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Space, Time, World

Michael Fortescue

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Space, Time, World

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by Michael Fortescue

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Michael Fortescue

University of Copenhagen, emeritus

John Benjamins Publishing Company

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M. C. Escher: "The three Worlds"

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Table of contents

CHAPTER 1. Introduction	1
Part I	
CHAPTER 2. Words for Space and Time	6
2.1 Words for Space	10
2.2 Words for Time	14
CHAPTER 3. Words for World	21
3.1 Words for World in Indo-European Languages and Beyond	22
3.2 World or Earth?	27
3.3 World or Age?	31
CHAPTER 4. The relationship between Space, Time and World	35
CHAPTER 5. The traditional Inuit World	40
CHAPTER 6. Grammatical Space and Time	50
6.1 Deixis and locational expressions	51
6.2 Aspect and Tense	55
CHAPTER 7. Being in Space and Time	64
7.1 Words for Being	65
7.2 Words for Living	69
7.3 Words for Home and Room	71
CHAPTER 8. Orientation, local and wider scale	75
8.1 Orientation in and around the house	76
8.2 Orientation further afield	82
CHAPTER 9. Frames of reference revisited	91
Part II	
CHAPTER 10. Psychological approaches	102
10.1 A neurological perspective	103
10.2 The development of the child's spatiotemporal concepts	107
CHAPTER 11. The world we grew up in	111

CHAPTER 12. Simulation: Language-generated worlds	115
CHAPTER 13. Canonical fictional and non-fictional worlds	123
CHAPTER 14. Some non-canonical worlds	135
CHAPTER 15. Maps and cosmologies, ancient and modern	144
CHAPTER 16. Earth's Deep Time	161
CHAPTER 17. Measuring Space, Time, and the World	176
17.1 Units of Space	178
17.2 Units of Time	181
CHAPTER 18. Conclusions	186
Abbreviations	197
References	199
 Appendices	
APPENDIX 1. Words for Sky, Air, and Weather	210
APPENDIX 2. Words for being and becoming in non-IE languages	213
APPENDIX 3. A tentative taxonomy of worlds	216
Subject index	219
Name index	221
Language index	223

Introduction

This book addresses the question as to how words for SPACE, TIME and WORLD across the world's languages relate to both cultural conceptions of the world speakers live in and to universal categories of cognition. The etymological sources of such words will reveal a good deal, though much more is required. There is considerable variation across languages as to how these concepts are expressed (if at all), although clearly there is also a common experiential reality shared by all speakers. Whorf argued, as is well known, that concepts of TIME are not universal across languages and cultures. Specifically, whereas English objectifies temporal notions as nouns, Hopi encodes time as a matter of recurring events – it has no term corresponding to the abstract concept expressed by the English word 'time' (Whorf 1956). Although Whorf's full-blown relativism, whereby language determines thought, has not proved popular today, Gumperz and Levinson (1996) have advocated a mitigated version of linguistic relativism that goes beyond Whorf's comparative work. The authors point out that Whorf did not in fact deny the same underlying reality behind expressions of TIME for both English and Hopi speakers. An eminently sensible expression of the relationship is still that of Carroll, who characterized the effect of language on experience as that of a lattice rather than a mould, one that lets through larger or smaller chunks of experience but obscures others (Carroll 1958: 33).

As regards SPACE, Levinson (2003: 76–97) has distinguished in the spirit of neo-Whorfian relativism three universal spatial "frames of reference" (sFoRs): relative, intrinsic, and absolute. Typical instances of these in English are, respectively, 'to my right', 'behind it', and 'to the north'. They may be prioritized differently from language to language. Aboriginal languages of Australia, for example, prioritize absolute dead-reckoning, thus 'to the north of' vs. 'to the south of' in indicating an object's relative position where English would use relative 'to the left of' or 'to the right of'. Coming from two somewhat different directions (Psycholinguistics and Cognitive Linguistics), MacWhinney (2005) and Evans (2013) have both discussed analogous "temporal frames of reference" (tFoRs). Corresponding to relative, intrinsic, and absolute sFoRs, MacWhinney distinguishes egocentric, allocentric, and global frames respectively (2005: 204). Evans distinguishes deictic, sequential and extrinsic frames (2013: 51–142). The first of these is experiencer-based (past, present and future from the experiencer's point of view) whereas the other two are allocentric. While the second of these is event-based (the sequential

order of events) the third is periodicity-based (time as matrix, as in clock or calendar time, analogous to Levinson's absolute sFoR). He sees the latter as an intellectual achievement related to the ability to measure time, and thus not necessarily expressible in all cultures (p. 127).

In the present work I shall concentrate especially on words and concepts for *WORLD* and suggest that there is another, third kind of frame of reference, combining the first two, a "world frame of reference" (wFoR), which can be said to frame in different ways what Barsalou (1991) has called a "world model" in his theory of knowledge representation, a person's beliefs about the current state of the world. This consists in his view of hierarchically arranged spatial frames, ranging from the location of the individual in a room, in a house, in a city, or in a country, etc. It is integrated with temporal knowledge relating to spans of time in the individual's life and to cycles such as seasons, days and years which organize the past, present and future for that individual. It includes the interactions and movements of other people the individual knows (each within their own frame), and contains information about types as well as individuals, all continually updated as further experience accrues.

It is well established that temporal relations are often expressed metaphorically by spatial terms, the future, for example, being gesturally 'in front' or 'up', or even 'behind' or 'down', according to the language concerned. From the point of view of Cognitive Linguistics there are deep "conceptual metaphors" relating the two domains – I shall return to the question of what constitutes a "domain" in Chapter 12. However, as Evans argues, not all temporal concepts are metaphorically expressed. A significant part of the domain is inherently structured in language along purely temporal lines in terms of sequentiality, simultaneity and duration, etc. For him *TIME* is essentially a matter of transience (as argued by Tenbrink 2011, and Langacker 2012: 210), a feature not shared by *SPACE*. It is experienced in real phenomenological terms, perceived as subjective experience (Evans 2013: 65–68). *TIME* can certainly be directly perceived and experienced in the absence of motion events, which form the basis for *SPACE FOR TIME* metaphors, for example in the circadian rhythms essential for regulating bodily functions like sleeping and waking. It can be experienced as faster or slower depending on how much experience is being packed into it. Although all languages have ways to modulate sentences according to spatial and temporal dimensions (notably through deictic and aspectual expressions), it is by no means the case that they all have words corresponding to *SPACE* or *TIME* in general. Expressions corresponding to (the) *WORLD* are more widespread, although the semantic extent of such words varies greatly according to the culture in which they are embedded.

With to my knowledge only one exception, no study has been conducted across a wide array of languages of lexical items corresponding to 'time', 'space'

and ‘world’ in English. The exception – Buck (1988) – is limited to the etymological origins of such words in the Indo-European (IE) languages. These share a common philosophical tradition.¹ Apart from this, a recent database-assisted study (Georgakopoulos and Polis 2021) has investigated TIME-related words in Ancient Greek and Ancient Egyptian in great detail, presenting the results in the form of a semantic map. As regards words for WORLD, Georgakopoulos et al. (2016) have included these in their diachronic study of words for Earth, covering Classical Arabic, Akkadian, Egyptian, ancient Greek, Hebrew and Hittite besides English, German and French. What is still needed, it seems to me, is a broader comparison of such words extending beyond Europe and the ancient world, which is part of what I shall be attempting in the present book. Etymological explanations of origins are of course less available outside of the Indo-European languages. The strict separation of SPACE and TIME implicit in English and other modern European languages turns out to be less than universal. It will be seen that these terms are often partially entangled – not only in terms of metaphor. This is not surprising in itself, in so far as distance to a goal can be measured either in miles (or kilometres) or in the time it takes to get there, and we can talk about a ‘point’, a ‘distance’ or an ‘interval’ either in TIME or in SPACE. But there is more to it than this. The relationship of SPACE and TIME to varying concepts of WORLD is particularly diverse and culture-dependent. It goes without saying that the languages surveyed are but a fraction (hopefully a representative one) of the variety presented by the world’s six thousand or so languages.

The book is organized so as to progress from the lexically specific in Part I towards broader cognitive, cultural, and geological/biological perspectives in Part II. Part I begins with an investigation of words and idioms for the categories of SPACE and TIME in Chapter 2. Thereafter, in Chapter 3, words for WORLD will be examined across languages, culminating in a semantic map for the conceptual field covered. Words for ‘Earth’ and ‘Age’ will be compared. Consideration of the relationship between SPACE, TIME and WORLD in terms of the relationship between tFoRs, sFoRs and wFoRs will be the subject of Chapters 4 (to be followed up in Chapter 9). In Chapter 5 I shall examine as an example of a coherent spatiotemporal framework a particular world view, that of traditional Inuit society. This will be followed in Chapter 6 by a brief overview of the morphosyntactic linguistic categories of deixis, tense and aspect, reflecting further spatial and temporal dimensions. Words for being and living in the spatiotemporal world will then be addressed in Chapter 7. Orientation systems applicable to both the interior of the house and the surrounding landscape in different cultures is the subject of

1. See for instance Levinson (2003: 6ff.) on the concept of “absolute space” as opposed to “relative space” in the European philosophical/scientific tradition.

Chapter 8. In Chapter 9 the correlation of “absolute” spatial frames of reference with “absolute” temporal frames of reference in a number of languages is considered, and a four-way rather than three-way distinction between frames of reference in general proposed.

Part II begins in Chapter 10 with the possible neurological and developmental basis underlying the words and concepts central to this study. An example of the expanding world of a single child will be the subject of Chapter 11. Chapter 12 will look at how fictional worlds are built up in the mind through language, and the nature of abstraction will be discussed. Chapter 13 will present example analyses of how fictional worlds can be built up from viewing a stage production of Chekhov’s “The Cherry Orchard” and from reading a historical account of the Greek world. Chapter 14 will examine some “non-canonical” worlds, ones that do not fit standard definitions of ‘world’. Chapter 15 will discuss successive concepts of the world, sketching cosmological and scientific perspectives on SPACE, TIME and WORLD from ancient times up to the present. This will lead in Chapter 16 to a discussion of the successive Ages of the Earth as seen from a modern geological and biological perspective. Chapter 17 presents an overview of how SPACE, TIME and the WORLD have been measured in the past, and of the terms used for the units measuring them today.

In the final chapter, Chapter 18, which brings together the multiple strands of the book, general conclusions will be reached as to the role of linguistic expression in reflecting and modulating the basic spatiotemporal framework of the world we live in. Concepts of SPACE and TIME, it will be suggested, only gradually emerge from the undifferentiated experience of Being in the World as experienced by young children. The complete separation of the two concepts, it will be claimed, is a feat of abstraction only achieved in literate, scientifically developed societies. Different senses of words for WORLD – when not entirely figurative – will be seen to relate to different perspectives on what Being in the World is understood to encompass across languages and cultures.

Part I

The following chapters are concerned principally with the lexical typology of words for SPACE, TIME and WORLD across the world's languages, with particular focus on English as a semantic yardstick. General readers should pay attention to the kinds of etymologies and polysemies involved rather than the specific forms and languages concerned. Associated categories of Living and Being will also be examined, as will non-lexical means of expressing SPACE and TIME. Applications of some of these words to particular spatiotemporal (and cultural) settings will be presented. This will lead to a discussion of the relevance of this data for Frame of Reference theories. The notion of the “specious present”, to be further discussed in Part II, will be introduced *en route*.

Words for Space and Time

Words for SPACE and TIME, even in languages that reflect a modern scientific perspective, typically have a range of meanings beyond the abstract concepts of absolute TIME and absolute SPACE. Here for instance are the contemporary definitions of 'space' in the Collins Dictionary of the English Language (slightly abbreviated):

(1) the unlimited three-dimensional expanse in which all material objects are located; (2) an interval of distance or time between two points, objects or events; (3) a blank portion or area; (4) an unoccupied area or room; (5) the region beyond the earth's atmosphere containing the other planets of the solar system, stars, galaxies; the universe; (6) the region beyond the earth's atmosphere occurring between the celestial bodies of the universe; (7) a seat or place, as on a train or aircraft. (Also, as a verb, 'to arrange or place at intervals or with spaces between'.)

The principal definitions given by Collins for 'time' are:

(1) the continual passage of existence in which events pass from a state of potentiality in the future through the present, to a state of finality in the past; (2) (in Physics) a quantity measuring duration, usually with reference to a periodic process such as the rotation of the earth or the vibration of electromagnetic radiation emitted from certain atoms;² (3) a specific point on the [space-time] continuum expressed in terms of hours and minutes; (4) a system of reckoning for expressing time (e.g. Greenwich mean time); (5) a definite and measurable portion of this continuum; (6) an accepted period such as a day or season; (7) an unspecified interval, a while; (8) a period or point marked by specific attributes or events ("time for breakfast"); (9) a sufficient interval or period ("have you got time to help me?"); (10) an instance or occasion ("I called you three times"); (11) an occasion or period of specified quality ("have a good time"); (12) the duration of human existence. (Also, as a verb, 'to ascertain or calculate the speed or duration of'.)

2. In classical mechanics, the dictionary adds, time is absolute in the sense that the time of an event is independent of the observer. According to the theory of Relativity it depends on the observer's frame of reference. Time is considered as a fourth coordinate required along with the three spatial coordinates to specify an event.

Similar ranges in meanings and collocations can be expected in other languages, including sign languages. The nearest sign for SPACE given by Riekehof (1963) for American Sign Language (ASL) is PLACE, in which the tips of the index fingers touch then are drawn apart in a circular movement towards the signer's body before touching again (as if defining an area). Abstract TIME in ASL is expressed by making a clockwise motion with the right hand in the palm of the left hand, no doubt iconic of a clock's movement. I shall look at words for SPACE and TIME in other languages below, including their etymological sources, which can be revealing as regards their experiential "grounding". But first, consider the following idiomatic expressions involving the words 'space' and 'time' in English, most of them mentioned in the Collins dictionary entries. I have added in parentheses the definitions from those given above that seems closest as the basis of their figurative extensions. First for 'space':

- 'There's no space here for a table' (4)
- 'I don't have any space for dessert'³ (4)
- 'Make space for her' (4)
- 'There's no space for error' (3)
- 'He stared into space for a while' (3)
- 'He's totally spaced out' (3)
- 'Watch this space' (3)
- 'the space race' (6)
- 'air space' (1)
- 'space between the lines' (2)
- 'in the space of a week' (2)

It can be seen that senses (3) and (4), which are close to each other, dominate as the basis here. In the last two examples we see the ambivalent spatial and temporal meaning of expressions referring to intervals. I shall return to these in 2.1.

Idioms involving the word 'time' are much more widespread in English. I have grouped them below into approximate groups as regards the Collins definition that seems most likely to underlie them. Some may not be figurative at all but simply more specific exemplars of some of the basic meanings.

- (1) 'time will tell'
- 'the ravages of time'
- 'with time'
- 'time out of mind' ('time immemorial')

3. Compare these two sentences with 'This is no place for sarcasm' and 'There's no room to swing a cat' (the 'cat' here is the 'cat o' nine tails' used for lashing criminals), with 'place' and 'room' rather than 'space'. The latter would be too literal or indefinite here.

'timeless values'
 'time is on our side'
 'time and tide wait for no man'
 'for all time'
 'time flies'
 'old times'
 'times are changing'

(2) 'keep time'
 'in time' (musical term)
 'two-four time'
 'a time bomb'
 'beat time'

(3) 'what's the time?'
 'at the same time'
 'the time has come'

(5) 'all the time'
 'for the time being'
 'work overtime'
 'a sign of the times'

(6) 'in good time'
 'on time'
 'a timely appearance'
 'time out'
 'tea time'
 'a time-share apartment'

(7) 'spend one's time'
 'pass-time'
 'time off'
 'kill time'
 'bide one's time'

(8) 'ahead of one's time'
 'behind the times'
 'before one's time'
 'ahead of time'
 'it's high time that'
 'it's about time!'
 'find time for'
 'there's no time like the present'

- (9) 'all in good time'
 'lose no time'
 'make time for it'
 'take your time'
 'give yourself time'
 'in no time'
 'there's plenty of time still'
 'in the nick of time'
 'a time-saving device'
- (10) 'time and again'
 'three times five'
- (11) '(have) the time of one's life'
 'do time' (in prison)
- (12) 'in our time'
 'in the time-honoured manner'

ome of these are clearly metaphorical, but few can be related to deeper “conceptual metaphors”, of the kind discussed by cognitive linguists. These are more general and not so much concerned with specific words like ‘space’ and ‘time’. I shall return to them briefly in Chapter 4. Note the examples under (9) above of ‘making time’ and ‘taking time’ for something: these extend the sense of ‘a sufficient interval or period’ to actually treating time as a commodity that can be manipulated according to one’s needs, hence the ‘Time as money’ metaphor (Langacker 2012: 210).

To return to *SPACE*, there is considerable overlap in English between uses of the words ‘space’ and ‘place’. Compare the following principal definitions of ‘place’ given by Collins with those for ‘space’ above (note especially definition (5)):

- (1) a particular point or part of space or of a surface, esp. that occupied by a person or thing; (2) a geographical point, such as a town, city, etc.; (3) a position or rank in a sequence or order; (4) an open square lined with houses of a similar type in a city or town; (5) space or room; (6) a house or living quarters; (7) any building or area set aside for a specific purpose; (8) a passage in a book or play or film; (9) proper or appropriate position or time; (10) right or original position (“put it back in its place”); (11) suitable, appropriate or customary surroundings (“out of place”); (12) right, prerogative or duty (“it’s your place to give a speech”); (13) appointment, position or job; (14) position, condition or state (“if I were in your place”); (15) a space or seat, as at a dining table.

In general, ‘place’ is more specific than ‘space’, typically a point or clearly delimited space or one with a distinct function. It is also more static and frame-like than ‘space’, which is more the vacant milieu in which one can move around in – thus compare ‘your place or mine?’ as opposed to ‘you need your own space’. As with ‘space’, there is also some overlap with TIME. The other IE languages have similar distinctions corresponding to English ‘space’ vs. ‘place’. Buck (1988) has no division corresponding directly to SPACE but has category Place in his Chapter 12 on “Spatial relations”. He includes there a number of the forms cited in 2.1 below, notably Latin *locus*, Greek *topos*, French *place* and *lieu*, Danish *sted*, German *Stelle*, *Ort* and *Platz*, and Russian *mesto*. It is more difficult to tease apart words corresponding to the distinction in English in less well documented languages.

2.1 Words for Space

In what follows I shall be concentrating on the most basic dictionary items and their definitions, upon which I have had to rely in most instances.⁴ The etymologies supplied, pointing back to earlier meanings and sources, will play an important role later on in this study. As regards words for SPACE in IE languages, the quintessential word ‘space’ itself, as in English and the Romance language (French *espace*, etc.), is from Latin *spatium* ‘room, space, place for another, interval, distance’ – also used of ‘time available for a purpose’. This does not seem to have been employed in Collins sense (1) given above for English (‘unlimited three-dimensional expanse in which all material objects are located’), nor in the cosmological senses (5) and (6), which will be treated further under words for WORLD. On the other hand, the temporal “interval” sense of *spatium* is retained through both French (*l’espace d’un instant* ‘for a moment’) and English (sense (9) above), as in ‘a space between meetings’.

As for ‘place’, it derives – via Old French – from Latin *platea* ‘broad way, open space’ (cf. Greek *platus* ‘broad’). Latin also has *locus* ‘place’ (into French *lieu*), and more specialized *ārea* ‘open space, building site, threshing floor, courtyard, field of action’ (< *ārēre* ‘be dry’). In Collins senses (3) or (4) there is also ‘vacuum’, neuter of Latin *vacuus* ‘empty, void, bare, deserted’ (= Greek *keno* ‘void, vacuum’ from *kenos* ‘empty’). Note also Greek *khaos* ‘empty space, chasm’ (English ‘chaos’)

4. The words and explanations that I cite for IE languages are from Buck (1988), supplemented by the single language dictionaries listed at the end of this book. The Eskimoan language forms cited are from Fortescue et al. (2010), the Wakashan ones from Fortescue (2007a), and the Chukotko-Kamchatkan ones from Fortescue (2005), supplemented by the single language dictionaries listed after the References.

from IE *gheu- ‘yawn, gape’. Probably related are Latin *hiatus* ‘opening, cleft’ and English ‘gap’ (< IE *ghāi-). Sanskrit had *sthānam* ‘place’, also in temporal sense ‘occasion’, from *sthā- ‘set up’.

In the languages of the ancient world there was no single generalized word for SPACE. All modern European languages besides the Romance ones have on the other hand at least one word singled out in the most generalized sense of English ‘space’. Thus Modern Greek has *khōros* ‘space’, also ‘area, room, interval, distance’,⁵ but also *topos* ‘place, position, space, room, country’, and *periokhi* ‘area, region, extent’. German has *Raum* ‘space, room’ is, like English cognate ‘room’, from Germanic *rūmaz ‘spacious’, today extended, like French *espace*, to all the senses of English ‘space’ except (7), which is generally expressed by a “place” word like German *Platz* (French *place*). *Raum* can also mean ‘hold (of a ship)’, ‘volume’, and ‘scope’, and note *luftleerer Raum* ‘vacuum’ (lit. ‘air-free space’), *Raumeinheit* ‘unit of volume’ such as the *Raummeter* (cubic metre), and adjective *geräumig* ‘spacious, roomy’. This contrasts with *Ort* ‘place, spot, point, locality, site, locus’ and *Stelle* ‘place, spot, position, situation’, the former, more concrete, from an earlier sense of ‘edge, point, shore’, and the latter from ‘position’ (thus *an meiner Stelle* ‘in my place’). Similarly, Danish *sted* (as opposed to *rum*) and French *endroit* (as opposed to *espace*) are ‘place’ in a general sense. Russian has *prostranstvo* ‘space’, from *prosteret* ‘extend, stretch’, also *prostor* of extensive open spaces (from IE *ster- ‘extend’), but *mesto* ‘place, room’ (Czech *město* ‘town’);⁶ *kosmos*, from the Greek, is used in the ‘outer space’ sense.

There are more figurative uses of the basic words in all these languages, similar to those for English given above, for example with *Raum* in German: *Raum geben* ‘give way’ (lit. ‘give space’), and *seinen Neigungen Raum geben* ‘follow one’s inclinations’ (lit. ‘give space to one’s inclinations’). French near-equivalent *espace*, less broad in meaning than *Raum*, has fewer figurative uses, but note *avoir le regard perdu dans l’espace* like English equivalent ‘stare into space’.⁷

Leaving the Indo-European sphere, the situation is much as Levinson (2003: 6) states: “Most languages have locutions for ‘place’ but few have expressions for ‘space’”. However, languages with long traditions of writing other than the IE ones usually do have means of referring to generalized SPACE (just as they also have expressions for abstract TIME). Arabic has *faḍa:ʔ* ‘space’ (also of ‘outer space’), as

5. Probably related to *khorein* ‘move, make room for’. From IE *ghorō- ‘empty space’, in turn from *ghē- ‘release, be released, go’. acc. Watkins (1985: 21).

6. This is related to Latin *mēta* ‘cone-shaped turning post in a circus’. Note also adjective *pomestitel’nyj* ‘spacious’.

7. It has more idiomatic extensions for *place*, e.g. *faire place* ‘make way’, and *prendre place* ‘install oneself’.

opposed to *maka:n* 'place', but also *şifr* 'empty space, zero' (the source of both 'cipher' and 'zero'). Mandarin Chinese has *kōngjiān* 'space, room, empty, air' (lit. 'empty space/room'), and in the 'outer space' sense *tàikōng* (lit. 'great emptiness'), as opposed to *dìfang* 'place'. Note the 'air' sense of *kōngjiān*, which shares its initial component with *kōngqì* 'air' (lit. 'empty breath/air'). Japanese has *kūsho* 'space, blank, gap', of which the first element is 'empty' as in the first Mandarin term, and the second is 'place' as also in general 'place, space, room' word *basho*. It also has *kūki* 'air, atmosphere', going with Mandarin *kōngqì* above. For 'outer space' it has borrowed the English word: *supēsu*. It has furthermore a native term *tokoro* 'place, home, point, situation, feature, (abstract) thing', which also has temporal meanings: 'point (in time), moment, extent (in time or space)'. I shall return to this.

Finnish has *avaruus* 'space, volume, wideness' (also about 'outer space'), as well as *tila* 'room, space', and *ala* 'area, space, territory' (cf. *ala-* 'down, below'). Turkish has *uzay* 'space' (as in 'outer space') and *boşluk* 'space, void, slot'. Indonesian has *ruang* 'space, room' and *tempat* 'place', also *udara* 'air, atmosphere'. For 'outer space' it has *angkasa* 'sky, space'. In all of these I assume the fully abstract notion of 'space' is included.

Among languages that have not had a written tradition until relatively recently, West Greenlandic has *ini* 'place, room, nest' (from proto-Eskimo – PE – *ənə 'place'),⁸ but also the affix *-vik/- (f)fik* 'place or time of' as in *puisinniar-fik* 'place or time at which seal-hunting is done' (the temporal sense will be mentioned again under 2.2.). Note also *imartooq* 'spacious' from *imaq* 'contents' and *-tooq* 'having much'. Isolate Nivkh has *laqv mif* 'place, space' (where the first word is 'around' and the second 'place, country, land').⁹ Nuuchahnulth (Wakashan) has affix *-ʔutʷ* 'place for'. Xhosa (Bantu) has *in-dawo* 'place' and *um-hlaŋa* 'earth, ground', also *um-gama* 'a distance, space', and Yoruba (Niger-Congo) has *àyè* 'place, opportunity, chance, room', also *ibi* 'place' (and *ibiti* 'the place where –'). Tariana (Arawakan) has a classifier affix of place *-wani*, as in *alia-wani* 'a place where there is –' (Aleksandra Aikhenvald, pers. comm.). Another Amazonian language, Kwaza, has *-rjy* 'area, surroundings, all over, room, place', which also functions as a classifier and can refer to the weather. Note also *si-dy-rjy* 'the place where I live, home' (van der Voort, pers. comm.). Ket (Yeniseian) has *baŋ* 'place, land', which also has temporal usage. Clearly specific 'place' words predominate here rather than ones for completely abstract SPACE. I shall return later to the conflation between SPACE and TIME meanings in a number of these languages.

8. In Central Siberian Yupik cognate *na* is also 'home'. In Aleut the cognate is *nag(a)* 'inside, interior'.

9. cf. *-f* 'place' and probably *mi* 'inside', also *jif* 'place' from *(j)iv-* 'have, exist' plus the same affix.

Then there are the words for ‘interval’, which include the English word in the sense ‘space between’. Across languages, these can refer to either time or space (including a musical interval). They presuppose a continuum that has been interrupted by a gap. ‘Interval’ itself is (via French) from Latin *intervallum* ‘space between two things, interval, distance, respite’ (originally ‘space between two palisades’). Greek has *diastima* ‘space, distance, interval, length of time, period’ (also *diasteimma* in the temporal sense ‘interval, intermission’). Russian has equivalent *promežutok*, and Danish *mellemrum* (lit. ‘between space’). German distinguishes between the spatial and temporal meanings here: *Zwischenraum* vs. *Zwischenzeit*. Mandarin has *jiàngé* (lit. ‘between-divide’), and Japanese has Sino-Japanese *kankaku* ‘interval’ but also native *ma* ‘space, interval, room, time, leisure’, and *aida* ‘interval, space, time, between, relationship’. Finnish has *väli* ‘space between, interval, distance’ – the temporal sense can be specified by compounding with preceding *aika* ‘time’. Indonesian has *selang* ‘interval’, also *ruas* ‘space between joints’, and Samoan has *vā* ‘space between two things’. West Greenlandic has *akunneq* ‘interval’ (also, in the temporal sense, ‘hour’), from PE *aku(ṛ) ‘space between’, and Aleut has *quchx-* in the same meaning (related to PE *qətər ‘middle’). Dzongkha (Tibetan) has *gêgu* ‘split, space between’. Xhosa has *isi-thuba* ‘gap, opening, space (of distance or time)’. The overlap between spatial and temporal senses of such words is clearly widespread.

From the forms presented above one can distinguish the most common senses of SPACE words across the languages surveyed, regardless of whether or not they have a general word corresponding to English ‘space’. These are (a) SPACE as emptiness, void; (b) SPACE as confined area or room; (c) SPACE as the medium or environment in which one moves around or feels one’s way; and (d) ‘outer’ SPACE, the boundless cosmos. In the majority of languages there are terms that cut across more than one of these meanings, but words covering all of them like English ‘space’ may be restricted to major literary (and scientific) languages and those influenced by them. Languages with general SPACE words also have words for more specific ‘place’, where something is positioned or some activity takes place – but not *vice versa*, since most languages have words for ‘place’ but not all have one for SPACE. In those languages for which plausible etymologies have been established, SPACE words generally derive from earlier concrete senses more like those of English ‘place’, not for example via metaphor. Words for ‘interval’ appear universally to be ambivalent between spatial and temporal meanings.

2.2 Words for Time

Words for TIME in IE languages are given by Buck in his Chapter 14. He introduces the section on these words with a mention of the etymological entanglement of spatial and temporal terms: “Some of the words are from roots for ‘stretch’ or ‘measure’, with established temporal rather than spatial application”. And in a footnote (p. 593) he mentions that expressions like ‘long’, ‘short’, ‘first’ and ‘last’ are often applied equally to TIME and SPACE. There is considerable overlap in these languages between words for time in general and for specific time periods like ‘hour’ and ‘year’. I have already discussed ambivalent ‘interval’ words in 2.1.¹⁰

Romance languages all have general TIME words like French *temps* or Italian *tempo*, also in the sense ‘weather’, reflecting Latin *tempus* ‘time, season, opportunity, sufficiency of time (for a purpose), suitable time for s.th.’, probably from IE *ten- ‘stretch’, so originally a ‘stretch of time’. French also has *fois* and Spanish *vez* in the sense of ‘occasion, time(s)’.¹¹ ‘Occasion’ itself is (via French) from Latin *occāsiō*, a nominalization of *occidere* ‘fall down’.

Germanic languages all have general TIME words too. English ‘time’ (originally ‘period of time’, OE ‘indefinite continuous duration’) is from IE *dā- ‘divide, measure’, via Old Norse (ON) *timi* ‘period of time’ or ‘appointed/good time’ (> Danish *time* ‘hour’).¹² Ancient Greek *demos* ‘division of society’ is from the same source (Watkins 1985: 10). Icelandic *timi* is ‘time’ in general but it also has *skipti* ‘time, occasion’ (from *skipta* ‘divide’, cognate with English ‘shift’). The Danish equivalent of the latter is *gang* (from IE *ghengh- ‘go, walk’, so ‘a walk’), while German has *Mal* from IE *mē- ‘measure’, as also in ‘metre’. Old English (OE) *tīd* ‘time’ is also from IE *dā- – it has produced modern English ‘tide’, corresponding to German *Zeit* ‘time’ (Danish *tid*). OE also had *hwīl* (modern ‘while’) corresponding to Old High German *hwīla* ‘point or period of time’, ON *hvīla* ‘bed, resting place’. ON also had *māl* ‘fixed time, mealtime’ (hence English ‘meal’ and German *Mal* above). Gothic had *mēl* ‘time’ from the same source.

Russian has *vremja* as its general TIME expression, from the root in *vratit* ‘turn’ (Latin *vertere* as in *annus vertēns* ‘the course of a year’ – Sanskrit *vartman* ‘course’). Compare English ‘a turn’ (i.e. at some repeated action). Russian also has *raz* ‘occasion’ (cf. *razit* ‘strike’), *srok* ‘period of time, appointed time’ (from earlier verbal ‘agree’), and *pora* ‘time to do s.th.’.¹³ Old Church Slavonic (OCS)

10. Compare ‘pause’ (via Latin from Greek *pausis* < *pauein* ‘halt’), which unlike ‘interval’ is a purely temporal expression.

11. Both from Late Latin ablative plural of *vicis* ‘change, turn’ (Buck p. 944). Italian has *volta* (lit. ‘turn’).

12. Danish also has *klokkeslæt* ‘the hour, the time’ (lit. ‘clock-strike’).

has *časū* (Russian *čas* ‘hour’), probably related to *čajati* ‘wait, expect’ (cf. Sanskrit *cāy-* ‘perceive’ and Albanian *kohe* ‘time, weather’), also *godŭ* ‘point in time’ (in Russian = ‘year’, and cf. *godit’sja* ‘be suitable’). It is the usual term for ‘time’ in Czech, which also has *doba* ‘period, season, (space of) time, fitting time’ (cf. OCS *podoba* ‘fitting’).

Modern Greek has *kairos* as its general word for ‘time, period’, also ‘weather’, which earlier was ‘fitness, fit time, opportunity’ (perhaps related to *keiro* ‘cut off’).¹⁴ The older term is *khronos* (also spelt *chronos*, as in English ‘chronology’) ‘time, duration, age, period’, of uncertain origin, but might have meant ‘the comprehensive’ according to Buck (p.954) – cf. IE *gher- ‘grasp’. In Greek mythology Chronos was of course the god personifying time. ‘Period’ itself is from Greek *periōdos* ‘circuit’. In Modern Greek *khronos* it is also ‘year’. It also has *fora* ‘force, direction, time, occasion’. Greek also has (*h*)*ora* ‘hour, time’ (earlier ‘period of time, season, fitting time’), which came into Latin as *hora* ‘season, time’ and English ‘hour’, ultimately related to English ‘year’ (< IE *yēr-ō ‘year, season’). Then there is *aion* ‘infinitely long time’ (modern *aionos* ‘century’),¹⁵ and *epokhe* ‘era, season’, earlier ‘holding back, pause, fixed point of time’ (from *epi-ekhein* ‘hold in a certain state’). The corresponding Latin term is *æra* ‘time from which a date is reckoned, epoch’ (from *æs* ‘copper’, referring to metal counters for the calculation of time). Sanskrit has *avasara* ‘opportunity, right time for –’, and *kāla-* ‘time, right time, occasion’, which may, according to Buck (p.955), be related to *kālaya-* ‘drive’ and refer to the time of driving the cattle out to pasture in the morning. All in all, the languages of the ancient world display an extremely variegated array of sources for TIME words, perhaps none completely general. All of them reflect more concrete earlier meanings.

Here are some figurative uses in French and German, comparable to those given above for English (from respectively the Concise Hachette French Dictionary and the Cassell’s German and English Dictionary). Some of these correspond to the English equivalents, others are quite different. First French, with *temps*:¹⁶

13. Gladkova (2012:135–180) describes the meaning of *pōra* (which overlaps somewhat with more general *vremja*), as twofold: firstly referring to a cyclical or characteristic time period (in Nature or people’s lives), outside of personal control, and secondly referring to the right time to do something (with some urgency).

14. Compare Irish *am* ‘time’, related to *aimsir* ‘weather’, of uncertain ultimate origin.

15. Watkins (1985:1) has *aion* (the source of English ‘ever’ as well as ‘eon’) as ‘age, vital force’, from IE *aiw- ‘vital force, long life’, from which comes also Latin *aevum* ‘age, lifetime’, *aetās* ‘age, generation, period’ (and *aeternus* ‘eternal’).

'le temps presse' (time is short)
 'en un rien de temps' (in no time at all)
 'les trois quarts du temps' (most of the time)
 'avoir tout le temps' (have all the time in the world)
 'ça a pris un temps fou' (it's taken ages – lit. 'it took a mad time')
 'faire passer le temps' (pass the time)
 'avoir du temps à perdre' (have time to spare)
 'nous sont dans les temps' (there's still time)
 'il est grand temps' (it's high time)
 'ces derniers temps' (recently)
 'j'ai trouvé le temps long' (time seemed to drag)
 'nous avons du temps devant nous' (we have plenty of time)
 'ne durer qu'un temps' (be short-lived)
 'dans le temps' (in my day)
 'être de son temps' (be up to date)
 'être en retard sur son temps' (be behind the times)
 'moteur à quatre temps' (a four-stroke engine)
 'mesure à deux temps' (two-four time)

And German, with *Zeit*:

'Zeitgeist' (spirit of the times)
 'andre Zeite, andre Sitten' (manners change with the times)
 'seine Zeit abwarten' (bide his time)
 'ausser der Zeit' (out of season)
 'er kam für die Zeit zu Boden' (he went down for the count)
 'sie hat ihre Zeit' (she has her period)
 'damit hat es Zeit' (there's no hurry)
 'kommt Zeit, kommt Rat' (time brings wisdom)
 'seine Zeit ist gekommen' (he is about to die)
 'mit der Zeit gehen' (keep pace with the times)
 'die Zeit ist noch nicht reif' (the time has not come)
 'dem lieben Gott die Zeit stehlen' (idle away one's time – lit. 'steal time from God')
 'vor der Zeit' (prematurely)
 'vor grauen Zeiten' (in days of yore – lit. 'grey times ago')
 'der Zahn der Zeit' (the ravages of time – lit. 'the tooth of time')

Words for TIME in a general, abstract sense are less widespread outside of Europe, but are found at least in the major written languages Arabic, Chinese and Japanese – in fact a writing system may well be necessary in order to reach that level

16. Some expressions with *temps* refer to the weather rather than the time. Some, like '*le temps est à la pluie*' ('it looks like rain') could refer to either (which goes far towards explaining the polysemy).

of abstraction.¹⁷ Thus Arabic has *waqt* ‘time’, borrowed into Hindi as *vaqt* ‘time, period, proper time, season for, occasion’, and into Indonesian as *waktu* ‘time, hours’. Arabic also has *mudda* ‘time, duration’, and *zamānun* ‘time, period’, and Indonesian also has *masa* ‘time, period’ and *kali* ‘time, (quantitative) times’, which may be borrowed from Sanskrit *kāla*- given above. Mandarin Chinese has *shíjiān* abstract ‘time’, where the second element is ‘interval’ and the first part is also found in *shíhòu* ‘length of time, period of time’, and *shídài* ‘time, age, period’ (the radical of the written logogram is – perhaps fortuitously – that for ‘sun’). Japanese has *jikan* ‘time’ from the first Chinese term and *jidai* ‘age, period’ from the second, but also native *toki* ‘point in time, occasion’, *tabi* ‘occasion, time’, and suffixed *-do* or *-kai* ‘times’ (like Chinese *cì* or *huí* with quantitative expressions). *Tokoro*, referring to space or time was mentioned under 2.1, as was *ma* ‘interval, time’.¹⁸

Turning to languages that apparently lack a general term for TIME, these will generally display words for specific points, periods or cycles of time like day, year, winter, today, tomorrow, etc. Sinha et al. (2012) have described the lack of a general TIME word in the Amazonian language Amondawa. The authors claim that speakers have no concept of time, only of events (much like the Hopi), and that the conceptual domain of TIME is therefore not universal. But they are talking here of the *concept* (as expressed linguistically) not of cognition as such. There are apparently no words for week, month or year in this language as opposed to words for recurring events and durations linked to seasonal activities, and time intervals are expressed in terms of *kuara* ‘sun’ (words for ‘moon’, ‘night’, ‘morning’, etc. are also used). The principal contention of the authors is that spacetime mappings are a thoroughly cultural matter.

The situation is somewhat different in West Greenlandic (WG), which has means of expressing ‘time at which something is done’, but this can also refer to a place at which something is done, thus WG affix *-vik/-f)fik* mentioned in 2.1 is ‘time or place at which/for V-ing’. The nearest equivalent to time in general in the modern language (used as an equivalent to Danish *tid*), is *piffissaq* based on general stem *pi-* ‘do, get, say, etc.’ plus *-(f)fik* plus *-ssaq* ‘future’.¹⁹ The second, purely

17. Those that did may include late Ancient Egyptian, which apparently developed a general TIME sense from earlier *nw* ‘discrete interval of time’. Later still Demotic/Coptic developed the sense ‘hour’ (Georgakopoulos and Polis. 2021: 24).

18. The collocations of *jikan* and *toki* differ, thus *jikan dōri* ‘on time’ (lit. ‘according to time’), *jikan ga kakaru* ‘take time (to do)’ (lit. ‘take/need time’), *jikan o sugosu* ‘spend time’ (lit. ‘pass time’), *jikan o tsubusu* ‘kill time’ (lit. ‘crush time’), *jikan ga nai* ‘have no time (for)’, but *toki ga tatsu* ‘time passed’ (lit. ‘time left’), *toki o utsusazu* ‘without delay’ (lit. ‘remove time’), and adverbial *tokidoki* ‘occasionally’ (Corwin et al. 1972).

19. Some lexicalized derivations have a specifically temporal sense, such as *inuuffik* ‘year of birth’, but also *inuuk* ‘birthday’ (both from *inuu-* ‘be born’).

temporal affix here is added to nominals in the sense of ‘s.th. future or intended for some purpose’ (as in *tupi-ssaq* ‘s.th. to be used as a tent’) – it contrasts with *-koq* ‘previous’ referring to the past, as in *palasi-koq* ‘a one-time priest’. In the slightly earlier language (reflected in Schultz-Lorentzen’s 1927 dictionary) *piffik* alone was ‘time or place of doing s.th.’ (the addition of *-ssaq* today no doubt emphasizes the temporal sense), and this is indeed the meaning of cognates throughout the Eskaleut world (e.g. Central Alaskan Yupik *pivik* ‘time, place’). WG also has an affix of doing ‘so and so many times’ (*-riar-* on a quantity base), and a nominal stem *nali-* (Proto-Eskimo **nałə-*) ‘s.th. corresponding in time or space’ (as in *nali-giit* ‘equivalents, two of the same age’ with *-giit* ‘mutual’). It has clear temporal use in expressions like *juullip nalaani* ‘at Christmas time’ (Christmas equivalent-its-LOC). The Aleut equivalent of *nali-* is unrelated *asl-* ‘point, position corresponding, opposite’, in Eastern Aleut also ‘time of s.th.’. It has an affix *-Vluġ-* ‘place for V-ing’ and sometimes ‘time for V-ing’, like the Eskimoan affix above. The overlap of expressions for TIME and SPACE is extensive in this family.

Other languages that display a similar overlap between basic expressions of SPACE and TIME include Koyukon (Athabaskan), which has stem *den* ‘specific place (where) or time (when)’. It also has an affix *-hu-* ‘area, place, event, situation, time’ used of a general place or time. Ket has, as mentioned in the previous section, *ba’ŋ* ‘place, land’, which also means ‘time’ in compound expressions such as locative case *banġa* ‘at some point in time’. It also has affixed *-ha* ‘time(s)’ (Vajda and Werner, in preparation). Nuuchahnulth (Southern Wakashan) lacks a general TIME word, but has a ‘times’ affix *-p’it* (on quantitative stems) which is also used of spatial ‘handspans’, and ‘time when/for’ affixes *-im’hi* and *-(y)i* like the Eskimoan ones (not referring to place however). Related Kwak’wala has *-laq^w* ‘time, date’. It should be born in mind that languages lacking abstract TIME and SPACE words do not necessarily show any overlap between their more concrete expressions for time and space. Thus Kwaza distinguishes two suffixes, *-wy* ‘time for/when’, as opposed to *-rjġ* ‘area, place of’ introduced in 2.1 (van der Voort 2014: 143, 507).

Some non-European languages do have dictionary equivalents of the general English word ‘time’, but it is not always clear whether the meaning is in fact more restricted than this suggests – recall the range of meanings given above for English ‘time’ itself. Two languages that do clearly distinguish ‘time’ from ‘space’ are Finnish and Turkish. The former has *aika* ‘time, hour, moment, period, age’ (as well as *kausi* ‘period, season, age’) and the latter *zaman* ‘time’ (from the Persian), contrasting with the SPACE terms given in the previous section. Nenets (Samoyedic) has *jol’tsə* ‘time’ (corresponding to Russian *vremja*), also in the senses ‘order’ and ‘age’ – compare *jol’tse-* ‘finish, measure, compare’ and adjectival *jol’tsamboj* ‘middle, measured’. Koryak has *ɤlwəj-vəyəj* ‘time, period’ (lit. ‘day-period’). Nivkh has *ə(ŋ)* ‘time, period’, relating to any durational period of time

from an hour to a season.²⁰ Thai has *wela* ‘time’ (and *welachao* ‘morning’ – cf. *chao* ‘early’). Nahuatl has *cāhuītl* ‘time’, which may be related to *cāhua* ‘stay, remain’ (Una Canger, pers. comm.). Xhosa has *i-xa* ‘time’ (from noun classifier *i-* and *xa* ‘when’), and Yoruba has *ìgbà* ‘time’, as opposed to more specific *àkókò* ‘time, season’ and *àsìkò* ‘time, period’. Samoan has *itūlā* ‘time, hour’ (lit. ‘side-sun’).

In Australia, Yidiny (Pama-Nyungan) has no abstract TIME word but it does have, for instance, *muguy* ‘all the time’, *wayu* ‘for a long time’, and a couple of affixes of durational time-*m* and -*may* on quantitative stems (Dixon 1977: 201–3). Dzongkha (Tibetan), apparently also lacking a completely general term, has *gang* ‘period, time, duration’, which functions also as a postposition ‘during’ (and apparently also as a noun ‘hill, slope’ acc. van Driem 1998:175). Quechua has *kuti* ‘time, frequency’ and *mit’a* ‘time period’, but also the interesting “space-time” word *pacha*. According to Heydt-Coca (1999: 13–14): “The Andean conception of time is cyclical; it is understood as a configuration of events, rather than a linear sequence. TIME is conceived as a sequence of ages or periods. The transition from one age to the other is announced by a Pachacutec, that is by cataclysms or turning points. The word *pacha* [here] means time, and *cutec* return.” I shall return to *pacha* under 3.1.

Languages that lack completely general words for TIME also tend to lack abstract words for ‘the future’ and ‘the past’ – note the article in the English here. Most languages have adjectives referring to some future or past event or period, but not an abstract nominal, though adjectives or participles have taken on nominal use in some European languages, like Latin *futura* and Russian *buduščee* ‘future’.²¹ Other sources include Greek *mellon* ‘future’ from *mello* ‘intend’, and German nominalization *Zukunft* ‘future’, literally ‘that which is coming’. Abstract words like these can actually refer to “worlds” rather than being strictly temporal: they can refer to the future or the past at different scales, i.e. the future or the past of the whole universe, that of the planet earth, or that of human history. In fact they can refer, like words for TIME and SPACE, not only to absolute time, but also to personal time, i.e. one’s perspective on the personal future or past, as in the English expressions ‘she has a bright future ahead of her’ or, insinuatingly, ‘she has a past’. It is possible in some languages to distinguish between the two, thus Japan-

20. This may be a loan from Tungusic – cf. Ul’ch *eru(n)* ‘time’. Most of the contemporary languages of Siberia – including Yukaghir and Evenk – use Russian loans for ‘time’ (*vremja*, *pora*, or *čas*).

21. I have already referred to WG suffix -*ssaq* ‘future’ above – it can be added to nominal *siuneq* ‘that which is in front’ (from location root *siu-* ‘in front’) to form *siunissaq* ‘future’, translating Danish *fremtid*. Compare with the same stem (in the vialis case) *siornatigut* ‘before, earlier’, contrasting with *kingornatigut* ‘afterwards’ from locational root *kingu-* ‘behind’.

ese *mirai* ‘(the) future’ is more absolute than *shōrai*, which refers more to personal prospects.

From the preceding brief survey it can be seen that the most common senses of TIME across languages, regardless of whether or not they have a single word corresponding to English ‘time’, are (a) TIME as the occasion for doing something; (b) TIME as a period or duration; and (c) TIME as a succession or sequence. The last two correspond to Evans’s extrinsic and sequential tFoRs respectively. Words clearly covering all three meanings may be restricted to major literary languages, since apparently general senses elsewhere may be due to recent influence from colonial languages. The most general words for TIME in other languages focus on senses (a) or (b) – or a combination of both. Quechua may be an exception, with its focus on cycles (but note the Mayan calendar, which I shall describe in 17.2).

Etymological sources (where known) tend to be metaphorical or metonymic. Besides those going back to ‘stretch’ (like Latin) mentioned by Buck, there are words in IE languages going back to ‘dividing’ (like English) and ‘turning’ (like Russian). There are also interesting cases of overlap of meaning with ‘weather’ (Romance languages, Greek, Albanian and Irish). The Eskimoan WORLD word that covers the meaning of ‘weather’ will be described in 3.1. Outside of Europe there do not seem to be any instances of TIME words deriving from a source meaning ‘measure’ (as in some Germanic languages).

To summarize how far this investigation has taken us up to this point, we can say that it appears that only certain languages (those of technologically more advanced, literate cultures) have developed generalized words for SPACE and TIME, and that there are indications that the overlap in temporal and spatial senses of many words in this area (including the more “advanced” ones) may be historically ancient, not just the result of relatively recent metaphor. Now we need to examine whether words for WORLD, combining spatial and temporal dimensions, can advance us towards understanding what it is that constitutes the essential experiential source of what these words refer to.

CHAPTER 3

Words for World

Words referring to (the) WORLD have in most languages shifted their reference throughout the historical period as the cultural milieu and the state of scientific knowledge developed. The meanings range from limited known territories to sophisticated cosmologies that all contain – at least implicitly – a fourth temporal dimension, the frame's duration. On the way forward words like English 'world' have been extended to refer to planetary worlds beyond our own and to religious conceptions of "the next world". There is a basic distinction made between words for 'earth, land' (or what lies below it) and words for WORLD as such, which may include the sky, the stars, and everything moving on the land or in the sea, though the distinction is often blurred. Conflation with the meaning of 'ground' in particular is very common. Here is the Collins definition of 'world':

(1) the earth as a planet, esp. including its inhabitants; (2) mankind, the human race; (3) people generally, the public ("in the eyes of the world"); (4) social or public life ("to go out into the world"); (5) the universe or cosmos, everything in existence; (6) a complex united whole regarded as resembling the universe; (7) any star or planet (esp. one that might be inhabited); (8) a section or division of the earth, its history, or its inhabitants ("the Ancient World", "the Western World", "the Third World"); (9) an area, sphere or realm considered as a complete environment ("the animal world"); (10) any field of activity or way of life or those involved in it ("the world of television"); (11) a period or state of existence ("the next world"); (12) the total circumstances and experience of an individual that makes up his life, esp. that part of it relating to happiness ("you have shattered my world"); (13) a large amount, number or distance ("worlds apart"); (14) worldly or secular life, ways or people.

Buck (1988) states with reference to the category World in his Chapter 1 ("The physical world in its larger aspects") that words here fall into three main sub-categories: (a) the physical world in the broadest sense, the universe; (b) the known world, the earth with all that belongs to it, especially the inhabited earth, mankind; and (c) life on earth, worldly life, thus world in contrast with the next. He adds that most of the words he lists are used in all three senses. He does not include words of a more technical and/or recent origin like 'universe' that have replaced or extended earlier, narrower words for WORLD.

As regards his separate category Earth, Land, he distinguishes (a) the whole earth (as distinct from the moon, the sun, etc., overlapping with words under

World); (b) the solid surface of the earth viewed simply as surface or as the source of vegetation; (c) the solid surface of the earth in contrast with that which is covered with water; (d) the earth as material in general; (e) a definite portion of the earth's surface, from the land of an individual to a whole country. Of the latter category I shall primarily be concerned with meanings (a), (b) and (c). As regards (e) compare the following Collins definition of 'land':

(1) the solid part of the surface of the earth as distinct from seas, lakes, etc.; (2) ground, esp. with reference to its use, quality, etc.; (3) rural or agricultural areas as contrasted with urban ones; (4) farming as an occupation or a way of life; (5) (in law) any tract of land capable of being owned as property, together with any buildings on it, extending above and below the surface; (6) a country, region or area; (7) a realm, sphere or domain; (8) (in economics) the factor of production consisting of all natural resources.

I shall turn to the distinction between general words for WORLD and those more specifically for Earth, in 3.2. and Age in 3.3.

3.1 Words for World in Indo-European languages and beyond

The sources of the basic words for WORLD within Indo-European are relatively few (and bear in mind that their exact meanings have in all cases evolved). Thus Greek *kosmos* 'world, mankind' was originally 'order', 'orderly arrangement', or 'decoration', applied to the starry firmament, and was not used about the inhabited earth until Hellenistic times.²² Latin *mundus* (which gave all the Romance terms, like French *monde*) was glossed on Greek *kosmos*, since it too had the original meaning 'ornaments, decoration' (from *mundus* 'clean, elegant'). Latin also had *orbis terrarum* 'Earth, the world' (lit. 'sphere or circle of lands'), where *terra* was 'ground, earth, country' (i.e. dry land), from *torrēre* 'dry up', also the source of Irish *tír* 'land', French *terre* 'ground, earth, land' and *la Terre* 'the Earth'.²³ Note also *tellūs* 'earth, the earth' (hence English 'telluric') from IE **tel-* 'ground, floor'. A late development of Latin *ūniversus* 'occurring all at once, the whole' (lit. 'one turning', from *vertere* 'turn') provided the source of French *univers* and English 'universe'. Greek also has *oikoumene* 'world, universe', earlier 'the civilized world, the

22. The Milesian philosophers used the word *ouranos* rather, today meaning 'sky, heaven, canopy' (Collingwood 1945: 31). Greek also has *ἄμος* 'people, district, land' (Modern Greek 'municipality') in Buck's sense (e), from IE **dā-* 'divide' (so originally probably 'division of society').

23. As opposed to *pays* 'country, home, village' from Latin *pāgus* 'rural area'. Compare Italian cognate *paese*, which can refer to anything from a local village to a city to a whole nation.

habitable globe', from *oikeo* 'inhabit'. Modern Greek has *simpan* 'universe, everything' (lit. 'with-all'). Another Latin term, *sæculum* 'age, generation' (French *siècle* 'century'), was used in ecclesiastical writings of the temporal world, "this world" as opposed to the next (like Greek *aion*), whence also Irish *saoghal* 'world'. The word 'temporal' (as opposed to 'spiritual') is of course from Latin *temporalis* 'pertaining to time'. In Christian thought the "world" in this sense clearly involves the dimension of TIME unlike the timeless "world" of eternity (from Latin *aeternālis* < *aevum* 'age, lifetime'). The concept of "timelessness" is not a natural one, directly related to everyday experience, and no doubt required a long gestation period within philosophical and religious traditions. Note also 'plenum', i.e. 'space filled by matter', from the neuter of Latin *plēnus* 'full, entire', which goes back to the philosophy of the Stoics.

Latin *nātūra* 'nature' is from *nāscī* 'be born', like Russian *priroda* from *rodit'* 'give birth' and Turkish *doğa* from *doğ-muş* 'born'. Compare also Greek *fisis* 'nature' (< *fio* 'bring forth, beget'), the origin of Physics and 'physical'. Apparently the earliest sense of this word was of something internal, determining the behavior of a thing or person (as in the usage in English about a person's 'nature'). This sense was also transferred to Latin *nātūra*, which was used to translate it. Only later did it acquire the meaning of the aggregate of all natural things (Collingwood 1945: 44–45). Aristotle used the word in its "true" meaning of "The essence of things which have a source of movement in themselves" (cited by Collingwood, p. 81). The meaning of English adjective 'natural' can be traced back to this early sense (as in 'It's only natural that...'). Greek also had *ge/ gaia* 'earth' of uncertain origin, referring to the goddess of the Earth (and revived in the environmental concept of Gaia today). It is the source of 'geology', etc. Sanskrit has *prakṛti* 'nature, force or principle evolving the natural world' (from *pra-* 'before, forth' and *kr-* 'do, make'), reflecting the same original (Indo-European?) sense of 'internal force behind natural phenomena'. It also has *loka-* 'open space, earth, world, people' (> Hindi *log* 'people'), related to Greek *leukos* 'bright', as well as *bhuvana* 'existence, creation, world' (from *bhū-* 'be, become') and *jagat* 'that which moves, lives, all creation, world' (from *gam-* 'go'), all in contrast to *deśa* 'place, country'.²⁴

Germanic words for WORLD, including German *Welt* and Old English *weorold*, refer literally to 'the age of man'. They come from **wer* < IE **wī-ro*, 'man', plus **ald* 'age' < IE **al-* 'grow', used as the equivalent of Latin *sæculum*. These Germanic words are interesting in their reference to the temporal dimension. This has its parallel in English 'age', treated in 3.3 below, in its historical as opposed to

24. There is also *janapada* 'country (and its people)' from *jana-* 'person' (*jan-* 'be born') and *pada* 'station, abode' (originally 'step, foot'). Thai *lok* 'world, planet' is presumably from *loka-*, the first Sanskrit form above.

its personal sense ('a period of history marked by some feature or characteristic, era'²⁵) – thus 'the Age of the dinosaur', 'the Space Age', 'the Stone Age', 'the present Age', also 'the Edwardian Age', etc. Both senses are found in French *age*, the source of the English word, also in German equivalent *Alter*. This usage overlaps with the WORLD concept, as it may involve a spatial as well as a temporal dimension, and crucially includes what goes on or went on within that framework.

Note also German *Weltall* 'universe' ('world-all') and *Weltraum* ('world-space') – *Welt* on its own can itself in context mean 'universe'. English 'earth' (from IE **er-* 'earth, ground' acc. Watkins 1985:17) was probably originally in Buck's sense (b) above. Compare German *Erde* and Danish *jord*, which have all the meanings of the English word, including 'ground' and – with the definite article or suffix – *die Erde* and *Jorden* 'the Earth'. I will look more closely at these in 3.2. Old Norse had *heimr* 'abode, world' going with German *Heim* 'home' (also *Heimat* 'native town, country'). 'Home' words will be returned to in 7.3.

All these words in Germanic languages are distinct from those for 'land' (including German *Land* itself), which can secondarily refer to a country or region – these correspond in meaning to Buck's category of Earth, Land above. 'Land', note, is related to Celtic **landā* 'enclosure' and OCS *lędina* 'heath, desert'. It was later mostly replaced in English by 'country' (Old French *contrée*, from Latin *contrāta* – lit. 'that which lies opposite').

The Slavic and Celtic WORLD words reveal different origins. Russian has two words, *svet* and *mir*, of which the first also means 'light' (via 'the realm of light, life'), whereas the second is also 'peace' (from which 'peaceful community, peasant community').²⁶ It also has *vselennaja* 'universe' (lit. 'installed, inhabited', apparently a calque of Greek *oikoumene* above), and *strana* 'country' (cf. *storona* 'side', like *prostor* in 2.1), alongside *rodina* 'homeland' (from *rodit'sa* 'be born'). Czech has *vesmír* 'universe', lit. 'all-world'. The Russian word for '(dry) land, Earth', *zemlja*, is related to a wide range of forms from IE **ghem-* in the sense of 'earth's surface, ground', e.g. Greek *khthon*, Latin *humus*, and Hindi *zamīn* 'earth, ground, world' (via the Persian). Irish *domhan* 'world' is related to English 'deep' and Russian *dno* 'bottom', while Welsh *byd* 'world' is related to Greek *bios* 'life', Latin *vīvus* 'alive'.

25. The Latin source of 'era', *aera*, is unusual: it referred to brass counters or pieces of money, the plural of *aes* 'brass'. In the feminine singular it was 'number used as a basis of reckoning'.

26. With prepositions *na* ('on') and *v* ('in') respectively. The collocations of the two words differ. Thus *svet* is used of the Old or New World and of 'the next world' (*tot svet*), and in 'bring into the world' (*proizvesti na svet*). *Mir* on the other hand often refers to 'the universe' today, but can also refer to the animal world (*životny mir*) and to worldly as opposed to monastic life (and note *xodit po miru* 'go begging' – lit. 'go about in the world'). Both can refer to society.

Moving beyond Indo-European, Mandarin Chinese has *shìjiè* ‘world’, with the first element originally meaning ‘age, generation, duration of life’ – reminiscent of the source of English ‘world’ – and the second element meaning ‘boundary, world, circle’ (compare *shìjì* ‘century’, with the same initial element and the second meaning ‘record’). The Chinese was borrowed early on into Japanese *sekai* ‘world’, which also has native *yo* ‘world, the public, lifetime, career, generation, age, era’ (cf. *yowatari* ‘going through life’ with *wataru* ‘cross’), and *chikyū* ‘Earth’, also from the Chinese (thus Mandarin *dìqiú*, from ‘ground’ plus ‘sphere, ball’). It further has *uchū* ‘universe’ from the Chinese (Mandarin *yǔzhòu*), written with *kanji* meaning respectively ‘eaves’ and ‘sky’, suggesting a mythological origin. It has *kuni* ‘country’, for which Mandarin has *guójiā* ‘country, state’, and *kōkyō* ‘native place, home’, also *riku* ‘(dry) land’ – for which Mandarin has *lùdì*. Mandarin also has *zìrán-jìè* (or *dàzìrán*, lit. ‘great-self-nature’) ‘Nature, the external world untouched by humans’ – *zìrán* is ‘the natural course of things’, borrowed into Japanese *shizen* ‘Nature’ (I shall return to these “Nature” words in Chapter 14). Note also Chinese *tiān* ‘sky, heaven, weather, day, season, nature’ (borrowed into Japanese as *ten*), as opposed to *dì* ‘ground, earth, place’ (borrowed into Japanese *chi*).

Arabic has *ʕalam* ‘world’, but also *dunya* ‘temporal, earthly world’ (as opposed to the hereafter), borrowed into Hindi *dunya*, Turkish *dünya*, and Indonesian *dunia*, all meaning ‘world’. Arabic also has *ʔard* ‘land, ground’, *alʔardī* ‘Earth’ (with the definite article), beside *balad* ‘country’. Indonesian also has *alam* ‘nature, world’ (from the Arabic), beside *tanah* ‘earth, ground, land, country’, and Turkish also has *yeryüzü* ‘Earth’ beside *ülke* ‘country’. Finnish has *maailma* ‘world’, consisting of *maa* ‘land, country, ground’ and *ilma* ‘air, weather’.

Outside of the major languages of Europe and Asia there is more conflation of terms for world, ground, and country. Thus Nenets has *ja* ‘place, earth, ashore, dry land, country’. Yukaghir has *kužuu oŋil* ‘world, universe’ (lit. ‘split in the sky’) as well as in the Kolyma variety *lebie* ‘country, ground’ – Tundra Yukaghir has *lewejn-burebe* ‘nature, homeland’ (lit. ‘cover of earth’). Nivkh has *kur-ŋ* ‘world, universe’,²⁷ as opposed to *mif* ‘land, place’ given in 2.1. Samoan has *lalo-lagi* ‘world’ (lit. ‘down’ plus ‘sky, heaven’). Classical Nahuatl has *cemanāhuatl* ‘world, universe’ (containing *ce(m)-* ‘completely, one’ and *nāhuatl* ‘close by’ – Una Canger, pers. comm.). Koyukon has *nen* ‘land, earth, ground, country’, *nen’ kkokk’e* ‘ground, land, earth, world’ (lit. ‘surface of the earth’), and *nen’ baaghe* ‘the world, the earth’ (lit. ‘edge of the earth’) (Jetté and Jones 2000: 474–5). Nuuchahnulth has *ḥaḥuuł* ‘territory, property’ as opposed to *c’ak’umc* ‘earth’ (the substance). Ket has *il’baŋ* ‘world, space, universe’, from *il-* ‘breathing’ and *ba’ŋ* ‘place, land, ground, region’ (but also

27. Also ‘god’. This meaning referred originally to the four spirits of sky, sea, fire, and mountain (Shternberg 1999: 158, 165).

'time').²⁸ Xhosa has *um-hlabathi* 'the world' (cf. *um-hlaba* 'earth, ground' mentioned in 2.1), also *ili-zwe* 'land, country' (cf. *isi-zwe* 'tribe' with a different classifier prefix). Yoruba has *aiyé* or *ilè aiyé* 'the world' (*ilè* is 'ground, land'), and note *aiyéráiyé* 'everlasting' with repetition of the stem, and *ilú* 'territory, country, town'. Yidiny has generic noun *bulmba* 'world, habitable place, house, camp' (in the first sense this can include the sky – Dixon 1977: 492), also *ḍabu* 'ground, earth, solid material other than wood or rock'.

Quechua is of particular interest: it has *pacha* 'the Earth' (in related Aymara it is 'time'), apparently better translated as 'spacetime', as opposed to *alipa* 'earth, ground, terrain'. Wikipedia has the following comment: "The *pacha* (often translated as *world*) was an Incan concept for dividing the different spheres of the cosmos in Incan mythology. There were three different levels of *pacha*: the *hana(n) pacha* or *hanaq pacha* (Quechua meaning 'world above'), *ukhu pacha* ('world below'), and *kay pacha* ('this world'). The realms are not solely spatial, but were simultaneously spatial and temporal." The temporal sense was mentioned in 2.2.

Eskimoan languages are also of interest here: they make a distinction between PE **nuna* 'earth, ground, land' (also 'country' and 'village') and **cila* (WG *sila*) 'weather, world, outside', also 'spirit, intelligence, awareness'.²⁹ Recall the link in Romance and other IE languages between 'weather' and 'time' in 2.2. In WG *nunarsuaq* ('great *nuna*') is '(the) world' (its reference specifically to the Earth presumably by later influence from Danish), and *silarsuaq* (lit. 'great *sila*') is 'the universe, Nature'. Yupik languages also use the *nuna* stem, as in *nunarpak* (Central Alaskan Yupik, CAY) and *nunarllak* (Central Siberian Yupik, CSY), with other affixes meaning 'big'. Elsewhere, in many Inuit dialects, *sila* alone can have the 'world' meaning. The 'intelligence, awareness' meaning comes from an animistic concept of the universal spirit infusing the world – basically everything in the environment that moves (inhabited by a spirit) as opposed to static *nuna* (in turn distinguished from *imaq* 'sea'). CAY equivalent (*c*)*ella* occurs also in the phrase *ellam yua* 'God' (lit. 'human – i.e. indwelling spirit – of the weather'). There is also PE **avan/ avatə* 'area around', of a vaguer sense of immediate surroundings, either on land or sea, extended in WG to *avataarsuaq* 'universe' (i.e. 'big surroundings').

In the same family, Aleut has *tana-X* 'land' (the cognate of *nuna*), which in Atkan also covers 'space' (open or too much of), and *slu-X* 'home, homeland, world, universe' (especially in a biblical context in the 'world' sense), which can

28. Vajda and Werner (in preparation) explain this as the mortal as opposed to the spirit world.

29. Compare Latin *animus* 'mind, reason' and Greek *anemos* 'wind', both from IE **anə-* 'breathe'. Interestingly, young children often associate thought with the air or wind (Piaget 1929: 47).

also mean ‘summer, year’.³⁰ The latter term is unrelated to *sla-X* ‘weather’, the cognate of Eskimoan **cila*. Atkan Aleut also has (mainly biblical) *hangada-* ‘earth, world, universe’ (literally ‘top surface’). Unrelated but adjacent Chukchi has something very similar to Eskimoan *nuna* vs. *cila* in its distinction between *nutæ(nut)* ‘land, country, tundra’ and *ɣaryənen* or *əmyaryənen* (with *əm-* ‘all’) ‘weather, outside, universe’, earlier also ‘universal spirit’, as in Eskimoan (cf. Krušanova 1987: 88–90).

The most common senses of WORLD across languages that can be abstracted from the forms given above are: (a) WORLD as the framework of human activity (in general); (b) WORLD as maximal extent of familiar territory or country; (c) WORLD as Nature (independent of human affairs); and (d) WORLD as planet – the most important of which is our own, Earth. Words for WORLD in sense (b) range in their referential potential beyond the house to the camp or village, to the surrounding land plus sky (all covered by Yidiny *bulmba*), to the whole country or to the Earth itself and beyond it to the infinite universe, depending on individual and cultural experience. There are usually distinct words for Land in the sense of Country – I shall return to those for Country in 7.3. Where reliable etymologies are available the origin of these words is often to be found in more concrete senses like ‘(dry) land’ or ‘community’, less commonly in metonymy involving weather or light, but not in metaphor. There may be overlap with both SPACE and TIME words (and sometimes with both at once, as in Quechua and Aleut).

We have now come some way towards understanding the underlying experiential basis behind words for SPACE, TIME and WORLD. But we have yet to consider the whole range of worlds that characterizes human experience – this is far from uniform. First we need to look a little closer at the different senses of the English word ‘world’ as opposed to ‘earth’ and ‘age’, and compare near-equivalents in other languages.

3.2 World or Earth?

English makes a distinction, slightly overlapping, between ‘world’ and ‘earth’, similar to that between French *monde* and *terre* and German *Welt* and *Erde*.³¹ Compare the Collins dictionary entry for ‘world’ given above with the following entry for ‘earth’:

30. *Slu-X* is probably cognate with CSY (*e*)*sluq* ‘lee side, south’, from PE **cilur*-‘glide (with the wind)’.

31. Russian is rather different, having, as we have seen, two overlapping words for WORLD, *svet* and *mir*. Corresponding (more or less) to ‘earth’ is *zemlja*.

- (1) the third planet from the sun, the only planet on which life is known to exist;³²
 (2) the inhabitants of this planet (“the whole earth rejoiced”); (3) the dry surface of this planet as distinguished from the sea or sky; land, ground; (4) the loose soft material that makes up a large part of the surface of the ground and consists of disintegrated rock particles, mould, clay, etc.; soil; (5) worldly or temporal matters as opposed to the concerns of the spirit; (6) the hole in which a burrowing animal, esp. a fox, lives.

Buck distinguishes between sense (c) of Earth/Land given in Chapter 3 (dry land or earth as opposed to the sea) and the separate category ‘Earth as ground or soil’. As regards the latter he mentions Greek *khoma*, originally ‘earth heaped up’, which in Modern Greek is ‘ground, soil’, Latin *solum* ‘ground, soil, bottom, sole’ (the source of English ‘soil’), and Czech *půda* ‘bottom, ground, soil’ (cf. Russian *pod* ‘bottom (of s.th.)’, from IE *ped- ‘foot’). Note that Old English *grund*, like German *Grund*, was originally ‘bottom’ rather than modern English ‘ground’. German has *Boden* meaning ‘ground, soil’ as well as ‘bottom, base, floor’. Other words specifically for ‘ground’ include French *terre*, German *Erde*, Russian *zemlja*, Greek *khthon*, Hindi *zamīn*, Japanese *jimen*, Arabic *ʾarḍ*, and further afield, Koyukon *nen*, Yukaghir *lebie*, Ket *baʼŋ*, Yoruba *ilẹ̀*, West Greenlandic *nuna*, Aleut *tana-X*, Yidiny *ḍabu*, and Quechua *alipa*.

Apart from the differences to be seen when comparing these definitions, there are also differences in idiomatic expressions containing the two terms. Why, one might ask, does one say either ‘where/what in the world’ (or ‘on earth’) when surprised at some situation, but only ‘when/who on earth’? The use of prepositions here is a clue: one is “in” the world (where people move about), but “on” Earth (i.e. the ground or the surface of the planet). Earth is a world, but not *vice versa*: a world is not necessarily a planetary body, nor is it just the ground we walk on. Compare the following idioms, which often reflects the different etymologies of the two terms: the ‘world’ is to do with the affairs and lifetime of man, ‘the Earth’ with the soil beneath one’s feet. First some idioms with ‘world’. Salient features include great extent or value; the whole of humanity; or reference to the “next” or some alternative world. The Collins definition closest to the use of the word in the expression (its figurative basis) is tentatively added in parentheses.

- ‘bring into the world’ (11)
 ‘think the world of’ (13)
 ‘dead to the world’ (3)

32. And further: “It is not quite spherical, being flattened at the poles, and consists of three geological zones (the core, the mantle and the thin outer crust). The surface, covered with large areas of water, is enveloped by an atmosphere, principally of nitrogen (78 per cent), oxygen (21 per cent) and some water vapour, etc.”

'for all the world' (and negative, 'not for the world') (13)
 'give to the world' (e.g. a publication) (3)
 'all the world and his wife' (2)
 'the best of both worlds' (cf. Spinoza's "best of all possible worlds") (11)
 'man of the world' (4)
 'on top of the world' (14)
 'set the world on fire' (i.e. be very successful) (3)
 'out of this world' (11)
 'a world of adventure' (10) (describing a theme park)
 'world without end' (5)
 'the underworld' (criminal) (8)
 'world-famous' (3)
 'world language/ power' (2)
 'worldwide' (2)
 'world-weary' (11)
 'worldly wise' (14)

Compare now some French expressions with *monde*. Some of them overlap with the English equivalent, but there are also some unique idioms (from the Concise Hachette French Dictionary):

'les meilleurs amis du monde' (the best of friends)
 'le plus calmement du monde' (quite calmly)
 'pas le moins du monde' (not in the least)
 'se porter le mieux du monde' (to be absolutely fine)
 'parcourir le monde' (travel the world)
 'c'est le bout du monde' (in the back of beyond)
 'à l'autre bout du monde' (half way round the world)
 'comme le monde est petit !' (it's a small world!)
 'les biens de ce monde' (worldly goods)
 'elle n'est plus de ce monde' (she's no longer with us/ dead)
 'le monde des vivants' (the land of the living)
 'le monde animal' (the animal world)
 'ils ne sont du même monde' (they are from different social backgrounds)
 'un monde nous sépare' (we are worlds apart)
 'il n'y a pas grand monde' (there aren't many people)
 'j'ai du monde ce soir' (I'm having people round this evening)
 'tout mon petit monde' (my family and friends)
 'le beau monde' (high society)
 'se faire un monde de qch.' (get all worked up about something)
 'depuis que le monde est' (since the beginning of time)
 'c'est un monde !' (that's a bit much !)

And now with German *Welt* (from the Cassell's German Dictionary). Note that some of these are translated with 'earth' rather than 'world' in English.

‘alle Welt’ (everyone)
‘aus der Welt schaffen’ (do away with, kill)
‘nicht aus der Welt sein’ (not be all that far away)
‘da ist die Welt mit Brettern verschlagen’ (that’s the end of it, no headway is to be made – literally ‘the world is boarded up’)
‘sich durch die Welt schlagen’ (make one’s way in the world)
‘die grosse Welt’ (high society)
‘warum in aller Welt?’ (why on earth?)³³
‘um alles in der Welt’ (for all the world)
‘in aller Welt nicht’ (not for all the world)
‘das geht mich in alle Welt nicht an’ (I have no earthly concern with that)
‘die junge Welt’ (young people)
‘ein Mann von Welt’ (a man of good breeding)
‘zur Welt bringen’ (give birth to)

Now compare some English expressions with ‘earth’. Features highlighted here are closeness to the ground, material as opposed to spiritual value, and representation of the physical planet. Similar expressions are found in French and German.

‘earthly’ (related to Earth, distinct from ‘earthy’ of the soil)
‘not an earthly chance’
‘earthman/ earthling’
‘cost the earth’
‘down to earth’
‘earthwards’
‘earthbound’
‘earth-born’
‘earth mother’
‘earth-rise’
‘earthquake’

It would seem that the distinction between World and Earth is not commonly made outside of the major languages of Europe and Asia. This presumably reflects cultural/historical awareness of the nature of the earth as a planet, not just as the immediate social and physical framework of human affairs. It is interesting to note here the ASL signs for World and Earth (in Riekehof 1963: 75). The sign for WORLD consists of a circling motion of the right hand in the W shape over the left hand in the same shape, indicating the world going round. The sign for EARTH is different: the thumb and middle finger of the right hand are placed on the back of the left hand near the wrist and rocked back and forth, indicating the earth rotating on its axis. These obviously reflect the same culturally transmitted picture of

33. Compare ‘auf der Welt’ (on earth), with *Welt* rather than *Erde*.

our planet that any English speaker would recognize today. Compare them with the sign for LAND (or FIELD), made by rubbing the fingertips against the thumbs of both hands, then making a counter-clockwise circle with the right open hand, palm down, as if feeling the soil and indicating a large area. This presumably covers the same sense as ‘ground’ in English.

3.3 World or Age?

Amongst the words for WORLD mentioned in 3.1 are several that include the term ‘age’ in their definition. What is the difference between a ‘world’ and an ‘age’? For a start, a specific, named Age (such as ‘the Iron Age’ or ‘the Age of Steam’) presupposes a striatal view of history or mythology. Ages succeed each other in a series, at least in theory – thus ‘the Stone Age’ precedes ‘the Bronze Age’. But ages may overlap – where exactly does the Age of Steam end and the Railway Age begin? And is not the Railway Age still going on, despite the fact that we are now in the Space Age? There is more to it than that. Why, for instance, do we talk of ‘the Age of the dinosaurs’, or ‘the Cretaceous Age’, with ‘age’ and not ‘world’? And why do we refer to ‘the Animal world’ with ‘world’ and not ‘age’, or to ‘the Jurassic world’ when referring to the contents of the film Jurassic Park rather than to the paleontological ‘Jurassic Age’? Why could the book titles “The Lost World”, and “Brave New World” not be reasonably reformulated with ‘age’? And why do historians talk of ‘the Greek world’ or ‘the Inca world’ rather than using ‘age’, even though these fit into a series of eras?

Let us start with the Collins definition of ‘age’ (slightly curtailed):

- (1) The period of time that a person, animal, or plant has lived or is expected to live;
- (2) the period of existence of an object, material, group, etc.;
- (3) a period or state of human life, age group;
- (4) the latter part of life;
- (5) a period of history marked by some feature or characteristic, era (capitalized when part of a name – The Space Age, The Middle Ages, etc.);
- (6) generation (the Edwardian age);
- (7) a period of the earth’s history distinguished by special characteristics (the Age of reptiles), the period during which a stage of rock strata is formed, a subdivision of an epoch;
- (8) mythological: any of the successive periods in the legendary history of man (Hesiod’s golden, silver, bronze, heroic and iron ages).

It is definitions (5), (6) and (7) that I am concerned with in the present section, not those referring to an individual’s age or to mythology.

The etymological source of ‘age’ itself is (via Old French) Latin *aetās* ‘age, generation, period’ (compare the Italian cognate *età*), ultimately from *aevum* ‘lifetime’, as mentioned in 2.2. The nearest equivalent in early Greek is *khronos* ‘time,

duration, age, period,' also mentioned there. There were also named *epokhe* 'era, season' (earlier 'fixed point of time'), and the corresponding Latin term *æra* 'time from which a date is reckoned, epoch,' the source of English 'era'.

Amongst modern European languages, we saw in 3.1 the Germanic words for WORLD, including German *Welt* and Old English *weorold*, as referring literally to "the age of man". They come, as mentioned, from **wer* 'man,' plus **ald* 'age'. Both the personal and the historical senses of 'age' are found in French *age*, as is also the case with German equivalent *Alter*. Russian has *vek* 'age, century, lifetime,' which does not refer to an individual's age in years however. It is related to Latin *vincere* 'conquer' and Gothic *weihan* 'fight,' the progression according to Buck (1988: 956) being from 'strength' to 'life' to 'lifetime/age'. Finnish *aika* 'time' can also refer to a 'period' or 'age'.

Outside of Europe, Mandarin has *shídài* 'time, age, period' in which the first syllable is 'time,' as mentioned in 2.2, also *niándài* 'era, period, age' in which the first syllable is 'year' (also 'person's age'). Japanese has borrowed the first of these in *jidai* 'time, period, age, era' (referring, for example, to the Meiji era). The second syllable in both languages is 'generation, age, reign' (also as a verb 'replace'). The Quechua 'time' word *pacha*, conceived of as a sequence of ages or periods, was discussed in 2.2. It can be compared with the mythological sequence of Ages in the ancient Greek world described by Hesiod: the golden, silver, bronze, heroic and iron ages, each one representing a decline towards the present. Compare also the four successive "worlds" of the Hopi creation myths, the first of which was Tokpela or "Endless Space", with no beginning, no end, and no life, requiring the intervention of a Creator to mould solid substances. Human beings were happy here until their misbehaviour caused the destruction of successive worlds and the establishment of new ones, ending with the present unhappy one (Waters 1977: 3).

To summarize so far: when one talks of a named 'world' one is referring not just to a chronological period (as quintessentially with 'age'), but of the characteristic contents of that period. Thus terms like 'the Ancient World,' and 'the Western World' refer to the kinds of characteristic mores, ethnic populations, economics, politics, culture, physical location, and many other things that they entail. And when we refer to 'the Animal world' we are concerned with the various species, their appearance and behaviour, that make up that classification (as opposed to the purely human world), not with an era, a chronological sequence as such (though that can be inferred).³⁴ To be sure, an age such as the Stone Age has contents too, but that is not what is focused on ("profiled", to use Langacker's terms).

34. The use of words for Age in Western languages to refer to successive historical periods may in fact be based upon an understanding of geological strata in rocks, concomitant with the growing awareness of "deep time".

We could go further and talk of “the Stone Age world”, thinking more of the way of life of people living in that chronological era. Even Conan Doyle’s “Lost World” focusses on content rather than chronological frame, even though that content is unfamiliar or quite unknown to readers (a similar argument could be made about the ‘Jurassic world’ example). But that is the point – like ‘the New World’ to which the title harkens, it contains the potential for life of some kind, even if of an alien or unknown kind. Its chronological sequence is quite uncertain, apart from being “lost” to contemporary western knowledge.

It is now possible to put together in Figure 1 a “semantic map” of words for WORLD, including overlapping ones for Earth and Age and some other closely associated meanings, in a number of the contemporary languages discussed above. While semantic maps were developed for comparing grammatical categories across languages and relating them to their common conceptual underpinnings, the basic idea can easily be applied to lexical fields as well, as Haspelmath (2003: 237) demonstrated with “tree/wood” words, based on an example presented by Hjelmslev (1963: 53), who used it in order to illustrate how different languages carve up semantic space in different ways. The categories I assume here – moving from the purely physical to the world of human affairs – are simply the most prominent distinctions made by a comparison of the linguistic items presented in the present chapter (here simplified). These all obey the “Semantic map connectivity” hypothesis (Croft 2001: 96) according to which the semantic extent of individual words mapped onto the conceptual space concerned may overlap but may not be split between non-adjacent categories. Note that ‘nature’ here refers to the dynamic, evolving aspect of WORLD, and that Russian *mir* may also refer to the universe, a later usage (see under 3.1).

Other distinctions could perhaps be included in the conceptual field here. I have intentionally not included separate words for ‘universe’, since they represent either later development of words for WORLD or neologisms coined as philosophical/scientific ideas of ‘the Whole’ developed. I have not included more figurative uses of the words concerned, as this would confuse the picture. The boundaries of the conceptual field are admittedly somewhat fuzzy. The distribution of the key terms in major European languages can be seen to be rather close, less so with languages outside Europe. Note especially the overlap in meaning of the ‘earth’, ‘world’ and ‘age’ words in English, French and German. I suspect the close parallelism has something to do with historical French influence. This overlap between ‘earth’ and ‘world’ is somewhat similar to that between ‘space’ and ‘place’ words in 2.1, where ‘space’ refers quintessentially to the purely physical world and ‘place’ to locations or positions relevant to human activities.

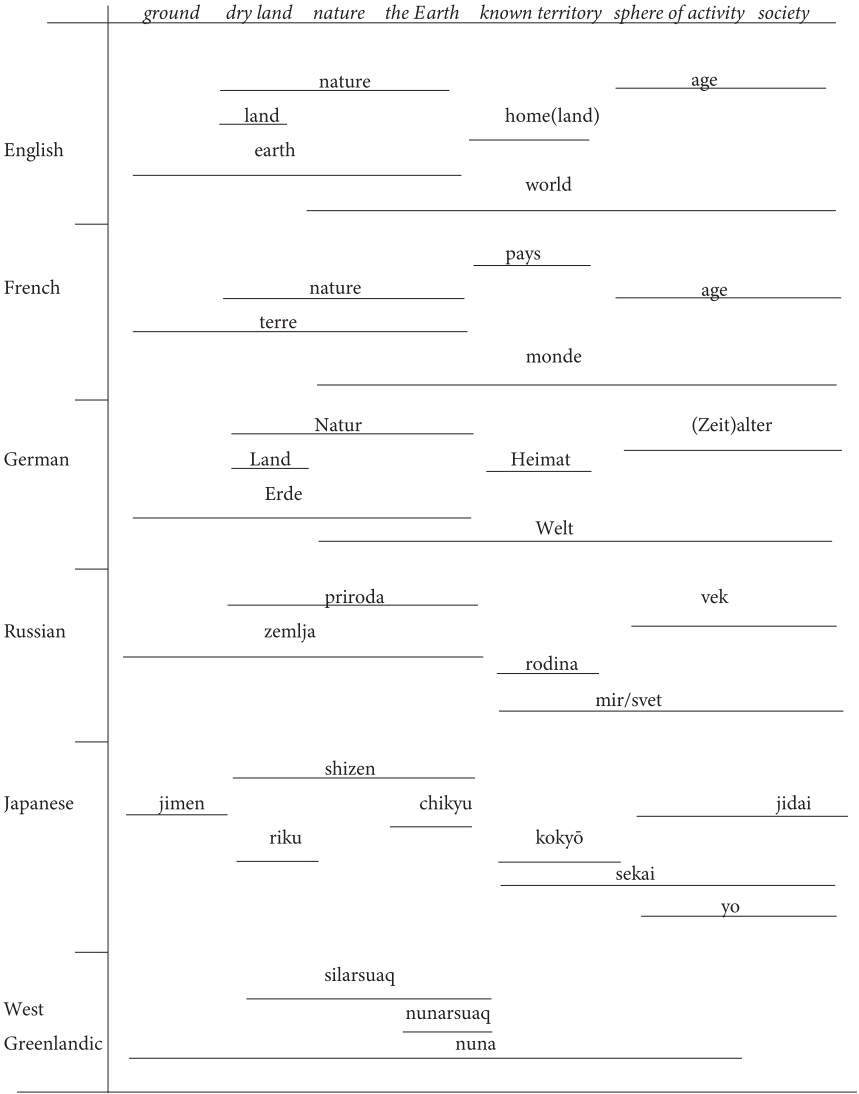


Figure 1. Semantic map of World, Earth and Age words

The relationship between Space, Time and World

There is much in the preceding survey suggesting that the overlap of the meaning of words referring to TIME and SPACE is quite common. The expression of TIME through reference to SPACE (for example by pointing at the position of the sun) is well attested across the world's languages (see Levinson 2003: 262, for examples). SPACE can also be expressed through time: 'The village is two day's march from here'. SPACE FOR TIME metaphors are more common amongst the world's languages than TIME FOR SPACE ones are, perhaps because SPACE is more readily manipulated and measured than is TIME. In general, spatial relations are more readily measurable since SPACE has three dimensions, allowing the measurer to move in a higher dimension than the measured. This includes measuring spatial as opposed to temporal length. We are also used to clock faces on which time – punctual and cyclical – is indicated by spatial (radial) positions. Whereas TIME is largely experienced through the auditory sense, SPACE is principally a visual matter, and vision is the predominate sense channel of human beings. Cognitive linguists like Lakoff and Sweetser have analysed expression of TIME in terms of underlying conceptual metaphors. Thus Lakoff (1993) identified two TIME PASSING IS MOTION metaphors, namely TIME PASSING IS MOTION OF AN OBJECT ("moving time"), and TIME PASSING IS MOTION OVER A LANDSCAPE ("moving ego"). Núñez and Sweetser (2006: 12) consider construals of time as relative motion as likely candidates for primary (i.e. universal) metaphors. This is of course a matter of psychological or subjective as opposed to absolute TIME – it is populated by sensory memories of the PAST and plans or predictions for the immediate or distant FUTURE. I should reiterate here that the metaphorical uses of the English word 'time' in Chapter 2 do not necessarily reflect conceptual metaphors themselves, though the word does enter into collocations that can be so construed. Thus 'The time will come when...' and 'Time flies' discussed by Lakoff and Johnson 1980: 42–3). Conceptual metaphors are deeper than individual words, coming to the surface in a wide range of words and constructions, e.g. 'We're looking forward to the coming weeks' and 'We're coming to the end of the year', which reflect respectively a 'time is a moving object' (with a "back" – after – and a "front" – before), and a 'time is stationary and we move through it' metaphor. Some such metaphors are more culturally specific.

Thus Casad discusses TIME MARCHES UPHILL and TIME COMES AROUND FROM BEHIND THE CORNER metaphors in Cora (Casad 2012: 154 and 175–6).

There is a still more basic subjective experience of TIME, that which William James (1963: 252–57) called the “sensible present” of experienced duration, elsewhere called the “specious present”.³⁵ It is the maximal stretch of time in the stream of consciousness, the here and now of which we can be directly conscious. James (1963: 253) estimated that it lasts between 1/500 of a second to about 12 seconds. Evans (2013: 81) refers to it as the “perceptual moment”, lasting in the order of a few seconds. This has at all events nothing to do with metaphor or the schemas underlying them, or indeed with frames of reference, though it is the starting point for these more articulated schemas of spatiotemporal and kinaesthetic bodily experience. I shall have more to say as regards the specious present in Chapter 10.

Consider now the common polysemies that we have seen in the specific linguistic forms discussed in the previous sections. These include the following:

time – weather (Romance languages, Greek, Albanian)

time – occasion (Japanese, Sanskrit, Icelandic)

time – hour (Indonesian, Samoan, Greek)

time – season (Latin, Hindi, Yoruba)

time – age (Ancient Greek, Finnish, Quechua)

time – opportunity (Latin, Sanskrit)

space – room (Latin, Danish, Mandarin)

space – weather (Eskimoan languages)

space – country (Greek, Nivkh)

space – place (ASL, Latin)

space – air (Mandarin)

These are principally a matter of metonymy, of adjacency, but the space-time overlap itself, where it occurs, is not metonymic: the spatial meaning is not adjacent to or associated with the temporal one, it is (partially at least) merged with it. Polysemies of words for WORLD that we have seen are different, involving essentially a dimension of “containment”. They include the following:

world – earth/ground (French, Latin)

world – order (Ancient Greek)

world – weather (Eskimoan languages, Chukchi)

world – age (Germanic languages)

world – light (Slavic languages)

35. Note the etymology of English ‘present’ from Latin *praesēns* < *prae-esse* ‘be in front’, which is a spatial metaphor.

world – people/community (Russian)
 world – nature (Indonesian, Sanskrit)
 world – country (Koyukon)
 world – home/abode (Aleut, Yidiny)

A number of words for ‘sky’, ‘air’, and ‘weather’ have been mentioned above – clearly these are relevant to the concept of (the) WORLD, and the association – principally by metonymy – between all of them is widespread. In Appendix 1 I present further words for these concepts in a variety of languages.

The extent to which many of the basic words we have looked at cover both TIME and SPACE is notable. This is particularly evident in words for ‘interval’, but it is reflected in other ways in some non-European languages like Quechua with its “space-time” concept of *pacha*. Recall also West Greenlandic affix *-vik* and stem *nali-*, Ket *ba’η*, Koyukon *den*, and Japanese *tokoro*, all introduced above in the sense ‘point in time or space’. In European languages it can be seen in the development of TIME words from expressions of Motion. Thus Greek *khōros* from *khōrein* ‘move’, and Russian *vremja*, related to Latin *vertere* ‘turn’ (as also in the pan-European word ‘universe’). This is clearest in the related words ‘moment’ and ‘momentum’, both from Latin *momentum* ‘movement, impulse, effort, impulse, importance’ < *movēre* ‘move’.³⁶ I shall expand in further chapters the claim that the basic relationship between words for SPACE, TIME and WORLD is neither metonymy nor metaphor, but lies at a still deeper cognitive level.

A general caveat should be added at this point: a person’s WORLD is not just a construct in the mind of the experiencer. It is a continual interplay between that inner “model” and the outer, spatiotemporal WORLD, as mediated through the senses – and not solely in the visual modality either. Consider auditory space for example. This is essentially a matter of TIME rather than SPACE – the rhythmic dynamic that projects us powerfully into an immediate, repetitive future. Music can nevertheless build transient “worlds” of pitch, harmony, tone colour as well as rhythm.³⁷ Consider in particular the subtle interweaving of spatial and temporal dimensions in the performance of a piece of music on an instrument: the spatial

36. Compare by contrast ‘instant’, literally ‘standing in’ (Latin *instāns*, from *in-* plus *stāre* ‘stand’), German *Augenblick* (lit. ‘eye glance’), and Russian equivalent *mgnovenie* (lit. ‘a blink (of an eye)’), which are metaphorical expressions for the same notion as ‘moment’, as is Greek *stigmai* ‘instant, dot’ (from *stizein* ‘prick, tattoo’).

37. One might even talk of a distinction between 2D and 3D musical worlds – compare a mono recording with a stereo one in which depth is simulated, though never as fully as in a real concert hall experience. Even a mono experience has dimensions analogous to left-to-right (the musical progression) and up vs. down (pitch).

positioning of the fingers on a flute or violin that rapidly alternates as the piece flows from note to note through time (and ‘in time’ with other participants).

The nature of the inner model may vary greatly according to the individual’s experience, as well as to his or her environment.³⁸ As Oliver Sacks puts it: “There is increasing evidence for the extraordinary rich interconnectedness and interactions of the sensory areas of the brain, and the difficulty, therefore, of saying that anything is purely visual or purely auditory, or purely anything. The world of the blind can be especially rich in such in-between states – the intersensory, the metamodal – states for which we have no common language” (Sacks 2010: 238). The deaf-blind too are certainly capable (like Helen Keller) of developing a reliable representation of the non-visual world they move around in, thanks to an enhanced sense of touch and access to language and culture through braille. I shall return to this in Chapter 12. Even fully sighted people living in extreme environments may experience quite different worlds from our own – the BaMbuti pygmies of the equatorial forest of the Congo are a case in point, as described by Turnbull (2015). The dense forest, with which they have an intimate relationship, constrains their spatial perspectives in such a way that emerging from it into open territory may completely disorientate them. Finally, naturalists Dawkins and Wong have speculated on the “qualia” (subjective experience) that creatures very different from us might experience in their worlds – sonar in the case of bats and touch with star-nosed moles. They suggest that this may be analogous to our own subjective experience of colour (Dawkins and Wong 2017: 294).

It should be borne in mind that the concept of WORLD encompasses more than just a unitary physical reality, it may involve a hierarchical structure of worlds-within-worlds (I shall produce an example in the following chapter). It also encompasses social worlds, as in the Collins definition (4) of ‘world’: “social or public life”. An individual may belong to a number of different overlapping worlds in this sense, each of them associated with various world-views and practices, ranging from one’s immediate family and friends to one’s community, to one’s language group, and to one’s nationality or religious affiliation. Animals too (at least higher ones) inhabit distinctive social worlds besides adapting to their spatiotemporal environment.

We can now, as a first approximation, suggest how spatial and temporal frames of reference might be combined in frameworks encompassing whole spatiotemporal worlds (wFoRs). The simplest model is to combine Levinson’s (2003) and Evans’s (2013) FoRs in the following manner. In Table 1 wFoR_i refers to an individual’s perspective on his/her changing environment, including personal

38. From OF *environ*: *en-* ‘in’ plus *viron* ‘circuit’, < *virer* ‘turn’, related to Latin *vertere* of that meaning.

memories (corresponding more or less to Collins definition 12);³⁹ $wFoR_2$ refers to a species' (including man's) life span or part of it (cf. Collins definitions 2 and 8); and $wFoR_3$ to a/the whole planet plus inhabitants (cf. Collins definition 1). Other senses of 'world', such as those under Collins definition 10 ("The world of television", etc.), are figurative. I shall return to a more refined version of this in Chapter 9.

Table 1. Approximate correlations between frames of reference

<i>sFoR</i>	<i>tFoR</i>	<i>wFoR</i>
relative	deictic	$wFoR_1$
intrinsic	sequential	$wFoR_2$
absolute	extrinsic	$wFoR_3$

There is one more important point to make here. We have seen a good many words with meanings that cover both 'world' and 'place', and we have noted the common area of overlap of meaning between words for 'world' and for 'Earth'. This surely reflects the natural tendency to refer to worlds as places or things, ignoring, that is, the temporal dimension altogether, given that language forces us to make a fundamental distinction between nouns (referring basically to objects) and verbs (referring basically to events), as Langacker (2012: 193–200) discusses. There is no half-way lexical category to refer solely to moving or evolving things, though verbs referring to events can always be nominalized ('my meeting with the director on Thursday'). When we talk of the Earth, we are referring to it as an object in SPACE. And when we talk of it is a 'world' – a noun – we transfer this perspective, potentially contrasting it with other worlds in SPACE and ignoring its temporal duration and/or evolution through TIME unless that is being specifically discussed. But note that we also refer to worlds understood in the temporal sense of successive Ages as objects expressed by noun phrases, for instance 'the Age of the dinosaurs'. This may be a further example of a neo-Whorfian affect of language on thought.

39. However, I would split definition (12) into two parts: here I am referring to the subjective experience, not the total objective circumstances of one's life.

CHAPTER 5

The traditional Inuit World

At this point I shall attempt (with limited success!) to describe the framework of a complete world view, combing both spatial and temporal aspects. This will be easier to do with a hunter-gatherer society like the traditional Inuit one than one displaying much more complex and varied modern European concepts of WORLD. In some respects this framework lies closer to the Medieval European view of the world, to be characterized in Chapter 15. The key PE words *cila and *nuna, often translated as ‘universe’ and ‘land’ respectively, have already been mentioned in Chapter 3, though their purport is much broader and at the same time more nuanced than these glosses would suggest. MacDonald (1998) has a succinct coverage of the subject, focusing on the views of the elder Inuit of Igloolik, and Zeilich-Jensen (1974) described in very similar terms the world view from the neighbouring North Baffin settlement of Pond Inlet. Accounts from as far afield as Alaska and East Greenland corroborate the overall picture, with some variation in detail.

According to MacDonald (1998: 23ff.) Inuit everywhere tended to regard the Earth (*Nunarjuaq* in the Igloolik dialect) as being at the centre of the universe:

Multiple celestial realms, sometimes up to four or five in number, were layered horizontally or spherically above the Earth, each supporting its own distinct world, often associated with a particular heaven or “land of the dead”. Temptingly reminiscent of a Platonic universe delineated by “perfect concentric spheres,” the Eskimos of the Bering Sea area have graphically represented their various celestial worlds by incorporating circular hoops of wood, known as *ellanguat* (“models of the universe”) into some of their ceremonial masks (Fienup-Riordan 1988: 257). This is a view supported by observing the apparent movement of the sun. “The sun moves around the sky in a circle during July and June when it never sinks below the horizon. During the months when the sun sets it was thought to travel all the way under and around the earth” (Gubser 1965: 193)... In form, the Earth was assumed to be a large, flat disk of some considerable thickness – an assumption supported by Inuit observation of the way water behaves on various surfaces. It was stationary and the celestial bodies moved around it.

MacDonald continues (pp.31–33): the celestial sphere, or the sky, in which the Sun, Moon, and stars are placed, is called *qilak* (‘sky’). In form *qilak* is a solid, arching canopy, “an immense dome, of hard material, raised over the earth, long from east to west and shorter from north to south” (Turner 1894: 267). The sky

was envisaged by many Inuit groups, including the people of Nunivak, as having holes in it – the stars – through which the shaman went when he journeyed to the sky (Lantis 1946: 197). All of this is reminiscent of the common beliefs of people in the European Middle Ages.

This brings us to the concept of *sila* (PE *cila). Spalding (1972: 102) summarizes its meaning as follows:

Sila can be used in three principal ways: as an indicator of environment, as indicator of locality, and an indicator of intelligence or spirit... In a world like *silarjuaq* [‘world, universe’ in Igloolik] we have a synthesis, one might say, of all these: that which supports life and physical being, that which defines horizons and limits, and that which regulates and clarifies mind and spirit. In this concept, one feels a unity of microcosm and macrocosm, near and far, inner and outer, that is, one living physical and spiritual unity of being. These are the outlooks and values of all peoples who are wise from the contact with the air, earth and water.

MacDonald adds (1998: 37): “The preeminent identification of *Sila* with the weather continues today. All of the Igloolik elders interviewed about *Sila* immediately began knowledgeable and detailed discourse about weather in all its forms. *Sila*, personified as weather, is still to be respected and, above all, carefully watched.”

Elsewhere in his book he discusses traditional Inuit perceptions of TIME, quoting Gad (1973: 265):

Formally [they] had been quite content with the changing of the seasons and the known migratory habits of the animals [they] had hunted. Wind and weather might upset everything, but on the whole there was a predictable series of changes in a relatively rigid sequence, which applied also to the rising and setting of the sun, its height over the horizon, the period of darkness, the midnight sun in the north and finally the phases of the moon and tide. Besides that there was a rough system for reckoning longer periods of time, but this was more an individual measure, in relation to important events in one’s own life or the life of the settlement... The individual and his immediate family had their private calendar based on landmarks on the growing-up of their children, especially the boys.

MacDonald focuses on two principal means of measuring time for the Inuit – “star time” and “sun time”. As regards the former, he describes how certain stars and constellations were important as markers of seasons for the Inuit (pp. 44–6). Thus the rising above the horizon in mid-winter of the constellation *Aagjuuk* (Altair and Tarazed in the constellation of Aquila) marked a crucial time of year for the Inuit (as it was also for the neighbouring Chukchi). This corresponds to the winter solstice, bringing in the light of the new year. He also mentions (pp. 199–202) the revolving of the constellation *Tukturjuik* (Ursa Major) around *Nutuittuq* (Polaris)

and the easterly rising and westerly setting of non-circumpolar stars in general as significant for the Igloodik Inuit. He refers to an Igloodik elder recalling the old days:

In those days... everyone lived in igloos. the hunters usually had a peek hole in the igloo to observe the stars that were used to determine the time of morning... Everyone went to sleep early in comparison to what we do today...⁴⁰

As regards “sun time” (pp.201–2), observe Figure 2, which represents the divisions into which the day was divided (MacDonald 1998:202).

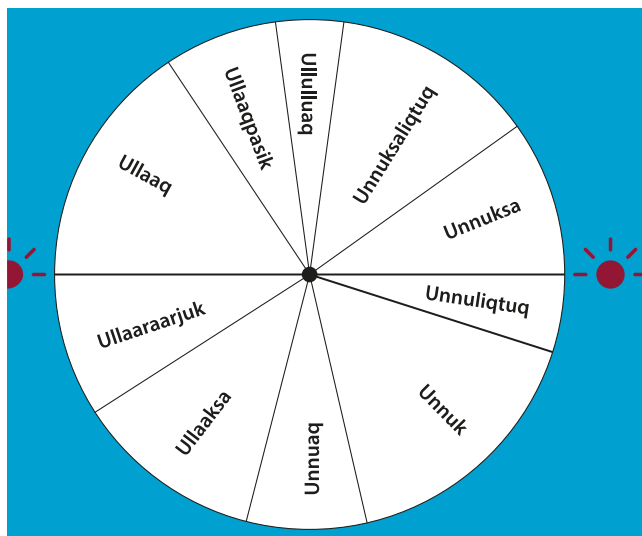


Figure 2. Divisions of the day for the Igloodik Inuit

With the exception of *ulluluuq* (the midday segment) and *unnuaq* (the midnight segment), these divisions are not directly dependent on the position of sun (which is of course impossible to calculate during the dark season, *Tauvikjuaq*). But *ullaaq* for example (that part of the morning when daily activities are normally underway) maintains the same relationship to the divisions on either side of it (*Ullaaraarjuk* and *ullaaqpasik*) irrespective of variable light levels. Depending on the season, further specification can be given by reference to the position of the sun. The seasonally progressing measurement of the sun’s height can be judged variously by harpoon, thumb or mitt length units. During the time of the midnight sun (*nipisuiqtuq* – literally ‘(the sun) never sets’) the night-time is

40. Note the parallel with the ‘vault of heaven’ view of *qilak* above, and in particular the peek holes through it described by Inuit cosmology – as below so above!

referred to as *unnuattak*, in contrast to *unnuk*, the term for ‘night’ when actual darkness occurs. Daytime can be approximately divided into the time when the sun is warming up (*kiakpallaktuq*), the time when it is at the warmest (*kijjiqtuq*), and the time when it is cooling off (*niglaliqtuq*).

For the approximate divisions of the year for the Igloodik Inuit according to seasonal activities see MacDonald (1998: 195–198) – these are comparable in type to those to be given for Central Alaskan Yupik in 17.2.

A composite picture that corresponds well with MacDonald’s description is presented in Figure 3, Zeilich-Jensen’s diagram below of the “world view” of the North Baffin Inuit of Pond Inlet. It is based on the account given to him by the oldest woman of the tribe, Kunuk (Zeilich-Jensen 1974: 33). Note that the sky is here held up by pillars, of which there are four at cardinal points (these are also mentioned by MacDonald) – in the diagram just the east and west ones are indicated (*östpelare* and *västpelare*). Other Swedish terms on the diagram are: *hav* ‘sea/ocean’, *himlavalv* ‘(vault of) heaven’, *världen eller den stora jorden* ‘the world or great earth’; *asiani* is given by Zeilich-Jensen as *den andra sidan* ‘the other side’, but is probably better rendered ‘somewhere else (far away)’.

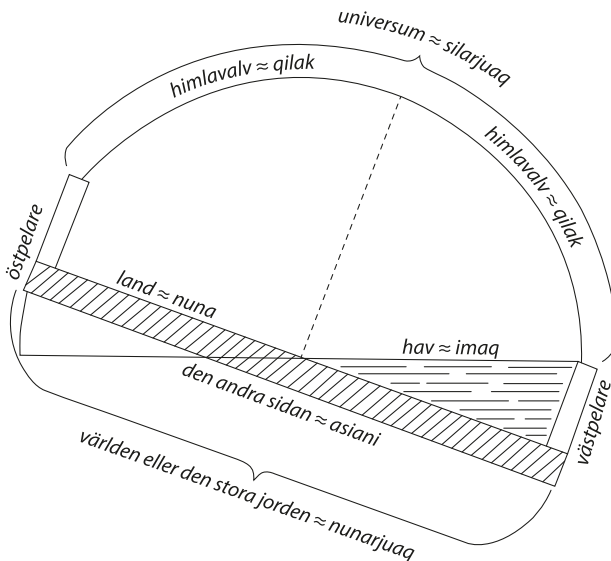


Figure 3. The world view of the Inuit (Zeilich-Jensen 1974: 33)

A cardinal concept in the Inuit and Yupik worlds is that of *nuna*, roughly translatable as ‘land’, which I have discussed in detail elsewhere (Fortescue 2021b). The term covers at least ‘land, earth, dwelling place, native country’ in WG, and ‘land, place, ground, the earth, animal’s habitat, village, country’ in CAY. Schneider

(1985) describes it for eastern Canadian Inuktitut (ECI) as ‘the earth, the sun and everything which grows on earth, country that is inhabited, vegetation.’⁴¹ The word has been in focus in recent times in connection with debates around Inuit land claims and is known to the wider world through the new Canadian administrative terms of *Nunavut* (‘our land’), and *Nunavik* (‘big land’), as well as in the official name of Greenland, *Kalaallit Nunaat* (‘land of the Kalaallit’). *Inuit Nunangat* (‘the land of the Inuit’) refers to the land of the Canadian Inuit as a whole.⁴²

Further related forms in individual dialects include the following WG ones (from Berthelsen et al. 1997 and Schultz-Lorentzen 1927): *nunarsuaq* ‘the world’ (with *-suaq* ‘big’), *nunasiaq* ‘colony’ (with *-siaq* ‘received’), *nunap timaa* ‘interior of the land’ (with *tima-* ‘body, trunk, interior’), *nunaqar-* ‘live (in a place)’ and *nunaqarfik* ‘settlement’ (with *-qar-* ‘have’ and *-fik* ‘place of’), *nunasi-* ‘immigrate, sight land, buy a piece of land’ (with *-si-* ‘get’), *nunasunni* ‘a smell of earth’ (with *-sunni* ‘smell of’), *nunat issittut* ‘Arctic, Arctic countries’ (with *issittu-* ‘cold’, in the plural), *nunarpasig-* ‘wind comes from inland’ (with *-pasig-* ‘come from a direction’), *nunaat* ‘cultivated soil’ (with *-ut/-at* ‘s.th. owned’), *nunar-* ‘touches land (boat pulled up or down on shore)’ (with *-r-* ‘go to’), *nunataq* ‘nunatak’ (with *-taq* ‘pertaining to’), and *nunagi-* ‘live there’ (with *-gi-* ‘have as’)

For ECI Schneider (1985) has *nunarjuaq* ‘the world’ (with *-juaq* ‘big’), *nunajaq* ‘the earth, vegetation’ (with *-jaq* ‘part or material of’), *nunaarait* ‘small flowers’ (with *-araq* ‘small’ in the plural), *nunaar-* ‘go inland, disembark’ (with *-ar-* ‘go to’), *nunalik* ‘inhabitant’ (with *-lik* ‘one provided with’), *nunaliri-* ‘cultivate the land’ (with *-liri-* ‘be concerned with’), *nunannguaq* ‘map’ (with *-nnguaq* ‘small, imitation’), *nunakkuujuuq* ‘terrestrial vehicle’ (with *-kkuujuuq* ‘means for travelling on’), *nunat-* ‘go ashore (once)’ (with *-t-* ‘get to’), and *nunatur-* ‘eat vegetation’ (with *-tur-* ‘eat’).

For CAY Jacobsen (1984) has *nunarpak*, ‘the world, city’ (with *-(r)pak* ‘big’), *nunarrluk* ‘dirt on floor’ (with *-rrluk* ‘dirty, unnatural’), *nunakegte-* ‘arrange, make room for’ (with *-kegte-* ‘have a good’), *nunakuarcuun* ‘car’ (from *-kuarcuun* ‘means for travelling on/in’), *nunaun* ‘(land) property’ (with *-un* ‘owned’), *nunate-* ‘visit from one village to another’ (with *-te-* ‘go to’), and *nuniur-* ‘dig in the earth’ (with *-(l)iur-* ‘work with’).

41. The inclusion of the sun here probably reflects derived extension *nunarjuaq*, literally ‘big world’.

42. Nunavut specifically refers to the eastern Canadian homeland of the Inuit, covering much of the original Northwest Territories, which was granted territorial status in 1999. Nunavik refers to the northernmost part of Quebec province inhabited by the Inuit for which a similar degree of autonomy is sought.

This array of meanings for *nuna* and its derivatives can be compared with those given by Buck (1988) for English ‘land’ in Chapter 3. Perusal of the forms given above suggest that Buck’s senses (b) ‘the solid surface of the earth (ground, the source of vegetation)’ and (c) ‘the solid surface of the earth vs. the sea’ are the most relevant – the prevalence of derived terms involving the latter sense clearly indicates usage by predominantly coastal people. The sense (e) ‘a definite portion of the earth’s surface, from the land of an individual to a whole country’ is certainly relevant but in the ‘whole country (or nation)’ sense it is a more recent development in colonial and post-colonial times. It can be assumed that knowledge of a distinct territory associated with one’s own tribe or dialect has always been possible to describe as “our *nuna*” or the like. Buck’s ‘whole earth’ sense (a) is clearly assignable to modern times, presupposing knowledge of the unity of the planet as a whole, although the meaning ‘all of the *known* world’ could be much older. The ‘soil’ meaning (d) given by Buck is naturally limited (though present) – not surprisingly given the limited extent of cultivatable soil in the Arctic.

Perhaps most significant as regards unearthing the core meaning is the derived PE form **nunivay* or **nunaviy* ‘tundra’, i.e. ‘real *nuna*’, which must be very old given both the transparent meaning and the irregular variation in form in the individual languages concerned. All the other meanings can be seen to be extended from *nuna* in this sense rather than from (e) above, the ‘individual territory’ sense. It was from corresponding terms for the latter that other senses of Land words developed in Germanic languages according to Buck (p.16). The core meaning in the Eskimoan languages could have referred originally to the extensive Arctic tundra that the nomadic ancestors of the Inuit and Yupiit travelled through and eventually settled in. The parcelling up into distinct tribal territories (however large or small) presupposes an end to the nomadic phase and the beginning of a sedentary – at least a seasonally sedentary – one. The tundra of Eurasia and North America is of course confined by its proximity to the Arctic coasts, so ‘coming to land from the sea’ and ‘coming to the tundra’ would be virtually synonymous, although other words could specify going further into the tundra from the coast. Corroborating the core ‘tundra’ sense of *nuna* is a group of derivatives focusing on the typical edible vegetation on the tundra, berries and roots. Thus WG *nuniag-* ‘pluck berries’, which appears to be a direct verbalization of PE **nunivay/ nunaviy*, as in ECI *nunivak-* ‘pick berries’ (extended also to ‘collect clams’, another “food of the land”).

The cognate of *nuna* in Aleut is *tana-X* ‘land, island, space, place, earth, ground, settlement, country’, which refers principally (especially in the western dialects) to whole islands – which can hardly be described as typical ‘tundra’ despite the lack of trees. This is quite natural, given the archipelagoan setting of that language. But most of the basic and derived meanings of PE **nuna* are to

be found there, including *tanalgît* 'live in a place, stay home, hunt on land' (with *-gî-* 'have as'), *tanasx-* 'field, hunting and fishing area' (with *-sx-* found in place names), *tanalgît-* 'settle, take land' (with *-lgi-t-* 'get, provide with'), *tanaanu-* 'go back to village in boat, approach land' (with *-Vnu-* 'go towards'), *tanuli-* 'remove (people) from their place' (with *-li-* 'remove'), and *tanatu-* 'be roomy, spacious' (with *-tu-* 'have much').

From the hypothetical original sense of *nuna* referring to the tundra extensions to the individual settlement or village probably developed. The sense of the individual tribal or dialect territory would be intermediate, and with the concentration of single tribes in specific places for most of the year these permanent settlements would have easily become designated by the word for the wider territory. The process of concentration in settlements has of course continued apace into recent times. The path from 'tundra' to 'the whole earth' can also be plotted against the widening knowledge of the world brought in by missionaries and explorers, though earlier concepts of the whole known world (essentially consisting of tundra and bordering mountains and sea) would no doubt have predated such contact, perhaps in the accounts of the spiritual travels of shamans. Terms like Greenlandic *nunarsuaq* 'the world' (lit. 'big *nuna*') probably reflects this. Note also the CSY equivalent, *nunaRłak* 'the world, continent, town' (equivalent of CAY *nunarpak*), indicative of a wide range of sizes covering both the 'whole earth' and the 'individual settlement' senses. At the other end of the scale is WG *nunaqarfik* 'settlement, village' (literally 'place having its *nuna*'), and Aleut *tanađyusi-X* 'settlement, village' (with *-đyusi-X* 'place of'). The modern, national sense of 'land' or 'country' is seen in WG *nunat issittut* 'Arctic countries' mentioned above.

An interesting question is what Land meant for the nomadic ancestors of the present people who probably first entered North America from Siberia some 5000 years ago. They were followed more definitely by the "Neo-Eskimos" some two and a half thousand years later, the forefathers of the modern Inuit and Yupiit, by now admixed with new people on the Asian side, as they spread in turn across the North American Arctic during the Thule migrations. The corresponding nomenclature of more recently nomadic neighbours, the Chukotkans, suggests that 'tundra' was indeed the original sense of *nuna*. In the Chukotkan languages Chukchi and Koryak the term corresponding to *nuna* is *nutæ-*, which refers to 'land, country, ground, tundra' but not to 'settlement, village', for which another term, *nəm(nəm)*, is used, a word widely found across Siberia referring to a nomadic dwelling of a more temporary kind (Fortescue 2005:190). Chukotkan *nutæ-* may in fact be from *nuna*, an early borrowing from the Eskaleut-speaking people who preceded the Chukotkans in Chukotka as they moved up from below the tree line in pre-historic times. The basic Chukotkan form is a reduplicated singulative,

nutænut, while a different singulative form *nutæ-lqan* means ‘ground, earth.’ The same connotation of tundra vegetation is present in derivatives like Chukchi *nota-nta*- ‘go and fetch s.th. from the open country such as berries and roots’.

For the original peoples of the Arctic then, ‘home’ was presumably that portion of the tundra that they regularly travelled around in, and this has remained so for the groups that with time became sedentary in particular regions as the modern Inuit and Yupiit, each group with their particular perspective on the boundaries of *nuna*, ranging from the most local settlement and its environment to the wider tribal or dialect region and finally to the whole known world.⁴³ They are all in a sense *nunamiut* ‘dwellers of *nuna*’. These people all share a common demonstrative-based orientation system with local coastal, island and riverine variants. Today that term refers mainly to the inland Inuit of Anaktuvuk Pass in Alaska (who live in a prototypical upland tundra region), but in the past it was apparently also applied to inland Inuit groups dwellers elsewhere. In older WG according to Schultz-Lorentzen’s 1927 dictionary it meant ‘earth dwellers’ (as contrasted with spirits).⁴⁴

Mention should be made of another term referring to one’s surroundings in Eskimoan languages, PE **avan/ avatā* ‘area around’ mentioned in 3.1, a nominalization from demonstrative root *av-* ‘over there (extended)’ – in CAY also ‘moving away from speaker’ or ‘that speaker moves away from.’ This is a rather vague, neutral expression, without the numerous connotations of *nuna*. It can refer to land or sea or just the immediate surroundings of the house. In CSY it is just ‘area on the other side’ of something, and in WG it generally means ‘off from land’ (as in possessed form *avataa* ‘off from the coast’), just as *avalag-* from the same root means ‘set off (to sea)’ or in more recent times specifically ‘sail to Denmark from Greenland’. Nowhere does it refer like *nuna* to the whole world one lives in.

Finally, let me briefly characterize the world of a distinct Inuit group, the Inughuit or Polar Eskimos, who live in a clearly circumscribed geographical region in the Northwest of Greenland (“Thule”). The physical setting in which they live is centred around the largely ice-bound Inglefield Fjord, which penetrates deep into the Inland Ice. The region is isolated both from Canada (by the Smith Sound) and from the rest of Greenland to the south by a long stretch of the Inland Ice that reaches right down to the ocean. In fact when the Inughuit were first contacted in 1818 by Sir John Ross during his Arctic expedition he was told

43. For a seasonal migratory pattern of Inuit over a large area, see for example Rasmussen 1931 on the Netsilik Eskimos, also Briggs (1970: 30–35) on the more local migratory pattern of the neighbouring Utkuhikhalingmiut.

44. In CAY and WG (and apparently elsewhere) related term *nunamiutaq* has acquired a different meaning, ‘land animal’.

that the inhabitants had no knowledge of other Greenlandic tribes at all. Their ancestors came from the Canadian High Arctic more recently than other Greenlanders (around 1700). The narrow strait between Ellesmere Land and Greenland has only periodically been passable, and there is a historical account of a small group of refugees from Baffin Land who at an inclement time during the last century made it to Thule, although some of them perished trying to return to the Canadian side again (Petersen and Rix 1982: 94 ff.).

Nowadays the inhabitants mainly live in the small town of Qaanaaq to which they were moved (after scanty consultation) in 1953, when the US airbase at Pituffik (Dundas) was built near their earlier settlement. There are also a few other villages to the north and south, nearer the borders of the district. These constitute the most northerly permanent settlements on earth, in the midst of a world of ice and barren cliffs, with midnight sun lasting from mid-April to the end of August. A century ago the sea ice in Smith Sound only broke up for a short time in August, though with global warming today it is becoming open all year, rendering substance hunting for seal and walrus more and more problematical.

The traditional Polar Eskimo winter house was built of stone and turf, the flat roof consisting of stone slabs covered with two layers of turf (Holtved 1967: 12ff.). It was partly dug down into the earth and had a deep house passage leading into it, often ending in a small "front house" of snow with a threshold stone at the entrance. The interior walls were covered with wall skins. The sleeping platform was at the back of the house, and blubber lamps were placed on smaller side platforms. There was an opaque gut-skin "window" above where the entrance passage comes into the house, with a small peep hole for peering out through. Cooking was done over the larger oil lamp or, when the weather permitted, on a fire outside. In the summer the family moved into a tent with a double tent skin over a frame, often with a wooden door fitted. The familiar Inuit snow house ("igloo") was only used by hunters off on overnight stays in the winter. Today the Inughuit live in individual Scandinavian-style wooden houses, colourfully painted, as in the rest of Greenland.

The continuing isolation of the Inughuit from the outer world (despite access today by helicopter) presents us with a particularly good example of a worlds-within-worlds perspective on the WORLD. This is in fact captured in the orientation system of their language, which, as in other Inuit regions, refers to different absolute directions around the immediate settlement as opposed to further afield, according to the local or overall configuration of the coastline. Superimposed on that is the global system of cardinal coordinates acquired through education and contact with the modern world. At the first level there is the individual house and its position in the town and its immediate vicinity. This is then contained within the broader confines of the administrative district with its distinct dialect (offi-

cially *Avannaata*, 'the North'). This in turn is contained within Greenland as a whole, to which there are multiple cultural links today, not least in the use of the standard West Greenlandic dialect in school and church and all administrative dealings with the capital in Nuuk.⁴⁵ Finally, the Inughuit are of course aware of Greenland's position in the global world. The world of the Inughuit can thus be characterized as multiply layered.

45. Cultural links to the Inuit of Northern Canada are also important for their sense of identity. Their dialect remains closer in a number of respects to the Inuit dialects of the Canadian Arctic than to West Greenlandic. It also has idiosyncrasies of its own that make comprehension of their dialect by West Greenlanders difficult. The Inughuit definitely feel that they are a distinct part of a wider Inuit world, both through continuing visits back and forth across the Arctic and through their participation in the International Inuit Conference.

Grammatical Space and Time

At this point it is necessary to make a detour to consider other means than by lexical labels that languages dispose of to modulate SPACE and TIME. These are far better represented in the linguistic literature than are words for these categories since they are dealt with in practically all grammatical descriptions of individual languages. The distinction is not watertight, however. As Langacker puts it, grammar is inherently meaningful, forming a continuum with lexicon (Langacker 2012: 192). The principal means are deixis and locational affixes as regards SPACE and aspect and tense as regards TIME. There is also temporal deixis correlating with Evans's deictic tFoRs (see also Levinson 1983: 73–79). The relationship of deixis to sFoRs, as delineated in earlier chapters, should be apparent. Unlike abstract words for these overarching concepts, the categories of deixis and aspect are truly universal. Both these subjects have been widely investigated across the world's languages (see for example Dahl 1985 and Levinson 1983: 54ff). My aim in this chapter is more limited. I shall simply describe the situation in a handful of lesser known languages which display a wide variety of relevant forms and constructions in order to illustrate the range of meanings concerned. As it happens, these languages display particularly rich spatial deictic systems, and, like most of those of North America and northern Asia, they also lay greater emphasis on aspectual distinctions than on tense. Unlike major European languages, they tend to make minimal tense distinctions requiring obligatory paradigm choices (often just future vs. non-future) but complex aspectual distinctions. In Chukotkan and Wakashan languages the choice of perfective vs. imperfective paradigms (sometimes called 'past' vs. 'present' respectively in Chukchi) is obligatory, but their interpretation as tense depends on suitable contexts. 'Future' across languages is often as much modal as temporal. The choice of perfective aspect often implies a past event or state by default. Among the native languages of eastern Siberia and North America the only exceptions, where the choice of morphologically expressed past, present and future tenses is obligatory, are the Tungusic ones (nomadic late-comers to northern Siberia from the southwest), and Aleut and Itelmen, both of which have come under strong influence from Russian and are highly endangered. North Slope Inupiaq has also developed a minimal tense distinction (past vs non-past) under influence from English. Even these exceptional languages have complex aspectual systems.

Note that words for TIME treated in 2.2 often relate historically or polysemically to aspectual categories such as duration, sequence, or iteration. Descriptions of a wider range of deictic systems (including the unusual cases of Mayan Tzeltal, and Australian languages Arrernte and Guugu Yimithirr) can be found in Levinson (2003).⁴⁶ I shall not consider here words for specific points, durations or cycles in TIME (like ‘yesterday’ and ‘night’), which all languages possess, nor to deixis applied to person or discourse referents. Extensions of locational terms to orientation within the house or the wider environment will be treated later, in Chapter 8.

6.1 Deixis and locational expressions

I shall start with West Greenlandic (WG), a typical Inuit language, as described in Fortescue (1984). Eskimoan languages possess probably the most complex array of demonstrative stems of any language, and West Greenlandic is no exception, even though it is much reduced compared to the maximal stock still possessed by central Alaskan Yupik (CAY), as in Table 2 from Jacobson (1984: 654).⁴⁷ All of these can be used deictically (i.e. for pointing). European languages are in comparison relatively impoverished as regards demonstratives (just ‘here’, ‘there’ and ‘yonder’ in English, though extendable by adverbs like ‘up’ and ‘down’).⁴⁸ The relevant terms in WG (with absolutive singular case ending *-na*) are: *manna* ‘this here’, *una* ‘this/that (nearby)’, *innga* ‘that yonder’, *sanna* ‘that (way) down there’, *kanna* ‘that down there’, *panna* ‘that (way) down there’, *pinnga* ‘that up there’, *qanna* ‘that in/out there (e.g. across a door)’, *kinnga* ‘that outside (the house)’, *anna* ‘that in the north’, *qanna* ‘that in the south’, and in enclitic usage only *inna* ‘that out of sight/in the past’. *Panna*, *pinnga*, *sanna*, *kanna*, *innga*, and *kinnga* also have cardinal directional uses – the first two ‘east’, the second and third ‘west’, and the last two ‘north’ and ‘south’ respectively. All may be anaphoric when preceded by prefix *ta-*. The system has clearly been adjusted to dedicated coastal usage compared with the fuller riverine CAY system, whose distinctions of ‘extended (or moving)’ vs. ‘restricted’ and ‘obscured’ have been largely lost in WG. The way in which the coastal terms vary locally along the convoluted coastline of Greenland

46. Note in particular the “tilted world” cosmology of Tzeltal speakers at Tenejapa described by Levinson (2003: 268ff.).

47. Some Papuan languages like Fore for example do distinguish up/down demonstratives like the Eskimoan ones, but in not quite such elaborate systems (Foley 1986: 76–7).

48. Many of these words are related to pronominal bases (‘this’ as opposed to ‘that’). English ‘here’ itself is related to ‘he’, from IE *k(e)i, as also in Latin *cis* ‘on this side’ and OCS *si* ‘this’.

is discussed in Fortescue (2011). Over and above this there are terms for specific wind directions, more local than the broader geographical usage of the demonstrative stems, to be discussed in 8.2.

Table 2. Central Alaskan Yupik demonstrative stems

	Extended	Restricted	Obscured	
I	a. man'a/maani	una/wani	...	near speaker
	b. tamana/tamaani	tauna/tuani	...	near listener
II	a. auḡna/avani	ingna/yaani	amna/amani	over
	b. agna/agaani	ikna, ikani	akemna/akmani	across
III	a. qauḡna/qavani	kiugna/kiani	qamna/qamani	inside, upriver
	b. qagna/qagaani	keggna/keggani	qakemna/qakmani	outside
IV	a. un'a/unani	kan'a/kanani	camna/camani	down below, downslope
	b. unegna/un'gani	ugna/uani	cakemna/cakmani	downriver, toward exit
V	a. pauḡna/pavani	pingna/piani	pamna/pamani	upslope
	b. pagna/pagaani	pikna/pikani	pakemna/pakmani	up above

Figure 4 from Salamon (2011) diagrams daily applications of the basic directional terms of WG, including the demonstrative stems referring to position in the landscape (the sea is to be envisaged to the extreme left and a channel between outer islands and the mainland in the middle of the diagram. The other terms are nominal and adverbial items. *Avat(-)* is 'outside (coast of mainland or island)', *tunu* is 'back side' (also of body). The forms in *-mut* are allative case forms of "positional" roots requiring possessor marking, from left to right: *avat(-)*, as mentioned, *tim(i)-* (body of land), *kit-* (towards the coast), *silat-* (outwards) and *ilu(m)-* 'inwards'. The last two are more general, not limited to geographical usage. Not shown is *kangi-* 'area to the east', the opposite of *kit-* in the sense 'area to the west'. *Qummut majuar-* is 'climb upwards', as opposed to *ammuat ater-* 'descend'.

In Nivkh the relevant roots are as follows, from Mattissen 2003:26–7), with the corresponding motion verbs added in parentheses:

- a-/ya-* 'downriver' (*qa-d*)
- k'e-/xe-* 'upriver' (*tu-d*)
- he-/ye-* 'upland, inland' (*may-d*)
- k'i-/xi-* 'up' (*mər-d*)
- qo-/Ro-* 'down, down to shore' (*məγ-d*)
- t'a-/řa-* 'into river, to opposite shore' (*qo-d*)

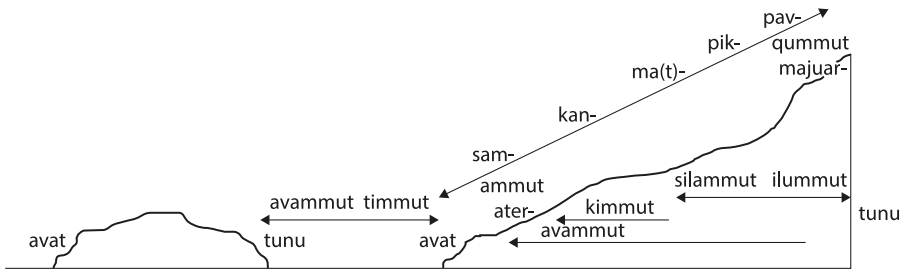


Figure 4. Greenlandic local directions

These items are all extendable by various affixes, e.g. for proximity and “preciseness” – the latter rather like the Eskimo distinction of ‘extended’ vs. ‘restricted’. Mattissen lists the nominal derivatives of one root, namely *k’e-*, as follows:

- k’er* ‘precise location upriver (not very distant)’
- k’erŋa* ‘a place upriver nearby’
- k’erŋayo* ‘a place just upriver (from the speaker)’
- ek’es* ‘there upriver’
- k’enx* ‘an extended space upriver’
- k’eqr* ‘distant space upriver, upper part of settlement seen from lower part’
- k’eqrŋa* ‘direction upriver, space upriver nearby’
- k’eqrŋayo* ‘space just upriver’
- k’eqræk* ‘a region upriver far away’
- k’engi/k’egi* ‘from upriver’ (cf. *k’engi la* ‘wind from upriver’)
- k’enun* ‘somebody living upriver’

There are also verbal derivatives such as *k’emd* ‘s.o. lives upriver’, *k’egud* ‘s.th. is somewhere upriver’, *k’e(ŋ)gid* ‘s.th. moves upriver’, *xemid* ‘s.th. faces/points upriver’ and *xet’t* ‘take s.th. upriver, carry s.th. from door to back wall of building’, plus a single adverb *xemi* ‘upriver’. Superimposed upon this are the terms for cardinal directions *ari/are (xuti)* ‘north’, *q’avlaf* ‘south’ (literally ‘hot place’), *k’erŋ mærf* ‘east’ (lit. ‘place where the sun goes up’), and *k’erŋ yuŋv* ‘west’ (‘place where the sun goes in’). The remaining intermediate directions are filled in by specific wind terms.

Nuuchahnulth has a number of deictic stems, namely *ya-* ‘there’, *yi-* ‘yonder’, *hiŋ-/his-* ‘at that place’, *ŋawa-* ‘close by’, *saya-* ‘far off’, *hac’i-* ‘deep down’, *n’opi-* ‘all over, scattered about’, *ŋaʔas* ‘out to sea’, *čimca-* ‘to the right’, *qaca-* ‘to the left’, and *ʔana-* ‘thus far off’. But it also has a remarkable wealth of “lexical” suffixes, including many locational ones directly related to space, thus for example *muučiŋy’-aqŋas* ‘four days in the woods’ with *-aqŋas* ‘in the woods’. These cover the following specific meaning categories – for fuller information on specific forms see Sapir and Swadesh (1939).

1. orientation vis-à-vis beach (down to beach/shore, on beach, up from shore, along shore), e.g. -*is* 'on beach'
2. orientation vis-à-vis sea (seawards, to shore, on the sea), e.g. -*ačišť* 'on the sea'
3. orientation vis-à-vis woods (into the woods, out of the woods, in woods), e.g. -*at* 'out of the woods'
4. orientation vis-à-vis river (on the bank, upstream, downstream, at river mouth), e.g. -*atis* 'downstream'
5. orientation vis-à-vis water (in water, into water, on water), e.g. -*čít* 'in water'
6. orientation vis-à-vis the coast (down coast, up coast, in bay), e.g. -*inřatu* 'up coast'
7. orientation around the house (in the house, out of the house, in front of house, into house, at wall, at rear of house, round back of house, at door, at centre of floor, on ceiling, at rear of the house), e.g. -*ipiř* 'in the house'
8. orientation vis-à-vis a boat (in boat, at stern of boat, at bow, at the side of boat, on the gunwale), e.g. -*ituř* 'at the side of boat'
9. geometrical dimensions (underneath, above, in middle, out of a hole, into a hole, inside, on top of, on top of long standing thing, at end, between, in front of, behind, alongside, at vertical surface, at base of, outside, flat against, from centre to edge, into centre, into a line, in a corner, across a barrier), e.g. -*wink* 'in a corner'
10. gravitational dimensions (down, down slope, down over drop-off, up slope, up from the ground), e.g. -*řatu* 'down'
11. general types of motion (away, out into the open, into the interior, apart, back, past, looping in semi-circle), e.g. -*stis* 'into the interior'
12. type of surface (on the ground, on a flat thing, on a raised platform), e.g. -*it* 'on the ground'
13. orientation vis-à-vis fireplace (e.g. on fire, into fire, towards fire, away from fire, over the fire), e.g. -*řc'i* '(drying) over the fire'
14. other landmarks (on a cliff, in the sky, across hill, barring passage, across strip of land, across body of water), e.g. -*sy'i* 'on a cliff'

Cora (Uto-Aztecán), as described by Casad (2012), does not have as prolific an array of locational affixes as Nuuchahnulth, but it far exceeds it as regards specialized combinations of the dozen or so prefixes and handful of suffixes it possesses (pp. 63, 70 and 92). These (not including separate locative particles/adverbs) are:

a' 'ablative', 'off yonder'

a- 'on a surface'

u- 'in a specific location'

ř'i- 'up'

ta- 'straight'

ka- 'down'

ye- ‘face of’
wa- ‘extensive through bounded area’
ku- ‘back and forth’, ‘around the corner’
na- ‘this side of perimeter’
nu- ‘far side of perimeter’
uu- ‘that way’
ii- ‘this way’
h- ‘in the slope’
an- ‘on top’
ya’a- ‘covering an area’, ‘coming this way’
ra’a- ‘back and forth’
ɬ’a- ‘in the middle of a surface’

And the suffixes:

-ɬʷap^wa ‘upriver’
-ɬʷe ‘downriver’
-ta(va)n ‘crossriver’
-ɬʷi(vi) ‘uphill’
-ki ‘downhill’
-ka’i(wa) ‘overhill’

A typical example can be seen in (1) and (2) (from pages 67 and 118 respectively).

- (1) *ú pú a-nú-’u-h-ve*
 there.inside 3SG.S out-PERI-inside-slope-fall
 ‘He fell into the interior of the house through a hole in the roof.’
- (2) *tu’u-rí a-n-ɬʷi-nʷéh*
 1PL.S-now out-top-up-arrive
 ‘We have now arrived at the top of the hill.’

6.2 Aspect and tense

Just as deixis and location overlap as categories, so do tense and aspect, corresponding roughly to Evans’s “deictic” and “sequential” tFoRs respectively. This is most noticeably so in non-European languages. As regards aspect, West Greenlandic displays a wide array of aspectual affixes, some fifty in all, but minimal distinctions of tense – in fact only future, with past vs. present unmarked. The distinction can usually be made by default: telic (completive) verbs are usually interpreted as past, non-telic (progressive, etc.) as present. The dimensions concerned can be analysed in relation to the smaller number of quasi-universal categories of the Croom Helm Descriptive Grammars series in which Fortescue 1984 appeared (pp.276–285).

These are namely perfect(ive), imperfective, habitual, continuous, progressive, ingressive, terminative, and iterative, all common in the world's languages, whether expressed morphologically (as in WG) or in syntactic phrases (as in English). The relevant affixes in WG fall into the two overall categories of 'Phase of Completion' and 'Frequency and Duration', as below (Fortescue 1983: 44–46, adjusted to the standard orthography). Some of these can be seen to combine aspect with other semantic features such as Degree and Modality.

Phase of completion

'not yet' -*nngikkallar*-
 'not yet for a long time (though expected)' -*gallanngit*-
 'not yet – but should' -*nngiler*-
 'more and more' -*galuttuinnar*-/ -(*gi*)*jartor*-
 'gradually more and more' -(*gi*)*jartuaar*-
 'take a long time doing' -*jumaarnertu*-/ -*jumaataar*-
 'no longer' -*junnaar*-/ -*gunnaar*-
 'about to' -*ler*-
 'just about to' -*leqqissaar*-/ -*liinnar*-
 'in state of' -*qqa*-/ -*nga*-
 'almost, about to' -*ngajag*-/ -*ngajaar*-
 'about to' -*nngersaa(r)*-
 'about to, almost do' -*qqajar*-/ -*qqajaa*-
 'set about doing' -*nialer*-
 'set about doing, dynamic state' -*riar*-
 'perfective/already' -*reer(sima)*-
 'perfective state' -*sima*-/ -*nikuu*-
 'be in middle of doing' -(*r*)*sari*-
 'continuing/intense state' -*simaar*-
 'no longer/stop doing' -*ssaar*-
 'be danger that/almost do' -*sungar*-
 'gradually/one by one' -*ter*-/ -*titer*-

Frequency and duration

'several do' -*a*-/ -*kaa*-/ -*rrat*-
 'repetition/habit' -*sar*-/ -(*s*)*ar(i)*-
 'repeated action' -(*r*)*sor*-
 'often/habitually' -*gajug*-/ -*kula(ar)*-
 'still/for time being' -*gallar*-
 'always/continually' -*innar*-/ -*tuinnar*-/ -*juaannar*-
 'on and on' -*juaar*-
 'continuously, still' -*juar*-
 'one after another' -*jortor*-/ -*jorar*-
 'for a short while' -*llatsiar*-
 'from time to time' -*llattaar*-

'for some time' -*mmersor*-
 'never' -*nngisaannar*-
 'again and again' -*qattaar*-
 'first' -*qqaar*-
 'again/further' -*qqig*-
 'often/all the time' -*saannar*-
 'for once/at least' -(*lla*)*toor*-
 'back and forth' -*umisaar*-
 'prolonged/repeated action' -*or*-/ -*ar*-
 'keep on doing' -*usaar*-

'Perfective' under 'Phase of completion', an aspectual category, needs to be distinguished from 'perfect', a category of tense. Perfect tense in English refers to a past event that continues up to or has relevance to the present, as in 'He has returned from Paris'. The WG perfective affix (-*sima*-) refers to a completed action or state but has in more recent times (compared with other Eskimoan languages) also come to mark perfect tense (in the same "slot" as future affixes) as in the Example (3) – this can be disambiguated by the addition of further affixes (see Fortescue 1984: 276ff.).

- (3) *illu sana-neqar-sima-vuq*
 house build-PASS-PERF/PERFTV-3SG.INDIC
 'The house was built/ has been built'

A language with a clear distinction of perfective vs. imperfective aspect is Russian, where nearly all verbs have perfective (completed) vs. imperfective (continuous or repetitive) correlates, e.g. by an additional prefix in the perfective version, and past is indicated by a suffix (originally participial) as in (4a) vs. (4b):

- (4a) *on pis'mo na-pisa-l*
 he letter PERFV-write-PAST
 'He wrote a letter'
- (4b) *on pis'mo pisa-l*
 he letter write-PAST
 'He was writing a letter'

Mandarin Chinese also has a category of perfective, marked by an affix *-le*, which is usually explained as indicating 'a new situation' or 'a change of state'. The same affix also functions as a perfect tense, the two functions distinguished by position in the sentence (rather as within the word in WG). Thus (5b) as opposed to (5a)⁴⁹ – note the *-le* occurs in the perfective sense in both sentences.

49. Examples from Scurfield (2010: 155).

(5a) *tā zài Zhōngguó zhù le bàn nián le*
 she in China live PERFTV half year PERF
 ‘She has been living in China for six months (and still is)’

(5b) *tā zài Zhōngguó zhù le bàn nián*
 she in China live PERFTV half year
 ‘She has been living in China for six months (and is no longer doing so)’

Another language like WG in which aspect dominates over tense is Chukchi, where a difference in aspectual or modal paradigms has in the past been interpreted by grammarians in the Russian tradition as one of present versus past and future tenses. This is rectified in Dunn (1999), who shows that the only true tense paradigms are those of the future (including neutral and progressive/imperfective versions), otherwise the non-future (or “aorist”) is divided between aspectual paradigms, which for stative verbs means perfect and habitual aspects and for active ones progressive and neutral aspects (pp.175–95). The “perfect”, by the way, indicates the attainment of a permanent state and occurs mostly in connection with narratives, so is not anchored in the speaker’s deictic present. There are distinct transitive and intransitive versions of the paradigms, also conditional and optative (Dunn’s “intentional”) mood paradigms. Of particular interest from a typological perspective is the fact that a historical progression can be reconstructed from a stage in which only aspectual and mood paradigms existed, to the present situation where the complete array of tense/mood/aspect paradigms is seen. These have various complex ways of marking inflectional person/number subject. The general progress can be seen with shifts of forms from left to right. This reinforces the general impression across languages that Aspect is a more basic, older category than Tense (apart perhaps from future vs. non-future). The stages are shown in Table 3 (adjusted from Fortescue 1996:167), giving the prefixes, suffixes and circumfixes (3rd person singular) associated with each paradigm.⁵⁰ The source of the future is a desiderative circumfix related to a root meaning ‘want to’. The traditional tense definitions have been applied to the Stage 3 “tense” affixes here. The ‘perfect’ and ‘(present) habitual’ that have been added are later additions from non-verbal sources, namely a derivational circumfix meaning ‘one having’ and an adjective formant respectively.

Chukchi has few derivational aspectual affixes compared with WG, but these are of interest from the perspective of grammaticalization since the various prefixes and suffixes can be traced back in all cases to lexical sources (Fortescue 1996:163), as in Table 4:

50. Under Mood *nə-* is for the intransitive, *qə-* for the transitive.

Table 3. Stages in the building up of Chukchi tense/mood/aspect paradigms

<i>Stage 1</i>		
(Root)	Aspect	Mood
<i>re-</i> -ng-	-g'ë 'perfective'	Ø 'indicative'
'desiderative'	-rkən 'imperfective'	nə-/qə- 'optative'
		nə'- 'conditional'
<i>Stage 2</i>		
	Aspect/Tense	Mood/Aspect
	-g'ə 'aorist'	nə-/qə- -g'e(n) 'optative'
	-rkən impf. 'present'	nə-/qə- -rkən 'impf. optative'
	re- -ngg'ë 'future'	nə'- -g'e(n) 'conditional'
	re- -(ngə)rkən 'impf. future'	nə'- -rkən 'impf. conditional'
<i>Stage 3</i>		
		Tense/Mood/Aspect
		nə- -g'i 'past'
		-rkən 'present'
		nə- -qin '(present) habitual'
		ge- -lin 'perfect'
		re- -(ng)g'ë 'future'
		re- -rkən 'impf. future'
		nə-/qə- -g'en 'optative'
		nə'- -rkən 'impf. optative'
		nə- -g'en 'conditional'
		nə- -rkən 'impf. conditional'

Table 4. Sources of Chukchi aspectual affixes

Affix	Lexical source
-tku- 'frequentative/intensive'	(t)ku- 'finish off (all)'
-plətku- 'terminative'	pələtku- 'finish'
-l'et- 'often'	l'et- 'steer boat with oar'
-c'et- ^a 'occasionally'	“ “
-ngngo- 'inceptive'	ngəvo- 'start'
-sqiv- 'semilfactive'	(l)qət- 'go off' (plus intensifier -iv/-ev)
-tələ- 'gradually'	təle- 'go'

a. An affective form of *l'et-*.

Aspectual distinctions in Nivkh (another aspectually heavy hunter-gatherer language) are somewhat simpler than in WG. They are realized not only by an array of suffixes but also by a number of “converbs” that take on aspectual function in auxiliary constructions. Tense in Nivkh is limited to future affix *-nə-*. The aspectual affixes are as follows (from Mattissen 2003: 18):

- yət-* ‘completive’
- yəta-* ‘resultative’
- data-* ‘stative continuative’
- durŋur-* ‘dynamic continuative’
- ivi-* ‘progressive/inchoative’
- tu-* ‘iterative’
- xə-* ‘habitual’

The converbs are:

- humɔ* ‘something is there’ = continuative/progressive/resultative⁵¹
- haɔ* ‘it is so’ = habitual
- tviɔ* ‘someone completes, stops’ = completive
- k’evaraɔ* ‘someone often does’ = frequentative
- nuɔ* ‘someone examines by sight’ = conative

An example (from p. 19) of converb usage is seen in Example (6), where CV is ‘converb’, and NML ‘nominalization’ (the indicative is a nominalized form in Nivkh).

- (6) *p’-lumř-ku tləhontq-si-r hum-ɔ*
 REFL-sable-PL bag-put-CV:3S be.there-IND/NML
 ‘He is putting his sables into a bag’

Aspect is also a prominent category in Nuuchahnulth, expressed there solely by suffixes. These are: momentaneous, durative, continuative, inceptive, iterative, graduative, and repetitive (Nakayama 1997: 25–29). The language does in fact also have a couple of tense suffixes, namely future *-ʔaq(tl)-* and past *-mit-*, but these are optional (like all “predicate-level” suffixes in Southern Wakashan languages) and tense is often left to be inferred from context (p. 85).

A notable feature of the expression of aspect in Nuuchahnulth (and indeed of all its lexical suffixes) is its iconicity, as discussed in detail in Fortescue (2014). All stems and lexical suffixes are either imperfective or perfective, whether overtly marked or inherently so. Imperfective aspect is expressed either by stem vowel lengthening (graduative and to some degree durative and continuative), or by stem reduplication (repetitive and iterative), with variants – some involving

51. Depending on the verbal actionality class.

infixes. These contrast as a group with perfective (including momentaneous and perfective inchoative), usually expressed by suffix $-(š)i\lambda$ (or one of its numerous related allomorphs), or by inchoative $-(a)či\lambda$. Imperfective (which is where the iconicity is overt) covers the following sub-divisions, expressed by templates as indicated. ‘L’ refers to lengthening of the first vowel of the stem, ‘R’ to reduplicating of the first syllable, ‘S’ to shortening of the first vowel, ‘L+S’ to lengthening with shortening of other than first vowels, ‘LR’ reduplication with lengthening of the (initial) copy, ‘R+L’ reduplication with lengthening of the stem. Lengthening is clearly iconic of continuative meanings and repetition of repetitive/iterative meanings, with some aspects combining more than one such feature.

continuative: suffix $-(y)a$ or rarely [L] alone

gradulative: [L+S]

durative: suffix $-ak^w/-uk$ ‘durative’ [sometimes L]

repetitive: [R with L of both copy and stem vowel (i.e. LR + L) and suffix $-(y)a$]⁵²

iterative: [R with suffix $-š/k$ and $-λ$ - infix after stem vowel]

With stative stems the continuative expresses “imperfective inception”, otherwise the continuative expresses dynamic situations requiring input of energy to maintain (as opposed to the durative, which does not). Both iterative variants refer to irregularly spaced repetition (as opposed to the regular repetition of the repetitive), and may have a habitual connotation.

These basic aspects may further be combined. The gradulative for example is added to bases containing a perfective suffix to imperfectivize them. Thus $-i:ʔi\lambda$ ‘into the house’, which does not itself cause lengthening or reduplication, combines with the gradulative [L+S] to produce an imperfective derived form, as in $huutiʔi\lambda$ ‘they danced into the house’ from $hut-$ ‘dance’. And the perfective suffix *par excellence* $-(š)i\lambda$ can be seen to cause [L+S] when it has a gradulative meaning. The example in (7) illustrates the interplay of pure aspect with the inherent aspectual profile of a lexical suffix. The whole sentence is perfective, but is the result of the perfectivization (by non-lengthening suffix $-ši\lambda$) of an inherently imperfective combination of stem plus lengthening lexical suffix $-(č)i:t$ ‘make’.

- (7) *maaht'iqiitšiλ*
maht'i(q)-(č)i:t [L]-*šiλ*
 house-make-PERFTV
 ‘He built a house.’

Cora too is basically aspect-oriented, perfective aspect usually being interpreted as past tense in a narrative context, only future (which is as much modal as tense)

52. Also $-λ$ - or sometimes $-c$ - infix after stem vowel.

being unambiguously expressed by a suffix (*-n'i*), like in WG. What is unusual in Cora is its use of locative prefix and suffix sequences in temporal use. Thus the sequence *á-h-ka'i-wá-*, literally ‘out-slope-hillside-beyond’, can be used in the temporal sense of the distant past (Casad 2012: 148–9), whereas *m-á-h-ka'i* (literally ‘medial.deictic-out-slope-side.hill’, i.e. ‘off to one side’) can indicate a near future (pp. 151–2). The sequence *a-n-ɸi-* (literally ‘outside-top-up’) can refer to the near past (p. 153). The use of ‘area’ prefix *á'a-* can signify a length of time taken (p. 158). In general, ‘downhill’ and ‘uphill’ sequences are employed to indicate past and future respectively, which may relate to the hilly terrain in which the speakers of Cora live and move. Example (8) (from p. 152) combines both spatial and temporal meanings, and Example (9) (from p. 176) exemplifies the metaphor of time as coming “round a corner” (from behind the horizon):

- (8) *Ayáa pú nú'u a-h=tá=wa'a y-a-va'a-ta-n'éh-sin*
 thus 3SG.S N.REP out-slope=AUG=EXT here-out-ALLAT-straight-arrive-DUR
m-á-h-ka'i wá-yee
 MED-outside-slope-behind.hill beyond-this.way
 ‘He says that he will arrive back here sometime later on.’
- (9) *Pu'u=rí n'á'u á-h=na ɸ'á-ha'-u-ré'e-n'e*
 3SG.S=now well out-VERT=LOC UNSP.S-DIST-inside-corner-arrive
 ‘Now the appointed time has arrived.’

As could be expected, Cora also uses its locative prefixes to indicate imperfective and perfective aspect, with sequence *wa-tá-* indicating a “heightened” perfective (p. 160–1) and *a-uu-* (lit. ‘distal-ablative’) a continuative imperfective (p. 170–1). Also cyclically repeating time can be expressed this way, with a sequence *a-uu-ta-* (lit. ‘outward-that.way-straight’, i.e. ‘going all the way around the circumference’) (p. 173). One motivation for this SPACE FOR TIME extension suggested by the authors is the frequent spatial setting of actions observed, as either on-going or completed (p. 160).

The aspectual systems in languages like West Greenlandic, Nuuchahnulth, and Cora are rather unusual or extreme amongst the world’s languages, but they nevertheless illustrate well some of the wealth of expression to be found in languages otherwise lacking in expressions for abstract TIME. I am not suggesting that all such languages are aspect-rich and tense-poor – this is patently not the case. Papuan languages, for example, generally have more tense distinctions than Indo-European ones (Foley 1986: 159–60), and the Inuit dialects of eastern Canada distinguish several degrees of past and future tense, from recent to remote. Although languages may lack generalized words for both SPACE and TIME they will always contain morphosyntactic phenomena that fill these domains with more than just

individual words for particular directions in space or periods in time, etc. The filled domains are just waiting, as it were, to have general names attached to them.

Deixis and locational expressions and aspect and tense expressions in any language can be said to share a common function, namely providing a framing perspective, respectively on SPACE and on TIME. Together they provide perspectives on the WORLD to which successive sentences refer. By looking at extensive systems like those presented above, one can see that they may define very precise frames-of-reference, both spatial and temporal. They summon up mental frames within which successive events can be placed.⁵³ Linguistic modulation of sentences along these dimensions mirror, as it were, the cognitive experience of the spatiotemporal framework in which events occur.

53. Compare Talmy's conception of the "framing event", the major component of his "macro-event". (Talmy 2000, vol. 2:213ff.). These contain components expressing motion, temporal contouring, state change, and "realization" (completion), besides the relationship between profiled figures and grounds. At their most basic they refer to motion events but can be extended metaphorically to a wide range of more abstract domains.

Being in Space and Time

We can now combine the concepts discussed in the chapters for SPACE and TIME to a level of abstraction beyond that of individual worlds, namely that of BEING, i.e. in expressions for BEING IN TIME and BEING IN SPACE. These are the most abstract perspectives language affords on BEING IN THE WORLD, the most generalized framework defining human experience. SPACE and TIME are “basic domains” in Langacker’s terminology, directly rooted in human experience, as opposed to “abstract domains” (Langacker 1987: 148). Others include MATERIAL and FORCE. He distinguishes between “basic experience” and “interpreted experience”, the latter being a matter of sociocultural context and hence highly variable. His Cognitive Grammar approach focusses on the basic experience relationship of Space and Time (Langacker 2012: 191–2). There are many specific experiential domains or frames that can be referred to (or “profiled”) through language, in fact there are branches of Cognitive Linguistics that focus in detail on the topics of Frame Semantics and Mental Spaces/Conceptual Blending (see Fillmore 1985 and Fauconnier and Sweetser 1996 respectively).⁵⁴ It should be borne in mind that “domains” as visualized by practitioners of the cognitive sciences do not necessarily reflect neurologically distinct networks such as the relatively clear distinction between the domains of language (left hemisphere) and that of visual percepts (right hemisphere). They are, as I see it, generalizations of meaning across linguistic expressions, projected by language on pre-linguistic cognitive reality, rather than the reverse. That these large scale concepts seen through the spectacles of language should by and large correspond to the workings of pre-linguistic cognition is not at issue, nor that linguistic expressions should cluster in such a way as to reflect cognitive reality. This after all allows the cross-linguistic comparison of related meanings. It is at the pre-linguistic level, where analogy, perceptual association, and “cross-domain” similarity is the order of the day, that deep conceptual metaphors are anchored. We have seen in Chapter 2, however, that the correlation is rarely so straight-forward: the boundaries of domains (when understood linguistically) may vary and overlap somewhat according to specific language. For practical purposes it is nevertheless a useful way to divide up conceptual meanings.

54. A “mental space” is in Fauconnier’s terms a temporary cognitive structure corresponding to a possible world.

Fillmore and Baker (2000) list a wide range of frames – essentially syntactic/semantic frames around English predicates. But my concern in this book is not with distinctions at that level. Rather, I shall turn now to verbs like English ‘live’ in the sense of ‘being alive’, which refer to a mode of BEING IN TIME abstracted from spatial location, as do verbs like ‘become’ (of a change in state). On the other hand, expressions of ‘being at’ refer to SPACE, independent of TIME (which can be instantaneous or persistent). Expressions like English ‘live’ in the sense of ‘dwelling in a place’ combine temporal and spatial extension: they refer to staying in a specific place for a length of time. In fact, ‘being’ in the full ontological sense of ‘existing’ also has an inherent spatial dimension, either ‘in a living body’ (animates) or ‘in a specific place’ (inanimates). Copular ‘be’ expressions have to varying degrees become abstracted away from original temporal and spatial meanings. The “leaching” of meaning to result in completely abstract copulas has developed from more concrete sources. Thus verbs of BEING IN SPACE like ‘stand’, ‘lie’, and locative expressions of ‘being at/in’, and verbs of BEING IN TIME like ‘grow’, are all known sources for the grammaticalization of copulas, as are verbs of ‘having’ and – as mentioned – ‘living’ in the ‘dwelling’ sense. Copulas may have lost both temporal and spatial dimensions. The verb ‘be’ in English maintains a range of senses reflecting successive stages in the leaching of earlier meanings of ‘being in time’ (‘existing’), and ‘being in space’ (‘dwelling’) on the way towards becoming a fully abstract copula.⁵⁵

7.1 Words for being

We have seen the way in which different languages have diverse ways of referring to TIME and SPACE. They also have diverse ways of referring to modes of BEING IN TIME and BEING IN SPACE. Most of them have an equivalent of English ‘be’ in at least some of its senses. These range from full ontological existing (i.e. ‘being alive’) to copula functions leached of all independent meaning – Dik’s “copula support”, functioning solely to introduce predicates consisting of nouns, adjectives and adverbs (Dik 1989: 165ff). The main functions of true copular verbs can be divided into equational, defining, classifying/ascriptive, attributive and locative variants. In some languages (like English) all these functions are covered by a single verb, in others they are divided up among different verbs and constructions.

55. Compare the stages of grammaticalization of French *être* discussed by Meillet (1948: 131), from a full ontological sense (“*je suis celui qui suis*”), to a locative sense (“*je suis chez moi*”), to an “almost redundant” sense with an adjective (“*je suis malade*”), and finally to a purely grammatical function as a tense-aspect auxiliary (“*je suis parti*”).

For a full cross-linguistic study of copular expressions see Pustet (2003). The Collins English Dictionary definition of 'be' covers all of its different functions:

(1) to have presence in the realm of perceived reality, exist, live; (2) (in perfect tenses) pay a visit, go to; (3) take place, occur; (4) (copula) used as a linking verb...with no intrinsic meaning of its own but rather expresses the relationship of either essential or incidental equivalence or identity or to express an essential or incidental attribute; it is also used with an adverbial complement to indicate a relationship of location in space or time ("Bill is at the office", "The dance is on Saturday")⁵⁶

Verbs destined to become copulas, maximally leached of their original meanings, have been subject to processes of grammaticalization. Heine and Kuteva (2002) list the following typical sources of copulas: verbs of change of state; sit or stand; demonstratives; and, specifically of locative copulas, verbs meaning 'live'. Equative copulas often develop in turn from locative copulas. The authors also indicate that the source of verbs meaning 'become' is often verbs meaning growing or movement.

Buck (1988: 635–6) gives the following Indo-European sources for verbal copulas in the principal languages of Europe. Suppletion between more than one of them is typical in the formation of paradigms:

IE *es- (the most colourless, its ultimate source unknown acc. Buck), as in English 'is', French *est*, Latin *essere*, Irish *is*, Spanish *ser*, Russian *jest*, etc.

IE *bheu-/bhū- (primarily 'become, come into being' acc. Buck),⁵⁷ as in English 'be', Russian *byt'* (not used in the present tense), Latin *fui* 'was' (and *futūrus* 'future', *fieri* 'become'), Sanskrit *bhū-* 'be, become', Hindi *ho-na* 'be, become', classical Greek *fiomai* 'come into being, grow' (middle voice of *fio* 'bring forth, beget'), etc.

IE *wes- 'remain, dwell', as in Sanskrit *vās-*, English 'was', German *Wesen* 'being', etc.

IE *stā- 'stand', as in Spanish *estar*,⁵⁸ Latin *stāre, existere*, German *entstehen* 'arise, come of', *bestehen* 'persist, endure', Russian *stat'* 'become', Serbo-Croatian *stanovati* 'dwell', etc.

To these can be added English 'are', probably from IE *er- 'move, set in motion', as in Latin *orīrī* 'arise, appear, be born' (Watkins 1985: 17). Words for 'becoming' (i.e. reaching a state of being) have a variety of sources in IE languages (apart from

56. Also, less relevant here: (5) forms progressive present tense; (6) forms the passive voice; (7) (with an infinitive) expressing intention, expectation, supposition or obligation (e.g. "The president is to arrive at 9.30.").

57. Watkins (1985: 8) has *bheuə 'be, exist, grow'.

58. Mainly of a temporary state or quality, as opposed to *ser* (though there are exceptions).

those above where it is identical to ‘be’). Thus English ‘become’ from ‘come’ is paralleled by French *devenir* (from Latin *dēvenīre* ‘arrive’), which no doubt influenced it – Old English had *weorðan*, going with German *werden* ‘become’ (and related to Latin *vertere*, Sanskrit *vrt-* ‘turn’ – cf. English ‘turn into’). Danish has *blive* (= German *bleiben* ‘remain’). Irish has a similar source as the French in a ‘come’ construction: *tagaim* ‘come’ plus *agam* ‘to me’, etc. (an impersonal construction with a noun subject). Greek has *gi(g)nomai* ‘become’ (lit. ‘be born’). Spanish has *hacerse*, Italian *farsi* (lit. ‘make oneself’) – compare Russian *delat’sja*. Russian also has perfective *stat’*, imperfective *stanovit’sja*, the usual words for ‘become’ (from *stā- ‘stand’, as mentioned above), whereas in Old Church Slavonic *byti* ‘be’ was also ‘become’.

Note that words for ‘exist’ refer principally to living beings (as in Collins definition (1) above). ‘Exist’ itself is originally in Latin ‘step forth’ (*sistere* is ‘take up a position’, from *stā-* reduplicated). Verbs like ‘exist’ are used in the full, non-copula meaning: unlike copulas they can stand as independent verbs. Most IE languages have distinct impersonal collocations with inanimates, i.e. (with a ‘be’ verb) English ‘there is/are’ (Danish *der er*) and Russian *jest*, or (with a ‘have’ verb) French *il y’a*, Spanish *hay*, and Russian *imeetsja*.⁵⁹ German has, besides *es hat*, also *es gibt* (‘it gives’).

Turning to ‘being’ and ‘becoming’ expressions beyond the Indo-European languages, we find similar distinctions, but also a number of different distributions, distinctions and conflations of words and constructions. Like Russian, Nahuatl and Arabic (and Cree in equational sentences) do not use their copulas in the present tense, and like English, many languages have the same verb for all copular uses plus ‘exist’, with a different verb for ‘become’, such as Finnish and (Papuan) Kalam, while in others, like Turkish, the same verb also covers ‘become’. Some distinguish ‘become’ plus adjective from ‘become’ plus noun (like Mandarin Chinese).⁶⁰ Many distinguish being in a location from all other copular senses (and ‘become’), like Japanese, which also distinguishes animate from inanimate subject copulas – in fact many languages distinguish a verb of existing of animates from a ‘there being/having’ construction for inanimates or conglomerates.⁶¹ Other languages distinguish all of these meanings with separate

59. Russian also has *suščestvovat’* ‘exist’ from archaic *sut’* ‘be’ (today a nominal, ‘essence’), ultimately from IE *es-.

60. Mandarin *shì* ‘be’ has developed from an anaphoric demonstrative (Pustet 2003: 55).

61. Japanese also uses its copula *da* in a “propredicational” construction, as in *yama ni yuki da* ‘the mountain has snow on it’ (lit. ‘the mountain snow is’). Mandarin Chinese has the same construction, as in *wǒ shì jīfān* ‘I ordered the chicken rice’ (lit. ‘I am chicken rice’) (Pustet 2003: 60).

verbs, such as West Greenlandic (which, like Abkhaz and other highly synthetic languages, has more than one affixal copula). Some languages (like Nivkh) use verbs of ‘living’ also as copulas of ‘being somewhere’ and others use their positional verbs of ‘lying’ or ‘standing’ (like Yidiny). More unusual distinctions are made by Himalayan languages like Dzongkha, which distinguishes “personal” from “acquired knowledge” copulas (a matter of evidentiality), and Bantu languages like Xhosa, which use pronominal prefixes as copulas, agreeing with the class of the noun complement (also those in adjectival function). Athabaskan languages like Koyukon have a whole array of different classificatory verbs of ‘being somewhere’, according to shape and consistency. See Appendix 2 for details.

In Table 5 can be seen a selection of these ‘be’ verbs/constructions with columns for the different functions: equational/identifying, defining/classifying/ascriptive, qualifying/attributive, and locative, also ‘existing’ and ‘becoming’. Forms in parentheses indicate limited use (by tense or collocation).

Table 5. ‘Being’ verbs in selected languages

	<i>equative/ identifying</i>	<i>defining/ classifying</i>	<i>qualifying/ attributive</i>	<i>locative</i>	<i>exist</i>	<i>become</i>
English	be	be	be	be	(there) be/exist	become
French	être	être	être	être	exister/ (être) il y’a	devenir
German	sein	sein	sein	sein	es gibt/hat/ existieren	werden
Russian	(byt’)	(byt’)	(byt’)	(byt’/na- xodit’sja)	jest/imeetsja/ suščestvovat’	stat’/stano- vit’sja
Spanish	ser	ser	ser/estar	ser/estar	existir/hay	hacerse
Greenlandic	tassa (deictic)	-nngu-	–	it-	-qar-	-nngor-/ -li-
Chukchi	it-	it-	–	(t)va-	(t)va-/it-	nʔel/tomyat
Koyukon	-laa	-laa	-t’aa/ (-laa)	classific. verbs	-laa	ee-/(P+e... -laa)
Kalam	md-	-md	(g-/pag-)	-md	-md	ay-
Chinese	shì	shì	shì	zài	zài/ yǒu	chéngwéi/ biàncéng
Japanese	da	da	(da)	iru/aru	iru/aru	naru
Dzongkha	’ing/ ’immä	’ing/ ’immä	’ing/ ’immä/ yö/ dü	yö/ dü/ yöp ’ing	yö/ dü	yä
Xhosa	pronoun prefix	(ukuḁa)	pron. prefix	pron. prefix	ukuḁa	(ukuḁa)

We can relate these directly to the three modes of BEING at the beginning of this chapter: while the locative sense corresponds to BEING IN SPACE and the ‘becoming’ sense to BEING IN TIME, it is the ‘exist’ sense that corresponds to BEING IN THE WORLD. I shall return to the relevance of these forms in the concluding chapter.

7.2 Words for Living

One source of copular ‘be’ expressions is, as noted, verbs meaning ‘live, dwell’. The English verb ‘live’ has two principal senses, as in the contrast between Collins definitions (1) and (2) below on the one hand, and (4) on the other. The original meaning of the verb was ‘remain’, which is understandable as the source of both contemporary senses. It is ultimately from IE *leip- ‘stick, adhere’, which is also the source of English ‘leave’, as in OE *læfan* ‘leave, have remaining’ (Watkins 1985: 36).⁶² Here is the Collins definition of ‘live’:

- (1) to show the characteristics of life, be alive; (2) remain alive or in existence; (3) to exist in a specified way (e.g. poorly); (4) (usually followed by ‘in’ or ‘at’) reside or dwell; (5) (usually with ‘on’) to continue or last (“the past still lives on in her memory”); (6) (usually followed by ‘by’) to order one’s life (according to a certain philosophy or religion); (7) (usually followed by ‘by’ or ‘on’) to support one’s style of life (“to live by writing”)⁶³

In languages other than English the ‘alive’ sense is more commonly expressed by verbs different from those in the ‘dwell’ sense. Russian, Nenets, Turkish, Kalam and Ket are at least partial exceptions, with overlapping meanings. Within the Indo-European languages, words for ‘live’ in the ‘alive’ sense mostly come from IE *g^wei- of that meaning, including Latin *vivere*, French *vivre*, Greek *zo* (earlier *zeo*) ‘live, experience’ (also nominal *bios* ‘life’), Irish *beo*, Welsh *byw*, Russian *žit’*, Sanskrit *jīv-* ‘live’ and Hindi *ji-na*, also English ‘quick’ from OE *cwec(u)* ‘alive’. German *leben* is different, related (without the prefix) to *bleiben* ‘remain’ and English ‘leave’ as above – perhaps referring to being left alive after battle (Buck 1988: 286).

62. English ‘dwell’, on the other hand, is from ON *dvelja* ‘delay’ (< *dh^wel-, which Watkins has as IE *dheu- ‘rise in cloud (of dust), fumes’, whence ‘obfuscate’, ‘doze’, and ‘deaf’. The development was from ‘confuse’ to ‘hinder, delay’ according to Buck (1988: 457).

63. Also, less relevant: (8) (followed by ‘with’) to endure the effects of a crime or mistake; (9) (followed by ‘through’) to experience and survive (“he lived through the war”); (10) (transitive) to pass or spend (one’s life, etc.).

And note also the ASL sign for 'live': both fists, thumbs up, moving up the sides of the chest, starting at the waist.

We can contrast the verbs given above for 'live' in the 'alive' sense with the following for 'live' in the 'dwell' sense. These are more directly relevant to TIME and SPACE. Latin has *habitāre* 'live (somewhere), inhabit' (frequentative of *habēre* 'have'), whence French *habiter*. It also has *incolere* 'dwell in, inhabit (of country or town)', from *colere* 'cultivate, dwell in' (< IE *k^wel-, which Watkins gives as 'revolve, move around, dwell').⁶⁴ The development was from 'move, turn' to 'stay' according to Buck (1988: 456). French also has *demeurer* 'live, remain' from Latin *morāre* 'delay' (as also Spanish *morar* 'live, dwell'), and *résider* 'reside' from Latin *re-* of repetition plus *sedēre* 'sit, remain' (like OE *sittan* 'sit, dwell'). Greek has *katoiko* 'live, dwell' (Classical *oikeo*, from *oikos* 'house'⁶⁵ – hence 'ecology'), also popular *kathomai* 'sit, live'. Irish has *aitreabhair* 'inhabit' from *trebhair* 'cultivate',⁶⁶ also *aitighim* 'dwell' from *ait* 'place', and *mairim* 'remain, dwell', going with Latin *morāre*. Welsh has *byw* 'live', extended from 'be alive' to 'dwell' under English influence (the older language had *trigiannu*, originally 'delay'). Sanskrit has *vās-* 'dwell' (< IE *wes- 'remain, dwell'), source of Hindi *bas-na*. German *wohnen* 'dwell' (OE *wonian*) is from IE *wen- 'desire, strive for', related to English 'win' and 'wont to' (via 'be accustomed to' acc. Buck p.456). Danish *bo* 'dwell' is from IE *bhū- 'be, become', whence also German *bauen* 'build'. Russian has besides *žit'* 'live' in both principal senses, also derivative *proživat'* 'live (somewhere)' (with *pro-* 'through'), *obitat'* 'inhabit, reside' (cf. OCS *ovitati* 'lodge (of birds)') and *pre-byvat'* 'reside' (from *byt'* 'be' with prefix *pre-* 'across'). Polish *mieszkać* 'dwell' was earlier 'delay, tarry'.

The most common sources here are 'remaining or tarrying', 'cultivating', and simply 'being'. The situation is similar outside of Indo-European. Some of the relevant expressions there are the same as verbs of 'being (somewhere)' – compare Appendix 2 for Chukchi, Nivkh, Thai, Samoan, Nuuchahnulth, Yidiny and Kalam. Others have the basic meaning 'sit', as in English 'reside' above – thus Yuk-aghur *modo-j* 'live (somewhere), sit', Quechua *tiyay* 'inhabit, sit', Dzongkha *dö-ni* 'sit, stay, live, reside, continue' (thus *dösa* 'place of residence'), and Xhosa *uku-hlala* 'sit, stay, dwell'. Note also West Greenlandic *najugaqar-* 'live (at)' (lit. 'have (as) dwelling place', from *najor-* 'live with (s.o.), be present'), CAY *uita-* 'live, stay, be situated' (from PE *uvita- 'have eyes open'), Aleut *tanaġi-* 'dwell' (lit. 'have

64. This was the source of Classical Greek *pelomai* 'be, be in motion', also of *telos* 'completion of a cycle, end result'.

65. From IE *weik- 'clan', as also Latin *villa* 'country house, villa', Sanskrit *viç* 'settlement, house, clan, people', *veçman* 'dwelling', and OCS *vīsi* 'village'.

66. cf. *treb* 'dwelling', cognate with German *Dorf* 'village'.

land'), and Chukchi (*t)va-*, *nəmətva-* 'live, dwell' (the latter with *nəm(nəm)* 'village, dwelling place'). All share a sense of combined spatial and temporal extension with the IE verbs above.

We have seen in Chapter 3 that the nominalization of 'live', namely 'life', can overlap in use with 'world' in English (and similarly in other languages) in the sense of 'public life', 'circumstances of life', or 'way of life' – recall Collins definitions 4, 12 and 14 of 'world', repeated here: (4) 'social or public life'; (12) 'the total circumstances and experience of an individual that makes up his life'; and (14) 'worldly or secular life, ways or people.' Amongst the WORLD words given for individual languages several contained reference specifically to a man's lifetime, namely Latin *aevum* 'age, lifetime', Japanese *yo* 'world, the public, lifetime, career, generation, age, era', Russian *vek* 'age, century, lifetime', and Old English *weorold*, literally "the age of man." Recall too the abstraction of *wFoR₂* in Chapter 4, referring to a man's lifetime. Compare the following idiomatic phrases with the English word 'life' referring to different aspects of experiencing the world: 'Life is full of surprises', 'How's life treating you?', 'The good life', 'A dog's life', 'Life begins at sixty', 'The life I'm used to', 'Life at the time of Henry VIII', 'Life on this planet as we know it', etc.

7.3 Words for Home and Room

The dwell sense of living words in the previous section naturally leads to words for 'dwelling place' and 'home' – some of the words below have already been mentioned there. Home is after all the first version of the WORLD that the child will learn to live and move about in. Recall the common sense (b) of WORLD in 3.1: "the maximal extent of familiar territory or country".⁶⁷ The English word 'home' has an interesting history (though its ultimate source is obscure). The Collins dictionary gives the following definitions:

- (1) The place or a place where one lives; (2) a house or other dwelling; (3) a family or other group living in a house or other place; (4) a person's country, city, etc., esp. viewed as a birthplace, a residence during one's early years, or a place dear to one; (5) the environment or habitat of a person or animal; (6) the place where something is invented, founded, or developed.

67. 'Extent' itself, note, is from Latin *extensus* 'extensive', from *extendere* 'stretch out'. It covers both spatial and temporal as well as more figurative senses.

Home, in other words, is a SPACE for living in, either of an individual, a group, a community or even a whole people (as in 'America, home of the free'). The modern word comes from Old English: *hām* 'collection of dwellings, village, estate, house', as does 'hamlet' and 'homestead'. The German cognate *Heim* is 'home, abode', as mentioned in Chapter 3. Note also Gothic *heims* 'village', and compare the extended German form *Heimat* 'home, native place or country, homeland'.

Similar words are found in all the Indo-European languages, thus Greek *spiti* 'home' (from Latin *hospitium* 'inn, lodging'), French *chez (nous)* 'at home of (us)' (from Latin *casa* 'hut, cottage'). French also has *foyer* in the sense of 'home, hearth'. Irish has *baile* 'village, town, home', and Welsh *gartre(f)* 'at home' (*tref* is 'home, town'). Russian has *dom* 'house, home' (and *doma* 'at home'), from IE **dem-* 'house, build', and *žilišče* 'dwelling' from *žit* 'live'. Hindi has *ghar* 'house, home, household, room, native place', also 'frame, container', while Sanskrit has (a)*vāsaḥ* 'home, dwelling' (from *vās-* 'dwell').

Outside of IE, Finnish has *koti* 'home', which also appears to have 'container' cognates – compare *kota* 'Laplander's hut, (botanical) capsule', and *kotelo* 'case, container'. Arabic has *manzil* 'home, place' and Turkish *ev* 'house, home'. Indonesian has *rumah* 'house, home' and Samoan *fale* 'house, home'. In Mandarin Chinese *jiā* is 'home, place to live, family, household', as opposed to *zhùzhái* 'home, house'. In Japanese *uchi* 'one's home, abode' is also more generally 'inside, indoors', while *kokyō* mentioned in 3.1. is 'native place'.

Further afield, WG has a nominalized form *angerlarsimaffik* 'home' with the affix *-vik/- (f)fik* mentioned in 2.1 (from *angerlarsima-* 'be at home', *angerlar-* 'go home'). But *nuna* 'land' mentioned in Chapter 3 also covers 'home' in Eskimoan languages, as does Aleut cognate *tana-X* 'land, homeland, dwelling place'. WG also has *nagguik*, literally 'place one grows up', based on the stem **nayu-* (starred, non-cursive) **nayu-* 'grow (of plants)'. Nenets has *mja?* 'tent dwelling, home' (and *mjakāna* 'at home'), as befits a nomadic tent-dwelling people, while Tundra Yukaghir has *lewejn-burebe* 'nature, homeland' (literally 'cover of earth' – compare Kolyma *lebie* 'country, ground'). Koyukon has *kkunkk'aat* 'hearth, home, dwelling, camp' (lit. 'fire cavity'), also *ts'eteetl'ot* 'home, birthplace, native place'.⁶⁸ Cree has *wiki* 'one's home' (cf. *wiki-* 'dwell'), and Quechua has *wasi* 'house, home'. Nahuatl has *chān* 'dwelling, house, home, one's place', like French *chez*. Dzongkha has *dōsa* 'place of residence' (with *zhūsa* as the honorific equivalent). Xhosa has *ikhaya* 'home' and *um-zi* 'native village, homestead'. Kwaza has *si-dy-rjy* 'the place where I live, home' (van der Voort, pers. comm. – from *-rjy* 'area, surroundings,

68. Probably from 'angled' plus 'among' plus 'rear' – *ts'et* is 'angular place'.

room, place' mentioned in 2.1). And finally Yidiny has *bulmba* 'world, habitable place, house, camp', as mentioned in Chapter 3.⁶⁹

Home is from a wider perspective the country one lives in, and in 3.1 numerous words for WORLD have been cited that also cover the concept 'country'. These include, besides English 'country' itself, French *pays*, Russian *strana*, Finnish *maa*, Japanese *kuni*, Mandarin *guójiā*, Arabic *balad*, Turkish *ülke*, Xhosa *ili-zwe*, and Yoruba *ilú*. Obviously the words for 'home' or 'country' are highly culture-dependent, but all of them, however exotic, relate to Collins definition (1): "the place or a place where one lives". Note the word 'place' here, referring to a specific place (whether house, village or birthplace). Words for 'home' are thus an unlikely source for the general notion of SPACE, whereas words for 'room' (apart from their specific 'rooms in the house' meanings) do indeed sometimes overlap with such a general meaning, as for example with German *Raum* given in 2.1. These 'room' words are well suited to concepts of 'empty space'.

Now a home is a dwelling place, usually a house of sorts made up of rooms. A child will speak of 'his or her room' and this will be the one he or she is most familiar with and usually sleeps in. Compare expressions like 'his own space', and 'in his own time' referring to someone's personal world in which to manoeuvre, like on a larger scale 'his world', 'a world of his own', etc. The word 'room' itself has an interesting background. Consider the Collins definitions:

- (1) space or extent, esp. unoccupied or unobstructed space for a particular purpose ("is there room to pass?");
- (2) an area within a building enclosed by a floor, a ceiling, and walls or partitions;
- (3) the people present in a room ("the whole room was laughing");
- (4) opportunity or scope ("room for manoeuvre").

The earliest attested meaning of the word is given in the Oxford Dictionary of English Etymology simply as OE 'space', which by the 14th century was more specific 'place'. It was only in the fifteenth century that it acquired its sense of 'chamber in a building'. The Germanic word is based on adjectival **rūmaz* 'spacious' (cf. OE *rūm* – modern 'roomy') used as a substantive, and is related to Latin *rūs* 'country, open land' (from IE **reuə* 'open space'). The general development of meaning would seem then to be from 'open space' to '(specific) place', and finally to 'enclosed space/chamber'. But adhering to even the earliest meaning may have been a nuance of 'occupied space' or 'space around one', at least potentially, i.e. empty space that can house something, as in 'room in the boot of the car' (for luggage). As an adjective it would have been applied to a kind of (available) SPACE.

69. See Wilkins (1993), discussing another Australian language, Mparntwe Arrernte, for how such 'place' words can be further related to totemic ancestors and the Dreamtime world.

Note expressions like ‘make room for s.o./s.th.’, ‘room for two more people (in a lift)’, also, more abstractly, ‘room for improvement’.

Words in other languages with meanings comparable to English ‘room’ have been met in 2.1. These included, besides German *Raum* and Danish *rum*, Latin *spatium*, Greek *topos*, Russian *mesto*, Mandarin *kōngjiān*, Japanese *ma*, Finnish *tila*, Indonesian *ruang*, West Greenlandic *ini*, Yoruba *àyè*, and Kwaza *-rj̃j̃*. To these could be added words given by Buck under his section 7.21 for “Rooms in the house”, including Latin *conclāve* (lit. ‘place that can be locked up’), Vulgar Latin *camera* (earlier ‘vaulted roof’), whence French *chambre*. Italian has *stanza* (lit. ‘standing place’), Old Norse *stofa* (in Danish *stue* ‘front room’, i.e. ‘heated room’ – cf. English ‘stove’), Old English *cofa* (cf. ON *kofi* ‘hut’), German *Zimmer* (originally ‘timber, building’), Russian *komnata* (from Medieval Latin *camīnāta* ‘fireplace, furnace’). Ancient Greek either used words for ‘house’ like *oikos* and *doma* (modern *domatio* ‘room’) or names for different specific rooms.

Words for specific kinds of room depend on particular types of dwellings in different cultures and geographical settings. Less familiar dwelling arrangements include for instance Chukchi *joroŋə* ‘sleeping compartment’ (a box-like canvas compartment suspended within the tent dwelling, the “yaranga”). Nevertheless, all of them refer to a SPACE that can be potentially filled by one or more occupant or object.

Orientation, local and wider scale

Picking up the theme of deixis and location from Chapter 6.1, we can turn now to the adult world of orientation within and outside the home. As in that chapter, I shall limit myself to summarizing some of the northern hemisphere systems that I am familiar with and have written about extensively (Fortescue 2011 and 2018). In these systems the relationship between microcosm (in the house) and macrocosm (in the wider geographical setting) is particularly clear. The categories and conclusions reached there have, I believe, a wider typological relevance – I shall mention a couple of examples in geographically and culturally distinct settings elsewhere. In Fortescue (2011) I distinguished five main types of orientation systems across the North Pacific Rim and beyond, namely the (1) riverine, (2) coastal, (3) nomadic, (4) archipelagoan, and (5) large island types. I shall focus on the contrast between the first two of these below. Each type is associated with a particular relationship of “macrocosmic” and “microcosmic” applications of the linguistic terms concerned, i.e. to the interior of the house and to the wider surroundings around it. The latter typically distinguishes local interpretations of the terms (within the area of daily movement) and wider geographical application (verging on the absolute or cardinal). The orientation systems described here do not consist just of individual spatial frames of reference but represent coherent world frames that incorporate (potentially deictic) demonstratives as in Ch. 6.1, as well as elements of absolute, relative and intrinsic sFoRs meaning ‘behind’, ‘in front of’, ‘on top of’, etc.

In relation to the external macrocosm the terms relating here to Levinson’s “absolute” sFoR are generally of the landmark (as opposed to cardinal) kind, referring to the coast or the bank of a river.⁷⁰ It can be questioned whether the purely coastal type is really absolute in the way he defines this term, in part because many of the languages in my survey have a cardinal system (absolute north/south, etc.) superimposed on a more local landmark one (Fortescue 2011: 111–3). A given language may also incorporate more than one type of landmark in any given locality, e.g. prevailing winds as well as a coastal or riverine deictic system, in order to provide greater reliability over a larger (e.g. dialect) area. A coastline or river may shift absolute direction quite significantly, even at

70. Levinson suggests that absolute systems may be typical of hunter-gatherer societies (Levinson 2003: 212), though Majid et al. (2004) conclude that there is little evidence for “ecological determinism” of this sort across societies.

the local level, whereas prevailing wind directions may be somewhat more stable. Levinson does in fact distinguish a “sub-absolute” landmark sub-type of absolute system (p.314–5). Cardinal systems – if one takes the standard European languages as exemplars – are typically reliant on the position of sunrise and sunset, and yet the precession of the sun across the sky is itself a landmark, one that varies seasonally through time just as coastal landmark systems vary through space.

8.1 Orientation in and around the house

Let us start with Central Alaskan Yupik, where terms relating to orientation within and around the house are represented in graphic detail by Jacobson (1984). As with the demonstrative system presented in 6.1, the situation in West Greenlandic has been simplified compared with that within CAY, which better illustrates the extent of the microcosmic/macrocosmic relationship. In Figures 5 and 6 the involvement of the stems in Table 2 in 6.1 will be recognized, here extended by allative case ending *-(a)vet*, resulting in slightly altered shapes of the stems themselves (e.g. *kiug-* alternating with *ki(a)-*). The verbs *anluni* and *iterluni* in Figure 5 are ‘going out’ and ‘going in’ respectively, and extended forms *anelrarluni* and *itrarluni* in Figure 6 are ‘go towards exit/downriver’ and ‘go in towards the back/upriver’ respectively. Note that there are more than one ‘in’ and ‘out’ and more than one ‘down’ and ‘up’ stems here, depending on the dimensions of ‘extended’, ‘restricted’ and ‘obscured’ in Table 2. Now compare the orientation of the *uavet* (<**ug-*) and *kiavet* (<**kiv-*) directions within the house in Figure 5 with that along the river in Figure 6, i.e. towards the front vs. the back wall and upriver vs. downriver respectively. This reflects a basic axis that runs through both the microcosmic and the macrocosmic orientation systems of Eskimoan languages, namely the opposition of ‘in’ to ‘down’.⁷¹ This makes sense when you consider that the typical location of the house is one in which the door opens out from the centre of the house downslope to the river (or coast), and that downriver is literally down from inside the land (i.e. inland, where the river rises). Still more fundamentally, it reflects the arrangement of the sunken entrance tunnel of the traditional Eskimoan dwelling (you had to go down into it to get out). This it shares with coast-oriented villages,

71. Besides these ‘in’ and ‘down’ terms several of the other demonstratives are indicated in the figures, namely the ‘outside’ ones leading from the door of the house, and the ‘upslope’ ones leading up behind the house. There are also a pair of positional stems partaking of the same opposition, namely *kete-* ‘area towards river’ as well as ‘away from the wall’, and *kelu-* ‘area away from the river’ as well as ‘area behind the house’.

typical of the Inuit further north and east, where the ‘upriver/downriver’ axis is replaced by ‘left/right along the coast’ when looking out to sea. It is likely that the original Eskimoan system was coastal (as the archaeology suggests), Central Alaskan Yupik speakers having later moved inland along the salmon-rich Alaskan rivers, though this is not certain. I shall return to this distinction in 8.2.

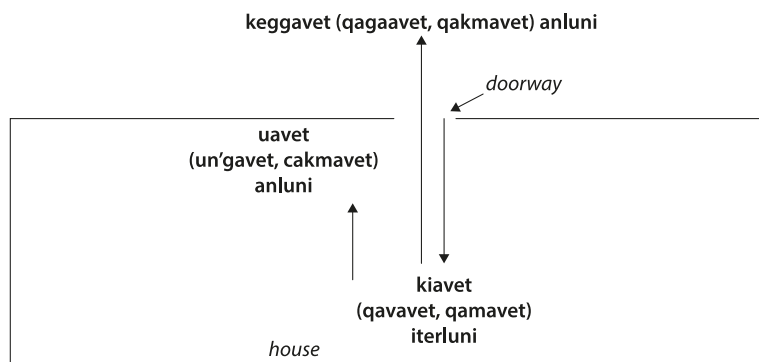


Figure 5. Central Alaskan Yupik house-oriented directions (Jacobson 1984)

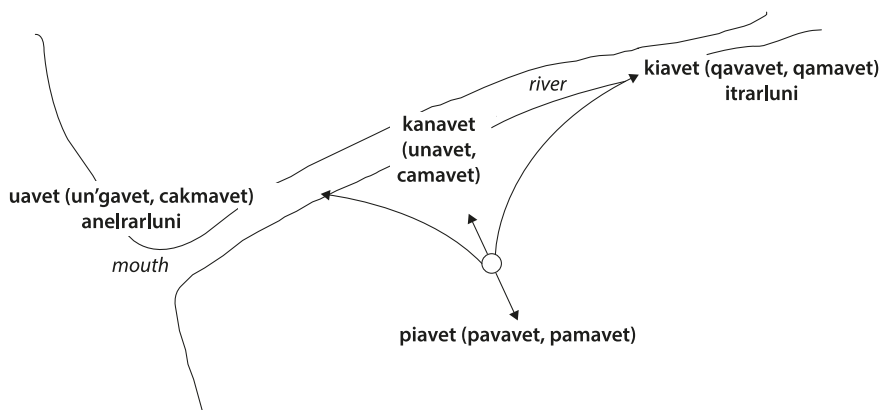


Figure 6. Central Alaskan Yup'ik riverine directions

As it happens, not all CAY-speaking villages lie inland along major rivers (though most do, unlike Central Siberian Yupik ones). What happens at the coast? Coastal CAY, as around Norton Sound, is of particular interest since it would represent a step back of a riverine system to the coast (along which early Eskimoan people were originally concentrated). Symptomatic of what has occurred is the maintenance of the orthogonal ambiguity of the riverine ‘down’ and ‘in’ terms (i.e. within the house or up/down river). At Kotlik, at the mouth of the Yukon river, the ‘down’ and ‘in’ directionals *waavət* vs. *kaavət* (from **ug-* and **ki(v)-*,

'downriver' and 'upriver' respectively) refer to right and left along the coast, which seems unmotivated or arbitrary. In other respects, Kotlik shares the same wider scale directionals as further inland on the Yukon (e.g. with *nəgəq* 'north', *uŋjalaq* 'south', *kiugnək* 'east', and *kanakliq* 'west'). As regards the microcosm of the house, *kaavət* is also 'towards the back of the house' at Kotlik, as expected of a riverine system. The question of what such discrepancies in general show as regards previous migrations towards the coast (or *vice versa*) is addressed in Fortescue (2011: 22f.). The correspondence of the 'downriver' vs. 'upriver' terms to 'left along the coast' vs. 'right along the coast' (when looking out to sea) in all essentially coastal Inuit dialects (with the exception of riverine Malimiut) is logical when one considers the geography: the ice-free passage to the east from North Alaska is narrower and requires more effort to penetrate than the more open one out west towards the Bering Sea – and this could probably be extended to the case of Kotlik vis-à-vis Bering Strait to its north.

The extension of the microcosmic directional terms would at all events everywhere have been outwards, towards the macrocosm, the result varying somewhat according to geographical setting, but the house type itself would in turn have depended strongly on the macrocosmic setting, so the relationship must be characterized as 'bidirectional'.

More can be said about the inner walls of the typical Eskimoan house. There is considerable variation in their naming from region to region, though the basic use of demonstrative stems and locational stems is the same everywhere. Thus in the traditional Alaskan Yupik house the rear wall was *kian* (cf. root *kiv-), and the front one *uaqliq* (from root *ug-), the same as in Siberian Yupik. But in North Alaskan Inuit this is switched through 90 degrees, such that *kivan* and *uan* (from the same roots) refer to the left as opposed to the right side walls, in the macrocosmic sense respectively up (east) and down (west) along the coast. As argued in Fortescue (1988: 23) this only makes sense etymologically if the typical NAI house once faced south, as indeed it is known to have been the case at Point Barrow at the end of the 19th century in order to keep the entrance away from the cruel northern wind (Murdoch 1892: 79).⁷² The front wall is *uati* (from *ug-) again further east, e.g. in Arctic Quebec, where the back wall (as in NAI and Greenland) is *kilu*, which in CAY (*kelu*) is 'area behind the house'. Thus the transparent *kiv- ~ *ug- microcosm-macrocosm link retained in Yupik was largely lost in the Inuit dialects as the people moved eastward along the Arctic coasts.

72. The southern entrance was apparently also typical of the Mackenzie Delta and Copper Eskimo regions of the western Canadian Arctic. Interestingly, this situation is different at Point Hope, not far west from Barrow, where there are still traces of the *ug*- 'front wall' and *kiv*- 'back wall' opposition in place, namely in the forms *kivalli*q for the back room and *ualli*q for the front room of the house.

The case of Nivkh as spoken on the Amur river of southeastern Siberia is somewhat simpler: it also displays a typical riverine system like CAY, but in this case it is definitely original, the Nivkh having never been coastal until they reached the mouth of the Amur and the island of Sakhalin beyond, where local adjustments to coastal orientation are in evidence, as with Eskimoan systems (Gruzdeva 2022:138). The orientation system can again be seen to correlate the microcosm of the house with the macrocosm of the geographical setting (here along the broad Amur river). The house is typically orientated with the door facing downriver, and the part of the house near the door is correlated with the mouth of the river and referred to as ‘downriver’. The opposite part of the house is correlated with the source of the river and designated ‘upriver’. The sleeping bench at the back wall of the house, considered the most comfortable place for guests, is referred to as the ‘upriver place’.

What is intriguingly different from the CAY situation is the involvement of the central fireplace in the Nivkh system. I have discussed this in terms of the “Fire and water” conflations of not only Nivkh but also of neighbouring Tungusic languages and others as far-flung as Selkup and Ket in western Siberia and Kwak’waka, Haida and some Na-Dene languages in Alaska (Fortescue 2011:98–107). In essence, direction towards the water is treated as the same as direction towards the fireplace and direction away from the water is treated the same as direction away from the fireplace.⁷³ The direction to or from the fireplace can be to or from either the back or a side wall (where people sit), but probably not from the front, where the entrance is positioned (Figure 7). The relevant roots (or stems) are the deictic ones seen already in 6.1, namely *a-/ya-* ‘downriver’, *k’e-/xe-* ‘upriver’, *he-/ye-* ‘upland, inland’, *k’i-/xi-* ‘up’, *qo-/ro-* ‘down, down to shore’, and *t’a-/řa-* ‘into the river, to opposite shore’.

The Fire and water conflation phenomenon appears neither to be specifically maritime nor inland-oriented, but simply indicative of a certain widespread perspective on the relationship between microcosm and macrocosm and of the spirits ruling them in the early hunter-gathering societies of this vast northern region. Savaljeva and Taksamai (1965:118) describe the Nivkh fireplace as having great ceremonial importance, the spirits of the fire helping man in communicating with Nature, for example to facilitate the hunt. Fire and the open water are both places that command respect, dangerous yet essential for subsistence. As regards the centrality of the hearth in the household, we find parallels in the languages of Europe.

73. Gruzdeva (2022:136) points out that the “big house” typical of the Amur River Nivkh actually had two separate hearths, “the hearth on the side of the water space” and “the hearth on the side of the forest”, corresponding to the spiritual “Masters” of the water and of the forest and hills (respectively Tol and Pal(η)).

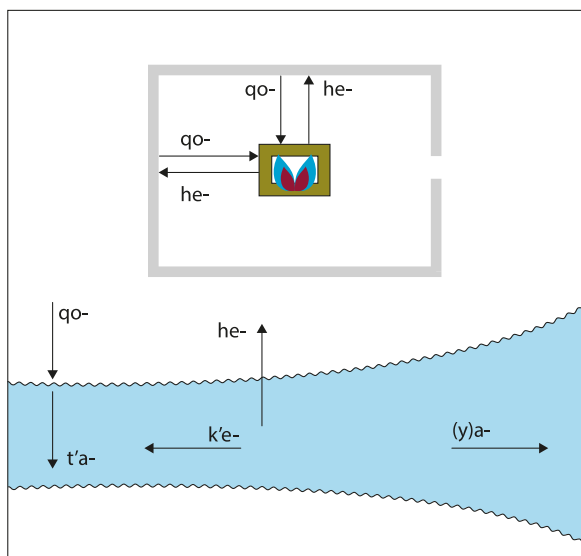


Figure 7. Orientation in and around the Nivkh house

Thus English ‘focus’ in its various modern senses (including the scientific use of ‘focus’) is directly from Latin *focus* ‘fireplace, hearth, household’, the focal point of the room, from which French *foyer* ‘hearth, home’ mentioned in 7.3 derives via Medieval Latin *focārium* ‘hearthstone’. The special later sense of the theatre “foyer” was passed on to English. Latin *focus* gradually came to denote also the contents of the fireplace, the source of French *feu* ‘fire’. Compare also Latin *aedēs* ‘building, house’, earlier ‘hearth’ (from IE *aidh- ‘burn’).

We have seen that the mutual orientation of terms for the house-internal microcosm and the surrounding macrocosm may vary in Yupik villages according to a coastal as opposed to riverine setting. This applies in still greater measure in the geographically complicated region, with numerous straits and islands, where Northern Wakashan languages are spoken. In Fortescue (2011:20ff) I describe some of this variation in detail, gathered during fieldwork with Kwak’wala. In Figure 8 (essentially for the northeast of Vancouver Island as described by Boas 1909) I illustrate the systematic shifts between a typical riverine site and a coastal one (‘coastal’ understood as including the coast of a wide inlet or strait). To avoid overloading the diagrams, not all directions involved have been added to both settings (thus the two houses contain between them all the directions indicated for the one and for the other). A further complication is that all the essential directional stems are doubled by a corresponding lexical affix (in parentheses in the figure). Wind directions are indicated by wavy lines -- these can be ignored, but it should be noted that in all the settings looked at in Fortescue (2011) prevailing

wind directions are typically superimposed upon terrestrial orientation systems, providing a further dimension to orientation in the wider region around the village. Two terms in particular are important here, namely *tl'as-* and *'atl-* (which in the standard Americanist orthography would be given as *ɬ'as-* and *ʔaɬ-* respectively).⁷⁴ They refer both to movement out to sea and on to shore (regardless of location) and to movement towards or away from the fireplace (in the old-style house) – Kwak'wala is another language displaying the Fire and water conflation. Two other stems to note here are *n'ala-* and *g^wa-*, respectively 'upriver' (or 'up coast of strait') vs. 'downriver' (or 'down coast of strait'). Within the house they refer to 'towards the front wall' vs. 'towards the back wall'.⁷⁵

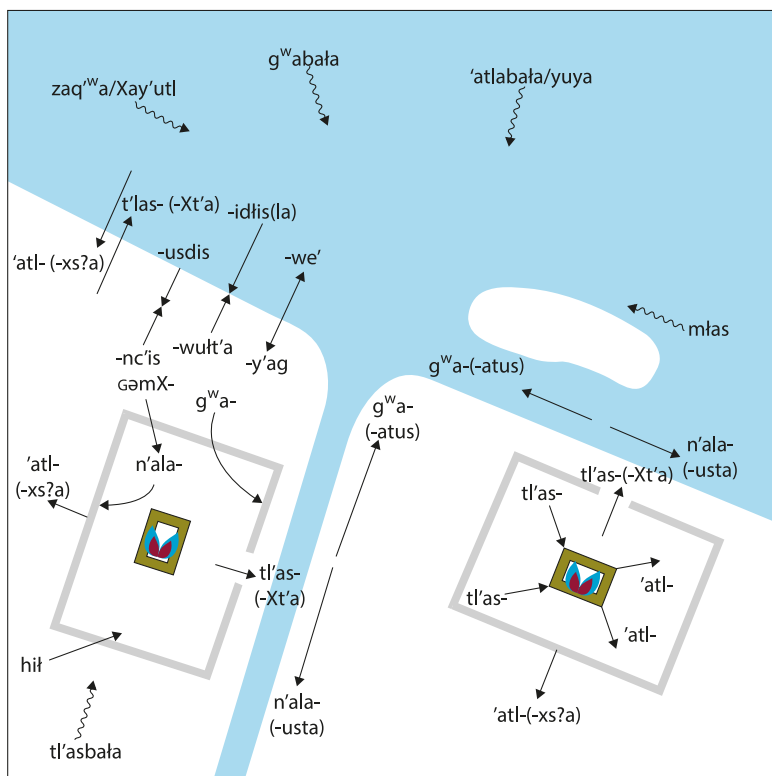


Figure 8. Orientation in and around the Kwak'wala house

74. The first of these corresponds to Nuuchahnulth *ɬa'pas* 'out to sea' mentioned in 6.1.

75. Note also the Kwak'wala house-related use of stems for 'left side' and 'right side' (cf. Levinson's "intrinsic" sFoR), thus *GəmXaniG^wil* 'lefthand side of house' – seen from inside the house looking out (with stem *qəmX* 'left').

At Quatsino on the northwest coast of Vancouver Island this last opposition is etymologically natural in so far as *n'ala-* 'south' (used for the south wall) matches its source meaning, 'daylight', and *g^wa-* 'north' (used for the north wall) is "behind" the northwest end of the island, as its etymology suggests. This may reflect the original coastal sense of all these terms, before the movement of Kwak'wala-speaking groups to the east side of the island (and further north from there). The rather unintuitive swivelling by 90 degrees of the *g^wa-/ n'ala-* axis on the northeast coast as applied to within the house (bringing it in line with the *tl'as-/atl-* axis) would have come later, part of the same adjustment to riverine/inlet use of the system in the area that Boas investigated. It is at all events easier to relate the Kwak'wala system at Quatsino to the Southern Wakashan system of Nuuchahnulth, which with its dedicated 'up coast' and 'down coast' terms is quintessentially coastal.

In all these cases, an absolute – or rather landmark – frame of reference dominates in the way speakers orientate themselves vis-à-vis the house walls. This can be contrasted with the way we, as speakers of English, refer to the house and its walls in terms of intrinsic and relative FoRs. Thus in English one would say 'the front wall' or 'the back wall', 'behind the house' or 'in front of the house', or (relatively from a position in front of it) 'the left-hand wall', 'to the left of the house', etc.

8.2 Orientation further afield

The basic orientation system in the Eskimoan world is the same everywhere, both in its Inuit and in its Yupik variants, though with some replacement of terms: the house-interior microcosm is everywhere aligned with the immediately surrounding macrocosm. The application of these and other terms to the broader geographical surroundings – i.e. all the territory that hunters might cover and need to be aware of and to be able to communicate about with neighbouring tribes – can be seen schematized with the directional axes of Figure 9. The demonstrative stems are again those presented in Table 2 in 6.1 (here in PE form and minus the locative *-ani* suffix), namely *av-* (and *ik-*) 'over there', *kan-* and *sam-* 'down there', *pik-* and *pav-* 'up there', *qav-* (or *kiv-*) (Yupik *qaw-* or *kiug-*) 'inside, upriver', and *ug-* (*u(a)-*) 'towards exit, downriver'. The different kinds of arrows relate to homologous directions: 'up', 'down', 'over there' (also 'up coast to right'), 'down coast to left' (the last two 'downriver' vs. 'upriver' in riverine systems). To them are added in red the prevailing wind directions *nigiq* and *ungalaq*, respectively a northerly and a southerly wind in the Bering Strait area but ending up reversed in various sites in the eastern Arctic. The addition of

the prevailing wind directions gives a somewhat firmer anchoring to the flexible demonstrative system (which can swing wildly in local application according to the exact contours of the coastline).⁷⁶

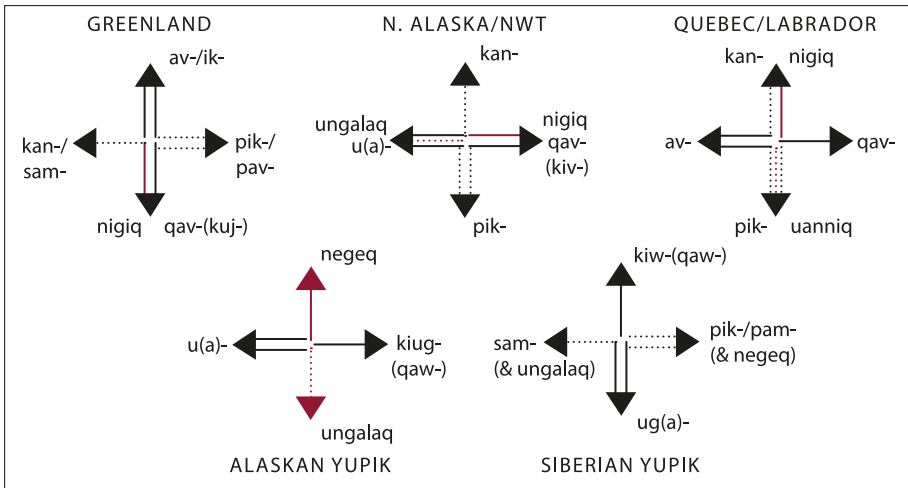


Figure 9. Inuit directional axes

Figure 10 schematizes how the abstracted directional axes are applied at specific locations as they swing along the convoluted Arctic and sub-Arctic coasts (both figures are from Fortescue 1988). It should be born in mind that the absolute orientation of the directional terms across a larger region (e.g. a dialect area) may be at odds with their natural local application in the immediate vicinity of the house. It makes sense that a more absolute orientation of basic directional terms should hold over such a larger region (the broader tribal *nuna*) for speakers of the same dialect in order to communicate about directions while travelling around within it, despite the same terms having a more coast-relative orientation in the immediate environs of the settlement.⁷⁷ All points connected by a solid line are in a homologous relationship, whereas the intrusion of a ‘-||-’ sign marks a mirror image relationship across an intervening strait, with at least one axis reversed. This simplified chart is in principle sufficient to allow the traveller to interpret larger area directional terms on journeys to any corner of the Inuit world. It rep-

76. In the southernmost regions, namely Arctic Quebec and Labrador, solar-based directions for north (lit. ‘dark’) and south (lit. ‘sun’) also appear, juxtaposed on the pan-Inuit system.

77. Thus in all of West Greenland *avani* refers to ‘in the north’, whereas the *av-* directions varies locally according to the immediate orientation of the coast. the reverse holds for all of East Greenland, where the same stem refers to the south.

resents more relevant information than could be supplied by a compass, which would of course point (today) towards Boothia Peninsula in the eastern Canadian Arctic wherever one happened to be. To adjust the major axes when moving inland along a river, it is only necessary to shift the *kiv- ~ u(a)-* ‘left/right along coast’ axis through 90 degrees so that it now becomes an ‘upriver/ downriver’ one.

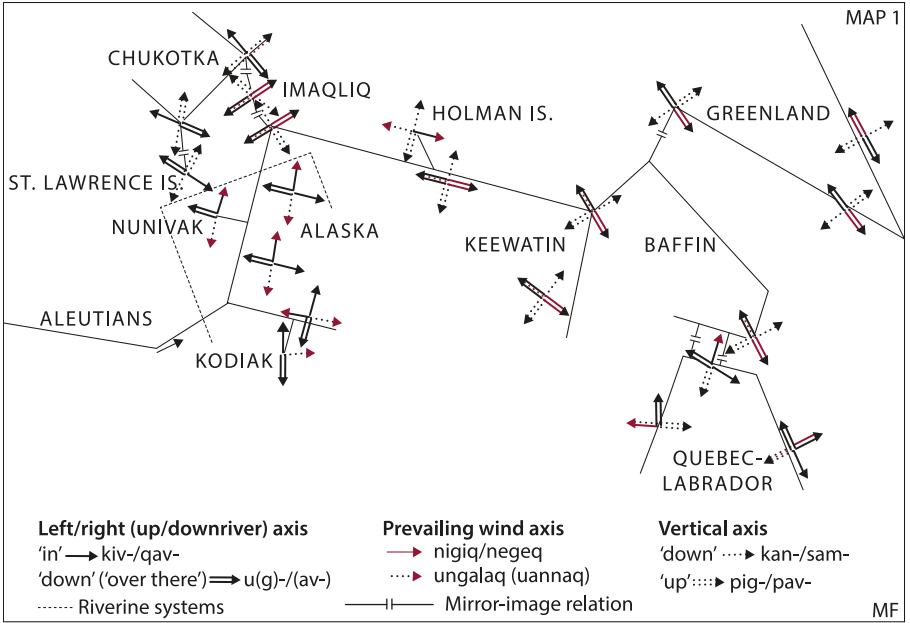


Figure 10. Shifting directional orientation across the Inuit world

Orientation by the stars may be as important for Arctic travellers in certain situations as navigation by terrestrial landmarks. MacDonald (1998:160–191) has a fine description of how the Igloolik Inuit make use of them in combination with other indices of direction such as wind direction, sea currents and the orientation of snowdrifts in a largely flat region of the high Canadian Arctic. Of particular importance for navigation are the local winds, which for Igloolik are *uangnaq* (WNW) and *nigiq* (ESE), *kanangnaq* (NNE), and *akinnaq* (SSW). These are seen as constituting two sets of opposites, *uangnaq-nigiq* and *kanangnaq-akinnaq*. The opposition between *nigiq* and *uangnaq* is personified as between counterbalanced male and female forces respectively (p.181), the one “retaliating” periodically against the other. There are intermediate directions designated by the use of suffix *-passik* on the primary wind term. The language also contains numerous words for winds of different strengths, some of them involving snow in one form or another. Gagné, in describing what he calls the “cognitive maps” of the Inuit, stresses that

although the traditional Inuit did not possess a highly systematized system of navigation like the Europeans, their language itself – in particular its demonstrative system – can specify the location of objects and places much more accurately than western languages (Gagné 1968: 38).

I have not yet discussed two of the other types of orientation systems treated in Fortescue (2011), namely the nomadic one of the inland Chukchi and the archipelagoan one of the Aleuts. As regards the “large island” type, no better example could be chosen than that of Iceland (though it contains some unique features), as discussed in Fortescue (2018) and with which I shall conclude this section.

The inland Chukchi, nomadically moving with their reindeer herds far from any coast or major river, would obviously need to orient themselves by other landmarks than these. Bogoraz (1904–9), described their orientation system in some detail – including its relation to the interior of the *yaranga* (the traditional tent). Here a wind-based axis from *eygə* ‘northwest’ vs. *ayval* ‘southeast’ (literally ‘wind side’ and ‘lee side’) is central, these being the most important prevailing wind directions on the Chukotkan high tundra. The western nomads call the eastern ones *ayval’ət* and the eastern ones called them in turn *eygəsqəl’ət*, based on these stems, so these terms obviously apply similarly over a large territory. They also correlate directly with the way in which the *yaranga* is (or was) set up, with the entrance towards the northeast, the direction of the dawn, and the righthand wall of the interior sleeping compartment (seen from the tent entrance) consequently facing the northwest (*aygəsqə-ron*), while the opposite, lefthand wall faced southeast (*ayval-lon*). The northeast orientation of the entrance of the *yaranga* was of ritual as well as physical significance: it faced the direction of *təŋa(y)əryən*, the Morning Dawn, the most important of these ritual directions (after the zenith) for sacrificing to the spirits.

Bogoraz (1904–9: 307–14) also has a description of the stars and constellations significant for Chukchi orientation. The directions themselves were regarded as animate spirits according to Bogoraz (pp. 303ff.). A number of other sun-related directional terms from this ritual set are found in use among nomadic Chukotkans, notably those for ‘sun up’ and ‘sun down,’ even though these would change significantly in their absolute geographical senses according to the season of the year. The latter must be kept close track of by nomads of the far north as they follow their herds around in predetermined cycles.

This all makes sense when considering the life style of inland nomads (as opposed to the coastal Chukchi, who share a coastal system like that of their Eskimoan neighbours), and it is indeed a pattern found with other nomadic groups of the Russian Far East, such as the Evens and Evenks, where east and west are similarly referred to as sunrise and sundown respectively, as is also the case with the origin of European ‘east’ and ‘west’ terms. Chukchi, like other Chukotkan lan-

guages, does have ‘upriver’ vs. ‘downriver’ terms like *gərgoca* ‘on top, up river’, but these are largely independent of other directional terms and do not form part of the primary orientation system.

As regards the “archipelagoan” Aleuts, with their traditional roof-entrance kind of house, they may well have brought their Eskimoan orientation terminology with them when they absorbed or ousted earlier people they met on the Alaskan archipelago whose house style they eventually took over. In time they altered the basic Eskimoan system in their own idiosyncratic manner. The orientation of the traditional Aleut house, with its roof entrance by ladder towards the east of the building, is the main factor here.⁷⁸ The specific point at which this system meshes with the Eskimoan system(s) is in the eastern pole of its east/west axis, which correlates directly with the ‘inward’ direction of the CAY system on the mainland and the ‘up coast’ one of northern Alaskan Inupiaq, all of these being expressed by one or more common demonstrative root meaning ‘inwards’. This makes sense when one observes the way the archipelago projects out from the Alaskan peninsula, which constitutes (especially along its north shore) the portal to the interior of the mainland at Bristol Bay. However, both the ‘inside’ (*qig-*) and the corresponding ‘outside’ demonstrative (*qag-*) are used of the east in Aleut. The conflation of the macrocosmic directions of Eskaleut ‘outside’ and ‘inside’ demonstratives in Aleut is from this point of view quite logical, given the position of the entrance ladder, typically towards the east end of the house. It also explains the use of the stem originally meaning ‘(inside of) house’ (*na-*) to mean ‘west’ in its orientation system – the position furthest from the ladder (cf. *nag-* ‘inside’ cognate with Eskimo *ənə* ‘place, home’ mentioned in 7.3). Furthermore, most Aleutian villages are positioned along the northern sides of the islands – and this has a bearing on the term for ‘north’, which is based on stem *chug-*, probably cognate with *chuguX* ‘beach’ (beaches typically lie on that side). The last of the four cardinal terms, that for ‘south’, variably *nu-*, *ŋu-*, *na-* or *ŋa-* (according to dialect), is in turn probably cognate with Eskimo *uŋalaq*, which is ‘south’ also in Central Alaskan Yupik (etymologically ‘far over there’). All four terms have cognates in Eskimo, and two of them have the same directional sense as there, aligning respectively with the Eskimoan ‘upstream/ downstream’ axis (coastal ‘right/ left along the coast’) and the ‘north/south’ prevailing wind axis (down through the Bering Sea). What typifies the system as archipelagoan is that the same terms referring to the same directions are repeated on every island along the chain individually.

78. Note that the word for ‘doorway’ in Aleut, *gal̥gi-X*, is the same word as Eskimoan *əy̥alər ‘smokehole, window’.

Other demonstrative stems in Aleut cognate with the Eskimoan ones in 6.1 include *qak*- ‘in there’ (obliquely, e.g. down the entrance ladder, also ‘at the bottom of a bay’), *aku*- ‘over there to the side’, and *iku*- ‘there aside’ (Bergsland 1994:567). These are innovative “transversal” extensions of the proto-Eskaleut demonstratives, which probably reflect the position of the entrance ladder within the Aleut house – another manifestation of the microcosm-macrocosm linkage. Virtually all additional terms for winds or intermediate directions are based on these directional roots. It is noteworthy that the vertical ‘down’ vs. ‘up’ demonstrative roots, much used in Eskimoan systems, are absent here. Actually this is logical in an archipelagoan system if one thinks about it: the ‘up’ demonstratives everywhere refer to up towards the centre of individual islands and thus can hardly be constant over larger areas, thus the root *haku*- ‘up there aslant’ has derived forms meaning ‘up from the shore’ everywhere.⁷⁹ A ‘down’ demonstrative is used for ‘down on the beach’ (*un(a)-*), which also forms *unaaġiX* ‘outer, seaward’ and *unaja*- ‘passage between an island and land, shore side’ – the source of the Aleut ethnonym *Unajan*, roughly ‘seasiders’ or ‘beach dwellers’.

Let us now move from the world of hunter-gatherers to somewhere nearer home, namely the orientation system on the large island of Iceland. It will be seen that much that has been discussed already with non-European examples will be familiar. As described by Einarsson (1942), the original words for absolute (cartographic/cardinal) ‘south’ and ‘west’, etc., in Iceland are still used about weather/wind directions and for relative directions within settlements (e.g. of the position of an object north, south, etc., of the church). But they also soon took on local geographical senses referring to directions along the coast that one had to move in from a given locality towards one of the other “quarters” of the island, as in Haugen’s schematic map, Figure 11.⁸⁰ Thus Reykjavik (R on the map) was always considered south wherever one was coming from, since it belonged to the southern quarter – the others were east, north (actually northeast) and west (actually northwest). In the west, with its convoluted coastline, the ‘north’ word was in most places replaced by the original ‘west’ word in opposition to ‘south’. In the north, by contrast, the ‘east’ word was replaced by ‘north’, in opposition to ‘west’. The variation in the east was even greater.

The situation was further complicated by certain of the four cardinal words being replaced by *út* (‘outwards’) or *fram* (‘forwards’) in some localities. Note

79. Compare the hybrid system on Bali described by Levinson (2003:132), where a landmark axis ‘up towards the central mountains’ changes as you move around the island coast and is combined with a fixed cardinal monsoon wind axis.

80. This is taken from Haugen (1957:456), with thanks to the International Linguistic Association for permission to reprint.

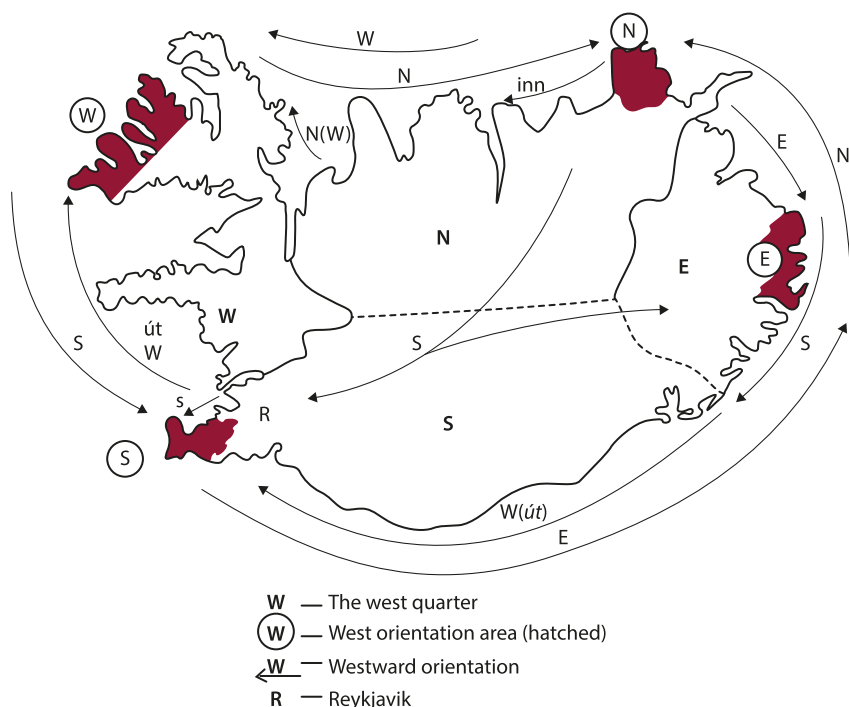


Figure 11. The four Icelandic 'quarters' (from Haugen 1957)

that *fram* within the traditional house refers to "from the inner recesses of the house to the door". On the south coast of Snæfellsnes (northwest of Reykjavik) for instance, *út* refers to the west and its opposite is *súður*, actually east or southeast (along the coast towards Reykjavik), and in the southwest lowlands the opposition is *austur* vs. *út* (i.e. west). This usage can actually already be found on the west coast of Norway, whence the Norsemen departed for Iceland (*út til Islands*), 'out to sea' obviously aligning with 'west' – although locally 'out' might in fact be to the southwest. The opposite, ablative form *utan* 'from out' can evidently still mean 'from Iceland to Europe' in Icelandic. The 'forwards' term is used in Iceland for orientation along deep fjords, with *fram* pointing up fjord valleys in the north and east, but in the south (where there are no fjords) it means 'towards the sea'. Up and down valleys is elsewhere expressed by *inn* vs. *út*. Note that Einarsson assumes that the earliest usage attested in Iceland (in the west) distinguished between *inn* vs. *út*, 'in to' vs. 'out from' the coast, as opposed to *upp* vs. *ofan*, 'up from' vs. 'down to' (literally 'from above') the coast.

Haugen further posits four "orientation areas" in the extreme cardinal regions of the four quarters and draws upon these in explaining local usage *within* the individual quarters (they are the shaded areas in Figure 11). Thus travel from

Reykjavík towards the extreme west of the Reykjanes peninsula to the west of the capital is considered ‘south’ or ‘out’ (both fall within the south quarter). From the same starting point ‘east’ (*austur*) is locally actually southeast, and ‘west’ (out to sea) is ‘out’ (*út*) as opposed to ‘up’ (*upp*) to the east. In reverse, from Reykjanes to the capital is ‘in’ (inn). Seemingly illogically, from Grindavík on the south coast of the Reykjanes peninsula to Njarðvíkur on the north one may actually travels ‘south’ (*suður*), which Einarsson explains (pp.44–45) in terms of the two-stage journey “down” (*niður*) from Grindavík to the north coast then ‘west’ (*suður*) to Njarðvíkur (as when travelling from the capital). Travel from Strandir (near the border between the north and west quarters) into the orientation area of the north quarter is termed ‘north’ even when it is almost due south along some parts of the convoluted coastline here. The latter area is one of Haugen’s “transitional areas” between quarters.

In other respects than those mentioned above the Icelandic dual-scale system is similar to that of another large island system, namely that of the Queen Charlotte Islands of British Columbia (for all intents and purposes one island with a narrow channel separating the two halves), where Haida is spoken. In that language, spoken by intrepid coastal travellers (as described in Fortescue 2011: 39–43), there is a major ‘out to sea’ vs. ‘inland’ axis, which varies of course in absolute orientation around the coast and crosses an equally relative ‘up inlet’ vs. ‘down inlet’ one. The latter is reminiscent of the relativistic ‘up fjord’ vs. ‘down fjord’ directions of Icelandic. Superimposed on this there are more absolute, broader scale terms referring anywhere to directions up and down the island(s) parallel to the main British Columbian coast (though the same terms, as in Icelandic and West Greenlandic, are not used to cover both scales). As opposed to Iceland, however, the Queen Charlotte Islands are densely forested and travel around the coasts was by and large out at sea (as opposed to by horseback across the open coastal uplands of Iceland), and thus local ‘along coast’ terms equivalent to those of both Icelandic and Greenlandic are lacking.

Note that even our cardinal Germanic terms have their origin in an observer standing in a particular direction relative to a landmark (as with Inuit coastal systems), in this case facing the sunrise (the ‘east’, by no means a precise cardinal direction). ‘North’ (etymologically ‘lower’ or ‘inferior’) was thus to the left, and ‘south’ (the ‘sunny’ side) to the right. This is seen still more clearly in Irish, where *airther* ‘east’ is from *air-* ‘before’, *īarthar* ‘west’ is from *īar-* ‘behind’, *tuascert* ‘north’ is from *tuas* ‘left’, and *descert* ‘south’ is from *dess-* ‘right’ (Buck 1988: 870–73). All of these European sFoRs are absolute according to Levinson’s definition, as can be seen by his criterion of rotation: the bearings indicated by the terms concerned remain constant whichever way the observer turns. The question remains as to the degree to which they can be abstracted from specific geographical landmarks.

The results of the present survey mesh nicely with the suggestion in Burenhult and Levinson (2008:144f.) that languages may display “semplates” (‘semantic templates’) in their orientation systems, i.e. prefabricated cultural systems that cut across a number of semantic and linguistic domains. Semplates correspond to broad cultural models and take their starting point in different baselines or “leit-motifs”, such as motion, part and size, or part and containment. In the languages we have looked at the most widespread manifestation of such entities would appear to lie in the general microcosm-macrocosm linkage, but this also covers more culturally specific cases such as the Fire and water conflation in Northern Wakashan and Nivkh. The semantic domains that are cut across which have been evidenced in this chapter are the interior of the house and the surrounding geographical environment (including movement back and forth between the two).⁸¹ In the case of the Eskimoan-speaking world the semplate from which the dominant leitmotif is generated is the axis ‘inside’ vs. ‘down’. One should be cautious, however, about applying the notion of an overarching microcosm-macrocosm semplate across the board to all Arctic and sub-Arctic languages (a generalization it is tempting to make). There is thus no overlap between house-internal and house-external uses of the same terms in Southern as opposed to Northern Wakashan languages. It should also be borne in mind that all trace of a semplate of this nature may have vanished irretrievably with new styles of house being adopted.

81. There is a further, secondary extension of orientation terms to the parts of the boat or canoe in some of the languages I have investigated (cf. for example Krejnovič 1986:165 as regards Nivkh, where the bow of the boat is construed as going with the source of the river, the stern with the river mouth). In Eskimoan languages *ug-* ‘down’ vs. *kig-* ‘outside’ can be extended in derived forms to the human or animal torso (the lower/back vs. upper/front half).

Frames of reference revisited

Having looked in some detail at the orientation systems of a number of languages, we need to look closer at the spatial and temporal frames of reference they display – in particular in those languages that lack a general word for abstract SPACE and TIME. We can then investigate the possible correlation between the preferred types across both sFoRs and tFoRs, in this way approaching a more comprehensive understanding of expressions of WORLD in terms of combined spatiotemporal wFoRs.

All the languages of the North Pacific Rim investigated in Fortescue (2011), from Vancouver Island on the American side to Hokkaido on the Asian, show a strong preference for landmark varieties of absolute spatial frames of reference. As will be seen, they also (with a few exceptions to be mentioned below) favour what Evans (2009) called “event-based” temporal frames of reference as opposed to “experienter-based” ones. In the revised terminology of his 2013 book these are called “sequential” as opposed to “deictic” tFoRs, and to them he adds the “extrinsic” tFoR. These, as mentioned in Chapter 1, he correlates with Levinson’s spatial frames of reference (sFoRs). Levinson (2003:262) himself hinted that there may be a direct link between type of favoured tFoR and type of favoured sFoR, referring specifically to the case of the absolute system of Tzeltal. As mentioned in Chapter 4, Evans’s experienter-based tFoR clearly aligns with Levinson’s relative sFoR, and his event-based tFoR with Levinson’s intrinsic sFoR. His extrinsic tFoR (“periodicity”) corresponds at least in part to Levinson’s absolute sFoR, of which the landmark sub-type is particularly relevant to the languages of the North Pacific Rim. Evans specifically compares time-reckoning systems to Levinson’s absolute sFoRs – mostly cultural artefacts like hours and weeks and months. The languages of the North Pacific Rim also display words of this nature in terms of diurnal and seasonal cycles linked to solar cycles and precessions, but I shall not be concerned with those here. I should emphasize (as Evans does) that the affinities or analogies between the two domains are far from perfect, since the temporal dimension differs radically from the dimensions of space by its unidirectional linearity and “transience” – the Arrow of Time.

I have suggested in the previous chapter as regards spatial sFoRs that cardinal and landmark types need to be kept more distinct than in Levinson’s analysis. I would suggest now that Evans’s event-based tFoR can be split up into two separate types: the “sequential” and the “durational” event-based tFoRs, jointly covering the domain of (event-internal) aspect. The experienter-based type is, as for

him, essentially a matter of tense. Evans himself discusses duration as the transience type associated rather with extrinsic tFoRs, concerned with time measurement (Evans 2013: 80), but this is not definitional for that type of tFoR. The four types and their (approximate) temporal correlates that I tentatively propose are as in Table 6. The languages in my 2011 survey, which give preference to landmark sFoRs, appear to give preference to both types of event-based tFoRs.

Table 6. The adjusted correlation between spatial and temporal frames of reference

Spatial sFors	Temporal	Evans's tFors
cardinal	cyclic	extrinsic
landmark	sequential (event-based)	sequential
intrinsic	durational (event-based)	sequential
relative	experiencer-based	deictic

Most languages make use to some extent of all four tFoRs, just as they make use of all three of Levinson's (or of my four) sFoRs – it is rather a matter of the degree to which they are favoured. Danish Sign Language appears to distinguish these same four tFoRs, reflected in (a) the deictic time line (experiencer-based), (b) the sequence line (non-deictic), (c) the mixed-time line (durational – in the sense that it takes the perspective of the start of an inherently ordered sequence of moments in time), and (d) the calendar plane (cyclical). There is also apparently an anaphoric line, a variant of the sequence line, not distinct from it for some speakers (Engberg-Pedersen 1993: 80ff). The sequence line is orthogonal to the deictic one. There is a similar predominance of the sequential temporal frame and the corresponding spatial landmark frame, and a very limited use of (experiencer-based) tense distinctions, much as in the languages of the North Pacific Rim (Elisabeth Engberg-Pedersen, personal communication).

Before proceeding further, it should be realized that the strict division of sFoRs into Levinson's three types has not gone without critical comments and proposed additions. English may not be typical on a world-wide basis in so far as its absolute sFoR is expressed principally in terms of cardinal directions. Thus Bohnmeyer and O'Meara (2012) make a distinction between landmark-based and "geomorphic" sFoRs, as in the distinction in English between 'the ball is seaward from the chair' and 'the ball is uphill from the chair' (p.218). In the latter the relational axis is not pointing to the landmark but is abstracted from the slope of the mountain (as a "vector"). They also argue that there is more ambiguity between intrinsic and absolute FoRs than generally thought, depending on one's perspective. They suggest a further distinction that cuts across egocentric vs. geocentric sFoRs, namely that between "angular-based" and "head-based" frames.

The former (more common) one involves transposed or abstracted axes (as in the geomorphic example in English above), dependent on the orientation of the anchor.⁸² In head-based frames it is the *location* of the anchor (frequently a body part of the speaker) that is critical – this type is egocentric but not relative. It is found more widely in languages like Yucatec (Mayan), in which the authors give an example that they gloss in English as “in the part in our direction the way we are sitting like this there is a ball lying on the ground” (p. 232).

To return to the question of preferred FoRs, in Eskimoan language Central Alaskan Yupik the favoured sequential and durational tFoRs are manifest respectively in the relative (non-deictic) construal of past and future tense in verbal mood choices, especially as regards subordinate “connective” ones bearing a temporal meaning such as “contemporative 1” with affix *-ller-* ‘when’, as in Example (10):

- (10) *aqume-ller-ma* *ner-unga*
 sit.down-when-1SG.CONT1 eat-1SGIND
 ‘When I sat down I ate’

Compare also “precessive” affix *-vaileg-* ‘before’, as in Example (11):

- (11) *ner-vaileg-ma* *aqum-unga*
 eat-before-1SG.CONT1 sit-1SGIND
 ‘Before I ate I sat down’

There are also nominal suffixes of a temporal nature (past *-lleq*, future *-kaq*, etc.). The language has a wealth of aspectual affixes, both those of “phase of completion” like *-nge-* ‘begin’, *-qatar-* ‘about to’, *-(u)ma-* ‘perfective’ and *-yuirute-* ‘no longer’, and those of “frequency and duration” such as *-a(r)-* ‘repeatedly’, *-yuite-* ‘never’, *-tuinar-* ‘habitually’, and *-(g)ur(ar)-* ‘continuously’.

The sole experiencer tFoR is manifest in the default deictic sense of future affixes such as *-cique-* (largely modal in character) and the weak implication of present time adhering to inherently stative verb stems – as opposed to dynamic ones, which in the indicative imply past tense by default. All of these affix-based distinctions are non-obligatory and not integrated in indicative or other mood paradigms. As regards cyclic tFoRs, these are reflected in common lexical distinctions dividing up the daily solar phases and the yearly precession of the sun into seasons plus specific subsistence activity-based “months” (such as *tengmiirvik* ‘April’ – lit. ‘goose come time’). Note also the denominal type of expression for ‘becoming

82. The anchor is the entity or feature that is the basis for the axes of the coordinate system – the body of the viewer in egocentric FoRs, the reference entity or ground in object-centred FoRs, and some environmental entity or feature in geocentric FoRs.

a season', as in *up'nerkar*- 'become spring' (from *up'nerkaq* 'spring'), a kind of expression very common in the whole area. Compare for example Nivkh *honvət*- (from *honf* 'spring' plus a denominalizing suffix) and Nuuchahnulth *λ'aqšišiλ*- (from *λ'aqšiš* plus a perfective suffix) of the same meaning. These are impersonal constructions, as if taking the whole of Nature as the subject.

Let us look a little closer at the dimension of Duration. Events are by nature less stable and enduring through time than things or persons (spatial entities) and, although they can be conceptualized by analogy with spatial entities as having inherent fronts and backs (beginnings and ends), they have their own dimensions of durational structure (both external as in the perfective/ imperfective distinction, and internal as in repetitive or continuative aspects). One potential problem with equating durational with intrinsic and at the same time with the linguistic category of aspect is that there is no clear demarcation between aspect as such and inherent *aktionsart* displayed by individual lexical morphemes (especially verbs). One language family in the region, Athabaskan, makes considerable use of such inherent *aktionsart* categories, all lexical verbs being classified as to whether they express states, actions, telic achievements, etc., and as to how they act accordingly to derivational potential, i.e. the combinations they make with specific derivational prefixes (Fortescue 1992: 100ff.).⁸³ However, there is considerable variation in expression in languages outside this family as to which categories are overtly marked as aspectual and which are inherently/lexically present as *aktionsart*. Thus although perfective vs. imperfective is part of the productive inflectional apparatus of Athabaskan languages (cutting across *aktionsart* categories), in Wakashan languages, though the distinction is obligatory, it can either be morphologically marked or lexically inherent (including in the case of lexical suffixes). Moreover, duration is not relational in the same way as the other three tFoRs hypothesized (between events and a reference point). Nevertheless, the perspective is in all cases a matter of the durational profile of events themselves, irrespective of any experiencer.

The same independence from any experiencer also applies to the other dimension of event structure which Evans describes in terms of an event-based tFoR, namely the sequential relationship of an event to another event or temporal "landmark". Both of these frames are specifically temporal and do not necessarily reflect metaphoric extension from the spatial domain. Evans (2009: 305f.) makes

83. Athabaskan languages like Koyukon also have a category of "superaspect", covering a handful of derivational processes that applies over and above the assignment of basic aspectual derivations, often overriding them (Fortescue 1992: 104). These include the customary, the distributive, and the conative, which may combine amongst themselves. They determine their own default *aktionsart* "themes".

an important point when discussing the limited role of conceptual metaphor in deriving temporal tFoRs from spatial ones: the former refer to cognitive models that have their own peculiarly temporal features and internal structure, though their expression is often recruited from that of spatial sFoRs. To quote his summary of the matter:

The temporal cognitive models include much that is purely temporal in nature. For instance, phenomenologically rich temporal experiences relate to notions such as sequentiality, simultaneity, temporal compression, protracted duration, our experience of pastness, futurity, the present, and so on. *In addition* [my italics], such notions are systematically structured in terms of structure recruited from cognitive models which relate to non-temporal aspects of perceptual experience such as motion through space. This is achieved via conceptual metaphors, which serve to provide an unconscious and automatic level of access to non-temporal knowledge allowing inferential structure from cognitive models associated with the domain of Space to form *part* [my italics] of our conceptual representations for temporal concepts.

More culturally specific semplates of a spatio-temporal nature, as discussed in 8.2, are also relevant here, as when speakers of a language conceptualize the future as behind or below one, as opposed to more common 'in front of one'. These constitute clear examples of conceptual metaphors. Most widespread in the North Pacific area, however (and perhaps typical of landmark systems), is the familiar correlation found in Eskaleut and Chukotko-Kamchatkan languages where the same terms as for spatial 'in front of' and 'behind' are also used of temporal 'before' and 'after' respectively (as also in Coast Tsimshian and other languages of the region). This common phenomenon arguably constitutes a semplate in its own right, covering as it does more than one domain, namely the spatial and the temporal, using the same expressions to refer to analogous dimensions in both domains.

In Eskimoan languages, note, there are separate words for 'front side' and 'back side' versus 'area in front' and 'area behind' – it is the latter pair that is involved here, namely stems *ci(v)u-* and *kiŋu-*. In Athabaskan (Koyukon and Ahtna) and in Nivkh separate expressions appear to be used. In Nivkh 'future' is expressed by a verbal stem *nuyi* meaning 'be in front' or 'first' in a race, and a verb (*j*)*əri-* meaning 'be left behind' is used for 'next, after, second'. This dynamic time-as-movement framework would seem also to be relevant for Athabaskan, for instance Ahtna, where temporal postpositions *-kke* 'after, following' and *-tse* 'before, ahead of' (distinct from purely spatial *-nae* 'behind' and *-ghanse* 'in front of') refer to being 'behind' vs. 'ahead of' someone or something in motion. All of these expressions can be considered to be of the non-deictic, sequential type.

In Chukchi there is a similar distinction between *janot* ‘in front, before, first’ and *jaacə* ‘behind, after, last’ (from *jaal-* ‘follow’), which overlap, however, with essentially static *ʔattʔjol* ‘in front, before, earlier, at first’ and *rəmagtə* ‘behind, further’ (as a verb ‘go further’). Also the Eskimoan opposition of ‘in front’ vs. ‘behind’, applied to both space and time, has its sequential sense of ‘coming first’ vs. ‘coming after/last’. Chukotko-Kamchatkan languages in general have certain expressions referring either to a more remote future or past, as in Koryak *qule-Rəlo* ‘day after tomorrow’ or ‘day before yesterday’ (with *quli-* ‘other’), according to which way one is figuratively facing. Compare the use in Aleut of the same remote tense markers *-na/-qa-* for both the remote past and (with certain auxiliaries) the remote future.

Now Chukchi also uses *rəmagtə-* ‘beyond, behind’ about the future (in adjectival form *rəmagtə-ken*), reminiscent of the unusual future-is-behind semplate of Aymara (Núñez and Sweetser 2006), whereby *mayra pacha* ‘(lit. ‘in front time’) is past time’ and *q’ipa pacha* (lit. behind time’) is ‘future time’. The phenomenon in Aymara may best be explained as an extension of the use of one tFoR, namely the sequential type – free of any external observer perspective – to another, namely the experienter-based type, i.e. not a matter of *direct* metaphor from space to time (as the authors see it). This would mean that ‘first’ in a sequence aligns with ‘in front’ (already happened), and ‘last’ with ‘behind’ (yet to come) when one inserts an experienter into the sequence, facing back towards the past, as it were.⁸⁴ This is close to Moore’s (2011) conclusion in his re-evaluation of Núñez and Sweetser’s original proposal, namely that in the Aymara phenomenon ego’s orientation is aligned with a “field-based” frame of reference in which front = earlier and back = later. He regards this field-based (i.e. non-experienter-based) tFoR as being analogous with Levinson’s absolute sFoR, whereas his contrasting “ego perspective” tFoR does not correspond with any of Levinson’s three sFoRs.

This unusual perspective is not as isolated as one might think. It is quite natural, after all, to talk of people coming before vs. after oneself (ancestors/elder siblings as opposed to descendants/younger siblings) with terms meaning ‘in front’ vs. ‘behind’. This at least is what is reflected in Chukchi and Eskimoan in what I shall call the “genealogical” extension of the sequential (experienter-independent) tFoR. The ‘in front’ term **civu-* is otherwise used of events or things in the future and the ‘behind’ **kiŋu-* of ones in the past, as mentioned in 2.2. in connection with WG *siunissaq*. Thus CAY *ciuneq* ‘that which lies ahead (in time or space)’ vs. *kinguneq* ‘area behind, time past’ (with nominalizer *-neq*). Table 7 gives the

84. Contrast Tungusic Even *d’ul-* ‘future, in front, front part, before, first’, *amar-* ‘after, following, behind, back, earlier, in old times, last’ (both spatial and temporal), which conflates spatial and temporal FoRs in a more familiar, straightforward way, like in English.

Eskimoan terms and meanings involved. Chukchi also uses its ‘in front’ term *əttəjɔl* for ancestors and its ‘behind’ one *jaacə* for ‘descendent’,⁸⁵ so Chukotko-Kamchatkan languages display similar extensions to genealogical sequencing as the Eskimoan ones.

Table 7. Extension of the sequential tFor in Eskimoan

Proto-Eskimo	Spatial	Sequential	Genealogical
*civu-	in front	first/before →	elder/ancestor
*kiŋu-	behind	last/after →	younger/descendant

Notice that that the spatially ‘in front’ term is now used of the past, namely in referring to one’s ancestors, while the ‘behind’ term is now used of the future, namely the generations to come, if one inserts Ego as the reference point.⁸⁶ The stance is one of facing the past, where one’s ancestors came from. In Aymara (Núñez and Sweetser 2006: 417) Ego Reference Point tFoRs are static, a fact which the authors relate to the emphasis on visual evidentiality in Aymara, with the unknown/unseen lying behind one, as opposed to the more common dynamic case of Ego moving through a landscape, with the unknown waiting somewhere up ahead. As regards the gestural data discussed by them, note that Aymara has a separate dynamic way of representing the Temporal Reference Point frame, namely by wavy lateral gestures indicating the passing of time (so independent of reference to the speaker’s body). This is parallel with the sequential time line of Danish Sign Language mentioned above.

However, the Eskimoan equivalents are also static and yet these languages do not grammaticalize evidentiality in the same way. The extension of the experiencer-independent, sequential tFor in Aymara has simply been more extensive than in Eskimoan, covering all of past vs. future time reference, not just earlier vs. later people in a genealogical sequence. Eskimoan uses a derivative of *ci(v)u-* ‘in front’ for the future rather, much as in English, e.g. CAY *ciunerkaq* ‘future’, with nominal future suffix *-kaq*. In fact, even English makes limited use of this genealogical tFor, in which predecessors (‘those that go before’) are contrasted with followers (‘those that go behind’) and where ‘before’ is in the (relative) past and ‘behind’ in the (relative) future. Whether this “relativized” sequential perspective should be regarded as a further universal tFor is an open

85. Related Itelmen conflates ‘behind’ and ‘younger’ (*sal-*) and ‘in front’ and ‘elder’ of siblings (*ktf-*) – Chukchi uses separate terms.

86. Thus CAY *ciuliaq* ‘ancestor’ vs. *kiŋuveq* ‘descendent’ (and note also *kiŋuqliq* ‘youngest sibling’ – lit. ‘one most behind’).

question, but for the time being I think not: as I characterized the sequential tFoR above, it contains its own equivalent of a landmark, the temporal reference point, and, like in the spatial analogue, that reference point can coincide with the experiencer or not.

Other phenomena of a similar nature in the North Pacific Rim region can be found in for example Nuuchahnulth, where ‘before’ is expressed by a suffix *-taq̓iɬ*, probably meaning ‘come from’ in spatial contexts, and ‘after’ is expressed by a suffix *-ʔatu* meaning ‘fall off’ or ‘down’, reminiscent of the Chinese perspective where ‘future’ is construed as ‘down’ and ‘past’ as ‘up’ (cf. Yu 1998).⁸⁷ Compare also English ‘descendent’. Nuuchahnulth also has *-wi-* meaning ‘point comes out, first’ (as also in *ʔuʷiihta* ‘ahead’) and *-ak̓li* ‘in the rear, behind, last’, parallel with the Eskaleut and Chukotian examples discussed above. Likewise, Kwak’wala has *gal-* ‘first, before’ (cognate with Nuuchahnulth *čaani* ‘at first, for a while’) and *-s(G)ma’y* ‘follow behind’ (also *ʔaλXd̓le* ‘last (in a line)’). Related Heiltsuk has *gal-* as in Kwak’wala (and a derivative meaning ‘ancestors’) and *ʔaλalis* ‘later, in future’ (also ‘next generation’), and *ʔaλ’it* ‘be after, next in a row, happening in near future’ (from *ʔaλ* ‘next, following, in near future’, found in all Wakashan languages). The extension of the sequential tFoR, to a genealogical and further to a general experiencer-based temporal one (at least in part), is thus attested throughout the whole region. It adds to the overall impression of preference being given to event-based tFoRs (durational as well as sequential) throughout the region.

The affinity between preference for spatial FoRs and preference for temporal FoRs is thus at least partially confirmed, since landmark spatial frames (the overwhelmingly preferred type in the region) correlate with sequential event-based tFoRs (dominant throughout the region). The latter may also be extended to expressions of experiencer-based frames. Intrinsic sFoRs are also widespread in the region, correlating with what I call durational event-based tFoRs (expressed by fine-grained aspectual choices, as described in 6.2). They are at all events much more in evidence than individual or experiencer-based relative ones, typically correlating with systems of tense. If tense systems in European languages reflect an experiencer-based tFoR one might wonder why the same linguistic category (tense) in most of the languages of the North Pacific Rim is expressed by default use of another category (aspect) – unless this reflects an alternative tFoR of duration, as I have suggested. Nevertheless one would need further typological and areal studies of this sort to justify the claim for universality and linguistic rele-

87. Compare Mandarin *shàng xīngqī* ‘last week (lit. up week)’ and *xià xīngqī* ‘next week’ (lit. ‘down week’), as opposed to *běn xīngqī* ‘this week’ with *běn* ‘origin, oneself’, an obviously ego-centric perspective. Evans (2019: 120–122) illustrates how this extends to a further range of temporal expressions. Note, however, *qiántú* ‘the future, future prospects’, literally ‘the road ahead’.

vance of the four tFoRs I have proposed. One factor that needs to be taken into account is the possible superimposition of more than one kind of “absolute” system. West Greenlandic is a case in point – the demonstrative stems used to indicate up and down the coast and inland vs. out to sea in local, coast-hugging usage have wider cardinal usage when referring to the entire length of the west coast as well as to the world at large (not just due to Danish influence).⁸⁸ This is a matter of what Levinson calls “scale” (Levinson 2003: 92), but here involving the same rather than different terms at different scales.

We are now ready for the revised version of the correlation between frames of reference promised in Chapter 4. I refrain from giving single word definitions in Table 8 for the different wFoRs. They combine temporal and spatial dimensions as frameworks for specific kinds of content.

Table 8. Revised correlation between frames of reference

sFor	tFor	wFor
cardinal	extrinsic	the/a whole planet
landmark	sequential	life span of a species (or parts thereof)
intrinsic	durational	a man's lifetime circumstances
relative	deictic	one's personal world model

A typical sentence exemplifying the “whole planet” wFoR would be: ‘Climate change is already rapidly melting the Inland Ice of Greenland.’ One typifying the “life span of the species” wFoR would be: ‘The last holdout of the Neanderthals before extinction was in southern Spain.’ One typifying the “man’s lifetime” wFoR would be: ‘In Chaucer’s world surpassing forty was to attain an unusually advanced age.’ And finally, typifying the “personal” wFoR: ‘That town is where I and my sister grew up.’

My main conclusion to be drawn from this chapter is that there is a close but not exact correlation between the linguistic expression of sFoRs and tFoRs and that this may help unify spatiotemporal conceptions of the WORLD, even in languages lacking words for abstract SPACE and TIME. The combination of sFoRs and tFoRs can be seen as (roughly) corresponding to wFoRs.

88. The system is reversed in East Greenlandic on the east coast, ‘north’ becoming ‘south’, etc. Compare also the Tarramiut and Labrador Inuit dialects of Quebec, the southernmost Eskimoan languages, where terms for cardinal ‘north’ and ‘south’ have developed, *siqiniq* ‘south’ also meaning ‘sun’, and *tarraq* ‘north’ also meaning ‘dark’.

Part II

This second part of the book shifts from an examination of individual words for SPACE, TIME and WORLD towards broader cognitive, cultural, and geological/biological perspectives. So far we have not considered in depth the internal, subjective nature of the three categories, and that is where we shall begin in the next chapter. A brief overview of some of the relevant research into the brain's handling of spatiotemporal perception and memory will be followed by consideration of how the child gradually builds up an internal model of the external world. This will lead to a discussion of fictional worlds and their relationship to reality. There follows in turn a condensed sketch of how ideas of SPACE, TIME and WORLD have evolved through history, culminating in a detailed account of the distinct geological ages of the Earth as well as the concept of relativistic Space-time. Finally, before the unifying synthesis of the concluding chapter of the book, the ways in which SPACE and TIME have been measured in the past and present will be discussed.

Psychological approaches

We have reached a point where we can begin to pinpoint more finely the experiential grounds of BEING IN THE WORLD, moving away for the moment from the linguistically and culturally determined range of world perspectives of preceding chapters. It is time to consider the cognitive basis for the lexical distinctions discussed so far and relate them to what is known of their psychological underpinnings. There is much to be gleaned from the psycholinguistic and neurolinguistic literature relevant to this endeavour. The early development of the child's expanding understanding of his or her spatially and temporally defined world will provide further clues as to what is involved.

One way into this subject is the analysis by Russell and Davies (2012) of the spatiotemporal nature of episodic memory. They see it as inherited directly from perceptual experience, lying at a deeper level than spatiotemporal *concepts* and prior to the child's acquisition of them. They follow Kant in arguing for a pre-existing cognitive framework of SPACE and TIME without which it would not be possible to have experiences at all. In particular, they claim this as the natural source of the child's pre-conceptual sense of TIME. Kant's theory of the "synthetic unity of apperception" is relevant to the modern neurological question of the binding of different sensory reflexions of the same perceptual event into a unitary experience. Russell and Davies relate this to the unity of the experiencing self (pp. 286–7). Episodic memories are for them "all-of-a-piece", not a loose congeries of associated conceptual atoms: any activated part will potentially entrain the whole (p. 301).

Another approach is that of MacWhinney (2005: 202–5), who stresses the importance of Perspective when discussing spatiotemporal frames and their expression in language. This he discusses in terms of the projection of deictic centres, corresponding to the egocentric, allocentric (or intrinsic), and geocentric (or global) frames mentioned in Chapter 1. The first of these directly encodes the perspective of the speaker as deictic centre ('here', also 'up', 'down', 'to the left', 'to the right' of the speaker), whereas the allocentric perspective projects this centre onto some external object (e.g. 'in front of' a house). The third, the geocentric frame, enforces a perspective based on fixed external landmarks such as a mountain range, the sun, or a river.⁸⁹ He points out that depending on one's exact posi-

89. He gives an example of such a landmark system in the Guugu Yimithirr language of Queensland, where one might say "Move a bit towards the mountain" rather than "Move back from the table."

tion (e.g. lying on the back in bed rather than standing) “strange alternations” of allocentric or egocentric reference can occur. As regards temporal location in TIME, he distinguishes analogous egocentric, allocentric and geocentric perspectives. The former relates events to the speaker’s Now, the allocentric perspective projects the deictic centre of events into the past or future, and the geocentric perspective relates events to fixed (calendric) points in time, such as New Year’s Day. This is similar to Evans’s treatment of tFoRs discussed in Chapter 9. As I shall illustrate in Chapter 13, narratives – both fictional and non-fictional – are replete with perspective shifts *within* the same overall World, which may be hierarchically organized, worlds within worlds.

10.1 A neurological perspective

Modern neuroscience can begin to relate the cognition of SPACE and TIME to specific cerebral areas and functions. They are handled in different though intimately interconnected parts of the brain and can readily be related to the notion of working memory with its limited time span, the seat or “stage” of consciousness (Baddeley 2007: 10–13). Replacing the earlier conception of a unitary short-term memory, Baddeley’s conception of working memory consists of several sub-components: the “visiospatial sketchpad”, the “phonological loop” and the “central executive” (of essentially attentional function), to which he now adds an “episodic buffer” of limited temporal and spatial capacity. The first of these is probably situated in the parietal lobes, where, amongst other things, egocentric orientation in space is handled, whereas the phonological loop involves Broca’s area, Wernike’s area, and the pre-motor region – it is by necessity sequentially organized. The central executive is situated in the frontal lobes where the higher functions of planning and prediction are carried out. This complex system surely underpins our conscious sense of TIME – including the feeling of expectancy, waiting for something to happen, and our awareness of change in general. Baddeley goes on to treat “recency” as the principal source of the sequential sense of TIME in episodic memory, in the laying down of which the hippocampus is critical (pp. 108ff.).

Evans (2013: 59–61) sums up recent neurological evidence for the dissociation of areas of the brain involved in temporal processing (including thinking about the past and future) from the sensorimotor areas involved in processing spatial action.⁹⁰ The areas concerned include the right parietal lobe involved in

90. He points out that episodic memory involves the simulation (i.e. the construction) of past events involving various multimodal sub-components (including the subjective experience of duration). Anticipated events of the future are probably also based on experience stored in episodic memory.

quantifying TIME in terms of sequences, and the basal ganglia and cerebellum which are involved in the durational aspect of time perception – the latter are known to be crucial in fundamental timekeeping operations as well as coordinating motor control. More specifically as regards the sense of duration, he cites evidence that sub-second intervals appear to be processed in sub-cortical regions, as opposed to supra-second ones in cortical regions (including the supplementary motor area, the left inferior temporal and superior temporal structures). Long-term circadian rhythms such as the sleep/wake cycles are regulated by the hypothalamus. Pöppel (1978) argues that the human experience of time is made up of a number of quite different experience types. Those that he refers to as hardwired “elementary time experiences” include our ability to perceive an elapse of duration, the ability to perceive simultaneity of events, the ability to perceive non-simultaneity, the ability to perceive succession (or event order), the ability to perceive the present and distinguish it from events that are set in the past, and the ability to perceive change.

Evans then discusses the neurological basis for the perceptual present (Now), a matter of distributed neurological processes (pp. 81–2). He follows Pöppel (1994) in distinguishing between the pre-conscious “primordial event”, lasting just a fraction of a second, and the ensuing coherent (potentially conscious) percept lasting 2 or 3 seconds. Evans further suggests that the coordinated oscillation of neurons during perception (the “binding” problem) contributes to the perceptual moment (2013: 151), which in turn may play a pivotal role in giving an event its structure. Crick (1994: 244–5) suggested specifically the binding of parallel but distinct aspects of a complex percept (e.g. of an object) by coordinated gamma rhythm oscillations combined with an attentional mechanism - leading to eventual unified input to the hippocampus and episodic memory.

Buzsáki (2011: 217–233) describes in detail how the hippocampus may function in the laying down of spatiotemporal maps before they are transferred to long-term memory sites in the neocortex. Basic mental maps are made through motor actions (p. 302). He argues that episodic and semantic memory representations may both have evolved from mechanisms in the hippocampal-entorhinal system serving dead-reckoning and map-based navigation respectively (pp. 331–3). Note that these correspond to Levinson’s absolute (allocentric) sFoRs. As regards episodic memory Buzsáki states: “An ideal structure for episodic coding and recall is an autoassociator with a large random synaptic space [i.e. the hippocampus], since free recall is essentially a pattern-completion problem.” He further suggests that theta rhythm oscillation in the hippocampal-entorhinal system is involved in objectively defining spatiotemporal context, a key ingredient in episodic memory, embedding the current input in representations of the past and expected future. Semantic (or explicit) maps, on the other hand, require “omnidirectional” land-

mark navigation through multiple, crossing trajectories that no longer need an egocentric temporal context.

Just as the abstraction of a 3D spatial reality from retinal input involves hierarchically organized, largely parallel processing from binocular input, the input to working memory is itself the end product of complex hierarchical processing before consciousness can be achieved. Baddeley's episodic buffer, which retrieves contents from long term memory for on-going attentional processing, may handle all four dimensions in the form of events or occasions (as well as abstract language-encoded facts). Events are not just a matter of external perception, as the etymology from Latin *ēvenīre* 'come forth' suggests.

As Langacker discusses (2010:176ff.), there is a difference between "processing time", the time the conceptualizer takes to mentally scan an event (e.g. of motion), and "conceived time", where time functions as an object of conception, producing an understanding of the actual extension of an event in time, typically much compressed.⁹¹ There is also "fictive scanning", where the spatial domain is left behind entirely and an abstract or virtual event is understood *as if* it involved motion through time, as in understanding the sentence "As body size increases, the average gestation period gets longer" (Langacker 2005: 177). He has more to say on the dynamic conception of SPACE in terms of "objective space" vs. "representational space" (Langacker 2012). The latter presupposes a finite time taken to scan spatial entities. It is the basis for the familiar metaphorical extension of spatial terms for TIME. But this does not equate with the primacy of SPACE OVER TIME, in fact TIME is in a sense more basic: it is the very medium of conceptualization. The reason for the ubiquity of SPACE FOR TIME metaphors, he suggests, is due to the grounding of conceptualization in bodily experience (p. 214). He goes on to wonder whether TIME and SPACE can be directly experienced at all, as opposed to the experience of the temporal succession of events and of the objects and situations they involve. The tracking of events through time is a matter of sequential scanning which appears smoothly continuous to the experiencer. There is also an important process of "summation" in which temporally extended events are conceptualized as unitary wholes, a moment or period or 'time when' treated as an abstract thing – as in 'more time', 'enough time', 'Wednesday', etc. (pp. 208–9).

Edelman emphasizes that the brain works essentially by pattern-recognition, which entails ambiguity and vagueness – logical clarity requires the relative specificity of language (Edelman 2006: 58). Metaphor, by which early human thought largely proceeded, is a matter of association and redundancy, the same conceptu-

91. Bergen (2012: 31–32) discusses evidence that mental scanning and image-spinning proceeds at a constant rate, and that distance is equated with time taken to scan. Scanning a mental image is much like scanning the real world. Eye-tracking studies whilst listening to narratives also suggest this (pp. 63–64).

ally relevant elements being ingredient in many distinct neural assemblies. It may lead to certain necessary (i.e. practical) illusions, of which the Heraclitean illusion of TIME progressing from the past to the future (and conceptual metaphors reflecting it) is a prime example. For Edelman the past and the future are concepts: only the “remembered present” (i.e. the specious present) is immediately relatable to events in Einsteinian space-time (p.155).

Kosslyn et al. (2006) argue convincingly for the “depictive” reality of mental imagery in the primary visual and parietal spatial orientation areas of the cortex, where one-to-one mapping of input can be shown to occur, albeit with distortions that are corrected automatically at higher levels of processing. As they put it, “Space on [the] cortex is used to represent space in the world” (p.142). They present evidence, including from mental imagery rotation experiments, for mental imagery being largely borne by the same neural circuitry as perception. They illustrate the necessity of mental simulation with the example of someone deciding in advance how to load various items of luggage into the boot of a car (p.71). This “embodied” imagery is crucial in generating explicit, accessible representations for working memory. Lower level representations become successively more abstracted as they spread forward to associational memory areas, which in turn will effect further processing of the visual input.

More can be added as regards the perception of movement, crucial, I would claim, to the individual’s experience of SPACE and TIME.⁹² It is by now well established that there are specific nodes in the complex visual system for the perception of motion. This includes, crucially, the perception of self-motion, i.e. of postural and reaching motions. According to Crick (1995: 50) motion perception is two-stage, a first low-level short-range one of static “snapshots”, a second long-range one that tracks the actual movement of objects. The former is extremely fast, and is reminiscent of Whitehead’s “epochal” theory of TIME, the second, further from the primary visual cortex, is hierarchically above it and slower, lying on the “dorsal” (or “where”) stream of visual perception. As Crick and Koch (2003: 122) put it:

We propose that conscious awareness (for vision) is a series of static snapshots with motion “painted” on them. By this we mean that perception occurs in discrete epochs. It is well established that the mechanism for position-estimation and for detecting motion are largely separate.... At the beginning of each new snapshot, there may be some hold-over from the previous one.... There is no evidence for a regular clock in the brain on the second or fraction-of-a-second time scale. The duration of any snapshot (or fragment of a snapshot) is likely to vary somewhat.

92. Sacks (2012: 345–6) reminds us that for Leibnitz space and time are simply ways of measuring action: “who does not act does not exist”.

Sacks (2017: 180) comments: “The sense of continuity results from the continuous overlapping of successive perceptual moments.” He points out (pp.161–3) that William James already pondered whether the “stream of consciousness” might be discontinuous and Bergson spoke of perceptual moments as permeating one another, melting into one another like the notes of a tune. The memorization of whole pieces of music by musicians and of long speeches by actors certainly presupposes the temporal and kinaesthetic as well as spatial organization of memory, with successive moments “welded” through linear associations. Sacks has described in detail the extreme contraction and expansion of time and space in Parkinsonian patients and its relevance for variable “personal time” (2017: 47–8).

As regards the cognitive underpinning of concepts of *WORLD*, this is a far more complex matter, doubtless involving widespread areas of the cortex, combining sensorimotor processing, episodic and semantic memory, the role of the thalamus in coordinating and relaying sensory and other information from across the cortex, and frontal lobe involvement in socio-cultural scenarios.⁹³ One important factor to bear in mind is that experiential worlds are not static. As described by Gibson (1979: 147), there is a “flowing array” of stimulus from the surrounding world constantly impinging on the perceiving subject. In order to account for perceptual constancy he invokes abstract properties within the flow that are invariant and recognizable. This is his influential theory of “affordances”. The world is here the individual’s environment – including the social environment – as presenting possibilities for action that depend on the experiencer’s needs and intentions, analogous with an ecological niche: the same environment can present different affordances for different individuals.

10.2 The development of the child’s spatiotemporal concepts

During the earliest sensorimotor stage, covering approximately the first two years of life until the appearance of language, there is no clear division between the child’s self and his or her environment. Infants develop a basic understanding of the world through coordinating sensory experiences (seeing, hearing) with motor actions (reaching, touching), in forming sensorimotor “schemas”. This is achieved according to Piaget through processes of assimilation and adaptation to input from the environment.⁹⁴ The main development during that stage is towards the

93. Edelman argues for the essential involvement of thalamo-cortical bidirectional “re-entry” links in consciousness and memory (2006: 28–30). He further points out the essential role of both sensory and motor systems in the general development of perceptual categories (p.57). This implies that motion is also crucial in the development of *WORLD* concepts.

eventual understanding that objects exist and events occur in the world independently of the child. Beard (1969: 18–38) summarizes the developing sub-stages of Piaget’s sensorimotor period, from simple reversible actions to the understanding of the spatial setting for successful actions and the ability to recall sequences of ordered events (the dawning sense of SPACE and TIME). Still at sub-stage 3 the child has limited understanding of the differentiation of spatial and temporal dimensions, for instance looking back to a place where an event first occurred in the hope of seeing it again despite subsequent events. By sub-stage 5 the child’s organization of spatial groups gives rise to “appreciation of an ordered sequence of events, to some conception of ‘before’ and ‘after’ and a more prolonged memory for a sequence of displacements”. The perspective throughout this period is thoroughly egocentric: the child is at the centre of the universe.

In subsequent stages, when children begin to understand questions put by Piaget and his fellow researchers and to be able to reply to them coherently, giving reasons for their beliefs, they are seen to extend their own immediate point of view to all other points of view, which Piaget terms “realism” (Piaget 1929: 123–168). This is when children confuse their own selves – their thoughts – with the surrounding world, and suppose that everyone around them sees and thinks the same things as they do. They attribute life and the ability to think to inanimate things, reflecting their basic “animism” (pp. 169–252), at first extending it to anything that moves (even a stream or the air), later limited to things that move (as if) by their own volition. The world around them is suffused with magic, and it is by magical intervention that natural events may be caused by simply thinking or wishing them. The names of things are considered to be part and parcel of the thing itself. Related to this is their “artificialism” (pp. 253–388), whereby things that happen in nature happen for a purpose assigned by human beings, in particular by their parents. Even intangibles like ‘night’ are seen as being there for a purpose, for example ‘to sleep’ (p. 292). This leads to ‘mythological’ explanations of the origin of natural phenomena, often made spontaneously in answering a question. At this stage relationships in space and time are only understood correctly if they pertain to practical actions in the child’s immediate vicinity. Their conception of SPACE is still closely tied to their own actions. They still have no clear notion of measurement – as regards TIME, for instance, the duration of a journey is decided by its endpoints, not by the actual distance traversed. It is not until the period of “concrete operations” and beyond that they will begin to

94. This position has not been without critics, in particular Vygotsky (1962), who emphasizes the role of socialisation and the importance of words in the acquisition of concepts. However, this does not affect the relevance of what follows for the child’s acquisition of the concepts we are concerned with here.

understand Euclidean concepts of length, area and angles. The overall succession is from “finalism” (seeing purposes behind all phenomena) to “animism”, then to “artificialism” (p. 359). The young child starts by seeking purposes everywhere before seeing them as the purposes of the things themselves (animism), and finally as the purposes of the makers of things (artificialism).

Play will in turn feed the internal world of imagination in the form of simulated scenarios, starting with the imitation of things and situations that the child sees. Their early forms of play, their make-believe worlds, are replete with subjective associations and are lacking in deductive reasoning. Later stages will fill out the real surrounding framework of the child’s world through the assimilation of expanding experience on the way towards full immersion in the adult world – a world which is by no means just physical, but contains TV films, ideas, and cultural artefacts of all kinds. The movement goes from the early acquisition of egocentric frames of reference, both spatial and temporal, to the more abstract, allocentric ones of the adult world.

Piaget specifically plots the development of the child’s understanding of Nature from his or her inquisitiveness about birth and where things come from (2019: 368–372).⁹⁵ Recall the etymology of the word ‘nature’, Latin *nātūra*, from *nāscī* ‘be born’ mentioned in 3.1. Piaget describes several stages, starting from a diffuse mixture of artificialism, animism and magic, in which the world is a society of living beings controlled and directed by man. This is succeeded by a stage of “mythological artificialism” characterized by myth-like explanations of the origins of things, much like those of primitive man, and finally “technical artificialism” where the child by the age of 9 or 10 has begun to be more interested in machines and making things (“the proceedings of human technique”) and where his or her explanations of phenomena will distinguish between natural and man-made products. Nature is now imbued with purposes (transferred from man alone), and it is Nature itself that gives birth to the growth of all material things. Manufactured bodies cease to be regarded as living and living bodies cease to be regarded as manufactured. This is now the world of Aristotle’s Physics.

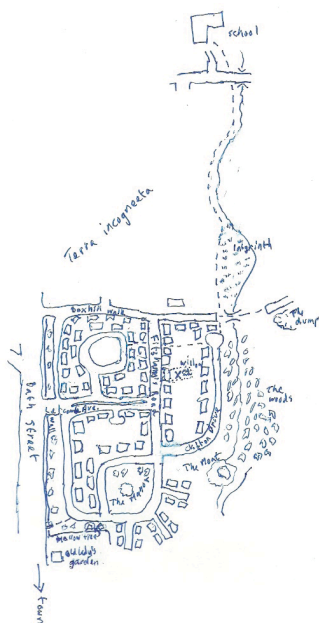
Presupposed by – and prior to – all these Piagetian stages, however, is surely the neonate’s exploration of the proprioceptive map of its own body (perhaps already in the womb), the somatosensory “body map” – its initial spatial interface with the world. This has been explored under the rubric of “motor cognition”, involving the mirror neuron system (Gabbard 2012: 2–3). Exploratory movements of the body are in turn the source of the infant’s initial sense of time, i.e. of movement within the world as externally sensed.

95. As Piaget puts it, “a baby being considered at the same time artificially made and living, the child has the tendency to consider all things as possessing the same characteristics.”

It is important to point out – as Piaget himself does (1929: 248) – that the animism of young children persists into adult languages, which abound in expressions like ‘The sun is trying to break through the clouds’, or ‘The sun is making the flowers grow’, or in French ‘le soleil se couche’ (‘the sun is laying down/going to bed’). The child (who cannot as yet interpret examples of figurative language like proverbs) will pick up on such expressions from adults and take them literally as personifying agents. As Piaget, sums this up: “It is not the child which is moulded by language, it is the language which is already childish.” One might also point to the “childish” etymologies which we have seen in Chapters 2 and 3 behind many words for SPACE, TIME and WORLD in contemporary languages.

The world we grew up in

Moving from the general to the specific, consider now the expanding world of a single individual – here the author – as he grew up in it. On the face of it this corresponds most closely to Collins’ definition (12) in Chapter 3: “the total circumstances and experience of an individual that makes up his life, esp. that part of it relating to happiness”. However, ‘the world we grew up in’ is obviously only a part of such a totality, and not necessarily a particularly happy one. It is only part of Barsalou’s individual “world model”, one subject to constant revision. The following series of crude hand-drawn maps reflects succeeding phases in the temporal development of one particular world. The first of the maps represents the world familiar to the author as a beginning primary school pupil: a new estate on the edge of a market town in southern England. Note the path leading along a stream to the school and the blank areas of which he was only dimly aware (misspelt as “terra incogneeta”, a term from some story book he had read). ‘X’ marks the location of a still earlier and more reduced world: the house and garden where he spent the first couple of years of his life (often up in a tree house).



Map 1.

And what of the fictional worlds introduced by the story books the boy read, the films he watched and the radio programs he listened to? These too surely represent a significant part of the overall world that he grew up in. Is its framework definable in terms of a particular material era, by the activities and attitudes belonging to a particular historical time and place? What of the town itself, its buildings and roads and green spaces, from its beginnings to the present?

The truth is that there are multiple juxtaposed worlds implied by the maps, both egocentric and (increasingly) allocentric. And these worlds are continually changing, each at their own rate, despite the expression 'the world we grew up in' suggesting something with determinate boundaries. Episodic (egocentric) memory is continually being updated/recategorized (cf. Edelman 2006: 59), and semantic (allocentric) memory is continually being added to with extended objective knowledge.

Simulation

Language-generated worlds

Up until now we have been dealing with an experiencer's interaction with the surrounding environment primarily through the visual sensory channel. But this is not the only kind of relationship to *WORLD*. What of individuals who have no visual interaction with the outer world – what kind of world do they live in? The well-documented case of Helen Keller is instructive. She was fully blind and deaf from the age of 19 months (so she had some visual memories to build on). In the autobiographical story of her life (Keller: 1903) she persistently used the verb 'see', as if the internal world she was experiencing could actually be seen. The fact that she achieved considerable academic success and went on to become an author and lecturer (with the help of an assistant) is remarkable. She was apparently quite capable of navigating through three-dimensional space and of interacting with the surrounding world by a combination of touch and interpreting air pressure and other vibrations around her, as well as through hand signing with her tutor. Reading her story one is amazed at her literary style, filled with sensory – especially visual – descriptions, and it is with no surprise that we learn that she had memorized large swathes of literature through braille readings and being read to through finger signing on her palm. She admits herself, somewhat regretfully, that her writing is sprinkled with memorized fragments of things she has "read" or been "told", fragments that have aroused deep feelings within her. This literary world of hers is largely language-generated, whatever the source. Certainly the worlds that her "reading" has evoked within her are of this kind. Perhaps her use of the verb 'see' is not so surprising after all: as Kosslyn et al. (2006: 108) indicate, blind people often talk of seeing mental imagery. They add (pp. 165–7) that some blind people deny that they see imagery yet show many of the skills associated with manipulating mental imagery.⁹⁶ We should perhaps be wary of what is meant by 'see' here. The result of Helen Keller's reading of a literary text is no different in kind from that of readers who are fully seeing in so far as the interior, fictional worlds generated are

96. Compare the laboratory dream report of Kerr, Foulkes and Schmidt (1982) concerning two blind subjects who became blind as teenagers. Their dream visualizations as they reported them were like their visual experiences before they became blind, including detailed visual descriptions of people and places they had only met after they became blind.

initially dependent on the words evoking them. Only the way in which these interiorized worlds were manifest to her was presumably rather different.

What then is a seeing reader's interiorization of a narrative text in memory actually like? This has been the subject of much debate by psychologists and linguists, often in terms of "mental models" (Johnson-Laird 1983). My own suggestions – which combine aspects of both sides of the propositional vs. perceptual symbol-based debate – were presented in Fortescue (2007b). In this article I described a test performed with a group of 24 native English speakers who were set to read an anecdote consisting of only seven lines and ending with an amusing punch line. Then, after a short distraction, they were asked to write down the story as they remembered it. Remarkably, there were no two versions that corresponded exactly, word by word, to the original (though one or two were close). There was in fact considerable variation in the precise wording. The overall nature of the various renditions was clearly a subjective matter. This highlights just how flexible a given language can be in describing the same chunk of 'reality' in a variety of slightly different ways. The results were tabulated according to recall of each of the propositions into which the original anecdote could be analysed. Here it could be seen that every participant had retained the same basic structure of the anecdote, in the same order of events. In other words, the skeletal gist of the story – the causally coherent sequence of events involving the protagonists – was well preserved, but the verbatim sequence of words largely lost (though not certain key words). As an extension of the procedure, one of the participants was then asked, un-forewarned, to recall the story again one day later, and a third time (equally un-forewarned) a week later. As expected, these later versions were much curtailed and to some degree rearranged, though preserving the position of the punch line. In the still later version the basic point was retained, as were the same key words as in the second version, but the presentation was subtly changed in register, e.g. by direct speech being changed to indirect, probably reflecting the participant's own framing preferences for telling anecdotes. This suggests the way in which verbatim recall following any kind of reading of a coherent text is degraded, initially rather rapidly, then more slowly, but how some kind of minimal, propositionally organized "pointers" are entered into memory for later recall.

The specific model I proposed for what is retained in memory following the reading of a text was multi-modal, containing both chained sensory-specific "perceptual symbols" (including kinaesthetic ones) in the manner of Barsalou (1999),⁹⁷ and some key words (actual word forms, especially the names of people

97. Perceptual symbols are "embodied" representations deriving from multimodal perceptual (interoceptive and exteroceptive) experience, summated memories of perceptual states. Barsalou proposes that the same brain mechanisms that underpin perceptual processing are also activated during thought itself.

and places), all organized in an easily reconstructed propositional format of relationships – or rather as a structure of events that can be “unfolded” as successive propositions. It is reasonable to suppose, however, that some information at least is stored not in propositional format, but as accompanying schematic pictorial representations. In fact Johnson-Laird (1983:146) sees mental models as image-schematic, structural analogues of real or imaginary worlds reflecting specific sensory modalities and not propositional at all. But this is largely a matter of one’s definition of “propositional”. Mental models may be temporary or permanent schemas in memory, but typically they do not directly retain the actual linguistic input for long but rather store the result of its analysis in the form of mental representations of the situations described by the verbal input. What I proposed was close to what van Dijk and Kintsch (1983) call a “situation model”, the organization of which may nevertheless reflect the propositional structure of the input, each proposition corresponding to an event structure element. Kintsch (1988) extended the situation model to a “construction-integration” model in which word meanings are activated, propositions formed and inferences made, and a network of interrelated items is integrated into a coherent structure drawing upon schemas already stored in long term memory and any contradictions resolved. Mental models are presumed to be largely spatiotemporally organized, though they may also contain information of a causal nature or refer to people’s goals and characteristics (Gernsbacher 1990). Ferstl et al. (2005:724) sum up the relationship between verbatim text and mental models in the following way:

On a level more removed from the verbatim input, comprehenders form a global representation of a mental model of text or discourse information. This so-called situation model integrates the current language input with both general knowledge and the prior discourse context. In contrast to bridging inferences, elaborative and predictive inferences are considered part of the situation model... The situation model of narrative texts has been shown to contain information about several important dimensions of the story, including the where, when, who, what, and why of events. Its representation is not necessarily verbal or propositional but flexibly tailored to the specific contents.

One problem with mental model theories is how to deal with more abstract word meanings – how are they to be represented on such models if these are perceptually based? In Fortescue (2017) I distinguished between two senses of ‘abstract’: Abstract₁ (far removed from sensory reality) vs. Abstract₂ (generalized). Not all abstract words reflect both senses, nor can they all be understood in terms of metaphor, a standard position within early Cognitive Linguistics. Barsalou (1999:600–602), taking the example of ‘anger’, emphasizes that abstract words cannot be entirely explained in terms of metaphor. Just as indirect speech acts

can “bypass” literal interpretation, familiar metaphors (like ‘explode in anger’) can bypass metaphorical mappings. For him three mechanisms relating to perception – framing (context), selectivity (or highlighting), and introspective (including proprioceptive) symbols – are all available for representing abstract concepts. He illustrates this with the abstract concept ‘truth’. In fact Barsalou and Wiemer-Hastings (2005: 129) see words like ‘farming’ and ‘cooking’ in English as lying on a continuum of abstractness somewhere between the two extremes of concrete and abstract (in the Abstract₁ sense) as regards complexity and variability of meaning. For them complexity refers to the complex situations to which abstract words refer, and by variability they mean that abstract words can apply to a wider variety of situations than concrete ones.

Many abstract words are anchored in complex scenarios involving social conventions or cultural beliefs such as ‘marriage’, or complex behavioural characteristics such as ‘obedience’, ‘sincerity’, and ‘truth’, all with outward sensorimotor manifestations or verifiability tests. Obviously this has little to do with metaphor. But what of words at the extreme of abstractness, such as the verb ‘be’ and its equivalents in other languages treated in Chapter 7? This is an instance of a word that is both maximally general (Abstract₂) and very far removed from sensory reality (Abstract₁), much like mathematical entities. But even here there are some uses of ‘be’ that are more Abstract₁ than others: as we have seen, it has both an overtly existential sense of ‘being alive’ and purely grammatical, semantically empty uses as a copula. Many languages such as Russian dispense with an overt copula (in the present tense at least) in existential, equational and locational constructions, merely juxtaposing nominal or locative phrases. At the other extreme, Athabaskan languages famously display a whole array of (full) verb stems in a locational sense, depending on the nature (size or consistency, etc.) of the subject or object of the verb. Other languages fall in between, such as Gaelic, with distinct verbs for existential, equative and locative ‘being’, and Spanish with its well-known distinction between *ser* and *estar*. We have seen that metaphor is indeed involved in the etymological origin of such words, but this hardly has any bearing on the interpretation of their meaning on line. As regards mental models, it seems *a priori* unlikely that the word or the meaning of ‘be’ in its most empty use will be retained in memory after reading a text containing it. The conclusion here should be evident: there is no clear cut-off point between concrete and abstract, rather a continuum from more to less Abstract₁ (distant from sensory reality), cross-cut by widely differing degrees of generality or complexity (Abstract₂). The complexity is a matter of the situational context which may range from culturally specific to universally human. To ‘be’ is maximally general but not particularly complex,

whereas a word like ‘marriage’ is to some degree generalizable across cultures but at all events complex, and so forth.

Another influential approach relevant to language-generated worlds is that of “mental spaces” initiated by Fauconnier (1985) and taken further in Fauconnier and Sweetser (1996), as mentioned in Chapter 7. Central to this approach is the analysis of counterfactual statements, of imaginary situations, and of ‘possible worlds’. Such spaces (expressing a conjectured or desired state, for example) are projected from a “base (or reality) space”, the mutually known world of interlocutors, by so-called “space-builders”, linguistic operators like ‘if’. Later work in this paradigm focused on how two spaces can be ‘blended’, with features of both combined (Fauconnier and Turner 1996).⁹⁸ This theory is largely concerned with logical mapping conditions between base and built spaces, and deals with the semantics of individual sentences rather than the construction of whole textual worlds.

Talmy (2000, vol. 2, Chapter 8) does have much more to say on the construction of narrative worlds – fictional worlds perceived or conceived. These he understands as encompassing any sequence of events that may be experienced as a whole entity, including personal life histories, which he discusses in terms of a general pattern-forming cognitive system applied to temporal sequencing (p. 419). He analyses narrative in terms of five domains, that of the work itself, that of its author, that of the addressee, that of culture (impinging upon our overall understanding of a narrative), and that of the surrounding spatiotemporal world to which the story world may relate in various ways. More specific than these are the “strata” of his analysis: temporal structure, spatial structure, causal structure, and psychological structure. These change independently through the temporal extent of the narrative, as opposed to more general “parameters” such as those of inclusion (spaces within spaces, times within times), abstraction (the relationship between the actions of characters in the narrative and real life human psyche and behaviour), scope (referring to the individual, the group or all humanity), coherence (which he breaks down into a number of aspects of “sequential structure”), and veridicality (allowing for the suspension of disbelief). His prototypical narrative is organized so as to ensure a sensible whole, with events in their causal

98. As an example of blending, consider the totally bizarre but still comprehensible scene in Flann O’Brien’s novel “The Third Policeman” where it is claimed that a certain Michael Galhane is “half way to being a bicycle” owing to his having ridden it for so long over bumpy Irish lanes. Some of the atoms in the bike have consequently been jolted up into his body, and some of his gone the other way, resulting in a gradual “intermingling of personalities” of bike and rider (O’Brien 1974: 73ff.). The two “spaces” that have merged here are on the one hand that of someone riding a bicycle and on the other what conceivably happens (given our understanding of the behaviour of atoms!) when a metal object like a bar of iron is given successive hard wallops with a hammer at the hands of a blacksmith.

sequence and so forth (pp. 479–80). This can be seen as a sophisticated update of Aristotle's unities of action, place, and time as applied to Ancient Greek drama – the where and when and what happens to whom on life's stage.

This brings us to the more general topic of “simulations” or “simulation semantics” within Cognitive Linguistics. The basic idea is that the internal simulations triggered by words involve the same areas of the brain as in perception and preparatory motor activity (excluding the direct activation of the primary motor system). For a succinct overview of the topic see Evans (2019: 354–60). As he describes it, a simulation is an enactment of a series of perceptual experiences, although in attenuated (weakened) form. Not only does thought rely on simulations – the reactivation of embodied experience – but language itself can cue or lead to the construction of simulations. Language provides the framework that facilitates the composition of concepts for purposes of communication. The integration of those reactivated body-based states under the guidance of language gives rise to complex simulations. For Barsalou (1999) a simulation is a general purpose computation, which reactivates body-based states – perceptual symbols – and combines them in order to facilitate higher-order processes such as thought. Barsalou proposes that when we act and interact in the world, perceptual information that we store and record comes to underpin mental representations of the world. Evans (2019: 355) discusses the example of our discrete perceptual experiences of hammers (what they look like, what it feels like to handle them, what they are used for, etc.). These give rise to distinct perceptual symbols that make up our stored experience with hammers. We form a complex unit of conceptual structure for them, based on these perceptual symbols. In Barsalou's terms, this is referred to as a “simulator”. A simulator is a mental representation that integrates and unifies related perceptual symbols. These are neural representations stored in sensorimotor areas of the brain (Barsalou 1999: 582). In sum, language-evoked simulations are multi-modal and may have both temporal and spatial – as well as sensory – aspects. They may define real or fictitious worlds.

Bergen (2012) has written extensively on the subject of language-induced simulation and experimental evidence for its reality. He espouses the “immersed experience” view, whereby simulations may express the perspective of the experiencer, either as participant or observer (“almost like being there”). Most of his book is concerned not with whole worlds and their spatio-temporal frameworks, but with the meaning of individual words and sentences in English, however the principles concerned are nevertheless relevant to the simulation of broader entities. His approach to embodiment is enthusiastic though cautious as to the sufficiency or necessity of perceptual and motor-based simulations for understanding language. In his Chapter 10 he emphasizes that simulation is not relevant for *all* kinds of language use. He further relates it to imagination and even to dream-

ing – and indeed in dreaming we create temporary ego-centric worlds.. He distinguishes between those idiomatic expressions that are so firmly established in language as to render simulation of the literal meaning unlikely and those, more novel, which do appear to summon up a literal simulation, however briefly, before they are interpreted as metaphorical. It could be added that simulations are in general only partially determined by on-line language, the rest is surely filled in by relevant memories of past experiences, both verbal, perceptual, and emotional.

Elsewhere Bergen mentions the well-known tendency for TIME to be expressed in spatial terms (distance), presenting it as an instance of something abstract being expressed by something concrete (p.214). However, as I have argued, both TIME and SPACE are mutually interrelated abstractions (Abstract₂ generalizations), both capable of being directly/ consciously experienced. The experience of distance in particular involves TIME as well as SPACE. Bergen also discusses the affect that grammar can have on simulations, including distinctions of grammatical aspect, e.g. progressive vs. perfect, with the focus on action or end state respectively, and again presents some experimental evidence for it (pp. 115ff.).

Of particular interest is the consideration in his Chapter 9 of the relationship between simulation and abstract (including metaphorical) meanings, taking this further than the often implied position within Cognitive Linguistics that it is simply a matter of metaphor. One such word he considers is ‘society’ (p.197), which in some contexts suggests a container metaphor (‘to fit back into society’, talking of war veterans) and in others one of organism (‘the backbone of our society’, talking of farmers). This is of course one of the words mentioned in connection with different senses of ‘world’ that I discussed in 3.1. The container analogy is natural here in so far as a society is a coherent environment (world) of human beings. It is also natural to regard it as an organism in so far as a society can evolve and “behave” in a more or less uniform manner. But there is more to the meaning of the word than that. Words, including abstract ones, have their own affordances, i.e. contexts of use and perceptual-based scenarios that help to define them. Bergen raises the question as to how one can distinguish the implications of the literal (concrete) and figurative meaning of metaphorical and abstract expressions (as for example in the expression ‘the prices dropped’). He can only suggest that abstract meanings are “less detailed” than literal ones.

An alternative solution suggests itself: we readily adopt an “as if” attitude, one open to recognizing analogical relationships, when triggered by words that themselves have both literal and non-literal affordances. Certain words are distinguished in a given language (through the cumulative experience of their contexts of use) as having this property. This would include ‘drop’ above, also ‘run’ and ‘take’ in English. Bergen presents examples of ‘run’ as applied to cracks in the surface of a wall or paths “running” down hills (pp.216 ff.). This he discusses under

the rubric of “fictive motion”, for which there is evidence that eye movement regions of the brain are activated. Languages (especially non-European ones) can vary considerably in this respect. Thus, anecdotally, I recall a joke being made by Robert Petersen, a native speaker of West Greenlandic, the then professor of Eskimology in the University of Copenhagen, as regards the translation of the Danish expression *han tog en taxa* (as in English ‘he took a taxi’) by Greenlandic equivalent *taxa tiguaa*, which evokes an amusing, purely literal meaning.

Canonical fictional and non-fictional worlds

Let us consider now an example of how we can build up an internal representation of a canonical fictitious world from scratch – canonical in the sense that it is homologous with the world we live in and falls within the standard dictionary definitions of the spatio-temporal dimensions of the words for SPACE, TIME and WORLD given in Chapters 2 and 3. I have chosen the start of the first act of an imagined stage production of Chekhov's "Cherry Orchard" (1904) since its spatio-temporal framework is quite straightforward, with projections both forward and backward in time. It is set within a not entirely unfamiliar wider geographical setting. Of course the psychology and behaviour of the characters and the twists and turns of the plot are by no means so straightforward and 'canonical'. The world that the audience will build up as they watch it involves more than just the spatial and temporal parameters of the action, though that is what I shall focus on. The development of the story-line and the relationship between the characters of the play can be gleaned directly from the successive exchanges, as given below. The presentation could equally well have been described in terms of the building up of a mental model from a reading of the play, but the relationship of a stage production to real life is more graphic and explicit.

Imagine, then, that you are attending a production in English of the play, which you are not familiar with though you will have read the list of characters and the names of their players in the brochure provided.⁹⁹ My comments are inserted in *italics* in the text below. The curtain rises and you are presented with the three-dimensional stage set, framed by the proscenium arch and the flats concealing the wings. This defines your unique perspective on the action – certain characters will appear closer to you (downstage), presenting a specific profile towards you when they speak, others will be more in the background (upstage). The initial spatial framework of the play's action is revealed as a room within the villa on Madame

99. The characters relevant to this act are: Lubov Andreyevna Ranevsky (Madame Ranevsky), a landowner; Anya, her daughter; Varya, her adopted daughter; Leonid Andreyevitch Gaev, Madame Ranevsky's brother; Ermolai Alexeyevitch Lopakhin, a merchant; Peter Sergeyevitch Trofimov, a student; Boris Borisovitch Simeonov-Pischin, a landowner; Charlotta Ivanova, a governess; Simeon Pantilevitch Epikhodov, a clerk; Dunyasha, a maidservant; Fiers, an old footman, aged eighty-seven; and Yasha, a young footman.

Ranevsky's country estate, specifically one which is called the nursery, though you as viewer do not know this yet. One of the doors leads into her daughter Anya's room (again as yet unknown to you). The lighting suggests it is around sunrise – the reader would further be told it is in May and that the cherry-trees are in flower though it is chilly in the garden and there is an early frost. Perhaps there is a hint of cherry blossoms through the stage window, which is closed. Then something happens, and TIME enters the picture: Dunyasha, the maid, comes in carrying a candle, together with Lopakhin, who has a book in his hand.

LOPAKHIN. The train's arrived, thank God. What's the time?

DUNYASHA. It will soon be two. [Blows out candle] It is light already.

The time of the action on stage is made precise.

LOPAKHIN. How much was the train late? Two hours at least. [Yawns and stretches himself] I have made a rotten mess of it! I came here on purpose to meet them at the station, and then overslept myself... in my chair. It's a pity. I wish you'd wakened me.

The present time is related causally to past actions. It is not yet clear who it is that is expected, but the proximity of a station is mentioned, expanding the spatial setting beyond what is visible.

DUNYASHA. I thought you'd gone away. [Listening] I think I hear them coming.

Anticipation of an immediately approaching event is added.

LOPAKHIN. [Listens] No.... They've got to collect their luggage and so on.... [Pause] Lubov Andreyevna has been living abroad for five years; I don't know what she'll be like now.... She's a good sort – an easy, simple person. I remember when I was a boy of fifteen, my father, who is dead – he used to keep a shop in the village here – hit me on the face with his fist, and my nose bled.... We had gone into the yard together for something or other, and he was a little drunk. Lubov Andreyevna, as I remember her now, was still young, and very thin, and she took me to the washstand here in this very room, the nursery. She said, "Don't cry, little man, it'll be all right in time for your wedding." [Pause] "Little man".... My father was a peasant, it's true, but here I am in a white waistcoat and yellow shoes... a pearl out of an oyster. I'm rich now, with lots of money, but just think about it and examine me, and you'll find I'm still a peasant down to the marrow of my bones. [Turns over the pages of his book] Here I've been reading this book, but I understood nothing. I read and fell asleep. [Pause.]

While waiting for the expected appearance of the new arrivals the character who we can deduce is Lopakhin the merchant fills us in with some anecdotal information about the early relationship between himself and the owner of the estate (whom we can now assume is amongst those arriving).

DUNYASHA. The dogs didn't sleep all night; they know that they're coming.

Another detail about the recent past.

LOPAKHIN. What's up with you, Dunyasha...?

DUNYASHA. My hands are shaking, I shall faint.

LOPAKHIN. You're too sensitive, Dunyasha. You dress just like a lady, and you do your hair like one too. You oughtn't. You should know your place.

Dunyasha's "place" is clearly that of a servant in the house.

EPIKHODOV. [Enters with a bouquet. He wears a short jacket and brilliantly polished boots which squeak audibly. He drops the bouquet as he enters, then picks it up] The gardener sent these; says they're to go into the dining-room. [Gives the bouquet to DUNYASHA.]

We associate the appearance of Epikhodov on stage as one of the anticipated new arrivals. This is confirmed by his mention of the exchange with the gardener on the way up. We still expect the others to appear.

LOPAKHIN. And you'll bring me some kvass.

An order is given in the future tense.

DUNYASHA. Very well. [Exit.]

EPIKHODOV. There's a frost this morning – three degrees, and the cherry-trees are all in flower. I can't approve of our climate. [Sighs] I can't. Our climate is indisposed to favour us even this once. And, Ermolai Alexeyevitch, allow me to say to you, in addition, that I bought myself some boots two days ago, and I beg to assure you that they squeak in a perfectly unbearable manner. What shall I put on them?

We are given further details about the season and the state of the cherry trees on the estate.

LOPAKHIN. Go away. You bore me.

EPIKHODOV. Some misfortune happens to me every day. But I don't complain; I'm used to it, and I can smile. [DUNYASHA comes in and brings LOPAKHIN some kvass] I shall go. [Knocks over a chair] There.... [Triumphantly] There, you see, if I may use the word, what circumstances I am in, so to speak. It is even simply marvellous. [Exit.]

Epikhodov refers to his imminent exit before actually leaving the stage.

DUNYASHA. I may confess to you, Ermolai Alexeyevitch, that Epikhodov has proposed to me.

Dunyasha mentions a further event in the past, causally related to the present situation (Epikhodov's appearance).

LOPAKHIN. Ah!

DUNYASHA. I don't know what to do about it. He's a nice young man, but every now and again, when he begins talking, you can't understand a word he's saying. I think I like him. He's madly in love with me. He's an unlucky man; every day something happens. We tease him about it. They call him "Two-and-twenty troubles."

LOPAKHIN. [Listens] There they come, I think.

In this and the coming responses the eager anticipation of the more important newcomers is built up to a climax.

DUNYASHA. They're coming! What's the matter with me? I'm cold all over.

LOPAKHIN. There they are, right enough. Let's go and meet them. Will she know me? We haven't seen each other for five years.

Now it is clear that the important person expected is a "she" last seen by Lopakhin several years ago – we can guess that it is the estate owner, Madame Ranevsky (Lubov).

DUNYASHA. [Excited] I shall faint in a minute.... Oh, I'm fainting!

Dunyasha expresses the possible consequence of her excitement with a prediction.

[Two carriages are heard driving up to the house. **LOPAKHIN** and **DUNYASHA** quickly go out. The stage is empty. A noise begins in the next room. **FIERS**, leaning on a stick, walks quickly across the stage; he has just been to meet **LUBOV ANDREYEVNA**. He wears an old-fashioned livery and a tall hat. He is saying something to himself, but not a word of it can be made out. The noise behind the stage gets louder and louder. A voice is heard: "Let's go in there." Enter **LUBOV ANDREYEVNA**, **ANYA**, and **CHARLOTTA IVANOVNA** with a little dog on a chain, and all dressed in travelling clothes, **VARYA** in a long coat and with a kerchief on her head. **GAEV**, **SIMEONOV-PISCHIN**, **LOPAKHIN**, **DUNYASHA** with a parcel and an umbrella, and a servant with luggage – all cross the room.]

The action here has both temporal and spatial aspects: it fits in with the on-going short journey from a nearby station alluded to already. The sound effects make it clear that the arrival is by horse-drawn carriage, reinforcing the picture of the setting on a country estate. The livery of the old servant and details of dress of the other actors suggest a particular historical setting.

ANYA. Let's come through here. Do you remember what this room is, mother?

LUBOV. [Joyfully, through her tears] The nursery!

The question by the young girl – who we can assume is the daughter of Madame Ranevsky – will spark off memories of the past associated with the house. Her mother's reaction suggests that she hasn't returned here for some time – it also clarifies the earlier function of the room.

VARYA. How cold it is! My hands are quite numb. [To LUBOV ANDREYEVNA] Your rooms, the white one and the violet one, are just as they used to be, mother.

The remark by Varya (who, in addressing Ranevsky as “mother”, we assume must be her other, adopted daughter), will spark off more poignant memories of the past that the house holds for her mother.

LUBOV. My dear nursery, oh, you beautiful room.... I used to sleep here when I was a baby. [Weeps] And here I am like a little girl again. [Kisses her brother, VARYA, then her brother again] And Varya is just as she used to be, just like a nun. And I knew Dunyasha. [Kisses her.]

The maid, we learn, was here when Madame Ranevsky last lived in the house.

GAEV. The train was two hours late. There now; how’s that for punctuality?

The remark by Gaev (who we can assume is her brother, the most significant figure accompanying her from the station) abruptly shifts the focus away from the distant past (Madame Ranevsky’s memories) to the recent past at the station, where he met her.

CHARLOTTA. [To PISCHIN] My dog eats nuts too.

PISCHIN. [Astonished] To think of that, now!

[All go out except ANYA and DUNYASHA.]

DUNYASHA. We did have to wait for you!

[Takes off ANYA’s cloak and hat.]

ANYA. I didn’t get any sleep for four nights on the journey.... I’m awfully cold.

The exchange between Dunyasha and Anya refers to the immediate past and the days leading up to it. The long journey – presumably from abroad – must have been on a train and/or other long-distance means of transport.

DUNYASHA. You went away during Lent, when it was snowing and frosty, but now? Darling! [Laughs and kisses her] We did have to wait for you, my joy, my pet.... I must tell you at once, I can’t bear to wait a minute.

We are now given a more precise temporal frame for the absence from the house of Anya: she must have left in mid-winter and it is now spring.

ANYA. [Tired] Something else now...?

DUNYASHA. The clerk, Epikhodov, proposed to me after Easter.

Another event is dated in the recent past.

ANYA. Always the same.... [Puts her hair straight] I’ve lost all my hairpins.... [She is very tired, and even staggers as she walks.]

DUNYASHA. I don't know what to think about it. He loves me, he loves me so much!

ANYA. [Looks into her room; in a gentle voice] My room, my windows, as if I'd never gone away. I'm at home! To-morrow morning I'll get up and have a run in the garden....Oh, if I could only get to sleep! I didn't sleep the whole journey, I was so bothered.

Anya's remark when she crosses to the door leading off-stage specifies that it leads to her old room. She anticipates what she will do in the morning after sleeping.

DUNYASHA. Peter Sergejevitch came two days ago.

Another specific past time reference is given, which explains the next two exchanges concerning the present.

ANYA. [Joyfully] Peter!

DUNYASHA. He sleeps in the bath-house, he lives there. He said he was afraid he'd be in the way. [Looks at her pocket-watch] I ought to wake him, but Barbara Mihailovna told me not to. "Don't wake him," she said.

[Enter VARYA, a bunch of keys on her belt.]

VARYA. Dunyasha, some coffee, quick. Mother wants some.

We can assume that her mother's request was made a short while ago, since her arrival.

DUNYASHA. This minute. [Exit.]

VARYA. Well, you've come, glory be to God. Home again. [Caressing her] My darling is back again! My pretty one is back again!

The reference is again to Anya's journey abroad, but now given in present perfect (resultative) form.

ANYA. I did have an awful time, I tell you.

Anya responds by characterizing that journey.

VARYA. I can just imagine it!

ANYA. I went away in Holy Week; it was very cold then. Charlotta talked the whole way and would go on performing her tricks. Why did you tie Charlotta on to me?

This last question specifies an event prior to Anya's departure, namely the assignment of Charlotte, her governess, to accompany her abroad.

VARYA. You couldn't go alone, darling, at seventeen!

ANYA. We went to Paris; it's cold there and snowing. I talk French perfectly horribly. My mother lives on the fifth floor. I go to her, and find her there with various Frenchmen, women, an old abbé with a book, and everything in tobacco smoke

and with no comfort at all. I suddenly became very sorry for mother – so sorry that I took her head in my arms and hugged her and wouldn't let her go. Then mother started hugging me and crying....

It now becomes clear that Anya was visiting her mother, who must have been living in Paris in uncomfortable circumstances for some time before her visit.

VARYA. [Weeping] Don't say any more, don't say any more....

ANYA. She's already sold her villa near Mentone; she's nothing left, nothing. And I haven't a copeck left either; we only just managed to get here. And mother won't understand! We had dinner at a station; she asked for all the expensive things, and tipped the waiters one rouble each. And Charlotta too. Yasha wants his share too – it's too bad. Mother's got a footman now, Yasha; we've brought him here.

Encapsulated within a further description of Anya's journey mention is made of a still earlier time when her mother was living in Mentone.

VARYA. I saw the wretch.

This brings us back to the immediate past.

ANYA. How's business? Has the interest been paid?

VARYA. Not much chance of that.

ANYA. Oh God, oh God...

VARYA. The place will be sold in August.

The temporal reference is to a specified time in the future. The "place" referred to must be the present estate owned by Madame Ranevsky. Anya's shocked response will confirm this.

ANYA. O God....

LOPAKHIN. [Looks in at the door and moos] Moo!... [Exit.]

VARYA. [Through her tears] I'd like to.... [Shakes her fist.]

ANYA. [Embraces VARYA, softly] Varya, has he proposed to you? [VARYA shakes head] But he loves you.... Why don't you make up your minds? Why do you keep on waiting?

The question is about the immediate past (with present consequences). The referent of "he" must be to Lopakhin, who has just looked in (jokingly).

VARYA. I think that it will all come to nothing. He's a busy man. I'm not his affair... he pays no attention to me. Bless the man, I don't want to see him.... But everybody talks about our marriage, everybody congratulates me, and there's nothing in it at all, it's all like a dream. [In another tone] You've got a brooch like a bee.

The continuing explanation about the possible future is broken off by a sudden return to the present with the remark about Anya's broach.

ANYA. [Sadly] Mother bought it. [Goes into her room, and talks lightly, like a child] In Paris I went up in a balloon!

The time and place referred to now is Paris during Anya's visit to her mother.

VARYA. My darling's come back, my pretty one's come back! [DUNYASHA has already returned with the coffee-pot and is making the coffee, VARYA stands near the door] I go about all day, looking after the house, and I think all the time, if only you could marry a rich man, then I'd be happy and would go away somewhere by myself, then to Kiev... to Moscow, and so on, from one holy place to another. I'd tramp and tramp. That would be splendid!

Note the specification of where the actors have moved to now on stage while Varya talks of her wishful prognosis for the future.

ANYA. The birds are singing in the garden. What time is it now?

Anya draws the focus back to the present.

VARYA. It must be getting on for three. Time you went to sleep, darling. [Goes into ANYA's room] Splendid!

[Enter YASHA with a plaid shawl and a travelling bag.]

YASHA. [Crossing the stage: Politely] May I go this way?

Yasha refers to a particular direction across the stage.

DUNYASHA. I hardly knew you, Yasha. You have changed abroad.

Dunyasha refers to Yasha's stay abroad, accompanying Madame Ranevsky.

YASHA. Hm... and who are you?

DUNYASHA. When you went away I was only so high. [Showing with her hand] I'm Dunyasha, the daughter of Theodore Kozoyedov. You don't remember!

She refers now to the time when Yasha and Madame Ranevsky left the estate and Dunyasha was much younger. This gives us an idea of how long ago this happened.

YASHA. Oh, you little cucumber!

[Looks round and embraces her. She screams and drops a saucer. YASHA goes out quickly.]

VARYA. [In the doorway: In an angry voice] What's that?

DUNYASHA. [Through her tears] I've broken a saucer.

Note the rapid changes of temporal reference in this and the following exchanges, from the immediate past to a suggestion bearing upon future action, to the past again (Varya's mention of what she told the servants a while ago).

VARYA. It may bring luck.

ANYA. [Coming out of her room] We must tell mother that Peter's here.

VARYA. I told them not to wake him.

ANYA. [Thoughtfully] Father died six years ago, and a month later my brother Grisha was drowned in the river – such a dear little boy of seven! Mother couldn't bear it; she went away, away, without looking round.... [Shudders] How I understand her; if only she knew! [Pause] And Peter Trofimov was Grisha's tutor, he might tell her....

Now Anya reveals the reason why her mother left all those years ago.

[Enter **FIERS** in a short jacket and white waistcoat.]

FIERS. [Goes to the coffee-pot, nervously] The mistress is going to have some food here.... [Puts on white gloves] Is the coffee ready? [To **DUNYASHA**, severely] You! Where's the cream?

Note Fiers's use of the future tense here – he is relaying his mistress's request, which does not imply inevitable compliance with it.

DUNYASHA. Oh, dear me...! [Rapid exit.]

FIERS. [Fussing round the coffee-pot] Oh, you bungler.... [Murmurs to himself] Back from Paris... the master went to Paris once... in a carriage.... [Laughs.]

This is Fiers's own not exactly relevant memory of the past.

VARYA. What are you talking about, Fiers?

FIERS. I beg your pardon? [Joyfully] The mistress is home again. I've lived to see her! Don't care if I die now.... [Weeps with joy.]

And so the action continues. By the time the curtain falls on Act 1 you will (if you have been attentive) have formed a mental model of at least the main features of the world in which the action of the *Cherry Orchard* takes place and to which you can refer back in discussing it. This has depended on your largely unconscious recognition that the successive actions and pronouncements within this fictitious world are credible and homologous with your own experiences of the “real world” (allowing for some unexpected minor hiccups like Fiers's non-sequiturs). All the perspectives on time and space that the characters express in their words are familiar ones: the anticipation of the future, the reminiscence about the past, the containment of the immediate surroundings in larger and larger settings – all this is the stuff of everyday experience. Your model of the play's framework and the actions it contains – however abbreviated – should hang together logically despite the play's (theoretical) novelty for you, though of course there will remain unanswered questions as to how it will develop in the rest of the play.

In this brief excerpt I hope I have at least convinced you of how complex the temporal and spatial framework of a fictional world can be, even when restricted to a single stage setting. Of course there are fictional worlds displaying a far less

direct relationship with the real world we are familiar with, but similar considerations apply to the building up of coherent internal models through the reading of any such works. Thus from Plato's "Atlantis", through Thomas More's "Utopia" and the imaginary worlds of Swift, Verne and Wells to modern Science Fiction, the descriptions of such fictitious places have to fit into a recognizable spatiotemporal framework (however bizarre or misleading) in order to be comprehended at all. This is true also of the most famous of modern fictitious worlds, namely Tolkien's "Lord of the Rings". His "Middle-earth" is replete with maps and is fitted into a time scale that stretches far back to an Age before the narrative action of the trilogy begins. As a spatiotemporal framework it can be compared with its source in the *Miðgarðr* of Norse mythology.

But how about a non-fictional work? Do we build up mental models when reading open-ended 'factual' texts – for example a historical work – in the same way as with self-contained literary worlds? The relationship to the real world is (supposedly) much more direct, although inaccuracies and lacunae and differences of interpretation can always be expected. A passage from H. G. Wells's non-fictional "Short History of the World", published in 1922, will serve to illustrate. The world described in this book is 'canonical' in that it conforms with our perspective on the world that we are familiar with, that is – to use Barsalou's term – with our world model, even though it describes places, times, and peoples far removed from our own personal experience. There is a causal relationship between that world and our own. They fit under the same overarching framework of "The World" referred to by the book's title – this planet and everything on it, throughout its history. It is similar to our own world model in another respect: it refers (literally) to a number of more specific worlds encapsulated within the overall one (I have italicized these). In the following two paragraphs (pp.143–4), Wells is describing life under the early Roman Empire:

In such countries as Gaul and Britain and in provinces like Dacia (now roughly Rumania) and Panonia (Hungary south of the Danube) where there were no pre-existing great cities and temples and cultures, the Roman Empire did, however, 'Latinize.' It civilized those countries for the first time. It created cities and towns where Latin was from the first the dominant speech, and where Roman gods were served and Roman customs and fashions followed. The Rumanian, Italian, French and Spanish languages, all variations and modifications of Latin, remain to remind us of this extension of Latin speech and customs. North-West Africa also became at last largely Latin-speaking. Egypt, Greece and the rest of the empire to the east were never Latinized. They remained Egyptian and Greek in culture and spirit. And even in Rome, among educated men, Greek was learned as the language of a gentleman, and Greek literature and learning were very properly preferred to Latin.

In this miscellaneous empire the ways of doing work and business were naturally also very miscellaneous. The chief industry of the settled *world* was still largely agriculture. We have told how in Italy the sturdy free farmers who were the backbone of the early Roman republic were replaced by estates worked by slave labour after the Punic wars. The Greek *world* had had very various methods of cultivation, from the Arcadian plain, wherein every free citizen toiled with his own hands, to Sparta, wherein it was a dishonour to work and where agricultural work was done by a special slave class, the Helots. But that was ancient history now, and over most of the Hellenized *world* the estate system and slave-gangs had spread. The agricultural slaves were captives who spoke many different languages so that they could not understand each other, or they were born slaves; they had no solidarity to resist oppression, no tradition of rights, no knowledge, for they could not read or write. Although they came to form a majority of the country population they never made a successful insurrection. The insurrection of Spartacus in the first century B.C. was an insurrection of the special slaves who were trained for the gladiatorial combats. The agricultural workers in Italy in the latter days of the Republic and the early empire suffered frightful indignities; they would be chained at night to prevent escape or have half the head shaved to make it difficult. They had no wives of their own; they could be outraged, mutilated, and killed by their masters. A master could sell his slave to fight beasts in the arena. If a slave slew his master, all the slaves in his household, and not merely the murderer, were crucified. In some parts of Greece, in Athens notably, the lot of the slave was never quite so frightful as this, but it was still detestable. To such a population the barbarian invaders, who probably broke through the defensive line of the legions, came not as enemies, but as liberators.

Although the contents of this passage consists essentially of accepted facts (as passed down through the ages), the author's opinions and attitude to what he is describing is quite clear (mainly of disapproval). Nevertheless we can align his description with the fragmentary knowledge we already have of that era: we have a reasonable idea already of how it fits into the elements of European history we acquired during our schooling. We come to the text with a much more extensive – if vague – framework than in the case of the *Cherry Orchard* performance, which we know is imaginary, though indirectly based on the real Russia familiar to Chekhov. We nevertheless build up our model of the two experiences in a similar manner, line by line or sentence by sentence, integrating it with what we think we know already, or adjusting that accordingly. There is no reason to suspend our disbelief at any of the facts presented in the historical text, or even to imagine what it would have really been like living in that time and place, which is what we are prompted to do throughout the performance of the play. What we experience in the fictional case will not result in a necessary adjustment to our world knowledge and to the way in which it interacts with everyday reality (though it might) – it is earmarked as fiction. By contrast, our increased knowledge of the

ancient world following our reading of the historical text might well influence our opinions and actions (though not necessarily so!). We might on the other hand impugn its authority. The borderline between fiction and non-fiction is certainly not fixed, though it is supposed to be – on the shelves of book-sellers and libraries.

Note especially the three italicized worlds that Wells refers to. The “settled world” is used in contrast to a previous nomadic one. This is certainly a matter of chronological succession, but not one that has been clearly stratified by any authority into successive Ages. There were too many non-contiguous areas in the world about this time – or in later times – that were undergoing such a gradual transformation. The immediate import of the phrase here is limited to the ancient world around the Mediterranean, as the reader understands very well from the wider context. The “Greek world” is for similar reasons understood by the reader as referring not to all possible worlds inhabited by Greeks (including that of modern times), but specifically to the Greek-speaking world around the Mediterranean at the time of Ancient Greece and the ensuing “Hellenized world”. The latter, the last of the three sub-worlds referred to in the excerpt, has a narrower, unambiguous historical extension, with rather precise dates associated with it (roughly from the reign of Philip of Macedonia to the collapse of his son Alexander’s empire), though its influence in Egypt and elsewhere around the Mediterranean was to be more long-lasting. The specific context (“that was ancient history now”) places this world as prior to the Roman one, to which perspective the paragraph reverts at this point. All three of these worlds are thus subservient to (and dependent for interpretation upon) the overall world of the present chapter of Wells’s book (“The common man’s life under the early Roman empire”). And that in turn is subservient to the whole World that is the overall topic of the book. We have no difficulty understanding this worlds-within-worlds structure, since our own world model is similarly hierarchically organized.

Some non-canonical worlds

Before leaving the subject of fictional and historical worlds, we should look at some examples of usage of the word ‘world’ in English that seem to fall outside of the standard definitions given in Chapter 3. The first example I shall discuss is its use in the translation of Japanese *ukiyo*, literally the ‘floating world’, referring to a certain historical aspect of society in Tokugawa era Japan centred on the Yoshiwara pleasure quarters of Edo. Although situated in a specific historical era it differs markedly from the Wells text in Chapter 12 by only referring to a particular aspect of that era, one with very fluid boundaries, not grounded in the specific actions of individuals within it and lacking the hard facts and causal flow of history itself. The term itself is reminiscent of the satirical floating island (Laputa) visited by Swift’s Gulliver, also of Escher’s print entitled “Three worlds” reproduced in the frontispiece of this book. This involves the unexpected superimposition of three sub-realms of the natural world, those of air (the tree tops), of water (the fish below), and of the intervening surface on which dead leaves are floating. A different kind of “three worlds” is that of philosopher Karl Popper, whose “World 3” of artefacts and ideas is in a sense floating free of both the material world (“World 1”) and of man’s subjective mental experience (“World 2”) (Popper 1972). His World 3 entities are not just abstract ideas, e.g. those of mathematics (though it includes these), but also cultural objects of all kinds, books, films, machines, computers, pictures, etc. Though created by human minds as products (not necessarily intentional ones) they exist independently of any individual conscious subject. A crucial thing to remember about World 3 artefacts is that they presuppose a material World 1 substrate in which they are manifest, and this includes scientific and mathematical ideas embedded in human brains or in external aids such as books or blackboards.

The *ukiyo* world, though referring to a socio-historical phenomenon, is accessible to us today mainly through the colourful, erotically tinged woodblock prints (*ukiyo-e*) of the Tokugawa era, such as those of Utamaru, though there are also literary works that illustrate its colourful but transitory nature. As a world it no longer exists in modern Japan (though its analogue may persist in the pleasure quarters of its major cities). The term itself is a descriptive artefact introduced by some human act of description, hence assignable to Popper’s World 3, though it is unclear exactly when and where the term was first thus used since it reflects earlier Buddhist usage (written with slightly different *kanji*) in the sense of ‘the

sorrowful world', referring to the transient world of death and rebirth. It can still be used to refer to living life for the moment. Like all such artefacts, it must then be manifest in some form of World 1 material. But what material? Surely not just in woodblocks. In the actual geisha houses and theatres of the Yoshiwara district of 18th century Edo? Or whatever took place between people within them? In the whole of the social milieu that framed the phenomenon? Including its historical background? If these constitute a definite material substrate it is one with very fuzzy borders. Is the term then a metaphor? Certainly the term 'floating' (*uki*-) is not meant to be taken literally. But it is a strange metaphor since what is floating is not the material framework itself, the relevant world (though that is indeed always changing), but the lifestyle of those living and acting within it. If you want to imagine a literally floating world you need look no further than Swift's Laputa mentioned above, a chunk of rock that floats above the earth's surface by magnetism and on which there is plant life and palaces and where a power elite spends its time totally absorbed by music, mathematics and abstract speculation about the stars. This floating island is not metaphorical (standing say for another world), but it does serve Swift's oblique satirical purposes.¹⁰⁰ It is most certainly imaginary (counterfactual), unlike the 'real' *ukiyo* world of Edo.

So how does the *ukiyo* world fit the Collins definitions given in Chapter 3? The answer seems to be problematic. The term relates in part to at least the following definitions listed there: (8) "a section or division of the earth, its history, or its inhabitants". It partakes of this meaning in so far as it covers a distinct historical era and population. It partakes also of (9) "an area, sphere or realm considered as a complete environment" in so far as it represented a physical and moral environment distinct from that of its surroundings. Still more relevant is (10) "any field of activity or way of life or those involved in it", the distinct "way of life" being crucial here. Also (11) "a period or state of existence" is relevant to its religious connotations ('the sorrowful world'), as is (14) "worldly or secular life, ways or people" – the living for the moment (or fleeting pleasures) that characterized the era, at least in its focus on the pleasure quarters of Tokugawa Japan. And yet it does not fit any of these exactly: it was certainly not a "complete" environment nor was it a distinct way of life for all those participating in it.

In what sense might it represent a Popperian World 3 artefact? To answer that we need first to enquire as to the involvement of his Worlds 1 and 2 here. There is (or rather was) a very concrete material basis here, namely the Yoshiwara district of Edo and all the people and objects moving around within it (we can ignore the fact that its boundaries "leaked" into the wider society of the time). The very real

100. Against the rationalists and deists of his time, something modern readers need not – and usually are not – aware of.

activities of the geisha and their clients, of the theatres and its actors and audiences, and so forth, was all captured graphically in the wood prints of the time (obvious World 3 artefacts themselves). The word *ukiyo* also refers to a specific state of mind, the frivolous ‘living for the moment’, without which it would be meaningless, so World 2 is definitely involved here. The problem is how to relate the phenomenon to some specific form of World 3 artefact. Well, I don’t think you can. It is the descriptive word *ukiyo* itself which is the only overall artefact here, although the World 1 substrate concerned undoubtedly contained innumerable distinct forms of artefact, many of which are still available to us today (especially in pictorial form). And this includes the word itself – words are themselves artefacts, artefacts embedded in whole languages that may in turn evolve further nuances. The meaning or idea behind the word can only be revealed by examining its use as applied to specific historical World 1 and 2 phenomena.

The meaning of *ukiyo*, the ‘floating world’, is quite abstract in the Abstract₂ (generalization) sense discussed in Chapter 11, summing as it does a good many phenomena associated with that world. But it is not particularly abstract in the Abstract₁ sense of ‘far from sensory reality’, in fact it lies very close indeed to the sensory reality encapsulated in that world. It also contains the nuance of a metaphorical dimension mentioned above. All in all, then, the world to which the word refers is a complex affair, with a complex relationship to the word and its uses.

Somewhat similar arguments can be brought to bear on the nature of another, otherwise very different use of the word ‘world’, namely in the somewhat antiquated political phrase “the Third World.” This is also rooted in a specific historical context, now passed, namely the Cold War conflict between those nations of the world that are/were aligned with the western democracies, and those aligned with the communist regimes (the first and second worlds respectively). The Third World consisted of the non-aligned, developing countries. Nowadays this tripartite division has been replaced in the media by the opposition between ‘developed’ and ‘emerging’ nations. Not only are the boundaries of what the term covers fuzzy, shifting as alliances, politics and economic development shifted, but it is also largely detached from reference to concrete, lasting cultural artefacts (other than the phrase itself) in a way that *ukiyo* is not. Systems of political ideology, though World 3 artefacts in their own right, are hardly historically ‘concrete’ in the same way. In Chapter 3 the phrase was named specifically by Collins as an example of definition (8) “a section or division of the earth, its history, or its inhabitants”. This is a reasonable approximation, but differs from the other examples given (“the Ancient World” and “the Western World”) by being still more vague and subject to differing interpretations.

Similar problems arise with the Collins exemplar provided for definition (10) “any field of activity or way of life or those involved in it”, namely “the world of

television". Again this seems roughly right, but when one looks in detail into what it entails doubts arise: who and what exactly constitute that world? Television studios around the globe? The producers, presenters, cameramen, and technicians etc., who staff them? The actual programs broadcast? What exactly constitutes the "field of activity" if not the "way of life" in this world? Surely that is very varied. Does a TV presenter who leaves the studio to return to her home life (and perhaps watch television herself) continue to be part of that world? What of the audience in general (both on site and in front of their television sets), aren't they part of that world, as opposed to the 'world of radio' or the 'world of theatre' that they may not be party to? Definition (9) "an area, sphere or realm considered as a complete environment" (like "the animal world") has similar problems with boundaries – which may change with scientific advances as well as being dependent on individuals' state of knowledge. And what exactly does "environment" refer to? One suspects some figurative nuance here: these non-canonical worlds are *like* (or narrower versions of) the meaning of 'world' in definitions (1) "The earth as a planet, esp. including its inhabitants", (2) "mankind, the human race", and (3) "people generally, the public". These in turn are metonymically related to one another, but considering them metaphorical of some basic meaning is problematical – which one is basic?

What about Popper's own three worlds themselves – how do they fare when compared with the Collins definitions? World 1 is everything material in the universe, everything, that is, as material as is our own planet (including "the Earth as planet" and "any star or planet" – definitions (1) and (7)). World 2 is more problematical.¹⁰¹ Perhaps definitions (12) "the total circumstances and experience of an individual that makes up his life, esp. that part of it relating to happiness" comes the closest, but it does not exclusively refer to one's mental life ("experiences" certainly, but not external "circumstances"). World 3 does not at first sight appear to be covered at all. This seems to be an abstraction unique to Popper, but one grounded, as he emphasizes, in World 1 – and moulded by the human experiences and aspirations of World 2. However, Collins definitions (4) and (3) can perhaps be regarded as depending on cultural artefacts defining "society". The 3-way distinction is at all events not canonical in the sense I am using the term, as corresponding to normal everyday usage.

In another, quite different medium, Escher's Three worlds are also non-canonical: they certainly correspond best to Collins definition (9) "an area, sphere or realm considered as a complete environment" (e.g. "the animal world"), but the

101. This is the world of qualia, of sensory experience, and of all the cognitive and emotional aspects of mental life, as analysed in Fortescue (2021a) from a purely linguistic perspective. Its interface with World 1 is that of Gibsonian affordances, as referred to in 10.1.

three referred to by the title are hardly “complete” in any sense, especially the intermediate one, the surface of the water. This is confined in the picture (one assumes) to the surface of a particular stretch of water. There is no such concept expressed in any of the world’s languages, as far as I know, corresponding to ‘the world of watery surfaces’, as opposed to a possible ‘world of the seas’ or a ‘world of the Earth’s surface’, though these too must be rather marginal. As regards the other two “worlds”, did the artist mean to distinguish ‘the world of trees’ (or perhaps ‘the world of the air’), as opposed to ‘the world of fish’ (or perhaps ‘the world of water creatures’)? Yet the use of the title “The three worlds” is immediately understandable. The usage is certainly figurative – and the human mind is geared to recognizing analogical extensions of meanings, in whatever medium they are manifest.

The case of Lovelock’s “Gaia” (first published in 1979) is different again: in so far as Gaia is to be equated with the Earth, this world (that of the Gaia Hypothesis) can hardly be said to be non-canonical. Earth is after all the quintessential WORLD. However, the Earth seen as in some sense a living entity is not. This is an abstract World 3 artefact, referring to the planet we inhabit. I do not intend to discuss whether it is true or not, but simply to consider in what way it agrees with or differs from the canonical (dictionary-based) Earth that modern science describes. Lovelock himself (in the preface to the 2000 edition) states that his earlier position suggesting that it was the Earth’s biosphere alone that regulated everything on the surface of the planet was liable to misunderstanding, a mistake which he has since tried to rectify, stressing that the whole Earth, biosphere, ocean, rocks and all, constitute a self-regulating entity. He points out that his language was “poetic”, in particular by his giving to the planet the name Gaia, the Earth Mother of Greek myth, and that he nowhere intended to suggest that Gaia was sentient. He now defines Gaia as “a complex entity involving the earth’s biosphere, atmosphere, oceans, and soil; the totality constituting a feedback or cybernetic system which seeks an optimal physical and chemical environment for life on this planet”, and adds: “the maintenance of relatively constant conditions by active control may be conveniently described by the term ‘homeostasis’” (p.10). He now sees the relationship between biosphere and Gaia as “like that between body and you. The biosphere is the three-dimensional geographic region where living organisms exist. Gaia is the superorganism composed of all life tightly coupled with the air, the oceans, and the surface rocks.”

Gaia is not an imaginary world (though critics might say it does not exist in the way Lovelock describes it), but it is certainly a world of sorts. In fact, when we look back at the definitions of ‘world’ and ‘earth’ in Chapter 3 it is clear that Gaia falls under the rubric of WORLD rather than EARTH: it is not *just* the planet. It is the planet plus the biosphere and the atmosphere (how far does that actually extend?). The definitions under ‘world’ that best fit it are (6) “a complex united

whole regarded as resembling the universe”, and (9) “an area, sphere or realm considered as a complete environment”. But even these fall short: in what way is Gaia meant to “resemble the universe”? And what is it an environment of? Not of the lifeforms on it, since they are part of the biosphere incorporated within it. Non-canonical then after all.

Moving from Science to Science Fiction, this is a genre that traditionally deals with worlds, that is planets, albeit imaginary ones, inhabited by imaginary creatures, situated in our universe and analogous to our own planet. Yet some manifestations of the genre deviate greatly from that rather straightforward relationship, moving further away from canonical senses of ‘world’ than “Gaia” does, for instance Pratchett and Baxter’s “Long Earth” series (first volume 2012). In this the Earth is replaced by “The Long Earth”, a possibly infinite series of parallel worlds that are similar to Earth, which can be reached by using a special device called a “Stepper”, allowing humanity to explore worlds “east” and “west” of basic “Datum Earth”. The worlds are mostly familiar, though they differ in greater and greater detail from our present planet the further they are removed in the series, being inhabited by early hominid species or by no one at all. This feat of imagination reflects the ‘multiple universes’ hypothesis of modern cosmologists (and of the unfortunate Giordano Bruno) to be discussed in Chapter 14, in itself a non-canonical approach to accepted definitions of ‘world’. Clearly it fits none of those listed in Chapter 3 any more than does Terry Pratchett’s comic “Discworld” – a flat world floating through space on the back of four giant elephants and a giant turtle (though this might at a pinch meet definition (9): “an area, sphere or realm considered as a complete environment”. “Long Earth” is precluded from canonical worldhood by the very fact that it is supposed to be infinite, or at least not a “complete” world or universe.

More like a planet – at least in its single spherical shape – is Robert Forward’s “Dragon’s Egg” (1980), though it is about as far from the familiar spatial and temporal aspects of our Earth that one can go and still imagine life upon it. The title refers to a neutron star (a highly dense collapsed star, about 20 kilometres in diameter), on the surface of which a life form (the *Cheela*) is evolving at breakneck speed. Despite their relative small size (an individual Cheela has approximately the volume of a sesame seed, but the mass of a human) and an intense gravity field that restricts their movement in the third dimension, the Cheela develop sentience. The climax of the book is reached when a human vessel approaches the neutron star and contact is made between the humans and the Cheela. A problem with this contact is that the Cheela live a million times more quickly than humans do: a Cheela year goes by in about 30 human seconds. When the humans arrive the Cheela are a savage, backward species, at war with rival clans. Within a few human days, the equivalent of a few thousand Cheela years,

the Cheela have already surpassed the humans in technology. The plot is not what concerns us here, but again the relationship of this world to the canonical definitions of Chapter 3. Perhaps surprisingly (and this is what is convincing about the novel, despite being so “far out” technologically speaking) it does meet the criteria for being a ‘world’ according to two of the Collins definitions: (7) “any star or planet (especially one that might be inhabited)”, and (9) “an area, sphere or realm considered as a complete environment”. Nevertheless, it must be considered non-canonical by flying so blatantly in the face of definition (1): “the earth as a planet, especially including its inhabitants” which refers to our own planet, consisting of familiar matter and situated in a familiar gravitational and temporal framework.

An earlier, philosophical vision of a multiverse, one that contains worlds even stranger than that of “Dragon’s Egg”, is Olaf Stapledon’s imaginative “Star Maker” of 1937. This partakes of myth and prevailing ideas of spiritualism more than of science, but nevertheless was highly influential on later Science Fiction writers. The narrator is transported out of his body in some unexplained manner and is able to explore space and other planets, including one similar to our own that existed millions of years ago and thousands of light years from Earth (“the Other Earth”), where his mind merges with that of one of its inhabitants, and eventually with still more minds, all telepathically linked together as they explore more and more distant planets and civilizations. It is discovered that the stars are intelligent beings, operating on vast time scales, and hardly paying attention to anything other than their own macroscopic universe. At the climax of the book the “cosmic mind” (which now includes that of the narrator) attains momentary contact with the “Star Maker”, the creator of the universe, who calmly assesses his creation without any feeling for the suffering of its inhabitants. After meeting with the Star Maker, the traveller is given a “fantastic myth or dream” in which he observes the Star Maker at work. He discovers that his own cosmos is only one of a vast number. He sees the Star Maker’s early “toy” universes, including one composed entirely of music with no spatial dimensions. He observes the Star Maker experimenting with more elaborate universes, which include the traveller’s own, up until the creation of an “ultimate cosmos”, the “ground and crown of all things”. Finally, the traveller returns to Earth at the same place and time as when he left, and resumes his previous life there. There are so many “worlds” in Stapledon’s narrative that it is hard to generalize their relationship to canonical definitions. But if we focus on the sentient stars, it is evident that these are worlds in the sense of (8) “any star or planet (especially one that might be inhabited)”, though that’s all – and far from being inhabited, they simply are alive themselves. They are simultaneously exemplars of Popper’s World 1 and World 2 – like human individuals. Of course the whole book is an object of World 3.

Speaking of dreams, a 'dream world' can also be regarded as a non-canonical world.¹⁰² These are discussed in detail by Globus (1987), who prefers the term "life-world" since the main thrust of his argument is that dream worlds and waking worlds share the same perceptual underpinnings of abstraction and creative projection – only unreflecting and unconstrained by sensory feedback in the case of dreaming. He argues from the phenomenological perspective of Husserl's theory of intentionality against the view of dreams as the "tinkering together" of images from memory. He opts rather for the creation *de novo* of dreams from abstracted "specifications" of meaning (cognitive acts rather than products) stored up in memory, including longer and shorter term wishes and preoccupations (whether conscious or not), reconstructed in fragmentary attempts at narrative. The dream life "fulfils a set of cooperative intentional acts which had previously been operative at different times during waking" (p.93). There need only be an abstract "family resemblance" (Wittgenstein's term) between the images projected in dreams to those experienced in waking life. And as he states on the first page of his book: "There are infinite worlds possible within our dreaming bubble of perception. Dreaming frees us from the actual world to the set of all possible worlds."

My final exemplar of a non-canonical world, Stanislaw Lem's "Solaris" (English version 1971), goes one step further still: despite being a spherical planet-like entity, Solaris is a totally unfamiliar world and cannot even be defined in terms of known science (as can – in theory! – the Dragon's Egg) or be subject to comprehensible cosmological explanation (as can Stapledon's *Star Maker*). It is a world unexplained, one not understood at all. It has nevertheless (or even for that reason!) been successfully filmatized – more than once in fact, but most notably in Andrei Tarkovsky's version. Solaris is a distant planet that is almost completely covered with an ocean of gel that appears to be a single, planet-encompassing entity. Terran scientists aboard Solaris Station, a scientific research station hovering near the oceanic surface of Solaris, conjecture that it is a living and sentient being, and attempt to communicate with it. They have studied the planet and its ocean for many decades, mostly in vain, simply observing, recording and categorizing the complex phenomena that occur upon the surface of the ocean. They do not as yet understand what such activities really mean. When they expose the ocean to more aggressive experimentation with a high-energy X-ray bombardment there are unexpected results which are psychologically traumatic for them as individual human beings. The ocean's response exposes the deeper, hidden aspects of the personalities of the flawed human scientists, while revealing noth-

102. Especially so as regards the dreams of young children. Piaget (1929: 88ff.) describes how children at the youngest age regard their dreams as projected outside themselves, reflecting their inability to distinguish interiority and exteriority yet.

ing of the ocean's nature itself. It does this by materializing physical *simulacra*, including human ones. Kelvin, a psychologist on board the station, confronts memories of his dead lover (seen as some kind of ghost) and guilt concerning her suicide. The other researchers apparently also have ghostly "guests", which are only alluded to. All efforts to make sense of Solaris's activities are futile.

So is Solaris a world at all, apart from in the basic 'spherical planet' sense? If, as the scientists surmise, it is sentient, then it resembles Stapledon's super-human stars and combines a World 1 exterior with a World 2 interior – but is it? Is it just the gelatinous "ocean" that is sentient? Is it not sentient at all but an artefact acting in some inscrutable manner upon the human psyche? If so, who created the artefact? To what conceivable purpose? Its status as a world is in doubt – it is certainly not a canonical one.

The filmed version is true to the inscrutable nature of the phenomenon, and represents a World 3 artefact in its own right, like the novel, only in a different medium, one that makes the action visually more immediate (and alarming), if lacking in the ideational detail that only a written text can provide. It is embedded, when watched, in the shared real world of an audience, which is different from that of the immediate circumstances of a single reader. But can it be said that a world created by a film that refers to a world created by a novelist, that refers in turn to an imaginary world in a distant corner of the universe, itself be said to constitute a world? This multi-tiered structure does not correspond directly to any of the canonical definitions. What it represents in effect is a virtual world abstracted and reconstructed in audio-visual form from an imaginary text-created world referring in turn to an entity that is recognizable as analogous in some minimal sense to what we understand as a 'world' according to definition (1), i.e. as a planet.

Despite the non-canonical nature of all these worlds, they all display their own internal logic, just as much as "The Cherry Orchard" in the preceding chapter. Only that logic is not necessarily homologous with that of the real world we experience on a daily basis. Imagination and suspension of disbelief may be required, as well as accommodation to some alien concepts of a philosophical or technological nature.

Maps and cosmologies, ancient and modern

At this point, before moving directly to conclusions as regards the source of expressions of SPACE, TIME and WORLD across the world's languages, we need to be aware of the historical context of these concepts and their development in western thought. To do so we must move beyond the sensory-based and language-based worlds built up by individuals to abstract concepts and theories of SPACE, TIME and WORLD that have developed during the course of history. These are mediated by what Dawkins (1976) has called “memes”, copied by cultural inheritance across individuals. As abstract ideas, the “memes” associated with our three principal concepts are transmitted principally via books and illustrations, employing language or mathematical formulae. Of course they need to fit with sensory experience to remain at all credible as abstractions, although they have not been subject to experimental testing until fairly recent times. Prior to historical times the world must have been seen as animistic or magical, but as Popper discusses, even then tribal life was ruled by abstractions, in the form of kinship relations and alliances, unquestioned customs and rituals – not to mention language itself (Popper 1972: 117–8). I propose taking a brief journey now through western history to see how in broad strokes the three concepts this book deals with have developed in successive philosophical and scientific traditions. How far these perspectives have filtered down to the common man in any epoch is another matter. The world of philosophers is not that of common man at any age – it has to be caught up with, by which time it will as like as not have changed already.

A good starting point is one of the earliest known maps of the world, due to Anaximander in the sixth century BC Greece, which is limited to the then known Mediterranean world. Map-making skills advanced considerably with Ptolomy in Alexandria of the second century AD, who introduced the notion of coordinate grids based on latitude (distance from the equator) measured astronomically. Compare now Anaximander's early map to the map below it depicting the known world following the discovery of the New World some two millennia after him.¹⁰³ By this time the whole globe could be depicted, split open as it were,

103. “A New and Accurate Map of the World” by John Speed, 1626. Note the lack of the Australian continent.

although various lacunae and inaccuracies remained. Below them both is a modern Mercator projection map of the world, a rational, practical abstraction from a direct mapping of the surface of the globe, stretched towards the poles to maintain latitude and longitude at right angles. The progression between these maps is obvious.¹⁰⁴

Although maps are basically two-dimensional objects, three-dimensional relief maps are by now familiar, and 3D holographic maps may well be a commonplace of the future. Terrestrial maps attached to the surface of globes have ancient roots, however, the first being mentioned by Strabo around 150 BC (that of Crates of Mallus).¹⁰⁵ The first extant globe is the “Erdapfel” of Martin Behaim constructed around 1492.



Anaximander's map (6th century BC)



John Speed's map of the world (1626)

104. Though the principle behind this kind of map goes back to Mercator himself in the 16th century.

105. Cf. Latin *globus* 'sphere, dense mass' (< IE *gel- 'form into a ball').



A modern Mercator projection map of the world

Of course Europeans are not the only people who have constructed maps. Hunter-gatherers such as the Inuit and the Yukaghir have ways of constructing them for practical purposes.¹⁰⁶ The wooden maps carved by the Ammassalik hunter Kunit in drift wood, shown below, is a case in point. These tactile maps of the Greenlandic coastlines around 66°N 36°W were gathered in the 1880s by Gustav Holm on his expedition to the coast of eastern Greenland, where he met Eastern Greenlanders who had had no prior direct contact with Europeans. These are now displayed in the Greenland National Museum in Nuuk. Turning from the earth to the heavens, observe the geocentric ‘planisphere’¹⁰⁷ below with the Earth at the centre, based upon the ideas of Greek thinkers such as Ptolemy and Aristotle. It includes the successive layers of the heavens, one for each of the known planets plus the sun, with the fixed stars occupying the outermost sphere. In the illustration below it is a fanciful medieval view of what lies beyond the stars. This is reminiscent of Babylonian (and earlier Sumerian) cosmologies of the Middle East, steeped in the mythology of capricious gods, as was the early Homeric world of Greece. It was not until the scientific insights of Copernicus and Galileo that the concept of a WORLD describable in terms of SPACE and TIME as measurable dimensions arose, freed from earlier mythology and dogma.

But let us first consider how the post-Homeric Ancient Greeks – at least their best-known philosophers – saw the world. Russell (1959) presents a succinct picture of the progression from Ancient Greece up until modern times. I summarize this in the following, with additional input from Collingwood (1945), especially as regards changing concepts of Nature. I shall mention only thinkers associated

106. The relationship between maps and the land was well known to the Inuit (cf. Spink and Moodie 1972), as reflected in the words for ‘map’ like ECI *nunannguaq* and CAY *nunaruq* (both with PE suffix *-ṇ(ṇ)uðaR ‘little, thing like a’ on *nuna* ‘land’). See Fortescue (1988: 4) for a reproduction of such a map for the Igloodik region by shaman Ewerat, drawn for Parry in 1824. For an account of the maps carved in birch-bark by Yukaghir hunters see Jochelson (1926).

107. The Planisphaerium Ptolemaicum by Andreas Cellarius, 1661.



Maps carved by Kunit



The Planisphaerium Ptolemaicum

with the landmarks in that progression. As Collingwood sums it up (pp.3–13), there were three main phases, first that of Greek “natural science”, which was based on the principle that the world of nature is saturated by mind (much as the world of hunter-gatherers like the Inuit was filled with spirits inhabiting natural phenomena). Then the view of Renaissance thinkers in which the natural world was seen as a kind of lifeless machine, set going by a higher, divine mind outside it. And finally the modern view, starting from the middle of the 18th century, informed by advances in science, in particular by Darwin’s theory of Evolution



A medieval glimpse of the heavens

in the mid-19th century, whereby the processes of the natural world were seen as analogous to the vicissitudes of human affairs as studied by historians. What was earlier seen as an unchanging framework, where the only kind of change was cyclical, was now seen as itself subject to (progressive) change. Concern with structure and form was to give way to focus on function and process.

Philosophers of the early Milesian school were principally concerned, as regards cosmology, with the particular material stuff of which the world (i.e. the known universe) is constituted.¹⁰⁸ For Thales in the sixth century BC (of whose thought only fragments exist) it was made of variously concentrated forms of water – the Earth was floating upon an ocean of water. According to Aristotle, he regarded the world (the earth plus the heavens) as a vast living organism inhabited by lesser organisms (reminiscent of the concept of Gaia discussed in the previous chapter). For Anaximenes the world was rather condensed from air, the infinite medium in which it floated freely. Anaximander (he of the map above) saw the world as a free-floating cylinder with mankind on one of the end faces. Our world was surrounded by many others, all with their ultimate source in “The Boundless” (reminiscent of the Chinese concept of Tao). The heavenly bodies were for him wheels of fire.

Anaximander was followed by Pythagoras, who it seems was the first to regard the world as a sphere. For him the world was to be described in terms of geometry (or more accurately of geometrical structure or form), i.e. of what is intelligible rather than what is sensible. In his famous analysis of acoustics, for example, it was the structure (the proportion) of the strings of a musical instrument rather than their substance that determined their aesthetic function.

¹⁰⁸. This is echoed in the belief of young children that matter (the earth, stones, clouds, etc.) are “made from” the condensation of a single substance (Piaget 1929: 347).

Mathematical truth as opposed to confusion around the nature of matter was the ultimate “intelligible” for him. This was to lead his followers in the direction of mysticism, though they were also responsible for the idea that both the earth and the sun are rotating about a central fire, which constituted a first confused step, as Russell put it (1959: 39), towards the heliocentric view of the world. This was later reversed by Aristotle’s flat earth alternative, that was to persist throughout the Middle Ages. More concerned with temporal aspects of the world was Heraclites, who saw the world as in a permanent state of flux (“You cannot step twice into the same river”). It constituted a balance between opposing forces that concealed a hidden harmony (“Nature loves to hide”). He speculated that the fundamental matter of the world was fire. By contrast, Parmenides, who founded the Eleatic school of philosophy, saw the world as a solid, unchanging sphere, a *plenum* containing no empty space, with no beginning or end and devoid of motion within it (a form of material monism).

Another important figure in the shifting climate of thought that was to lead to the position of the atomists, was Empedocles, who developed the concept of the temporal aspect of the world beyond the Heraclitean notion of flux in his doctrine of the evolution of the world through cycles of strife and love (i.e. resolution). Anaxagoras saw the cosmic opposition of Empedocles as manifest in every tiny scrap of material. He had his own theory of the origin of the world (or rather of the many worlds), whereby an eddy was set in motion by the “Nous” (the active intelligence behind the universe), in which clouds of rock thrown out by the rotating earth begin to glow, becoming the stars.

The famous paradoxes of Zeno (“Achilles and the tortoise” and “the Flight of the Arrow”¹⁰⁹), did not solve the inconsistencies of previous thinkers but brought them to the fore in such a way as to prepare the ground for a deeper understanding of TIME and SPACE. In particular, Zeno denied that space is either infinite or an empty container (as an Eleatic he regarded motion as an illusion), in fact he saw SPACE as a continuum consisting of no units as such, arguing against the Pythagorean theory of discrete quantity. This was to lead the way (by reaction to the paradoxes) towards the full-blown atomism of Leucippus and Democritus, who combined the apparently incommensurable views of Heraclites and Parmenides. These Greek atomists surmised that the world consists of constituent particles, each an indestructible Parmenidian sphere, moving in empty space. It was not until the Renaissance that this idea was taken up again and SPACE again viewed as an infinite three-dimensional void following centuries of Christian dogma adopted from Aristotle in which space was seen as a nested series of spheres. The

109. Whereby the arrow is said to cover half of its trajectory before covering half of the rest, then half of the rest, etc., *ad infinitum*.

atomists were also to develop further the influential notion of the four elements (earth, fire, water and air) proposed for the first time by Empedocles.

Of the great Greek philosophers of the fifth and fourth centuries BC, Plato held a strange kind of cosmological position, combining as it did the Pythagorean mathematical approach to “the intelligible” with the theory of the four elements, which, he claimed, each embodied distinct geometrical forms. In fact his whole view of the world was one in which form (including Motion, Rest, and Being) dominated – form understood as belonging to a transcendent world.¹¹⁰ The sensible world he regarded as the result of form being “imprinted” on basic matter. Everything there is to know about the changing, material world can be observed through perception, but only truly understood through the immanence of pure forms within it. In the *Timeus* dialogue he identified TIME with the unchanging motion of heavenly bodies and SPACE as “that within which things come to be” (by copying from the world of forms). The entire world of Nature is a becoming or a process, (one which must have an external cause), a surprisingly modern view that was to be eclipsed during the Middle Ages. He followed Pythagoras in seeing the world as a sphere, since the sphere is the only completely uniform solid.

Aristotle, a student of Plato’s, had his own more empirically grounded and ultimately more influential view of both SPACE and TIME, although some of his views – such as the claim that the earth is flat – were of course erroneous. The world of Nature was for Aristotle one of self-moving things, a living world of process (as also for Plato). I have mentioned in 3.1 his understanding of *φύσις* as “The essence of things which have a source of movement in themselves”. Unlike Plato the mathematician, Aristotle was the great biological taxonomist of his time. What particularly characterized his position was that nature’s processes were teleological, i.e. tending towards a specific end. For him SPACE was both continuous and infinitely divisible (his reply to Zeno’s paradoxes): “all things are in space, but the universe is not”, as he put it. As regards TIME, he saw three kinds of temporal ordering: consecutive, by contact (adjacency), and continuous. These separate specific times the way that places are separated in SPACE – a precursor to modern views of the relationship between SPACE and TIME. He saw the natural universe as eternal, containing past and future duration. In Book IV of his “Physics” Aristotle defined TIME as the number of changes with respect to before and after, and the place of an object as the invariant motionless boundary of that which surrounds it.¹¹¹ His doctrine of the “unmoved movers” responsible for change in the world

110. In fact the continuing dualism between an immanent (internal) and a transcendent (external) view of life’s forms was to persist in philosophical thought up until our present age. It may be said to reflect the dualism between animism and artificialism in the child’s early view of the world (Piaget 1929: 254), as discussed in Chapter 10.2.

led him to a hierarchical vision emanating at the highest level from God (the “first mover”, of pure “self-thought”) down through successive layers, of which the first, the *primum mobile*, corresponded to the outermost, stellar sphere of the heavens. This moved in perfect unchanging harmony, an initial imitation of God. Successive lower levels or “intelligences” were associated with the more erratic movement of specific planets – each an increasingly imperfect imitation filtering down from above, as it were (recall the planisphere illustrated above).

Only with the Renaissance did the theological dogma of the Middle Ages, which absorbed Aristotle’s cosmological views unchanged, begin to be challenged. A return to Plato and Pythagoras was heralded by Neo-Platonist philosophers. There is a shift from Nature seen as a living self-creating organism, to be treated with reverence since it was a reflection (if distantly removed) from the divine, a view in which the relationship between man and Nature was still rooted in magic and astrology, towards Nature conceived of as a machine, albeit a machine that presupposed an external maker. Efficient causes rather than teleological ones were sought to explain phenomena. Nature was now something that could be tamed, no longer feared or revered, but respected and open to careful observation.¹¹² Horizons were expanding intellectually with the heliocentric system of Copernicus and with Galileo’s discovery that the Milky Way is made up of stars like our own sun. The implication was that the laws governing the Earth and the heavenly bodies were the same. Not long afterwards, peering in a quite different direction with his microscope, Robert Hooke was to discover the tiny worlds of microorganisms in single drops of water. Modern Science can be said to have started with Galileo, who understood that nothing is scientifically knowable unless it is measurable. This mechanistic view of Nature as purely quantitative was taken further by Descartes, who was to separate the material world entirely from the world of Mind to which all secondary qualities such as colour and sound were relegated, as mediated through the sense organs.

Horizons were also expanding geographically, with daring voyages of discovery, aided now by the compass, to the New World and beyond (see the second map given above). None of this helped Giordano Bruno, however, whose work “On the Infinite Universe and Worlds” of 1584 was just too advanced for his time: his proposal of an unbounded universe in which “innumerable earths revolved around innumerable sun, with living beings inhabiting these worlds”, was to lead

111. Contrast this with the view of the English materialist Hobbes in the 17th century, who saw TIME as a “permanent now”.

112. With the Romantic movement of the nineteenth century this attitude was to be replaced by an actual appreciation of Nature in all its wildness, harking back to Rousseau’s cry of “Back to Nature!”.

him into collision with the Catholic Church and to the stake. Astrology was nevertheless gradually being replaced by astronomy and the scientific method was becoming established to replace – or at least supplement – dogma and superstition. The medieval view of the world as a static, finite, well-ordered place was being turned upside down.

It was not long before Newton, having “discovered” gravity and used it to predict planetary orbits correctly, went on to propose a distinction between absolute and relative space, something foreseen by Aristotle. Since absolute space is not available to the senses we must by necessity rely on relative space (“some moveable dimension or measure of the absolute spaces”). The space in which his solid particles moved he conceived of as an infinite vacuum. The rationalist Leibnitz, his near contemporary, argued that the notion of absolute SPACE was quite unnecessary. He conceived of SPACE as purely relative, defined by the relationship between objects, and was “on the threshold of relativity”, as Levinson put it (2003). His concern with the notion of infinity, struggled with by Greek philosophers since Anaximander’s time, was to result in his calculus of “infinitesimals”, ideal mathematical entities. This was an important step forward from Euclid’s vague notion of the hypothetical point at which parallel lines are assumed to meet.¹¹³

Arguing against Leibnitz’s “monads” (purely subjective, living but low-grade atoms that filled all matter), Spinoza, the pantheistic monist, put forward the at the time highly controversial claim that Nature and God are one and the same all-encompassing Whole. This was different from Leibnitz’s view of Nature as an organism whose parts are lesser organisms forming a continuous scale from the purely mechanistic up to the highest conscious life.

Another kind of critique of Newton’s absolute SPACE was that put forward by Kant, for whom SPACE and TIME were both *a priori* intuitions of the human mind, so more relevant to psychology than to cosmology. Although TIME and SPACE were mind-dependent for him, they were also “empirically real”, not just the result of subjective perceptions of the individual consciousness, and presupposed a transcendent ego immanent in all human beings. Nature for him was a mere phenomenon or appearance, a necessary, rational product of the human way of seeing things – things which we can never directly know “in themselves”. The

113. The nature of infinity was also pondered upon in early Indian mathematical texts – in particular the *Surya Prajanapti* of the 4th to 3rd century BC. A modern, linguistically informed approach to the question is that of Lakoff and Núñez (2000), who see it as a matter of metaphor, grounded in the motor-control system of the brain as reflected in the iterative linguistic category of Aspect. Analogical extension from concrete operations like object collection lie at the heart of their approach to mathematics, which proposes an ‘embodied’ as opposed to an idealist explanation. This can perhaps be viewed more simply in terms of generalization (my Abstract₂).

empiricism of British sceptics like Hume represents a very different approach. For Hume the world was known to the individual experiencer through sense perceptions, the more abstract relationship between them (“ideas”) being a matter of association through the recognition of resemblances, of spatiotemporal contiguity, and of cause and effect. Kant’s synthesis of the rationalist and empirical positions of Leibnitz and Hume respectively was to propose that the mind simply imposed certain principles upon experience. This was to lead to the more extreme idealism of Hegel, for whom Nature (an abstraction that is nevertheless real) is spread out through time and space and is striving continually from its material origins towards becoming Mind.

With Darwin’s revolutionary theory of Evolution in the mid-19th century the emphasis on Becoming rather than Being took another major move forward, though without the teleological trappings of German idealism. Conscious intentions never entered into Darwin’s explanation of progress in the evolution of species, which was a purely mechanical result of natural selection. Nature could be cruel in its impersonal unfolding. As Collingwood put it (1945:133), a third entity, biological Life, was now introduced between the Cartesian dualism of Matter and Mind. New discoveries in palaeontology had already been opening up vistas of immense spans of Deep Time (as advanced by Scottish geologist James Hutton in the late 18th century). It became clear that the world had not always been as it is today, its flora and fauna had varied enormously through distant eras of pre-history. One could speak for instance of a “Jurassic world” very different from our own.

Moving forward in time to the turn of the 20th century, Bergson, with his dematerialized notion of Nature as pure *élan vital*, carried further the Kantian notion of psychological TIME, distinguishing between TIME as we think about it (spatialized) and TIME as experienced – a duration (*durée*), an unbroken flow only graspable through intuition (Bergson 2012). Nature as a process of emergence towards a higher plane of mind (and ultimately deity) is also central to more scientifically informed thinkers such as Alexander and Whitehead, both of whom saw the universe – Nature – as an organism, but one differing crucially from the similar view of the Ancient Greeks by having absorbed the Einsteinian notion of Space-time (to which I return below) and by being in a constant flux of “creative advance”. For Alexander, life is the time-aspect of the organism, the rhythmic pattern of its material parts, its space-aspect being inorganic matter. For him space-time is itself the creator of the universe, not some external deity.

In discussing perception and its relation to SPACE and TIME, Whitehead distinguishes between “presentational locus” (geometrical Space as projected by the bodily senses – “a locus with a systematic geometrical relation to the body”), and “duration” (Whitehead 1985: 126–129). In itself the former lacks both past and

future, although it is through it that the world is experienced as extensive in SPACE. He treats presentational locus in terms of his theory of “strains” (p.310ff). These are not only relative to the body, but may be independent, i.e. absolute. He makes clear the distinction between absolute and relative SPACE and TIME in terms compatible with the ‘frames of reference’ approach of Levinson and others. Normal perception, however, is in the combined mode of “symbolic reference”, in which what he calls the mode of “causal efficacy” is projected onto presentational immediacy, thus uniting BEING IN SPACE with BEING IN TIME. This is the way we experience the world around us, relatable to Gibson’s notion of affordances. Causal efficacy represents the entire past of the individual impinging in a massive but unanalyzed manner upon the immediate present. TIME in Whitehead’s philosophy of Process is “epochal”, created through the successive coming into being and perishing into their successors of “actual occasions”, quanta of physical time (p.68–9). Actual occasions as experienced by a subject are extensive in both TIME and SPACE. They constitute Whitehead’s solution to Zeno’s paradox of the Flight of the Arrow.¹¹⁴ They are organized into “societies”, including the society of living things. Through his theory of “prehensions” they relate to and participate in all other occasions throughout space-time. He further espouses a radical theory of “cosmic epochs”, in which the universal constants of Nature that modern science has revealed may be different elsewhere in space-time from those pertaining in our present epoch.

Although Whitehead was perfectly familiar with the latest scientific advances of the first half of the twentieth century – including relativity and quantum theory – his was probably the last example of a philosophical system-builder on the grand scale. After him, cosmology has been handed over squarely to Science. Philosophers have turned to focus more on questions of language and meaning as well as scientific methodology. As regards the first of these directions, Wittgenstein was the key figure. Radically revising his earlier “picture theory” of language in which the structure of ordinary language sentences directly map the structure of reality, he proposed in his “Philosophical Investigations” the notion of “language game”, according to which the meaning of words is not directly tied to the nature of the real physical world but to the context of their use, a matter of the linguistic activity of language users (Wittgenstein 1953).

As regards scientific methodology, the central figure is Popper, who is also particularly relevant to clarifying the notion of WORLD. His theory of the three

114. He cites James (1911, Chapter X) in this connection: “Either your experience is of no content, of no change, or it is of a perceptible amount of content or change. Your acquaintance with reality grows literally by buds or drops of perception. Intellectually and upon reflection you can divide these into components, but as immediately given, they come totally or not at all.”

worlds, which I have discussed already in Chapter 13, has been widely influential (Popper 1972). In all his work he exemplifies – and has largely been instrumental in defining – what objective, scientific knowledge is, notably the openness to step-wise changes through critical feedback and to the potential falsification of its theories. As Magee puts it (1973: 67) “[His] evolutionary view leads one inevitably to a concern with developments over time. For instance the history of science, or philosophy, is seen not as a record of past errors but as a running argument, a chain of linked problems and their tentative solutions.”

So far I have limited discussion of concepts of *WORLD* and *Nature* to the western world, but there are important Asian traditions that have taken a somewhat different path. In China, in particular, there is a long history of regarding *Nature* as a self-generating organic process (cf. Whitehead above), an all-enfolding harmony, emphasizing the continuity of *Being* (Tu Wei-Ming 1989). A central concept is ‘*qi*’ (elsewhere spelt *ch’i*), a vital force combining matter and energy (the yin and the yang of it), that can be roughly compared to Bergson’s *élan vital*. The universe was seen by traditional Chinese thinkers as closer to biology than to physics, a dynamic process of growth and transformation. *Nature* (*zìrán*, lit. ‘self-so’) is quite simply the way things are resulting from that creative process. It is *Tao*, “The Way”, which embraces the whole cosmos – including humanity, as stressed by the Confucianists.¹¹⁵ Tu cites an early thinker Wang Fu-chih on the power of *qi*:

The fact that the things of the world, whether rivers or mountains, plants or animals, those with or without intelligence, and those yielding blossoms or bearing fruit, provide beneficial support for all things, is the result of the natural influence of the moving power of *ch’i*. It fills the universe. And as it completely provides for the flourish and transformation of all things, it is all the more spatially unrestricted. As it is not spatially restricted, it operates in time and proceeds with time...

This basic attitude is evident in Chinese paintings of *Nature*. Tu (p.74) cites the 17th century painter Tao Chi as saying that mountains flow like rivers, “like ocean waves frozen in time.” Rocks are not static objects but dynamic processes with their particular configuration of energy-matter (*qi*).

Japanese thinkers took over the term *shizen* ‘*Nature*’ from the Chinese (Mandarin *zìrán*), but there is an older tradition in Japan of attachment to *Nature* in the native pantheistic or animistic religion Shintō. As Tellenback and Kimura (1989),

115. Note also the word *tiān* ‘heaven, sky, God’ mentioned in 3.1, which in conjunction with *dì* ‘earth (as *tiān-dì*)’ covers the whole of the natural world, including weather, nature, and the seasons, in an “all things under heaven and earth” sense.

explain, there was in fact a native expression, *onozukara*, (lit. 'from self'), corresponding to *shizen* and written with the same *kanji*. Both refer to a spontaneous becoming without human intervention, a force flowing forth from a source (cf. the original meaning of Greek *fisis* in 3.1). Unlike the principally objective sense of Nature in the West, it is more of a subjective response to Nature's phenomena that dominates in Japanese thought. This can be seen in the reverential attitude of Japanese to Nature, also in its tradition of gardens, where one attempts to create in a confined space a totality of mountains and rivers, which can only be appreciated by someone in the correct frame of mind. According to Tellenbach and Kimura (p.158) this reflects a radically different attitude to Nature, one that prevented the traditional Japanese from arriving at a conception of Nature from which natural science could have evolved. Another aspect of this attitude is the sense of *mu-jō* (lit. 'nothing permanent'), which instils the appreciation of nature with a poignant melancholy. The influence of Chinese forms of Buddhism is in evidence here, but in Japan it has become inextricably mixed with the more cheerful animist tradition of Shintō. One difference between the use of European Nature and Japanese *shizen* is that the latter is not used in the sense of "the nature of things" (whether events, circumstances, artefacts or of man himself). In that case Japanese employs another term, *shō* (or *sei*), which means 'quality, character' (Tellenbach and Kimura p.161). Compare this with the common expressions under "*shizen*" in Corwin et al. (1972): *shizen no nariyuki* 'the natural course of things' (*nariyuki* is 'course of events'), and *shizen ni shitashimu* 'commune with nature, be at home in nature' (*shitashimu* is 'be friendly with').

A much more radical attitude to the natural world is that of traditional Indian strains of philosophical and religious thought that consider the phenomenal world to be Maya, pure illusion. This constitutes a denial of the reality of Popper's World 1, and a restriction of the notion of "truth" to ideational memes concerning World 2 (treated as if it were World 1). This view is actually not far from that of European Idealism, or indeed from Globus's theory of the reconstructive nature of memory and the creative projection of perception mentioned above.

Let me proceed now to a wholly scientific, modern perspective. The recreated image of our galaxy below graphically reflects just how far our understanding of the WORLD and our position in the infinitely expanded horizons of deep SPACE and deep TIME has become in recent decades. The Earth is of course far too small a speck to show up in amongst the myriad of stars and galaxies captured here.¹¹⁶ Just how deep TIME and SPACE are was only gradually realized following the great

116. The neo-Darwinist J.B.S. Haldane pointed out that the human body is almost exactly half way in size between the smallest and the largest entities known to exist at the time – respectively the electron and the spiral galaxy (Haldane 1927).

step forward in our understanding of the origin of life on the planet heralded by Darwin's theory. Already the geology of his time had begun to reveal how ancient the earth's crust really was, though it wasn't until the next century that plate tectonics and the gradual formation and dissolution of successive seas and continents and mountain ranges could be understood in any detail. I shall return to this in the next chapter.



Our galaxy

The sharp distinction between TIME and SPACE that philosophy had assumed until the twentieth century was to be overthrown by the Einsteinian concept of Space-time, as was the accepted notion that SPACE was filled by an intangible “ether” – this had superseded Newton's view of space as a vacuum in order to explain the behavior of light. Henceforth it was to be filled by force fields impinging from all sides on whatever matter is there. Einstein's theory of Special Relativity denied Newtonian absolute TIME and took the speed of light is a constant from whatever viewpoint one measured it, and at whatever speed the observer is moving at. He famously proved that mass and energy are interchangeable. Anyone or anything travelling at the speed of light would have infinite mass, which obviously precludes exceeding it. What is regarded as future and past, it turns out, is dependent on the speed of light, and the past and future of events in relativistic space-time come to be analysed in terms of past and future “light cones”. Einstein was to further stretch the credulity of the layman in his subsequent theory of General

Relativity, which argues that gravity is the result of the curvature of space by massive bodies and that SPACE and TIME are really just aspects of Space-time subject to its flexible geometry (probably influenced by Gauss, who had earlier discussed the possibility of “curved space”). Movement in this can produce counterintuitive results, as in the “twin paradox”, a thought experiment in which one twin who makes a journey into space in a high-speed rocket returns home to find that the twin who remained on Earth has aged more than he has. Observational evidence (the “lensing” of light by distant stars) has nevertheless confirmed the predictions of General Relativity.

Relativity is not the only outcome of the progress of scientific theory since the start of the twentieth century that is counterintuitive.¹¹⁷ The other great leap forward in physics, at first sight less obviously germane to cosmology, is Quantum Theory, as developed by Niels Bohr and his younger colleagues following the crucial discovery by Max Planck that light is emitted not as a continuous flow but in discrete packets he called “quanta”. At the level of individual atoms it was found that electrons “leap” from one orbit to another with no intermediate state. Dealing the final deathblow to the theological vision of a stable, deterministic universe, Heisenberg’s Uncertainty Principle proclaimed that there is no certainty as to the exact position and momentum of sub-atomic particles at the same time, their location being a matter only of probability. This is a strange world in which matter can only be defined in terms of pattern and rhythmical vibration, of dynamic action rather than substance, a world far deeper than that envisaged by the Ancient Greek atomists. It is inhabited by quarks exhibiting bizarre properties of spin and colour and “strangeness”, expressed in abstruse mathematical formulae but shored up by irrefutable experimental results. As Whitehead put it: “At an instant there is nothing...There is no nature at an instant” (Whitehead 1934: 47–48). Without space there is no time and without time there is no space. Action at a distance between particles once contiguous is now not an impossibility, and TIME itself can either move forwards or backwards at the highly local level of quantum mechanics. The medieval dictum of “As above, so below” has been replaced by “As above, not so below”, although the human mind insists anyway on seeing resemblance and analogy everywhere. Traces of what actually goes on at the sub-atomic level could now be seen in “bubble chambers” attached to powerful cyclotron accelerators.

117. I should also mention advances in mathematics, which have led to such concepts as four-dimensional “Minkowski spaces” (used to explore general relativity), and multi-dimensional “Hilbert spaces” that have informed the more abstruse aspects of modern cosmology. Already the investigation of non-Euclidean geometry, in which parallel lines can meet and in which the sum of the angles of triangles is not equal to 180 degrees (as on the surface of a sphere), had been initiated by Gauss in the 1830s.

In this same period of intense scientific exploration of the universe it became accepted that elementary particles of matter – including the “photons” constituting light – simultaneously show properties of particles and of waves, depending on experimental conditions. The Heraclitean notion of the interplay of universal forces and the firmly held medieval view, taken over from Aristotle, of the four elements, were now replaced by the four distinct basic forces of Nature: gravity (the weakest), and the electromagnetic, weak nuclear and strong nuclear forces. The number of elementary particles discovered now soared. Strange new ones were mooted, field particles and virtual particles responsible for interchanges between heavier ones. Antiparticles were as numerous as particles and were seen as filling “empty” space, bubbling up in self-destroying pairs. Almost undetectable neutrinos and “gravitons” joined the ranks.

Astronomy also moved forward at an ever accelerating rate. In 1929 Hubble, with the advanced power of the latest telescopes, showed that our galaxy, the Milky Way,¹¹⁸ was not the only one in the universe, that in fact there are billions of galaxies beyond ours. Then, by investigating the ‘red shift’ of distant stars, he showed that the universe is expanding and that it consequently must be expanding from some distant point in time when all matter was in close proximity. This was to lead to the conclusion (though one not at first apparent to Einstein) that the universe began with a “singularity” in which the known laws of physics no longer applied (Hawkins 1995: 53). The seminal work of Stephen Hawkins along with Roger Penrose introduced the concept of space-time singularities in “black holes”, these being the result of the collapse of giant stars producing such intense gravitational fields that not even light can escape from them, except, as Hawkins has shown, by the possibility of radiation leakage at their outer ‘horizon’, due to quantum effects. For him the Big Bang, as a singularity, represents no less than the birth of TIME and SPACE themselves.¹¹⁹ It has since been established that there are huge black holes at the centre of probably every galaxy, including our own. Hawkins further discusses the origin and fate of the universe in relation to the Arrow of Time and the second law of Thermodynamics, which states that ‘entropy’ (disorder) cannot grow less in a closed system, which suggests a gradual running down of the universe.¹²⁰ But he stresses the phrase “in a closed system”, as

118. Glossing Greek *galaxias* from *gala* ‘milk’ – and note Latin calque *via lactea*.

119. Although this is not an easy concept to come to grips with, it should not be forgotten that on a personal experiential level TIME and SPACE are of course also “born” to each one of us at the time of our own birth.

120. He actually posits three distinct Arrows of Time, the thermodynamic, the psychological, and the cosmological, the first two always in alignment while the last is depending on the phase of expansion of the universe, expanding or collapsing.

the universe is precisely not a closed system and – in the modern consensus view of cosmology – is roughly the same in all directions (p.153 ff.). He has suggested that the universe is finite but unbounded, expanding equally in all directions, with no actual beginning (like walking around a sphere, only in four dimensions). How the Big Bang – which is taken to have had zero size but infinite heat – could have expanded to produce such a universe has been the subject of intense debate, most of which accepts some form of “inflation”, with slight irregularities already in the initial conditions due to quantum uncertainty.

The “life history” of stars could now be plotted from the condensation of clouds of interstellar gas to their death as white dwarves or in spectacular explosions as huge stars collapse in supernovas that seed the universe with heavy elements. More and more unexpected phenomena like pulsars and quasars were encountered in the depths of space, now opening up for direct (but time-delayed) observation. More recently, it has become increasingly evident that the universe does not consist solely of matter and energy as we experience and measure it today, but also of a still greater proportion of mysterious “dark matter” and “dark energy”. Modern Science can hardly be said to have eradicated the sense of mystery and awe in the face of Creation that orthodox theologians lament the loss of.

The Holy Grail for modern cosmology is the ultimate joining of the inconceivably small with the inconceivably large in Quantum Gravity, a possibility already glimpsed in Hawkins’s work on what happens at the horizon of black holes. There is no shortage of theories aiming in this direction, for example “String Theory” with its positing of multiple dimensions all “curled up”. Such a theory is needed in order to explain what may have gone on in the first nano-seconds after the Big Bang, and even before it (multiple universes?).¹²¹ But that Grand Unified Theory has yet to be reached, though it doubtless will someday soon. Increasingly powerful telescopes in orbit around the Earth can probe right back to the most distant – and therefore most ancient – glimmer of background radiation still lingering from the Big Bang. It has also become increasingly possible to detect planets around distant stars, and to speculate as to the number of them in the galaxy that might meet the basic requirements for life to develop on them by being just the right distance from their star, like Earth in the “Goldilocks zone”, which allows water to exist in its liquid form. The worlds imagined by Science Fiction writers no longer seem so impossibly distant.

121. This is reminiscent of the view expressed already in the Vedas of the 2nd millennium BC that the universe goes through repeatable cycles of creation, destruction and rebirth, each cycle lasting over four million years.

Earth's Deep Time

As we have seen in the preceding chapter, twentieth century advances in astronomy based on Hubble's discoveries led to a growing awareness of Deep Space and Deep Time, both intimately linked at the cosmic level. Meanwhile advances in palaeontology and Darwin's Theory of Evolution had led to an understanding of Deep Time within the prehistory of Earth. Successive stratigraphic Ages of the Earth combining geological and biological data have today been standardized, as in Figure 12 from Dawkins and Wong (2017: 15). The diagram is published by the International Commission on Stratigraphy, of which an updated version is now available with the label "Tertiary" removed. This replaces earlier vague designations such as "the Age of Fishes", "the Age of Reptiles", and "the Age of Mammals". Observe the distinction between eons, eras, periods and epochs here (only the first two appear for the early strata on the right, where the timescale is compressed). Time is given in millions of years (Ma). The exact transition times and circumstances may of course be blurred. These Ages refer to more than just chronological stages, they also have spatial dimensions (various configurations of land and sea and ice) and contain as well the forms of life inhabiting them, as witnessed by the fossil record. They reflect in other words successive spatiotemporal worlds and are often – legitimately – discussed in those terms. These ages are all hypothetical (except our own) and to be considered as worlds (in my sense) they presuppose a theoretical observer, although they have been established with ample scientific evidence, as has the starting point: the formation of the Earth some 4.6 billion years ago, which is based on radiometric measurements of meteorite material.

Here are the relevant definitions of 'eons', 'eras', 'periods' and 'epochs' according to the Collins dictionary:

eon/aeon: immeasurably long period of time, age; largest period of geological time comprising two or more eras.¹²²

era: period of time considered as being of a distinct character, an extended period of time the years of which are numbered from a fixed point or event ("The Christian era"); a major period of geological time, divided into several periods.

122. cf. Greek *aion* 'infinitely long time' mentioned in 2.2. The unusual source of 'era' in Latin is mentioned in 3.1.

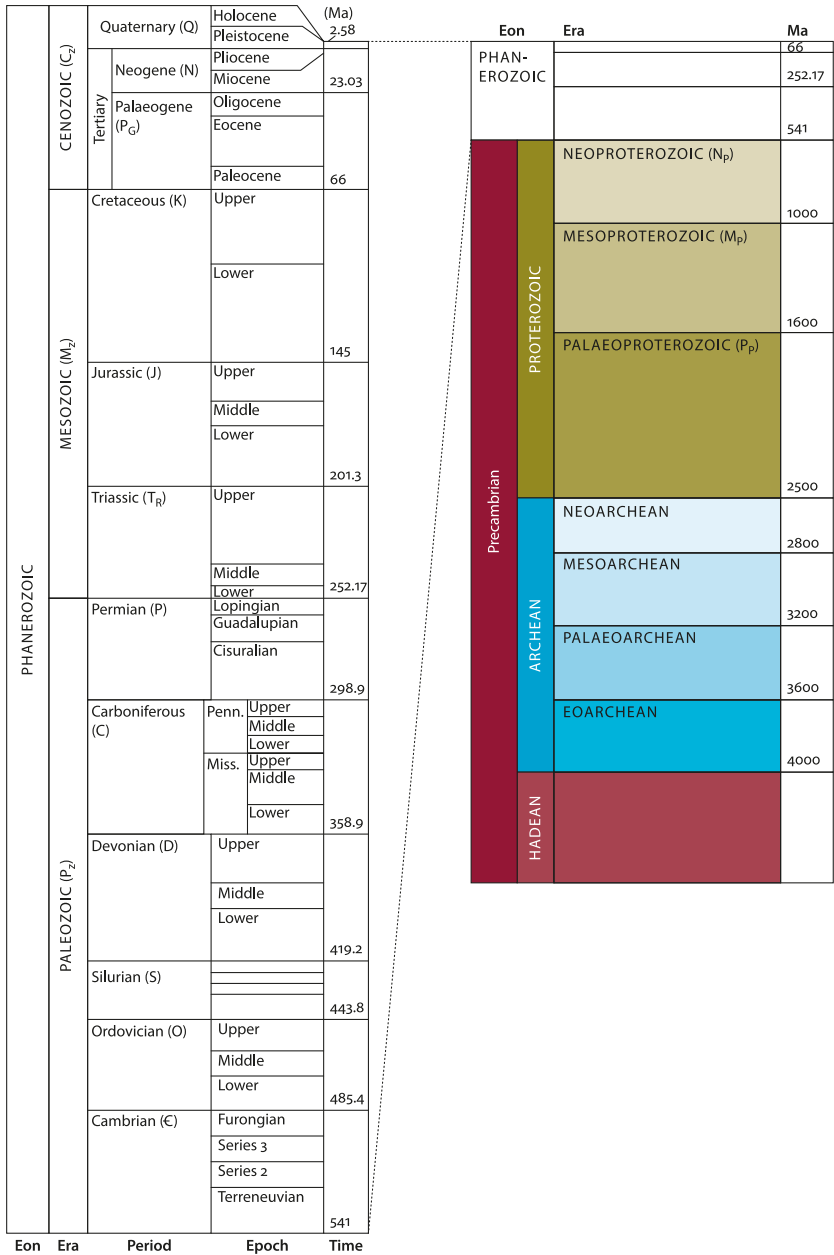


Figure 12. Stratigraphic timescale (from Dawkins and Wong 2017)

period: a portion of time of indefinable length, a portion of time specified in some way ("Picasso's Blue period"); a unit of geological time during which a system of rocks is formed.

epoch: a point in time beginning a new era or distinctive period; a long period of time marked by some predominant or typical characteristic; a unit of geological time within a period during which a series of rocks is formed.

In the following I shall characterize each successive stratum of Figure 12, based on Dawkins and Wong (2017), eked out by relevant Wikipedia articles on the relevant periods.

Precambrian

This is divided into three eons, the Hadean, Archean and Proterozoic. The first of them is prior to the first appearance of life and is best described as an uninhabitable hell, as described in fictionalized terms by Wells (1946: 14–15):

[In this earliest stage of Earth's history...] we should behold a scene more like the interior of a blast furnace or the surface of a lava flow before it cools and cakes over than any other contemporary scene. No water would be visible because all the water there was would be superheated steam in a stormy atmosphere of sulphurous and metallic vapours. Beneath this would swirl and boil an ocean of molten rock substance. Across a sky of fiery clouds the glare of the hurrying sun and moon would sweep swiftly like hot breaths of flame. Slowly by degrees as one million of years followed another, this fiery scene would lose its eruptive incandescence. The vapours in the sky would rain down and become less dense overhead; great slaggy cakes of solidifying rock would appear upon the surface of the molten sea, and sink under it to be replaced by other floating masses....At last an age would come when, in the cooling air, steam would begin to condense into clouds, and the first rain would fall hissing upon the first rocks below. For endless millennia the greater part of the earth's water would still be vaporized in the atmosphere, but there would now be hot streams running over the crystallizing rocks below and pools and lakes into which these streams would be carrying detritus and depositing sediment...

During the still very hot Archaeon eon most of the surface of the planet was under deep water. In the ensuing Proterozoic the continental accretion of the earth's crust, begun at the end of the Archaeon, continued, sometimes coming together as a single super-continent, sometimes spitting up again under tectonic pressure, releasing liquid magma along the rifts.

The earliest clear signs of life on Earth were in the Proterozoic eon with worm-like creatures, probably preceded by jellyfish-like ones leaving few fossilized traces (Dawkins and Wong pp.428, 523). The authors argue that there are already earlier signs of life 3 billion years ago in the Archean eon (p.8). There were certainly bacteria (prokaryotes) around much earlier, perhaps even as far back as the Hadean in deep hot rock (pp.662–4). Essential to life was the appearance of (blue)green algae – cyanobacteria – that started producing oxygen in the atmosphere through photosynthesis.

The first cells appeared at the beginning of the Proterozoic, and some two billion years ago “eukaryotes” emerged: early protozoan cells that engulfed mitochondrial bacteria to produce the complex cells of all plant and animal life today. As Dawkins and Wong indicate, the early division of life into the three ‘kingdoms’ of plants, fungi and animals (all eukaryotes) was preceded by multiple microbiotic bacterial kingdoms. And prior even to the diffusion of reduplicating DNA, there may well have been an “RNA world” based on single-strand ribonucleic acid (p.651). The precise beginnings of life are still cloudy today.

During the later Proterozoic there were several very cold periods. One particularly striking phase starting some 700 million years ago and lasting at least 50 million – the Cryogenian period – has been termed “Snowball Earth”, when the surface of the earth was entirely covered with ice. But life still persisted somewhere, eventually producing the sponges, early colonies of single protozoan cells (flagellated protists).

Cambrian

With this period began the Phanerozoic eon in which the first animal and plant fossils appear – the “Cambrian explosion” of the fossil record. Prior to it there were mainly unicellular creatures. Most forms of life during this period were aquatic, and the land was completely barren. Vertebrates may have appeared already in the mid-Cambrian (Dawkins and Wong, p.408).

This was a period of warm shallow seas as the remaining sea ice of the preceding period vanished and sea levels rose, impinging on the super-continent Gondwana, which was concentrated in the southern hemisphere and from which Laurentia (North America) and Siberia were beginning to split off. Towards the end of the period the climate became still warmer.

Ordovician

This period began very hot (with greenhouse conditions) and was still barren on land, but with diverse marine life in the oceans that dominated the planet (including sharks and jawed fish as well as molluscs). Algae (the first plant life) started to emerge from the oceans, followed by arthropods, the ancestors of insects, spiders and centipedes.

The continent of Gondwana now reached from north of the equator to the south pole. There was widespread tectonic activity and volcanism. The first episodes of glaciation occurred as the climate cooled. There was at least one major extinction event before the next period.

Silurian

There was still an ice cap at the southern pole, but it was now warmer again, with rising sea levels and at times a high level of CO₂ producing greenhouse effects. The climate was to undergo drastic fluctuations during this period.

Gondwana still covered much of the southern hemisphere, while in the vast ocean to the north ("Panthalassa") the first bony and ray-finned fish appeared, as did the first vascular plants on land. The smaller continents of proto-Europe and North America collided to produce a new Laurasian/ Euramerican continent. In general the land surfaces were relatively flat with a number of island chains and a rich diversity of environmental settings.

Devonian

This was the so-called "Age of Fishes". It was a warm, arid period, later becoming very hot with high sea levels. A great diversity of life developed in the oceans. In the warm shallow seas of the lower Devonian that developed during dry periods from earlier freshwater swamps lungfish and mudsuckers appeared out of the sea. Forests now spread across the continents. This was the time of the 'greening of the land'. In fact this attained tropical conditions on Greenland in the far north of Laurasia. But towards the end of the period there was a return to 'icehouse' conditions that caused a marked drop in sea level, which may or may not have contributed to another extinction that almost killed off oceanic creatures like the trilobites.

Panthalassa, the 'world ocean', dominated the northern hemisphere still. This period is characterized by a number of continents of different sizes, the main one still being Gondwana, which comprised (at least) South America, Africa, Australia, Antarctica and India. Laurasia was drifting closer and closer to Gondwana.

Carboniferous

This was the so-called “Age of Amphibians”. Vast swamps of giant club moss trees and horsetails dominated the tropics, laying down layers of coal from their decay, while an extensive ice cap developed in Gondwana in the south. Sauropsids appear (reptiles, later to produce the dinosaurs) and early amphibians (lizards and snakes) began to proliferate. Huge dragonflies and scorpions emerged. The period was warm at first, but later cooled and dried, leading eventually to the collapse of the rain forests.

Laurasia and Gondwana now collided, forming the core of Pangaea. This was a period of active mountain-building. Another large ocean, the Paleo-Tethys, was almost enclosed within the periphery of Pangaea.

Permian

Pangaea was now whole, surrounded by the Panthalassa ocean. This was a generally cool, but dry period, with deserts widespread in the interior and glaciation at the poles.

The first modern trees, conifers, appear on land, and with them the earliest shrew-like ancestors of the mammals, creatures like the cynodont, a therapsid that had mammal-like features such as hair and differentiated teeth (Dawkins and Wong, p. 299). Side by side with them were the early ancestors of the dinosaurs, the archosaurs. There were other odd creatures like the sabre-toothed gorgonopsians that did not survive.

Marking the abrupt end of the period was the most devastating extinction event of all time, probably triggered by the extreme volcanism of the Siberian Traps, which flooded molten basalt over a vast area in the north of Pangaea, with a massive release of CO₂ into the atmosphere. Some ninety percent of all life on Earth was wiped out, especially affecting life in the oceans.

Triassic

This period marked the start of the Mesozoic ‘hothouse’ era (the “Age of Reptiles”), characterized by dry desert heat. The land was now largely barren, with an extensive gap in the fossil record in most regions, but trees such as ginkgos were soon to appear alongside surviving conifers and tree ferns. It was only towards the end of the period that the first dinosaurs developed from the archosaurs, together with the ancestors of birds and crocodiles.

Rifts between Laurasia and Gondwana appeared as Pangaea began breaking up again and the climate grew more humid. The tectonic uplift resulting in the Andes began at this time but was not completed until the Cretaceous. Mega-monsoons were triggered at the borders between continents and ocean.

Another mass extinction occurred at the end of the period, destroying three quarters of all species. Small insectivore therapsids survived, having developed nocturnal habits to escape daytime predators.

Jurassic

This period, in which the dinosaurs reigned supreme, both on land and in the ocean, was warmer than today, half monsoonal, half arid, with both the north and south poles covered in water. There were extensive forests of conifers, cycads and ginkgos.

Pangaea was drifting definitively apart into Laurasia, corresponding to modern-day North America and the fragmented predecessors of Eurasia, and Gondwana, corresponding to modern South America, Africa, Madagascar, India, Antarctica, and Australia. The Atlantic ocean remained narrow in the north and was only to open in the south during the following period.

Mammals developed new and varied forms alongside the dinosaurs, such as the marsupials and monotremes like the platypus, and birds now evolved, including the early archaeopteryx. Crustaceans appeared in the sea.

Cretaceous

A relatively warm period with shallow seas reaching inland characterized this new period, allowing the laying down of extensive chalk beds from the shells of marine invertebrates. Flowering plants appeared on land and dinosaurs continued to evolve new forms (like the pterosaurs), as did the small nocturnal mammals. There were cooling periods, but the late (upper) period was once more a hothouse.

Tectonic plate movement continued to expand the Atlantic as Gondwana broke up completely – it had begun to break up already, but its fragmentation accelerated during the Cretaceous and was largely complete by the end of the period. South America, Antarctica, and Australia rifted away from Africa (though India and Madagascar remained attached to each other until around 80 million years ago). The South Atlantic and Indian Oceans were newly formed.

This period (and the Mesozoic era as a whole) ended abruptly with a major extinction event, the great Cretaceous catastrophe, probably caused by a massive asteroid landing in the Yucatan which wiped out the terrestrial and marine dinosaurs, heralding in the “Age of mammals” in the ensuing Cenozoic era. Although the freezing temperatures probably returned to normal within decades, dust from the impact would have blocked out sunlight and inhibited photosynthesis while wildfires raged for several years, releasing still more material into the atmosphere.

The following period, the *Paleogene*, is divided into three successive epochs, the Paleocene, the Eocene, and the Oligocene. The immediate aftermath of the Cretaceous catastrophe was cold and dry but the climate quickly warmed again. There was considerable volcanic and tectonic activity resulting in mountain formation throughout the period.

Paleocene

In the rebound from the catastrophe the temperature began to rise again rapidly, with the poles ice-free, and deciduous trees gradually replacing conifers as dense tropical and sub-tropical forests covered the globe. The mammals proliferated, producing forms as diverse as primates and cetaceans (hippopotamus-like future whales). It was also a period of diversification of modern birds following the extinction of the archaic birds of the previous era.

The continents of the Northern Hemisphere were still connected via land bridges, and South America, Antarctica, and Australia had not yet completely separated. The Rocky Mountains were being uplifted, and the Americas had not yet joined up at the isthmus of Panama. The components of the former supercontinent Gondwanaland in the southern hemisphere continued to drift apart, but Antarctica was still connected to South America and Australia. Africa was heading north towards Europe, and the Indian subcontinent towards Asia, which would eventually close the Tethys Ocean. The Indian and Eurasian Plates began colliding sometime during the Paleocene.

The end of the epoch was marked by the Paleocene–Eocene Thermal Maximum, which was a major climatic event whereby vast amounts of carbon were released into the atmosphere, causing a spike in global temperatures.

Eocene

This epoch saw a gradual transition from ‘hothouse’ to ‘coldhouse’ as Europe, Greenland and North America drifted apart, the northern supercontinent of Laurasia beginning to fragment. In Europe, the Tethys Sea finally disappeared, while the uplift of the Alps isolated its final remnant, the Mediterranean, and created another shallow sea with island archipelagos to the north. Though the North Atlantic was opening, a land connection appears to have remained between North America and Europe. Eurasia was separated into three different landmasses, Western Europe, Balkanatolia and Asia. The on-going collision of India with Asia initiated the formation of the Himalayas.

In the early part of the period the warm waters teemed with marine life and deciduous trees covered much of the northern continents. Mammals diversified, producing at first small versions of modern species such as the horse and the elephant, but by the end of the period new megafauna had appeared, including carnivores like the so-called “bear-dogs”. Whales appeared in the oceans.

Oligocene

The climate and vegetation in this epoch was not much different from that of today, but it started out relatively warm. Tropical forest was by now largely replaced by temperate forest and, as the climate cooled, by scrubland, especially in North America.

The sea made inroads into western Europe, and Australia, South America and Antarctica separated further, as did Greenland from North America. Ice sheets developed on Antarctica, now separated from South America, facilitating the establishment of global ocean circulation.

The opening of a passage between Asia and Europe brought Asian fauna like the rhinoceros into Europe, largely driving out the original fauna there (the “Grande Coupure”), while isolated Australia and South America developed their own endemic fauna. Mammals were generally getting smaller again after the Eocene. All modern species, including dogs and bears, were around by now.

The global climate gradually cooled throughout the course of the ensuing period, the Neogene, which was divided into two epochs, the Miocene and the Pliocene. Some significant continental movements took place during this period, which also saw the origin of the apes (Dawkins and Wong 2017:143). The first humans (*Homo habilis*) appeared in Africa near the end of the period.

Miocene

This epoch was at first still somewhat warmer than today but cooled towards the end. Large swathes of grasslands were developing at the expense of the forests. During the early part of the epoch, Afro-Arabia collided with Eurasia, severing the connection between the Mediterranean and Indian Oceans and pushing up the Alps. This allowed a faunal interchange to occur between Eurasia and Africa. During the late Miocene, the connections between the Atlantic and Mediterranean closed, causing the Mediterranean Sea to evaporate nearly completely.

The Indian tectonic plate continued to collide with the Eurasian plate, creating new mountain ranges and uplifting the Tibetan Plateau, resulting in the rain shadowing and aridification of the Asian interior as the Himalayas continued to rise.

Pliocene

At its start this epoch was warmer than today, but it cooled rapidly towards the end, with Greenland for instance becoming glaciated. The land bridge between Siberia and Alaska flooded but then opened again sporadically during this epoch. The joining of North and South America at the Isthmus of Panama late in the Pliocene cut off the warm ocean currents from the Pacific to the Atlantic Ocean, only the Gulf Stream remaining to transfer heat to the Arctic Ocean. The migration of species between North and South America became possible. In Europe woolly mammoths roamed. The Mediterranean had formed again, but was destined to appear and disappear again several times up until recent times.

The climate change that produced more open savanna in Africa may have led to the adaptation to it by early hominids (Dawkins and Wong pp.108–9). *Australopithecus* was present in Africa in the early Pliocene, and it is in this epoch that the earliest stone tools have been found.

The final, Quaternary period, that in which modern man appears, is divided into the Pleistocene and the Holocene, the former dominated by Ice Age conditions, the latter following after the end of the final Ice Age, about 11,700 years ago.

Pleistocene

This epoch lasted from 2.58 million years ago to the end of the final Ice Age (which started about 115 thousand years ago). It was characterized throughout by periods of severe glaciation with sea levels up by 120 metres at the height of glaciation compared to today. There were in all eleven main glacial periods, with interglacial periods of 10 to 15 thousand years between them.

Archaic humans (*Homo erectus*) spread throughout Afro-Asia during the early phases of the Pleistocene. One group, the Neanderthals, became extinct during it, as did much of the existing megafauna – mammoths, mastodons, sabre-toothed cats, etc. *Homo sapiens* developed in Africa some 300 thousand years ago, and began to leave Africa perhaps not long after that, certainly by 130 thousand ago, with some interbreeding with remaining archaic humans in the Middle East. Palaeolithic cultures developed throughout the world, wherever modern man had spread.

Wells (1946: 39) presents a fictional vision of the last Ice Age as follows:

At that time the climate and geography of our world were very different from what they are at the present time. Europe for example was covered with ice reaching as far as the Thames and into Central Germany and Russia; there was no channel separating Britain from France; the Mediterranean and the Red Sea were great valleys, with perhaps a chain of lakes in their deeper portions, and a great inland sea spread from the present Black Sea across South Russia and far into Central Asia. Spain and all of Europe not actually under ice consisted of bleak uplands under a harder climate than that of Labrador, and it was only when North Africa was reached that one would have found a temperate climate. Across the cold steppes of Southern Europe with its sparse arctic vegetation, drifted such hardy creatures as the woolly mammoth and woolly rhinoceros, great oxen and reindeer, no doubt following the vegetation northwards in spring and southward in autumn.

Holocene

As the ice everywhere retreated, the climate steadily rose, with one major short-lived reversal (the Younger Dryas) about 11 to 13 years ago. The Thermal Maximum (above current global temperatures) was reached some nine and a half to five and a half thousand years ago, and the climate has gradually cooled ever since – until very recent times.

The bursting of huge lakes as the ice melted from the northern continents affected both landscape and climate. The land freed from the pressure of the ice in North America and Scandinavia started to rise in isostatic adjustment, a process still continuing today. There were major shifts in the distribution of plants and animals as the forests moved north, bringing new species with them. Eventually man's cultivation of plants, beginning some ten thousand years ago in southern latitudes, was also to spread northwards.

The Beringian land bridge appeared in the period from 25 to 19 thousand years ago when sea levels were at their lowest during the height of the last Ice Age,

and people moved into Alaska from Asia, later moving down through the length of the Americas.

Paleolithic cultures of the Pleistocene were replaced by Mesolithic and Neolithic developments among hunter-gatherers everywhere, and these were to be replaced in turn in Europe and beyond by the historical Bronze and Iron Ages.

Climate change and its result on patterns of human life can be followed in some detail during the Holocene. There were northward migrations of Neolithic people within Siberia and from there into the Americas in the period leading up to the Thermal Maximum (similar movements of people occurred of course also within Europe). These can be traced with greater certainty across Bering Strait and on towards Greenland thanks to extensive archaeological investigations. Let me focus on these, linking up with the description of the contemporary Inuit world in Chapter 5.

The movement of the Arctic Small Tool (AST) people (“Paleo-Eskimos”) out of continental Asia began some five thousand years ago, at the height of the Thermal Maximum. Their spread to the east as far as East Greenland in successive stages was followed two millennia later by the Thule Inuit pursuing the bowhead whale. These movements can be correlated both with climate changes recorded by ice core samples from the Greenland Inland Ice and with historical language relations (as discussed in Fortescue and Vajda 2022). The ice core data from Camp Century on the Greenland Inland Ice, broken down into successive hundred year intervals, is shown in Figure 13 (from Dansgaard 1980).

In Alaska the AST people mainly hunted caribou inland on the tundra, with seasonal sealing camps on the coast. These people soon moved on eastward from Alaska along the Arctic coast of North America in successive pulses of entry into Greenland. These were Independence 1 and 2 in the far north of Pearyland (respectively 2500–2000 BC and 1400–800 BC), and in between them further south on the west coast Saqqaq (2300–1000 BC), then Dorset 1 and 2 (respectively 500–1BC and 700–900 AD). There were marked absences in some areas of Greenland between these phases, when the people either died out or retreated back to the focal region of the Paleo-Eskimos in eastern Canada around Hudson Bay as the climate became harsher. The principal animals hunted during the various phases were: musk ox (Independence I and II); seal and caribou (Saqqaq and Dorset I); and walrus (Dorset II). Independence 1 corresponds to an extended warm period, whereas Independence II was more fluctuating (Petersen and Rix 1982: 96). The final phase of Dorset 2 in northwest Greenland ended as late as 1300 AD, when they were assimilated by the incoming Thule Inuit from the west, who were better equipped technologically for a cooling Arctic existence.

The Neo-Eskimo (Thule) migrations eastward began with the flourishing cultures of the Bering Strait region around 500 BC, which corresponds to the

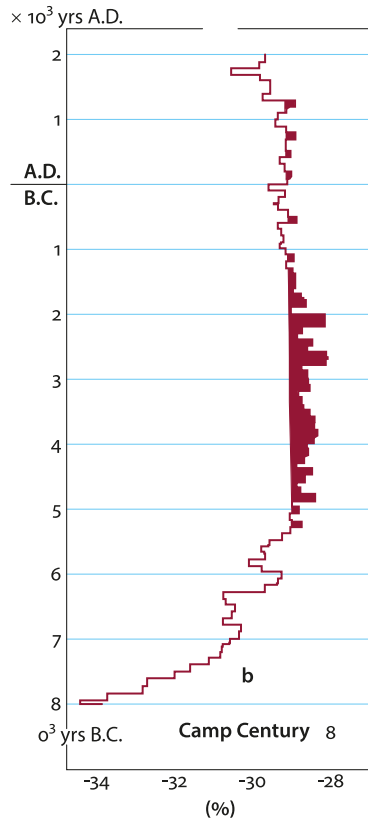


Figure 13. Climate graph for Camp Century, Greenland

last relatively mild peak following the post-glacial maximum. It was here that the adaptations typical of the fully developed Inuit culture took place, with skin boats (kayaks and umiaks), toggling harpoons, polished slate blades and semi-subterranean houses, etc. The Thule migration out of Alaska began around 1000 AD, reaching the north of Greenland around 1200 AD (Gulløv 2012). It may appear paradoxical that the initiation of the migration corresponds to the last short-lived warming peak before the much colder times up until the present, but one must consider that the Inuit were now adapted to marine mammal hunting, and in particular whaling. Their principal subsistence resource was the bow-head whale, whose migration paths were shifting further and further eastward towards the icy waters they are adapted to (Dumond 1977:140). The Inuit were also becoming more and more dependent on ice-hole sealing, which could be severely jeopardized by rising temperatures.

On reaching Greenland the ensuing deterioration in temperature was to result in the main body of Inuit new-comers moving further south along the west coast, eventually reaching warmer coastal regions. Those Thule Inuit who continued on around the north coast to the much less favourable east coast, not warmed by the Gulf Stream, met another fate. Some were to make it all the way down the coast and indeed to make journeys back up the west coast for trade with their by now more sedentary cousins, but they remained essentially sea mammal hunters, as did the Polar Eskimo newcomers from Canada. Those Inuit who remained in the far northeast of Greenland (as observed only once by European sailors) met a more dire fate: unable to survive the continuing climatic deterioration corresponding to the European 'Little Ice Age' from the 16th to the 19th century, they perished leaving only archaeological traces of their presence.

This brings us up to historical times and the meeting (sometimes violent, sometimes peaceful) with Norsemen who had arrived in southern Greenland in Viking times. Owing to climate deterioration, the colonies they established were no longer viable and no further Scandinavian ships arrived in the Norse colonies after 1410, which contributed to their decline and eventual disappearance. They were not re-established until 1721 by the Danish missionaries. Note that when the Norsemen first arrived in the south of Greenland soon after 1000 AD the south of the country was empty, the Inuit having moved north to better ice-hunting conditions during a relatively warm period (the last one appearing on Figure 13). The West Greenlanders ("Kalaallit") would turn eventually from sealing on the ice, which was growing more and more difficult in southwest Greenland, to open water fishing as their main subsistence, as still today.

Meanwhile within Alaska, the expansion of the Neo-Eskimos from the Bering Strait region would have resulted in a continuum of related Yupik dialects all the way from the eastern tip of the tip of Chukotka to the Aleutian peninsula, replacing or merging with earlier peoples of southwest Alaska, and probably forcing the ancestors of modern Aleuts out along the peninsula towards the island chain beyond.

Dumond (1977) has the following remarks to make on climate changes involved in some of these successive movements:

- About 1500 BC, during a cooler and less stable period, AST people moved southwards within Canada when territories suiting the caribou became limited. Thereafter as the climate warmed they moved up again from the south.
- The period of occupation of the High Arctic by Dorset people around 700 BC was a relatively warm one, but this reversed, followed by a withdrawal southwards around 500 BC (p.98).
- The early Paleo-Eskimo Choris culture in southwest Alaska (the predecessor of the longer-lasting Norton culture) developed during a short warmer period.

Deterioration of the climate followed from ca. 700 to 200 BC, with Norton people spreading southwards to the Pacific coast within Alaska (p. 126).

- Shortly before 1000 AD, as temperatures rose, whales, walrus and bearded seals could move over wider migratory paths to summer feeding grounds further east, rendering ice-lead hunting techniques ineffective and inducing Neo-Eskimo sea-mammal hunters to develop open sea hunting techniques (p. 140).
- The Central Eskimos of Arctic Canada were forced into a more mobile way of life hunting smaller game after the whales changed their migration routes during the last few centuries (pp. 25–26)
- Extreme deterioration of the climate in the 16th century extended the pack ice, disrupting animal migration patterns. In the Central Arctic the Inuit gave up their winter houses of stone and turf and moved out onto the sea ice. Here they built domed snow houses to hunt through the ice for ringed seal, moving back to land in the summer, where they led a migratory life hunting caribou and fishing, much as the Dorset people preceding them had done (p. 147).

Throughout the Holocene the surrounding world continued to change for migrating Arctic peoples, necessitating adjustments to new horizons and the developing of new means of exploiting the environment.

To bring this overview of the Earth's Ages up to date, mention must be made of recent proposals for a new epoch: the *Anthropocene*, generally deemed to have started in the mid twentieth century, but perhaps, as some argue, still earlier with the burgeoning of the Industrial Age in Europe. This is defined as the on-going period where human activity has had a significant impact on Earth's geology and ecosystems, including, but not limited to, anthropogenic climate change. The global warming that characterizes this new epoch is felt most acutely in the Arctic regions, affecting the stability of the Inuit world as described in Chapter 5.

Measuring Space, Time and the World

Parallel to the development of expressions for SPACE and TIME in the world's languages is the development of means for measuring these dimensions in the objective world. In early times measurement was in terms of spatial units corresponding to parts of the human body, and to temporal units corresponding to the movement of the sun and moon and of the cycle of the seasons, probably already known to Neolithic megalith builders. Such measures, attested in writing in Ancient Egypt, have persisted up to the present time in many cultures – and with traces still in our own.¹²³ TIME was measured (beyond the alternation of day and night) in terms of the lunar calendar. SPACE was measured on a small scale by various kinds of measuring rods and carpenter's rulers, as well as less readily standardized human feet. The earliest of these standards was a copper rod unearthed from a site of ancient Sumer. Ivory rulers from the Indus Valley civilization are believed to have been used to indicate the standard dimensions of bricks used in their buildings. More recent devices utilized in surveying include levels for measuring height differences and theodolites for measuring angles in the vertical plane. There are devices for measuring angles as well as linear distances. With the introduction of the metric system of measurement in France in 1795 (gradually accepted elsewhere), the standard unit of length became the metre, defined as ten millionth of the distance from the equator to the North Pole along the meridian running through Paris (ca. 40,000 kilometres). It is extendable to area (as square metres) and to volume (as cubic metres). The actual standard “metre bar” was kept in Paris, though the definition of the metre has been adjusted slightly since (most recently in terms of the caesium atom wavelength).

Measuring spatial distance on a global scale was a slower process, culminating in Ancient Greece with attempts to measure the size of the Earth once it was recognized as a sphere. In 240 BC Eratosthenes measured the angle of the sun's rays at midday in two distant locations, Alexandria and (modern) Assuan. On this basis he calculated that the Earth's circumference was 252,000 *stadia*, which

123. The history of these systems and devices is widely available and can be gleaned in greater detail from relevant Wikipedia articles under the following headings: ‘History of measurement’; ‘English units’; ‘History of timekeeping devices’; ‘Ancient Roman units of measurement’; ‘Ancient Egyptian units of measurement’; ‘Maya calendar’; ‘Slavic calendar’; and ‘Earth's circumference’. I merely summarize some of the relevant landmarks here. The etymological information I provide is from the sources cited elsewhere in this book.

is remarkably accurate when compared to the modern measurement through the poles.¹²⁴ It was not until much later in Europe that similar calculations were made – thus in 1617 the Dutch scientist Snellius assessed the circumference of the Earth at 24,630 Roman miles (24,024 statute miles). Around that time British mathematician Edmund Gunter used Snellius's circumference to define a nautical mile as 6,080 feet (one one-sixtieth of one degree of latitude) and introduced a new navigational tool, the quadrant, to determine latitude at sea.

The earliest time-keeping devices were the sundial (the Greek *gnomon*) and the water clock (which leaked at a fixed rate), both in use in Ancient Egypt. The hourglass filled with sand was a later invention, which could be used during travel at sea in conjunction with the compass (as Magellan did). Other methods included the 'candle clock' of Anglo-Saxon times, and the 'incense clock' of ancient China. Mechanical clocks with weights and escapements developed in Europe from the 14th century on, and were much improved with the application of Leonardo da Vinci's idea of the pendulum in Huygens's clock built in 1656. One swing of his "second pendulum" accurately marked for the first time one second (Tycho Brahe in the preceding century had employed seconds and minutes in astronomical usage for the observations of the position of stars). This was checked by correlation with the earth's rotation time. Watches with internal balance springs came later. The word 'watch' comes from OE *wāccan* 'be awake, on the alert'.¹²⁵ Whereas the astrolabe, known since Hellenistic times in Greece, a hand-held 'model of the universe' for calculating astronomical positions, could be used for determining latitude at sea, it was not until Harrison's chronometer in the 18th century, which remained constant during sea voyages, that longitude could also be accurately measured. Electric clocks were introduced in the 19th century and quartz ones in the 1940s. Most recently, atomic clocks, based on the radiation cycles of caesium atoms, has raised the accuracy of these devices to billionths of a second. By contrast, the radial division of the clock face into 360 degrees, still in use, reflects the ancient Sumerian and Babylonian sexagesimal system of fractions. Sixty is the lowest common denominator of 1, 2, 3, 4, 5, and 6, and is easily broken down into fractions. The word 'second' itself is from Latin *secunda* (*minuta*) 'following', referring to the second operation of sexagesimal division.

Today science can not only measure these things with great precision, it is capable of measuring distances out to the farthest reaches of space and to measure

124. There is some slight doubt about the exact size of the *stade*, however.

125. This split into two distinct meanings in the fourteenth to sixteenth centuries, on the one hand referring to the action of waking, keeping vigil, then someone set to do this, and on the other an alarm clock, later the spring-driven time-piece for the pocket. 'Clock' originally meant 'bell', from the Celtic via medieval Latin.

the minutest period of the ticking of atomic clocks. Progress here has been determined by the development of successively more accurate instruments for measuring these dimensions, not least by more and more powerful telescopes. Edwin Hubble, as mentioned in Chapter 14, radicalised astronomy in the 1920s by his discovery of a regular ‘red shift’ in stars and galaxies that are moving away from the Earth, analogous to the Doppler shift in the sound of passing vehicles. From accurate measurements he was able to convert these observations (using the known constant speed of light) into actual spatial distance. In recent decades the increase in depths to which telescopes can reach into SPACE – and hence back in TIME – to close to the Big Bang has been phenomenal. It has also become possible to weigh the Earth accurately (by its gravitational effect on other bodies), namely ca. 6^{24} kilograms, and even to estimate the weight of the entire universe, only a small percentage of which is contributed by ordinary matter, the rest accounted for by mysterious “dark matter” and “dark energy” (Krauss 2012: 36).

Mention should be made of another modern means of measuring time, one relevant to the preceding chapter, namely the Molecular clock, based on extrapolations from the DNA of known species in order to achieve a relative chronological sequencing of species. As Dawkins and Wong describe it (2017: 25): “The method is to count discrepancies in molecular sequences between surviving species. Close cousins with recent common ancestors have fewer discrepancies than distant cousins, the age of the common ancestor being – or so it is hoped – proportional to the number of molecular discrepancies between their two descendants. Then we calculate the arbitrary timescale of the molecular clock, translating it into real years, by using fossils of known date for a few key branch-points where fossils happen to be available.”

17.1 Units of Space

I have already mentioned in 2.2 the origin of the modern term ‘metre’ and its multiple the ‘kilometre’ from IE **mē-* ‘measure’. This is also the root of ‘dimension’, from Latin *dimensiō* ‘extent’ (< *dimētiri* ‘measure out’). Let us go back in time to some earlier measurements for SPACE. Linear measurements in Ancient Egypt were based on body parts, including the foot, the span (between outstretched arms), and the ‘cubit’ (the forearm – from Latin for ‘elbow’). At some point, lengths were standardized by cubit rods, which have been found in the tombs of officials and were apparently used in constructing the pyramids.¹²⁶ Somewhat

126. Note Greek equivalent *kanōn* ‘measuring rod, rule’, which gave the English ecclesiastical term ‘canon’ and derivative ‘canonical’, and Latin *norma* ‘carpenter’s square’ (cf. ‘normal’).

longer ‘royal cubits’ were used for land measures such as for roads and fields. Cubits were divided into ‘palms’ and ‘hands’, each palm was divided into four fingers from left to right, and the fingers were further subdivided. One foot was the equivalent of three hands and fifteen fingers or four palms and sixteen fingers. Surveying was undertaken using rods, poles, and knotted cords of rope. As regards area, the *setat* was the basic unit of land measure, equal to one square *khet*, where a *khet* measured 100 cubits.

The Greeks and Romans appear to have inherited the foot as a measure from the Egyptians. The Greek *stadion* (plural *stadia*), Latin *stadium*, anglicized as ‘stade’, was an ancient Greek unit of length, equal to 600 Greek feet (*podes*). The Roman foot (*pes*) was divided into both 12 *unciae* (“inches”) and 16 ‘digits’.¹²⁷ The Romans also introduced the *mille passus* of 1000 paces or ‘double steps’ (the *passus* equalled five Roman *pedes*). This was of course the source of the English ‘mile’. The Roman mile measuring 5000 *pedes* was introduced into England during the Roman occupation. As regards area, there was (in a second use) the *uncia* of 2,400 square *pedes* (210 square metres), as well as the *pes quadratus*.¹²⁸ Volume was measured by the *amphora quadrantal* or cubic foot.

During the Anglo-Saxon period, the North German foot of 13.2 inches was the nominal basis for other units of linear measurement. The foot was divided into 4 palms or 12 thumbs. Prior to the Anglo-Saxon invasions, the somewhat smaller Roman foot was used and continued to be used in the construction crafts. In the late 13th century, the modern foot was introduced, equal to exactly $^{10}/_{11}$ of an Anglo-Saxon foot, and the yard was defined as three feet, as today. The rod (also called a ‘perch’ or pole) was 15 Anglo-Saxon feet (virtually the same still today). The furlong (literally ‘furrow long’) was – somewhat variably – 40 rods, notionally the distance a plough team could plough without rest, now standardized as 220 yards. The mile was adjusted from (the Roman) 5000 to 5280 feet, but reckoning by the Roman mile of 5,000 feet (or 8 stades) continued, in contrast to other Germanic countries, which adopted the mile for a longer native length, closer to the native ‘league’ (which was three Roman miles, notionally an hour’s march). An acre (from IE **agros* ‘field’) was 160 square rods or 36,000 square Anglo-Saxon feet, though it could vary somewhat from place to place. The hectare of 10,000 square metres (roughly two and a half acres) was a later introduction from the French.

127. The term *uncia* (defined as the length of the thumb) is related to *ūnus* ‘one’ and can refer to more than one basic unit – compare the area sense below.

128. The word ‘area’ has an interesting origin: its source in Latin *ārea* referred to a level ground, an open space, or a threshing floor, as mentioned in 2.1. Compare ‘volume’, via the Old French from Latin *volūmen* ‘roll, book’ (< *volvere* ‘roll’).

Other early units included the ‘barleycorn’ (a third of an inch), the ‘cubit’ (the length of the forearm, ca. two feet), the ‘elne’ or ‘ell’ (from fingertips of an outstretched arm to the opposite shoulder, ca. 4 feet, the term being related to ‘elbow’), the ‘shaftment’ (the width of the hand and outstretched thumb, ca. 6 inches), and the ‘fathom’ (fingertip to fingertip of the outstretched arms), ca. 6 feet. The last of these derives from IE *pot-/pet- as in Latin *patēre* ‘be open’ and Greek *petalos* ‘spreading’. The inch (defined as three barleycorns) derives from Latin *uncia* ‘twelfth part of a foot’ mentioned above – it also produced ‘ounce’ when applied to weight. A yard was originally a pole or staff, i.e. a measuring rod.

Other modern languages that use the metric system today have retained some older items of this kind referable to body measurements, often found in literature, thus Russian has *djujm* (an “inch” of 2.54 cm.),¹²⁹ *veršok* (1¾ inches), *aršin* (28 inches), *sažen’* (7 feet), *versta* (2/3 mile), and *desjatina* (2.7 acres). Japanese has the *sun*, the Japanese inch (a unit of 1.19 inches), the *shaku*, the Japanese foot (ca. 12 inches, a measure of cloth), the *chō* (2.44 miles), and the *tsubo* (6 shaku square, of land or *tatami* mats).¹³⁰

As an example of a set of measures from a hunter-gatherer cultural background, consider the following spatial units in Central Alaskan Yupik (from Jacobson 1984).

cetyaaq ‘inch, minute, any small kind of measure’ (from *ceteq* ‘mark, line’ – note the overlap between spatial and temporal senses here)

patneq ‘the width of 4 fingers of one’s hand’ (from *pateg-* ‘slap’)

tekneg ‘the width of the last section of one’s index finger’ (from *tekeq* ‘index finger’)

yagneq ‘fathom, distance between the ends of one’s arms stretched out in opposite directions’ (from *yagte-* ‘stretch one’s arms, raise one’s hand, fight’)

itegneq ‘foot’ (perhaps a calque from English according to Jacobson p. 177; from *itek* ‘piece of boot over the toes and on top of the foot’, from which also *it’gaq* ‘(anatomical) foot’)

agneq ‘a mile’s distance, a small snowbank, a single stanza of a song’ (from *age-* ‘go from one place to another without crossing an extended obstacle’)

The relationship to body parts of most of these items is evident. The only non-native term is *yaaltaq* ‘yard’, which is from the English.

129. From Dutch *duim* ‘thumb, inch’.

130. The *tatami* itself (from *tatamu* ‘fold’) is a standard unit of flooring in the Japanese house, and rooms are described in terms of the number of *tatami* their floors are covered by (McClure 2000: 294).

17.2 Units of Time

The ancient Egyptian civil calendar was organized according to eras that were reset with the ascension of each new pharaoh, much as calendar time is divided into eras in Japan corresponding to the ruling emperor's reign. It was based on the solar year and was apparently roughly geared to the rising of Sirius in conjunction with the onset of the annual Nile flood. Its year was divided into 3 seasons, 12 months, 36 'decans', or 360 days. The three seasons were Akhet ('flood'), Peret ('growth'), and Shemu or Shomu ('low water' or 'harvest'). The Egyptian months were originally simply numbered within each season but, in later sources, they acquired names from the year's major festivals and the three decans of each one were distinguished as first, middle, and last (compare the Ancient Greeks' division of the month into three 'decades'). The civil calendar was apparently preceded by an observational lunar calendar, which was eventually made 'lunisolar' and fixed to the civil calendar in the 4th century BC. The months of these calendars were known as "temple months". Smaller units of time were vague approximations for most of Egyptian history. Hours were known by a variant of the word for stars and were initially only demarcated at night. They were measured using the stars and water clocks. Equal 24-part divisions of the day were introduced later. Division of the hours into 60 equal minutes is attested by the second century, reflecting the Sumerian/Babylonian sexagesimal system.¹³¹

An earlier Roman calendar was replaced by the Julian calendar in 45 BC, in which an ordinary year is 365 days long, and a leap year is 366 days long. The year was specified by naming the Roman consuls for that year. The Romans grouped days into a nine (actually eight) day cycles called *nūndinae* (from *novem* 'nine'), with every eighth day being a market day. Independent of the *nūndinae*, astrologers kept a seven-day cycle called a *hebdomas*, where each day corresponded to one of the seven classical planets, with the first day of the week being Saturn-day, followed by Sun-day, Moon-day, Mars-day, Mercury-day, Jupiter-day, and lastly Venus-day, terms largely preserved in modern European languages. The Jews used a seven-day week, which began Saturday evening. The seventh day of the week they called Sabbath. Christians followed the Jewish seven-day week (which was to spread throughout Europe), except that they commonly called the first day of the week the *Domenica* or the Lord's Day.¹³² The Romans divided the daytime into twelve *horae* (hours) starting at sunrise and ending at sunset. The night was divided into four watches. The duration of these hours varied with the season. Astrologers divided

131. The Babylonian hour (a double hour) was 1/12 of a whole day, but the equivalent concept borrowed into Greek and Latin was understood as a single hour.

132. But note Russian *nedelja* 'Sunday' (lit. 'no work').

the solar day into 24 equal hours, and these astrological hours became the basis for medieval clocks and our modern 24-hour solar day. Although the division of hours into minutes and seconds did not occur until the Middle Ages, classical astrologers had a *minuta* equal to $1/60$ of a day (24 modern minutes), a *secunda* equal to $1/3600$ of a day (24 modern seconds), and a *tertia* equal to $1/216,000$ of a day (0.4 modern seconds). The source of the term 'second' in the Sumerian/ Babylonian sexagesimal system has already been mentioned. As for the 'minute', this is from Medieval Latin *pars minuta prima* (lit. 'first minute part'), which referred to the one sixtieth of a unit in the same system (cf. *minuere* 'diminish').¹³³ In Europe the earlier lunar calendar was replaced by the more rational solar one in Roman times, and finally corrected in the 16th century to the Gregorian one still in use today. This differs from the Julian calendar in that it skips three leap years every four centuries. In the Middle Ages, the Roman year numbering was changed to the Anno Domini count.

Calendars were by no means limited to Europe and the Middle East. A much more complex calendar system was in fact developed by the Maya of Central America. The Mayan calendar consists of the juxtaposition of a 260-day count known as the 'Tzolk'in', plus a 365-day solar year known as the 'Haab'. This forms a synchronized cycle lasting for 52 Haab', called the 'Calendar Round', still in use by many groups in the Guatemalan highlands. A different calendar was used to track longer periods of time and for the inscription of calendar dates, i.e. identifying when one event occurred in relation to others since some mythological starting-point. This is the 'Long Count' of days.

Elsewhere in the world, the names of months and seasons were largely based on natural phenomena associated with their succession. Thus in Africa the Xhosa seasons and months according to McLaren (1955: 215) are as follows:

January	<i>eyom-Qungu</i> ('month of Tambuki grass')
February	<i>um-Dumba</i> ('swelling grain')
March	<i>eyo-Kwindla</i> ('month of first fruits')
April	<i>u-Tjhaz'impuzi</i> ('withering of pumpkins')
May	<i>eka-Canziŋe</i> ('month of Canopus')
June	<i>eye-Silimela</i> ('month of the Pleiades')
July	<i>eye-Khala</i> ('month of aloes')
August	<i>eye-Thupha</i> ('month of buds')
September	<i>eyom-Sintsi</i> ('month of the Kaffir-tree')
October	<i>eye-Dwara</i> ('month of <i>Senecio latifolius</i> ')
November	<i>eye-Nkanga</i> ('month of <i>Senecio juniperinus</i> ')
December	<i>eyom-Nga</i> ('month of mimosa thorn')

133. Compare Greek *lepto* 'minute' from *leptos* 'thin, slight'.

The distinct seasons are:

Spring	<i>i-Ntlakohlaza</i> ('green points of grass')
Summer	<i>i-Hlobo</i> ('the genial, friendly season')
Autumn	<i>u-Kwindla</i> ('the eating season')
Winter	<i>ubu-Sika</i> ('the cutting or reaping season')

And in the Arctic, Central Alaskan Yupik has the following approximate months, here in the Bristol Bay variants (Jacobson 1984: 670):

January	<i>iralull'er</i> ('the bad month')
February	<i>kanruyauciq</i> (related to <i>kaneq</i> 'frost')
March	<i>kepnerciq</i> ('cutting time?')
April	<i>tengmilirvik</i> ('geese come')
May	<i>kayangut anutiit</i> ('coming of eggs')
June	<i>kaugun</i> ('hitting (of fish)')
July	<i>ingun</i> ('moulting (of birds)')
August	<i>tengun</i> ('flight (of birds)')
September	<i>amirairvik</i> ('caribou shed velvet')
October	<i>qaariitaarvik</i> ('masked festivals')
November	<i>cauyarvik</i> ('time of drumming')
December	<i>uivik</i> ('time of going around')

The seasons are:

Winter	<i>uksuq</i> (also 'year')
Spring	<i>up'nerkaq</i> (cf. <i>upete</i> - 'get ready to go')
Autumn	<i>uksuaq</i> (with affix <i>-aq</i> 'thing resembling' – cf. 'winter' above)
Summer	<i>kiak</i> (from PE *kiðay 'heat')

Calendars based on seasonal phenomena are not unknown in Europe, in particular in older Slavic systems, as preserved for example in Czech:

January	<i>leden</i> (from <i>led</i> 'ice')
February	<i>únor</i> (probably from <i>nořit</i> (<i>se</i>) 'plunge, welter', as the ice welters or writhes under the lake surface)
March	<i>březen</i> (either from <i>bříza</i> 'birch', or from <i>březí</i> 'gravid, with young', as forest animal like hares and rabbits are pregnant at that time)
April	<i>duben</i> (cf. <i>dub</i> 'oak')
May	<i>květen</i> (cf. <i>květ</i> 'blossom')

June	<i>červen</i> (either from <i>červený</i> ‘red’ or <i>červ</i> ‘worm’, both related to fruit)
July	<i>červenec</i> (the same as <i>červen</i> with a diminutive suffix, lit. ‘small <i>červen</i> ’)
August	<i>srpen</i> (cf. <i>srp</i> ‘sickle’)
September	<i>září</i> (Old Czech <i>zářij</i> , from <i>za říje</i> – see <i>říjen</i> below, with <i>za</i> ‘behind?’)
October	<i>říjen</i> (cf. <i>říje</i> ‘rutting’)
November	<i>listopad</i> (lit. ‘leaf falling’)
December	<i>prosinec</i> (probably from <i>prosinalý</i> ‘pallid’, because the sky is usually pallid at this time)

The etymology of basic words for divisions of TIME in English and other European languages is also of interest here (from Buck 1988):

‘season’ (from *IE *sə-* ‘sow’, via OF *seson* and Latin *satiō* ‘sowing time’)
‘week’ (Germanic **wikōn* ‘succession, series’, from IE **wīk-* ‘bend, turn, change’ – cf. German *Wechsel* ‘change’)¹³⁴
‘month’ (derived from ‘moon’, ultimately from IE **mē-* ‘measure’)
‘year’ (from IE **yērō* ‘year, season’, related to **ye-/yō-* ‘go’ – cf. Czech *jaro* ‘spring’; Modern Greek uses *khronos* ‘time’ colloquially also of ‘year’; Latin *annus* is from IE **at-no-* – cf. Sanskrit stem *at-* ‘go’)¹³⁵
‘day’ (the Germanic source is probably related to Lithuanian *dagas* ‘(summer) heat’ from IE **dhegwh-* ‘burn’;¹³⁶ IE **dei-* ‘shine’ produced Latin *diēs*, French *jour* (and *journée* of the passage of a day), and Russian *den’*)
‘night’ (from IE **nokt(i)*, as in most IE languages)
‘morning’ (OE *morgen* – the Germanic term was probably originally ‘morning twilight’, related to Russian *merknot’* ‘grow dark’; Latin had *māne* ‘morning, in the morning’, and derived form *mātūtīnum* ‘early’, source of French *matin*)
‘evening’ (German *Abend*, Danish *aften*, OE *āfen*)¹³⁷
‘hour’ (the relationship to Greek (*h*)*ora* ‘period of time, hour’ was mentioned in 2.2, as was Czech *hodina* from OCS *godŭ* ‘period of time’)

134. The earliest sub-month units among the Indo-Europeans were probably phases of the moon according to Buck (p.1004).

135. Whence French *an* and (of the passage of a whole year) *année*. Russian *leto* ‘summer, year’ is probably related to Irish *lāa/laithe* ‘day’.

136. Note ON *dægr* ‘12 hour period, day or night’ – Danish has *dag* ‘day’ and more specific *døgn* ‘24 hours’.

137. ON had *aptann*, which was longer (from mid-afternoon) than *kveld* ‘evening time’ – related to English ‘quell’.

‘autumn’ (in Latin *autumnus*, which was perhaps of Etruscan origin – American English ‘fall’ is more transparent; German *Herbst*, Danish *høst* is the same as English ‘harvest’ – cf. Latin *carpere* ‘pluck’)

‘summer’ (related to Sanskrit *samā* ‘year, half year, season’; Latin *aestās* – French *été* – is related to *aestus* ‘fire, heat’)

‘winter’ (from IE *wed- ‘wet’; elsewhere from IE *gheim-, e.g. Russian *zima*, Latin *hiems*)

‘spring’ (i.e. plants “springing” into growth; German *Frühling* is from *früh* ‘early’; French *printemps* from Latin *tempus primum*; other words are from IE *wer-/wesr-, as Latin *vēr*, ON *vār*, Russian *vesna*)

It is evident from the above that expressions for units of TIME have everywhere evolved predominantly from (and still reflect) natural phenomena.

Conclusions

We are now ready to bring together the major themes discussed throughout this book and present some general conclusions integrating the perspective of the objective world described by Science with that of subjectively experienced worlds. The conceptual diagram in Figure 14 illustrates the overall relationship of SPACE and TIME that can be abstracted from the wealth of individual words and their meanings that have been the subject of earlier chapters of the book. It applies both to objective (World 1) and subjective (World 2) SPACE and TIME. This relationship, note, is not one of the subordination of TIME to SPACE, but rather of parallelism and overlap. SPACE and TIME display other parallel distinctions, notably that of relative vs. absolute, respectively within positions in space or points in time, i.e. whether anchored in Ego's here and now or not. They both share a further possibility of being nested, i.e. contained within larger spatial regions or temporal cycles – spaces within spaces or cycles within cycles.¹³⁸ The principal difference between them is that SPACE has two extra dimensions (belonging under 'region' on the diagram). Both 2D and 3D spaces may be empty (though bounded) or to some degree filled. The temporal equivalent of a region, a sequence, may also be more or less filled with divisions and cycles within it. 'Interval' is equally applicable to SPACE and TIME, and is what relates them at the higher level which I label 'Space-time'. This term is applied here not to Einstein's cosmological concept, but to the intimate interrelation of SPACE and TIME in human experience, including when as yet "unwrapped" by young infants.

One linguistic generalization that immediately suggests itself as regards the representation of these concepts in individual languages is this: if a language has words for abstract SPACE and TIME, it will also have words for the measurable spatiotemporal dimensions at the lowest level in Figure 14, but not necessarily *vice versa*. Words applicable to distinctions at the lower level may "drift upwards" in the course of their history and general cultural setting towards more inclusive, higher meanings – at least to the level of finite/ bounded SPACE and TIME respectively. We have seen examples of this upward drift of individual word meanings even within Indo-European languages that have developed fully abstract words for SPACE and TIME. Meanings that also embrace unbounded SPACE and TIME

138. Recall Barsalou's hierarchical "world model" containing spatial frames within frames, as mentioned in the Introduction.

may only have emerged in relatively recent times with philosophical and scientific thought. Or so it would seem. What I am suggesting is that this overall conceptual schema reflects in a top-down manner stages both in modern man's conceptual (not linguistic!) development and in the ontological growth of spatial and temporal awareness in the individual infant. The undivided stage labelled 'Space-time' at the top reflects a time when the spatiotemporal WORLD was experienced by the individual as the limits of how far one could get by moving around in familiar SPACE, and TIME was how prolonged an effort was required to get to some goal within it. Corresponding lexical distinctions would have evolved in the reverse, bottom-up direction in individual languages. The evidence we have seen from languages lacking abstract words for SPACE and TIME – and in the historical origins of words in languages that do have them today – all suggests that a conceptual grasp of the intertwining and parallelism of SPACE and TIME may have been in place long before abstract words for these concepts could emerge.

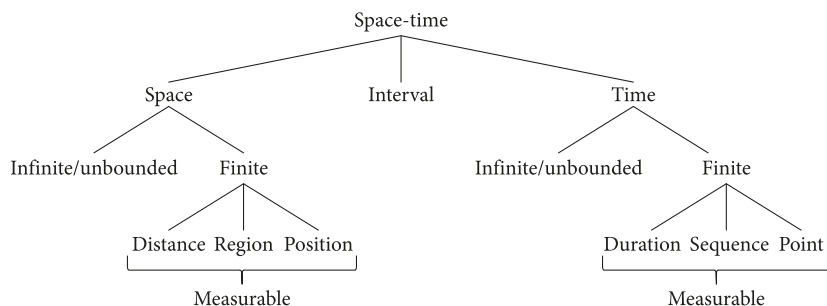


Figure 14. Space/Time parallels

Words for TIME and SPACE in the hunter-gatherers' languages that we have looked at reflect pre-scientific, "naïve" conceptions in everyday use rather than generalized abstractions. In fact the words referring to the generalized abstractions in English are only abstract in the Abstract₂ sense that I discussed in Chapter 11, i.e. maximally generalized. They are not Abstract₁, i.e. 'far from sensory reality' – both SPACE and TIME are tangible aspects of sensorimotor experience, if not ones that are easily amenable to labelling. It is a general paucity of Abstract₂ words that characterizes hunter-gatherer languages, not of Abstract₁ ones. It is well known, for example, that Inuit traditionally lack generalized words for 'snow' and for 'seal', while possessing a good many specific words for them, but they also possess numerous words for social and behavioural abstractions like any language. As regards TIME, people must from early times have recognized durations (long or short) and cycles/sequences (seasons, time of the day, etc.). Likewise, early conceptions of SPACE must have covered a variety of familiar places,

including hollow spaces like rooms. Words for (the) WORLD in their basic, non-figurative sense, defining the maximal framework of what is known or known about, must have extended from the start outwards, from reference to the familiar territory one lives in to the vague, boundless beyond. Such words may indeed be abstract in the Abstract₂ sense, but they do not necessarily extend all the way to an absolute or total universe in all languages in the way SPACE and TIME words may extend to absolute TIME or SPACE in English. In pre-scientific cultures corresponding words are variably bound by the limits of personal and cultural experience, as for instance when the Inuit word *nuna* refers to various aspects of their world, including the totality of all the land known by the tribe, thus *numarsuaq* ‘great *nuna*’, as described in Chapter 5. In modern times these can be aligned with globally shared knowledge of the actual extent of the universe, just as native terms can be aligned with modern senses of generalized TIME and SPACE words in the languages of technologically advanced civilization.

If the partial overlap of the meanings of words for TIME and SPACE that we have observed in a wide variety of languages can be related to an initial undifferentiated experience of Space-time, it is not unexpected that the conceptual overlap should have persisted to some degree, occupying the speculations of philosophers through the ages, to emerge finally in more sophisticated garb in the contemporary cosmological conception of Space-time.¹³⁹ This is best seen in words for ‘interval’, which refer to either SPACE or TIME. The overlap in their extension would seem to constitute a natural starting point for an intellectual leap from the experiential world to relativistic Space-time – recall from 2.1 that an ‘interval’ presupposes a continuum that has been interrupted, whether spatial or temporal, and consider again the natural judging of the distance to a goal in terms either of time taken or of space traversed. The use of words for spatial distance like ‘far’ and ‘long’ also for temporal distance must be approaching universal. Thus (almost at random) Latin has *longē* ‘far off, for a great while’ (as well as *longinquitās* ‘distance, duration’), Danish has *ffjern* ‘distant’ (of a place or a time), Mandarin has *yuǎn* and Japanese *tōi* ‘far’ (in space or time), Yoruba has *jìnnà* ‘far’ (of space or time), Chukchi has *n-ure-qin* ‘far’ (of space or time), and Koyukon has stem *naat* ‘be far way, be a long time’. It is surely not necessary to invoke metaphor from the domain of SPACE to that of TIME when judging the distance to a place is already tantamount to judging how long it would take to get there. There is entanglement in experience from the start.

The overall picture can be schematized by the interlocking circles in Figure 15 referring to subjective TIME and SPACE, where successively more inclusive stages

139. Sacks explicitly compares the warping of the experience of SPACE and TIME in his Parkinsonian patients to the modern notion of flexible Space-time (Sacks 2012: 339ff.).

of grasping the framework of the WORLD by an experiencer can be envisaged as expanding out from the two smaller circles within it. These indicate the universal starting points of Ego's durational here and now. Of course this is all highly schematized – WORLD in particular covers a juxtaposition of a number of different worlds besides the spatiotemporal setting at different levels of scope, notably the overlapping social groupings in which the experiencer participates. It is not limited to reflecting the 'real' external world either, but represents the whole conceptual world of the experiencer, only a fraction of which will be available to consciousness at any one time. I would suggest that the two inner circles of the figure can in fact be understood as starting out completely merged, just as the infant's earliest egocentric world conflates them. One can envisage the separate SPACE and TIME 'bubbles' as not yet separated out for the neonate. The progression is from a purely egocentric perspective to an increasingly allocentric one.

As the child's initially restricted concept of the WORLD expands outwards to embrace a wealth of adult experience so do the concepts of SPACE and TIME develop, differentiated into specific concepts of temporal durations, points and sequences (cycles), and of spatial distances, regions, and positions. Reflecting this, words for the more tangible and useful of these concepts would have emerged in all languages, and expressions for 'interval' would have developed corresponding to a suspension of either a spatial or a temporal continuum (as indicated by the overlap of the two cognitive circles). Words referring to the WORLD would have distinguished at an early stage between those referring to the sky (and the weather, both intangible) and those referring to the land/earth (tangible), a distinction surely made by all languages. More general words for WORLD (or 'universe') may indeed, as we have seen in Chapter 3, develop from those for either 'sky' or 'land'.

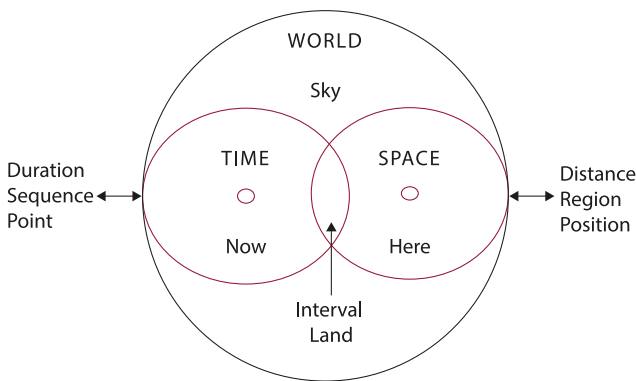


Figure 15. The subjective relationship between Time, Space and World

How does this relate to Popper's three worlds? I think it is quite straightforward: subjective/egocentric TIME and SPACE belong to his World 2, and objective TIME and SPACE to his material World 1, but the former is embedded in – and dependent on – the latter (as the inner experience of material bodies). Not only World 1 and World 2 but also World 3 objects (artefacts, ideas) have their own temporal and spatial dimensions, embedded or encoded as they are in objective World 1 – they have temporal duration from their initial “birth” in individual brains and hands to their “death” when culturally forgotten. They also display fluctuating spatial distribution amongst human populations. Philosophy and Science have over the millennia attempted to develop an understanding of objective (World 1) SPACE and TIME through the creation of World 3 concepts corresponding to them. These take us beyond World 2 subjective experience, but must nevertheless account for it.

Languages differ as to how far they have reached towards fully generalized and separated concepts of TIME and SPACE, but all of them contain words for the starting point of here and now. English, like other ‘sophisticated’ European languages, maintains a whole range of stages in the polysemy of its SPACE and TIME words, from the here-and-now senses of the specious present and the experiencer's immediate surroundings up to the absolute abstractions of mathematics and physics, but it still clearly distinguishes ‘here’ from ‘now’. Other languages display overlapping ‘here’ and ‘now’ words, like Yidiny *bidi* ‘near, just now’, and Koyukon *doogh hu* ‘about this time, around here’ (based on *daa* ‘this way’). Likewise Amondawa *awo* and Yukaghir *id'i* ‘here, now’ and Samoan *nei* ‘this, now’, and note also Cora *áhna* ‘at that place/at that time’. The common Eskimoan ‘near speaker’ demonstrative stem *mað- occurs in both ‘here’ and ‘now’ words, for instance WG *maani* ‘here’ (locative case) vs. *manna* ‘now’ (aequalis case); CAY also has deictic form *maa-i* ‘now’. Similarly in Aleut, where cognate *uda* is ‘now, around here, nowadays’. From another demonstrative root (Proto-Eskimo *uv- ‘close to speaker’), CAY has *wa* ‘here, now’, and deictic correlate *way*. Note also in American Sign Language the rather similar iconic signs for HERE and NOW, respectively the two palms held upwards and circling simultaneously to the left and right for HERE, expressing ‘what is before one’; and both hand placed in front of one palms up, fingers bent upwards, then dropping slightly for NOW, expressing ‘the time immediately before one’ (Riekehof 1963). What is experienced by the individual speaker, whatever language they speak, is presumably a succession of unfolding events and continuing states anchored in their present situation, some involving the body, others more peripheral, accessed through the distal senses, and this represents the universal source of words for here and now. The meaning of many of these expressions have spread to ‘recently in the past’ or ‘soon in the

future', or to a vague 'nowadays'.¹⁴⁰ Words for both 'here' and 'now' are contextually variable in their extension, from the specious present to a broad geo-historical perspective as in 'England here and now'.

Throughout this book I have stressed (in agreement with Evans 2013) that the relationship of overlap between words for TIME and SPACE is not simply to be explained as a matter of metaphor from the domain of SPACE to the domain of TIME. Such metaphors are indeed widespread, notably with the temporal use of spatial prepositions/ postpositions like 'on' (the wall or Thursday) or 'after' (the town hall or next week). In fact TIME is not strictly a 'domain' at all until it is measured or compared, and hence abstracted and spatialized (compare the words for TIME based on root *mē- 'measure' in 2.2.). In itself it reflects the causal dynamic behind all successive events and actions in SPACE. Recognition of the intertwined nature of TIME and SPACE is not a new thing in history but has deep roots in the very nature of the human condition. The specific metaphoric extension of spatial expressions to temporal meanings may only have emerged with methods of linear measurement and flourished with sophisticated linguistic usage. SPACE is not *prior* to TIME. No language has dedicated words for spatial but not temporal relations. But the experience of motion, combining SPACE and TIME, is deeper than either measurement or language. This is no doubt the origin of Lakoff's (1993) conceptual metaphor TIME PASSING IS MOTION OVER A LANDSCAPE. Notice that this does not equate time directly with space, it equates it with motion, which by necessity must take place within a spatial framework. But deeper still is the specious present of experienced duration, as introduced in Chapter 4: it is not limited to motion.

Whichever way one looks at it, being in the specious present, the individual's here-and-now, must surely be the starting point for the imprinting in memory of episodic sequences, in turn the precondition for the emergence of words referring to concepts of both TIME and SPACE. The specious present is not static, it is intrinsically the focus of becoming, of potential movement through TIME and SPACE – and it is indeed movement that creates them for the individual. SPACE and TIME are both essentially defined by movement. Just as the world of the infant is at first created by moving around in his or her immediate surroundings, then gradually expands through exploration to the whole of the dwelling he or she lives in, then to the ambient environment beyond, and finally to the entire territory known to the tribe, language too has evolved to match expanding spatial horizons that can be moved around within. Only in near-historical times has this been extended –

140. Words for 'now' in most IE languages include derivatives of *nū, related to *newo 'new', as in Latin *nunc*, Russian *nyne* (colloquial *nynče*), German *nun*, as well as English 'now'. Languages may have more than one term for 'now' – see Gladkova (2012: 181–4) as regards subtle distinctions of usage between *sejčas*, *teper'* and *nynče* in Russian.

depending on cultural development – to notions of lands with borders, countries and to the whole planet, through cartographical maps and recorded history, forming the preconditions for purely abstract notions of SPACE and TIME.

Words for WORLD are also abstractions, whether they refer to the ‘world as we know it’, ‘the world we were brought up in’, ‘the animal world’, ‘the world of television’, or ‘the New World’. These specific usages all highlight certain features of historical, geographical, biological or technological reality under a unitary concept in order to talk about them at all and to which we assign characteristic qualities. Words like ‘world’, it is important to stress, do not just refer to a spatiotemporal framework: they refer to the *contents* of such a framework, quintessentially living, active contents. They take up a level of abstraction somewhere between that of individual kinds of phenomena and that of completely generalized notions such as SPACE and TIME, much as a zoo is intermediate between individual species of animals within it and the generalized concept of the Animal World. That is why ‘world’ is not really a suitable word to refer to the purely spatial universe or cosmos (or to purely temporal eternity for that matter), despite Collins definition (5) in Chapter 3 (“the universe or cosmos, everything in existence”). Nor is it suitable for describing an artificial satellite. But it *is* suitable for referring to the Earth as a planetary globe, which includes life on or near its surface (and potentially on any other planet).

Not all the languages I have presented have words for abstract SPACE and TIME (notably not the pre-literate ones), but they all have verbs or affixes meaning ‘become’, as well as verbs for movement. In some languages they are not distinguished from those meaning ‘be’ (thus Hindi, Old Church Slavonic, Turkish, Xhosa, and Indonesian in 7.1). It is surely no coincidence that the source of ‘be’ in English is IE **bhū-*, originally meaning ‘become’ (thus Sanskrit *bhuvana* in 3.1), and that the source of ‘exist’ is literally ‘step forth’ in Latin. Distinct conceptualizations of BEING in SPACE and TIME would, it seems reasonable to suppose, have arisen from an earlier undifferentiated sense of BEING IN THE WORLD, i.e. of Becoming in a three-dimensional environment, equivalent to being within an evolving here-and-now. And, as the etymology of the English word indicates, ‘becoming’ is motion, TIME being experienced as a form of coming. This of course is not to say that all words for Being derive from a diachronic source meaning ‘become’ (which is patently not the case), but only that they all presuppose awareness of the specious present, which is itself minimally extensive in SPACE and TIME, and from which all subsequent concepts of (the) WORLD and action within it can be projected.

The WORLD as experienced by the individual is an internalized representation of the spatiotemporal environment, a four-dimensional framework within which experience plays out. Culture, mediated principally by language, speaks to us of

what we cannot directly experience. Older words referring to partial aspects of SPACE and/or TIME have had to keep up with expanding knowledge in the modern era by developing new, extended meanings, although, as we have seen, they may still betray their pre-scientific sources etymologically, reflecting meanings that resemble those of young children and/or pre-literate societies. The *complete* separation of the concepts of TIME and SPACE represents at all events a feat of abstraction that surely could not have come about without language. Many languages today still reflect an earlier stage of only partial separation of the two concepts, arguably from before metaphor began to dominate linguistic expressions of their relationship. One might add that it took the genius of an Einstein to recombine them in scientific terms.

But what of words for WORLD itself? As we have seen in 3.2 they cover a range of senses. In Appendix 3 I have attempted a very tentative taxonomy of the referents of these words. What is the most basic of them, and what is the relation of the other senses to it? It will have become apparent throughout this book that there is no firm ground here, no basic sense of 'world' from which the others are related figuratively from some core. Consider once again the definitions given in Chapter 3 of 'world' in English:

- (1) the earth as a planet, esp. including its inhabitants; (2) mankind, the human race; (3) people generally, the public ("in the eyes of the world"); (4) social or public life ("to go out into the world"); (5) the universe or cosmos, everything in existence; (6) a complex united whole regarded as resembling the universe; (7) any star or planet (esp. one that might be inhabited); (8) a section or division of the earth, its history, or its inhabitants ("the Ancient World", "the Western World", "the Third World"); (9) an area, sphere or realm considered as a complete environment ("the animal world"); (10) any field of activity or way of life or those involved in it ("the world of television"); (11) a period or state of existence ("the next world"); (12) the total circumstances and experience of an individual that makes up his life, esp. that part of it relating to happiness ("you have shattered my world"); (13) a large amount, number or distance ("worlds apart"); (14) worldly or secular life, ways or people.

Sense (1), for instance, which requires the definite article, cannot be the basis of sense (2), (3) or (4): human society in no way resembles a spherical planet even if the concept of the planet Earth *includes* its inhabitants. Nor does the universe as a whole resemble a planet. And in what way do the further, more amorphous senses of 'world' resemble the universe (sense (6))? Clearly there is something common in the vague notion of a framework in which human activity and development takes place, whether this concerns the individual, the group, or the whole of mankind. There are multiple possible perspectives here, just as there are multiple perspectives on the same global reality according to cul-

ture and language. Generalized words for *WORLD* are abstractions across all such perspectives. There are figurative uses of such words in which the viewpoint of the individual experiencer is replaced by that of others, typically some group or population of individuals, as in senses (4) and (10) above. Though they may be purely fictitious (or even counterfactual), they always presuppose some experiencing – albeit ideal – subject, and share the coherence and boundedness of the individual's experience of his or her own world. However, I would hesitate to call the relationship 'metaphorical', i.e. as extended from one 'domain' to another. It is as much a matter of different subjects/experiencers as of different domains, however defined. Such a displaced world may well be part of the same overall domain, but in a relationship of containment within it, as in the 'world of tennis', which is peripherally at least (through the 'world of television') ingredient in my own experiential world. More fundamental here is Langacker's distinction between 'basic' and 'interpreted' (conceptually defined) experience mentioned in Chapter 7.

Rather than apply a procrustean approach in order to relate all the meanings of 'world' to a single basic meaning, I would suggest that the root of all such perspectives is to be found in the minimal experience ('basic' in Langacker's pre-conceptual sense) of *BEING IN THE WORLD* (or, rather, *BEING IN A WORLD*), as experienced by the young infant. It is this that expands as the infant grows and when a word relating to it is acquired from the adult language, that can be applied to a variety of perspectives on contexts that can be referred to as wholes, eventually reaching far beyond the bounds of an individual's experience. When the word is learnt, Collins sense (1) may well be a late comer, with sense (3) being more basic – it is after all the one most used by the adults around the child in expressions amongst themselves like 'the world at large' or 'what's the world coming to?', referring, that is, to people, not to the planet as such. Also the names of programs heard on radio or seen on television (like "The World Today") could be assimilated early on in life, without any real understanding of what the word refers to beyond somewhere vaguely 'out there'. It may not be until attending infant school that he or she will learn about the world as a planet and the different countries and people living on it. There is not much scope for metaphor here, though the child will soon enough come across idiomatic uses of the word as given in 3.2, in which the literal meaning is no longer relevant.

Words like English 'world' are abstractions in the sense of generalized even in their most basic uses, and the most that can be said of the inter-relationship between their varied senses is that it is one of family resemblance. They all refer to an encompassing spatiotemporal framework and some kind of characteristic activity or category of animate – quintessentially human – beings within it. This includes, crucially, what the child brings into the adult world from their earliest

experiences of moving, sensing, and feeling in their immediate environment. So when we talk of ‘moving between two worlds’ we are referring to shifting from one four-dimensional frame of reference to another. However, unlike words referring to generalized three-dimensional SPACE the reality behind words referring to WORLD, however generalized or specific, is never completely static – it includes after all the transient dimension of TIME. The exact boundaries of what we refer to as a ‘world’ are largely a matter of convention. A ‘world’ presupposes a content, and contents, even at the galactic level, are always in flux. The role of language is to provide convenient ways of framing, referring to, contextualizing, and discussing such complex, shifting content *as if* it were a matter of manipulable things.

Within every individual there are multiple personal worlds, both realistic and imaginary, which can be awakened at different times and in different circumstances, as was evident in an extreme form amongst Sacks’s post-encephalitic Parkinsonian patients (Sacks 2012: 261–2). There is by contrast just one overall shared objective world, albeit one containing multiple eras and open to a multitude of different perspectives. Some of these personal worlds are ‘at home’ in the objective world and are smoothly compatible with external circumstances – in particular those of a social nature, interlocking with those of one’s fellows. Others, in varying degrees pathological, are not.

The essential distinction within personally experienced worlds is between those of an egocentric nature and those of an allocentric nature, as reflected in the distinction between the corresponding FoRs and in the two types of memory structures generated by the hippocampus, as mentioned in Chapter 10.1. Neither the contents of episodic or semantic memory, both extensive and complex, can be experienced holistically, only piecemeal. However, they can be referred to by language, in particular by words for SPACE, TIME and WORLD (including those for ‘Nature’ and ‘universe’). It is thanks to language, as passed down through the generations (and to a lesser degree through the visual arts), that a spatiotemporal conceptual framework is available at all. A language contains its own implicit philosophy, including its own cosmology, however vague and under-determined. Language both liberates the human imagination and at the same time confines its expression within a mould, although the reference of its terms can be continually adjusted to our expanding understanding of the objective world.

Abbreviations

ALLAT	allative	NWT	Northwest Territories
ASL	American Sign Language	OCS	Old Church Slavonic
AUG	augment quantity	OE	Old English
CAY	Central Alaskan Yupik	OHG	Old High German
CONT1	Contemporative 1	ON	Old Norse
CSY	Central Siberian Yupik	PASS	passive
CV	converb	PE	Proto-Eskimo
DIST	distal from X	PERF	Perfect
DUR	durative	PERFTV	Perfective
ECI	Eastern Canadian Inuktitut	PERI	periphery
EXT	extensive	PL	Plural
IE	Indo-European	REFL	Reflexive
IND	Indicative	S	subject
LOC	locative	SG	Singular
MED	medial distance	UNSPEC.S	unspecified subject
NAI	North Alaskan Inuit	VERT	vertical
NML	nominalization	WG	West Greenlandic
N.REP	reported narrative		

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Appendices

APPENDIX 1

Words for Sky, Air, and Weather

There are numerous words for 'sky', 'air' and 'weather' mentioned in Chapter 3. These meanings often overlap and are often difficult to tease apart. Here are some further examples. Greek *ouranos* 'sky' is probably from IE *wer- 'cover', whereas Latin *cælum* 'sky, weather' (the source of French *ciel* 'sky, heaven') is probably related to OHG *heitar* 'bright', ON *heið* 'bright sky' according to Buck (1988: 52–53). Russian *nebo* 'sky, heaven' is related to Irish *neamh* 'heaven', Hittite *nepis* 'sky', and Greek *nephos* 'cloud', perhaps from an IE root *nem- 'bend' according to Buck. The modern Irish for 'sky' is *speir* (also 'sphere, atmosphere'), related to Greek *sphaira* 'ball'. Classical Greek also had *aithir* 'sky, weather', in Homer 'upper air, ether' (cf. *aithrios* 'clear, bright'), with words for good and bad weather but no general term (compare modern *kairos* under TIME words in 2.2). It had *aer* 'air, lower atmosphere' (in Homer 'thick air, haze', later just one of the four "elements"), borrowed into Latin and – via Old French – English 'air'.¹⁴¹ Czech has *obloha* 'sky' (= Russian *obloko* 'cloud') beside *nebe* going with the Russian above. English 'sky' is from the Old Norse, originally 'cloud', whereas 'heaven' (like German *Himmel* 'sky, heaven') is probably related to Greek *kamara* 'vault, covering'. There is a link here to Old Persian *asman* 'sky' and Sanskrit *açman* 'stone, cloud', the connection apparently being the notion of the 'stone vault of heaven'.¹⁴² Sanskrit also has *div-* 'sky' from IE *dei- < *dei- 'shine', like Latin *deus* 'god'. German *Luft* 'air, atmosphere, breeze, breath' has developed from common Germanic *luftjan/luftuz 'sky, air', related to English 'lift' – from an earlier 'ceiling' sense, as still preserved in English 'loft' (Buck p. 64).

Other Indo-European 'weather' words include German *Wetter* (English 'weather') and Czech *povětrí* 'weather, air, storm', cognate with English 'wind' (like Russian *veter*, Latin *ventus* and Sanskrit *vāta-* 'wind, air', all from IE *wē- 'blow'). Slavic 'weather' words are more generally related to 'time' words, thus Polish *čas*, Czech *počasí* (cf. Russian *čas* 'time'), and Russian *pogoda* 'weather'

141. From IE *wē- 'blow' like Sanskrit *vē-* according to Buck (p. 63), but alternatively perhaps from IE *wer- 'raise', as in Watkins (1985). Note also related *aura* 'breath, vapour'. Buck claims that the connection between air and breath was a late development (though recognized by the Greeks), but note the close connection in some non-European languages.

142. It is interesting to note that according to Piaget very young children (from 2 to 6) tend to explain the sky as a solid arch made of stone, whereas slightly older ones see it as made up of cloud (Piaget 1929: 288–9).

from OCS *godŭ* ‘point in time, suitable time’. Compare Latin *tempestās* ‘tempest’ from *tempus* ‘time’. Russian also has *vozdux* ‘air’ from *voz-* ‘up’ plus *dux* ‘spirit’ (cf. *duša* ‘breath’ – OCS *duchŭ*). Baltic languages are idiosyncratic here: Lithuanian has *oras* ‘open field, outdoors’ as well as ‘air’ (probably from *arti* ‘to plow’), and Latvian has *gaiss* ‘bright’ as well as ‘air’.

Beyond Indo-European, Finnish has *taivas* ‘sky’ (borrowed from IE **deiw-* above) but native *sää* ‘weather’ and *ilma* ‘air, weather, wind’. Mandarin Chinese has *tiānqì* ‘weather’ (lit. ‘breath of heaven’), containing *tiān* ‘sky’, and Japanese has *tenki* ‘weather’ from the Chinese, but native *sora* ‘sky’. Arabic has *taqs* ‘weather’ and *sama:ʔ* ‘sky’ (but *janna* ‘heaven’ in the religious sense), also *hawa:ʔ* ‘air’. Turkish has *gök* ‘sky’ and *hava* ‘weather, air’ (from the Arabic, like Hindi *hava* ‘air’). Thai has *a-gad* ‘weather, air’ and *tongfa* ‘sky’. West Greenlandic has *qilak* ‘sky’ (PE **qilay*) – *sila* ‘weather, outside’ and its Aleut cognate was mentioned in 3.1, as was Chukchi equivalent *ŋaryənen*. Note WG *silaaanaq* ‘air’ (lit. ‘just *sila*’) – *sila* on its own can mean ‘air’ in other Inuit dialects. Eastern Aleut has *ini-X*, Atkan *inka-X* ‘sky, heaven, air’ (in the plural ‘clouds’), from *inka-* ‘hang’, related to PE **ini-* ‘hang out to dry’. Atkan also has *anġi-X* ‘air’ (in all Aleut ‘breath, spirit, soul’). Chukchi has *jʔiq* ‘sky, heavens’ (also *iʔin*, apparently contaminated with *jʔən* ‘cloud’), also *wəjin* ‘air, steam from breathing out in the cold’ (cf. *wəjənto* ‘breathe’). Ket has *es* ‘sky, weather, God’ besides *i* ‘air’, and Nenets has *num* ‘sky, weather’, besides *ind* ‘breath, air, steam from breath’. Nivkh has *tlə* ‘sky, weather’, also *ləx* ‘weather, rain’, *la* ‘weather, wind’, and *tʔaf* ‘air’ (from *tʔa-* ‘breathe’). Koyukon has *yo* ‘sky, heaven, atmosphere’ (with no general word for ‘weather’, only cold or hot weather). It also has *doyeets* ‘breath, air’ (lit. ‘orifice breath’ from *yeets* ‘breath, spirit, soul’). Nuuchahnulth has *hinaayit* ‘sky’ (with affix *-ayit* ‘in the sky’ on “empty” root *hin-*), but no general ‘weather’ term (only terms for bad or calm weather). It does have *yuuʔi* ‘air, north wind’ (and affix *-api* ‘in the air’). Nahuatl has *ilhuicatl* ‘sky, heavens’ (cf. *ilhuitl* ‘day’). Dzongkha has *nam* ‘sky, heaven’. Kwaza has *hanāwā*, ‘sky, heaven, cloud’, also ‘heavenly body’ and ‘year’ (*-nāwā* is a sky classifier which occurs in combination with *-rjŷ* ‘area’ in *-rjŷwā* – referring to the weather – van der Voort pers. comm.). Yoruba has *òrun* ‘sky, other world’. Xhosa has *isi-baka-baka* ‘sky, firmament’, but also *i-zulu* ‘the sky, heaven’.

Of interest here are words like English ‘climate’ (via the French and Latin), from Greek *klima* ‘inclination, region’, which are found in all European languages today. The earlier sense in English was ‘belt of the earth’s surface between two parallels of latitude’, today ‘long-term prevalent weather conditions of an area’. The Greek word derives from *klinein* ‘lean, slope’ – related to ‘climax’ (from Greek *klimax* ‘ladder’). ‘Climate’ can be regarded as a generalization (Abstract₂) over different seasons of weather in a given region, much as ‘space’ and ‘time’ are generalizations. It is thus unlikely to be found in pre-literate societies, and this is indeed

the case. In a language like WG there is no distinction between *silā* as ‘weather’ or (today) as ‘climate’. The concept is by contrast found in long-standing literate societies outside of Europe such as Mandarin *qìhòu* ‘climate, weather, situation, atmosphere’, and Japanese equivalent *kikō*.

The ASL sign for SKY or HEAVENS is graphically expressed by a sweeping motion with the open left hand to the right above eye level, indicating the broad expanse of the skies (Riekehof 1963:75) – a deictic gesture rather than strictly iconic?

APPENDIX 2

Words for being and becoming in non-IE languages

Finnish: *ole-* ‘be’ (existential or locative senses, also ‘there is/are’ and ‘have’ with the adessive case); *tule-* ‘come, become’

Turkish: *ol-* ‘be, exist, become, happen’ (and 3sg present ending *-dir* can function as an optional copula – it can also have inferential meaning; it derives apparently from an earlier posture verb meaning ‘stand’ acc. Pustet 2003: 57)

Arabic: *yu:jadu* ‘exist’; copula *yakunu* ‘be’ (not used in present tense); *yušbiḥu* ‘become’

Tamil: *iru* ‘be’ (usually omitted in the present); *aaku* ‘become’

Abkhaz: *-q’a-* ‘be’ (defining, equational, or locational – not used with adjectives, and elsewhere optional); *-a-* ‘be’ (identifying – Hewitt 1979: 46); *-xa-* ‘become’ (also *-q’a-* + *-la-* ‘move into, become’)

Mandarin Chinese: *shì* ‘be (so)’; *zài* ‘be in, at, exist, be alive’; *yǒu* ‘there is, have’; *chéngwéi* or *biàncéng* ‘become’ (followed by noun), and *biàn(de)* (followed by adjectival expression)

Japanese: *da* ‘be’ (equational or before adjective, etc.); *iru/oru* ‘be (at), exist’ (animates) and *aru* ‘be (inanimate object), also ‘there is/are’; *naru* ‘become’

Thai: *pen* ‘be’ (originally ‘be alive’ acc. Pustet 2003: 54); *glai**pen* ‘become’ (perhaps from *glai* ‘distant’ plus *pen*); *yu* ‘be at, exist, live at, stay’

Indonesian: *ada* ‘be, exist, have, be present’; *menjadi* ‘be, become (with adj.)’ (*jadi* is ‘become, happen, so’)

Samoaan: *iai* ‘exist, be present, live at’ (lit. ‘(in)to there’, from *i-* ‘locative’ and *ai* ‘anaphoric’); *avea* ‘become’ (lit. ‘take-ergative’), also *fai* ‘do, become’ (with a predicative noun)

Evenki: *bi-mī* ‘be (at)’ (also definitional, classifying and ‘there are’); *ō-mī* ‘become (s.th.), make, create, come about’

Nenets: *ŋe-s* ‘be (s.th.), there is, be (somewhere)’ (of inanimate objects); *me-s* ‘be (somewhere)’ (of animates); *xe-s* ‘become’

West Greenlandic: *it-* (as in *-miit-*) ‘be (at a place)’ (also with some adverbial expressions of manner); *-nngu-* ‘be’ and (derived from it) *-nngor-* ‘become’, also *-li-* ‘become’ on qualitative stems; deictic *tassa* ‘there’ in equational constructions; *-qar-* ‘have, there is’¹⁴³

Aleut: *a-/u-* ‘be’ (cognate of WG *-nngu-*); *haqa-* ‘come, become’ (also *hit-* ‘come out, appear’ with transitivized empty stem *hi-*, cognate of WG *pi-*, in reflexive use ‘become’)

Chukchi: *it-* ‘be, do, happen, act (thus)’, and *itə-lʔən* ‘existing’; *(t)va-* ‘be (somewhere), live, exist’; *nʔel-* and *tomyat-* ‘become’ (and *-tvi-* ‘become’ on adjectival stems)

Ket: *qan-* ‘be’; *bataq* ‘become (s.th.)’ (and *bimba* ‘pass, become’)

Nivkh: *hum-d-* ‘be (somewhere), live, exist’ (also as progressive auxiliary and as nominal ‘life’); *fi-/pi-* ‘be (place)’; *(j)iv-* ‘have, exist’; *mu-d-* ‘become (s.th.)’; *ha-d-* ‘be or do such’; affix *-m-* ‘be or live at’

Yukaghir: *lʔə-/lʔej* ‘be, exist (somewhere)’; *(ŋ)o-* ‘be (s.th.)’ (Kolyma – Tundra has *pan-/ban-*, which is a nominal expletive subject ‘thing’ in Kolyma); *lʔi-* ‘have’; *kude-* ‘become, turn into’

Koyukon: *-laa* ‘be, exist, be in a state’ (and *P+e...laa* ‘become, turn into’); *-tʔaa* ‘be thus (in such circumstances, position, shape or manner)’; and all the classificatory roots of being and handling objects of different shape/texture: *-ʔ* (compact), *-ton* (rigid or – with *-t-* prefix – enclosed object), *-kkaatl* (bag, container of), *-koot* (flat, flexible), *-nokk* (granular), *-dzok* (multiple disordered uncontained objects), *-tlaakk* (viscous, mushy), *-kko* (in shallow container), *-koot* (food stored away), *-de+tʔtʔo* (burning object, light), *-lo* (plural objects); transitional prefix *ee-* + D classifier ‘changing, becoming’

Nahuatl: *cā* ‘be (somewhere)’ (in present nouns or adjectives alone can be predicates; in the past preterit form of verb *cā* (*catca*) used); *mocuepa* ‘become’ (lit. ‘be turned (reflexive)’ – Launey 2011: 334)

Cree: *ih̄tā-* ‘be at’ (and cf. *ih̄tāwin* ‘village’); nominalizing affix *-iw-* ‘be’ with nouns (classifying), and *-istaw-* ‘become’ (e.g. angry)

Quechua: *kay* ‘be’ (as Spanish *ser*, also ‘have, this’ – note *kaypi* ‘here’); *-yay* ‘become, get’

143. Note also “empty” stem *pi-* ‘be, say, do, etc.’

Dzongkha: *'ing* and *'immä* 'be', both copulas of identity, location or quality, but the former of immediate, personal knowledge and the latter acquired knowledge (van Driem 1998: 125ff) – in attributive use *'ing/'immä* is of a factual situation, as it is in combination *yöp 'ing* 'be situated'; *yö* and *dû* 'be' in existential, locational and attributive uses – the distinction between them is the same as between the preceding pair;¹⁴⁴ *yâ* 'become' is the suppletive perfective form of *jo/song* 'go, become' (van Driem p.280)

Yoruba: *ní* 'in, at, be, have' (also a focus marker); *yà* 'turn aside, become'

Xhosa: *ukuba* 'be, become' (and the present tense of intransitive quality verbs often has a 'become' sense – McLaren 1955:85); pronominal prefixes generally used as copulas, agreeing with the class of the noun complement (in adjectival function)¹⁴⁵ (McLaren p.157); *ukuthi* 'be, say or do so'

Yidiny: *wuna-n* 'lie, be, exist, live at, sleep' (existential or with adjective, but no verbal copula); *dana-n* 'stand, be' of vertical objects rather (Dixon 1977:500); *-daga-n* 'inchoative, become'

Tariana: *alia* 'exist, there is'; *-dia-* 'become'

Kalam: *md-* 'be, exist, stay, live, be at, be alive' (also of extended action); *ay-* 'become, (cause to) become stable' (and 'put, form, put in order, turn into, be affected by visible or stable condition'); also *g-* 'do, make, function, happen' is sometimes used in copula function as in *kls g-* 'be strong'; and note *pag-* 'be in disturbed or broken condition' (Pawley 1987:337ff)

144. They can also be used as 'have' with a dative possessor.

145. Also the locative form of nouns or adverbs of place takes a pronominal prefix as copula (McLaren p.163).

APPENDIX 3

A tentative taxonomy of worlds

In the table below I present a tentative taxonomy of worlds, aligning the wFoRs proposed in Chapter 8 with Popper’s three worlds and the Collins definitions of ‘world’ given in Chapter 3. The examples given all meet my criteria of “world-hood” by being (at least by implication) four-dimensional (spatiotemporal) in essence and construed as finite wholes (although this is largely illusory, reflecting the enforced parcelling of phenomena by linguistic labels). It will be seen that I have split Collins definition (12) (“the total circumstances and experience of an individual that makes up his life, esp. that part of it relating to happiness”) into two parts, as in Chapter 4 in connection with Table 1.

A tentative taxonomy of worlds

Popper’s worlds	wFoRs	Collins definitions	Example worlds
W1 (objective)	whole planet	(1), (2), (7)	planet Earth; life on Earth; Mars
	lifespan of species (or parts thereof)	(8), (9)	The Ancient World; the Age of the Dinosaur; the Bronze Age; the Greek world; the natural world
	a man’s lifetime circumstances	(12a), (14)	the world we all live in; Chaucer’s world; worldly life
W2 (subjective)	one’s world model	(12b)	one’s own world; a dream world; one’s home; one’s memories
W3 (artifacts/memes)	(figurative/ fictitious extensions)	(4), (10), (6)	“The Lost World”; “Middle-earth”; “The “Cherry Orchard”; the Next World; the world of television

I have left out several of the Collins definitions here as too problematical. Thus (3) referring to “people generally” is difficult to distinguish from (2). (5) “The universe or cosmos” does not refer to a unitary, finite world like a planet but is a theoretical framework containing all such worlds – it is an abstraction while a planet is a material entity. (11) “A period or state of existence” is really covered by (8). (13) “A large number or distance” (extending also to “of high value”) is clearly figurative (going with the idioms given under 3.2) but is far removed from the

more transparent meanings I have concentrated on here. I have also not added examples of geological Ages that do not necessarily refer to the life within them (e.g. The Ice Age).

Popper's World 3 artefacts cover both material cultural objects (e.g. a book – such as this one – plus the meaning of its contents) and abstract memes manifest in language and mathematics. The term 'meme' itself covers both ideational structures created by man and those discovered and "read" from Nature. I have included the hypothetical Next World, which presents the irreducible paradox of an afterlife that is both active (with harp-strumming angels or dancing houris) and at the same time somehow 'eternal'. I could have added the Quantum world as a further example of a meme. This undoubtedly reflects a proven level of reality, but is in itself just a theory worked out in the minds of physicists (and resident there and in their writings). I have discussed in 3.3 the vague and overlapping nature of worlds or ages reflecting the wFoR of "the lifespan of species (or parts thereof)" – these can actually be regarded as memes imposed upon reality, but there is nevertheless a reality behind them, and it is to this I am referring here, not to the labels as such. It is not unreasonable, as a matter of fact, to regard words and whole languages themselves as memes.

Subject index

A

absolute frames of reference 1–2,
39, 75–76, 89, 91, 104
absolute space 3, 6, 152, 154
absolute time 6, 35, 157
abstract₁ and abstract₂ 117–118,
121, 152, 187–188
abstract words 19, 117–118, 187
affordances 107, 121, 138, 154
Aleut orientation 86–87
allocentric frames of reference 1,
102–103, 109, 189
Ancient Egypt 176–178
Anglo-Saxon measurements
179–180
animism 108–110, 144, 150, 155
Anthropocene 175
arrow of time 91, 159
artefacts 91, 109, 135, 137, 143, 190
Asian views of nature 155–156
aspect 55–62, 91, 94, 98, 122
auditory space 37–38
Aymara orientation 96–97

B

being in the world 69, 194
binding 102, 104

C

cardinal frames of reference 51,
75–76, 91–92, 99
child's concept of world 107–110,
189
Chukchi orientation 46, 85–86,
96
circadian rhythms 2, 104
clocks 35, 106, 177–178
coastal orientation 51, 75–81, 89
cognitive underpinnings 33, 107,
142
conceived time 105
conceptual blending 64, 119
conceptual metaphors 2, 9,
35–36, 64, 95
consciousness 36, 103–107

Cora orientation 55–56, 61–62
cosmology 42, 147–154, 160
cycles 2, 91, 104, 181, 186–189

D

dark matter 160
deep time 32, 153, 156, 161
definitions of 'land' 22
definitions of 'place' 9
definitions of 'space' 6
definitions of 'time' 6
definitions of 'world' 21
deixis 50–53, 55
dimensions 21, 24, 65, 91, 94, 152,
178, 195
domains 2, 95, 191, 194
dreams 142
duration 150, 153, 189–191

E

egocentric frames of reference 1,
92, 102, 109, 190
élan vital 153, 155
elementary particles 159
entropy 159
episodic memory 102–104, 107,
195
evolution 147, 153, 161
extrinsic frames of reference 20,
39, 55

F

fictional worlds 114–115, 119–120,
123–132
fictive scanning 105
figurative uses 7–9, 11, 15–16, 194
films 143
fire and water conflation 79–81
frame semantics 64–65

G

Gaia 23, 139–140
galaxy 157, 160
geocentric frames of reference
102

generalized words for space, time
and world 11, 20, 187–188,
194–195
geological eras 161–163
global warming 175
globe 144–145, 192
gravity 152, 158–159
Greek atomists 149–150
Greenland 40, 47–49, 172–174

H

heliocentric view of the world
149, 151
Heraclites 149
hierarchical organisation 105,
186
hippocampus 104
Holocene 171–172, 175
house walls 76–81
hunter-gatherers 41, 75, 79,
146–147, 172, 180, 187

I

Ice Age 171
Iceland 87–89
Igloodik 41–43, 84, 146
interval 3, 13, 186, 188–189
intrinsic frames of reference 1,
39, 81, 91–92, 98–99
Inuit orientation 40–41, 76–79,
82–85

K

Kwak'wala orientation 80–82

L

landmarks 75–76, 84–85, 91–93
locational expressions 51–63

M

maps 85, 104, 111–114, 144–146
mathematics 135, 150, 152, 217
Mayan calendar 182
memes 144, 156, 216–217
mental spaces 54, 64, 119

microcosm vs. macrocosm 41,
75, 78–82, 90
Middle Ages 41, 149–151
metaphor 35–36, 62, 105–106,
117–118, 121, 191
metonymy 36, 138
migration 172–173
mirror neurons 109
motion metaphors 35–36

N

names of months 93, 181–184
names of seasons 93–94, 183
Nature 109, 147, 150–156
neurology 103–105
Nivkh orientation 52–53, 79–80
nomads 85
North Pacific Rim 91, 98
nuna 43–46
Nuuchahnulth orientation 53–54

O

organism 148, 151–152, 155
overlap of time and space words
13–18, 186–191

P

pacha 19, 26, 32
Paleo-Eskimos 172
perception 104–106, 118, 142,
153–154
perceptual symbols 116, 120
personal time 19, 107
perspective 102–103, 123, 132, 189
planet 27–28, 99, 139–141

planisphere 146–147
play worlds 109
Polar Eskimos 47–49
processing time 105
primordial event 104
pygmies 38

Q

qualia 38, 138
quantum theory 154, 158–159, 217

R

relative frames of reference 1, 91
Relativity 7, 152, 154, 157–158
riverine orientation 51, 75, 77,
79–80
Roman calendar 181
Roman measurements 179,
181–182

S

schemas 36, 107, 117
semantic map 33–34
semplates 90, 95–96
sensorimotor experience 103, 187
sensorimotor stage 107–108
sequential frames of reference
20, 39, 55
sequential scanning 105
sexagesimal system 177, 181–182
sign language 7, 30–31, 70, 92,
190, 212
simulation 103, 106, 120–121
situation model 117
social worlds 38

Space-time 19, 106, 154, 157–159,
186–188
spatial frames of reference 1, 4,
75, 91–92, 99
specious present 36, 106, 190–192
stars 41–42, 85, 146, 156–160
subjective time 35, 188, 190

T

temporal frames of reference 1,
39, 91–99
tense 53–63
time expressed as space 2, 62, 105

V

Vancouver Island 80–81, 91

W

way of life 33, 71, 136–138
words for Earth 3, 27–31
words for ‘the future’ and ‘the
past’ 19–20, 93, 95–98
words for Ages 31–32
words for cardinal directions 1,
87–89
world frames of reference 2, 38,
99
world model 2, 99, 111, 134, 186,
216
world of the deaf-blind 38, 115
worlds-within-worlds 132, 134

Z

Zeno’s paradoxes 149–150, 154

Name index

A

Aikhenvald, A. 12
 Alexander, S. 153
 Anaximander 144–146, 148
 Aristotle 23, 109, 120, 149–152

B

Baddeley, A. 103, 105
 Barsalou, I. 2, 111, 116–120, 186
 Barsalou, I. & K. Wiemer-
 Hastings 118
 Bergen, B. K. 120–121
 Bergsland, K. 87
 Bergson, H. 107, 153
 Boas, F. 80–81
 Bogoraz, V. G. 85
 Bohnmeyer, J. & C. O'Meara
 92–93
 Bohr, N. 158
 Briggs, J. L. 47
 Bruno, G. 151–152
 Buck, C. D. 3, 10, 14–15, 20–21,
 24, 28, 32, 45, 66, 69–70, 74,
 184, 210
 Burenhult, N. & S. C. Levinson
 90
 Buzsáki, Gy. 104–105

C

Casad, E. H. 36, 54, 62
 Chekhov, A. 123, 133
 Collingwood, R. G. 147, 153
 Copernicus 146
 Crick, F. 104, 106
 Crick, F. & Ch. Koch 106–107
 Croft, W. 33

D

Dahl, Ö. 50
 Dansgaard, W. 172
 Darwin, C. 147–148, 153, 157, 161
 Dawkins, R. 141
 Dawkins, R. & Y. Wong 161–162,
 166, 169–170, 178
 Descartes, R. 151

van Dijk, T. A. & W. Kintsch 117
 Dik, S. 65
 Dixon, R. M. W. 19, 26, 215
 van Driem, G. 19, 215
 Dumond, D. E. 173–174
 Dunn, M. J. 58

E

Edelman, G. 105–107, 114
 Einarsson, S. 87–89
 Einstein, A. 157–159, 186
 Engberg-Pedersen, E. 92
 Escher, M. C. 135, 138
 Euclid 158
 Evans, V. 1–2, 36, 91–94, 98,
 103–104, 120, 191

F

Fauconnier, G. 119
 Fauconnier, G. & E. Sweetser 64,
 119
 Fauconnier, G. & M. Turner 119
 Ferstl, E. C. et al. 117
 Fillmore, C. J. 64
 Fillmore, C. J. & C. Baker 65
 Foley, W. A. 51, 62
 Fortescue, M. & E. Vajda 172
 Forward, R. L. 140

G

Gabbard, C. 109
 Gad, F. 41
 Gagné, R. 85
 Galileo, G. 146, 151
 Gauss, C. F. 158
 Georgakopoulos, Th. et al. 3
 Georgakopoulos, Th. & S. Polis 3
 Gernsbacher, M. A. 117
 Gibson, J. J. 107, 138, 154
 Gladkova, A. 191
 Globus, G. 142, 156
 Gruzdeva, E. 79
 Gubser, N. 40
 Gulløv, H., Ch. 173
 Gumperz, J. J. & S. C. Levinson 1

H

Haldane, J. B. S. 156
 Harrison, J. 177
 Haspelmath, M. 33
 Haugen, E. 87, 89
 Hawkins, S. 159
 Hegel, G. W. P. 153
 Heine, B. & T. Kuteva 66
 Heisenberg, W. 158
 Heraclites 149
 Heydt-Coca, M. von der 19
 Hjelmlev, L. 33
 Hobbes, T. 151
 Holtved, E. 48
 Hooke, R. 151
 Hubble, E. 159, 161, 178
 Husserl, E. G. 142
 Hutton, J. 153
 Huygens, Ch. 177

J

Jacobson, S. A. 51–52, 76–77, 180,
 183
 James, W. 36, 107, 154
 Jetté, J. & E. Jones 25
 Jochelson, V. 146
 Johnson-Laird, P. 116–117

K

Kant, E. 102, 152–153
 Keller, H. 38, 115–116
 Kerr, N. et al. 115
 Kintsch, W. 117
 Kosslyn, S. M. et al. 106, 115
 Krauss, L. M. 178
 Krejnovič, E. A. 90
 Krušanova, A. I. 27

L

Lakoff, G. 35, 191
 Lakoff, G. & M. Johnson 35
 Lakoff, G. & R. E. Núñez 152
 Langacker, R. 2, 9, 32, 39, 50, 64,
 105
 Lantis, M. 41

Leibnitz, G. W. 106, 152–153
Lem, S. 142–143
Levinson, S. C. 1, 3, 12, 35, 50–51,
75–76, 87, 90, 92, 94, 152, 154
Lovelock, J. 139–140

M

MacDonald, J. 40–43, 84
MacWhinney, B. 1, 102
Magee, B. 155
Majid, A. M. et al. 75
Mattissen, J. 52–53, 60
McLaren, J. 182, 215
Meillet, A. 65
Moore, K. E. 96

N

Nakayama, T. 60
Newton, I. 152, 157
Núñez, R. E. & E. Sweetser 35,
96–97

O

O'Brien, F. 119

P

Parmenides 149
Pawley, A. 215
Petersen, R. & L. Rix 48, 172
Piaget, J. 26, 108–110, 142, 148,
150, 210

Planck, M. 158
Plato 150–151
Pöppel, E. 104
Popper, K. 135, 138, 142, 144,
154–156, 190, 216–217
Pratchett, T. & S. Baxter 140
Pustet, R. 213
Pythagoras 148, 150–151

R

Rasmussen, K. 47
Riekehof, L. L. 7, 30, 190, 212
Rousseau, J.-J. 151
Russell, B. 146, 149
Russell, J. & J. Davies 102

S

Sacks, O. 38, 106–107, 188, 195
Salamon, J. 52
Sapir, E. & M. Swadesh 53
Savaljeva, V.N. & Č.M. Taksami
79
Shternberg, L. Ja. 25
Snellius, W. 177
Spalding, A. 41
Spink, J. & D. W. Moodie 146
Spinoza, B. 29, 152
Stapledon, O. 141, 143
Swift, J. 132, 135–136

T

Talmy, L. 63, 119
Tellenback, H. & B. Kimura 155
Tenbrink, T. 2
Tu, Wei-Ming 155
Turnbull, C. M. 38
Turner, L. M. 40

V

Vajda, E. & H. Werner 18, 26
van der Voort, H. 12, 18, 72, 211
Vygotsky, L. S. 108

W

Waters, F. 32
Watkins, C. 11, 14–15, 24, 66,
69–70, 210
Wells, H. G. 132–134, 171
Whitehead, A. N. 154–155, 158
Whorf, B. L. 1
Wilkins, D. P. 73
Wittgenstein, L. 154

Y

Yu, N. 98

Z

Zeilich-Jensen, L. 40, 43
Zeno 149–150, 154

Language index

(Only for fuller mentions, not all single word citations)

A

Aleut 18, 26–27, 45–46, 86–87,
211, 214
American Sign Language (ASL)
7, 30, 70, 212
Amondawa 17, 190
Ancient Egyptian 17, 181
Aymara 26, 96–97

C

Central Alaskan Yupik 26, 44,
51–52, 77–79, 96–97, 146, 190
Chukchi 27, 46–47, 58–59, 74,
85–86, 96–97, 211, 214
Cora 54, 161–162
Czech 15, 183–184

D

Danish 11, 14, 24, 67, 70, 122, 184
Danish Sign Language 92
Dzongkha 19, 68, 215

F

Finnish 12, 25, 72
French 10–11, 15–16, 22–23, 29,
65, 67, 70, 72, 80, 184–185

G

German 11, 13–14, 16, 23–24,
28–30, 32, 67, 69–70, 72, 185,
210
Greek 10–11, 13–15, 22–24, 28, 66,
69–70, 72, 74, 184, 210–211

Guugu Yimithirr 51, 102

H

Haida 89
Hopi 1

I

Icelandic 14, 87–88

J

Japanese 12–13, 17, 67, 71, 135–136,
155–156, 180, 213

K

Kalam 67–68, 215
Ket 12, 18, 25–26
Koyukon 18, 25, 68, 72, 94, 190,
211, 214
Kwak'wala 81–82, 98
Kwaza 12, 72, 211

L

Latin 10, 13–15, 22–24, 31–32, 37,
66–67, 70, 74, 80, 105, 177–178,
182, 184–185, 210–211

M

Mandarin Chinese 12, 17, 25, 32,
57–58, 67, 72, 98, 213
Mparntwe Arrernte 51, 73

N

Nahuatl 19, 25, 67, 214

Nivkh 12, 25, 52–53, 60, 79–80,
95, 214

North Alaskan Inuit (Inupiaq)
50, 78

Nuuchahnulth 25, 53–54, 82, 94,
98, 211

O

Old English 14, 28, 32, 72–73

Q

Quechua 19, 26, 32

R

Russian 11, 14, 24, 27, 32, 37, 67,
70, 180, 184, 191, 210

T

Tariana 12

W

West Greenlandic 12, 17–18, 26,
37, 44, 49, 51–52, 72, 99, 190,
214

X

Xhosa 26, 68, 182–183, 215

Y

Yidiny 19, 26, 190, 215
Yucatec 93
Yukaghir 25

Although major cognitively based studies of SPACE and TIME in language have appeared in terms of "Frames of Reference", these do not extend to a wide selection of the world's languages, nor do they combine SPACE and TIME in the overarching concept of WORLD, which has its own corresponding frames of reference. The aim of relating and unifying these concepts and their expression across languages constitutes the unique thrust of the present book, which will represent a significant extension of earlier approaches. Among its main conclusions will be that the complete separation of terms for SPACE and TIME is a relatively recent cultural phenomenon, rather than just a metaphorical extension of the latter from the former. The book will be of interest to all students and practitioners of Linguistics, in particular Cognitive Linguistics and Linguistic typology, but also to a more general readership interested in the historical evolution of concepts of SPACE and TIME.

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