, like normal adjectives , as in
  "upper floor"
  ᒥᓂᓗᐢ ᓗᐦᒪᒃᑲ
  rosu~ secai
  (lit. *floor upper)*

- if the entire message is simply attributing a location or time to something, a STATIC verb may optionally be placed between the object and its location:
  "It is below"
  ᐃᓱᓚᑌ ᒪᓂᐢᐢ ᓗᐦᒪᖏᓂ
  hisi xohu secwo

If two or more words are used to describe a location, it is recommended (not required) to state them in the following order: LATERAL, VERTICAL, PROGRESSIONAL; or AXIAL, ROTATIONAL,RADIAL. For example, 'left upper front' rather than 'front left upper', etc. This matches with the order in which COORDINATE WORDS organize multidimentsional space.

14.13. Bit map

Dp 14.52 is a summary of correspondence between the semantics and the bit-pattern of *S---*words.

Dp 14.52: Correspondence between semantics and bit-patterns of S--- words in Nwehu Nuswei (next page)

				V1				C2				V2			
				8	4	2	1	8	4	2	1	8	4	2	1
V1: 8	Grammatical Relations: General			○											
	Completeness [1]	Incomplete[1]	w	●											
V1: 4-2	Frame	Unspecified			○	○									
		1 .Close	e		○	●									
		2. Mid-distance	a		●	○									
		3. Far	o		●	●									
V1: 1		Unspecified					○								
	Completeness [2]	Complete [1]	i				●								

V1: 8 & 1		Continual [1]	w-i	● ●
C2: 8	Space-time only (non-grammatical)[2]	spatial	**voiceless**	○
		Planetary/Time	voiced	●
C2: 4	Energy	Dynamic	continuant	○ ○
		Static	stop	●
C2: 2-1	Dimension[3]	Centering/Radial	velar	○ ○
		Vertical/North-South	palatal	○ ●
		Progressional/Future-Past	apical	● ○
		Rotational/East/West	labial	● ●
V2: 8	Negative direction	Unspecified [2]		○
		out, south, down, left, back [2]	w	●
V2: 4-2	Distance from	Any [2]		○ ○
	head or reference	Here [2]	e	○ ●
		There [2]	a	● ○
		Yon [2]	o	● ●
V2: 1	Positive direction	Unspecified [2]		○
		in, north, up, right, forward [2]	i	●

w_i Positive and Negative together = oscillating, back-and-forth

Note 1: Cells highlighted in yellow are used in more than one way:
w- with e, a, and o is "incomplete"
w-i is "continual"
w and wi are grammatical particles
u, and i by itself, are grammatical particles

Note 2: In grammatical genuses, C2 and V2 are assigned quasi-arbitrarily;
In space-time genuses, C2 and V2 are assigned fairly systematically as documented in this bitmap, but some flexibility is built in to avoid semantic overlap, especially between forms with a single final vowel (indicating non-directionality) and forms with w_i (indicating polydirectionality).

Note 3: For unspecified dimensionality use a combination of centering = velar and non-directionality = no w or i
Spaces and time periods can be described using the *Si*-- GENUS

This concludes the discussion of space and time in Nwehu Nuswei.