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Contact and semantic shift in extreme language endangerment

Ahtna riverine directionals in a cardinal world*

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This paper examines the effects of contact with English on the directional system of Ahtna, an endangered Athabascan language of Alaska. The Ahtna directionals reference direction and location in the geographic landscape, but contact with the dominant English system is causing changes in lexicon and possibly the replacement of the entire semantic basis of directional reckoning in Ahtna. I present conversational evidence showing that the conflation of the Ahtna concept of *upriver* with the English concept of *north* is leading to the breakdown of the entire Ahtna cognitive directional basis. Although Ahtna is so endangered that we are not likely to witness the full replacement of its directional system, we can still see the processes of contact-induced change at work.

Keywords: Ahtna; directionals; endangerment; contact

1. Introduction

Contact between languages can lead not only to structural and lexical change, but can also cause change in speakers' cognition of the surrounding world. The wholesale replacement of cognition – not just of lexicon or grammar – is especially likely in cases of extreme language endangerment, when speakers are more likely to replace the endangered cognitive system with that of the dominant language, rather than just map borrowed terms onto the native system.

In this paper I examine the effects of contact with English on the directional system of Ahtna, a highly endangered Athabascan language spoken by fewer than fifty

* I wish to thank Marianne Mithun, Sandra A. Thompson, Patricia Clancy, Jim Kari, Markle Pete, and two anonymous reviewers for their invaluable help with this paper; all errors are mine alone. An earlier version of the work here appeared in Berez 2011a.

elderly people in south central Alaska. The Ahtna directionals are a lexical class used to describe and reference direction and location in the geographic landscape, but as we shall see, contact with the dominant English directional system – that is, the cardinal *north-south-east-west* system – is causing not only changes in lexicon, but also what appears to be the replacement of the entire semantic basis for directional reckoning in Ahtna. I present detailed conversational evidence from my fieldwork that shows that the conflation of the Ahtna concept of *upriver* with the English concept of *north* is leading to the breakdown of the entire Ahtna cognitive directional basis. Although Ahtna is so endangered that we are not likely to witness the full replacement of the directional system in that language, we can still see the processes of contact-induced change at work.

In Section 2, I introduce the Ahtna directional system, including the morphology of the lexical class, its riverine semantic basis, and some basic cognitive principles of the system. Section 3 acquaints the reader with the geography of Ahtna territory, which is crucial to understanding the signs of contact-based changes in the directional system. These are presented in Section 4, along with a close, line-by-line discussion of the conversational data. Section 5 contains concluding remarks.

2. The Ahtna directionals

2.1 Morphology of the directionals

Like other Athabascan languages, Ahtna has a separate lexical class of directionals. Kari (1985, 1990, 2008, 2010) analyzes the Ahtna directionals as having a tripartite morphemic structure: a stem expressing orientation (a system that is largely, but not completely, riverine), an optional prefix expressing relative distance or concepts like ‘straight’, ‘adjacent to’, etc., and an optional suffix that expresses either a punctual vs. areal distinction or an allative vs. ablative distinction (see Kari 1985, 1990, 2008, 2010; Leer 1989; Moore & Tlen 2007). This structure is shown in Table 1.

Directionals can appear either as unaffixed stems, or as affixed forms – with considerable morphophonemics, as is typical of Athabascan polysynthesis. Examples of affixed directionals are given in (1).

- | | | |
|-----|--------------------------|-------------------------|
| (1) | Affixed directionals | |
| | ’udaa’a | ’utsene |
| | DIST.downriver.ALL | DIST.downland.ALL |
| | ‘to distantly downriver’ | ‘to distantly downland’ |
| | nanii | nanaa |
| | MED.upriver.PUNC | MED.across |
| | ‘intermediately upriver’ | ‘intermediately across’ |

Table 1. Tripartite morphemic structure of Ahtna directionals (from Kari 1990)¹

Prefixes	Stems	Suffixes
<i>da-</i> PROX	<i>nae</i> 'upriver, behind'	<i>-e</i> ALL
<i>na-</i> MED	<i>daa</i> 'downriver'	<i>-dze</i> ABL
<i>'u-</i> DIST	<i>ngge</i> 'from water, upland'	<i>-t</i> PUNC
<i>ts'i-</i> 'straight, directly'	<i>tse</i> 'toward water, lowland'	<i>-xu</i> AREA
<i>ka-</i> 'adjacent'	<i>naan</i> 'across'	
<i>P+gha-</i> 'from P'	<i>tgge</i> 'up vertically'	
<i>n-</i> 'neutral'	<i>igge</i> 'down vertically'	
<i>hw-</i> AREA	<i>'an</i> 'away, off'	
	<i>nse</i> 'ahead'	

<i>'unggat</i> DIST.upland.PUNC 'a point distantly upland'	<i>niidze</i> upriver.ABL 'from upriver'
<i>'unuuxe</i> DIST.upriver.AREA 'a general area distantly upriver'	<i>'utsiit</i> DIST.downland.PUNC 'a point distantly downland'
<i>'uyggu</i> DIST.down.AREA 'a general area distantly vertically down'	<i>dan'e</i> upriver.ALL 'to near upriver'
<i>nangu'</i> MED.upland.AREA 'a general area intermediately upland'	<i>dunse'</i> PROX.ahead 'near ahead'

An example of the use of directionals in spontaneous narrative is shown in (2). Note that the speaker uses three variations built on the stem *ngge* 'upland'.

1. Because of the fusional nature of polysynthesis in Ahtna, I do not give morphemic parses for directionals throughout this paper. Instead, the reader may refer to the glosses to interpret the morphology of the directionals; glosses are consistently given for all morphemes present, even when it is not possible to indicate morpheme boundaries. Abbreviations used in this chapter are as follows: ABAN = abandoned word, ABL = ablative, ADJACENT = adjacent, ADVZ = adverbializer, ALL = allative, AREA = area, CPT = compact, DEM = demonstrative, DIST = distal, EMPH = emphatic, FOC = focus, HES = hesitation word, INCEP = inceptive, INDF = indefinite, IPFV = imperfective, ITER = iterative, MED = medial, NH = non-human, OBJ = object, PERAMB = perambulative, PFV = perfective, PL = plural, POSS = possessor, PROX = proximal, PUNC = punctual, REL = relativizer, SG = singular, SBJ = subject, SP/TMP = spatial and temporal, TERMIN = terminative.

- (2) Directionals in use²
- 01 KJ; Yihwts'en xona **danggeh** ta,
DEM.AREA.from then **PROX.upland.ALL** among
- 02 c'ena,
stream
- 03-04 ngge' ta kets'edel dze' yi ya
upland among 1PL.SBJ.GO.IPFV.against.a.place thus there
- xungge'**, kecdilaa de.
ADJACENT.upland they.have.names SP/TMP.ADVZ
- 'From there in the uplands, as we go on upland, and there are names in the upland there.'
- ((Katie John, *Natael Nenn* 'The Batzulnetas Country', 07:21.186–07:31.430. Kari 2010: 84))

2.2 Semantics of the directional stems

The directional system is largely riverine; that is, the frame of reference of the system is based on the orientation of the flow of a river of some cultural and cognitive importance (see Kari 1985, 1990, 2008, 2010; Leer 1989). Kari (2010: 130) points out that the stems exist in orthogonally oppositional pairs (across::across (i.e., in both directions), upriver::downriver, upland::downland, up (vertically)::down (vertically)); see also Leer 1989 for Na-Dene). The directionals can also be used to describe indoor locations and for some objects with intrinsic fronts and backs, like large game animals, rifles, etc.³ Figure 1 shows a schematic representation of the stems given in Table 1.

2.3 Absolute frame of reference and Major River Orientation

Levinson 2003, which is to date the most thorough typological treatment of the expression of spatial cognition in language, is useful here for sorting out notions of *frames of reference*, i.e., the reference points upon which linguistic coordinate systems are based. Levinson describes three types of frames of reference: *intrinsic*, *relative*, and *absolute*. Like the English cardinal system, the Ahtna directional system is an absolute system, meaning that orientation is determined by a feature of the larger environment, in this case, the direction of flow of the local river.

Unlike the English cardinal directional system, however, the Ahtna riverine terms do not maintain a constant mapping to fixed bearings. Where the English system bases the main axis of the north-east-south-west on a single polar constant ('north') from

2. See the Appendix for information about the discourse transcription system and conventions used in this paper.

3. See Berez (2011a, 2014) and Berez-Kroeker (to appear) for other uses of the directionals, including discourse uses.

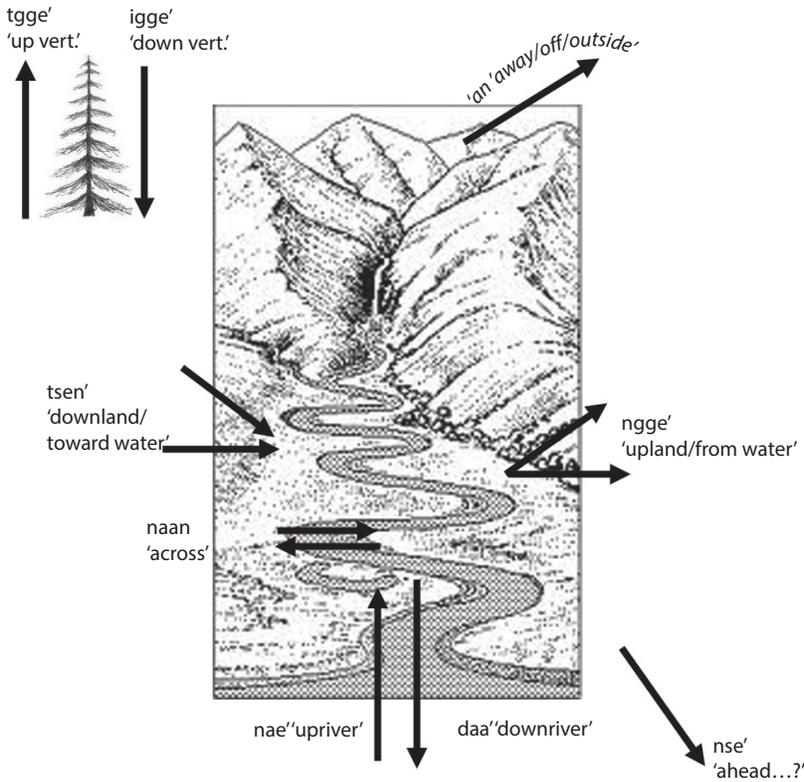


Figure 1. Schematic representation of the semantics of Ahtna directional stems

which all other directional terms can be derived (i.e., by going clockwise from north to find east, south, and west; Levinson 2003: 49), the Ahtna system orients its main upriver/downriver axis according to the flow of the major river in a given river drainage. All other directions in the drainage are calculated from that axis.

For ease of discussion here, I refer to this river-based axis orientation as *Major River Orientation* (MRO), which in fact subsumes two principles. The first of these is the fact of the orientation itself, which I am terming *Major River Orientation Principle 1* (MROP1), stated in (3):

- (3) Major River Orientation Principle 1 (MROP1):
Ahtna speakers align the major upriver/downriver axis of the directional spatial grid with the major river in the particular drainage about which they are speaking.

The result of MROP1 is twofold. The first is that because all directions in a given drainage are calculated based on the upriver/downriver axis of the major river, directions on minor streams and tributaries are determined based on the major axis of the drainage,

and not on the direction of the flow of water in those streams and tributaries. This is stated in (4) as *Major River Orientation Principle 2* (MROP2):

- (4) Major River Orientation Principle 2 (MROP2):
Ahtna speakers ascribe to minor streams and tributaries the spatial grid of the major river in a given drainage.

The second result of MROP1 is that speakers will shift their mental coordinate system when crossing from one drainage to another, to match the flow of the major river in the new drainage (Leer 1989; Busch 2000; Levinson 2003; Kari 2010). This is illustrated in Figure 2, which shows a schematic representation of two adjacent river drainages separated by a mountain range. Thick lines indicate the major river, while thin lines represent tributaries flowing into the major river.

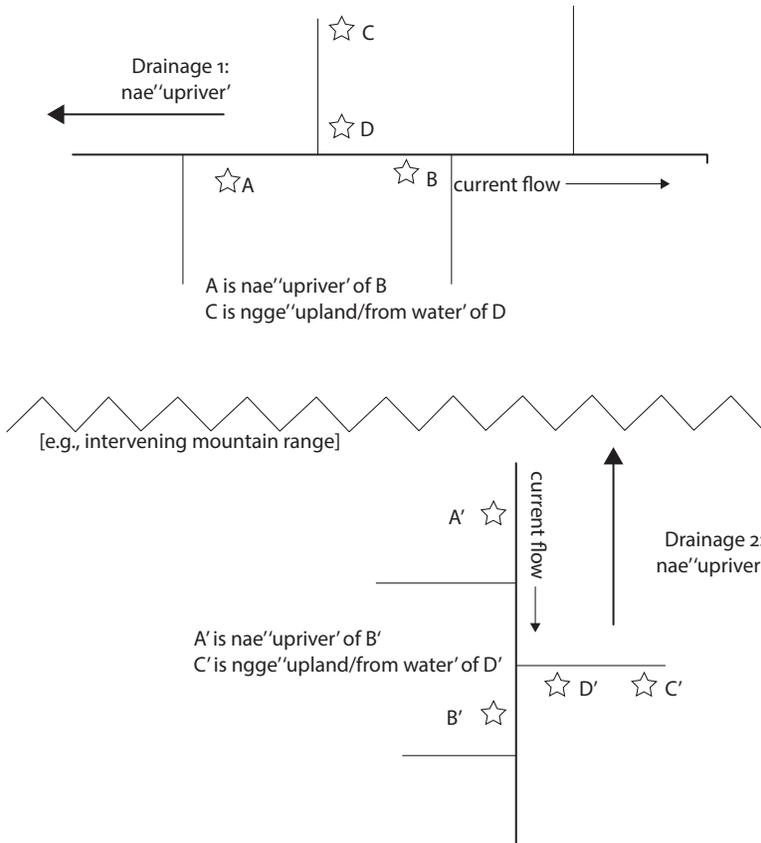


Figure 2. Schematic representation of Major River Orientation Principles 1 and 2

In Drainage 1, location A is considered to be *nae'* 'upriver' of location B, but location C, while indeed upriver of location D along the tributary, is in fact considered in Ahtna

to be *ngge* 'upland' of location D. *Ngge* refers to locations that are in a roughly perpendicular direction from the flow of the major river, which includes points along the tributaries. This illustrates MROP2, which requires Ahtna speakers to have an awareness of the local ecology so that they know which waterways are tributaries and which are major rivers. Note how MROP2 contrasts with English *upriver* and *downriver*; English speakers are likely to refer to location C as being upriver (or perhaps *upstream*) of location D, based on their placement along a waterway of any size.

Crossing from Drainage 1 into Drainage 2 brings a shift of the axis of the Ahtna absolute system to match the current of the major river in the new drainage. Consistent with the flow of the major river in Drainage 2, location A' is considered to be *nae* 'upriver' of location B', even though the relationship between these two locations is cardinally perpendicular to the relationship between A and B. Likewise, C' is *ngge* 'upland' of D'. This illustrates MROP1. Note how MROP1 contrasts with the English absolute frame of reference based on cardinal directions, in which the relationship between locations C and D would be described with the same term (e.g., *north* or *south*) as that used to describe the relationship between locations A' and B'.

Kari (2008) gives a striking example of MRO in Ahtna discourse in a 49 minute recording by Chief Jim McKinley from 1981 about the geography of the Copper River region. In particular, Mr. McKinley discusses locations found on the Copper River and its tributary, the Klutina River, shown in Map 1.



Map 1. The Copper River and its tributary, the Klutina River

- (6) Use of ‘upland’ for points along the Klutina River, which is a tributary of the Copper River

01 JM; Yii ucaeè yegha
 3SG.NH 3SG.POSS.river.mouth 3SG.OBJ.in.relation.to
 ts’ini’aa yi gha
 3SG.SBJ.linear.extends.IPFV.straight.REL in.relation.to
 su Tl’aticaeè,
 EMPH rear.water.mouth

02 dae’ konii de.
 thus 3PL.SBJ.say.IPFV SP/TMP.ADVZ
 ‘There at the mouth the current flows by there, thus it is said ‘rear water mouth’ [Copper Center].’

03-04 Ye kanggat, ye’du’,
 DEM ADJACENT.upland.PUNC then

05 Ts’ekul’uu’i Caeè dae’ konii.
 one.that.washes.out INDF.POSS.river.mouth thus 3PL.SBJ.say.IPFV
 ‘The next place upland of there then is ‘one that washes out mouth’, thus it is said.’

[14 IUs about Ts’ekul’uu’i Caeè omitted]

06 Ye kanggat ɫdu’,
 DEM ADJACENT.upland.PUNC FOC

07 Ba’ane Ts’ilaaggen Tak’adze’ dae’,
 outside someone.killed.him spring.POSS thus
 ‘The next place upland is ‘spring of someone killed him outside.’

[33 IUs about Ba’ane Ts’ilaaggen Tak’adze’ omitted]

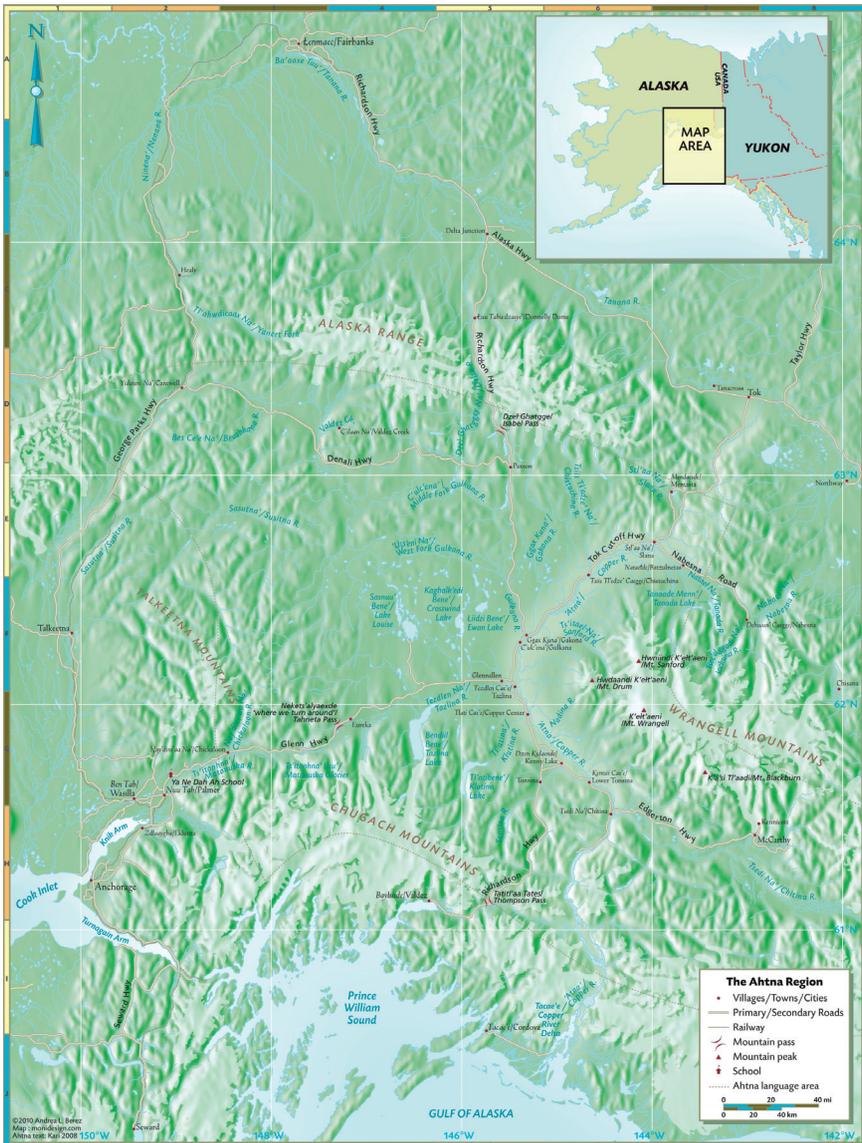
08-10 Yet kangga,
 DEM ADJACENT.upland
 ya’a ɫdu’, Tak’ats’ Kaghi’aa den dae’
 FOC spring linear.extends.IPFV.up.SP/TEMP.ADVZ
 ‘Next upland there is ‘spring water flows up’ thus.’

((Jim McKinley, Tl’atina’ Ngge’ ‘The Klutina River Drainage’,
 00:04:01.660-00:05:25.050. Kari 2010:27–28))

3. The Ahtna region

Before continuing on to the present study, some familiarity with the geography of the Ahtna region, including the location of towns, villages, highways, and major bodies of water, is required. The traditional Ahtna language area covers more than 35,000 square

miles of south central Alaska, consisting mostly of boreal forest and permafrost, and encompassing parts of three mountain ranges (the Alaska Range, the Chugach Mountains, and the Wrangell Mountains) and three major river drainages (the Copper, Matanuska, and Susitna Rivers) with countless tributaries, lakes, and glaciers. See Map 2.



Map 2. The Ahtna region

Most of the territory is unpopulated wilderness, with the majority of the region's nearly 4000 residents centered in a few small towns and Native villages (Mentasta (Map 2, E7), Chistochina (F6), Gakona (F5), Gulkana (F5), Tazlina (G5), Copper Center (G5), Chitina (H6), and Cantwell (D2)) along several two-lane highways connecting to Anchorage to the southwest, Fairbanks to the northwest, and Valdez to the south. The region contains only a few other roads.

4. Riverine directionals in a cardinal world

4.1 The bilingual fieldwork conditions

The data presented in this paper come from my fieldwork with Mr. Markle Pete of Tazlina.⁵ Mr. Pete is an ideal consultant for studying Ahtna directional reference because of his knowledge of both the language and the geography of the region. He is a first-language speaker of Ahtna who is also fluent in English, and he has lived in the Copper River valley his entire life. In his youth he traveled on foot at least as far as Mentasta to the north (Map 2, E7), to the flatlands between the Copper River and the Wrangell Mountains to the east (Map 2, F-G6), and to Tazlina Lake and the Louise/Crosswind/Ewan Lakes region to the west (Map 2, F-G4). As an adult Mr. Pete worked in construction, building major sections of the Richardson, Tok, Glenn, and Edgerton Highways, as well parts of the Trans-Alaska Pipeline. Even today he drives several times each month to Anchorage and occasionally to Fairbanks and Valdez. Mr. Pete is also currently employed as a teacher at the Ya Ne Dah Ah School (Map 2, G2), which is administered by the Chickaloon Village Traditional Council and is one of a handful of Alaska Native elementary schools. He is a respected tribal Elder and culture bearer for the Ahtna people, and is considered in his community to be an especially patient and engaging teacher of Ahtna language and tradition. He is also a modest teacher, one who will admit when he does not know the answer to a question.

My work with Mr. Pete on the topic of directional reference took place during four videotaped sessions over one week in early March 2010. The first three sessions involved the use of tabletop dioramas as stimuli, and the fourth used a printed

5. Mr. Pete and I spoke at length about publication and he has graciously granted me permission to print his words. In no case should Mr. Pete's expressions of uncertainty about the "correct" Ahtna words to use in these sessions be taken as an indication of Mr. Pete's inability to speak his Native language. Instead, it is merely a reflection of his status as a fluent speaker of two languages in contact, one of which is under the constant societal hegemony of the other.

Ahtna-language map of the region as a stimulus. The tabletop dioramas were made of colored fabric representing different landforms (e.g., snow-covered earth, grass-covered earth, bodies of water, highways) and figurines of people, cars, rifles, mountains, trees, and appropriate animals like moose, foxes, dogs, and tree squirrels. See Figure 3.

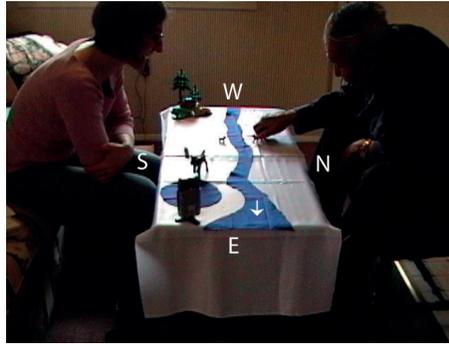


Figure 3. Fieldwork on Ahtna directionals; Diorama of the Tazlina River. Pictured: the author (left) and Markle Pete (right)

During the time in which this research took place, I had been conducting linguistic fieldwork in the Copper River valley for about seven months. Throughout that period Mr. Pete was my primary consultant, and the data that is presented here occurred after Mr. Pete and I had built a friendship and a trusting student-teacher relationship, which is reflected in the direct and sometimes joking tone of our interactions. It must also be noted that Mr. Pete is the only Ahtna consultant with whom I formed a close enough relationship to do the video-based research contained in this paper. It should not be forgotten that I was a guest in the Ahtna community, and many of the conversations presented here show Mr. Pete working hard to accommodate my lack of knowledge of the Ahtna language and the worldview presented in the directional system.

At the outset of the research program on the semantics of Ahtna directionals, my intention was to use the dioramas to create a fictional, anonymous landscape for the purpose of eliciting directionals. However, moments after I laid down white and blue cloths representing a snow-covered landscape and a river, Mr. Pete immediately assigned to the blue fabric the identity of the Tazlina River, which is the closest tributary of the Copper River to Mr. Pete's home outside of the village of Tazlina. This exchange is shown in (7); note that elicitation sessions, like most of daily life for Mr. Pete, are bilingual.

- (7) Assignment of Tazlina River to diorama
- 01 AB; Ga ɬdu' na' ((*sic*; intended: *c'ena'* 'INDEF.POSS.river')),
DEM FOC river
- 02 caek'e. {{AB indicates river mouth}}
river.mouth
'This is a river; a river mouth.'
- 03-04 Alright? What did I?.
- 05 MP; Una'?,
3SG.POSS.river
'A river?'
- 06 AB; Uh-huh?
- 07 MP; That's r-,
08 a river, {{MP gestures downriver}}
- 09 AB; Una',
3SG.POSS.river
- 10-11 yeah, uh-huh?.
- 12 Aen',
yes
- 13 una', {{AB gestures downriver}}
3SG.POSS.river
'A river, yes, a river.'
- 14 Okay,
- 15 MP; Tazlina', {{MP gestures downriver}}
Tazlina.River
'The Tazlina River.'
- 16 AB; Okay. @@@.
(Markle Pete, oai:paradisec.org.au:ALB01-057, 00:01:31.130-00:01:44.560)

Mr. Pete's rejection of an imaginary river and a fictional landscape leads me to assume such things are perhaps less important to him than thinking and talking about real locations. This was surprising, because the previous literature on the semantics of Athabaskan directionals (e.g., Leer 1989; Kari 1989, 1996a, 1996b) presents the systems as abstractable and widely applicable to any landscape one may encounter. As we shall see, however, to Mr. Pete the system is far from abstract, and is instead grounded in the very physiography of the landscape and the communicative habits of the speech community.

As with any part of grammar, the usage of the Ahtna directional system by speakers on a daily basis influences the development of the semantics and structure of that system. With the Ahtna directional system, it is the landscape of Ahtna territory that

influences how Ahtna people use the system, and over time with repeated use across the speech community, the directional system has shifted from a proto-Athabaskan system like that presented in Leer (1989) to one with region-specific semantics that are implicitly agreed upon by the speech community. Once the demography of the speech community changes, as it has been doing for the last century via intensive contact with English and a rapid decline in the number of Ahtna people who speak the language, the directional system (again, like any grammatical system) is susceptible to a new kind of contact-based semantic shift. Thus Mr. Pete's refusal of a fictional landscape creates an opportunity to study the use of Ahtna directionals by a representative of the bilingual portion of the Ahtna community *in situ*, in reference to actual locations that are familiar to him.

4.2 Hints of contact-induced change

The first indication that Mr. Pete's directional system may have come under the influence of the English cardinal system occurred midway through the first elicitation session. The stimulus at the time was the diorama as pictured in Figure 3. As we have just seen, the river in the diorama had been established as the Tazlina River, which flows in an easterly direction to its mouth at the Copper River (Map 2, 5F-G). In the diorama this is toward the bottom of Figure 3 (the Copper River is not represented). Thus, in terms of the cardinal directions represented in the diorama, Mr. Pete is sitting to the north of the Tazlina River, and I am sitting to the south.

It is also important to understand the actual cardinal directions of the room in which the sessions take place, because at times both Mr. Pete and I refer to these directions for clarification. In this and in all other examples from these four fieldwork sessions, the cardinal directions of the room, shown in Figure 4, are as follows: the video camera had been placed in the southern edge of the room and points north, thus east is to the reader's right and west is to the reader's left. In all examples in this paper, however, descriptions of gestures indicating direction refer to the directions understood by the discourse participants (Mr. Pete and myself) to be represented in the diorama unless otherwise specified. These were established as each diorama was being arranged on the table, and they reflected our shared knowledge of the regions depicted. The directions of the diorama are shown in Figures 3, 6, 7, and 8.

Approximately fifteen minutes into the session, Mr. Pete used the English words *north* and *south* for the first time, after having used exclusively Ahtna directional terms (I had not used those words that day either). At the time I was testing the integrity of MROP2. In (8), I had just placed the figurine of a hunter with a rifle to the south of and facing away from the river, with a toy moose in its line of sight. While this direction is upland of the Tazlina, if MROP2 is intact in Mr. Pete's use of Ahtna directionals,

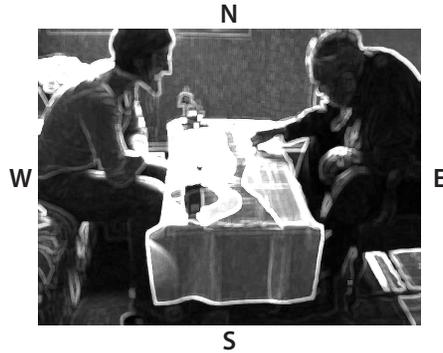


Figure 4. Cardinal directions of the room in which the fieldwork took place

we would expect him to call this *daa* ‘downriver’, in relation to the flow of the larger Copper River.⁶

- (8) Use of English *north* and *south* in elicitation of Ahtna directionals; diorama: the Tazlina River

1-3 AB; Would you call this, um, ’ungge? {{AB gestures upland/south}}
 ‘Would you call this ‘to distantly upland?’

4-5 MP; ’Ungge ((sic)) yi’et teldic, ehn-heh.
 DIST.upland.ALL 3SG.with 3SG.SBJ.shoot.PFV
 ‘He shot it toward the distant upland, yes.’

6-8 AB; ’Ungge, Okay. Alright.
 DIST.upland.ALL

9-10 MP; It’s the south, ’udaa’a. {{MP points to south}}
 DIST.downriver.ALL
 ‘To distantly downriver.’

11 AB; ’Udaa’a.
 DIST.downriver.ALL
 ‘To distantly downriver.’

12 MP; Ehn-heh.

13 AB; What if he’s like this.

{{AB orients toy moose to downland/north of hunter}}

6. For this and all directions in this papers, the stem morpheme of the directional is the only morpheme that is relevant to the discussion. Readers may ignore affixes for now and rely on the English gloss to decode the stem that is present in each directional.

- 14 MP; North.
- 15 AB; Okay how do you say that.
- 16 MP; 'Unè.
DIST.upriver.ALL
'To distantly upriver.'
- 17 AB; 'Unè.
DIST.upriver.ALL
'To distantly upriver.'
- 18 MP; 'Unuuxe c'e-,
DIST.upriver.AREA ABAN
- 19 C'ena' ts'idi'aa de
INDEF.POSS.river keep.linear.OBJ.in.position SP/TEMP.ADVZ
xu su izełghaen le'.
AREA EMPH 3SG.SBJ.3SG.OBJ.kill.PFV indeed
'In an area distantly upriver, where the river extends out, he kills it
(the moose) right there.'
- 20 AB; Uh-huh.
- 21-22 MP; Xu izełghaen means, they kill moose there.
AREA 3SG.SBJ.3SG.OBJ.kill.PFV
- 23 AB; Xu izełghaen.
AREA 3SG.SBJ.3SG.OBJ.kill.PFV
'He kills it there.'
- 24 MP; Mm-hm.
- 25 AB; Okay.
- 26 AB; And did you just call this⁷ north? {{AB gestures north across river}}
- 27 MP; I would call north here,⁸
- 28 AB; Mm-hm.
- 29 MP; that's north, {{MP gestures north on diorama, then north in room}}
- 30 right here.⁹
(Markle Pete, oai:paradisec.org.au:ALB01-057, 00:15:44.100-00:16:22.900))

In IU 01, I erroneously suggest the term 'ungge 'to distantly upland' to indicate the direction away from the shore of the Tazlina River, which Mr. Pete at first accepts in IU 04. In IUs 07 and 08, I acknowledge that I understand and accept the referenced

7. The referent of *this* in IU 26 is the north direction in the diorama.

8. The referent of *here* in IU 27 is the north direction in the diorama.

9. The referent of *here* in IU 30 is north in the room.

direction as *'ungge* 'to distantly upland'. However, Mr. Pete immediately recognizes our agreed-upon error in IUs 09 and 10, and corrects himself and me, saying that the direction is actually south, which he then translates as *'udaaà* 'to distantly downriver'. Referring to this direction as *'udaaà* in Ahtna is to be expected in accordance with MROP2: the Tazlina River is a tributary of the Copper River, which is the major river in the watershed and flows, in this region at least, from north to south (Map 2, 5G-J). What is interesting, however, is that Mr. Pete uses this term as the translation of the cardinal English *south* (IU 09), rather than referring in any way to the flow of the nearby Copper River (i.e., he did not say in English *downriver* in IU 09).

In IU 13 I reverse the orientation of the figurines so that the moose is downland and to the north of the hunter. Mr. Pete immediately again uses an English cardinal term, *north*, to describe, and also translates this as *'unè* 'to distantly upriver'. Again, the use of *'unè* 'to distantly upriver' is in accordance with MROP2, but the fact that Mr. Pete immediately provides a translation as English *north* is indicative of the bilingual teacher-student interaction as well as his own bilingualism. When I ask for clarification in IU 26 (*did you just call this [i.e., north on the diorama] north?*), Mr. Pete confirms that he indeed intended to say *north* by gesturing toward that direction both in the diorama and in the room. There is little doubt that Mr. Pete (i) is not confused by the directions in the diorama in relation to the actual directions in the room, and (ii) equates, at least to some degree, the notion of 'north' with *nae* 'upriver'.

Given that Mr. Pete is a first language speaker of Ahtna, a reasonable expectation – and the one I began my research with – would be that he keeps the riverine directional system of Ahtna separate from the cardinal system of English. However, the evidence presented in (8) leads me to suspect that for Mr. Pete the two systems are not completely distinct from one another, and that their contact with one another in my consultant's daily experience, as well as his daily interaction with non-native speakers of Ahtna (not only myself, but most members of his community) is causing a change of meaning in the Ahtna system. In other words, a contact-based semantic change in the Ahtna directional system is occurring in some speakers. In bilingual settings at least, speakers conflate the directional systems of English and Ahtna in their speech to some degree.

4.3 Evidence of change: 'Upriver' becoming equated with 'north'

While Mr. Pete's translation of *south* as *'udaaà* 'to distantly downriver' and *north* as *'unè* 'to distantly upriver' allows us to suspect that some contact-base change is occurring in his use of the directional system, it is not sufficient to allow us to fully say so. This is because it does not tell us how Mr. Pete assigns directional terms across larger regions. In order to posit that the English directional system is influencing the Ahtna system, we need some evidence that MROP1 and MROP2, the two principles that

constitute the hallmark difference between the two systems, are not fully intact. In other words, we need evidence that Mr. Pete does not always shift the major axis of the spatial grid when transitioning from one drainage to another, and/or that he does not always assign to minor rivers the spatial grid of the major river.

I tested MROP1 in the second elicitation session by using two dioramas, one representing the Matanuska River drainage (Map 2, 2-3G), and another representing the adjacent Copper River Drainage (Map 2, between E5-7 and J5-7). These locations are ideal for testing MROP1 because the Matanuska River runs in a drainage located directly west of the Copper River drainage, and flows roughly perpendicular to the Copper. It begins at a glacier in the east and flows to the west and southwest into the salt water of the Knik Arm of Cook Inlet. The Glenn Highway, the only road connecting the Copper Valley to Anchorage, runs parallel to the Matanuska River along its north bank and is very heavily traveled by residents of the Copper River valley, including Mr. Pete.

If the Matanuska River drainage is perceived by speakers to be a separate drainage from that of the Copper River, we would expect that in accordance with MROP1, the main axis of the spatial grid would shift to match the flow of the Matanuska, with *nae* ‘upriver’ now corresponding to *east*. Indeed, the fact that the Matanuska drainage is considered to be a distinct drainage is supported by two observations. The first is a physical one: the change in terrain between the two drainages is obvious to anyone traveling along the Glenn Highway. Traveling westward toward Tahnetta Pass, the elevation gain is gradual, but once one is over the pass, the terrain drops off dramatically and one finds oneself descending quickly through the deep river canyon. Figure 5 shows the elevation along the Glenn Highway; Tahnetta Pass is at approximately mile 67.

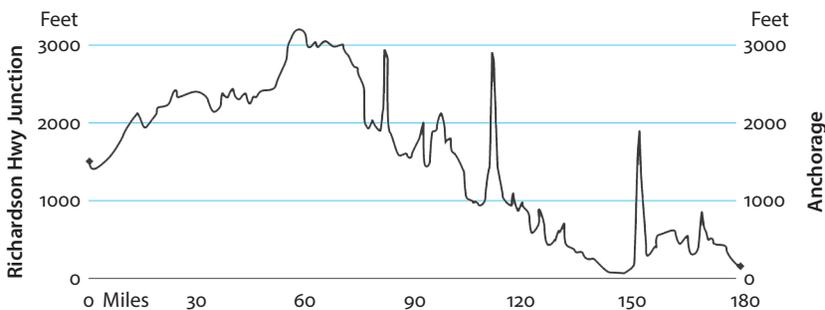


Figure 5. Elevation profile of the Glenn Highway

The second reason for the clear distinction between the Copper and Matanuska drainages is based in Ahtna language and culture: the last point at the top of the pass from which the Copper River can be seen is named *Nekets'alyaxde* ‘where we turn around’. At this location, travelers would traditionally stop “to look back and say a prayer”

- 10-11 AB; Oh okay. Only if this is going north. {{AB indicates flow of river}}
- 12 MP; Yeah,
- 13 AB; Okay,
- 14-15 MP; that's¹⁰ going, west ((*sic*))
- 16 AB; we'll do that one in a minute,
- 17-18 MP; going so – east.
 ((Markle Pete, oai:paradisec.org.au:ALB01-059, 00:10:11.340-00:10:29.090))

Mr. Pete responds that 'uniit' 'to distantly upriver' would be an appropriate response only if the river were flowing from the north to the south (IUs 06-09). His first turn consists of the abandoned *some-* in IU 06 (which I interpret as being a truncation of *sometimes*), a hesitation in IU 08 while he makes a gesture indicating a north-south river that is perpendicular to the Matanuska, and the statement in IU 09 that if the river were coming from the north, one could say 'uniit' 'to distantly upriver' for the upriver direction. 'Uniit' is presumably not correct here for Mr. Pete because the Matanuska flows east to west (IUs 14-18). I confirm this in IU 11, in which I am gesturing to indicate a river flowing from north to south (which is the referent of *this* in IU 11). Mr. Pete's gesture and statement that 'uniit' 'to distantly upriver' would be appropriate if the upriver direction were to the north shows that Mr. Pete is in fact aware of the connection between river direction and the Ahtna directional terms. However, for him 'upriver' can only be used when the river flows from north to south.

The reason for Mr. Pete's association between *nae*' 'upriver' and *north* is likely due to the prominence of the Copper River in Mr. Pete's home region. For residents of the Central Ahtna dialect area, which includes the villages of Gakona, Gulkana, Tazlina, and Copper Center, the Copper River flows from north to south. Thus the opportunities to refer to the upriver direction as *north* (and vice versa) in English conversation are abundant, and in the next example Mr. Pete goes on to show that his association between the two terms, *nae*' and *north*, is quite strong.

Example (10) is based on work with the diorama of the Copper River drainage. Notice that while the Copper River does flow southward for most of its 287 miles, at its headwaters it flows nearly due north out of the Copper Glacier before quickly turning counterclockwise around the base of Mount Sanford. The diorama shown in Figure 7 corresponds to the length of the entire Copper River (the blue fabric), the Richardson and Tok Highways (the black fabric), and the Wrangell Mountains (the green mountain figurine). Our shared knowledge is that the town of Tok (Map 2, D7), not depicted, would be off the top right corner of the table.

10. The referent of *that* in IU 14 is the Matanuska river.



Figure 7. Diorama of the Copper River, with the Richardson and Tok Highways

In (10), Mr. Pete and I are first discussing highway travel along the Richardson Highway, which runs parallel to the Copper River, in the area south of the junction of the Tok Highway. The directionals Mr. Pete uses here are to be expected: south, which is the downriver direction of the Copper, is *'udaa'a* 'to distantly downriver', and north, which is the upriver direction, is *'unè* 'to distantly upriver'. In IU 12 I ask Mr. Pete what to call the direction one takes when one turns to the northeast on the Tok Highway. This is followed in IU 36 by a discussion of traveling all the way to Fairbanks, some 250 miles north of the Copper River area.

- (10) Strength of association between *nae* 'upriver' and *north* on the Tok and Richardson Highways; diorama: the Copper River
- 1-3 AB; Okay, how about, the car,
 {{AB indicates toy car driving downriver/south on the Richardson Highway}}
- 04 driving on the Richards-
- 05 MP; 'Udaa'a.
 DIST.downriver.ALL
- 06 AB; on the Richardson,
- 07 MP; 'Udaa'a.
 DIST.downriver.ALL
 'To distantly downriver, to distantly downriver.'
- 08 AB; 'Udaa'a.
 DIST.downriver.ALL
 'To distantly downriver.'
 {{AB turns car around so that it is driving upriver/north toward Fairbanks}}
- 09 MP; 'Unè.
 DIST.upriver.ALL
 'To distantly upriver.'

- 10 AB; 'Unè,
DIST.upriver.ALL
'*To distantly upriver.*'
- 11 okay.
{{AB indicates that the car is at the fork of the Richardson and
Tok Highways, and heads upriver/northeast toward Tok}}
- 12 and then you get to here,
13-14 what's that direction. On Tok ((i.e., Tok Highway).
- 15-17 MP; Ehn, 'un- ehn,
ABAN
- 18 Tok ts'e' kughiyaal.
T. to 3SG.SBJ.GO.IPFV.AREA
'*Um, he is going to Tok.*'
- 19 AB; Tok ts'e'. {{AB points at Tok}}
T. to
'*To Tok.*'
- 20 MP; Ehn-heh.
- 21 AB; And what direction is this. {{AB gestures upriver/northeast}}
- 22 MP; I don't know.
- 23-24 AB; Okay. Okay.
- 25 MP; I don't know.
- 26-27 AB; Okay, you just say Tok.
- 28 MP; <SMILE>I can't know.
- 29-30 AB; Okay, that's alright.
- 31 MP; No I don't know.
- 32 AB; <SMILE>Oh hush you</SMILE>.
- 33 MP; @@@@</SMILE>.
{{AB moves car to Richardson Highway, then moves it
upriver/north toward Fairbanks}}
- 34 AB; But this way is 'unè.
DIST.upriver.ALL
'*To distantly upriver.*'
- 35-37 MP; That's uh, going to Fairbanks, 'unè
DIST.upriver.ALL
'*To distantly upriver.*'
- 38-39 AB; Yeah, 'unè.
DIST.upriver.ALL
'*To distantly upriver.*'

- 40 So this one's not 'unè.
 {{{AB moves car back to Tok Highway and indicates it
 moving upriver/northeast}}}
 DIST.upriver.ALL
 'So this one's not 'to distantly upriver'?'
 41 MP; I don't know what they,
 42 AB; Okay.
 43-44 MP; what you call that #, you go west ((*sic*)).
 45 AB; Okay.
 46 MP; Eastwest ((*sic*)) I guess.
 47-48 AB; Yeah north– northeast.
 49 MP; Northeast.
 50-51 AB; Northeast. Okay.
 52-53 MP; Northeast, that's right.
 54 AB; Okay.
 55 MP; That's the name.
 ((Markle Pete, oai:paradisec.org.au:ALB01-059, 00:19:46.900-00:20:44.130))

On two fronts this rich example shows both the strength of the association between *nae* 'upriver' with *north*, and the loss of integrity of MRO. First, consider Mr. Pete's use of *upriver* to refer to the route to Fairbanks (Map 2, A3; IUs 34-39). Fairbanks is quite some distance from the Copper River, across a major mountain range and nowhere near any southerly flowing river. That Mr. Pete agrees with my use of this term (i.e., my use of it in IU 34, which was a reiteration of what he had told me in IU 09) to refer to Fairbanks is striking evidence for the erosion of MRO1 and MRO2, because the association with north effectively extends beyond the Copper River region to refer to locations hundreds of miles away and with no association with an upriver direction (indeed, even the upriver direction of the Tanana River, in whose valley Fairbanks is located, is to the east/southeast).¹¹ The English cardinal system allows for this kind of extension – north is north regardless of intervening physiographic features – but Ahtna has developed a lexicalized name for the Fairbanks region, *Ba'aaaxe* 'a general area outside'. Mr. Pete does not use this term.

Second, and even more crucially, consider IUs 12-33, in which I ask Mr. Pete about the direction to Tok. The Tok Highway follows the curve of the Copper River

11. In Example (10) Mr. Pete agrees to my suggestion of 'unè as indicating the route to Fairbanks, but my suggestion in line 34 was based on previous conversations in which he used the term in this way. I am referencing information he already gave me but that is not shown here.

around the north face of Mt. Sanford, and in this region the upriver direction is to the northeast. After some hesitation (and the abandonment of a directional in IU 16), Mr. Pete refers to this direction as *Tok tsé* ‘to Tok’ (IU 18). His answer is significant, because it is the first time he needs to appeal to a grammatical system other than the directional system. He uses a postpositional phrase instead of a directional, and upon further inquiry (IUs 21-33 and 40-55) he comments that he simply does not know what to call it. This suggests that MROP2 is losing its centrality to the semantics of the Ahtna directional system: when the upriver direction on the Copper is no longer north, Mr. Pete hesitates about which directional term to select and instead opts for a different solution altogether (I return to his solution to the problem of directional reference near the headwaters of the Copper in Section 4.4).

4.4 The role of general topography

The evidence above supports the idea that there is some degree of contact-induced semantic shift occurring in Mr. Pete’s use of the Ahtna directional system, at least when interacting with a second language learner of Ahtna. The fact that Mr. Pete is unsure of what to say in cases in which *upriver* and *north* do not align suggests that this is the beginning of a shift, rather than a mature shift, when we would expect speakers to have fully integrated the new system into their grammar. While Ahtna is so endangered it is likely we will never witness a complete shift, it is still worth examining some of Mr. Pete’s strategies for dealing with directional reference in cases that are now problematic because of the gaps left in the shifting paradigm. Two of these are examined below.

4.4.1 *Ngge* ‘upland’ in the Matanuska River drainage

Let us return to the discussion of the axis of the directional grid in the Matanuska River drainage (Figure 6). Recall that this river flows from east to west, but that in (9), Mr. Pete rejected *nae* ‘upriver’ for east. Instead, as can be seen in (11), he uses *ngge* ‘upland’ to refer to the east.

- (11) Use of *ngge* ‘upland’ for the upriver direction; diorama: The Matanuska River drainage
- 01 AB; What direction is this? {{[AB moves toy car upriver/east]}}
- 02 MP; ’Ungge nac’éaał.
DIST.upland.ALL 3S.SBJ.INDF.OBJ.handle.CPT.OBJ.ITER.IPFV.PERAMB
‘S/he is driving back to distantly upland.’
- 03 AB; ’Ungge.
DIST.upland.ALL
‘To distantly upland.’

- 04 MP; Ehn-heh,
'Yes.'
- 5-6 AB; Okay, 'ungge,
DIST.upland.ALL
'To distantly upland.'
- 07 so, {{AB moves toy dog upriver/east atop surface of Matanuska River}}
- 08-10 if this river, is frozen over, and he's on top running?,
- 11 MP; Mm-hm,
- 12 AB; what direction is that.
- 13 MP; ten k̄e.
ice on
- 14 AB; Mm-hm?.
- 15 MP; Ten k̄e ngge' nadzitez'aan.
ice on upland 3SG.SBJ.animal.runs.ITER.PFV
'On the ice, it runs back upland on the ice.'
- 16 MP; Ten k̄e ngge' nadzitez'aan.
ice on upland 3SG.SBJ.animal.runs.ITER.PFV
'It runs back upland on the ice.'
- ((Markle Pete, oai:paradisec.org.au:ALB01-059, 00:06:51.740-00:07:14.870))

Mr. Pete uses 'ungge' 'to distantly upland' to refer to a car driving in the upriver direction on the highway in IU 06, and *ngge'* 'upland' to refer to a dog running upriver atop the frozen surface of the river in IUs 15 and 16. Before considering why Mr. Pete selected these terms, let us look at his other strategy for avoiding the now-inappropriate use of *nae'* 'upriver'.¹²

4.4.2 *Tgge'* 'up (vertically)' along the Tazlina River to Tazlina Lake

The excerpt in (12) is based on a diorama of the trail system around Tazlina Lake (Map 2, G4), including the Glenn Highway and the Lake Louise region (Map 2, F4). This diorama, which Mr. Pete had in fact assembled from memory, is shown in Figure 8. The brown strip of fabric on the left represents an old trail that used to run parallel to the Tazlina River on its south bank up to Tazlina Lake; the blue fabric to the right represents the Tazlina River, which flows eastward from Tazlina Lake, also pictured. The black fabric represents the Glenn Highway. Again, the bottom of the figure represents east; Mr. Pete is sitting to the diorama's north, and I am to the south.

12. Inappropriate now because *nae'* is now reserved for north-south rivers.

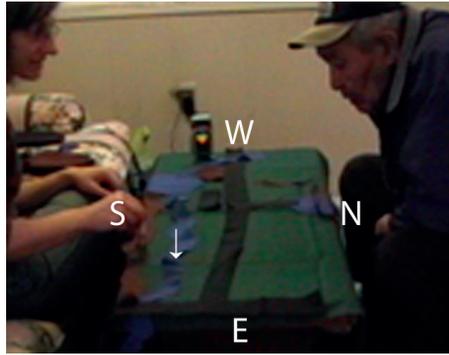


Figure 8. Diorama of the trail to Tazlina Lake

In (12), we are discussing foot travel along the trail toward Tazlina Lake. Mr. Pete refers to this direction as *'utgge* 'to distantly up (vertically)'. This is notable because the terrain in this area is not particularly vertical or steep.

(12) *Tgge* 'up (vertically)' along Tazlina River; diorama: the trail to Tazlina Lake

01 AB; So if he's walking on the trail,
 {{[AB moves toy hunter upriver/west along a trail parallel to
 Tazlina River toward Tazlina Lake]}}

02-03 how would you say, he's walking that way.

04 MP; *'Utgge natesdyaa.*
 DIST.up.ALL 3SG.SBJ.go.IPFV.ITER.INCEP
'S/he is starting to go back/again to distantly up (vertically).'

5-6 AB; *'Utgge, cause he's going up to the,*
 DIST.up.ALL
'To distantly up (vertically), cause he's going up to the'

07 MP; Yeah.

8-9 AB; lake? Okay,

10 MP; Going up to the lake.

11 AB; Okay.

12 MP; *'Utgge ts'ina'idyya.*
 DIST.up.ALL 3SG.SBJ.go.IPFV.straight.ITER
'S/he is going straight back to distantly up (vertically).'

13 AB; *Ts'ina'idyya.*
 3SG.SBJ.go.IPFV.straight.ITER
'S/he is going straight back.'

14 MP; Mm-hm.
 ((Markle Pete, oai.paradisec.org.au:ALB01-060, 00:10:00.835-00:10:17.615))

circumambulated) by foot or dogsled may be more important than strict adherence to a perpendicular grid, which is most useful for marine navigation. In this sense, the Ahtna directional system is more three-dimensional than the English system, including changes in elevation in the same paradigm as axial relations.

As for Mr. Pete's selection of *ngge* 'upland' to refer to the east/upriver direction on the Matanuska, recall that this is an area of steep elevation change. The salience of the sloping topography makes *ngge* a reasonable choice when *nae* 'upriver' is not available, as it now is not available for the westerly flowing Matanuska because he now associates this term with *north*. While choosing *ngge* 'upland' to refer to an upwardly sloping direction is not necessarily innovative, reserving *nae* 'upriver' only for rivers that flow from north to south is innovative, and a sign of a semantic shift.

Mr. Pete's use of *tgge* 'up (vertically)' in (12) and (13) to describe an area that is not particularly vertical is intriguing. Although *tgge* and its opposite *igge* 'down (vertically)' are morphologically members of the lexical class of directionals, they do not have an exclusively topographic semantic basis. These terms can refer to many kinds of steep verticals including ladders, cliffs, and trees. In (14) Mr. Pete uses *tgge* 'up (vertically)' to refer to the vertical cliff in *Frog, Where Are You?* (a picture book by Mercer Mayer), and in (14) he uses it to describe a squirrel's perch at the top of a tree.

(14) *Tgge* 'up (vertically)' for true verticals

(a)

MP; 'Utgga hwnene u'eł niyitats'
 DIST.up.PUNC hill 3SG.OBJ.with 3SG.SBJ.animal.rushes.PFV.TERMIN
 łic'ae u'eł dadits'et tuu
 dog 3SG.OBJ.with 3SG.SBJ.animate.moves.indep.down.PFV water
 yii tahghidaek.
 in 3PL.SBJ.PL.OBJ.water.move.indep.PFV

'Up on a cliff it stops suddenly; he falls with the dog and they fall in the water.'

((Markle Pete, *Naghaay Ndaane Zidaa 'Frog Where Are You'*,
 oai.paradisec.org.au:ALB01-042, pp. 21–22))

(b)

MP; Dligi tgge' dazdaa.
 tree.squirrel up 3SG.SBJ.sit/stay.up.IPFV
'The tree squirrel is sitting high up (vertically) on something.'

((...))

'Utggat adazdaa.
 DIST.up.PUNC 3SG.SBJ.sit/stay.up.IPFV
'It is sitting at a point distantly high up (vertically) on something.'
 ((Markle Pete, oai.paradisec.org.au:ALB01-57, 00:12:17.225-00:12:20.610))

In both of these examples, Mr. Pete uses directionals based on the stem *tgge'* 'up (vertically)'. Using *tgge'* to describe directions on the ground as well as vertical height can also be seen as an example of the Ahtna directional system incorporating the third dimension, but this time with perhaps some influence from English. English *up* encompasses a broad and very general semantic range, e.g., *upriver*, *uphill*, *uptown*, *up the road*, etc. Given that Mr. Pete is, like all other living speakers of Ahtna, bilingual in English, it is reasonable to suggest that perhaps *tgge'* 'up (vertically)' is now being used to describe situations in which English *up* would be appropriate, rather than just to refer to things that are strictly vertical.¹³

The semantic shift that is occurring in Mr. Pete's use of the directionals is summarized in Figure 9.

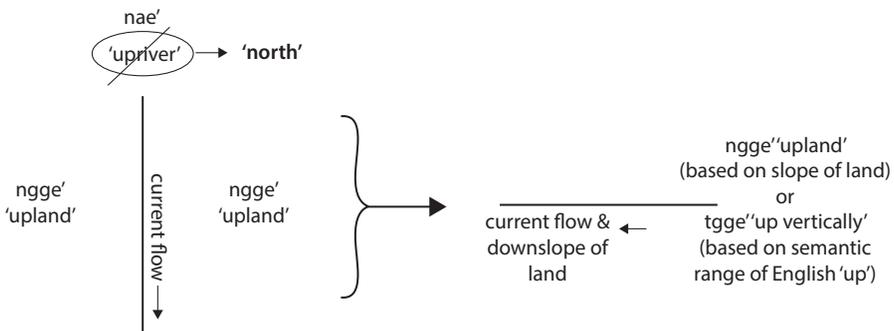


Figure 9. Diagram of semantic shift

As *nae'* 'upriver' becomes strongly associated with English *north* due to the prevalence of the north-south flowing Copper River, it is no longer available to Mr. Pete for 'upriver' in rivers that run in a different direction. This leaves a gap in the paradigm, which Mr. Pete fills with either *ngge'* 'upland', possibly based on the slope of the land, or with *tgge'* 'up (vertically)', possibly based on the semantic range of 'up' in English, a language in which Mr. Pete is bilingual.

13. Ahtna also has several far more grammaticalized – and hence semantically general – adverbial verb prefixes corresponding to English *up*, e.g., *a-* (*dazyaa* 's/he went up') and *ka-* (*kaghi'aa* 'linear object extends up'). *Tgge'* is still phonologically independent and behaves as an affix-taking member of the directional lexical class, which further suggests that its semantic extension to describe landforms that are not particularly vertical is a new development.

5. Conclusion

Although Ahtna is Mr. Pete's first language, a lifetime of full bilingualism with English is causing the erosion of Major River Orientation in his use of directionals. Evidence for this erosion can be found in his reluctance to use *nae'* 'upriver' for rivers (or portions thereof) that do not flow north to south, and his extension of *nae'* to refer to distant locations like Fairbanks.

Mr. Pete's innovative use of Ahtna directionals indicates an ongoing shift of the semantic basis of the system. The first change in this shift is the strong association of *nae'* 'upriver' to *north*. Although this step is not complete – we have seen that Mr. Pete is still aware of the connection between *nae'* and river flow – it nonetheless leaves a semantic gap in the paradigm that other terms (*ngge'*, *tgge'*) must now be recruited to fill. It is likely that Ahtna will become extinct before the entire system shifts sufficiently that speakers no longer experience moments of hesitation about which terms to select, but this chain-shift pattern is a common indicator of contact-based language change (e.g., Thomason & Kaufman 1988, Heine & Kuteva 2005).

Important to this analysis is the understanding that during the fieldwork sessions described here, Mr. Pete was working to accommodate a learner of Ahtna whose first language is English. In fact this situation mirrors most of Mr. Pete's opportunities to use Ahtna in his family and community. There are few fluent speakers of Ahtna today, and Mr. Pete spends most of his day communicating with learners or non-speakers of Ahtna. This daily contact with English influences the way Mr. Pete adapts his knowledge of the indigenous semantics of the Ahtna directional system to accommodate English speakers, who have a very different understanding of the semantics of direction. Mr. Pete's shifting use of directionals does not reflect an ignorance of Ahtna language or the semantics of the directional system; rather, it reflects the fact that a very real contact-induced change is taking place in the language. In terms of Thomason and Kaufman's model of the linguistic results of language contact (1988:50), Mr. Pete's hesitation is typical of the early stages of intense contact leading to large-scale language shift, in which influence between the substratum and superstratum is moderate to heavy. The semantic change we observe in Mr. Pete's use of the directionals is a natural result of intense language contact, even though the contact could arguably be viewed as unnaturally catalyzed by historical pro-English policies and economic pressure (a discussion that is beyond the scope of the present work). Regardless of the cause of the contact between the two languages, my interactions with Mr. Pete in this study are akin to those taking place within the changing demography of the Ahtna-speaking community. This of course has implications for language revitalization. Ahtna teachers and learners will need to decide if revitalization should include not just the re-integration of vocabulary for Ahtna directional terms, but also the entire semantic and cognitive system underlying the original terms.

Appendix: Transcription conventions

All transcriptions of spoken language are provided in the transcription system outlined in Du Bois (2006) and Du Bois et al. (1992). This system is based on the notion of the ‘intonation unit’, or IU, the holistic prosodic unit that forms the armature upon which speakers build discourse. Most text lines contain only one IU, the boundaries of which were determined by a series of acoustic and perceptual cues that are outlined in Berez (2011b). In some cases a line contains multiple IUs separated by a comma, a period, or a question mark, to save space.

The line breaks in the examples drawn from Kari (2010) do not match those found in the original publication. Kari’s line breaks correspond to normative sentences, but I have inserted line breaks at IU boundaries (with permission) for the purposes of this paper. Below are other symbols related to the transcription system that can be found in the examples of spoken language herein:

17	IU number
MP;	Speaker identification label
,	Continuing boundary tone
{{}}	Concurrent gesture
.	Terminative boundary tone
?	Appeal or rising boundary tone
@	Pulse of laughter
-	Truncated word
_	Linked words
:	Nonlexical segment lengthening
#	Inaudible syllable

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