1. Underspecification

Segmentation problem (English present tense)

(2)  I like trucks.  We like trucks.
You like trucks.  You like trucks.
Leo likes trucks.  They like trucks.

What’s the distribution of bare verb form (Ø)?

(3)  Analysis 1  
Ø correlates w/, expresses, exponent of (morpho-synt feats)
-s [3,sg]  no context, "elsewhere" / “default”

(4)  Analysis 2
Ø Ø 1 SG  Ø Ø 1 PL
Ø Ø 2 SG  Ø Ø 2 PL
-s Ø 3 SG  Ø Ø 3 PL

equivalent:  Ø Ø {1 sg or 2 sg or …}

Analysis 1 invokes a default, and underspecification.  cf. English plurals.

(5)  -en Ø PL / [OX, CHILD] ___
-Ø Ø PL / [DEER, FISH, …] ___
-ta Ø PL / [SCHEMA, STIGMA, …] ___

Ø Ø PL / (Context free)

Notation:  The list is disjunctive, read top-to-bottom, and only one may apply.
The order between the default and all others is crucial (and automatic), other orders in this example are not.

(6)  Subset Principle (Elsewhere Condition, etc…)

The most highly specified exponent (rule) consistent with the context must apply.
A rule R is consistent with a context C if the features of R are a subset of the features of C.

(7)  * Leo likes trucks.  context: [3 sg]
* deers  context: DEER-pl.

The default, by definition, is compatible with all environments.
Why is it excluded here?

Underspecification invokes a competition.
An additional example:

(9) German (weak) Past Tense: sagt 'to say'

<table>
<thead>
<tr>
<th>Person</th>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>sagt (is)</td>
<td>sagt! (are)</td>
</tr>
<tr>
<td>2nd</td>
<td>sagt(2)</td>
<td>sagt(2)</td>
</tr>
<tr>
<td>3rd</td>
<td>sagt(3)</td>
<td>sagt(3)</td>
</tr>
</tbody>
</table>

(10) German Agreement (Past):

- a. -t [2 PLURAL] underspecified ≠ unspecified!
- b. -st [PLURAL] underspecified ≠ unspecified!
- d. Ø [elsewhere]

**Note that underspecification is a relative notion.**

The context must be independent of the vocabulary item that expresses the context!

The context, relative to which v.i.s are underspecified, is the MORPHO-SYNTACTIC REPRESENTATION (MSR) of the sentence.

(11) MSR: SAY [TENSE: PAST; AGR: 2 PL]

Exponents: ______ ______ ______ competition makes reference to MSR

(12) In D.M., the MSR = (the output of the) syntax. (see (1); we'll come back to this)

Realization: Late-Insertion; Separation

(13) V [SAY] [TNS: PAST] [AGR: 2 PL]

Exponents can be underspecified.

Terminal nodes (morphemes) can be fully specified.

Underspecification in a Realizational approach:

(14) MSR: Leo [3SG] [LIKE, 2 SGL] trucks. We [1PL] [LIKE, 2PL] trucks.

PF: like - s

(15) *Leo likes truck: Ø is blocked by –s vocabulary insertion

Note: Blocking depends on full specification of MSR.

(16) Syncretism via underspecification: Old English third person pronouns

<table>
<thead>
<tr>
<th>Gender</th>
<th>Nom.</th>
<th>Accus.</th>
<th>Dative</th>
<th>Genitive</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL</td>
<td>Masculine</td>
<td>h góc</td>
<td>hine</td>
<td>him</td>
</tr>
<tr>
<td></td>
<td>Feminine</td>
<td>h gö</td>
<td>hing</td>
<td>hing</td>
</tr>
<tr>
<td>Neuter</td>
<td>hit</td>
<td>hit</td>
<td>him</td>
<td>his</td>
</tr>
<tr>
<td></td>
<td>Masculine</td>
<td>h góc</td>
<td>hing</td>
<td>hing</td>
</tr>
<tr>
<td></td>
<td>Feminine</td>
<td>h góc</td>
<td>hing</td>
<td>hing</td>
</tr>
<tr>
<td>Neuter</td>
<td>h góc</td>
<td>hing</td>
<td>hing</td>
<td>hing</td>
</tr>
</tbody>
</table>

(17) The finite space problem

Hypotheses make predictions about un-encountered data.
In inflection, we (often) have all the data.

The data regularly underdetermines the analysis.
(Many analysis, all descriptively adequate)

Other sources of evidence: Cross-linguistic generalizations
Acquisition, Psycho-neuro evidence

(18) English forms of the verb be:

<table>
<thead>
<tr>
<th></th>
<th>SINGULAR</th>
<th>PLURAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>am</td>
<td>are</td>
</tr>
<tr>
<td>2nd</td>
<td>are</td>
<td>are</td>
</tr>
<tr>
<td>3rd</td>
<td>is</td>
<td>are</td>
</tr>
</tbody>
</table>

(19) a. am ⇔ [1, sg]
   is ⇔ [3, sg]
   are ⇔ #elsewhere

b. are ⇔ [PLURAL] + Rule of referral: (2SG → 2PL)
   cf. pronouns

(20) It is … Isn’t it?
You/they are … Aren’t you/they?
I am … * Aren’t I?
      instead: * I aren’t I?

How do you get “are” with a first person subject, given: * I are …
2. ALTERNATIVES TO REALIZATION (LEXICALISM / PROJECTIONISM)

Two approaches to the Morphology-Syntax Interface.

(21) a. Projectionist/Incremental (prominent in syntax)
   b. Realizational (prominent in morphology)

   Morpho-Syntax
   Phonological Form

   Morpho-Syntax
   Phonological Form

(22) a. [LIKE, 3 SG PRES]     b. [LIKE, 3 SG PRES]
    like - s
    -s [3, SG, PRES]

- Unmarked form blocked in b. by marked (FEM) form, which is a better fit for the context.

2.1 Gender agreement (French, Russian)

(26) French adjectival inflection (partial)

   [ [ Root ]
   - Gender   - Number ]
   -e < FEM
   -s < PLURAL
   -0 < ]

(27) a. (Jean) il est intelligent. French
   (John) he is
   ‘John is intelligent.’

   b. (Marie) elle est intelligent-ê / *intelligent
   (Maria) she is
   ‘Maria is intelligent.’

- Unmarked form blocked in b. by marked (FEM) form, which is a better fit for the context.

(28) Russian gender inflection (short adjectives, nominative case)

   [ [ Root ]
   - GND/NUM/CASE
   -i/y < [PLURAL]
   -a < [FEM]
   -0 < [NEUT]
   -Ø < ]

   NB, more precisely /i/ < *û

(29) a. (Vanja) on bolen. Russian
   (John) he
   ‘John is sick.’

   b. (Masha) ona bol’-a / *bolen
   (Maria) she
   ‘Maria is sick.’

- Analysis as above: agreement + underspecification

(30) Pronominal paradigms (nominative)

<table>
<thead>
<tr>
<th></th>
<th>French</th>
<th>Russian</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL</td>
<td>MASC</td>
<td>FEM</td>
</tr>
<tr>
<td>1</td>
<td>je</td>
<td>jà</td>
</tr>
<tr>
<td>2</td>
<td>il</td>
<td>ona</td>
</tr>
<tr>
<td>3</td>
<td>nous</td>
<td>my</td>
</tr>
<tr>
<td>-PL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>ils</td>
<td>elles</td>
</tr>
</tbody>
</table>

"je” < [1 sg] … underspecified for gender

NB. like Russian PL, ignores issue of meta-syncrism, to which we return
• Gender agreement when the subject nominal does not mark gender (1st and 2nd person):

31  a. Je suis intelligent. (speaker is male)
    b. Je suis intelligent-e. (speaker is female)

     I am intelligent-[O]-[FEM]

    ‘I am intelligent.’

32  a. Ja — bol’en. (speaker is male)
    b. Ja — bol’n-a. (speaker is female)

     I sick-[O]-[FEM]

    ‘I am sick.’

If “masculine” is unmarked, why can’t (31a)/(32a) be used by a female speaker?

• A real(izational) answer:

   Full Specification of MSR / Underspecification is property of VIs / exponents

33  MSR: [1SG FEM] BE [INTEL, FEM] [1SG M] BE [INTEL, M]

    PF: je intelligent – e je intelligent – O

• A projectionist answer (HPGS, Pollard & Sag 1994):

34  MSR: [1SG ] BE [INTEL, FEM] [1SG ] BE [INTEL , ]

    PF: je intelligent – e je intelligent – O

• There is no syntactic source for the gender, to define the context for “best fit”

• Syntactic agreement cannot resolve this competition.

  Hypothesis: Predicate adjective agreement is “semantic” agreement (not syntactic or morphological) and is resolved by choosing the sentence that best fits the discourse context (i.e., natural gender of speaker). FEM as presupposition.

35  Realization

    Agreement in copying/matching
    Agreement is non-class / unification
    Subset Princ regulates competition
    for exponente (very local: X’)
    Subset Princ regulates competition
    for syntactic or semantic agreement
    (not local) (complexity?)

    competition defined over morphemes
    (linear) competition defined over (possible)
    words and sentences

36  Projection/Unification: two sources for resolving competition / underspecification.

   (i) (inherent) grammatical features of other words in the expression
       (ii) (natural) semantic features of referents [speaker, hearer]

2.2 Underspecification: Agreement with no grammatical source

Russian: like French (29), (32), but third person (singular) pronouns: same gender exponents as adjectives

37  pronouns | past tense | short adjectives
    on-i    | byl-i       | bol’n-y    zakryt-y [pl]
    on-o    | byl-o       | bol’n-o    zakryt-o [neut]
    on-a    | byl-a       | bol’n-a    zakryt-a [fem]
    on byl   | bol’en     | zakryt     default

• Gender exponents in pronoun and predicate are subject to underspecification.
  • Both pairs of sentences in (38a-b, c-d) will unify, with neither blocking the other.

    sg-fem     sick-fem    ‘She was closed.’
    ‘She was closed.’ (door)

    b. On bol’en. d. On byl zakryt
    ‘He/it was closed.’
    ‘He/it was closed.’ (drawer)

• Like French je, Russian ja: competition cannot be resolved morpho-syntactically.

• semantic agreement? OK for (38a-b) [humans can be sick]
  But inanimates (38c-d) grammatical gender

• Facts are even more complex; see Corbett 1991, Wechsler & Zlatić 2003, etc.
  o Where natural gender ≠ grammatical gender ⇒ optionality + trends

  Grammatical gender must come from the word (root), and can’t come from the semantics.

Conclusion

Underspecification ⇒ Separation

MSR is independent of morpho-phonological representation.

Underspecification ⇒ Realization / Late Insertion

Morphology interprets, rather than feeding, syntax.
3. SYNTAX ALL THE WAY DOWN

DM: The MSR is (determined by) the syntax.
“Single Generative Engine”

Isolating languages: UG contains the mechanisms needed to combine morphemes.
(Chomsky’s MERGE) creates labelled (headed) constituent structures

Agglutinating languages: Is there any reason to think that MERGE is insufficient? Is the internal structure of words different from the internal structure of phrases? (cf. Swadesh 1939, Pike 1949)

(39) a. John cried. Did John cry. [Past tense]
b. John is smarter. John is more intelligent. [comparative]
c. John leapt. John took/made a leap. [simple actions]

(40) Syntax composes, morphology determines (in part) word vs. phrase status

(41) Syntax: DegP Uniform syntax/semantics

Spell-Out: Merger

(42) Morphological Merger (Marantz 1984, 1988: 261) At any level of syntactic analysis (d-structure, s-structure, phonological structure), a relation between X and Y may be replaced by (expressed by) the affixation of the lexical head of X to the lexical head of Y.

(43) Idiosyncratic conditions on Merger, partly phonological.

a. [xER {y SMART}] b. [[-ER [INTELLIGENT]] smarter mo-re intelligent]

(44) Differences between syntax and morphology:

Headedness (English: rigidly head-initial syntax, but dominant head-final inside X) Assumption: linear order is part of the Spell-out component (Morphology).

Thus, Merger routinely creates suffixation in English (see (39))

(45) Latin –que ‘and’; occurs after first word of its complement.

Open question: how much ordering is PF and how much syntax?

(46) Aside: Merger (word-hood) is hard to detect when word-internal and external syntax have same headedness (recall Cynthia’s?: what’s a word?, Miguel’s? re: circumfixes)

(47) a. Taroo–ga Tanaka sensee-o tasuke-ta (normal)
   TarO-NOM Tanaka Professor-ACC help-PAST
b. Taroo–ga Tanaka sensee-o o-tasuke(-)si-ta (honorable object)
   TarO-NOM Tanaka Professor-ACC HP-help(-)su-PAST
   ‘Taro helped Prof. Tanaka.’

Is o-tasuke(-)si-ta one word or two? Light verb si-ta (PAST) su-ru (PRES)

(48) a. [Lina-o tasuke]-sae Kai-ga tVR si-ta.
   Lina-ACC help-even Kai-NOM do-PAST
   ‘Kai even helped Lina’

b. [Tanaka-sensee-o o-tasuke]-sae Taro-ga si-ta.
   Tanaka-Prof-ACC HP-help-even Taro-NOM do-PAST
   Taro even helped Prof. Tanaka.

(49) *[Lina-o tasuke]-sae Kai-ga tVR -ta.
   Lina-ACC help-even Kai-NOM -PAST

(50) a. Yamada sensee-ga kono ronbun-o kak-are-ta
   Yamada Professor-NOM this article-ACC write-PASS-PAST
   Prof. Yamada wrote this article. (passive as subject honorification)
b. *[kono ronbun-o kaki]-sae Yamada sensee-ga tVR (rare-ta
   this article-ACC write-even Yamada Professor-NOM PAST-PASS
   Prof. Yamada even wrote this article.

See (1) Syntax all the way down:
+ Morphological Operations (like Merger) that blur this

Intuition: Isomorphism between syntactic structure (and thus semantics) and morphology should ‘come for free’ (cf. Muysken 1981, Baker 1985); Morpheme order/structure is essentially syntax, deviations are minor and local.

Morphology, like syntax and semantics, is compositional: piece-based

Why might one be tempted to an alternative? (Matthews, Anderson, Stump)

Process Morphology (see Hockett 1954). non-segmental morphs: tones, ablaut, mutations

Somali gender inan “boy” inán “girl” (LH vs. HL)
number dibi “ox” dibi “oxen” (gndr polarity)
case bull/ox UNMARKED NOMINATIVE GENITIVE VOCATIVE
Fatima Fatimso Fatimso Fatimso (suff)
Dibi Dibi Dibi Dibi
Faadumo Faadumo Faadumo Faadumo
Reduplication in Tagalog (from Andrea’s handout)

 present  future
buy  bili  bi-bili
get  kuha  ku-kuha
go  punta  pa-punta
write  sulat  su-sulat

Syntax: TP Head Movement or Merger
FUT VP Verb

Vocabulary item for “FUT” CV- (or minimal syllable, McCarthy)

- The feasibility of such analyses relies on the plausibility of having a theory of association in the (morpho-)phonology.

Piece-Based analysis and morpheme order:

- Quite generally, the ‘slots’ in a template have internal and external coherence.
  - Internal: Slot 13 = Aspect, Slot 16 = Tense, Slot 17 = Object Agreement
  - External: The order of affixes often mirrors syntactic hierarchy.

DM: The affixes are (in the general case) heads in the syntax (MSR)
But there are deviations: theme vowels, augments etc.

Template Ordering:

Clitics in Slavic (mostly syntactic):
Q>AUX>DAT>ACC/GEN>REFL(se)=je
Bošković 2001

Clitics in Romance (templates):
se: [te le [lai] y.en] French
vous


se te m’enfadáre  ‘I’ll get angry at you’
se te m’enfadáras  ‘You’ll get angry at me’

Hierarchies, inverses, and the like:

Nishnaabemwin (Algonquian) Bejar 2003 < Valentine 2001

<table>
<thead>
<tr>
<th>Case</th>
<th>Alg.</th>
<th>wpa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obj</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Subj</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>n=</td>
<td>1 w</td>
<td></td>
</tr>
</tbody>
</table>

For a syntactic analysis of inverse in one Algonquian language, see Bruening 2001.

4. MORPHOLOGICAL OPERATIONS: AN INVENTORY OF TWEAKS

Recall: 1:1 mapping morphological structure/syntactic structure is basic case
Deviations abound, and are the core area of theoretical inquiry

NOTE: IDENTIFYING MORPHO-SYNTAX ISOMORPHISM OR MISMTACHES REQUIRES DOING SYNTAX (AND PHONOLOGY)! Conversely, we know that mismatches exist, and thus any syntactic analysis relying on overt morphological cues for structure (affix order, possibly word order) is making implicit commitments about morphology. Analyses are significantly incomplete until those are chased out.

DM leading idea: deviations are constrained by linguistic (morphological) principles
All of these are areas of active inquiry within DM

Syntax Morphology

- **MERGER** (above)  
  \[ X \vDash X \vDash Y \]  
  \[ X \vDash X \vDash Y \]  
  cf. head mvt

- **FUSION**  
  \[ X \vDash X \vDash Y \]  
  cumulative exponence

(56) Italian:  
  ‘boy’ ragazz-o ragazz-i  
  ‘girl’ ragazz-a ragazz-e

IF the syntax has separate number and gender nodes, then this is fusion.

Alternative:  
**BUNDLING** (Bobaljik 1995 et seq., Pylkkänen 1999, in press)

(57) a. F Set of functional features. UG  
    (after: Chomsky 2000: 101)

b. \([F_L]\) One-time selection: the features active in L

c. Lex Assembly of \([F_L]\) into LIs — “the Lexicon of L” [Bundling]

d. \(C_{IL}\) Syntax

e. Spell-Out: Interpretation of the output of \(C_{IL}\)

Refer to (1)—relationship of morphological to syntactic variation…


a. L1 (Lex) \([\text{INF}, \text{TNS}, \text{AGR}]\)

b. L2 (Lex) \([\text{TNS}]\)

(59) a. \(\text{IP} \ 	ext{AgrP}\)

b. \(\text{Agr} \ 	ext{TP}\)

\(\text{Inf}\)

\(\text{TP}\)

\(\text{V}…\)

\(\text{Tns}\)

\(\text{V}…\)

(60) a. More specific positions (subject positions) in (59a) than (59b)

b. More syntactic terminal nodes (heads) in (59a) than (59b)

c. Non-local relations among “Inf-type” heads in (59b)

Syntactic variation: In the absence of any variation in the Syntax (grammar, \(C_{IL}\)), the points in (60) could very well turn out to be manifest as differences in the syntax (descriptive) of the languages.

Morphological var.: If the terminal nodes of the syntax (X’) are the locus of vocabulary insertion (realization), then (59b) allows for separate Tns and Agr “morphemes”, but (59a) does not.

Practical limit: Underspecification—no requirement that all heads have overt exponents.

**FISSION:**  
\[ X \vDash \begin{array}{c} \text{Feat1} \\ \text{Feat2} \end{array} \] \rightarrow \[ X' \vDash \begin{array}{c} \text{Feat1} \\ \text{Feat2} \end{array} \]

Syntax: Agr  
Morphological form: Separate Person and number

(61) Russian:  
po-id-em-te Syntax AGR; Fission “2pl” (polite)

\(\text{ASP-go-1PL-2PL} \)

‘Let’s go’ (polite)

An alternative to FISSION: Feature Movement (McGinnis)

doubly-inflected form (61) only in hortative (1 psn imperative):

not in “inclusive” contexts: my po-id-em-te)

we \(\text{ASP-go-1PL-2PL} \)

‘We will go.’

Could there be an additional syntactic node in hortatives to host double agr?

Requirement for evaluation: Independent evidence for syntactic structure.

**IMPOVERISHMENT:** deletion/suppression of features prior to vocabulary insertion

(62) Macedonian padn: ‘fall’ (from Stamp 1993:452)

Present past (imperf) past (aorist)

1sg. padn -am padn-e -v padn-a -a

2sg. padn-е -a padn-e -le padn-a

3sg. padn-e padn-e -le padn-a

1pl. padn-e -me padn-e -v -me padn-a -v -me

2pl. padn-e -le padn-e -v -te padn-a -v -te

3pl. padn-at padn-e -u padn-a -a

(63) a. In the past tenses, the second person singular has the same form as the third person singular (p. 452)

b. Person:2 \rightarrow Person:../[sg. past]

**Meta-Paradigmatic Syncretism:**

(64) Russian (cf. Ole Eng. (16), Greenberg’s U 37 and 45)

<table>
<thead>
<tr>
<th></th>
<th>Pronouns</th>
<th>Adjectives</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>-PL.</strong></td>
<td>Masculine on-e</td>
<td>emu -yj</td>
</tr>
<tr>
<td>Feminine on-a</td>
<td>ej -iaa</td>
<td></td>
</tr>
<tr>
<td>Neuter on-o</td>
<td>emu -oje</td>
<td></td>
</tr>
<tr>
<td><strong>+PL.</strong></td>
<td>Masculine on-i</td>
<td>im -ye</td>
</tr>
<tr>
<td>Feminine on-i</td>
<td>im -ye</td>
<td></td>
</tr>
<tr>
<td>Neuter on-i</td>
<td>im -ye</td>
<td></td>
</tr>
</tbody>
</table>
Underspecification misses a significant generalization.

(65) a. -i ⇔ [PLURAL] b. im ⇔ [DAT.PLURAL]
   -a ⇔ [FEM] ej ⇔ [DAT.FEM]
   Ø ⇔ [NEUT] emu ⇔ [DAT]

Such a treatment leaves the lack of gender in the plural as a series of accidental statements about individual vocabulary items.

(66) GENDER ⇒ Ø / [__ PLURAL] 
   or: " [GENDER, PLURAL] (cf. Noyer, Calabrese)

Where’s impoverishment? (cf Bundling)

(67) List 1
   ↓ Syntax
   MS < Impoverishment (suppresses features that are in the syntax)

Same effect could be achieved if the features are never combined in the first place.

Is there reason to think [gender, plural] co-occur in Russian?

(68) Mama, vy ste taká dobrá! Slovak
    Mama you.PL be.2PL so.FEM.SG kind.FEM.SG
    ‘Mother, you are so kind.’ (Corbett, 1988, 40)

Predicate Hierarchy (Comrie 1975), Agreement Hierarchy (Corbett 1983, 2006)

Syntactic number + semantic gender?

(69) (U menja) dv-e mlads-ix sestr-ý.
    At me two-FEM.SG.NOM younger.-PL.GEN sister-FEM.SG.GEN
    ‘I have two younger sisters.’ (Corbett, Greville 1991. Gender. CUP

5. SOME REMAINING TOPICS

- ROOTS (Late or Early Insertion)? Key issues: Does interpretation “sec” PF?
  Root allomorphy / suppletion?

- LOCALITY (Contextual allomorphy / Bobaljik v. Carstairs-McCarthy)

- PARADIGMS (closely intertwined with impoverishment)

Corbett, Greville G. 1991. Gender. CUP
Corbett, Greville G. 2006. Agreement. CUP

Further information and references: http://www.ling.upenn.edu/~moyer/dm