CONTRAST IN INUIT CONSONANT INVENTORIES[*]

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1. Introduction

1.1 The /t/~/j/ alternation

In Inuit dialects (and to a lesser extent in Yupik) voiceless stops alternate with voiced continuants (Kaplan 1982, Ulving 1953). Most of these consonant alternations in Inuit dialects appear to involve only voicing and frication/spirantization (North Baffin, Dorais 2003, 98-103):[1]

(1)   /p/~/v/:   sinik-**p**uŋa   taku-**v**uŋa
                        sleep-INDIC.1SG   see-INDIC.1SG
                        'I sleep'   'I see'

(2)   /k/~/ɣ/:   tikik-**k**uma   taku-**ɣ**uma
                        arrive-COND.1SG   see-COND.1SG
                        'if/when I arrive'   'if/when I see'

(3)   /q/~/ʁ/:   ama**qq**u-t   amaʁuq
                        wolf-ABS.PL   wolf.ABS.SG
                        'wolves'   'wolf'

However, the partner of /t/ in this alternation is the glide /j/ in North Baffin and a number of other dialects. This is a more complicated alternation involving more than just a change in voicing and frication.

(4)   /t/~/j/:   sinik-**t**uŋa   taku-**j**uŋa
                            sleep-PART.1SG   see-PART.1SG
                            'I sleep'   'I see'

Why is there a change of place of articulation (among other feature changes)? The /t/~/j/ alternation occurs in the same environments as the other alternations (at morpheme boundaries on suffixes and in stem-internal consonant gemination). How can we unify the alternations as a single phenonemon? It is difficult to imagine a single (plausible) phonological rule for these alternations that would subsume the /t/~/j/ alternation.

2   Variability of /t/'s partners across dialects

Another question arising from the /t/~/j/ alternation is why there is so much variability in the form of /t/'s partner across different Inuit dialects. It is realised as [j] in a number of dialects, [ɹ] in several dialects, [z] in Cape Dorset, [ʒ] in some areas of Itivimiut, [ʃ] in West Greenlandic, [l] in East Greenlandic, and [h] in Thule (Polar Greenlandic):

(5)   /t/~/ɹ/ in Uummarmiutun (Dorais, 2003, p. 48)
       a)   tautuk-**t**uatin
             see-PART.2SG
             'you (one) saw'
       b)   niʁi-**ɹ**uŋa
             eat-PART.1SG
             'I am eating'

(6)   /t/~/ɹ/ in Natsilingmiutut (p.67)
       a)   tuhaq-**t**uŋa
             hear-PART.1SG
             'I hear'
       b)   niʁi-**ɹ**uŋa
             eat-PART.1SG
             'I eat'

(7)   /t/~/ʃ/ in West Greenlandic (Rischel, 1974, p. 243)
       a)   sinit-**t**uq
             sleep-PART.3SG
             'he/she is sleeping'
       b)   aki-**ʃ**uq
             answer-PART.3SG
             'he/she is answering'

(8) /t/~/l/ in East Greenlandic (Robbe & Dorais, 1986, p. 13)
    a) tiɣit-**t**uut
       arrive-PART.1PL
       'we coming'
    b) taɣi-**l**uut
       see-PART.1PL
       'we seeing'

(9) /t/~/h/ in Thule/Polar Greenlandic (Fortescue, 1991, p. 56)
    a) tuʁaaq-**t**uq
       straight-PART.3SG
       'is straight'
    b) niuŋa-**h**uq
       bend-PART.3SG
       'is bent'

Why is there so much variation in the form of /t/'s partner across Inuit dialects? Also, while *t appears to have alternated with *ð in Proto-Eskimo (Fortescue, Jacobson, & Kaplan, 1994), and while *ð has been replaced by a variety of segments in modern dialects, it is curious that no dialect has chosen /d/ or /dʒ/ as the modern exponent of *ð. Arguably /d/ would be phonetically closer to *ð (and to modern /t/) than most of the other modern exponents.

3 Analysis

3.1 Contrast

Following Dresher (2002), Dresher & Zhang (2004), and Dresher, Piggott, & Rice (1994) (*inter alia*) I propose an analysis that employs the Successive Division Algorithm (SDA). Dresher (2002) presents the following informal version of the SDA:

(10) Successive Division Algorithm (SDA) (informal version)
    a) Begin with no feature specifications: assume all sounds are allophones of a single undifferentiated phoneme.
    b) If the primordial allophonic soup is found to consist of more than one contrasting member, select a feature and divide the set into as many subsets as the feature allows for. (With binary features, it becomes the Successive Binary Algorithm.)
    c) Repeat step (b) in each subset: keep dividing up the inventory into sets, applying successive features in turn, until every set has only one member.

The SDA has the effect of creating *contrastive* feature specifications for each phoneme. The scope of the features in an inventory (as applied by the SDA) can be represented in feature hierarchies. (Additional *redundant* features which provide full specification are added post-lexically.)

In particular, all the alternations (including the /t/~/j/ alternation and the alternation of /t/ with the other exponents of *ð) involve a change of continuance. I propose that all the stops in question differ only from their alternants by the *contrastive* feature [+CONTINUANT]. If we assume that phonology computes only contrastive features, all the alternations can be characterized as the insertion/spread or deletion/delinking of the contrastive feature [+CONTINUANT].

The order in which features are applied varies cross-linguistically and cross-dialectally. Accordingly, phonetically identical segments may have different contrastive feature-specifications in different dialects.

Below is the contrastive hierarchy I propose for North Baffin (Compton 2008, p.69):[2]

(11)   Contrastive feature hierarchy for North Baffin consonants
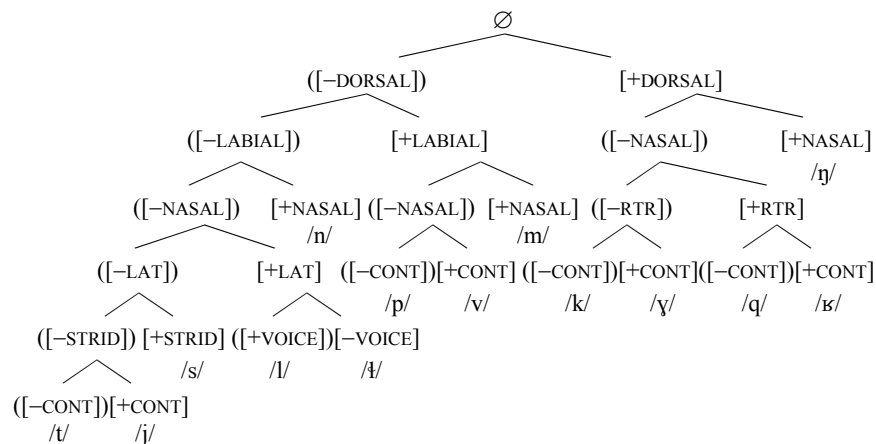
Given this contrastive feature hierarchy for North Baffin, /t/ and /j/ differ only in terms of the feature continuant. Also, the relationship between /t/ and /j/ is now entirely parallel to that between /p/ and /v/, /k/ and /ɣ/, and /q/ and /ʁ/. Thus, we can characterize all the alternations above in terms of the feature [+CONTINUANT]:

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[2] In Compton (2008) I propose contrastive feature hierarchies for sixteen dialects of Inuit and three dialects of Yupik based on the phonological inventories and activity in each dialect.

(12)　/p/ + [+CONT] → /v/
　　　/t/ + [+CONT] → /j/
　　　/k/ + [+CONT] → /ɣ/
　　　/q/ + [+CONT] → /ʁ/

Note that the features in these hierarchies are based on phonological activity, whenever possible. Furthermore, they are based on my study of Inuit dialects (Compton, 2008). When evidence for phonological activity was lacking, evidence from activity in neighbouring dialects was used. When no informative activity was found, phonetically/phonologically plausible features were assumed (e.g. [LATERAL] for /l/ and /ɬ/).

　　　Finally, it is worth noting that not every ordering of features is crucial; there are alternative orderings that would yield the same feature specifications for the phonemes.

　　　Now compare the North Baffin hierarchy above with the hierarchy for the Itivimiut subdialect of Nunivak below (Compton, 2008, p.74):

(13)　Contrastive feature hierarchy for Itivimiut Nunivak consonants
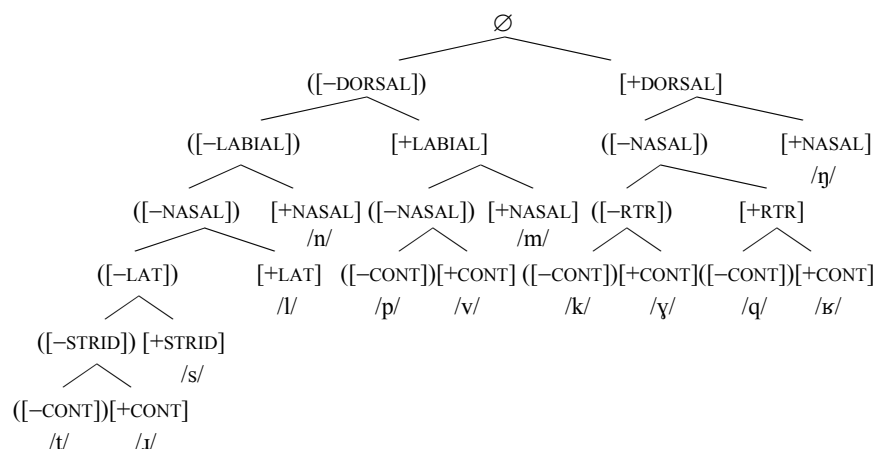
Although this dialect possesses /ɹ/ instead of /j/, we can assign /ɹ/ the same contrastive feature specification as /j/ in other dialects. In essence, we are claiming that /ɹ/ is the most underspecified or least featurally complex continuant in this dialect. By doing so we can explain why /t/ alternates with /ɹ/ in this dialect; though the redundant features for this segment are distinct in this dialect, it is still the [+CONTINUANT] partner of /t/.

3.2　Markedness

In addition to contrastive features, my analysis also employs markedness. For instance, consider the contrastive hierarchy of Inuinnaqtun:

(14)   <u>Contrastive feature hierarchy for Inuinnaqtun consonant inventory</u>

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                                    ∅
                         _____
                ([−DORSAL])                    [+DORSAL]
              _____                  _____
     ([−LABIAL])       [+LABIAL]      ([−NASAL])        [+NASAL]
                                                           /ŋ/
      _____                   _____      _____
([−NASAL])   [+NASAL] ([−NASAL]) [+NASAL] ([−RTR])      [+RTR]
               /n/                   /m/
  _____                 _____      _____
([−LAT])   [+LAT] ([−CONT])[+CONT] ([−CONT])[+CONT]([−CONT])[+CONT]
            /l/      /p/      /v/     /k/     /ɣ/     /q/     /ʁ/
  _____
([−CONT]) [+CONT]
   /t/    _____
   ([+VOICE])[−VOICE]
      /j/      /h/
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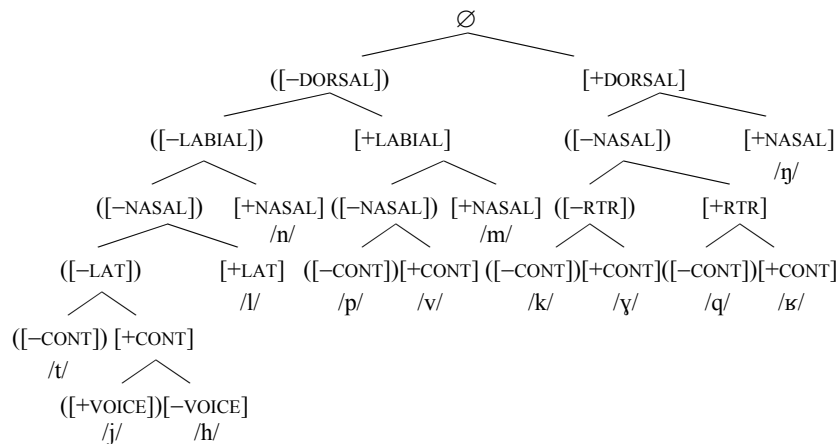
Notice that in terms of *contrastive* features, /j/ and /h/ differ only by the feature [VOICE]. However, /t/ is contrastively underspecified for voicing. While I argue that the /t/~/j/ alternation is due to the feature [+CONTINUANT], by adding this feature to /t/ we actually don't arrive at any segment in the Inuinnaqtun inventory:

(15)   /t/   →   ?   cf.   /j/   /h/
     [−CONT][3]   [+CONT]   [+CONT]   [+CONT]
        …   …   [+VOICE]   [−VOICE]
                                             …   …

Alternatively, by treating one value of each contrastive feature as marked (and the other as default), we can explain why /t/ alternates with /j/, despite the fact that /h/ appears equally underspecified for place.

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[3] Here I ignore the contrastive features that all three segments (/t/, /j/, and /h/) share.

(16)　Marked contrastive feature hierarchy for Inuinnaqtun consonants

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                                    ∅
                    ∅                         [+DORSAL]
            ∅             [+LABIAL]       ∅          [+NASAL]
        ∅     [+NASAL]   ∅    [+NASAL]                 /ŋ/
               /n/             /m/      ∅      [+RTR]
    ∅   [+LAT]     ∅  [+CONT]   ∅  [+CONT]  ∅  [+CONT]
         /l/     /p/   /v/    /k/   /ɣ/   /q/   /ʁ/
∅  [+CONT]
/t/
    ∅   [−VOICE]
   /j/    /h/
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If we assume that only _marked_ contrastive features are active in the phonology (a quasi privative-feature approach), the addition of [+CONTINUANT] to /t/ yields /j/, with /h/ containing the additional marked contrastive feature [−VOICE].

(17)　　/t/　　→　　/j/　　　　　　　cf.　　/h/
　　　　∅　　　　[+CONT]　　　　　　　　　[+CONT]
　　　　　　　　　　　　　　　　　　　　　　[−VOICE]

In support of these markedness values, when there is a pure voicing contrast between two phonemes, voicelessness appears to be the marked value in Inuit. For instance, when dialects collapse /l/ and /ɬ/, they always converge on the unmarked /l/.

　　　　Using this type of contrastive underspecification also helps explain the assimilation behaviour of /h/ in Inuinnaqtun. Having /h/ marked only as [+CONTINUANT] and [−VOICE] without any contrastive place feature, we might predict that it will assimilate to other places of articulation. This turns out to be correct; the sequences /ph/, /kh/, and /qh/ become [ff], [xx], and [χχ], respectively, with /h/ assimilating to the place of articulation of the preceding consonant (Dorais, 2003, p.61):

(18)　[utkuhi**xx**aq]　　　(cf. Siglitun: utkusiksaq)
　　　/utkuhik-haq/
　　　kettle-THAT.WHICH.X.IS.MADE.OF
　　　'soapstone'

(19) [uχχuq][4]   (cf. Siglitun: uqsuq)
      /uqhuq/
      'blubber'

(20) [pitixxik][5]   (cf. Siglitun: pitiksivialuk)
      /pitikhik/
      'bow'

(21) [piffi]   (cf. Siglitun: pipsi)
      /piphi/
      'dried fish'

Furthermore, the contrastive features on /h/ [+CONTINUANT] and [−VOICE] (and only those features) spread to the preceding consonant:

(22) /   p   h   /   →   [f   f   ]
         [+LABIAL] [+CONT]   [+LABIAL]   [+CONT]
                    [−VOICE]   [+CONT]   [−VOICE]
                                       [−VOICE]   [+LABIAL]

Thus, by using contrastive underspecification we can begin to explain why /h/ spreads its continuance but not its place of articulation and furthermore why it is susceptible to the place of articulation of an adjacent consonant but not to its continuance (i.e. it doesn't become a stop).

4   Benefits of this analysis

4.1   A single rule for all the alternations

All the alternations at each of the four places of articulation can now be explained with a single simple rule (although the environments vary across dialects). In each case stops become their marked contrastively [+CONTINUANT] partners.

4.2   Encompasses all dialects

This analysis also applies to all the various alternants of /t/ across dialects. Notably, [+CONTINUANT] is virtually the only feature shared by the various

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[4] This form also appears to contain a morpheme boundary between /q/ and /h/. In the Aivilik dialect: *uʁsuq* 'fat, oil, grease'; *uʁsiʁtuq* 'it is oiled, lubricated with grease or oil' (Spalding, 1998, p.191).

[5] This form also appears to contain a morpheme boundary between /k/ and /h/. In the Aivilik dialect: *pitiksit* 'bow (of an arrow); *pitiksaʁtuq* 'he suddenly let go of it' (Spalding, 1998, p.97).

exponents of PE *ð and the only feature that can reasonably differentiate them as a class from /t/.

4.3   Explains Proto-Eskimo Alternations

This analysis also accounts for the reconstructed alternation between *t and *ð in Proto-Eskimo. According to entries in Fortescue, Jacobson, & Kaplan (1994)'s *Comparative Eskimo Dictionary*, *t and *ð alternated at morpheme boundaries. Once again, despite a change in place of articulation (coronal/apical to interdental) this change can also be characterized as involving the contrastive feature [+CONTINUANT].

4.4   Explains the behaviour of /h/ in Inuinnaqtun

Positing that /h/ is specified as [+CONTINUANT, −VOICE] and unmarked for place in Inuinnaqtun explains its behaviour in assimilation; assimilating to the place of an adjacent consonant while spreading its continuance to that consonant.

5   Potential area of future research

An interesting, albeit speculative, possibility related to the stop-continuant alternation is that stops and continuants were merely allophones at an earlier stage of Proto-Eskimo (i.e. pre-Proto-Eskimo). This could explain the origin of the alternations (as allophones in complementary distribution) as well as the limited phonotactic distribution of the continuants (not occurring word-initially or word-finally). The allophonic [+CONTINUANT] contrast could have emerged into the current phonemic contrast at a later stage of Proto-Eskimo.

6   Conclusion

The contrastive feature approach unifies the alternations synchronically, within each dialect and between modern dialects, as well as diachronically with Proto-Eskimo. Differences between dialects are due to redundant features which are essentially invisible to the alternation phenomenon. An approach employing full feature-specification would not be able to achieve the same result without considerable complication.

Furthermore, such an approach can help us begin to explain the behaviour of segments like /h/ in Inuinnaqtun and Natsilingmiutut; while phonetically glottal, /h/ in these dialects appears underspecified for place. Conversely, some dialects possess [h] as an allophone of /q/. Such dialects would arguably have a very different feature specification for [h]; differences that are easily accommodated by the contrastive feature approach.

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