Semantic Prominence and Argument Realization I

Mapping from Lexical Semantics to Syntax

Part I: The Problem of Argument Realization

1   Introduction

WHAT IS INVOLVED IN ARGUMENT REALIZATION?
Delineating the possible syntactic expressions of the arguments of a verb and accounting for
why the arguments of a verb are syntactically realized as they are in and across languages.

AN EXAMPLE: Why do *break* and *hit*, though both showing transitive uses, have distinct
patterns of argument realization (Fillmore 1970)?

(1)   Transitive uses:

    a.   The boy broke the window.

    b.   The boy hit the window.

(2)   Causative alternation:

    a.   The boy broke the window with a ball.
        The window broke.

    b.   The boy hit the window with a ball.
       *The window hit.

(3)   Possessor raising:

    a.   I broke his leg./*I broke him on the leg.

    b.   I hit his leg./I hit him on the leg.

(4)   *With/against* alternation:

    a.   Perry broke the fence with the stick.
        Perry broke the stick against the fence. (not comparable to *hit against*)

    b.   Perry hit the fence with the stick.
        Perry hit the stick against the fence.

THE CONTEXT FOR SOLUTIONS TO ARGUMENT REALIZATION:
— The generalizations are taken to involve mapping semantic onto syntactic notions.
— Specifically, the mapping is taken to preserve at least some elements of semantic structure.

(5)   UNIVERSAL ALIGNMENT HYPOTHESIS: There exist principles of UG which predict
       the initial [grammatical] relation borne by each nominal in a given clause from the
       meaning of the clause. (Perlmutter & Postal 1984:97)

THE SIMPLEST PERSPECTIVE ON MAPPING

There are semantic roles, identifying classes of arguments bearing the same semantic relation to their verbs; each has its own syntactic realization.

Mapping of semantic roles to their syntactic realizations is insensitive to cooccurring roles. The alternate syntactic realizations of some arguments is seen as syntactic in nature.

CENTRAL HYPOTHESIS: Agents are subjects and patients are objects.
        (i.e., Agent-patient verbs, perhaps two-argument verbs in general, are transitive.)

MORE COMPLEX CHALLENGES: WHY ARGUMENT REALIZATION IS NON-TRIVIAL

— Well-known difficulties with identifying relevant components of meaning
— The problem of verbs with multiple argument realizations
— Failure to appreciate the influence of coarguments on each other's realizations
— Failure to appreciate dimensions of crosslinguistic variation in argument realization,
        such as adequately recognizing the significance of language-particular coding options:
            – case-marking, agreement, word order trade-offs
            – the problem of indirect object/first object/dative case
            – differences in the transitive verb inventory
            – differences in fine-grainedness of verb meaning

2 A challenge for argument realization: Context dependence of coarguments

Particular semantic roles need not be consistently associated with a specific syntactic
        realization, with the exact realization depending on cooccurring semantic roles.
Must capture attested/preclude unattested semantic role-grammatical relation mappings.

Priorities among a verb's coarguments with respect to their potential realization.

(6)   An instrument can't be realized as subject in the presence of an agent.

        a.   The door opened.
        b.   Dana opened the door.
        c.   The chisel opened the door.
        d.   Dana opened the door with a chisel.
        e.   ∗ The door opened by Dana.
        f.   ∗ The chisel opened the door by Dana.

(7)   If there is an A [=Agent], it becomes the subject; otherwise, if there is an I [=Instrument], it becomes the subject; otherwise, the subject is the O [=Objective, i.e., Theme/Patient]. (Fillmore 1968:33)

(8)   A recipient can't be realized as subject in the presence of an agent.

        a.   Alex received a package.
        b.   Sam sent Alex a package.

(9)   An experiencer can't be realized as subject in the presence of an agent/causer.

    a.   The toddler (*deliberately) feared the lion.

    b.   The lion (deliberately) frightened the toddler.

(10)   A moving entity (i.e., theme) can't be realized as subject in the presence of an agent.

    a.   Kelly moved the cat into the room.

    b.   The cat entered the room.

(11)   A moving entity can't be an object in the presence of an entity that changes state.

    a.   Pat broke the window with a bat.
              Pat broke the bat against the window. (not comparable to *hit against*)

    b.   Shelly smeared oil on the axle.
              Shelly smeared the axle with oil.

    c.   Pat hit the window with a bat.
              Pat hit the bat against the window.

(12)   Whether an "oblique" role can be the object of an applicative verb depends on cooccurring oblique roles (Polinsky & Kozinsky 1992).
        — When a recipient and a benefactive cooccur, only the recipient can be an object.
        — When a benefactive and an instrument cooccur, only benefactive can be object.

IMPLICATION: A notion of semantic prominence is necessary to explain context dependence.

3   A crosslinguistic dimension to this challenge

Context dependence has a cross-linguistic dimension: it is much more pervasive in some languages, such as English, than in others.

• LIMITATIONS ON INSTRUMENT SUBJECTS (DeLancey 1984; Van Voorst 1996):

"... Irish, like Dutch, requires that the subject NP be an initiator of the event described by the verb. Irish instruments, like those of Dutch, cannot serve as an external argument." (Guilfoyle 2000:66)

(13)   a.   D'oscail Seán an doras leis an eochair.
            open.PAST Seán the door with the key
            'Sean opened the door with the key.' (Guilfoyle 2000:66, (13))

    b.   ∗ D'oscail an eochair an doras.
            open.PAST the key the door
        ∗ 'The key opened the door.' (Guilfoyle 2000:66, (11))

• LIMITATIONS ON EXPERIENCER SUBJECTS:

"Unless the subject is clearly an agent ..., there is a strong tendency for the 'subject-like' element to appear as a PP internal to the VP rather than as an external argument. Thus, predicates expressing physical and psychological states typically appear as nominal predicates with PP experiencers." (Guilfoyle 2000:67)

(14)   Tá eagla orm.
       is fear on1S
       'I am afraid.' (Guilfoyle 2000:67, (15a))

Dative/accusative experiencers in German impersonal constructions are subjects in English.

(15)   a.   Mich friert. 'me freezes'
            I'm freezing.
       b.   Mir ist warm. 'to-me is warm'
            I'm warm. (Hawkins 1985:56, (4.7a,b))

• OTHER LIMITATIONS ON SUBJECTS:

Rohdenburg (1974) shows that English allows a much broader range of subjects than German; many non-agents in German resist being mapped onto subject, though they may be in English; manifested in grammaticality judgments and frequency of occurrence.

(16)   English subjects lacking German counterparts (Hawkins 1985:58-59)

       a.   A few years ago a pfennig would buy two or three pins.
       b.   This hotel forbids dogs.
       c.   This trial cannot proceed.
       d.   The latest edition of the book has added/dropped a chapter.
       e.   My guitar broke a string.
       f.   The book sold 10,000 copies.

Consequently, many English non-agent subjects correspond to PPs in German.

(17)   a.   The roof of the tunnel was seeping water.
       b.   Durch die Tunneldecke sickerte Wasser (durch).
       c.   Through the tunnel roof seeped water. (Hawkins 1985:60)

       d.   The latest edition of the book has added a chapter.
       e.   In der letzten Ausgabe des Buches ist ein Kapitel hinzugefügt.
       f.   In the latest edition of the book a chapter has been added. (Hawkins 1985:61)

IMPLICATION: These limitations on subject choice again reflect priorities in argument realization suggestive of semantic prominence relations.

4 Another challenge for argument realization: Transitivity

Not all two-argument verbs show same argument realizations in and across languages.

Every language has a syntactically-privileged class of two-argument verbs: transitive verbs. These verbs display the unmarked expression of arguments for two-argument verbs;
  one argument bears the core grammatical relation "subject", the other "direct object".

A major challenge for theories of argument realization is making appropriate predictions
  regarding which two-argument verbs MAY or WILL BE transitive across languages.

Specifically, two-argument verbs, which clearly fit the "agent act on and cause an effect in patient" semantic mold that is behind the name "transitive" are transitive in all languages. Call these CORE TRANSITIVE VERBS (CTVs), cf. Andrews' (1985) "primary" transitives.
  Examples of CTVs: *break, destroy, kill, open*

Outside this class, all is not chaos: there appears to be fairly systematic variation as to which two-argument verbs are most likely to be transitive across languages.

A SCALE OF THE POTENTIAL TRANSITIVITY OF TWO-ARGUMENT VERBS

Tsunoda (1985:388-389) posits an implicational hierarchy of two-argument verbs; he proposes that it be interpreted as a transitivity scale, organized in terms of the decreasing affectedness of the verbs' patient. The verbs highest on the hierarchy are the most likely to be realized as transitive across languages; these verbs are also most likely to show passive, antipassive, reflexive, reciprocal forms.

(18) a.   Direct effect on patient
          — Resultative (i.e., creates a change of state): *kill, break, bend*
          — Non-resultative: *hit, shoot, kick, eat*

      b.   Perception
          — Patient more attained: *see, hear, find*
          — Patient less attained: *listen, look*

      c.   Pursuit: *search, wait, await*

      d.   Knowledge: *know, understand, remember, forget*

      e.   Feeling: *love, like, want, need, fear, boast; fond, afraid, angry, proud*

      f.   Relationship: *possess, have, lack, resemble, correspond, consist; similar, lacking*

      g.   Ability: *capable, proficient, good*

• English has a large class of transitive verbs; all of Tsunoda's classes with the exception of pursuit (some relationship, and ability) are transitive in English.

• French has a broader class of transitives: in French verbs of pursuit are transitive, thus, these English two-argument non-transitives have transitive translation equivalents.

(19)   *chercher* 'look for', *attendre* 'wait for'; also *demander* 'ask for', *pleurer* 'mourn for'

• Many other languages have more restricted transitive classes than English does.

English transitives with non-transitive translation equivalents in Caucasian languages include representatives of most of Tsunoda's classes except for the core transitive verbs (Tsunoda's resultative verbs with direct effect on patient).

(20)   "Certain verbs that we would regard as distinctly transitive normally occur in N.W. Caucasian in the nominative construction. These include the verbs 'beat', 'bite', 'expect', 'harm', 'help', 'kiss', 'look at', 'meet', 'push', 'read', 'stab', 'wait for'." (Catford 1976:44)

• A subclass to single out: Verbs of surface contact by impact are not transitive in many languages (a subset of Tsunoda's non-resultative verbs with direct effect on patient).

Lhasa Tibetan counterparts of *break, cut, kill*, and so on are obligatorily transitive, but the counterpart of *hit* is not: argument denoting surface contacted takes a locative marker (DeLancey 1995).

(21)   shing*(-la) sta=re-s gzhus-pa
        tree-LOC axe-ERG hit
        'hit the tree with an axe' (DeLancey 1995: (18))

Concepts expressed by other English surface contact verbs involve verb-noun combinations.

(22)   nga-s blo=bzang=la rdog=rdyag gzhus-pa yin
        I-ERG Lobsang-LOC kick$_N$ hit/throw-PERF/CONJUNCT
        'I kicked Lobsang' (DeLancey 1995: (20))

(23)   I gave Lobsang a kick (= 'I kicked Lobsang')
        (cf. *I gave the window a break.)

Ingush also uses verb-noun combinations to express the counterparts of certain English surface contact verbs (Nichols 1982:447, 1984:188). Again the surface contacted is expressed in an oblique case—a case-marking pattern common across Caucasian languages (Nichols 1984:188).

Even in English, these verbs allow either the surface contacted or the instrument used as their object.

(24)   a.   Lindsay hit the stick against the fence.
        b.   Lindsay hit the fence with a stick.

(25)   a.   Taylor beat his fists against the wall.
        b.   Taylor beat the wall with his fists.

IMPLICATION: A theory of argument realization should account for the systematicity in what must or may be a transitive verb,
Yet, some approaches (e.g., Dowty's proto-roles) assume a verb's transitivity is GIVEN.

As with context dependence, this challenge requires a theory of argument realization that is sensitive to the relationship between a verb's coarguments: it is these relations that distinguish the core transitives from other two-argument verbs.

(26)   The less similarity is there between the two major participants of the predicate
       in terms of control and affectedness, the more semantically transitive is the verb.
       (Testelec 1998:41, (11))

5   Unifying these challenges

Hawkins (1985) suggests a unifying perspective on these challenges: They reflect differences
in the degree of "semantic transparency" languages show in argument realization.

A language which limits subjects to agents or the class of transitive verbs to agent-patient
verbs shows a more transparent semantics-to-syntax mapping than one which doesn't.

From this perspective, English is less semantically transparent than some other languages.

6   A related challenge: The breadth of object choices available to a verb

Semantic transparency (or the lack thereof) also manifests itself in object choices.

English allows a wide range of semantic roles to be realized as objects, both across verbs
and with a given verb.

(27)   The engineer built the bridge. (effected object/factitive; cf. Fillmore 1968)
       The engineer destroyed the bridge. (patient/consumed object)
       The engineer widened the bridge. (patient/incremental theme; cf. Dowty 1991)
       The engineer moved the bridge. (theme)
       The engineer washed the bridge. (location/surface)
       The engineer hit the bridge. (location; cf. Fillmore 1970)
       The engineer crossed the bridge. (path)
       The engineer reached the bridge. (goal)
       The engineer left the bridge. (source)
       The engineer saw the bridge. (object of perception)
       The engineer hated the bridge. (stimulus/target or object of emotion)

(28)   a.   Kelly sewed.
       b.   Kelly sewed bows on the costume.
              Kelly sewed the costume with bows.
       c.   Kelly sewed the lining to the skirt.
              Kelly sewed the lining and skirt together.
       d.   Kelly sewed the piece of silk into a ball gown.
              Kelly sewed a ball gown out of the piece of silk.
       e.   Kelly sewed her fingers to the bone.
       f.   Kelly sewed her way to fame.

(29)   Kim whistled.
       Kim whistled a tune.
       Kim whistled a warning.
       Kim whistled her appreciation.
       Kim whistled a piercing whistle.
       Kim whistled her way through difficulties.

Not all languages allow such a variety either across verbs or with a given verb.

Van Voorst (1996) suggests that English has the broadest semantic range of objects, French next, Dutch next.

(30)   a.   DUTCH: write letter/*check, *ski the Rockies, chew (on) meat, chew on gum, bite *(on) tongue

         b.   FRENCH: write letter/check, *ski the Rockies, chew meat, bite-REFL tongue

A SUBTLE MANIFESTATION OF THIS CHALLENGE: LEXICAL SPECIFICITY

In English, a single verb may have a range of objects, so that a range of semantic notions are realized as objects.

Other languages may use distinct verbs where English has one, with the choice among them governed by the choice of object. In these languages, verbs seem to "agree semantically" with their objects, to quote Plank (1985).

"Semantic agreement" is a strategy for maintaining semantic transparency while allowing for a range of object choices.

IMPLICATION: In English, distinct semantic notions might be in competition for objecthood when they cooccur, while in languages with "semantic agreement" there is not competition for objecthood.

AN EXAMPLE: Effected and affected objects

English has some verbs which take only effected objects and others that may take affected or effected objects; the latter tend to be basically activity verbs.

(31)   build, construct, create, design, fabricate, manufacture, synthesize, . . .

         a.   The engineer built an innovative house out of recycled materials.

         b.   * The engineer built recycled materials into an innovative house.

(32)   bake, carve, grind, sew, spin, weave, whittle, . . .

         a.   Taylor carved the chunk of wood into a dog.

         b.   Taylor carved a cat out of the chunk of wood.

In Spanish, effected objects are primarily found with verbs whose meaning includes a notion of creation; when the verb emphasizes the activity over the creation, then effected objects are not possible (Martínez Vázquez 1998).

(33)   Escribió unas palabras.
        'S/he wrote some words.' (Martínez Vázquez 1998:259, (66))

(34)   a.   Rayó/grabateó un papel.
              'S/he scratched/scrawled on paper.'

         b.   * Rayó/grabateó unas palabras.
              'S/he scratched/scrawled some words.' (Martínez Vázquez 1998:259, (68))

A single English verb may be translated into two distinct, morphologically-related German verbs, one taking an affected, and the other an effected object (Hawkins 1985; Plank 1985):

(35) a. ein Grab/ein Loch/einen Tunnel graben
          to dig a grave/a hole/a tunnel
      b. den Boden umgraben/Kartoffeln ausgraben
          to dig the ground/potatoes (Hawkins 1985:30)

Other examples (though they may not all represent the same phenomenon):
— English *search* is translated by French *chercher* and *fouiller* (Gougenheim 1975).
— English *teach children* translated by a different verb from *teach French*
    (Workgroup on Functional Grammar 1981).
— Languages with verbs of wearing determined by body part being clothed.
— Languages with multiple verbs of putting.
— See Plank (1985) for many more examples; also Gougenheim (1975).

Part II: Approaches to Preserving Meaning in the Semantics-Syntax Mapping

7   Two well-known hypotheses about the semantics-syntax interface

There is a pervasive, though often implicit, assumption that the lexical semantics-syntax mapping preserves facets of the semantic representation in the syntax, but what are taken to be the key elements of meaning that need to be preserved differ, to some extent reflecting different views of semantic representation.

(36) UNIVERSAL ALIGNMENT HYPOTHESIS: There exist principles of UG which predict the initial [grammatical] relation borne by each nominal in a given clause from the meaning of the clause. (Perlmutter & Postal 1984:97)

MOTIVATION: Unaccusative phenomena

(37) THE UNIFORMITY OF THETA ASSIGNMENT HYPOTHESIS (UTAH): Identical thematic relationships between items are represented by identical structural relationships between those items at the level of d-structure. (Baker 1988:46, (30))

MOTIVATION: Grammatical relation-changing phenomena: dative alternation, applicatives, causatives, noun incorporation; extended to other near-paraphrase pairs.

(38) a. Martha gave an apple to Myrna. (*to* variant)
      b. Martha gave Myrna an apple. (double object variant)

(39) a. Sally fears glass elevators.
      b. Glass elevators frighten Sally.

But these hypotheses do not address the questions of context dependence and crosslinguistic variability in semantic transparency.

8   Types of hypotheses about the lexical semantics-to-syntax mapping

8.1   Equivalence class preservation constraints

AN EQUIVALENCE CLASS PRESERVING MAPPING:
Preserves equivalence classes of arguments (i.e., treats arguments with the same semantic roles in the same way) and/or equivalence classes of verbs.

KEY POINT: Equivalence class preservation constraints take the relationship of individual arguments to their verb as most important in lexical semantic representation.

(40)   THE UNIFORMITY OF THETA ASSIGNMENT HYPOTHESIS (UTAH): Identical thematic relationships between items are represented by identical structural relationships between those items at the level of d-structure. (Baker 1988:46, (30))

ADVANTAGE: Retention of transparency in the mapping from lexical semantics to syntax.

PROBLEM: Apparent many-to-many character of the mapping, which arises because the semantic representation appears to make more distinctions than the syntactic representation.
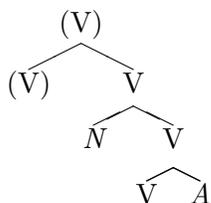
STRATEGIES FOR OVERCOMING THIS PROBLEM:

• Use abstract syntactic representations to increase the number of syntactically-encoded distinctions.

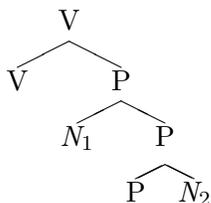e.g., Fillmore's Case Grammar, VP-shells (Larson 1988; Hale & Keyser 1997, 2002).

(41)   We cleared the screen./The screen cleared.

(42)   Deadjectival verb (Hale & Keyser 1997:211, (15))

(43)   We saddled the horse.

(44)   Denominal locatum verb (Hale & Keyser 1997:213, (21))

Verbs are derived by "successive incorporation into immediately governing heads" (1997:205) of the root, subject to the Head Movement Constraint (Baker 1988; Travis 1984).

This constraint explains why certain verb meanings are unattested:
they involve incorporations that would violate this constraint.

Simple transitive verbs do not all have the same lexical syntactic structure:
— object of *clear*, which is the entity that assumes the state named by the verb,
originates as the specifier of a verbal projection in (42).
— object of *saddle*, which names the place that will be provided with the thing named by
the verb, originates in the specifier of a prepositional projection in (44).

Use of abstract syntactic representations results in syntactic structures that mirror the
structure of proposed semantic representations; cf. generative semantics.

• Use either coarser-grained definitions of semantic roles or generalized semantic roles
(macroroles, Foley & Van Valin 1984, Van Valin & LaPolla 1997; proto-roles, Dowty 1991)
to reduce the number of semantic distinctions to the number of syntactically-encoded dis-
tinctions (i.e., subject, direct object, indirect object).

Coarser-grained roles

AN EXAMPLE: Levin & Rappaport Hovav's (1995) notion of immediate cause: the par-
ticipant in an eventuality which is its immediate. This notion subsumes agents, as well as
natural forces, certain instruments, the emitter arguments — whether animate or inanimate
— of verbs of sound and light emission such as *rumble* or *sparkle* and some other inanimates
(i.e., subjects of *quiver* or *pulsate*). (See also Van Valin & Wilkins's (1996) related notion
"effector".)

(45) a.   The hooligans broke the car windows.

      b.   The crane loaded the truck.

      c.   The hammer broke the window.

      d.   The sun dried the clothes.

      e.   The water sparkled in the sunlight.

      f.   The stream babbled.

      g.   The aspen leaves quivered.

Generalized semantic roles

Role and Reference Grammar's (RRG) macroroles: Actor and undergoer

(46) Original RRG actor-undergoer hierarchy (Van Valin 1990:226):
      Agent > Effector > Experiencer > Location > Theme > Patient

(47) Revised RRG actor-undergoer hierarchy (Van Valin & LaPolla 1997:126-127):

| Arg of | > | 1st arg of | > | 1st arg of | > | 2nd arg of | > | Arg of state |
| DO | | $\mathbf{do'}$(x,... | | $\mathbf{pred'}$(x, y) | | $\mathbf{pred'}$(x, y) | | $\mathbf{pred'}$(x) |

• Weaken equivalence class preservation, allowing the lexical semantics-to-syntax mapping
to be many-to-one, rather than one-to-one; each semantic equivalence class, then, must have
a specific syntactic realization, though it need not be a unique realization.

e.g., Some implementations of Baker's UTAH.

• Use underspecified syntactic representations as a way of creating equivalence classes of syntactic realizations, thus decreasing the number of syntactic distinctions.

e.g., LFG's Lexical Mapping Theory (Bresnan & Kanerva 1989), where the feature [–r] is assigned to patient/theme arguments to allow them either subject or object realizations.
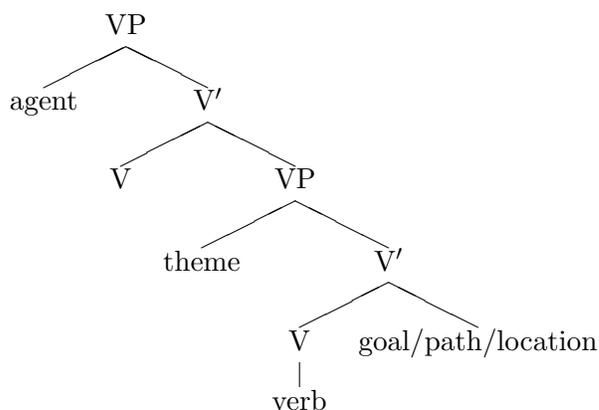
Grammatical relations are defined in terms of the features [r] (restricted) and [o] (object): subjects are [–r, –o], while objects are [–r, +o]; thus, they share the feature [–r].

• Combine several of these strategies.

Baker (1997) uses coarse-grained semantic roles and abstract syntactic representations.

(48)   a.   An agent is the specifier of the higher VP of a Larsonian structure.
        b.   A theme is the specifier of the lower VP.
        c.   A goal, path or location is the complement of the lower VP.
        (Baker 1997:120-121, (76))

(49)   Syntactic configuration assumed by Baker (1997)

```
              VP
             /  \
        agent    V′
                /  \
               V    VP
                   /  \
              theme    V′
                      /  \
                     V    goal/path/location
                     |
                   verb
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ANOTHER PROBLEM: Inability to deal with context dependence generally.

8.2   Prominence preservation constraints

A PROMINENCE PRESERVING MAPPING:
Preserves prominence relations encoded in the lexical semantic representation in the syntax.

(Presupposes lexical semantic and syntactic representations over which prominence relations among arguments can be defined, as well as an understanding of what prominence means with respect to each representation.)

(50)   the syntactic prominence of an argument is determined (or largely determined) by its thematic prominence (Jackendoff 1992:22)

(51)   Since semantics is not just interpretive and crucially determines syntax, but since one-to-one correspondence between semantic and syntactic representations is untenable, let us consider the next best thing, namely, homomorphy. ... For our purposes, a mapping of an SR to an SS will be homomorphic if it preserves the relative relations of the elements involved. (Bouchard 1995:95)

(52)   Homomorphic Mapping Principle: In a mapping from SR to SS, dominance relations
       are preserved. (Bouchard 1995:96, (38))

KEY POINT: Prominence preservation constraints take the overall hierarchical structure of
the lexical semantic representation to be critical.

Compatible with the conjecture that the compositional structure of the semantic representation is preserved in the syntactic representation.

(53)   Constituent structure at D-structure represents (the) semantic compositionality (of
       events). (Marantz 1993:143, (51))

THE CHALLENGE: Defining semantic and syntactic prominence.

• SYNTACTIC PROMINENCE: c-command, grammatical relations, or morphological case
hierarchies.

(54)   subject > object > indirect object > oblique

(55)   nominative > accusative > dative > oblique cases

• SEMANTIC PROMINENCE: thematic hierarchies, "c-command" defined over predicate
decompositions or event structures.

— *Thematic hierarchies*

A THEMATIC HIERARCHY is a language-independent ranking of possible semantic roles,
which establishes prominence relations among them.

(56)   The Relativized UTAH: If a verb α determines theta-roles θ_1, θ_2, ..., θ_n, then
       the lowest role on the Thematic Hierarchy is assigned to the lowest argument in
       constituent structure, the next lowest role to the next lowest argument, and so on.
       (Larson 1988:382)

(57)   ... syntactic configurations projected from a given θ-grid should reflect the hierarchy,
       so that for every pair of θ-roles in the grid, the higher role in the hierarchy is projected
       to a higher structural position ... (Belletti & Rizzi 1988: 344, n36)

— *Semantic c-command*

(58)   In an SF [=semantic form] representation, a node α L-commands β iff a node γ
       which either directly dominates α or dominates α via a chain of nodes type-identical
       with γ also dominates β. (Wunderlich 1997:104, (20))

(59)   Restriction on structural arguments: an argument is structural only if it is either
       the lowest argument or (each of its occurrences) L-commands the lowest argument.
       (Wunderlich 1997:112, (35))

(60)   die Gäste tranken den weinkeller leer
       'the guests drank the wine cellar empty' (German; Wunderlich 1997:118, (46a)

(61) $\lambda z \; \lambda y \; \lambda x \; \lambda s \; [\text{DRINK}(x,y)(s) \; \& \; \text{BECOME}(\text{EMPTY}(z))(s))]$
        x and z are structural arguments, but y is not
        (cf. Wunderlich 1997:121, (52b))

ADVANTAGES:

• Prominence preservation is compatible with lexical semantic and syntactic representations that make different numbers of core distinctions: it only requires that each asymmetric relation in the semantic representation is mapped onto a similarly asymmetric relation in the syntax.

Either agents or themes may be realized as subjects, as long as their coargument is lower ranked; similarly, either themes or locations may be realized as objects, as long as their coargument is higher ranked.

(62)   Agent > Theme > Location

(63)   a.   Kelly moved the cat into the room.
        b.   The cat entered the room.

• Since prominence preservation does not require that an argument bearing a particular semantic role have a unique syntactic realization, such approaches can handle the context dependence of argument realization.

(64)   A theme can't be realized as subject in the presence of an agent.

8.3   Prominence and equivalence class preservation are independent

• A one-to-one equivalence class-preserving mapping need not preserve prominence relations (though actual mappings do not seem to violate prominence relations).

e.g., nothing precludes agent/object and patient/subject associations, though these are not attested ("deep" ergative languages aside).

• Prominence preservation does not require equivalence class preservation; it merely constrains the relative hierarchical relationships between the syntactic expressions of pairs of arguments, but does not force an argument to have a unique syntactic expression.
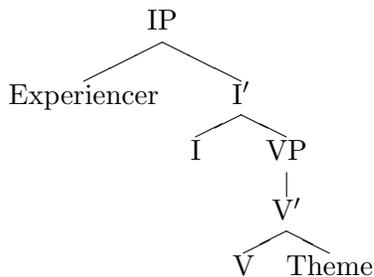
e.g., Belletti & Rizzi's analysis of psych-verbs, which allows two realizations of experiencers.

(65)   a.   Gianni teme questo.
              Gianni fears this (Belletti & Rizzi 1988: 291, (1))
        b.   Questo preoccupa Gianni.
              this worries Gianni (Belletti & Rizzi 1988: 291, (2))

(66)   Syntactic representation of the VP for a *preoccupare*-type verb
(Belletti & Rizzi 1988: 320, (76c))

```
            VP
           /  \
          /    \
        V'     Experiencer
       /  \
      V   Theme
```
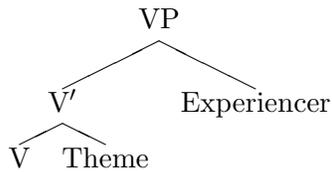
(67)   Syntactic representation for a *temere*-type verb

```
            IP
           /  \
          /    \
   Experiencer  I'
               /  \
              I   VP
                   |
                   V'
                  /  \
                 V   Theme
```

9   Repercussion: Types of mapping algorithms

• ABSOLUTE MAPPING ALGORITHMS: statements that explicitly specify the morphosyntactic realization of an argument of a verb bearing a particular semantic description.

Absolute mapping rules preserve equivalence classes; they are insensitive to prominence relations between semantic and syntactic notions.

(68)   a.   Immediate Cause Linking Rule:
The argument of a verb that denotes the immediate cause of the eventuality described by that verb is its external argument. (Levin & Rappaport Hovav 1995:135, (1))

        b.   Directed Change Linking Rule:
The argument of a verb that corresponds to the entity undergoing the directed change described by that verb is its direct internal argument. (Levin & Rappaport Hovav 1995:146, (24))

        c.   Existence Linking Rule:
The argument of a verb whose existence is asserted is its direct internal argument. (Levin & Rappaport Hovav 1995:153, (47))

DISADVANTAGES:
— Impose few constraints on set of possible mapping rules.
— Face the problem of context dependence: e.g., instrument subjects.
— Do not explain why any particular set of mapping rules is possible.

A more recent instantiation: syntacticized semantic representations

● RELATIVE MAPPING ALGORITHMS: statements that specify mappings in terms of additional organization inherent in or imposed on the lexical semantic representation to identify the arguments receiving a particular syntactic realization.

Most prevalent form of relative mapping uses a thematic hierarchy.

ADVANTAGES:

● Avoids direct reference to semantic notions (thus, may not preserve equivalence classes).

● May be prominence preserving and able to deal with context dependence in argument realization.

(69)   The argument of a verb bearing the highest-ranked semantic role is its subject:

     a.   For (6): Agent > Instrument > Theme/Patient
     b.   For (8): Agent > Recipient > Theme (Speas 1990)
     c.   For (9): Agent > Experiencer > Theme (Grimshaw 1990)

(70)   For (10): Agent > Theme > Location

(71)   For (12): Recipient > Benefactive > Possessor > Causee > Instrument > Comitative (Polinsky & Kozinsky 1992:440, (40))

CLASSES OF RELATIVE MAPPING ALGORITHMS:

● HIERARCHY-ALIGNING ALGORITHMS: The most (or, alternatively, least) prominent argument semantically is matched with the most (least) prominent syntactic realization and the next most (less) prominent semantically with the next most (less) prominent syntactic realization, and so on, until all the arguments of a verb are exhausted.

Such algorithms are prominence-preserving; the matching may be top-down or bottom-up.

(72)   Hierarchical Linking Rule: Order a verb's unlinked θ-roles according to the Thematic Hierarchy. Link θ-roles to case-markers in order of precedence on their respective hierarchies. (Carrier-Duncan 1985: 7, (12))

(73)   The Relativized UTAH: If a verb α determines theta-roles θ_1, θ_2, ..., θ_n, then the lowest role on the Thematic Hierarchy is assigned to the lowest argument in constituent structure, the next lowest role to the next lowest argument, and so on. (Larson 1988: 382)

Top-down algorithms: attractive to those who adopt what could be called the natural prominence scale conception of the thematic hierarchy: semantic roles are ranked in decreasing order of some notion of cognitive salience. Grammatical relations directly encode the information structure notion of topic (Givón 1984:134), so that semantically more salient arguments are given the grammatically more topical realizations.

Bottom-up algorithms: mesh with the conjecture that syntactic structure preserves semantic compositional structure: order of semantic composition is reflected in syntactic depth of embedding (the argument the verb composes with first will be the most deeply embedded in the syntactic representation). Used predominantly in conjunction with configurationally-represented syntactic structures, as in the Principle and Parameters and its descendants.

• BIDIRECTIONAL ALGORITHMS: combine a subject selection rule that applies from the top of the hierarchy downwards with an object selection rule that applies from the bottom of the hierarchy upwards.

Such algorithms are not prominence-preserving, but treat the notion of object as in some sense "opposed" to that of subject, rather than as the second most prominent notion.

A hierarchy-aligning algorithm favors a ranking of semantic roles that emphasizes the similarities between semantic correlates of subjecthood and objecthood, while a bidirectional algorithm favors a ranking that emphasizes dissimilarities.

INTERDEPENDENCE OF SEMANTIC ROLE RANKING AND RELATIVE MAPPING ALGORITHM

Relative mapping algorithms and the ranking of semantic roles in the accompanying thematic hierarchy are interdependent.

EXAMPLE: A thematic hierarchy of the form 'Agent > ... > Patient' may be empirically equivalent to 'Agent > Patient > ...' with respect to object selection, if the former is paired with a bottom-up object selection algorithm and the latter with a top-down algorithm.

(74)   Marlo put the snake in the garden.

   a.   Bottom-up algorithm plus 'Agent > Location > Theme'
   b.   Top-down algorithm plus 'Agent > Theme > Location'

10   Conclusions

• A theory of argument realization faces challenges from within and across languages.

• Theories of argument realization are developed in the context of the assumption that the semantics-to-syntax mapping preserves meaning.

• Crosslinguistic variation in argument realization may reflect differences in degree of surface semantic transparency.

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