

AN ONTOLOGY OF LANDSCAPE AND SEASCAPE IN GREENLAND: THE LINGUISTIC ENCODING OF LAND IN KALAALLISUT¹

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The linguistic encoding of landscape and seascape in Kalaallisut, an Unangan-Yupik-Inuit language spoken on the west coast of Greenland, exists within a complex domain of spatial language, coming together with a coastal-based orientation system and an extensive demonstrative system anchored in the geophysiography of Greenland. In this paper we describe the Kalaallisut landscape lexicon, unpacking its categorization as well as the close relationship between landscape and toponyms. As a framework for our analysis, we use the principles of ethnophysiography and the study of landscape terminology to present a culturally specific ontology for Kalaallisut. The categorization of landscape features is shaped by both the physical topography of the land and the cultural practices of engagement with the land, resulting in the primacy of shape, material, and function, particularly within the context of navigation.

[KEYWORDS: Inuit, Greenland, landscape, spatial deixis]

1. Introduction. This paper describes the linguistic encoding of landscape in Kalaallisut (ISO 639-3 *kal*), a Unangan-Yupik-Inuit language spoken

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on the west coast of Greenland. Kalaallisut exhibits a rich grammatical and lexical system for the encoding of spatial relations, embedded with environmental knowledge. The language family stretches from the eastern part of Siberia across Alaska and the Canadian Arctic to Greenland. The Inuit branch, which includes Kalaallisut, forms a rough dialect continuum from northwest Alaska across Canada to Greenland; thus, Kalaallisut is closely related to the Inuit languages of eastern Canada. The Inuit languages of Greenland fall into three main groups: Inuktun (Avanersuarmitut or North Greenlandic), Kalaallisut (West Greenlandic), and Tunumiisut (East Greenlandic). Kalaallisut is the official (standard and standardized) language of Greenland, based on central dialects spoken in the Sisimiut/Nuuk/Maniitsoq area, along the west coast.

We argue for a complex interplay between language, culture, and environment: the categorization of landscape features is shaped by the physical topography of the land on the one hand and the cultural practices of engagement with the land on the other. We demonstrate that culturally specific conceptual ontologies are encoded in Kalaallisut landscape terms. Our analysis uses the frameworks of ethno-physiography (e.g., Mark et al. 2011) and what we might call *landscape linguistics*, a term we coin from work on the study of the linguistic encoding of landscape terminology (land, sea, geographical formations) and how this terminology is related to spatial language and orientation systems (e.g., Burenhult and Levinson 2008; Turk et al. 2012). Our study of landscape linguistics informs work in sociotopography (Palmer et al. 2017:457), which similarly argues that “spatial language shows sensitivity to features of the topography, but this is mediated by the way speakers interact with the landscape.”

1.1. Why landscape? A commonality to all languages is the need for a mechanism through which to describe the physical environment in which speakers interact. Though the environments are diverse, all humans experience landscape in some form, and language must be able to make reference to it, in whatever ways are necessary for human interaction and functioning. Thus, landscape provides a common domain through which cross-linguistic comparisons can be made.

Landscape terminology requires the discretization of a geologically continuous surface, such that the landscape categories that result from naming are a product of the speakers and encode culturally shaped ontologies and conceptual templates (Burenhult and Levinson 2008; Levinson 2008). Ethnophysiology studies the relationship between the continuousness of the Earth’s geological surface and inherently discretized landform terminology used to describe it. The domain of landscape is thus necessarily segmented through a linguistic/cultural system allowing for variation in the discretization of the same landscape.

Affordances are often identified as playing an important role in the construction of landscape categories, such that elements of the landscape with similar functions in human interaction are likely to be grouped together (Turk et al. 2012). Levinson (2008) suggests several possible motivations for the category formation of the landscape domain achieved linguistically: perceptual/cognitive salience, affordances, and conceptual templates and cultural beliefs. Landforms and topography, hydrology, and vegetation are the most important natural landscape domains with respect to affordances, the characteristics of the physical environment relating to its potential usability or potential interaction, in particular by humans (Turk et al. 2012:2).

Landform terms and place names are the two fundamental and universal linguistic manifestations of landscape (Burenhult and Levinson 2008). Many questions arise in regards to landscape and place names in a language: How is landscape divided into categories and what motivates this categorization? How is the landscape lexicon organized? What gets named? What land features are labelable? What is the relationship between landscape terms and place names? Does hierarchy play a role in naming practices? This article begins to address these questions for the case of Kalaallisut language use by speakers in Greenland, where the single largest category of toponyms is derived from landscape terminology.

1.2. Greenland and Kalaallisut. Research on the sociocultural conception of space and place in the Arctic (e.g., Collignon 2006; Holton 2011) has shown a deep connection between Arctic indigenous communities and their physical environment, expressed linguistically through place names, landscape, and orientation systems. The ancestors of the Inuit who inhabit Greenland today, the Thule or proto-Inuit, migrated there from western Arctic regions, arriving in the Thule (Qaanaaq) area. The date of their settlement is controversial, but archaeological evidence and carbon dating point to no later than the thirteenth century (Friesen and Arnold 2008; McGhee 2000). Prior to their arrival, Greenland was inhabited by the Dorset people, who were supplanted by the Thule; modern Inuit are descendants of the Thule people, who are named for the place in northwest Greenland where their archaeological remains were first found. The arrival of the Thule people resulted in rapid expansion along both coasts, spreading what can be considered proto-Greenlandic (Fortescue 1986). The result of this expansion was the settlement of regions along the coast, with subsequent migrations around the coast. The net result of these migrations and more recent resettlements is that the majority of the population lives in West Greenland today. Critically for our purposes, settlements are coastal, as seen in the map of Greenland in figure 1, with the area where we have focused our research circled.

Greenland encompasses more than 2 million square kilometers, and the terrain varies considerably from north to south. The northernmost parts of



FIG. 1—Map of Greenland with major towns. Created by Carmen Caswell using data from the Geological Survey of Greenland and Denmark (GEUS).

Greenland has a tundra climate with sea ice, whereas the southern part of Greenland is warm enough to support more vegetation and sheep farming. Although located above the Arctic Circle, Sisimiut is sufficiently far south not to have sea ice. Our research focuses on west Greenland, the most densely populated area of the country. In the specific area where we have conducted fieldwork, the terrain is notably rocky, with significant elevations and relatively few large flat surfaces. The overall rockiness of the terrain is notable. There are no roads connecting towns and settlements in Greenland; travel between them is by air, sea, or dogsled above the Arctic Circle. The terrain makes it impractical to impossible to construct roads between settlements and, similarly, landing strips that can service large airplanes. For this reason the major international airport is located in Kangerlussuaq, and not the capital Nuuk, the largest city (population approximately 17,000), or Sisimiut, the second largest (population 5,500). In fact, much of Greenland is serviced by heliports, not airports, as the local terrain makes it impossible to build runways for airplanes.

Almost all of the settlements in Greenland are located along the coastline, either directly on the ocean or along one of the fjords. The Greenland ice



FIG. 2—The coastline in Sisimiut

sheet covers about 80% of the country's landmass, leaving only the coastline available for permanent human settlement. The coastline is characterized by significant vertical elevation change, and the land consists of rocky permafrost. Further, this coastline is complex in shape, made up of fjords, islands, promontories, and the like. One such coastline is shown in figure 2.

The practices of naming parts of the landscape, and even the official toponyms that are derived from them, predate modern transportation, to a time when Inuit navigated by sea or over (frozen) land by dogsled. But dogsledding was possible only in the northern half of the country, and then only during certain times of the year, making waterways a primary means of travel. As we show in 4 and 5, the close relationship between landscape terminology and toponyms is apparent since these toponyms serve as landmarks, signposts to navigators, along waterways.

1.3. Overview of the paper. The body of the paper is as follows. Having introduced the general concept of landscape terminology in Greenland, we turn to a discussion of our methodology in 2. Next, we provide an overview of the Kalaallisut terminology in 3, detailing the main landscape terms and their usage. 4 then provides an analysis of these terms according to our proposed cultural ontology: we see that the basic division is between

land and water, with function (navigation and landmarks) along with shape and substance serving as key criteria for distinguishing landscape. Size is indicated by the use of augmentative or diminutive suffixes, or a combination of them, rather than lexically. This ontology is ratified by the use of a clustering technique to group like terms together as a result of a basic sorting task. Finally, in **5** we discuss how landscape terminology interacts with orientation in Kalaallisut, with brief overviews of toponyms, directionals, and landmark-based frame of reference.

2. Methods. Fieldwork for this paper was conducted on the west coast in Nuuk, the capital, and Sisimiut, the two largest cities in Greenland. The cities were selected for both dialect and spatial considerations. The standard language, which is based on West Greenlandic dialects, is the language of education, media, and government. Moreover, since Kalaallisut uses a coastal-based orientation system (5.2), relative position on Greenland is critical for understanding spatial language. Our research shows the primacy of landscape over directional terms in naming practices, although areas of Greenland are named with reference to the coastal orientation system.

The present study is an outgrowth of a place names reclamation project based in Oqaasileriffik, the Greenland Language Secretariat, the goal of which was to reinstate Inuit toponyms that had been replaced by Danish colonization. One of the authors of this paper (Grenoble) was invited to participate in this project. Because a large percentage of the toponyms are landmark-based, it became clear that a separate study of landscape terminology was warranted. Our goal here is to identify landscape terminology as used by the general public in the Nuuk and Sisimiut regions, and we worked with a range of speakers in those two areas, identified primarily through snowballing. One of the authors (Kleist Petrussen) is from Sisimiut and has also lived in Nuuk, so we used her social networks as well as others independently formed by Grenoble and McMahan. The result is a broad representation of landscape naming practices and knowledge in this area. Our interviewees do include one hunter, who can be described as having expert knowledge, but rather than focusing on what hunters know, we attempt here to give a synchronic snapshot of landscape terminology as used in the region today. This necessarily includes some variation in terms of usage and knowledge (even within a single family), as would be expected with any speaker population.

To establish a working taxonomy of landscape terminology, we worked through the *Oqaatsit* (Berthelsen et al. 2006), a dictionary of approximately 17,000 entries. The entries in *Oqaatsit* are approved by the Greenland Language Committee, which is part of the Greenland Self-Government and has authority over all official usage. *Oqaatsit* thus provides a window of access to a Greenlandic Inuit view as to which terms are seen as sufficiently significant

or frequent to warrant being listed in the dictionary. The decision to use a dictionary may be surprising, but it provides an initial lexicon as a starting point. The preliminary inventory of possible landscape terminology was then reviewed with three native speakers and subsequently modified. We walked the land in Nuuk and Sisimiut with native speakers, asking them to point out the landscape and describe it, and asking for exemplars of specific terms. On subsequent walks around town, we noted uses of verbs and directional terms. Looking over maps of the greater Sisimiut and Nuuk areas with speakers allowed us to target larger-scale coastal landscape and seascape features, as well as providing information about use of the orientation system. Finally, we elicited brief travel narratives that use landscape features as landmarks to see how they combine with the directional system and motion verbs. These studies formed the initial basis of the ontology proposed here, which was tested by a categorization task in which speakers were asked to sort landscape terms, written on index cards, into groups. A cluster analysis was then performed on the sorting task data to quantitatively verify our qualitative analyses.

3. Landscape terminology in Kalaallisut. We begin with the question of what entities in the landscape are named and how they are formed into categories making up the landscape lexicon. For Kalaallisut, we consider what is named through nominal stems, how these stems discretize and categorize a more or less continuous physical environment, and how they combine with suffixes to further modify landscape terms. Kalaallisut is highly polysynthetic with a complicated morphological system of both inflectional and derivational suffixes. The high number and flexibility of derivational suffixes means that word formation is very productive and can result in long words that encapsulate the meaning of an entire sentence. For our purposes, this means that a large number of landscape terms can be derived from a set of basic, unmodified forms, by adding suffixes (or other words) that specify certain attributes of the feature referenced by the term, such as size, shape, or color.

We understand *landscape* in Greenland broadly, to include the terrain, water in the land (lakes, rivers), coastal features, and sea ice (note that Turk et al. 2012 see hydrology as water in the landscape), but do not include vegetation.² The relationship between the sea and the land is complicated and changes with the seasons. Water is frozen much of the year in the far northern part

² Vegetation is not a salient aspect of the landscape in Greenland; the vegetation of the Arctic tundra is sparse, low-lying, and covered by snow for much of the year. Vegetation was not mentioned by any speakers while walking the land, describing landscape, or as missing from the sorting task. Studies of plant usage in Greenland have not shown vegetation to be a salient part of the landscape in the western part of the country, where we conducted fieldwork (see Grenoble and Whitecloud 2014; Whitecloud and Grenoble 2014).

of Greenland, and sea ice is seen by Greenlanders as an extension of the landscape or, more specifically, as a different part of it. Recognition of sea ice as an integral part of the landscape is common to Inuit living in coastal regions with sea ice in the Arctic: Krupnik et al. (2010) provides a collection of articles on the importance of sea ice (*siku*) in the pan-Inuit-Yupik context; see also Mauss (1904–1905), cited in Collignon (2006:193), and Heyes (2011). Heyes (2011) discusses the role of ice as part of the landscape of the Kangiqsualujjuaq, Inuit living in the Canadian village of Kangiqsualujjuaq in the Quebec-Labrador Peninsula. But their landscape is markedly different from any place in Greenland: the Kangiqsualujjuaq live in a coastal woodland region, remarkable from an Inuit standpoint for both its trees and extreme tidal changes, with strong tides breaking off coastal ice in the winter and reconfiguring it constantly. Nuttall (1991) similarly notes that the Inuit of Kangarsuatsiaq, in northwest Greenland, treat “ice-scape” the same way as landscape (and seascape); yet again this environment differs from the part of Greenland of focus here (Nuuk and Sisimiut), being several hundred miles further north. Gearheard et al. (2013) provide an ethnographic perspective of sea ice in the pan-Inuit Circumpolar North.

Thus sea ice is an important part of the landscape for Inuit in the far northern regions of Greenland, as it is for other Arctic indigenous regions; the Inuit have developed a complex sea ice terminology to describe it. In Greenland, knowledge of sea ice and sea ice terminology is tied to how one engages with the land. In the more southern areas where we have conducted fieldwork,³ there is no sea ice. Thus it is not part of the local landscape and people in this part of Greenland and our consultants in the Sisimiut and Nuuk areas consistently told us that they do not know about sea ice.

As noted above, Unangan-Yupik-Inuit speakers live across a broad region of the Arctic and Subarctic. They share their linguistic and cultural heritage, but with important differences in each area, not only because of the historically different patterns of colonization in Russia, the United States, Canada, and Greenland/Denmark, but also because of the differences in landscape. As Holton (2011) points out, the directional systems in Alaska and western Canada are riverine, not coastal as in Greenland. Moreover, Inuit in Alaska and Canada have inland settlements; Greenlanders live only on the coast. Their view of the landscape, and their use of the land, differ accordingly. Fortescue (2011) discusses this adaptation of the Yupik-Inuit directional systems to different environments across space and time further.

We present an inventory of landscape terminology in table 1. The terminology associated with each major geographical zone is then described. Note that not all of these land/seascape terms are known to all speakers. For the most

³ “Southern” regions in Greenland are still north of much of the settled regions of the world.

TABLE 1
KALAALLISUT LANDSCAPE/SEASCAPE TERMS

Terms	Gloss
Landscape features	
<i>nuna</i>	land
<i>qaqqaq</i>	mountain, hill
<i>qaarsoq</i>	attached rock
<i>ujarak</i>	rock
<i>pingu</i>	mound
<i>innvik</i>	peak
<i>innaq</i>	rock-faced cliff
<i>narsaq</i>	plain
<i>qooroq</i>	valley
<i>qassi</i>	low area between hills
<i>quppaq</i>	crack, crevasse
<i>qunneq</i>	ravine, ditch
<i>qoornoq</i>	gulch
<i>qaarusuk</i>	cave
<i>kuuk</i>	river, stream
<i>taseq</i>	lake, pond
Seascape features	
<i>imaq</i>	sea
<i>kangeq</i>	cape, headland
<i>nuuk</i>	promontory
<i>kangerluk</i>	fjord
<i>(kangerlup) qinngua</i>	head of a fjord (innermost part)
<i>(kangerlup) paava</i>	mouth of a fjord (opening)
<i>ikeq</i>	inlet mouth
<i>eqi</i>	cove
<i>qeqertaq</i>	island
<i>ikkarluk</i>	skerry
<i>ippik</i>	sandy cliff
<i>sisaaq</i>	shore

part, younger speakers knew fewer than older speakers. Specifically, *pingu* ‘mound’, *innvik* ‘peak’, *qassi* ‘low area between hills’, *eqi* ‘cove’, *ikkarluk* ‘skerry’, and *ippik* ‘sandy cliff’ are known by older speakers, and they have been fossilized in toponyms, but they are not actively used by all speakers in describing the landscape today. Several more terms were not known by the youngest speakers we interviewed: *qooroq* ‘valley’, *qunneq* ‘ravine, ditch’, and *kangeq* ‘cape’. See 4.3.1 for more details about knowledge of individual landscape terms.



FIG. 3—*qaqqat* ‘mountains’

3.1. Landscape features. Topological landscape features include convexities/eminences, concavities, and horizontal areas. Kalaallisut has three main terms used to cover the spectrum of rocky convex landforms in the Greenlandic landscape: *qaqqaq*, *qaarsoq*, and *ujarak*. To either extreme are *qaqqaq*, which is the generic term for large, convex landforms, and *ujarak*, which labels pieces of rock. *Qaarsoq* lies somewhere in between; it is specifically attached to the land. Thus a part of a *qaarsoq* is an *ujarak*; a *qaarsoq* can be attached to a *qaqqaq*. All three are distinguished by shape and function.

Qaqqaq is the main stem used for convexities within the rocky landscape. At first glance ‘mountain’ appears to be a fitting translation of *qaqqaq*, yet in several ways the extension of the term mismatches that of English ‘mountain’. The extension of the stem includes mountains of all sizes as well as smaller convexities and hills, but always made of rock. The word *qaqqaq* along with words derived from that stem, such as *qaqqaaaraq* (*qaqqaq* ‘mountain’ + *-araq* ‘little’) or *qaqqarsuaq* (*qaqqaq* + *-suaq* ‘big’), are used to label much of the convex landforms occupying the landscape of Greenland (figures 3 and 4). These are generally rocky, possibly with some vegetation cover, and may be covered in snow for much of the year. The term *ujarak* more straightforwardly matches its English gloss, ‘rock’ (in its count noun sense). The important difference between *ujarak* and other rocky parts of the landscape (such as *qaqqaq*) is that *ujarak* is not attached to the land. *Ujarat* (pl. *ujaraq*) can be



FIG. 4—*qaqqaaraq* ‘small mountain’

picked up, if they are not too heavy (as would be the case for *ujarassuaq*, *ujarak* ‘rock’ + *-suaq* ‘big’, ‘big rock’ or ‘boulder’).

Qaarsoq is a landform label that is difficult to translate into English; it is a rounded rock landform with a flat top surface, part of a *qaqqaaraq* or *qaqqaq*. The flatness of the surface allows one to sit on it. Walking around in Nuuk, one speaker explained that a *qaqqaq* may be made up of many *qaarsut* (pl. *qaarsoq*), such that patches of vegetation break up *qaarsoq* from *qaarsoq*, but underneath everything is connected into a single *qaqqaq* as in figure 5. The *qaarsut* encountered with speakers in Sisimiut were generally larger and more autonomous landforms, as in figure 6, where the *qaarsoq* is indicated with an arrow.

Together, *qaqqaq* and *qaarsoq* comprise the majority of the elevated landforms found around Sisimiut and Nuuk. Also made of rock is *innaq* ‘cliff’, a rock face that can occur either inland as part of a *qaqqaq* or on the coast. Whereas *qaqqaq* and *qaarsut* are made of rock, *pingu* refers to a mound or hillock of any material, such as dirt, earth, or ice, and can be very small or large. We did not encounter a *pingu* on our walks of the land. *Pingu* can also refer to the mounded top of a *qaqqaq*; it refers to the rounded, convex shape. *Inngik* can refer to the pointed peak of a *qaqqaq* or *pingu*. Other landscape terms as well as relational nouns are used to refer to parts of such landforms. For instance, the pair *saqqaq* ‘sunnyside’ versus *alanngoq* ‘shady side’ refer to different sides of *qaqqaq*. Other convex landforms make up the coastline and thus are described under seascape features.



FIG. 5—*qaarsut* in Nuuk



FIG. 6—A *qaarsoq* in Sisimiut

FIG. 7—*kuuk* ‘river/stream’

Still other types of topological features include flat and concave landforms. These are salient because they stand in direct contrast to the majority of the Greenland land mass, which consists of rocky crags and elevations. *Narsaq* is a horizontal (flat) area, similar to English ‘plain’ yet of varying size. *Qooroq* has a concave shape (‘valley’) between two mountains. Similarly, *qassi* is a low area between hills. There are multiple concave shapes: *quppaq* and *qunneq* both refer to concavities in the land or rock, but *quppaq* is narrower (such as a crack or fissure) and *qunneq* is rounder (such as a ditch or a valley), whereas *qaarusuk* denotes a cave.

Kalaallisut has many terms for navigating elevation, including slope terms which encode steepness and/or perspective. Since they do not function as basic landscape terms and are more verbally descriptive, we do not include them here but some are discussed in 5.2.

3.2. Inland water. Bodies of fresh water are often found within the landscape of Greenland. We use the term “inland” here to refer loosely to water that is in or toward the interior (of the mainland or on islands), not on the seacoast. Two landscape terms in Kalaallisut cover most inland water: *kuuk* ‘river’ and *taseq* ‘lake’. The first can refer to all kinds of flowing watercourses, from small streams to large rivers, regardless of size (figures 7 and 8). Additionally, *kuuk* may make reference to a dried-up stream bed, where a watercourse used to flow.



FIG. 8—*kuuk* ‘river/stream’

The term *taseq*, similarly, labels inland bodies of fresh (non-flowing) water, on the main island of Greenland as well as offshore islands, and it is used for freshwater bodies of various sizes (e.g., puddles, ponds, lakes) through combination with size suffixes. For instance, *taseraq* ‘puddle’, from *taseq* ‘lake’ + *-araq* ‘small’. A *taseraq* was described as a transient *taseq*—for example, one that appears after the snow melts (figure 9)—whereas small permanent ponds and lakes are simply called *taseq* (figure 10). A large *taseq* may be called a *tasersuaq* (*taseq* + *-suaq* ‘big’), as in figure 11.



FIG. 9—*taseraq* 'small lake/pond'



FIG. 10—*taseq* 'lake/pond'



FIG. 11—*tasersuaq* ‘big lake/pond’

3.3. Seascape features. At the intersection of land (*nuna*) and sea (*imaq*), we find a series of terms describing Greenland’s complex coastline (as illustrated by figure 12), most of which label coastal landforms but also coastal water features. *Sissaq* is the land that borders the sea, referring broadly to the intersection of land and sea. It is often glossed ‘beach’, though ‘shore’ may be more accurate.

As for landforms, *nuuk* and *kangeq* both make reference to coastal landforms that jut out into *imaq*. *Nuuk* is a promontory with a pointed shape (figure 13). *Ippik* is a particular kind of cliff, made of sand and located near the sea, often with flowers growing on top. The topological landform *innaq* may also occur near the sea, yet not necessarily, and it further differs from *ippik* by being made of rock.

Several terms are used for different kinds of indentations to the coastline. Especially important is *kangerluk* ‘fjord’ (figure 14), of which there are many along Greenland’s coastline. *Kangerlussuaq* (*kangerluk* ‘fjord’ + *-suaq* ‘big’), the international airport and former US military base, is located at the head of a large fjord of the same name (figure 12). The opening or mouth of a *kangerluk* is called *paava*,⁴ and the head is known as *qinngua*. An *eqi* is a

⁴ *Paava* also may refer to the openings of other objects or places (but not the human mouth, which is *qaneq*).

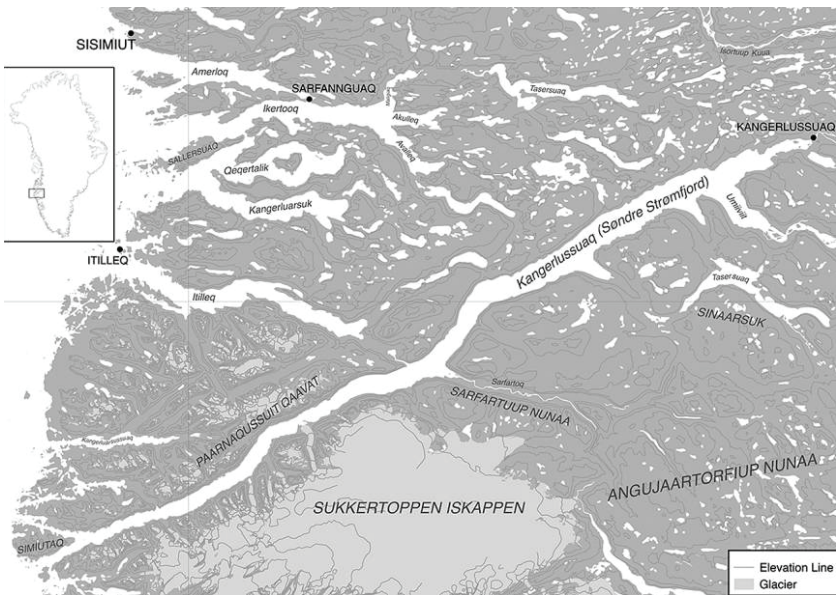


FIG. 12—Coastline around Kangerlussuaq and Sisimiut

FIG. 13—*nuuk* 'promontory' and *sissaq* 'shore'



FIG. 14—*kangerluk* ‘fjord’

cove, while *ikeq* is a constricted passage of water between two pieces of land, opening into a wide expanse of water.

Finally, another important landform is *qeqertaq* ‘island’. The term *qeqertaq* can refer to any island, surrounded by sea or fresh water.

4. A cultural ontology of landscape in Greenland. In this section we analyze the cultural ontology of landscape in Greenland, showing how naming practices are culturally situated. This includes a discussion of what is labeled, how it is labeled, and how the terms are organized within a conceptual ontology of the Greenlandic landscape. Two main methods were used in reaching the analysis proposed in this section: fieldwork and a sorting task, discussed in detail below.

Not surprisingly, the landscape lexicon is anchored in the physical environment of Greenland, one that is defined by a juxtaposition of rocky land and water (which may be frozen during parts of the year). Thus the major division in the landscape terminology is between land (including rocks) and water; however, this division is not straightforward from an outsider’s (or non-Inuit) perspective, as discussed in 4.3.

4.1. Navigation. Transportation between settlements in Greenland, historically and today, is largely by boat or by ski mobile or dog sled (in Sisimiut and further north), although changes in climate have limited the use

of dog sleds. No roadways connect towns and cities in Greenland. Travel is by boat or air, and the national airline, Air Greenland, flies a fleet of both planes and helicopters; many towns do not have sufficient land for runways and heliports are common. Travel by air is expensive, and the use of boats for travel and recreation is widespread.

Beyond the basic dichotomy of land versus water, navigation, broadly defined, (and, by extension, the need to survive) is a major factor in determining which land features are labeled. The semantic field includes navigation points, such as landmarks, obstacles, hazards and places of safety (havens, refuges), and information about terrain. The prominence of coastal features attests to the need for identifiable wayposts while traveling in sea waters. Thus, which landforms are both labelable and labeled is determined by overarching functional needs and for remembering important hunting and fishing locations in terms of navigation. That is, landscape terminology serves to specify landmarks on navigation routes on waterways and over land. Formations that are singled out for labels (and proper names; 5.1) not only divide the landscape into different cognitive categories but frequently function as landmarks, over multiple routes in multiple regions. For this reason, we see extensive duplication of toponyms: the kinds of landforms that serve as landmarks are ubiquitous in Greenland. For example, since the presence of a large fjord is relevant for travel, there are multiple uses of the proper name *Kangerlussuaq* ‘Big Fjord’ in Greenland.

Many other landscape terms, however, encode important information about terrain, slope, and elevation, all of which function to provide information on potential travel routes. The labels can serve the dual role of indexing specific landmarks along a route while also providing topographical detail about a route. Thus a fjord (*kangerluk*) can function as a landmark but also indexes a navigable waterway. Certain terms in Kalaallisut do not specify routes as they generally do in other languages. For example, in many cultures, the word for “river” indexes a waterway, a route for travel by water. But the word *kuuk* does not necessarily reference a navigable waterway, but rather the channel in which fresh water would flow if it were there.⁵ In actual use, *kuuk* can reference flowing fresh water or a stream or riverbed, but the size of the channel and the actual presence of flowing water are not inherently part of the lexical meaning. In contrast, in English a stream is smaller than a river, and is defined as “a course of water flowing continuously along a bed on the earth, forming a river, rivulet, or brook” (OED 2016), and river is defined with reference to a stream: “A large natural stream of water flowing in a channel to the sea, a lake, or another, usually larger, stream of the same kind” (OED 2016). In English, both words indicate flowing water, and “river” references size. But

⁵ It also means ‘to flow’, as in *kuuppoq* ‘it flows/flowed’.

in Kalaallisut, neither size nor the presence of flowing water are necessary for use of the word *kuuk*, which does not give any indication about whether the waterway is navigable.

Another example is *ippik*, defined in *Oqaatsit* as Danish *klint* ‘cliff’, but which was consistently described by speakers as ‘a way you can get down to the sea from the land’. We understand this to be indexing functionality as a potential pathway—walkable land between water and land along the coast. Thus *ippik* refers to a very specific kind of cliff, whereas the Danish and English translations are more generic and not semantically or pragmatically equivalent. This underscores the fact that there is not a direct correlation between terms in Kalaallisut on the one hand, and English on the other; differences can be masked by translation.

Furthermore, many landscape-related terms encode a particular point of reference, which suggests a high degree of navigational functionality. This deictic element can be found predominantly in slope terms as well as in terms used for navigating the coastline and fjords. *Qummukajaaq* and *ammukajaaq*, for instance, both denote a slope but specify different relative orientations to that slope: the former specifies an upward slope (looking up from the bottom) whereas the latter specifies a downward slope as seen from the top. These terms are related to allative case adverbs *qummut* ‘(to) upwards’ and *ammut* ‘(to) downwards’. *Kussangajaaq* similarly denotes a steep slope extending downwards from the point of reference. Such slope terms are morphologically related to verbs specifying either particular movement up/down a slope or the quality of sloping in a particular way. They encode information about the position of the speaker relative to the topographical elevation. *Majoqqaq* means something you travel on going ‘upwards’, which could be an upward slope, a river you travel upstream, etc. The use of such words indexes one’s position within a local deictic system, interfacing with the demonstratives (5.2) and situated within the landscape. Similarly, other landscape terms refer to aspects of the coastline from particular reference points; *itilleq* and *itinneq* both make reference to an overland crossing between two fjords, with the former being from the perspective of the sea and the latter from that of the land. Such landscape terms highlight the significant role played by navigation and function within the landscape domain.

4.2. Shape and function over scale. An overarching factor reflected in the categorization of landforms in the Kalaallisut landscape lexicon is the importance of shape over size; this is an ontological primary. (The word *kuuk* is a prime example of this fact; see 3.2) For the Kalaallisut landscape stems, scale is of minimal importance in determining the extension of the base noun (the set of landforms to which the term may refer). Moreover, in comparing one landscape term with another, scale does not emerge as

an important property for capturing the crucial differences between different terms. Rather, suffixes are added to bases to provide information about scale. Two of the most frequent are *-araq* ‘small’ and *-suaq* ‘big’. They can be added recursively to amplify size (large or small) and can be combined to modify one another, as in *kangerlussuaaraq* ‘pretty big fjord’: *kangerluk* ‘fjord’ + *-suaq* + *-araq*. Another example is *taseq*, which is most properly glossed as ‘body of fresh water’ without reference to scale. *Taseq* can refer to a puddle or a large lake; if the speaker wants to specify scale, a suffix may be added (3.2).

Our findings thus confirm for Greenland a conclusion reached by Holton (2011) for Alaska that Yupik-Inuit landscape terms prioritize shape over scale or extent, in contrast with Athabaskan, as revealed by elevation terms. Although the primary elevation terms in Kalaallisut differ from those given for Yupik, the conclusion remains the same—that vertical scale is less of a concern within the landscape terms themselves. This holds true across the landscape/seascape domain.

This gives a primacy of substance, shape, and function to how Kalaallisut speakers categorize the land into stems; however, the modifications given by suffixes also assert important subcategorizations within a landform ‘type’ according to scale. The basic and modified landscape terms also function as conventionalized toponyms in Greenland (5.1), wherein scale and other such modifications may play an important role in identifying particular instances of a landform.

4.3. A conceptual ontology: *imaq* vs. *nuna*. An emic categorization of Kalaallisut landscape most fundamentally breaks the domain into land versus water. However, this juxtaposition of categories is complex and is predominantly based on indexical association (contiguity) rather than on substance. One speaker described this difference in terms of *imaq* ‘sea’ or ‘ocean’; the water category comprises land/sea forms that are defined in part by *imaq*. For instance, *kangerluk* ‘fjord’ and *qooroq* ‘valley’ have roughly the same concave shape, but *kangerluk* is filled with *imaq* (which is crucially what makes something a *kangerluk*). Broadly, the landscape domain is made up of those features that are defined in relation to *imaq* and those that are not. In terms of substance, features made of land instead of water are part of *nuna*, yet generally coastal landforms are conceptualized within the *imaq* category. We denote these abstract and flexible categories here as WATER and LAND.

Inland water features (*kuuk* ‘stream/river’ and *taseq* ‘pond/lake’) are not straightforwardly part of water or land, as confirmed by the sorting task results (4.3.1). Depending on which features are emphasized, they could be categorized with WATER (for substance) or with LAND (based on contiguity; rivers and lakes are often found around mountains, valleys, and plains). Similar to

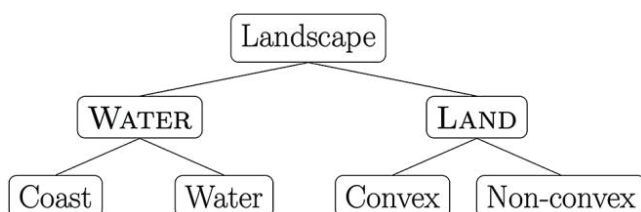


FIG. 15—Cultural/conceptual ontology of Kalaallisut landscape

inland water, *qeqertat* ‘islands’ also occupy a middle ground or almost fall outside the basic dichotomy.

Within these groups, we can further break them down into categories based on substance and shape. The basic ontology is represented in figure 15.

4.3.1. Sorting task. In order to verify how speakers categorize the terms, we devised a basic sorting task, with 20 Kalaallisut landscape terms written on index cards, and asked speakers to sort them according to similarity. All participants were fully fluent in Kalaallisut with high literacy skills, proficient in both reading and writing, and most were also proficient in Danish and English. We tested 25 speakers, men and women, ranging in ages from 22 to 65. This was a convenience sample created using the basic snowball technique: we contacted our own acquaintances and then, with their help, their acquaintances. Our goal was to get a sense of how the general population in West Greenland understands landscape terminology, rather than to test expert knowledge of, say, hunters.⁶ The test was conducted in Nuuk, although many of the speakers were born elsewhere.

The 20 terms provided in table 2 were selected to include the most common landscape terms, terms from across different geophysical zones (e.g., concave and convex landforms, coastal features, and water features), as well as several less common terms. Based on our own knowledge of the topography of the Nuuk and Sisimiut regions, we anticipated that most of the landforms found there could be appropriately labeled with these terms.

⁶ Many Greenlanders engage in hunting and fishing to some extent, even if they are not professional hunters. We single out hunters here as a group of people who may know the land and sea from a different perspective, perhaps more intimately, than people whose livelihood does not depend on the land. Professional hunters and fishers are represented in their professional organization, KNAPK (Kalaallit Nunaanni Aalisartut Piniartullu Kattuffiat, the Association of Fishermen and Hunters of Greenland, www.knapk.gl), which represents modern-day hunters and fishermen and defends their interests in an international arena. Testing the understanding of landscape, seascape, and ice terminology with this group would be an interesting project, but our focus here is somewhat different—looking at the speaker population more broadly.

TABLE 2
SORTING TASK WORDS

Terms	Gloss
<i>qaqqaq</i>	mountain, hill
<i>qaarsoq</i>	attached rock
<i>ujarak</i>	rock
<i>narsaq</i>	plain
<i>qassi</i>	low area between hills
<i>kangeq</i>	cape, headland
<i>nuuk</i>	promontory
<i>kangerluk</i>	fjord
<i>eqi</i>	cove
<i>taseq</i>	lake, pond
<i>sissaq</i>	shore
<i>ippik</i>	sandy cliff
<i>qooroq</i>	valley
<i>kuuk</i>	river, stream
<i>qunneq</i>	ravine, ditch
<i>qeqertaq</i>	island
<i>pingu</i>	mound
<i>innvik</i>	peak
<i>imaq</i>	sea
<i>majoqqaq</i>	something you climb up

Each card had one single word written in Kalaallisut, and that was the only information on the card. Consultants first performed a sorting task with animal names as a warm-up exercise, having received the basic instruction to sort them according to similarity. This warm-up exercise was used to familiarize the speakers with the concept. Speakers were not told the focus of the research. We shuffled the cards prior to each test. Speakers were tested individually, and they were directed to put the words into groups; if they asked for further instructions, we simply told them to sort however they wanted to. The number of groups was left up to the speaker, as well as the number of cards in a group (e.g., a card could be in a group on its own). If the speakers did not know a particular word, they were instructed to set it aside. Once the sorting was finished, we asked each speaker to explain the rationale behind their overall sorting strategy. Sometimes a speaker would assign names or descriptions to particular groups, but not always (and we did not ask them to do this, only to explain groups where clarification was needed). Some speakers proposed a sorting and then resorted, discussing their strategies and pointing out that different criteria would lead to different sortings. They were told just to pick whatever system they thought was best, and the different strategies were noted.

TABLE 3
SORTING BY SUBSTANCE

Group 1 (water)	Group 2 (rock)
1. <i>imaq</i> 'sea'	1. <i>qaqqaq</i> 'mountain, hill'
2. <i>kuuk</i> 'river, stream'	2. <i>qaarsoq</i> 'attached rock'
3. <i>kangerluk</i> 'fjord'	3. <i>ujarak</i> 'rock'
4. <i>taseq</i> 'lake, pond'	4. <i>inngik</i> 'peak'

TABLE 4
SORTING BY SHAPE AND CONTIGUITY

Group 1	Group 2
1. <i>qaqqaq</i> 'mountain, hill'	1. <i>nuuk</i> 'promontory'
2. <i>qaarsoq</i> 'attached rock'	2. <i>kangerluk</i> 'fjord'
3. <i>ujarak</i> 'rock'	3. <i>eqi</i> 'cove'
4. <i>pingu</i> 'mound'	4. <i>sissaq</i> 'shore'
5. <i>inngik</i> 'peak'	5. <i>imaq</i> 'sea'

The results confirmed our analysis of Kalaallisut landscape based on field-work, in addition to providing further detail about how the landscape domain is conceptualized and structured. No two speakers sorted the terms exactly the same way, but several broad patterns are apparent. The major division for speakers that emerges is some version of the LAND VERSUS WATER distinction (including a distinction between inland and coastal landforms), with different possibilities for which criteria are highlighted in making the division.

So, one speaker emphasized substance in making this distinction, sorting the terms into two basic categories as shown in table 3.

Shape further emerges in the sorting task as an ontological primary that cuts across this categorization of substance. One speaker grouped the following terms together as in table 4. We see that group 1 comprises terms that reference landmass and convexities (shape). Group 2, however, includes both landmass and water, but only landmass that is, by definition, in contact with water.

A further example is the word *kuuk* 'river, stream', which one speaker sorted together with *qooroq* 'valley', explaining that she conceptualizes them as going together because they are found together, and because the shape of the river/stream bed is concave, such as the shape of the valley. But two other speakers grouped *kuuk* with a larger category of water terms that includes both sea and inland water, such as *taseq* 'lake, pond', *imaq* 'sea', and *sissaq* 'shore'. Some people put terms such as *nuuk* 'headland' and *kangerluk* 'fjord' with sea terms; others put them with coastal features. So there is some variation across speakers, but the overarching distinction between land and water, and the primacy of shape, are common to all classifications.

TABLE 5
ANOTHER SORTING BASED ON SUBSTANCE

Group 1	Group 2
1. <i>ippik</i> 'sandy cliff'	1. <i>qaqqaq</i> 'mountain, hill'
2. <i>narsaq</i> 'plain'	2. <i>qaarsoq</i> 'attached rock'
3. <i>qooroq</i> 'valley'	3. <i>ujarak</i> 'rock'
	4. <i>innigik</i> 'peak'
	5. <i>qunneq</i> 'ravine, ditch'

TABLE 6
SORTING BASED ON GEOPHYSICAL CONTIGUITY

Group 1: "What I find walking in nature"	Group 2: "Around the beach"
1. <i>narsaq</i> 'plain'	1. <i>ippik</i> 'sandy cliff'
2. <i>qooroq</i> 'valley'	2. <i>sissaq</i> 'shore'
3. <i>qunneq</i> 'ravine, ditch'	3. <i>imaq</i> 'sea'
4. <i>kuuk</i> 'river, stream'	4. <i>qeqertaq</i> 'island'
5. <i>taseq</i> 'lake, pond'	

Another sorting scheme (table 5) based on substance distinguished between "soft, green" features of the landscape (group 1) and "sharp, hard and cold" features (group 2): This speaker also sorted the terms into a coastal landform group (*kangerluk*, *kangeq*, *nuuk*) and a water group (*sissaq*, *imaq*, *taseq*, *kuuk*), with *qeqertaq* 'island' by itself.

Beyond the land/water distinction, another sorting strategy employed by many speakers was to group terms according to geophysical contiguity, as in table 6.⁷ This speaker created a group (1) of landscape features typically found while walking in nature, and another group (2) of features found around the beach. These groups were contrasted with a rock/mountain group (*ujarak*, *qaarsoq*, *qaqqaq*, *innigik*) and a coastal landform group (*nuuk*, *kangeq*, *kangerluk*). Interestingly, this speaker gave a further option to pull *imaq* 'sea', *kuuk* 'river', and *taseq* 'lake' from groups 1 and 2 in table 6 into a third possible category based on substance (water).

Sometimes, groupings were organized around central concepts, such as those shown in table 7. This speaker provided four main categories centered around 'water', 'rock', 'valley', and 'mountain'. We asked for clarification of the 'valley' group (group 3), to which the speaker responded that a *kangerluk* 'fjord' would be a *qooroq* 'valley' if the sea vanished. It is thus clear that this

⁷ In fact, several speakers began by arranging the index cards in space according to their typical geophysical locations in nature.

TABLE 7
SORTING BASED ON CENTRAL CONCEPTS

Group 1: “related to water”	Group 3: “related to valley”
1. <i>kuuk</i> ‘river, stream’	1. <i>ippik</i> ‘sandy cliff’
2. <i>taseq</i> ‘lake, pond’	2. <i>qunneq</i> ‘ravine, ditch’
3. <i>sissaq</i> ‘shore’	3. <i>kangerluk</i> ‘fjord’
4. <i>imaq</i> ‘sea’	
Group 2: “related to rock”	Group 4: “related to mountain”
1. <i>narsaq</i> ‘plain’	1. <i>qaqqaq</i> ‘mountain, hill’
2. <i>ujarak</i> ‘rock’	2. <i>ippik</i> ‘sandy cliff’
	3. <i>inngik</i> ‘peak’

TABLE 8
SUBGROUPING OF WATER GROUP

Group 1a: “inside shore”	Group 1b: “outside shore”
1. <i>kangerluk</i> ‘fjord’	1. <i>imaq</i> ‘sea’
2. <i>kangeq</i> ‘cape’	2. <i>taseq</i> ‘lake’
3. <i>sissaq</i> ‘shore’	3. <i>qeqertaq</i> ‘island’
4. <i>kuuk</i> ‘river, stream’	

particular group is based on shape (i.e., the concave shape of a valley); the ‘mountain’ group (group 4) similarly contains particularly convex landforms, of which *qaqqaq* ‘mountain/hill’ is prototypical. Groups 1 and 2, on the other hand, appear to be based on substance (rock and water).

Finally, a clearly hierarchical landscape ontology emerged as speakers indicated subgroups within larger groups along predictable patterns. For instance, one speaker began with a typical ‘water’ category, then decided to break it into two groups (shown in table 8). The speaker described group 1a as “inside the shore” and group 1b as “outside the shore.” In other words, the landscape features in group 1a are part of the coastline (or intersect with the coastline, as in *kuuk*), whereas the group 1b features are not part of the coastline. Such subgroupings indicate that the landscape ontology is indeed hierarchical (shown in more detail in 4.3.2).

4.3.2. Cluster analysis. In order to confirm our impression of the sorting task results, we applied a computational technique to sort the data into a tree depending upon how likely words were to be sorted in the same groups (Rokach 2010). Specifically, we performed agglomerative clustering with the SciPy software package using Jaccard distance to calculate the distances between words and mean distance to calculate distances between groups.⁸ We

⁸ The Jaccard distance between two words is equal to one minus the number of categories that include both words divided by the number of categories that include either word. Thus,

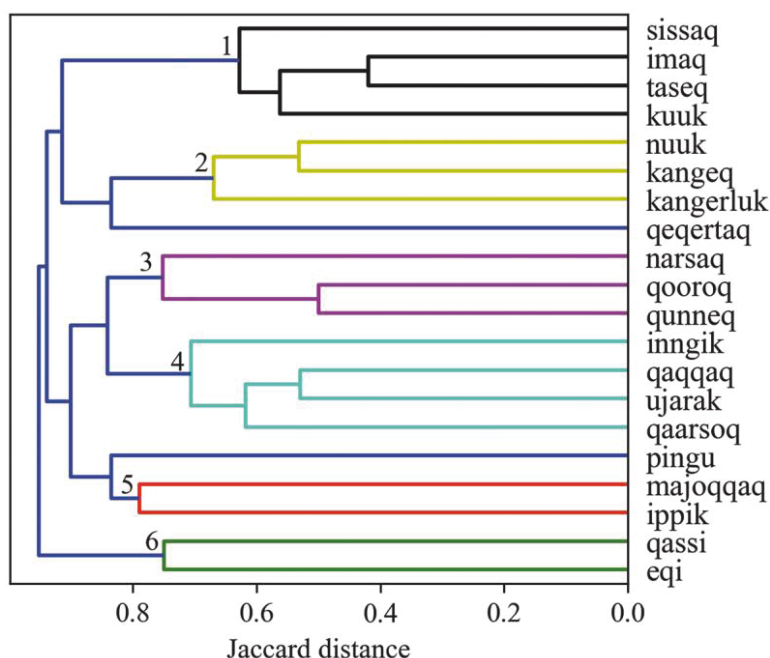


FIG. 16—Clustering of the sorting task results

provide the raw sorting task data in the appendix. The dendrogram in figure 16 shows the resulting hierarchy of clusters. Each horizontal line represents a cluster. A vertical line connecting two horizontal lines indicates the merging of those two clusters. The x position of the vertical line indicates the distance of the two clusters when they were merged.

The results of the clustering technique confirmed the ontology we developed from a preliminary, qualitative analysis of the sorting task data. At the highest level (the far left on figure 16) the words are sorted into two clusters. The largest, uppermost group (clusters 1–5) consists of the majority of the landscape terms; the two terms in a separate cluster (cluster 6, shown in green; *eqi* ‘cove’ and *qassi* ‘lowland’) were not known to a majority of speakers. The largest cluster then breaks up into two primary subclusters, representing

if two words are in exactly the same categories, they will have a Jaccard distance of 0. If two words are in completely distinct categories, they will have a Jaccard distance of 1. Agglomerative clustering produces a hierarchy of clusters in the following way: each word is put into a cluster by itself. The two closest clusters are then merged, with the distance between two clusters representing the mean of the distances between their constituent words. This merging process is repeated until only a single cluster remains.

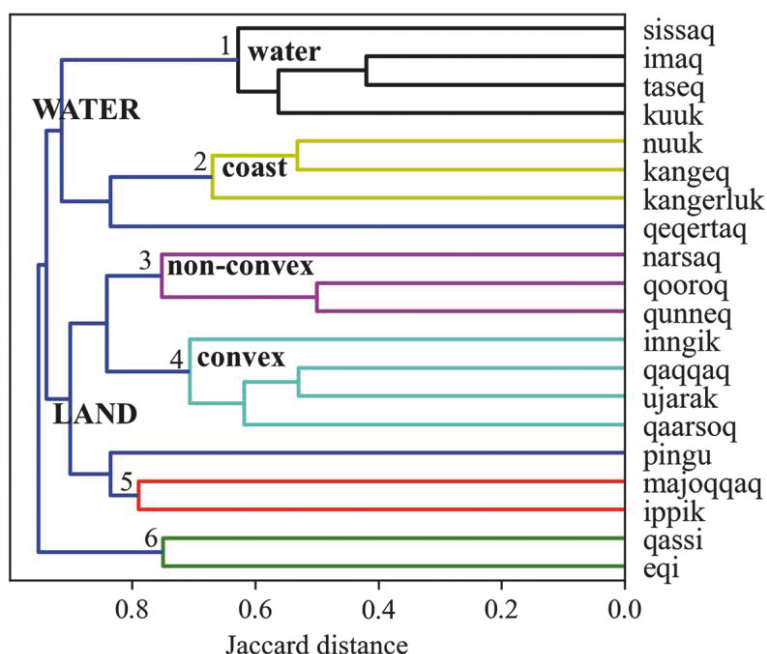


FIG. 17—Ontological categories found in clustering results

our WATER (*imaq*) versus LAND (*nuna*) distinction. The (uppermost) WATER cluster further separates into two main groups as represented by the black and yellow lines, the black cluster (1) being water in the strictest sense and the yellow cluster (2) being coastal landforms. *Qeqertaq* ‘island’ is loosely associated with the coastal landform group, representing the hesitation of many of our participants to put it into a group. Within the LAND cluster, the primary distinction separates another group of lesser-known landscape terms (*pingu* ‘mound’, *majoqqaq* ‘something you climb up’, *ippik* ‘sandy cliff’) from the rest of the LAND cluster. These three lesser-known terms loosely cluster with the LAND category, being more likely to occur with those terms than with any other categories. Finally, the clusters shown in purple (3) and light blue (4) represent the main breakdown of the LAND cluster into flat/concave landforms and convex landforms/rocks. The categories are labeled in figure 17.

We found that speaker age correlates with the number of landscape terms known. Younger speakers knew significantly fewer terms than older speakers, and the terms not known by all speakers were consistent (see bottom of figures 16 and 17). Overall, the terms known and their specific denotation reflect the background of the speaker and the location of use. Similar to the

effect of age on landscape knowledge, the specific variant of the landscape lexicon used by speakers in a given part of Greenland is anchored within that particular physical environment. For instance, the application of the term *qaarsoq* varied subtly in Sisimiut and in Nuuk; in the former, *qaarsoq* was used more for semi-autonomous landforms (with an emphasized flat top) whereas in Nuuk, the term was more often applied to flat parts of a larger *qaqqaaraq*. Likewise, use of sea ice terminology is highly dependent on the location in Greenland, as discussed in 3.

Finally, in order to calculate the diversity in speaker judgment, the Simpson Diversity Index is calculated based on the number of speakers and number of categories that each individual speaker used in the sorting task. The resulting value is 0.867, signaling a high diversity of opinion in the number of categories. This is not surprising since the sorting is a subjective task; as mentioned above, no two speakers categorized the terms identically. Despite the diversity of opinion among speakers, the clustering analysis nonetheless reveals robust, large-scale patterns in the data which support our proposed ontology.

5. Landscape and spatial orientation. The Kalaallisut landscape plays a significant role throughout the broader spatial domain, particularly in spatial orientation. 4.1 showed that navigation is a major factor within the landscape lexicon, both in identifying what is labeled and in the meanings of those terms. The reverse is also true: the conceptualization of the environment encoded in the Kalaallisut landscape lexicon is a major factor in navigation and in the associated domains of spatial orientation. In this section, we show the importance of landscape in place naming, deictic and cardinal orientation, and the frames used for navigation.

5.1. Landscape terminology and toponyms. Our investigation of landscape terminology was initially inspired by work on toponyms, and a study of landscape terminology is incomplete without some discussion of them. Toponyms in Greenland can be divided into the following basic semantic categories: landscape (or natural features), location (or cardinal directions), animals, implements and tools, body parts (or possibly a sub-category of shape), activities (or the place where X occurs or did occur), color, and shape. Landscape-based toponyms comprise the largest category by far; their prevalence has been documented in other Inuit-speaking regions as well (Collignon 2006).

Toponyms can function like other nouns as landmarks (Palmer 2015:202). In the case of Greenland, landscape terms often serve as toponyms and landmarks, making it challenging to distinguish the two. In this we recognize the authority of the Place Names Committee, which completed an indigenous place names reclamation project, working with speakers in each area and

TABLE 9
MOST FREQUENT TOPONYMS IN SISIMIUT AREA

NUNA				<i>N</i> †
convex	<i>qaqqaq</i>	mountain/hill	Qaqqaq	5
	<i>qaarsoq</i>	attached rock	Qaarsoq	21
	<i>ujarak</i>	stone	Ujarassuaq	5
flat/concave	<i>narsaq</i>	plain	Narsaq	4
	<i>qooroq</i>	valley	Qooroq	6
	<i>qunneq</i>	ravine	Qunneq	4
IMAQ				
water	<i>taseq</i>	lake/pond	Taseq	13
	<i>kuuk</i>	river/stream	Kuuk	15
coast	<i>nuuk</i>	promontory	Nuuk	26
	<i>kangerluk</i>	fjord	Kangerlussuaq	19
	<i>qeqertaq</i>	island	Qeqertaq	32
	<i>ikkarluk</i>	skerry	Ikkarluk	13

† Numbers of places with that toponym in the Sisimiut area

comparing their knowledge with the records from historical maps supplied by Danish cartographers.⁹

Landscape terms combine with other specificational features within place names to indicate size, color, relative position, and evaluation. Evaluative suffixes include such categories as ‘nice’, ‘good’ or ‘bad’. Both modified and unmodified landscape terms can serve as toponyms, as in unmodified *nuuk* ‘headland’ and Nuuk, the capital of Greenland, or modified *kangerlussuaq* (*kangerluk* ‘fjord’ + *-suaq* ‘big’) and Kangerlussuaq, the major international airport and former US base. Some of the possibilities are illustrated in the following toponyms, all using the basic word *nuuk* ‘headland’:

1. Nuuk Qaqortoq: *nuuk* + *qaqortoq* ‘white’ (color)
2. Nuummiut: *nuuk* + *-miuq* ‘one from’ + *-t* (abs/rel.pl) (place)
3. Nuunnguaq: *nuuk* + *-nguaq* ‘small, lovable, dear’ (evaluation)
4. Nuukassak: *nuuk* + *-kassak* ‘bad, poor’ (evaluation)
5. Nuussuaq: *nuuk* + *-suaq* ‘big’ (size)
6. Nuussuatsiaq: *nuuk* + *-suaq* ‘big’ + *-tsiaq* ‘fair-sized’ (size)
7. Nuussuaq Kangilleq: *nuuk* + *-suaq* ‘big’ + *kangilleq* ‘a neighbor to the east’ (location)
8. Nuussuaq Killeq: *nuuk* + *-suaq* ‘big’ + *killeq* ‘west’ (location)

The most frequent toponyms in the Sisimiut area are based on landscape terminology. They are summarized in table 9; two of them occur in the modified

⁹ Personal communication, Carl Chr. Olsen (puju), former Chair of the Place Names Committee.

form (*Kangerlussuaq* ‘Big Fjord’ and *Ujarassuaq* ‘Big Rock’), whereas the others are unmodified. From an outsider’s perspective, there is remarkable repetition between some of these names, although this is not at all unusual in Greenland.

A landmark-based toponym can serve as the anchor for locating other named places, and thus named landscape formations, in relation to it. An example from the Sisimiut region illustrates this point. The basic term *pingu* ‘mound’ is used as a toponym anchor (and listed on official maps): Pingu (54° 7′ 59.1″ W, 67° 24′ 24.1″ N). Two other “mounds” are positioned in relation to it.

- (1) Pingup Sallia¹⁰
pingu-p salleeq-a
mound-ERG side-3SG
‘the one on the side of the mound’
- (2) Pingup Kangilia
pingu-p kangilleq-a
mound-ERG neighbor.to.east-3SG
‘the neighbor to the east of the mound’

Viewed on a map, (1) is located southeast of Pingu and (2) to the northwest; that is, both are located relative to Pingu.

In sum, there is a clear interaction between landscape terminology and place-naming strategies. We see that the landforms that are singled out for naming have lexical labels with a functional purpose, indexing landmarks or navigable routes. By the same token, many of the places that have official names are landforms that function as landmarks. This set of naming practices is directly anchored in Inuit culture, which even today has hunters traveling great distances over water or land to hunt sea and land mammals.

5.2. Spatial deixis and orientation. The role of landscape in navigation is highlighted by Kalaallisut’s coastal orientation system and landmark-based navigation. This orientation system—which shapes part of the demonstrative paradigm and the cardinal directions—is made up of two orthogonal axes anchored by Greenland’s coastal configuration (Fortescue 1988). Demonstrative *qav-* and directional *kujat-* refer to the leftward direction along the coastline while facing out to sea, and *av-* refers in the rightward direction. The orthogonal axis, perpendicular to the coastline, is a seaward-landward axis, represented by directional *kit-* and demonstrative

¹⁰ The glossing abbreviations used here are as follows: ABL = ablative case; ABS = absolutive case; ALL = allative case; CONJ = conjunction; CONT = contemporative mood; ERG = ergative case; HAB = habitual; IND = indicative mood; INSTR = instrumental case; LOC = locative case; PL = plural; POS = possessed; PROS = prosecutive case; PROX = proximal demonstrative; SG = singular.

TABLE 10
CARDINAL DIRECTIONS (FORTESCUE 1988:364)

Term	Direction	Coastal configuration
<i>avannaa</i>	north	up the coast
<i>kitaa</i>	west	towards the sea
<i>kangia (tunua)</i>	east	inland
<i>kujataa</i>	south	down the coast

TABLE 11
KALAALLISUT DEMONSTRATIVE STEMS

	Proximal	Distal
Horizontal	<i>uv-, ma-</i>	<i>ik-</i>
Up	<i>pik-</i>	<i>pav-</i>
Down	<i>kan-</i>	<i>sam-</i>
Interior/Exterior	<i>qam-, kig-</i>	
Coast	<i>av-, qav-</i>	
	<i>(im- 'non-visible')</i>	

sam-/kan- (down or seaward) versus directional *kangi-* and demonstrative *pik-/pav-* (up or landward). This coastal system makes clear the very localized nature of the spatial system since the frame of reference shifts as the speaker (or observer) moves around the island of Greenland.

The Kalaallisut cardinal system (table 10) emerges from the anchoring of this coastal configuration to Greenland's west coast. Thus the coastal axis points north-south, and the seaward-landward axis points east-west. Fortescue (1984, 1988) states that even these orientation terms refer to the configuration of the coastline; they "may be used to gloss non-native terms for absolute north, west, east and south" (Fortescue 1984:364). In general, however, these cardinal directionals appear to function simply in their "non-native" absolute usage today.

The demonstratives similarly encode this particular coastal configuration, along with other deictic parameters, and are thus highly anchored to the landscape of Greenland. This complex demonstrative paradigm is organized by a range of semantic parameters, shown in table 11. Traditionally, the coastal demonstratives (*av-* and *qav-*) could be used to indicate different directions according to the shape of the coastline as one moved along the coast (by

land or boat), thus having an obvious function within Arctic navigation. (The system is currently undergoing change owing to a combination of factors, including cultural change and the use of GPS.)

Generally, *av-* and *qav-* presuppose an origo along the west coast, such that *av-* points roughly north (right along the coast) and *qav-* points roughly south (left). They point in relation to the macro-scale coast, regardless of small intricacies in the coastline.¹¹ It is flipped on the opposite coast, where *av-* points southward and *qav-* points northward (Fortescue et al. 2010). The up-down demonstratives (*kan-*, *sam-*, *pik-*, and *pav-*) point to referents or locations above or below the deictic origo. Again, since they are anchored to Greenland's landscape, they doubly refer to the seaward and landward directions; overall, "downward" when situated on the coast points toward the sea (*kan-* and *sam-*), whereas "upward" points inland (*pik-* and *pav-*). Again, these demonstratives may also have a roughly cardinal usage based on a west coast origo, then, with "toward the sea" pointing west and "inland" pointing east.

Apart from obvious connections to navigation, the grounding of both demonstrative and cardinal orientation systems in the coastal landscape of Greenland mirrors the conceptual ontology of landscape proposed in 4. The coastal configuration of the orientation system centers around a basic land-water interface (the coastline), which similarly represents the LAND-WATER dichotomy that forms the basis of the landscape ontology. We see this again at a lower level in the WATER (*imaq*) category, as that further breaks down into concepts of water versus land/coast based on substance. The particular geophysiography of Greenland's landscape is at the core of these spatial systems, and likewise the landscape categories are situated within the spatial coordinates of the local deictic system. Situated within this geographical coordinate system, navigation is often landmark-based, as shown in 5.3.

5.3. Landmark-based navigation. For the purposes of navigation, frames of reference are often anchored through landscape entities or place names (often, named landmarks) in Kalaallisut. This is a "landmark-based" frame, wherein the axes of the coordinate system used for location point to a local landmark (Bohnemeyer and O'Meara 2012). In describing routes around town, for instance, locally known places or landmarks often form an important basis for the series of directions. For navigation or route descriptions over a larger area, directionals are generally embedded in the landscape, and landscape entities (often named) act as spatial anchors.

¹¹ Within a fjord near Sisimiut, for instance, they would still point roughly north and south, even though the coastline along that fjord might run perpendicular (east-west). The demonstrative *qam-*, usually 'that in/out there' (on the other side of an enclosure), is used to refer to something toward the interior of a fjord (inland).

The use of a landmark-based navigation system is seen in context in the following brief narrative, in which the speaker talks about repeatedly taking hunting trips in the Sisimiut region with her family. The speaker, Miilla Lennert, is a native to Sisimiut and was 26 years old at the time of recording (5 July 2014). The narrative was elicited in Nuuk using a print map of Sisimiut as reference for grounding the narrative. While speaking, the narrator traced the route along the map with her finger, pointing at landmarks while speaking. Reindeer hunting trips; transcribed by Alliaq Kleist Petrussen:

- (3a) Ukiakkut ilaqtakkalu umiatsiamik ilummukartarpugut
 ukiaq-kkut ilaqutaq-kka=lu umiatsiaq-mik
 fall-PROG.SG family-1SG.POS.ABS=CONJ boat-INSTR.SG
 ilu-mut-kar-tar-pugut
 inside-ALL.SG-go-HAB-1PL.IND
 'In the fall, with my family, we would regularly travel inland by boat'
- (3b) Amerlukkut Ikertuukkut
 Amerloq-kkut Ikertooq-kkut
 Amerloq-PROG.SG Ikertooq-PROG.SG
 'through Amerloq, through Ikertooq'
- (3c) Maligiap qinnguanut
 Maligiap-p qinngu-a-nut
 Maligiap-ERG.SG fjord.head-3SG.POS-ALL.PL
 'to the bottom (innermost part) of Maligiap'
- (3d) taava umiatsiamik
 taava umiatsiaq-mik
 and.then boat-INSTR.SG
 'and then, by boat'
- (3e) kuukkut majoriarluta Eqalugaarniarfimmut
 kuuk-kkut majoriar-luta Eqalugaarniarfik-mut
 river-PROG.SG go.upriver-1PL.CONT Eqalugaarniarfik-ALL.SG
 'by river we go upriver to Eqalugaarniarfik'
- (3f) taava qummut pisuttarpugut
 taava qummut pisut-tar-pugut
 and.then up:ALL walk-HAB-1PL.IND
 'and then, we walk upwards'
- (3g) maani tupeqarfeqartarpugut
 ma-ani tupeqarfik-qar-tar-pugut
 PROX-LOC.SG tent.place-have-HAB-1PL.IND
 'here we have a camp'

- (3h) *taava maanngaanniit aavariartarpugut maani.*
taava ma-anngaanniit aavariar-tar-pugut ma-ani
 and.then PROX-ABL hunt.reindeer-HAB-1PL.IND PROX-LOC.SG
 ‘and then, from here, we regularly hunt reindeer here.’

Each line of the narrative contains a spatial anchor, with the exception of (3d), which uses the temporal marker *taava* ‘then’, signaling the next action in a series. Otherwise, each line moves the journey from point to point: moving inland (3a), through two fjords (Amerloq, Ikertooq) (3b), along to the head of Maligiaq fjord (3c), and then to a place named Egalugaarniarfik (3e, the place for catching Arctic cod: *eqalugaq* ‘Arctic cod’), then upwards (3f), to a point that the speaker indicates on the map, which becomes deictic origo (*maani* ‘here’; 3g, h).

To be sure, the frequent use of landmarks and toponyms in this particular narrative has to do with the fact that the speaker was explaining a route to interlocutors who had not been on the trip. Still, this narrative exemplifies the significant role played by landscape in navigation. The Greenlandic landscape is filled with named entities that act as landmarks anchoring navigation, which is further directed through the geophysical features of the land. In turn the Kalaallisut landscape lexicon is shaped by such functionality, resulting in a categorization system which provides important information about travel within the topological environment of Greenland.

6. Conclusion. Landscape terms in Kalaallisut are organized around a basic distinction of land versus water. This primacy is not surprising. People live on the coast of Greenland; there are no permanent, landlocked settlements or towns, and people live in constant dialogue with the sea and the land. The Kalaallisut directional system anchors position relative to the coastline and the sea.

Further subdivisions are organized along the parameters of substance, shape, and functionality. Size is secondary, and distinctions according to size are not lexicalized as they are in English (consider mountain versus hill), but rather derived through affixation (*qaqqaq* ‘mountain’ versus *qaqqa-araq* ‘mountain-small’). Overall, functionality is an ontological primary that is a critical factor in determining how the landscape is segmented into parts, which of these are labeled, and even which items receive official place names.

Navigation—in the broader sense of planning and following a route or a way, and in the more localized sense of determining one’s position at any given moment—is key. Navigation is an underlying concept that determines in large part what is labeled and how it is indexed. The role that navigational functionality plays in landscape terminology emerges both in the lexicon itself and in speakers’ explanations of landscape. Landmarks and pathways are named and labeled. Certain landscape terms index a function: *kangerluk*

‘fjord’ is a navigable waterway; *ippik* ‘sandy sea cliff’ provides a route from higher land to the beach, which is how speakers describe it: “you walk down it to get to the sea”; “there’s a flat place, and then it goes down, and you can walk on sand, and get to the water.” The centrality of navigation is a direct reflection of Inuit history and of the lifestyle of Inuit in Greenland today. The people migrated from great distances to Greenland, across the Arctic, and move today over land, sea, and sea ice, to hunt and gather food. Gearheard et al. (2013) provides a rich example of this engagement with one part of the landscape that we have not discussed here, sea ice. Accurate navigation is critical for survival in the Arctic, and its importance is reflected in the language.

Questions about the “meaning” of a landscape term often result in a description of its use, or of how it is experienced. An example is *qoornoq* (table 1). Many speakers do not know what it refers to, and we did not encounter anything called *qoornoq* in any of our walks on the land. However, it is found in toponyms. All speakers recognized it as the name of a place, but not everyone could define it. Berthelsen et al. (2006) defines it in Danish as *indsnævring* ‘gulch’. An older speaker explained its meaning to us by saying that “it’s land that you can’t really see before you get there, it’s kind of hiding . . . you walk along and come upon it.” Within our ontology, *qoornoq* would be classified as a concavity, but that does not begin to connect with the kind of experiential knowledge that the term invokes for this elder speaker. And that is the point here: Landscape terminology must be studied within a broader framework of spatial relations that includes not only the linguistic marking of space, but also cultural practices and the geophysical topography of Greenland. Its use is both embedded in and determined by human interactions with the natural environment.

Full understanding of the usage of these landscape terms requires a deeper ethnographic analysis of the practices in which they are embedded, and the practices they index, than we have been able to provide here. The present paper lays the foundation for such research in the future. We provide a snapshot overview of landscape terminology in West Greenland today. One aspect of our fieldwork not discussed here is that the system is currently in flux for a combination of factors. Speakers who are more actively engaged with the land and who are professional hunters know more landscape terms than do urban dwellers in Nuuk, for example. Furthermore, speaker age correlates with the number of landscape terms known. Technological changes, such as the widespread use of GPS and echo sensors, even on small, family boats, mean that people increasingly rely on GPS for navigation. The extensive use of Danish and English at least supports these changes.

APPENDIX

SPEAKER CATEGORIES, WITH ITEMS PER CATEGORY

Speaker (Gender)	Age	Category	Word	Speaker (Gender)	Age	Category	Word
F-1	38	1	ippik	M-4	40	5	qaqqaq
		1	narsaq			5	qaarsoq
		1	qooroq			5	ujarak
		1	qunneq			5	qunneq
		2	sissaq			5	qassi
		2	imaq			5	innvik
		2	taseq			5	pingu
		2	kuuk			1	ujarak
		3	kangerluk			1	qaarsoq
		3	kangeq			1	qaqqaq
		3	nuuk			1	innvik
		4	qaqqaq			2	nuuk
		4	innvik			2	kangeq
		4	qunneq			2	kangerluk
		4	ujarak			3	sissaq
		4	qaarsoq			3	ippik
		5	qeqertaq			3	imaq
M-2	25	1	qaqqaq	F-5	23	3	qeqertaq
		1	qaarsoq			4	kuuk
		1	ujarak			4	taseq
		2	imaq			4	narsaq
		2	qeqertaq			4	qooroq
		2	taseq			4	qunneq
		3	kangerluk			1	ujarak
		3	kangeq			1	qaqqaq
		3	sissaq			1	qeqertaq
		3	kuuk			2	sissaq
		4	narsaq			2	imaq
		4	nuuk			2	kuuk
F-3	29	1	imaq	M-6	23	2	taseq
		1	kangerluk			2	nuuk
		1	qeqertaq			3	narsaq
		1	eqi			1	narsaq
		2	nuuk			1	kangeq
		2	sissaq			1	nuuk
		2	eqi			1	qaqqaq
		3	taseq			1	qeqertaq
		3	kuuk			2	taseq
		4	qooroq			2	kuuk
		4	narsaq			2	imaq

Speaker (Gender)	Age	Category	Word	Speaker (Gender)	Age	Category	Word
F-7	29	2	ujarak	F-10	22	3	ujarak
		2	sissaq			3	qaqqaq
		1	taseq			3	pingu
		1	kuuk			4	taseq
		1	imaq			4	narsaq
		1	sissaq			4	qassi
		2	qaarsoq			5	qeqertaq
		2	ujarak			6	kangeq
		3	qooroq			1	taseq
		3	kangerluk			1	sissaq
		3	qunneq			1	imaq
		3	kangeq			1	kuuk
		4	qaqqaq			1	kangerluk
		4	ippik			2	nuuk
		4	innqik			2	qaqqaq
		5	nuuk			2	qooroq
		5	qeqertaq			2	eqi
M-8	42	6	narsaq	F-11	30	2	narsaq
		1	ujarak			2	ujarak
		2	imaq			2	qaarsoq
		2	kangerluk			2	qeqertaq
		2	qeqertaq			1	qaqqaq
		2	kangeq			1	ujarak
		2	sissaq			2	taseq
		2	nuuk			2	sissaq
		3	kuuk			2	kuuk
		3	taseq			2	imaq
		4	qunneq			3	qeqertaq
		4	qaqqaq			3	kangeq
		4	qaarsoq			3	kangerluk
		4	narsaq			3	nuuk
		4	qooroq			3	narsaq
		4	ippik			3	qooroq
		4	qassi			4	eqi
F-9	32	1	sissaq	F-12	62	1	nuuk
		1	nuuk			1	kangerluk
		1	imaq			1	kangeq
		1	kangerluk			1	eqi
		1	kangeq			1	qassi
		2	qooroq			2	qaarsoq
		2	qunneq			2	taseq
		2	kuuk			2	sissaq
		3	innqik			2	ippik
		3	qaarsoq			2	kuuk

Speaker (Gender)	Age	Category	Word	Speaker (Gender)	Age	Category	Word
F-13	30	2	qeqertaq	F-15	55	1	qaarsoq
		2	imaq			1	qooroq
		3	qaqqaq			1	qunneq
		3	ujarak			2	qaqqaq
		3	narsaq			2	ujarak
		3	qooroq			2	innngik
		3	qunneq			3	taseq
		3	pingu			3	sissaq
		3	innngik			4	kangerluk
		3	majoqqaq			4	eqi
		1	qaqqaq			4	qeqertaq
		1	qaarsoq			5	kuuk
		1	ujarak			5	imaq
		1	narsaq			6	narsaq
		1	kangeq			6	kangeq
		1	qooroq			6	nuuk
		1	qeqertaq	M-16	34	1	qaqqaq
		2	kangerluk			1	qaarsoq
		2	taseq			1	ujarak
		2	sissaq			1	qooroq
		2	kuuk			1	kuuk
		2	qeqertaq			1	qunneq
		2	imaq			1	qeqertaq
		3	nuuk			2	taseq
F-14	37	1	taseq			2	sissaq
		1	sissaq			2	imaq
		1	kuuk			3	narsaq
		1	imaq			3	nuuk
		2	qassi			3	kangerluk
		2	eqi	M-17	32	1	narsaq
		2	pingu			1	kangeq
		3	qaqqaq			1	nuuk
		3	qaarsoq			1	kangerluk
		3	ujarak			1	ippik
		3	qunneq			1	innngik
		3	innngik			1	majoqqaq
		4	narsaq			2	ujarak
		4	ippik			2	eqi
		4	qooroq			2	qassi
		4	majoqqaq			2	qunneq
		5	kangeq			3	qaqqaq
		5	nuuk			3	qaarsoq
		5	kangerluk			3	taseq
		5	qeqertaq			3	sissaq

Speaker (Gender)	Age	Category	Word	Speaker (Gender)	Age	Category	Word
M-18	65	3	qooroq	F-20	29	4	pingu
		3	kuuk			1	taseq
		3	qeqertaq			1	imaq
		3	pingu			2	qaarsoq
		3	imaq			2	ujarak
		1	qaqqaq			2	sissaq
		1	ujarak			3	kangeq
		1	ippik			3	nuuk
		1	pingu			4	qeqertaq
		1	majoqqaq			5	qaqqaq
		2	narsaq			5	narsaq
		2	kangeq			5	kangerluk
		2	nuuk			5	qooroq
		3	qaarsoq			5	kuuk
		3	kangerluk			5	qunneq
		3	qooroq	F-21	61	1	eqi
		3	kuuk			2	qaqqaq
		3	qunneq			2	qaarsoq
		3	innigik			2	qeqertaq
		4	qassi			2	majoqqaq
		4	eqi			3	ujarak
		4	taseq			3	sissaq
		4	sissaq			4	taseq
		4	qeqertaq			4	imaq
		4	imaq			5	narsaq
M-19	53	1	qaqqaq			5	kuuk
		1	qaarsoq			6	kangeq
		1	narsaq			6	nuuk
		1	kangeq			6	kangerluk
		1	nuuk			6	ippik
		1	qooroq			6	qooroq
		1	qunneq			6	qunneq
		1	qeqertaq			6	pingu
		1	innigik			6	innigik
		2	kangerluk	F-22	50	1	taseq
		2	taseq			1	kuuk
		2	kuuk			1	imaq
		2	imaq			2	qaarsoq
		2	majoqqaq			2	narsaq
		3	ujarak			2	sissaq
		3	sissaq			2	ippik
		3	ippik			3	kangeq
		4	qassi			3	qunneq
		4	eqi			3	qeqertaq

Speaker (Gender)	Age	Category	Word	Speaker (Gender)	Age	Category	Word
M-23	52	4	nuuk	M-25	53	5	qooroq
		4	kangerluk			5	qunneq
		4	qooroq			6	qaarsoq
		5	qaqqaq			6	ippik
		5	ujarak			6	pingu
		5	innvik			7	qeqertaq
		6	qassi			7	innvik
		1	qaqqaq			8	kangeq
		1	innvik			8	nuuk
		2	sissaq			9	qassi
		2	ippik			9	majoqqaq
		2	majoqqaq			10	eqi
		3	qaarsoq			1	qaqqaq
		3	ujarak			1	taseq
		4	taseq			1	kuuk
		4	qeqertaq			1	innvik
		4	imaq			2	nuuk
		5	qooroq			2	ippik
		5	kuuk			3	sissaq
F-24	45	5	qunneq			3	imaq
		6	narsaq			4	narsaq
		6	nuuk			4	qooroq
		7	kangeq			5	pingu
		7	kangerluk			5	majoqqaq
		1	qaqqaq			6	kangeq
		1	ujarak			6	eqi
		2	narsaq			7	kangerluk
		2	kangerluk			7	qeqertaq
		3	sissaq			8	qaarsoq
		3	eqi			8	ujarak
		4	taseq			9	qassi
		4	kuuk			9	qunneq

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