8. Argument Selection

8.1 The Selection Principle and Corollaries

The way these proto-roles are involved in argument selection is given by the principle (31), which is to be understood so as to have the two corollaries (32) and (33) and the characteristics in (34):

(31) *Argument Selection Principle:*

In predicates with grammatical subject and object[1], 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.

(32) *Corollary 1:* If two arguments of a relation have (approximately) equal numbers of entailed proto-agent and proto-patient properties, then either or both may be lexicalized as the subject (and similarly for objects).

(33) *Corollary 2:* With a three-place predicate, the non- subject argument having a greater number of entailed proto-patient properties will be lexicalized as the direct object, the non-subject argument having fewer entailed proto-patient properties will be lexicalized as an oblique or prepositional object (and if two non- subject arguments have approximately equal entailed P- patient properties, either or both may be lexicalized as direct object).

(34) *Non-Discreteness:* proto-roles, obviously, neither exhaustively classify arguments (some arguments have neither role) nor uniquely (some arguments may share the same role) nor discretely (some arguments could qualify partially but equally for both Proto-roles)

Although using the traditional term "argument selection", I do not mean by "selection" a step that occurs during the derivation of a sentence (as in early Case Grammar), nor the linking-up of two different levels of representation, the syntactic level and the "thematic level" (the latter does not make any sense on the straightforward conception of monostratal syntax, and homomorphic (Montague-

style) compositional semantics assumed in this paper[1]). Rather, I mean a constraint on what kind of lexical predicates may exist in a natural language, out of many imaginable ones. Besides *build*, one can imagine a hypothetical basic (i.e. non-passive) verb meaning "is built by", i.e. a verb with the built as subject and the builder as object. But it is the consequence of (31) that the latter is not found while the former can be, and the phrase "be lexicalized as" is only a convenient locution for describing such constraints.

It should be noted that although I have used the term *prototype* in talking about roles, I am not suggesting that individual lexical meanings themselves are prototypes, in the way suggested in Rosch and Mervis (1975) or Lakoff (1977) or similar work. "Proto-roles", as I am using them here, are higher-order generalizations ABOUT lexical meanings (viz. "fuzzy" classifications of verbs by argument), not statements about individual lexical meanings, so the boundaries of individual word meanings can be as precise as you like, with definite criterial definitions. Note also only arguments, not adjuncts, are being classified protopypically[2].

To see how these principles apply to verbs, note first that they imply that verbs in (35) should be the most stable in the lexicon in their argument pattern, since their subjects have several P-Agent entailments (volition, sentience, causation and movement) and no P-Patient entailments, while the objects have several of the latter (change, causally affected, and (mostly) incremental theme, stationary, dependent existence).

(35) build (a house)
write (a letter)
murder
eat
wash (a plate)

Andrews (1985) calls attention to the "prototypicality" (in one sense) of these as

[1] To be sure, one could easily reformulate the claims of the present paper within a theory in which "semantic arguments" (or "semantic roles") of predicates were "linked" with grammatical relations in a way (partially) governed by the non-discrete role-types and selection principles of this paper, but to do so would in my view add conceptual baggage that is quite unnecessary and even obfuscating.

[2] If by *NP adjunct* we mean a phrase whose referent's relationship to an event is the semantically compositional result of applying that phrase's meaning to the meaning of any verb or VP (categorially, a "VP functor"), rather than a NP referent whose relationship to the event is defined by the verb's meaning itself (Dowty 1982), then any ajunct (like the instrumental *with a knife*) must have a constant meaning across every VP it occurs in. Thus there can be many kinds of meanings for "Patient", but only one for English instrumental *with*. (This view of course allows there could be different prepositions describing slightly different "kinds" of instrumentality, (cf. *with, by means of, through, etc.*), benefaction, etc. but each individually has the same meaning for every verb.)

primary transitive verbs, and Hopper and Thompson (1980) and others (cf. papers in Hopper and Thompson 1982) have pointed out consequences of such verbs being high on a scale of *transitivity*.

Combinations of certain P-entailments correspond to the familiar role-types (or often, to each of various conceptions of them). *Agent* is volition + causation + sentience + movement, or in some usages, just volition + causation or just volition (Dowty 1979), or, according to the ordinary language sense of "agent", causation alone. *Experiencer* is sentience without volition or causation. *Instrument* is causation + movement without volition or sentience. *Theme* (excepting Jackendoff's and Gruber's stative Theme) is most typically change + Incremental-Theme + dependent-existence + causally-affected, but causally-affected is sometimes absent (*Patient* can be distinguished from broader *Theme* by this entailment); Incremental-Theme is as we have seen sometimes absent from arguments called Themes, as is dependent-existence. But change alone is not really a sufficient criterion for this traditional role, as other participants too often move or otherwise change in events (Agents, Instruments, "Secondary" Themes), nor is any other one or group of these entailments: this points, I believe, to the traditional difficulty of tying down traditional Theme (or Patient) by any fixed criterion and the desirability of regarding this role in particular as a cluster concept instead. As this list indicates, these properties offer us instead of the traditional disjoint roles, broader and narrower semantic classes, which may be desirable for concerns like Cruse's about the need for various senses of "Agent" (cf. the four combinations above).

8.2 Role Hierarchies

Many of the other familiar relative ranking of the traditional role types in argument selections--as well as arguments that may fall "between the crack"---will follow: Not only do strong Agents outrank strong Patients, but both Instruments and Experiencers outrank any relatively patient-like argument for subjecthood, as in *The rock broke the window* and *John sees Mary*. In agreement with Fillmore (1968), an Agent outranks an Instrument. At least one P-Agent entailment, in the absence of any P-Patient entailments, is enough to qualify an argument for subject, and conversely with P-Patient entailments for object. The limiting cases of these situations---only one entailment of either kind---are in fact the example sentences in (29) and (30). Though the traditional *Source* and *Goal* are not really defined by any P-entailments, it nevertheless follows from the second corollary in (32) that Theme arguments will be direct objects while traditional Sources and Goals are obliques in many cases (but cf. §9.3), because Themes have more P-Patient entailments than these other arguments: cf. *John removed the lamp from the box* and *John put the lamp on the table*. The lamp undergoes a change of position and is causally affected, but the box and the table remain stationary and relatively

unaffected.[3] Thus the Proto-roles and their argument selection principle determine hierarchies of traditional roles such (36) (where ">" means "outranks for subject" and "outranks oblique for direct object") and additional rankings such as (37) (where "Arg" is an argument with no P-Agent and no P-Patient entailments):

(36)	Agent	>	Instrument Experiencer	Patient	>	Source Goal (usually)

(37)	causing even	>	caused event
	moving argument	>	Source, Goal, Arg
	Experiencer	>	Arg

The point not to be missed here is that such hierarchies fall out of the two P-role definitions and the argument selection principle, whereas if Agent, Patient, etc. are introduced as primitives, then hierarchies must be stipulated additionally . (On the position of "Source" and "Goal" in hierarchies, see §11 and also §9.3.)

8.3 Argument Selection Indeterminency

Lexical doublets like *buy* and *sell* or *like* and *please*, lexicalizations of the same relation (or almost the same) with different argument configurations, have been a puzzle for the argument selection problem. If selection rules should be formulated to give a single possible pattern for each verb, then these are counterexamples. But if selection principles are only tendencies admitting a small number of exceptions, then why do the multiple lexicalizations consistently appear in some semantic classes but never in others (e.g. never in the "primary transitive verbs")?

The selection principle (31) offers an explanation, since it permits alternate lexicalization in case of "ties" in Proto-Role entailments; arguably, this is a natural and not stipulative explanation under the Proto-Roles hypothesis: why shouldn't two lexicalizations be possible if there is nothing in the meaning of the verb to significantly distinguish the two possibilities in terms of the Agent-Patient

[3] It can be pointed out that the Source undergoes a change in that it no longer has the Theme in it, and the Goal undergoes a change in that it aquires the Theme in it; both these are caused as well. It may be important that the lamp here undergoes two changes (leaving its original position and assuming its new one), while the Source and Goal undergo one, or that the Source and Goal changes are otherwise less significant (on the relative importance of changes in different participants and its effect on argument selection, see §9.3.3), and it may be that insofar as the lamp's position on this path is an Incremental Theme, the lamp indirectly "counts" as one too for argument selection purposes. But in any event there are Theme-Source-Goal sentences with one added entailment that differ in argument configuration from these (cf. §9.3.1), so the difference in P-Patient values here cannot be too great.

continuum?

Buy and *sell* have already been mentioned as examples of verbs which do not distinguish their buyer and seller arguments by any entailments relevant to traditional roles, nor are they different in any proto-role entialments: cf. §3.2). Other such pairs are *borrow* and *lend*, and the two *rent*'s (*I rented it to her* vs. *She rented it from me*).

The psychological predicates (Postal 1970), or *mental verbs* (Croft 1986a) or *flip verbs* Rogers (1974) are another example of doublets but of an interestingly different sort. For convenience, I will call the subject of the verbs in the first column of (38) the *Experiencer* and the other argument the *Stimulus* (following Talmy's (1985b) terminology):

(38) *Psychological Predicates*

Experiencer Subject	*Stimulus Subject*
x likes y	y pleases x
x fear y	y frightens x
x supposes (that) S	(it) seems (to) x (that) S
x regard y (as) VP	y strikes (as) VP
x is surprised at y	y surprises x
x be disturbed at y	y disturb x

(*similarly,* is astounded/dismayed/disappointed, *etc.*)

What I believe sets this class of predicates off from all other natural language verbs is that (i) the predicate entails that the Experiencer has some perception of the Stimulus--thus the Experiencer is entailed to be sentient/perceiving though the Stimulus is not--and (ii) the Stimulus causes some emotional reaction or cognitive judgment in the Experiencer. The first of these is a P-Agent entailment for the Experiencer, while the second is a P-Agent entailment for the Stimulus argument.[4]

Moreover, these predicates have no OTHER entailments for either argument that are relevant to argument selection (with one possible exception to be discussed directly), which leaves a situation in which each argument has a weak but apparently equal claim to subjecthood. This contrasts with the *buy/sell* case in that here there are different P-entailment for each argument, but the selection

[4] This explanation for the occurrence of doublets in psych verbs was put forward in Dowty (1982a); Rozwadowska (1988) independently pointed to these two semantic properties of this class of verbs and used them to explain syntactic properties of the two arguments in nominalizations.

principle still give each out the same "count".

In a 1986 LSA paper, William Croft (Croft 1986) made an interesting further observation about this class of verbs: the Experiencer-Subject verbs of this class (left column in (38) above) are always stative, while the Stimulus-Subject verbs can be either stative or inchoative--i.e. describing the coming about of the perception and the consequent emotional or cognitive reaction. Even more interestingly, Croft claims that this restriction on the inchoative interpretation holds not just in English but in at least the three other languages he investigated (Russian, Lakhota and classical Nahuatl).

Note that the inchoative interpretation implies a change of state in the Experiencer (coming to experience an emotion or new mental state), but not necessarily any motion or other change in the Stimulus. (Suppose it is true that what happened was that the package in the back seat surprised John; it doesn't follow that the package did anything at all.) Therefore I would interpret the pattern Croft observed cross-linguistically as resulting from the fact that the inchoative interpretation entails a Proto-Patient property in the Experiencer that is not present in the stative: undergoing a (definite) change of state. Hence though the two arguments are still equal in Agent properties, they are unequal in that one is a "better" Patient, so it must be the direct object according to the selection principle (31).[5],[6]

[5] Croft (1986a) proposed a different explanation in terms of causal chains, but perhaps the two are not really incompatible (cf. §11).

[6] There are of course well-known analyses of psych verbs in which the two forms of a doublet pair (e.g. Experiencer-Subject *be surprised at* and Stimulus-subject *surprise*) are derived from a common deep syntactic source and therefore not really a case of alternative lexicalizations---beginning with Chomsky's *Aspects* and Lakoff (1967), best-known in Postal (1970), many Relational Grammar analyses, and recently in Belletti and Rizzi (1986). This is not the place to make a meaningful comparison with these analyses, which are extensively developed but made in the context of specific theoretical assumptions I do not share, but perhaps two observations will be useful. First, note that it is the Experiencer-Subject form of the verb that is inevitably analyzed as "basic", the Stimulus-Subject form as derived. Cf. also Talmy's (1985b) observation that some languages (Atsugewi) have only Experience-Subject verbs as basic, the other class derived from these by lexical process. This may show that there is some sense in which sentience (Experiencer) outranks causation, even if it is not enough to block lexicalization of both forms in many languages.

Second, no matter how compelling the arguments may be that that Stimulus (= Theme) subjects of psych verbs behave like "derived subjects" (e.g. raised, passivized and non-thematic NPs) in English and Italian, while Experiencer objects are like underlying subjects, the deeper question which these accounts do not answer is why THIS particular class of lexical predicates should occur in these abstract underlying structures and appear in this surface alternation, while other classes of verbs (prototypical transitives like *kill*, statives, motion verbs, three-place verbs, etc.) never do. (Simply stipulating that it is verbs with Agent-Experiencer argument structures that have such properties is not much help; though this might identify just the right class extensionally, the tranditional theory of discrete, "primitive" thematic role types in no why explains why this particular combination (rather than, say Recipient-Source) should have this constellation of syntactic properties.

The remaining question about argument selection principle indeterminacy that is of interest is whether any multiple lexicalizations are attested that are not predicted to be "ties" in argument ranking by these principles. I am not aware of any, and in §9. I will try to show that some apparent alternations of this kind ("symmetric" predicates and the *spray-load* alternations) are in fact not of this kind.

8.4 Non-Standard Lexicalizations

As troublesome for the Proto-Roles Selection Hypothesis as unpredicted multiple lexicalization would be single lexicalizations that violate it. There is one relatively small group of such verbs that includes *receive, inherit, come into (an inheritance); undergo, sustain (an injury), suffer (from), submit to, succumb to, [tolerate* which seem to have Goals (*receive, etc.*) or Patients (*undergo, etc.*) as subjects, but Agents or causes as other arguments. Perhaps the appropriate comment is that these are in fact exceptions, but are few in number, so the selection principle is not an absolute rule but is nevertheless a stong tendency. However, it is noteworthy that almost all entail that their subject argument is sentient (for the relevant event). Of those that do not, I may be correct in sensing that their use with inanimates often sounds bookish and derivative of their animate use (*The car sustained/suffered little damage in the collision*, *The theory underwent a major reexamination*). *Recieve* and *get* are other exceptions for which this is not apparently so: *The house received a new coat of paint*, *The play got a good review.* But *receive* is historically interesting in that the OED (i) lists citations for this verb which virtually all have human subjects, particularly before the 19th century, and (ii) implies that "active" senses of *recieve* ("take or accept something willingly ") are historically as common as "passive" senses (no volition on the part of the recipinet implied). *Undergo* also has historical active senses ("submit oneself to") (and almost exclusively human, sentient subjects). *Get* has active meanings hard to disentangle from its non-volitional ones. If sentience were an actual entailment of the subject of a verb of this class, then this argument would have one P-Agent property as well as one or more P-Patient entailments. These observations may suggest (i) sentience might in some cases be a sufficient entailment to license an argument's lexicalization as

For mono-stratal syntactic theories which reject derivations altering grammatical relations, the challenge is of course to analyze the same data that appears in these arguments in terms of an account which exploits the relationship between syntax and semantics directly, e.g. one that points to the special anaphoric control properties of NPs in positions reserved for animate, sentient referents, whether they be grammatical subjects or objects, perhaps following the ideas of (Kuno 1987), and associates the anaphoric behavior directly to the semantic and pragmatic

subject, no matter how many P-patient entailments it has (in addition to other configurations possibly, cf. *receive* vs. *give*), and (ii) argument selection might be determined by a "core" use of a predicate, not entailments of its fully general meaning, and/or historical semantic drift can result in a predicate that violates selection principles.

8.5 Argument Selection in Ergative Languages

A very important issue for the Proto-Role Hypothesis, which I can unfortunately make only brief mention of here, is argument selection in ergative languages. Ignoring the various kinds of "mixed" ergativity for the present, I want to focus on ergativity as found in the well-known case of Dyribal (Dixon 1972) and in certain Mayan languages like Mam (England 1983) and Quiche (Trechsel 1982), in which the ergative-absolutive contrast is not only one of case marking or agreement but apparently the basis of syntactic organization throughout the grammar of the language, just as the subject-object contrast is for other kinds of languages. That is, absolutively-marked NPs "behave alike" in transitive and intransitive clauses for most syntactic purposes, while ergative NPs of transitive clauses (agent-like in meaning) are treated differently. Dixon (1979) has described this situation by classing absolutives as the "syntactic pivots" of such ergative languagees, just as the nominatives (transitive and intransitive subjects) are the syntactic pivots of other languages.

Schmerling (1979), Dowty (1982a), and Trechsel (1982) have pointed out that if the categorial interpretation of grammatical relations suggested in Dowty (1982a, 1982b) is adopted, then there is every reason to simply identify "syntactic pivot" with the categorially-defined "subject", as the syntactic properties of these languages can then be described quite naturally. That is, an Ergative NP combines with a transitive verb to form a VP, having the syntactic and semantic properties of VPs in other languages. This means in effect treating the transitive "Patient" as a grammatical subject and the transitive "Agent" as analogous to an object (i.e. this is a form of the "inverse hypothesis" of ergative syntax, the idea of which is of course much older than this categorial interpretation).

Under this view, the argument selection principle in (31) cannot literally apply to syntactically ergative languages, but their argument pattern can be described with the same proto-roles and the same kind of principle, if we merely REVERSE the syntactic association: arguments relatively high in P-PAtient entailments are syntactic pivots (categorial subject) and relatively agentive arguments are non-pivots (categorial object, here ergative NPs).

If the categorial inverse analysis of these languages is the correct way to proceed, this provides an extremely strong reason why we should not try to COLLAPSE the

notion of P-Agent with grammatical subject and P-Patient with grammatical object (or Absolutive), as Keenan (1976, 1984) has done, nor adopt a theory which necessarily correlates them in this single way. Another such reason, of course, is to properly distinguish the event-dependent role notions which are associated with lexical verbs from the discourse-dependent semantic associations of subjects (including subjects of passives, which are not Agents), as argued in §5. Rather, proto-roles and grammatical relations are distinct phenomena that languages must correlate consistently with one another, but in one of two possible patterns. Note that what we do NOT find, even in split ergativity, is "random" allignment from one verb to another, e.g. "build" with Agent absolutive, "kill" with Patient absolutive.[7]

considerations, not to an abstract syntactic level.

[7] This last hypothical but non-occurring possibility must not however be confused with that of "active" languages like Lakhota (Boas and Deloria 1941), which make use of both nominative and accusative marking for intransitive subjects, alloting them verb by verb according to whether its (only) argument is more agent-like or

more patient-like: here the allignment of marking IS consistent in a certain way with meaning across all verbs (presumably), but intransitives are not marked like either transitive subjects or transitive objects consistently. (This situation is an instance of the "unaccusativity" phenomenon, for which see §12.)

[1] Note that many predicates have two arguments but the second is not a grammatical direct object but a PP, as in *rely on NP, suffer from NP, be afraid of NP, arrive at NP*: the selection principles apparently only govern argument selection for two-place predicates having a subject and true direct object. This will be important for understanding *Water filled the tank* vs. *the tank filled with water* or *Water poured into the tank* in § 9.3.2.