Paradigmatic Relationships
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PARADIGMATIC RELATIONSHIPS

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Let me begin with an anecdote from my personal experience as a linguistics student.[1] At the Ninth International Congress of Linguists in Cambridge in 1962, after a paper by Paul Postal (1964) on the generative phonology of Mohawk, which I observed from the front row of Kresge Auditorium, a leading member of the Department of Linguistics at MIT went to a blackboard on the stage to present a comment. He wrote up the English sentence *Help yourself.* and explained that the form of the pronoun *yourself* showed that there was an underlying second-person subject *you* that had been deleted by a transformation. As he stepped down off the stage he muttered under his breath, "And if you can't see that you don't deserve to call yourselves linguists." What was and may still be significant about the sentence *Help yourself.* to formalist linguists is that the pronoun *you* is present in it; but as I listened to the discussion of this sentence it occurred to me that what was significant about it was that the pronoun *you* was absent. I would like to be able to tell you that in that moment I became a functionalist, but I suppose that the reality was more complex.

Linguists who confine themselves to formal accounts of languages (or, more typically, parts of languages) feel that their job is done when all the pieces have been arranged or derived under labels sanctioned by the chosen framework. At about the point the formalists lose interest, the functionalists' interest begins to perk up. They are not intrigued by a claim that it can be shown that imperatives have second person subjects, but wonder how to account for the fact that, if imperatives and indicatives are differentiated by one having and the other not having a subject pronoun, it is predictably the imperative in which the pronoun is lacking. Functionalists ask an additional set of questions and have different standards of what it means to account for the features of a language. They may also feel that some things that formalists do account for are uninteresting, or marginal, or even unreal. I should say that my use of the term formalist is not intended just as a codeword for any particular individual or group; it encompasses not only generative grammarians, but also American structuralists, who are the proximate source of contemporary anti-functionalism, as well as strict Neogrammarians and others.

One of the things that interests functionalists is what I am calling paradigmatic relationships. Bloomfield's (1926:154) famous first assumption in his "Set of Postulates" was: "Within certain communities successive utterances are alike or partly alike." Paradigmatic relationships are those between partially similar utterances. They may include any link of similarity between coexisting forms, not just those that reflect derivation.[2] The interest arises from the relationships that remain untreated, or incompletely or imperfectly treated, after the utterances have been formally derived and labeled. Typical cases include those in which formal and functional relationships do not coincide, cases in which the choice between two similar utterances has a function that is not accounted for lexically or syntactically, and cases in which multiple relationships cannot be subsumed under a single, internally consistent derivational scheme. The competing models Heath (1987) postulates to account for what he calls ambiguities in phonological structure are instances of paradigmatic relationships. Multiple and mutual relationships are the essence of paradigmaticity.

Let us first look at some kinds of paradigmatic relationships.

1. The three forms in (1a-c) form a simple, static paradigm of the familiar sort:[3]

(1) Fox independent indicative.

a) 1s–2s *ke|pye·n|ene* 'I brought you (sg.)'
b) 1p–2 *ke|pye·n|ene-pena* 'we (excl.) brought you (sg., pl.)'
c) 1s–2p *ke|pye·n|ene-pwa* 'I brought you (pl.)'

The underlined form (1c) is inflected for first person singular subject even though it contains no first person singular morpheme; its inflectional affixes are: *ke-* (second person involved); *-en(e)* (second person object); *-pwa* (second person plural).[4] That the categorial structure of

this form includes the first person singular is reflected by its use with the first singular emphatic pronoun *ni·na*:

(2) *ayo·h=ni·na kepye·nenepwa* *'I* brought you (pl.) here.'

This categorial structure is accounted for, not by its ostensible morphological structure, but by its paradigmatic relationships.[5] The paradigm provides for all possible combinations of subject and object; within it, this is the form used for first singular acting on second plural.

2. The example in (3) is phonological, or close to it:

(3) Oneida utterance-final forms (Lounsbury 1953:33-34, 95-96; Michelson 1983:259-281).

	utterance-medial	utterance-final
a)	*loteswá·tu*	*loteswáhtu̯*. 'he has been playing'
b)	*loteswáhtu*	*loteswáhtu̯*. 'he has smelled of it'
c)	*sátyʌ*	*sátih*. 'sit down'
d)	*wahátyʌ?*	*wahátih*. 'he sat down'
e)	*lóhsu?*	*lóhsuh*. 'he has finished it'
f)	*ʌwa·tú·*	*ʌwa·tu̯*. 'it will be possible'
g)	*loyo·té·*	*loyo·hte̯*. 'he is working' (exceptional type)
h)	*tehotawʌlyehátye?* (older) *tehotawʌlyehá̯ti?* (more common)	*tehotawʌlyehátih*. 'he was traveling along'

Oneida words typically have different shapes utterance-medially (in the left column) and utterance-finally (right column, written with a following period). It is very nearly possible to derive the utterance-final forms from the utterance-medial forms by strictly phonological sandhi rules, a directionality that is consistent with the fact that some types that are distinct medially fall together finally (3a and b; c and d). Some exceptions, however, complicate the picture (e.g. types f and g, which are distinct finally but not medially). Furthermore, there are many cases of medial forms that are backformed from final forms (such as the second medial form in h, backformed on the model of type e). Descriptively, then, there is a system of conditioned doublets between which speakers can pass bidirectionally. The bidirectional paradigmatic relationship between the two forms accounts for the ability of speakers to create new utterance-medial forms from the final forms, including new forms that are inconsistent with other occurrences of the same morphemes: *tehotawʌlyehátyehse?* 'he travels along', etc.

3. Bidirectional paradigmatic relationships are also illustrated by the class of Unami (Delaware) possessed nouns that have irregular stem variation with and without prefixes (4a-c):

(4) Unami possessed-noun stems.

a)	*kší·k·an* 'knife'	*m|paxkší·k·an* 'my knife'
b)	*təmá·k·an* 'road, path, trail'	*nə|mət·əmá·k·an* 'my road, path, trail'
c)	*sá·p·a·n* 'cornmeal mush'	*n|nəs·á·p·a·n* 'my mush' (older form)
		nə|məs·á·p·a·n 'my mush' (some good speakers)
d)	*sí·p·u* 'creek'	*n|si·p·ó·yəm* 'my creek'

Although this pattern arose historically by the loss from the unpossessed forms of certain word-initial short-vowel syllables, descriptively the directionality goes the other way. The possessed-noun stems are derived by the addition of lexically specified syllables to the unpossessed forms (these added syllables are underlined). This is shown by disagreements over the shape of the added syllable (4c) and by the different treatment in some related verbs (5a, b):

(5) Initial-syllable retention in Unami unprefixed verbs.

a) *paxkšəmá·ne* 'if I cut it (=string)' (cf. 4a)

b) *mətáme·* 'he takes the road, path, trail' (cf. 4b)

Note that the innovative form in (4c) is not simply regularized (to match the type in 4d); it retains its lexical mark as a stem that adds a syllable but adopts a more widespread pattern within that class. The paradigmatic relations include those between the possessed and unpossessed stems and those among the members of the irregular class.

4. Paradigmatic relationships do not necessarily run in the putative channels of derivation. Example (6) illustrates the two basic morphological patterns used in Fox to add an initial

(a stem-initial element) to a verb, in this case the addition of *ki·š-* 'finish' to make the corresponding perfective.

(6) Fox simple and compound stems.

a) *wi·seni|wa* — Stem: *wi·seni-* 'eat'.
'he eats'
↓
b) *ki·šisenye·|wa* — *ki·š-* 'finish' + derived final *-isenye·-* 'eat'.
'he has finished eating'

c) *meno|wa* — Stem *meno-* 'drink'.
'he drinks'
↓
d) *ki·ši meno|wa* — *ki·š-* 'finish' + particle final *-i*; stem *meno-* 'drink'.
'he has finished drinking'

Some verbs, like 'eat' (6a-b) add the initial to a final (a stem-final element) derived in some way from the independent stem. Other verbs, like 'drink' (6c-d), have no corresponding derived final and add the initial as part of a preverbal particle that forms a compound stem with the simple verb. The resulting forms in (6b) and (6d) are both single syntactic words: word-initial processes, such as prefixation, operate on the first preverb (Goddard 1988; Dahlstrom 1987:65-67). But while (6b) is also a single phonological word, (6d) is two phonological words, between which other, extraneous words may appear.[6] A paradigmatic relationship links these two morphologically disparate but functionally parallel types of stem (6b and 6d). This paradigmatic relationship should lead us to consider the theoretically interesting possibility that the derived expressions in (6b) and (6d) have the same lexical status (Goddard 1988).

5. Another phenomenon that bears on the question of the lexical status of derived stems in Fox is what I have called preverb bumping (Goddard 1990). For example, when the stem for 'walk' (7a) adds the initial meaning 'begin to' (7b) the added initial replaces the existing initial and the dislodged initial forms a preverb:

(7) Fox preverb bumping.

a) *pemose·|wa* — *pem-* 'along' + *-ose·-* 'walk'
'he walks (along)'
↓
b) *pemi we·pose·|wa* — *pem-* 'along' + *-i*; *we·p-* 'begin to' + *-ose·-* 'walk'
'he begins to walk (along)'
↑
c) Template order: *pemi we·p-*

This is the usual treatment: the initial *pem-* 'along' is always dislodged by *we·p-* 'begin' and is retained as a preverb over 80 percent of the time. There is a paradigmatic relationship between the simple stem in (7a) and the compound stem in (7b) that is not accounted for by the analysis of the morphological structure of the individual words (given at the right). This relationship is mediated by a template that specifies the linear order of initials (7c).[7] Compound stems like (7b) are part of a set that shares this order of elements and has a paradigmatic relationship to the set of simplex verbs like (7a).

6. Another type of paradigmatic relationship is found in cases where an entity in part resembles or behaves like another entity from which it is otherwise distinct. For example, in the operation of the complex phonological rules of Menominee, short vowels before *ʔ* sometimes behave like long vowels, both in conditioning (8a) and in being conditioned (8b).

(8) Menominee vowel length.

a) Long vowel after first cluster is shortened, provided that the preceding vowel is long (or precedes *ʔ*):

ko·hnɛw 'he swallows him'
koʔnɛw 'he fears him'
(cf. *pahnɛ·w* 'he roasts him', *na·nɛ·w* 'he invites him')

b) Long *o·* (and short *o* before *ʔ*) → *u·* (*u*) if *i(·)*, *u(·)*, *Cw*, or *Cy* follows in the word:
pu·setua? 'if they embark' (cf. *po·set* 'if he embarks')
kuʔnatua? 'if you (sg.) fear them' (cf. *koʔnat* 'if you fear him')
(cf. *ota·hpenatua?* 'if you (sg.) pick them up')

Phonetic plausibility is lent to this patterning by the fact that, although long and short vowels are distinct in this environment (9a, b), they are apparently harder to distinguish here than elsewhere (9c, d):

(9) Menominee vowel-length contrast before *ʔ*.
a) *aʔtɛw* 'it is (there)'
b) *a·ʔtɛw* 'it (fire) goes out'
c) *pɛʔnan* 'it is snowing' (Guile); *pɛ·ʔnan*, once *pɛʔnan* (Bloomfield 1975:204, 202)
d) *a·ʔsemɛw* 'he tempts him' (Guile); *aʔsemɛ·w* (Bloomfield 1975:26)[8]

There is not, however, any realistic way to account for this similarity by converting such short vowels to long vowels just long enough for the application of some rules (though it will not surprise you to hear that at least one generative solution has proposed a version of this: #(C)VʔC- → #(C)V·ʔVC- and subsequent adjustments [Bever 1963:200, 1966:136-146]).

7. A morphological example of a paradigmatic relationship of partial similarity is furnished by the derivation of verbs of possession that are formed from nouns in Menominee. Many verbs of possession incorporate the exact duplicate of the third-person-possessed theme of the possessed-noun paradigm, marked with the third-person prefix *o-*:

(10) Menominee verbs of possession (I).

a) *su·niyan* →	*o|su·niyan-em* →	*osu·niyanem-e|w*
'money'	'his money'	'he has money'
b) *a·seyan* →	*ot|a·seyan* →	*ota·seyan-e|w*
'breechclout'	'his breechclout'	'he has a breechclout'
c) *ahke·w* →	*ot|a·hke-m* →	*ota·hkem-e|w*
'land'	'his land'	'he has land'
d) *ohpuakan* →	*ot|u·hpwakan|an* →	*otu·hpwakan-e|w*
'pipe'	'his pipe'	'he has a pipe'
e) *ne|ta·n*,	*o|ta·n|an* →	*ota·n-e|w*
'my daughter'	'his daughter'	'he has a daughter'

These verbs are made both from ordinary nouns (10a-d) and from dependent nouns, which are always prefixed (10e). If the noun is animate (10d, e) third-person-possessed forms are inflected with the obviative ending *-an*. If the noun takes the possessed-theme marker *-em*, this appears in the corresponding verb (10a, c), and the prefix *o-* has the shape *ot-* before vowels (10b, c, d), with the insertion of *t* otherwise found only in the pronominal prefixes. The semantics, also, would obviously fit such a derivational link perfectly. For some nouns, however, the shape of the verb diverges from the third-person-possessed theme of the noun:

(11) Menominee verbs of possession (II).

a) *n|e·k*,	*w|e·k* →	*o-we·k-e|w*
'my house'	'his house'	'he has a house'
b) *n|o·hn-ɛʔ*,	*Ø|o·hn|an* →	*ow-o·hn-e|w*
'my father'	'his father'	'he has a father'
c) *si·ʔsekwan* →	*o|si·ʔsekwan-em|an* →	*osi·ʔsekwan-e|w*
'rattle'	'his rattle'	'he has a rattle'

In particular, it is systematically the case that nouns in which the third-person prefix is not *o-* on the surface (11a, b) add *o-* in the derivation of the verb. It is easy enough to derive such verbs from the corresponding third-person-possessed themes by prefixing an element *o-* (*ow-* before *o·*, which there is probably more than one way of getting automatically). The problem is explaining what this *o-* is. If the *o-* in these verbs is categorially the third-person prefix, why is the third-person prefix present twice in some of them (11a, b)? If the *o-* is not the third-person prefix, why does it look and behave so much like it? It appears that the productive form of the third-person prefix (*o-* rather than *w-* or Ø) is a salient marker of the verbs of possession as a class, even though this is precisely a morphological environment in which it does

not function to mark the third person. The initial *o-* on verbs of possession is not an inflectional affix but part of the stem; third-person intransitive verbs, which these are, take no prefix. Inflectional prefixes (e.g. *ne(t)-* 1st pers.) may appear before this derivational *o-* (~ *-o·-*):

(12) Menominee verbs of possession (III).
  a) *net|o·tohpwakan-e|m* 'I have a pipe' (cf. 10d)
  b) *net|o·-we·k-e|m* 'I have a house' (cf. 11a)
  c) *net|o·w-o·hn-e|m* 'I have a father' (cf. 11b)

Because the similarity between the inflectional and derivational processes that indicate possession is clearly functionally motivated it cannot be ignored, and yet it cannot be explained simply by formally equating the two. There is a paradigmatic relationship but not a formal identity.

8. Another class of cases in which inflectional morphemes are used in derivation is exemplified by the theme signs of Algonquian languages, which are added to transitive stems in Algonquian to indicate some features of the object, or the subject and object. Among the proofs that they are indeed inflectional is the fact that they are used differently in the different orders, which are inflectional classes. The direct theme sign (13a) is incorporated into a noun-forming suffix (13b):

(13) Menominee theme sign used in inflection and derivation.
  a) Menominee *nayo·m-* 'carry (animate) on back':
    + (direct theme sign) *-a·-* → (direct theme) *nayo·m-a·-*:
      nayo·m|a·-t 'if he carries him (obv.) on his back'
    + (inverse theme sign) *-Ekw-* → (inverse theme) *nayo·m-Ekw-*:
      nayo·m|ek 'he (obv.) carries him on his back'
  b) (direct theme) *nayo·m-a·-*:
    + (noun final) *-kan* → *nayo·m-a·-kan*:
      nayo·ma·kan 'saddle'

The inverse theme sign (14a) is incorporated into a suffix that forms verbs with a passive meaning (14b):

(14) Fox theme sign used in inflection and derivation.
  a) Fox *ina·čim-* 'speak (thus) of (animate)':
    + (direct theme sign) *-a·-* → (direct theme) *ina·čim-a·-*:
      ina·čim|a·-t-e 'if he speaks (thus) of him (obv.)'
    + (inverse theme sign) *-ekw-* → (inverse theme) *ina·čim-ekw-*:
      *ina·čim|ekw-*a 'he (obv.) speaks (thus) of him'
  b) (inverse theme) *ina·čim-ekw-*:
    + (anim./inan. verb final) *-esi-/-at-* → *ina·čim-eko-si-/ina·čim-ekw-at-*:
      ina·čimekosi|wa 'he is told about', *ina·čimekwat|wi* 'it is told about (thus)'

The elements appearing in the derivational endings (13b, 14b) cannot be identified with the theme signs (13a, 14a), since, for one thing, the theme signs are used after every verb of the appropriate category, while the derivational endings are found with only a few stems. Also, the gender-specificity of the inverse theme sign is leached out in the derivational use (14b). At the same time these derivational elements retain morphological features of their inflectional counterparts; for example, the suffixes in (14b) appear only after stems that in their primary use take animate objects, a restriction characteristic of the incorporated inverse theme sign. Although the inflectional and derivational uses of these elements cannot be collapsed together, their similarities are, again, functionally motivated and no accident.

The multiple paradigmatic relationships of a form, or set of forms, can have dynamic effects, either diachronically or on the equilibrium of the synchronic system.

9. The rules that adjust vowel length in Menominee cause complex patterns of alternation in the surface shape of stems (15a; cf. 12), which many have tried to explain by formulating rules of unidirectional phonological derivation:

(15) Menominee vowel-length adjustment (I).
  a) |oseta·hkw-| *oseːtaːh* 'axe handle' (< PA[9] **wesita·xkwi*):
    → |net|oseta·hkw-| *netoːsetaːh* 'my axe handle'

Cases of variation (16a) and historically unexpected underlying vowel length (16b, c) show, however, that speakers can extrapolate in both directions:

(16) Unhistorical Menominee vowel-length.

a) |maskihkiwa·poh-| *maskiːhkiwapoh* 'tea' (< PA **maškixkyiw-a·pow-*):
→ |ne|maskihkiwa·po-m| *nemaːskiːhkiwaːpom* 'my tea'
→ *nemaːskiːhkiwapom* ("less urbane" [Bloomfield 1962:121])

b) |atohpo-| 'eat off something' (< PA **atoːxpo-* ← **atoːt-po-*):
→ |atohpw-an-| 'table' → |atohpwan-i·kw-| *atuːhpwani·k* 'tablecloth':
→ |net|atohpwani·kw-| *neta·tohpwani·k* 'my tablecloth' (Bloomfield 1928:596)

c) |atotape-| 'sit on something' (< PA **atoːt-api-*):
→ |atotapy-a·kan-| *atuːtapyakan* 'chair':
→ |net|atotapya·kan-| *neta·totapiakan* 'my chair' (Goddard, 1974 notes)

The full array of occurring forms can only be accounted for by postulating a complex array of multidirectional paradigmatic relationships.

10. Morphological splits provide clear cases of multiple paradigmatic relationships. The so-called prohibitive in Fox (Goddard 1985), formed with a modal marker *-hk-* (17a), is used in three distinct functions (17b):

(17) Fox prohibitive.

a) Stem + (transitive theme sign +) *-hk-* + pronominal ending.

	Negative imperative	Undesirable possibility	Desirable future possibility
b)	*ka·ta wani·hke·|hkani*	*nepači|hkani*	*owi·wi|hkani*
	'don't forget (sg.)'	'you (sg.) might get cold'	'get married (sg.)'

Sequences of certain theme signs (see §8) and the modal marker occur with or without portmanteau fusion:

(18) Themes signs in the Fox prohibitive.
Direct theme sign *-a·-* + *-hk-* → *-iye·k-* or *-a·hk-*
Inanimate theme sign *-am-* + *-hk-* → *-ak-* or *-amo·hk-*

There is a functional difference between the forms with fusion (19, left and center columns) and those with agglutinative juxtaposition of these elements (19, right column):[10]

(19) Differentiated functions in the Fox prohibitive.

	Negative imperative	Undesirable possibility	Desirable future possibility
a)	*ka·ta a·čimoh|iye·kani*	*ketema·kih|iye·kani*	*a·čimoh|a·hkani*
	'don't tell him (sg.)'	'you (sg.) might make them poor'	'tell them (sg.)'
b)	*ka·ta a·nwe·htaw|iye·ke·ko*	*se·kih|iye·ke·ko*	*wi·tamaw|a·hke·ko*
	'don't disbelieve him (pl.)'	'you (pl.) might frighten them'	'you (pl.) should tell them'
c)		*a·piškon|iye·kiče*	*pesetaw|a·hkiče*
		'she must have let them loose'	'she might listen to her'
d)	*ka·ta me·šen|akani*	*a·hkwamat|akani*	*koht|amo·hkani*
	'don't touch it (sg.)'	'you (sg.) might be sick'	'you (sg.) should fear it'

The forms that categorially lack the theme signs that are subject to fusion have the same range of functions but do not show a formal split (17b).

What is interesting about the forms exemplified in (19) is that, not only is there a split between the negative imperative (left column) and the future imperative (right column), there is a third category that has the morphology of the negative imperative but lacks the negative (center column). The function of these forms for undesirable possibility can be understood by looking at their paradigmatic relationships. Far and away the most common use of the prohibitive mode is in the negative imperative construction. There is thus a markedness anomaly, in which the functionally unmarked use is the one that has the more complex form (with the negative particle *ka·ta*). Functionally the negative imperative is not the negative of the undesirable-possibility type; the undesirable-possibility type is the non-negative of the

negative imperative. This explains the particular association of form and function illustrated in the center column in (19): the paradigmatic relationships have a functional pattern beyond what can be accounted for by labeling their morphological components. To some extent in such cases, the categorial structure is a function of the way the lexicon is used, since, for example, the same verbs will tend to show up in the negative-imperative and undesirable-possibility sets, while different verbs will tend to be used in the future imperative (though some, of course, will be found in both formations: 19a).[11]

11. Another case of the multidirectionality of paradigmatic relationships is exemplified by the use of Fox *taši*. Fox verbs with a locative oblique argument require a locative valence-bearer. Some verbs have this locative valence as an optional lexical feature; not surprisingly these verbs are ones that refer to actions that are inherently localized and durative:

(20) Fox stems with optional locative valence.

	Verb alone	Locative oblique + verb
a)	*e·h=wi·seniči, e·h=nepa·či.*	*i·ya·hi e·h=nepa·wa·či.*
	'He ate, and he slept.'	'They slept over there.'
b)	*nešekišekišine*	*nekotahi e·h=šekišekišinowa·či*
	'I was lying down'	'they were lying down somewhere'

When other verbs are used with locatives, *taši* (or a variant of this)[12] is added to bear the oblique valence:

(21) Fox stems without locative valence.

	Verb alone	Locative oblique + *taši* + verb
a)	*e·h=we·pi kakano·neti·či*	*sa·kiči e·h=taši kakano·neti·wa·či*
	'he began to converse'	'they conversed outside'
b)	*ni·h=peseše*	*i·nah=ne·h=wi·na taši peseše·wa*
	'I shall listen'	'he, too, listened there'

In addition, the verbs that require *taši* with a locative are used with *taši* and no locative to give the aspectual meaning 'be engaged in':

(22) Fox *taši* with no locative.

a) *a·kwi ... ayi·nehka taši kakano·neti·wa·čini* (cf. 21a)
'they did not continue conversing inattentively'

b) *wi·h=taši wi·ke·či peseše·ya·ni* (cf. 21b)
'for me to be listening carefully'

This durative aspectual use of *taši* cannot be explained simply by describing it as a second function of this lexical item. For one thing, such a description would not account for why one set of verbs has *taši* in both functions (21, 22) and the other set has it in neither function (20). The explanation for this durative aspectual function of *taši* with no locative oblique lies in the similar aspectual meaning that is inherent in the verbs that do not take *taši*: 'be lying down (somewhere)' is to 'be lying down' (20b) as 'listen (somewhere)' (21b) is to 'be listening' (22b).

12. Paradigmatic relations are also extensive in the semantic component of language. The descriptive fiction that the meaning of a concatenation of elements is a function of the meanings of the separate elements, though convenient, is inadequate for understanding some typical kinds of meaning relationships in polysynthetic languages. Some semantic sets can only be understood with reference to the inverse relationship, in which the meaning of an element is a function of the set of contexts in which it is used.[13] This is particularly evident in cases of semantic generalization in which divergent meanings grow out of a single semantically basic stem inherited in two related languages. For example, Algonquian languages inherit an initial PA **šenk-* that appears to be reconstructible in only one stem set:

(23) Proto-Algonquian.
**šenkihšinwa* 'he is lying down' (stem = **šenk-* '?' + **-ihšin-* 'lie down')[14]

Ojibwa builds up a set of stems that share the initial element in the meaning 'be spread out, strewn, stretched' (24), while Arapaho builds up a set in which this element means 'flat' (25):

(24) Ojibwa.

šinkišš<u>i</u>n 'he is lying down' (< PA **šenkihšinwa* [23])

→ *šink-* 'be spread out, strewn, stretched' (McGregor 1988:376)

šinkate·ssin 'it is spread out, stretched out, strewn'

šinka·kama· 'the water (of the lake) extends beyond the shoreline'

(25) Arapaho.

|se?isin-| *se·?si?* 'he is lying down' (stem < PA **šenkihšinwa* [23])

→ *se?-* 'flat'

|se?yo·-| *se·?é·?* 'it is flat'

se?î·čô·ó 'flat pipe' (a straight, tubular pipe) (cf. *hî·čô·ó* 'pipe')

se?béí?čiθe? 'spade' (cf. *béí?čiθe?* 'metal')

That the stem meaning 'lie down' remains the core member of each of these sets (24, 25), and that the initials in each language are in some sense derived from these core stems, are functionally real facts about these languages that can be expressed as paradigmatic relationships but find no place in any type of unidirectional, piecemeal formal account.

13. Cases of morphological contamination, in which the channel of analogy runs across the direction of the derivation, can be understood as the crossing of paradigmatic relations. For example, Munsee animate intransitive verbs, in the independent order, have *-w* in the third singular and Ø in the first and second singular after vowel stems, the most common type:

(26) Munsee vowel stem.

	stem |pa·-|
1s	*mpá* 'I came'
2s	*kpá* 'you came'
3s	*pé·w* 'he came'

The only permitted word-final C + *w* cluster is *kw*, and consonant-final stems consequently show *-kw* in the third person of *k*-stems (27, 'weep') and no *-w* in stems ending in other consonants (27, 'fare so'). In addition, however, the stems in *k* have *-w* in the first and second singular:

(27) Munsee consonant stems.

	stem |ənt-|	stem |ləpak-|[15]
1s	*ntónt* 'I fare so'	*lápakw* 'I weep'
2s	*któnt* 'you fare so'	*kəlápakw* 'you weep'
3s	*ónt* 'he fares so'	*lpákw* 'he weeps'

The *-w* in the first and second person could be described as the variant of the first and second singular ending that is used after consonant stems, surfacing only after *k*, but this would not explain why it is precisely *w* that appears here. The operative generalizations are that the sequence *kw* patterns in part like a single consonant, and that consonant stems have the same word-final shape throughout the singular; hence *kw* appears word-finally in all the singular forms. The distribution of the morpheme *w* makes no sense unless interpreted paradigmatically.

A similar case is found in the Massachusett preterite, basically formed with a suffix *-p*:

(28) Massachusett Conjunct.

	Conjunct subjunctive		Conjunct preterite (Pro + *-p* PRET)	
	Trans.	Intrans.	Trans.	Intrans.
1s	*-ak*	*-ãn*	*-akəp* (< PA **-ak-epa*)	*-ãhp* (not †*-ãp* < PA **-a·mpa*)
2s	*-at*	*-an*	*-ahp* (< PA **-at-pa*)	*-ahp* (not †*-ap* < PA **-ampa*)
3s	*-ãt*	*-t*	*-ãhp* (< PA **-a·t-pa*)	*-hp* (< PA **-t-pa*)

After *h* was extended along one paradigmatic channel from the second singular transitive to the second singular intransitive, making these endings identically *-ahp*, the *h* was then extended along another channel to the first singular intransitive, where it appears to have no possible phonological or morphological motivation. This reshaping does, however, make sense as the outcome of pattern pressure on the cross-weave of paradigmatic relationships linking first and second singular and preterite and non-preterite. And the innovative forms (with *h* underlined in 28) can only be understood synchronically in terms of their paradigmatic relationships.

14. The paradigmatic approach is needed, not to make sense out of marginal loose ends, but to reveal core patterns of functional significance in complex morphological subsystems. For example, Fox two-syllable reduplication presents the familiar sorts of ordering problems often found with reduplication. Basically, consonant-intial stems prefix $C_1V(\cdot)C_1V$ and vowel-initial stems prefix $V(\cdot)C_1Vh$; the reduplicated forms denote multiple or extended actions:

(29) Fox two-syllable reduplication (underlined): basic patterns.

a) *<u>kete</u>keteminoːnwaːsa* 'they would have been blessing you (pl.)'
(stem: *keteminaw-* 'bless')

b) *<u>neːse</u>neːseːhekwiyeːkwe* 'what cured you (pl.)' (stem: *neːseːh-* 'cure')

c) *iːnahi <u>apih</u>apiwaki* 'they kept sitting there' (stem: *api-* 'sit')

The first two syllables are repeated, up through the second vowel (29a), which is always short in the reduplication (29b). Vowel-initial stems insert *h* (29c). The copying starts with the beginning of the stem, ignoring prefixes and proclitics (set off with =):

(30) Fox two-syllable reduplication: with prefix or proclitic.

a) *nekotahi iːyaːhi net<u>apih</u>api* 'I was sitting over there someplace'
(stem: *api-* [29c]; prefix *net-*, 1st pers.)

b) *wiːh=<u>apih</u>apiyeːkwe* 'that you keep sitting' (*wiːh=*: future)

c) *eːh=<u>apih</u>apinitehe* 'where he (obv.) had been sitting' (*eːh=*: aorist)

After the reduplication, the core stem appears in its word-initial shape, notably with initial |e| raised to *i* (31a) by a general rule (31b):

(31) Fox two-syllable reduplication: treatment of core stem.

a) *pyeːči <u>iših</u>išimehki* 'what those so far told you (sg.)' (stem: |ešim-| 'tell (thus)')[16]

b) |e-| → *i-* /#_[17]

Prefixation (32a) and the vowel ablauting process called initial change (32b, c) appear on the reduplicated segment just as they would on the core stem. (Forms with initial change [IC], called "changed" forms, replace the first short vowel of stem [or compound stem] with *eː*.)[18] The core stem is unaffected and hence may differ in shape from the reduplication:

(32) Fox two-syllable reduplication: divergence from core stem.

a) *net<u>eši</u>hišimekwa* 'he always told me' (stem: |ešim-|; prefix *net-*)

b) *eːš<u>ih</u>išimenakoːwe* 'what I have been telling you (pl.)' (stem: |ešim-|; IC |e| → *eː*)

c) *keːn<u>a</u>kanawita* 'one who gave a speech' (stem: *kanawi-* 'speak'; IC |a| → *eː*)

If the stem is shorter than two syllables, the target of the reduplication extends into the inflectional suffix complex:

(33) Fox two-syllable reduplication: short stems (in bold).

a) *weːči <u>ine</u>h<u>in</u>enakoːwe* 'why I used to tell you (so)'
(stem |eN-|[19] ~ Ø- 'say (thus) to'; suffixes: *-enakoːwe* 1s–2p/conjunct)

b) ***eːš<u>ih</u>išiči*** 'what he used to say to me'
(stem |eN-| ~ Ø-; suffixes: *-iči* 3s–1s/conjunct)

c) *eːh=<u>am</u>w<u>ah</u>amwaki* 'I used to eat them (anim.)'
(stem |amw-| 'eat'; suffixes: *-aki* 1s–3(p)/conjunct)

d) ***<u>am</u>oh<u>am</u>okoniwahi*** 'they (further obv.) used to eat them (obv.)'
(stem |amw-|; suffixes: *-ekoniwahi* 3′′–3′p/independent; |we| → *o*)

With the stem allomorph Ø of the verb 'say (thus) to' (cf. 33a), the reduplication affects only inflectional suffixes:

(34) Fox two-syllable reduplication: Ø stem.

a) *net<u>ekwah</u>ikwa* 'he used to say to me'
(stem allomorph Ø; prefix *net-* 1st pers.; sufixes: *-ekwa* 3s–1s/independent)

b) *eːh=<u>ikoh</u>ikoči* 'he (obv.) used to say to him'
(stem Ø-; suffixes: *-ekoči* 3′–3s/conjunct)

With the stems *iha·-* 'go' (35a) and *toːtaw-*, *toːt-* 'treat him, it (so)' (35b) and stems containing the initial element *tan-* '(there); be engaged in' (35c) the reduplicating stems (35, right column) have the shape of the irregular changed forms of these stems with the vowel replacement undone:

(35) Fox two-syllable reduplication: backformation from irregular change.

Stem	Stem + IC	Stem with reduplication
a) *iha·-* |eha·-| 'go'	*e·ya·-*[20]	*aya·-*
b) *to·taw-*, |to·taw-|, 'treat him (so)'	*e·to·taw-*[21]	*ito·taw-*
c) *tan-* |taN-| '(there); be engaged in'	*e·tan-*[22]	*itan-*

The stem 'go' generalizes the backformed reduplicating stem from changed forms (36a) to unchanged forms (36b), while the other irregular stems retain their normal stem-initial shape in the reduplication itself (36c, d):

(36) Fox two-syllable reduplication: examples of irregular type.

a) ***e·yahaya·****\|ye·kwe* 'where you (pl.) go (at different times)' (cf. 35a)
b) *ka·ta peno·či* ***ayahaya·****\|hke·ko* 'don't go far away' (cf. 35a)
c) *pye·či* ***tohito·ta·ti·****\|wa·či* 'the way they have always treated each other'
(stem \|to·ta·ti·-\| 'treat each other (so)' ← \|to·taw-\| + \|-eti·-\| recip.; cf. 35b)
d) *net**ah**it**an**we·kesi* 'I was crying' (stem \|taNwe·kesi-\| 'be crying'; cf. 35c)

A stem with both reduplication and initial change (as in 36a) does not have regular reduplication (a derivational process) followed by initial change (an inflectional process); it has a reduplicating segment (here *e·yah-*) based on the form of the stem that has already undergone the inflectional process of initial change (*e·ya·-*), followed by a core stem with this inflectional process undone (*aya·-*). The reduplicated stem without initial change has the same reduplication as the changed stem (36b).

All of these occurring forms (30-36) can be described as having exactly the shape needed to maximize the surface transparency of three paradigmatic relationships: (1) to other reduplicated forms (the form looks like it has the appropriate kind of reduplication and is consistent for each stem); (2) to other inflected forms (the reduplicating segment undergoes the same word-initial inflectional processes and adjustments that the unreduplicated word would have); and (3) to the stem (the core stem has its word-initial shape, to the extent allowed by the first constraint). The interaction of these sets of paradigmatic relationships determines the shape of the reduplicated form.

15. The linguist must be able to recognize what needs to be explained and must be willing to risk explanations that go beyond simply illustrating what a given framework can handle. What is actually going on in the examples reviewed in this paper would be hard to explain by purely formal accounts operating under the usual constraints of economy. The essential coherence of the disparate facts in each case can be understood only by reference to the paradigmatic relationships. Paradigmatic relationships map the terrain on which languages must perforce be studied, and probably also language learnability and language learning. They are not marginal curiosities but rather reveal important aspects of how language actually works on the leading edge of its productive mechanisms. And language, after all, is a dynamic process, not a static configuration. In fact, we must ask whether analytical relationships that do not mirror active paradigmatic relationships can, in principle, have descriptive validity. Language is a mass of partial similarities, and there seems little reason to assume a priori that it would be possible to account for these similarities using abstract expressions of identity as the only formal representation.

Nothing I have said should be taken as reflecting a lack of appreciation for the utilitarian contribution formal accounts often have. From a functional perspective, however, a formal account merely provides the basis for asking the really interesting questions of how and why. American Indian languages have a lot of morphology, and relational-morphology languages (negatively characterized as non-configurational languages) especially provide a great deal of paradigmatic material for analysis. The opportunities await you. Of course, it is possible to do some useful linguistic work without caring about such questions, but such an attitude (to quote another linguist on another topic) "just seems to me to indicate a certain lack of curiosity as to why things are the way they are" (N. Chomsky, cited in Botha 1989:5).

ENDNOTES

[1] The style of the oral presentation of this paper is here retained.

[2] Bybee (1988) sketches a formal representation for her ostensibly similar concept of lexical connections.

[3] Vertical bars (|, italic /) divide stems from prefixes and suffix complexes; other morpheme boundaries are indicated by hyphens. Vertical bars also bracket underlying forms.

[4] Cf. *ne|wi·seni* 'I ate', *ke|wi·seni* 'you (sg.) ate', *ne|wi·seni|pena* 'we (excl.) ate', *ke|wi·seni|pena* 'we (incl.) ate', *ke|wi·seni|pwa* 'you (pl.) ate'. (1a-c) comprise all the independent indicative forms with the theme sign *-en(e)*; in other orders it is used with third-person and indefinite subjects.

[5] Anderson (1986) accounts for such cases, in which a form contains the morpheme marking one of its inflectional categories to the exclusion of the morpheme marking another of its inflectional categories, by disjunctively ordering the rules that select the morphemes (cf. Goddard 1979:84, 111, 136-137). From a functional perspective, however, generating the morphology is only part of what has to be accounted for.

[6] Non-proclitic preverbs, like Fox *ki·ši* (6d), *pemi* (7b), *taši* (21, 22), *we·pi* (21a), and *pye·či* (31a, 36a), are followed by word boundaries in spite of being parts of compound stems; Algonquianist convention is to link the parts of compound stems with hyphens, but in this paper spaces have been substituted to more clearly indicate that word boundaries are involved.

[7] This fixed order was described by the Sauk and Fox linguist William Jones in his 1904 Ph.D. dissertation (Jones 1904:386, 1911:763).

[8] I am indebted to Tim Guile (personal communications, 1986) for the corrections in (9c) and (9d), which correspond to the forms expected on comparative evidence.

[9] PA = Proto-Algonquian.

[10] In *-amo·hk-*, *-amo·-* is a variant of *-am-* used before certain morphemes.

[11] The lexical distribution of inflectional categories is a significant descriptive fact about them. A major deficit of formal grammars of all theoretical persuasions is typically their failure to discuss or characterize the lexical range of use of inflectional forms, as by giving extensive representative examples or (in the case of small corpora) exhaustive listings of the attestations. It may be quite significant for an understanding of, say, the morphology or history of a locative formation to know what nouns are attested in the locative and which locatives are especially common.

[12] To simplify the discussion the examplies are all verbs that take the preverb *taši* (cf. 6a-b, n. 6); the same pattern of usage is found with stems that have the corresponding initial |taN-| *tan-* ~ *taš-* (cf. 6c-d; Goddard 1988:64, ex. 35; 66, ex. 40). (|N| represents an *n* that undergoes mutation to *š* before *i* [Goddard 1977].)

[13] Actually, this is also characteristic of other types of languages. An English example is the morpheme *grizzle*, originally meaning 'partly gray'. On the basis of its occurrence in *a grizzled old man* and *grizzly bear* many speakers have apparently assigned it the meaning 'having stubbly hair (on face, body)'.

[14] The other stems with this initial are the corresponding inanimate and transitives.

[15] For the stem |ləpak-|, cf. the subjunctive forms *lpaká·ně* 'if I weep', *lpákaně* 'if you weep', *lpákkě* 'if he weeps'.

[16] *pye·či* is the cislocative preverb (see note 6).

[17] Cf. *išim|enokwe·ni* 'he probably told you'; *e·h=išim|eči* 'he was told'; *ket|ešim|eko·pwa* 'you (pl.) were told'.

[18] E.g.: *e·šim|iči* 'what he told me': stem |ešim-| *išim-* + IC |e| → *e·*.

[19] For |N|, see n. 12.

[20] Cf.: ***e·ya·***|*ya·ni* ***iha·***|*hka·ha* 'where-I'm-going I-would-go' (suffixes: *-ya·ni* 1s/conjunct; *-hka·ha* 1s/potential).

[21] As if underlying |eto·taw-|; cf. *e·to·taw|aki* 'how I treated him' (suffixes: *-aki* 1s–3/conjunct).

[22] As if underlying |etaN-|; cf. *i·ya·hi e·tanakihto·|ye·kwini* 'those that you (pl.) lost over there' (*-akiht-* 'lose'; suffixes: *-o·ye·kwini* 2p–INAN/inan. pl. participle (Goddard 1987).

REFERENCES

Anderson, Stephen R. 1986. Disjunctive ordering in inflectional morphology. Natural Language and Linguistic Theory 4.1-31.

Bever, Thomas G. 1963. Theoretical implications of Bloomfield's "Menomini morphophonemics." Quarterly Progress Report 66.197-203. Cambridge: Massachusetts Institute of Technology, Research Laboratory of Electronics.

-----. 1966. The phonology of the Menomini Indians and Leonard Bloomfield. Ph.D. dissertation, Massachusetts Institute of Technology, Cambridge, Massachusetts.

Bloomfield, Leonard. 1926. A set of postulates for the science of language. Lg. 2.153-64.

-----. 1928. Menomini Texts. Publications of the American Ethnological Society vol. 12. New York: G.E. Stechert & Co.

-----. 1962. The Menomini Language. New Haven: Yale University Press.

-----. 1975. Menomini Lexicon, ed. C.F. Hockett. (Milwaukee Public Museum Publications in Anthropology and History, 3.) Milwaukee: Milwaukee Public Museum.

Botha, Rudolf P. 1989. Challenging Chomsky: the generative garden game. Oxford: Basil Blackwell.

Bybee, Joan L. 1988. Morphology as lexical organization. Theoretical morphology: approaches in modern linguistics, ed. Michael Hammond and Michael Noonan, pp. 119-141. San Diego: Academic Press.

Dahlstrom, Amy. 1987. Discontinuous Constituents in Fox. Native American languages and grammatical typology, ed. Paul D. Kroeber and Robert E. Moore, pp. 53-73. Bloomington: Indiana University Linguistics Club.

Goddard, Ives. 1977. The Morphologization of Algonquian Consonant Mutation. BLS 3.241-250.

-----. 1979. Delaware Verbal Morphology: A Descriptive and Comparative Study. New York: Garland.

-----. 1985. Paradigmatic splitting by morphological regularization: the Fox prohibitives. IJAL 51.419-21.

-----. 1987. Fox participles. Native American Languages and Grammatical Typology, ed. Paul D. Kroeber and Robert E. Moore, pp. 105-118. Bloomington: Indiana University Linguistics Club.

-----. 1988. Post-transformational stem derivation in Fox. Papers and Studies in Contrastive Linguistics 22:59-72. Poznań: Adam Mickiewicz University; Washington: Center for Applied Linguistics.

-----. 1990. Primary and secondary stem derivation in Algonquian. Ms.

Heath, Jeffrey. 1989. Ablaut and Ambiguity: phonology of a Moroccan Arabic dialect. Albany: State University of New York Press.

Jones, William. 1904. Some Principles of Algonquian Word-Formation. American Anthropologist 6:369-411.

-----. 1911. Algonquian (Fox). Handbook of American Indian Languages, Part 1, ed. Franz Boas, pp. 735-873. Bureau of American Ethnology Bulletin 40. Washington: G.P.O.

Lounsbury, Floyd G. 1953. Oneida verb morphology. (Yale University Publications in Anthropology 48.) New Haven: Yale University Press. (Reprinted: Human Relations Area Files Press, 1976.)

McGregor, Ernest. [1988?] Algonquin lexicon. Maniwaki, Quebec: River Desert Education Authority.

Michelson, Karin E. 1983. A comparative study of accent in the Five Nations Iroquoian languages. Ph.D. dissertation in linguistics, Harvard University.

Postal, Paul M. 1964. Mohawk Prefix Generation. Proceedings of the Ninth International Congress of Linguists, Cambridge, Mass., August 27-31, 1962, ed. Horace G. Lunt, pp. 346-357.