Dowtyian Proto-Properties and Lexical Mapping Theory

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1. Goals

- Explore a proposal for MORPHOSYNTACTIC LEXICAL OPERATIONS which combines LEXICAL MAPPING THEORY and Dowtyian ARGUMENT SELECTION.

- Demonstrate that the modest domain over which Dowtyian argument selection was originally formulated can be extended for wider empirical coverage, contra claims by Davis and Koenig (2000).

2. Challenges posed by Davis and Koenig

Challenges to the LEXICAL MAPPING THEORY:

(i) Conceptual problems with the THEMATIC HIERARCHY

(ii) Alternative INTRINSIC CLASSIFICATIONS in applicative constructions

Challenges to Dowtian ARGUMENT SELECTION:

(i) Causer linking in derived causative constructions

(ii) Incapable of explaining the absence of basic intransitive predicates where subject is less agentive than object of preposition, e.g.:

(1) * A Porsche yearns for the president.
(intended reading: 'The president yearns for a Porsche.')

(iii) Incapable of dealing with common morphosyntactic alternations such as ACTIVE/PASSIVE pairs.

(iv) Incapable of dealing with certain lexically determined alternations, e.g.:

(2) a. Water filled the tank
b. The tank filled with water.

3. Correspondence Theory

Taxonomy of lexical operations:

- MORPHOSYNTACTIC RULES: Function-changing rules that do not correspond to a change in lexical semantics; often discourse-related (e.g., PASSIVE and LOCATIVE INVERSION).

  These are monotonic operations and are the domain of the LEXICAL MAPPING THEORY (L. Levin 1985, Bresnan and Kanerva 1989, Bresnan and Moshi 1990, Alsina and Mchombo 1993, Zaenen 1993, Alsina 1996, Butt, Dalrymple, and Frank 1997, among others).

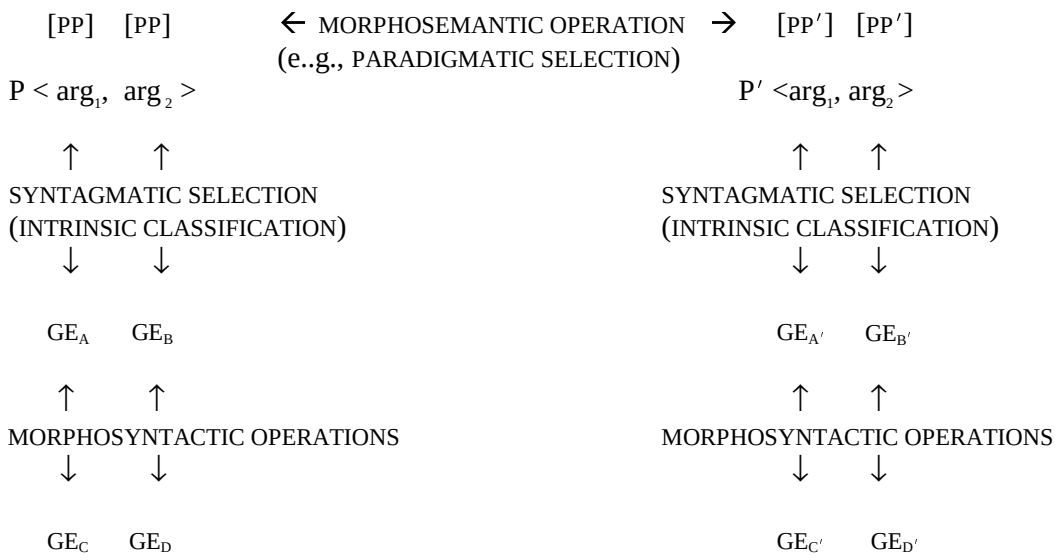
- MORPHOSEMANTIC RULES: Rules that alter lexical semantics, this is formally associated with function changes and/or valence change (e.g., CAUSATIVE and APPLICATIVE).

  These are non-monotonic and are subject to lexical semantic principles such as the PARADIGMATIC ARGUMENT SELECTION PRINCIPLE (Ackerman and Moore 1999, 2001).

  (cf. Simpson 1983, Ackerman 1990 and 1992, Joshi 1993, Markantonatou 1995, and Dubinsky and Simango 1996, Sadler and Spencer 1998, among others within LFG).

- In Ackerman and Moore (2001), we propose the CORRESPONDENCE THEORY that organizes these operations as in (3):

(3) CORRESPONDENCE THEORY



[PP] = 'proto-property set'; GE = 'grammatical encoding'

3.1. Argument Selection and Intrinsic Classification

Dowty's (SYNTAGMATIC) ARGUMENT SELECTION PRINCIPLE is a well-formedness condition on lexical entries:

(4) In predicates with grammatical subject and object, the argument for which the predicate entails the greatest number of Proto-Agent properties will be lexicalized as the subject of the predicate; the argument having the greatest number of Proto-Patient entailments will be lexicalized as the direct object (Dowty 1991:576).

Incorporating Dowtian assumptions into the LMT yields the following REVISED (SYNTAGMATIC) ARGUMENT SELECTION PRINCIPLE – adapted from Zaenen (1993):

(5) In predicates with [-o] and [-r] arguments, the argument for which the predicate entails the greatest number of Proto-Agent properties will have the intrinsic classification [-o]; the argument having the greatest number of Proto-Patient entailments will have the intrinsic classification [-r].

- LMT features ([±o], [±r]) are in correspondence with semantic properties; the nature of these feature assignments conforms to the Argument Selection Principle, interpreted here as a well-formedness condition on lexical entries. Hence, Zaenen's intrinsic classification in (5) amounts to a restatement of Dowty's Argument Selection Principle in terms of the LMT.

- Default feature specifications derive the ultimate grammatical functions for basic predicates:

(6) a. build <arg_1, arg_2>

Proto-Agent	Proto-Patient	-	*proto-roles (determined from semantic entailments)*
[-o]	[-r]	-	*intrinsic classification (regulated by the Argument Selection Princ.)*
SUBJ	OBJ	-	*grammatical functions (derived via default specifications)*

b. * build <arg_1, arg_2>

Proto-Agent	Proto-Patient	-	*proto-roles (determined from semantic entailments)*
[-r]	[-o]	-	*intrinsic classification (**Argument Selection Principle violated**)*
OBJ	SUBJ	-	***wrong functional encoding***

3.2. Morphosemantic Operations

- Ackerman and Moore (1999, 2001) develop a theory of certain morphosemantic alternations - in particular, those where a corresponding argument contrasts in semantic entailments and alternates in grammatical encoding:

(7) a. Los perros **lo** molestan. *DO – undergoes change of state*
'The dogs harass him.'
b. Los perros **le** molestan. *IO – no change of state*
'Dogs bother him.'

(8) PARADIGMATIC ARGUMENT SELECTION PRINCIPLE:
Let P (…, arg_i, …) and P′ (…, arg'_i, …) be related predicates, where arg_i and arg'_i are corresponding arguments. If arg_i and arg'_i exhibit different grammatical encodings and arg_i is more prototypical with respect to a particular proto-role than arg'_i, then arg_i's encoding will be less oblique than arg'_i's encoding (Ackerman and Moore 2001:67).

- Interpreted in terms of LMT features, the more oblique argument will be [+o] or [+r], given Zaenen's (1993) hierarchy:

(9) [-o] < [-r] < [+o] < [+r] (Zaenen 1993:151)

(10) a. *molestar*$_a$ <arg_1, arg_2>
P-A P-P + change of state
[-o] [-r]

b. *molestar*$_b$ <arg_1, arg_2>
P-A P-P (no change of state)
[-o] [+o] (or [+r])

- Valence increasing morphosemantic operations introduce new arguments – these arguments do not correspond to arguments in the base predicate, and are outside the scope of the Paradigmatic Argument Selection Principle.

(11) RESTRICTION ON VALENCE-INCREASE
If a morphosemantic operation introduces an argument to a predicate's argument structure, this argument must be encoded as a non-restricted function (i.e., it may not be [+r]) (cf. RG Oblique Law, Perlmutter and Postal 1983:90).

- The intuition behind (11) is that valence increase turns a peripheral element into a 'core argument' (cf. Payne 1997, Dixon and Aikhenvald 2000:13-14).

4. Addressing the challenges

4.1. Conceptual problems with the THEMATIC HIERARCHY

(i) The thematic hierarchy predicts possible, but unattested, combinations of co-arguments, e.g.:

(12) *pred* <ben, goal> - *unattested*

(ii) Predicates whose argument rankings are not predicted by the hierarchy; e.g.,

(13) a. Oak trees dot the hillsides.
b. The hillsides sport oaktrees.

- This raises the issue of θ-role fragmentation (Dowty 1989).

- Davis and Koenig take these as evidence for a verb-class based linking theory.

- Dowty (1991) derives the Thematic Hierarchy from the Proto-Roles – this is most easily done through GRAMMATICAL STAUS LOADING (Dowty 1998):

(14) The GRAMMATICAL STATUS LOADING of an argument is the number of proto-agent properties minus the number of proto-patient properties.

- Given (14), the hierarchy emerges as a function of Grammatical Status Loading:

(15) X outranks Y on the THEMATIC HIERARCHY iff, X's loading is greater than Y's loading.

- This notion of the Thematic Hierarchy addresses both conceptual problems.

  - The attested types of thematic oppositions will emerge from existing predicate classes, just as in Davis and Koenig's account.

  - Cases where the arguments have equal loading will result in lexically-specified encodings, given a appropriate reformulation of the Argument Selection Principle:

(16)

	dot < arg_1,	arg_2 >
properties:	independent existence (PA)	independent existence (PA)
	stationary (PP)	stationary (PP)
loading:	0	0
IC:	[-o]	[-r]

- The intrinsic classification is lexically determined in (16); *sport* will arbitrarily have the opposite classification.

4.2. Alternative INTRINSIC CLASSIFICATIONS

- Davis and Koenig argue that the Chichewa applicative examples in (17) pose conceptual problems for the LMT:

(17) a. Asodzi a-ku-póny-ér-a pa-tsîndwi myálá.
fisherman 1S-PR-throw-AP-FV on.the.roof stones
b. Asodzi a-ku-póny-ér-a myálá pa-tsîndwi.
fisherman 1S-PR-throw-AP-FV stones on.the.roof
'Fishermen are throwing stones on the roof.'

- Alsina and Mchombo (1993) propose alternative intrinsic classifications for these examples:

(18)

póny-ér 'throw-on'	<ag	th	loc>	or	<ag	th	loc>
IC:	[-o]	[+o]	[-r]		[-o]	[-r]	[+o]
Functions:	SUBJ	OBJ_θ	OBJ		SUBJ	OBJ	OBJ_θ

- This follows from alternative intrinsic classification rules for certain arguments (e.g., instrumentals, patients, themes, locatives).

- Davis and Koenig note that this rule would also allow alternative intrinsic classifications in simple transitive predicates; i.e., the patient argument could be classified [-r] or [+o].

- This would not lead to incorrect function assignments, so it is largely a conceptual issue.

- Nevertheless, under our approach, the alternative classification is a consequence of the morphosemantic rule – simple transitive predicates are subject to the Argument Selection Principle.

4.2.1 Corollary Two Effects

(19) COROLLARY 2: With a three-place predicate, the nonsubject argument having the greatest number of entailed Proto-Patient properties will be lexicalized as the direct object and the nonsubject argument having fewer entailed Proto-Patient properties will be lexicalized as an oblique or prepositional object (...) (Dowty 1991:576).

- The Revised Argument Selection Principle in (5) under-determines the intrinsic classification of 'third' arguments – this predicts that any classifications should be possible – again, yielding a *de facto* lexical class based account.

- There is potentially more to be accounted for in this domain through general principles, e.g., along the lines of Butt, Dalrymple, and Frank (1997) or Asudeh (2001).

4.3 Causer Linking

- In certain instances of derived (e.g. morphological) causatives, the causer argument is equally (or in some cases, less) proto-agentive as the causee. However, even in these cases, the causer is encoded as a subject:

(20) Vitsi naura-tt-i nais-i-a (Finnish)
joke laugh-CAUS-PST woman-PL-PART
'The joke made the woman laugh.'

- This also follows from the Restriction on Valence Increase in (11); assume that the causative morphosemantic rule introduces the causee as [-ô] - that is, it stipulates that the new argument must be the subject.

- This is no different from any other treatments of causatives.

- Perhaps this type of intrinsic classification might be limited to clearly agentive arguments that are introduced through morphosemantic rules.

4.4. Basic Predicates

- Dowty's Argument Selection Principle is limited to transitive predicates – as such, it makes no predictions about the encoding of arguments of intransitive predicates.

- This would predict that two-place intransitive predicates should allow more or less random linking. However, (21) illustrates that this isn't true:

(21) * A Porsche yearns for the president.
(intended reading: 'The president yearns for a Porsche.')

- Clearly, the Argument Selection Principle needs to be adapted to intransitives:

(22) a. UNERGATIVE SELECTION: In 2-place predicates with a [-o] argument and no [-r] argument, the argument with the greatest grammatical status loading will have the intrinsic classification [-o]. 1-place predicates with a [-o] argument will entail a positive loading for that argument.
b. UNACCUSATIVE SELECTION: In 2-place predicates with a [-r] argument and no [-o] argument, the argument with the least grammatical status loading will have the intrinsic classification [-r]. 1-place predicates with a [-r] argument will entail a zero or negative loading for that argument. (cf. Zaenen 1993)

(23)

yearn (for) <	arg_1	arg_2 >
properties:	sentient (PA)	no independent existence (PP)
loading:	1	-1
IC:	[-o]	[+r]
Functions:	SUBJ	OBL

(24) *work* <arg>
properties: sentient (PA)
volitional (PA)
loading: 2
IC: [-o]
Function: SUBJ

(25) *fall* <arg_1>
properties: causally affected (PP)
loading -1
IC: [-r]
Function: SUBJ

- Thus, Dowty's selection principle extends straightforwardly to intransitive predicates.

4.5. Passive Predicates

- Because the Argument Selection Principle was limited to transitive predicates, Passives constructions, as intransitives, did not fall under the scope of argument selection.

- Once the Argument Selection Principle is expanded to handle intransitives, as in (22), Davis and Koenig point out that Passives become problematic:

(26) The city was destroyed by the enemy.

- Clearly the city is the Proto-patient and the enemy the Proto-Agent – the linking in (26) runs counter to Unergative Selection in (22a).

- However, Passive is a monotonic morphosyntactic operation – exactly the type of function alternation that the LMT was designed for.

- The cross-linguistic construction types that motivated the standard formulation of lexical mapping were Passive and Locative Inversion: these are both morphosyntactic operations and simply relink an invariant inventory of semantic arguments to new grammatical functions:

(27) PASSIVE: Suppress the argument with the highest loading.

(28)

	Active:			Passive:		
	destroy	<arg_1	arg_2>	*destroyed*	<arg_1	arg_2>
properties:		PA	PP		PA	PP
loading:		+	-		+	-
IC:		[-o]	[-r]		[-o]	[-r]
Passive:		n/a			∅	
Functions:		SUBJ	OBJ			SUBJ

- The Argument Selection Principle predicts that there will be no natural language basic transitive predicate which has passive meaning (29) – this appears to be a correct prediction.

(29) Sandy *snorged* the mammoth
(intended reading: 'Sandy was *snorged* by the mammoth.')

4.6. Lexical Alternations

- Davis and Koenig claim that the following alternation is problematic for an Argument Selection Principle, extended to intransitives:

(30) a. Water filled the tank
b. The tank filled with water.

- Water is the proto-agent in (30a) – it is a causer; tank is the proto-patient – it undergoes a change of state and is the incremental theme.

- Given the Unergative Selection Principle in (22a), (30b) appears to be misaligned.

- However, the contrast in (30) is an causative/inchoative alternation (cf. B. Levin 1993). As such, it is a morphosemantic, valence-increasing alternation:

(31)

	Inchoative		Causative		
	fill	<arg_y>	*fill*	<arg_x	arg_y>
properties:		change of state incremental theme		causer	change of state incremental theme
loading:		-2		1	-2
IC:		[-r]		[-o]	[-r]
Functions:		SUBJ		SUBJ	OBJ

5. Conclusions

- The key issue with many of Davis and Koenig's challenges to both LMT and Dowty's Proto-Role Theory comes from a failure to distinguish morphosyntactic and morphosemantic operations.

- Once this distinction is made, it becomes clear that the respective domains of the LMT and Proto-Property Theory divide roughly along these lines.

- The static well-formedness nature of the selection principles and the emergence of the Thematic Hierarchy from the Proto-Roles achieve some of the predicate-class effects that Davis and Koenig attribute to multiple inheritance.

- The Correspondence Theory brings together aspects of Proto-Roles, with static argument selection, and the LMT, with its account of monotonic morphosyntactic operations, to account for the full range of lexical operations.

References

Ackerman, F. 1990. Locative Alternation vs. Locative Inversion. *The Proceeding of the Ninth West Coast Conference on Formal Linguistics*, ed. Aaron Halpern, 1-13. Stanford: CSLI Publications.

Ackerman, F. 1992. Complex Predicates & Morpholexical Relatedness: Locative Alternation in Hungarian. *Lexical Matters*, eds. I. Sag and A. Szabolsci, 55-83. Stanford: CSLI Publications.

Ackerman, F. and J. Moore. 1999a. Syntagmatic and Paradigmatic Dimensions of Causee Encodings. *Linguistics and Philosophy* 22: 1-44.

Ackerman, F. and J. Moore. 2001. *Proto-Properties and Grammatical Encoding: A Correspondence Theory of Argument Selection*. Stanford: CSLI Publications.

Alsina, A. 1996. *The Role of Argument Structure in Grammar: Evidence from Romance*. Stanford: CSLI Publications.

Alsina, A. and S. Mchombo. 1993. Object Asymmetries and the Chicheŵa Applicative Construction. *Theoretical Aspects of Bantu Grammar*, ed. S. Mchombo, 17-45. Stanford: CSLI Publications.

Asudeh, A. 2001. Linking, Optionality, and Linking in Marathi. *Formal and Theoretical Issues in Optimality-Theoretic Syntax*, ed. P. Sells, 257-312. Stanford: CSLI Publications.

Bresnan, J. and J. Kanerva. 1989. Locative Inversion in Chichewa: A Case Study of Factorization in Grammar. *Linguistic Inquiry* 20: 1-50.

Bresnan, J. and L. Moshi. 1990. Object Asymmetries in Comparative Bantu Syntax. *Linguistic Inquiry* 21: 147-185.

Butt, M., M. Dalrymple, and A. Frank. 1997. An Architecture for Linking Theory in LFG. *On-line Proceedings of the LFG97 Conference*, eds., M. Butt and T. King. http://www-csli.stanford.edu/publications/LFG2/lfg97-toc.html, Stanford: CSLI Publications.

Davis, A. and J.-P. Koenig. 2000. Linking as Constraints on Word Classes in a Hierarchical Lexicon. *Language* 76: 56-91.

Dixon, R. M. and A. Aikhenvald. eds. 2000. Changing Valency: Case Studies in Transitivity.Cambridge: Cambridge University Press.

Dowty, D. 1989. On the Semantic Content of the Notion 'Thematic Role'. *Properties, Types and Meanings* 2, eds. B. Partee, G. Chierchia, and R. Turner, 69 - 130. Dordrecht: Kluwer.

Dowty, D. 1991. Thematic Roles and Argument Selection. *Language* 67: 547-619.

Dowty, D. 1998. On the Origin of Thematic Role Types. Paper, the Lexicon in Focus Conference. Wuppertal, August 1998.

Dubinsky, S. and R. Simango. 1996. Passive and stative in Chichewa: Evidence for Modular Distinctions in Grammar. *Language* 72: 749-81.

Joshi, S. 1993. Selection of Grammatical and Logical Functions in Marathi. Doctoral dissertation, Stanford University.

Levin, L. 1985. Operations on Lexical Forms: Unaccusative Rules in Germanic Languages. Doctoral Dissertation, MIT.

Levin, B. 1993. English Verb Classes and Alternations: A Preliminary Investigation. Chicago: Chicago University Press.

Markantonatou, S. 1995. Modern Greek Deverbal Nominals: an LMT Approach. *Journal of Linguistics* 31: 267-299.

Payne, T. 1997. Describing Morphosyntax: A Guide for Field Linguists. Cambridge: Cambridge University Press.

Perlmutter, D. and P. Postal. 1983. Some Proposed Laws of Basic Clause Structure. *Studies in Relational Grammar 1*, ed., D. Perlmutter, 81-128. Chicago: University of Chicago Press.

sadler, L. and A. Spencer. 1998. Morphology and Argument Structure. *The Handbook of Morphology,* eds. A. Spencer and A. Zwicky, 206-235. Malden: Blackwells.

Simpson, J. 1983. *Aspects of Walpiri Morphology and Syntax*. Doctoral dissertation, MIT.

Zaenen, A. 1993. Unaccusativity in Dutch: Integrating Syntax and Lexical Semantics. *Semantics and the Lexicon,* ed. J. Pustejovsky, 129-161. Dordrecht: Kluwer.

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