Semantic role marking: A preliminary report

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1 Introduction

The mapping between semantic roles and their morphosyntactic markings is many-to-few: the number of possible *semantic* distinctions that can be made vastly outnumbers those actually lexicalized in a language, and these in turn exceed by far the number of marking distinctions that are **grammaticized** — i.e., given some consistent morphosyntactic marking (e.g. Croft 1991; Talmy 1985; Hopper & Traugott 1993). Each language finds a unique way to bridge this gap between meaning and form, and the challenge for linguistic theory is to explain or at least motivate both individual solutions and the range of their cross-linguistic variation. This paper represents the beginnings of an investigation into the limits of the variation in this mapping from semantic roles into surface morphology and grammatical relations. These concepts, broadly defined, easily encompass all of modern linguistics, and even their more restricted versions have spawned whole subfields of research. In view of this vast literature and the complexity of the phenomena, I will focus on sentences that are syntactically simple – though these are often semantically quite complex – in presenting some observations and generalizations culled from the literature.

Given that each contribution to the literature seems to employ new terminology or make new distinctions using old terminology, it is important to distinguish between the different topics to be covered and provide a summary of the terminology to be used here. As discussed in the introduction to Campe (1994), there is widespread overlap and confusion between the various terms used in the literature. For example, different authors use the term **case** to refer variously to morphological case markers, semantic roles and relations, syntactic roles and relations and even construction-level notions (as in the conflation of dative case marking in some languages with the indirect object position in the ditransitive construction). As is clear from this example, the division between syntactic and semantic considerations in this area is fuzzy indeed, and the situation is no better for the equally widely applied terms **relation** and **role**. At the broadest level, we must distinguish meaningful units from their outward manifestations. Anderson (1985) makes a point of distinguishing between **grammatical categories** (marked in his case by morphological means) and the actual **grammatical processes** that reflect them. Here I will use *marking* as a generalization of Anderson's grammatical process beyond morphological inflection to include pre/postpositions, word order, grammatical relations and anything else that may serve to indicate semantic content; these are described in Section 2. As for the content itself, I will generally follow Comrie (1981) in using *(semantic) role* or *semantic relation* to refer loosely to traditional semantic labels (AGENT, EXPERIENCER, INSTRUMENT, etc.), which are discussed in greater detail in Section 3, and *grammatical relations* to refer to syntactic notions like SUBJECT and OBJECT; verb-specific valence requirements will be referred to as *arguments*. On occasion it will also be useful to refer to

roles defined in terms of focus of attention, such as the TRAJECTOR/LANDMARK distinction often made in cognitive linguistics; these might be considered **_pragmatic roles_**, though no hard line is being drawn between semantics and pragmatics.

Regularities between roles and their markings are discussed in Section 4, but their elusiveness suggests that a more refined set of tools for building abstract representations is needed to accommodate the cross-linguistic evidence; Section 5 offers some speculations about minimal representational requirements. While the material presented here is not particularly novel, it does provide a catalog (in progress) of the work so far and as such will, I hope, provide the foundation for more theoretically motivated work to come.

2 The evidence: how languages mark semantic roles

2.1 Explicit and implicit role markers

One of the factors that complicates a definitive analysis of role marking is the sheer variety of ways in which such concepts can be indicated; these range across phonological, morphological and syntactic means, confounding traditional divisions, both within and across languages. In this section we briefly describe the main tools at the disposal of the world's languages for indicating semantic role. Explicit role markers — those often grouped under the rubric of **case markers** — include both morphological inflection and adpositional constructions; I also include here the more syntactically influenced implicit marking of word order.

Morphological inflection Morphological marking of semantic roles takes a number of forms.[1] Perhaps the canonical case markings via morphological inflection are **affixes**, which include prefixes, suffixes and infixes (e.g. the various Latin affixes for nominative, accusative, etc.; the many affixes of languages like Finnish). But the actual lexical stem may also undergo modification of a phonological nature: vowels and consonants may shift to related shapes depending on the grammatical category (as in English _drink_ and _drank_; templates in Semitic languages, e.g. Egyptian Arabic _kitaab_ 'book' and _kátab_ 'he wrote'), and both stress (Spanish) and tone (West African tone languages) are also markers, though this type of alternation seems more directly correlated with verbal tense and aspect than role marking. (As will be discussed later, however, tense and aspect markings often affect marking of semantic role.) Other morphological processes include reduplication (copying of phonetic material) and suppletion (replacement with an alternative stem).

Adpositions These are a generalization of prepositions and postpositions, and in many languages the more peripheral semantic roles (see Section 3) tend to be expressed this way. Familiar examples from English include the marking of path-related roles (_to_ for goal, _from_ for source), and the use of _with_ to mark either an instrument (_I cut the cake with a knife_) or accompaniment (_I went to the game with Harry_).[2]

Word order Some languages do not overtly mark semantic roles at all, so that word order may be the primary indicator of semantic relations. It is slightly unconventional to consider word order as directly marking role information; word order is often viewed as driven by syntactic

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[1] Although morphological case is usually restricted to within-word phenomena, we can (as does Anderson (1985) in his thorough cross-linguistic summary of inflectional morphology) include separate particles (like _up_ in English _pick up_) as often performing the same function as morphological markings.

[2] The use of the same marking for both roles is an example of **syncretism** and will be discussed in Section 5.2.

and cognitive/pragmatic constraints, to the extent that Payne (1992:3) hypothesizes that "there will be no language where an essentially semantic principle governs the majority of order facts for major constituents in the clause." Word order is usually specified in terms of grammatical categories present in the basic transitive construction: Subject (S), Object (O) and Verb (V); Comrie (1981) notes that of the six logical possibilities for the ordering of these three constituents, SVO and SOV dominate the world's languages, with a number of VSO, a handful of OVS and almost no OSV languages. The focus on syntactic notions of word order shows that it is seen as indicating semantic roles only indirectly, by virtue of constructions that link verbal arguments to particular positions, especially in intransitive constructions and more complicated transitive constructions. Whether the relation comes about indirectly or directly, however, there remains some correlation between word order and semantic role, as even a cursory examination of English transitive sentences demonstrates.

These possible ways of marking roles and relations are by no means mutually exclusive; languages tend to take advantage of more than one of these at once, or apply some only optionally, often depending on subtle semantic and pragmatic factors. English, for instance, marks case by word order and prepositions, with morphological alternation only for pronouns (*I/me*, *she/her*) determined by grammatical role (object of verb or preposition) rather than purely semantic roles.

2.2 Head/dependent marking

Before delving into the semantic correlates of the devices above, we first note that languages exhibit great variation in which constituent of a phrase they mark. Nichols (1986) observed that languages tend to mark either the **head** or the **dependent** item across constituents, including noun phrases, adpositional phrases and clauses. The head of a constituent determines its syntactic type (as with English *house* in *new house*). At the clausal level, the head is usually considered the verb, and its dependents are its nominal arguments. Case marking in the traditional sense, then, is simply dependent marking at the clausal level. While familiar Germanic and Romance languages tend toward dependent marking, extensive research in language typology demonstrates the existence of the other logical possibilities as well, such as languages that place all case markings on the verb (all examples in this section taken from Nichols (1992)):

(1) Head-marked clauses: Tzutujil
   x-ø-kee-tij   *tzyaq*   *ch'ooyaaʔ*
   ASP-3SG-3PL-ate   clothes   rats
   'rats ate the clothes'

Nichols (1992) details the variety of types of head/dependent marking: the four expected combinations of these markings (head, dependent, double and none) are found in the world's languages, as well as split-marking (not to be confused with split-marking languages in the context of *ergativity*, to be discussed in Section 4.2), in which characteristics of a constituent (such as whether its dependents are pronouns) determine whether it is head- or dependent-marked:

(2) Split-marked adpositional phrase: Hungarian
    a. pronominal object: head marking
       mellett-em
       beside-1SG
       'beside me'
    b. nominal object: no marking
       a   *ház*   *mellett*
       the   house   beside
       'beside the house'

Also, some languages have detached marking, in which marking applies to neither head nor dependent but instead has some position usually relative to the constituent boundary.

For current purposes I am simply noting the various role-marking mechanisms at the disposal of the world's languages; much typological work concerning correlations between these mechanisms, as well as possible functional and cognitive explanations for those correlations, remains unexplored. Instead, we turn to the underlying concepts that marking devices are intended to represent.

3 The concepts: semantic roles

The natural starting point for any study that purports to discuss semantic roles must be Fillmore's seminal 1969 paper, which identified a number of semantically distinct **roles** or **cases** that entities can play in a predication. Since then, these roles — both labels and underlying concepts — have undergone much debate and change, leading to widespread recognition that verbs can license quite idiosyncratic roles that may not fit any one of a fixed list of more generalized cases, but rather combine or specialize them in some way. That is, "there is no unique or exclusive set of role conceptions. Those cited as archetypal are analogous to the highest peaks in a mountain range: they coexist with others that may be significant despite their lesser salience" (Langacker 1991:237). The diversity of possible roles has led to the outright rejection in some theories of generalized roles in favor of verb- (or predicate-) specific roles, like those used in frame semantics. Nevertheless, roles remain a useful abstraction for identifying idealized or prototypical semantic relations, particularly those that tend to be grammaticized in the world's languages. Moreover, the traditional labels have permeated the literature, so it is important to mention them here. Rather than provide an exhaustive list, I will focus on what many theories consider the most central roles, in the sense that they tend to participate directly in the main predication made at the level of the sentence: AGENT and PATIENT, which have also enjoyed the bulk of the attention in the literature.[3] Brief descriptions of these and other roles will be followed by discussion of two general properties of roles: they are best viewed as complex clusters of graded features defining prototypes that can themselves be placed along a continuum.

3.1 Basic semantic distinctions

In the broadest and most informal terms, the term AGENT usually denotes an entity that performs a volitional action, and a PATIENT usually denotes an entity that is affected by the action of some other participant. These caricatures do not, however, come close to capturing the variety of other characteristics with which they have been associated:

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[3]This division into **central** and **peripheral** roles (Langacker 1991), or **participants** and **non-participants** (Frawley 1992), correlates in the prototypical case with the syntactic division of a verb's **direct arguments** (those considered part of its **argument structure**) and its **oblique arguments**. Thus, the central roles AGENT and PATIENT correlate prototypically with grammatical SUBJECT and OBJECT; we will return to this correlation in Section 4.

- An AGENT tends to: be human (animate), volitional, definite, independent, directly responsible; act as a source of energy directing action outward; remain unaffected by the predication.

- A PATIENT tends to: be inanimate, non-volitional, indefinite, dependent, not responsible for the predication; serve as an energy sink, the target of an externally initiated action; undergo a change of state.

The prototypical transitive scene involves an agent acting on a patient, each having all of the characteristics listed here. Some other well-known role labels are most easily (and informally) given in the context of the interaction of agent and patient: the agent may use an INSTRUMENT to perform an action affecting the patient, or may transfer it to a RECIPIENT or perhaps from a SOURCE toward a GOAL. The agent may perform the action for a BENEFICIARY, or accompanied by a COMITATIVE. Not all roles necessarily fit the transitive scene, however; entities asserted to move or to be at some location are often termed THEME, though the separate terms MOVER and ABSOLUTE (since assertion of location is usually independent of other participants), respectively, may also be used. In some cases, especially scenes involving emotional or psychological reactions, a participant may be better described as an EXPERIENCER whose psychological reactions are caused by some STIMULUS.

These role labels provide convenient shorthand for some of the semantic distinctions that can be made among the ways in which entities can participate in predications, especially for relations that fit common scenes (motion, transfer, change of state, emotion, etc.). Each of these is widely grammaticized throughout the languages of the world. Note, however, that they are neither strictly defined nor mutually exclusive, and they are by no means universally marked. Indeed, non-prototypical roles are more the rule than the exception, as demonstrated by a wide variety of markings applied cross-linguistically to subtle variations on prototypical roles. For example, an agent that is not necessarily volitional (nor human, animate, responsible, directly involved, etc.), such as *liquor* in *Liquor killed him*, is marked distinctly from typical agents in many languages; this role is often called an AUTHOR. Although English has no such overt marking, other languages do, either with an explicit author marking (a special particle in Hare) or simply different marking under special conditions (e.g., Russian uses INSTRUMENTAL morphological case for passivized agents but DATIVE case for passivized authors (Frawley 1992)).

3.2 Graded features: animacy and definiteness

Many of the lower-level features used to define role prototypes are, on closer inspection, difficult to judge as either true or false. Comrie (1981) notes that both animacy and definiteness are scalar concepts, not binary ones. Many languages make some marking distinction between animate and animate nouns; in particular, accusative marking often appears *only* on animate nouns, as in Russian (Comrie 1981:125):

(3) Accusative marking (*-a*) for animate nouns: Russian
 Ja videl mal'čik-a/begemot-a/dub/stol.
 I saw the boy/hippopotamus/oak/table.

But other languages make much finer-grained distinctions. Over a wide range of phenomena in diverse languages (e.g., Yidiny, Dyirbal and Chukchi), a general picture emerges of a hierarchy in which first- and second-person pronouns (speaker and hearer in a dialogue context) are considered most animate, followed by kin of these two (Chukchi), proper names and other third-person human referents. Next come the animal world, which is sometimes ranked from mammals down to insects

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and fish (as in Ritharngu). Finally, inanimate objects may be distinguished based on how capable of spontaneous motion they are, with special status usually given to natural phenomena like wind, rain, water and lightning (Navaho).

A similar pattern of markings reflects a scale of definiteness. This feature is the most clearly pragmatic of those that play a role in defining agents and patients. Instead of being a simple binary judgment of whether a given referent is identifiable in the context of the utterance, definiteness can range from a situation in which the referent is uniquely identifiable down to one in which it is either impossible or irrelevant to identify. In between lie members of sets that have been identified (i.e., the superset of some referent is identifiable, even though the particular member being referred to isn't), and less definite would be an entity whose identification is simply irrelevant to the current context.[4]

The marking patterns described for animacy and definiteness illustrate two more general properties. First, patients and other semantic roles exhibit some of the hallmarks of complex **radial categories** like those described by Lakoff (1987). Although the conditions that determine whether and how roles are marked varies from language to language, all seem to involve the interaction of multiple features (or cognitive models), some scalar and some of a more discrete nature. Second, the presence of a marking may indicate not just whether a feature is true but instead whether it is *atypical*: neither animacy nor definiteness is prototypically associated with patients, but both appear particularly relevant to patient marking. Additional support for this conclusion comes from Comrie's observation that many languages have special markings — either on the verb or on the nouns — for transitive constructions in which relative animacy between agent and patient reverses the expectation that the agent should be the more animate of the two. That is, distinct markings may be employed to signal that expectations about the nature of a participant are to be overridden. As we shall see, however, these expectations can be established only in the context of a particular construction, and in relation to the other participants in a scene (see Section 4.3).

3.3 Roles as prototypes along a continuum

The graded nature of low-level characteristics like animacy and definiteness is reflected in the lack of strict boundaries at the role level. Some theories attempt to capture the graded nature of roles themselves by recognizing only the most generalized versions of the agent/patient opposition (called **macroroles** by Frawley (1992)) and redefining all other roles relative to the macroroles. Comrie (1981), for instance, considers the notion of **control** the basis for a continuum of roles ranging from conscious initiator controlling an action (agent) to affected entity with no control over the situation (patient); this hierarchy will be discussed again in Section 5.2. Foley & Van Valin's (1984) propose a similar ACTOR/UNDERGOER hierarchy of *affectedness*, the idealized endpoints of which are agent (least affected) and patient (most affected); between these lie all the other relatively traditional roles. Dowty (1991) also focuses on two macroroles or **proto-roles**, called PROTO-AGENT and PROTO-PATIENT, but instead of positing one hierarchy on which all roles can be located, his theory assigns proto-roles to the entities in a predication according to how many of an associated cluster of (binary) entailments they fulfill.

By focusing on basic role oppositions, these approaches acknowledge that roles are *complex* cognitive models often determined only *relative* to other roles or participants.[5]But while accom-

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[4]Interestingly, Comrie notes that some languages (like Turkish and Persian) may apply markers normally reserved for definite objects (often accusative marking) to indefinite objects, under the condition that the object will subsequently be important to identify; this is essentially a special marking of future relevance, one way of signaling that a topic being introduced should be remembered.

[5]The limited number of roles also results in relatively simple theories of syntax and argument structure (i.e., how

modating the description of the similarities and differences among some roles, they fall short of descriptive and explanatory adequacy. Dowty's proto-roles are too simply defined to account for the graded features we have noted. A less-readily remedied drawback, however, arises from the lack of structure or motivation for the particular groupings of features for each role. These are not entirely *arbitrary*; for example, the tendency of animacy and volition to correlate with each other, and with (proto-)agent, has clear motivation, but specifying (proto-)agent as a simple list of features sheds little light on why this should be so. In contrast, the approaches that place roles along a single hierarchy (of control for Comrie, or affectedness for Foley & Van Valin) do attempt to explain these correlations, but assuming a single determining feature oversimplifies the complex interaction of multiple features that typifies semantic role prototypes. Moreover, such concepts may be reducible to more basic features of the interactions between entities. We will take up this issue in Section 5; for now, armed with the basic vocabulary of semantic distinctions, we can finally consider what kinds of cross-linguistic regularities hold between roles and their markings.

4 Regularities between roles and markings

In this section we discuss several factors that complicate the search for cross-linguistically valid generalizations about the mapping from roles to markings.

4.1 Comparing roles across languages

Given the graded nature of semantic features and the complex radial structure of semantic roles, it is highly unlikely that two languages ever mark *precisely* the same underlying concept. We have already seen examples in which roles with distinct markings in one language may be conflated in another (cf. the discussion in Section 3 about special markings in Hare and Russian for the author role, which can be seen in this context as indicating a non-prototypical agent). Similarly, as mentioned in Section 2, English *with* marks both instrument and comitative (accompaniment) roles; it can also mark somewhat less standard roles, such as manner (*tremble with joy*), content (*fill with water*) and target (*angry with her*). Slobin (1997) discusses a study by Schlesinger (1979) showing that the first two, instrument and comitative, form a conceptual continuum along which particular sentences may convey varying amounts of each associated concept. *The prisoner won the appeal with a highly paid lawyer* and *The blind man crossed the street with his dog* both lie in the middle range of this continuum, the former closer to instrument and the latter closer to comitative. The study shows how twelve different languages divide the continuum between different markings at different points; Slobin notes that a similar range seems to hold between containment and support, which are conflated in Spanish *en*.

Variation in markings goes beyond simple conflation of conceptual content. A greater difficulty arises from the fact that markings rarely correspond directly to purely semantic roles, in many cases representing the intersection of diverse constraints. The two scales of animacy and definiteness discussed in Section 3.2, for example, can actually interact to produce a system like that in Hindi, in which all human patients are marked, but inanimate patients are split between definite (marked) and indefinite (unmarked) (Comrie 1981). In a similar vein, Slobin (1997:290) points out that the marking for patient "conflates with various other notions from language to language, including such categories as tense, aspect, definiteness, nature of effect, and so forth," listing a number of features that determine Russian case inflection, including masculine animacy, whole/partial patient, singular/plural patient and affirmative/negative clause. Other examples cited include Finnish case

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semantic and grammatical roles are linked).

inflections, which depend on whether the patient is whole or partial, and whether the action is completed; as well as the Mandarin *bǎ*-construction, which seems to be restricted to marking definite direct objects that are manipulated or handled by the subject in some way.

Mediation by syntactic factors is especially pervasive for the central roles of agent and patient: "it is noteworthy that there are no (direct) case-marking systems that are based fundamentally on semantic principles (rather than syntactic relations)" (Anderson 1985:184). In other words, as noted earlier, the prototypical association of agent with particular morphological (e.g. nominative case) or word order (e.g. sentence-initial) markings merely reflects its connection to a grammatical role (e.g. subject). Even this mapping, between semantic and grammatical role, is susceptible to significant cross-linguistic variation; Comrie (1981) observes greater influence of syntax in English, in which it is strongly tied to word order, than in Russian, in which word order tends to convey pragmatic information (topic usually sentence-initial and focus toward the end) and explicit case marking predominates. Note that in all cases, it is difficult to disentangle the pragmatic factors (such as focus of attention) that may play a part in determining syntactic roles. A second kind of variation is found in the particular grammatical role associated with semantic roles, since even in prototypical transitive sentences, agents do not necessarily surface as subjects. We discuss this phenomenon in more detail in the next section.

4.2   Clause alignment and ergativity

Ergativity has been widely discussed in the literature on case marking, but it is merely one instance of a more general typological distinction termed **clause alignment** by Nichols (1992:65). Clause alignment has to do with how languages mark the following three roles: subject of an intransitive sentence (S), subject of a transitive sentence (usually termed A, as a mnemonic for agent) and object of a transitive sentence (P, a mnemonic for patient). Depending on what markings a particular language employs, two of these often become grouped. For example, English employs equivalent markings (none) and word order (sentence-initial) for subjects of both transitive and intransitive sentences, thereby grouping S and A. This is the pattern of **accusative** (also known as **nominative-accusative**) languages, since P, which appears in accusative case, is distinguished from the other two:

(4) Accusative clause alignment: English
   a. Jill (S) ran.
   b. Jill (A) hit him:ACC (P).

In each case, the grammatical subject role is associated with a relatively agent-like entity (S or A).

Ergative (or **ergative-absolutive**) languages, on the other hand, group S and P, usually in the unmarked or **absolutive** case, as demonstrated by the following example from Basque (Comrie 1978:333):

(5) Ergative clause alignment: Basque
   a. intransitive
       Martin   *ethorri*   *da*
       Martin:ABS (S)   came   AUX:3SG
       'Martin came.'
   b. transitive
       Martin-ek   *haurra*   *igorri*   *du*
       Martin-ERG (A)   child:ABS (P)   sent   AUX:3SG
       'Martin sent the child.'

Tests for subjecthood (coordination, agreement) show that in ergative languages, the subject is S or P. That is, it is not possible to directly associate subjecthood with agentivity in such languages.

The situation is still more complicated, however, since many languages are neither fully ergative nor fully accusative (these two being the poles usually assumed); just as some languages selectively apply head or dependent marking, ergative marking may appear only, for instance, in the perfect tense (e.g. Georgian, Hindi), or differentiate between pronouns and ordinary noun phrases. An example of the latter is Dyirbal, which marks the pronouns with the accusative system (i.e., nominative for S and A, accusative for P) and other nouns with the ergative system, although subject remains associated with P (Comrie 1981:124). This system exemplifies a more general characteristic of split-marking languages, which is that they appear to obey the scale of animacy discussed in Section 3.2, with more animate nouns marked according to the accusative system, and less animate nouns marked according to the ergative system (Silverstein 1976).

Other clause alignments can be identified for the other combinatorial possibilities: **neutral** alignment marks none of S, A and P, while **three-way** alignments mark them all differently. More interestingly, some languages, called **stative-active**, provide two different markings for S depending on the nature of the verb: an S with a stative verb shares marking with P, while an S with an active verb shares marking with A. Finally, Nichols identifies **hierarchical** languages as those whose marking seems to depend on interacting hierarchies involving the inherent properties of a participant, such as person, number and animacy.

Fortunately, these morphosyntactic facts clearly have some semantic motivation. Loosely speaking, the ergative marker indicates an energetic participant. Ergative languages therefore morphologically mark the more active participant and syntactically focus on the less active participant. Since intransitive sentences generally have only one entity in focus, it is unnecessary to apply marking (ergative or otherwise), even when S appears to have prototypical agentive features. Similarly, the fact that animate nouns (or pronouns) tend to be energetic renders ergative marking somewhat unnecessary, accounting for some split-marking systems; these can be interpreted as differentially marking non-prototypical semantic features of a participant. Hierarchically marked languages simply take more features of the participant into account. The marking behavior of stative-active languages is likewise semantically motivated, but according to features of the verb.

Clause alignment may involve more than purely semantic factors: Hopper & Traugott (1993) offer an explanation of ergative marking as a method of grammaticizing the flow of new information, and Nichols (1992) observes a correspondence between ergativity and dependent marking. Nichols also relates clause alignment to the relative influence of syntactic relations mentioned in Section 4.1: "The ordering of neutral > accusative > ergative > three-way > stative-active > hierarchical gives a cline of decreasing relevance of nominal syntactic relations, or increasing relevance of nominal semantics and semantic relations, to morphological marking" (68-9). In particular, accusative languages grammaticize the distinction between subject and object, while ergative languages grammaticize the distinction between agent and patient.

Whatever other factors are involved, however, it appears that ergativity and related phenomena stem from alternate ways languages devise to distinguish particular roles, not in isolation but *in the context of an interaction*. Differences in markings on transitive and intransitive constructions within and across languages arise because particular features of a scene and its participants make differing communicative demands. That is, as noted in Section 3.2, expectations for a given scene, as described by a particular construction, interact with semantic features of the entities involved to determine what markings will be present in a given sentence.

4.3   Generalizing across constructions of a language

The need for constructions to distinguish participants in a scene extends beyond the data related to ergativity and transitivity. In fact, this function seems to be a general property of marking phenomena, one that wields significant influence on the mapping from semantic to grammatical roles. This mapping has received particularly widespread attention in the literature, from transformational grammar to approaches based on lexical rules, and there has been much debate about the form (as well as the source) of the **linking rules** that govern how roles are realized. Linking rules are often stated in terms of the semantic properties of individual participants. But the pattern emerging from the data suggests that the emphasis should be expanded beyond the individual participants to include the interactions between them as well; the realization of a semantic role depends in large part on the overall scene being described, as well as which other arguments the chosen *construction* happens to express. Goldberg (1994) argues persuasively on this basis for construction-specific linking rules, with linking generalizations inherited from higher-level constructions but potentially overridden. Extensions of the transitive construction — such as the caused-motion, resultative, transfer and ditransitive constructions — can thus inherit the link between agent and subject while allowing features (and marking) of the patient role to vary.

A constructional approach accommodates much of the data discussed in this section. Most importantly, as Goldberg notes, recognizing constructions themselves as prototypes provides a framework for explaining seemingly mysterious markings as signaling deviation from central cases: "language-specific idiosyncrasies would arise ...in just how languages extend their inventory of grammatical argument structure constructions to cover expressive requirements" (118). Markings can easily involve diverse constraints on a construction-specific basis, as with the highly idiosyncratic nature of patient marking across languages. Event-level features like aspect and participant-level features like animacy can thus jointly determine role realization. Similarly, properties of ergative marking systems can be separated into independent syntactic constraints (in the form of construction-specific linking) and precise semantic conditions.

Some complications remain, however, since verb-specific roles must still somehow correctly unify with the more general semantic roles of a construction. For example, in using the verb *hand* in a ditransitive construction, how or why does the HANDER inherit from the more general GIVER of the ditransitive construction, or the still more general AGENT of its ancestral transitive construction? Even more difficult to explain is the realization of the HANDEE and HANDED roles. The constructional approach (as well as some constraint-based approaches) may facilitate the descriptive task of asserting high-level linking rules and stipulating instantiation relationships between arguments; the explanatory task of making and motivating generalizations across constructions and languages remains a much greater challenge.

4.4   Summary of cross-linguistic variation in marking

So far we have identified several sources of the diversity both within and across languages in how semantic roles are marked:

- Languages make different choices about what portions of conceptual space their markings distinguish or conflate. Some of this variation takes place along a single continuum, but more complex notions may result from the interaction of several semantic properties.

- Markings may indicate diverse kinds of information, so it is not always possible to isolate semantic roles from what have traditionally been considered more syntactic and pragmatic

ones. In particular, languages differ in both the nature and strength of the relation between syntax and semantics, as ergativity phenomena demonstrate.

- Markings are jointly determined by (language- and) construction-specific expectations and semantic features, especially non-prototypical ones, of the participants and their *interaction.*

These markings fulfill dual and sometimes conflicting functions: they must both *differentiate* participants in (stereotypical) scenes, and *generalize* to some degree across different scenes. Both functions, however, derive constraints from a single source: regularities in the range of cognitively familiar *interactions* entities tend to engage in. From this perspective, the seeming vagaries of role marking can be seen as offering clues to underlying cognitive structures; these structures should in turn constrain the kinds of generalizations that will be universally valid. The remainder of the paper is devoted to examining some of the minimal representational requirements for an adequate theory of role markings.

5 Representation of interactional structure

In this section I consider several factors that any adequate representation of events and possible interactions must take into account.

5.1 Potential primitives of interaction

A few phenomena have received considerable attention in the literature as cognitively basic concepts with wide-ranging linguistic implications; all involve not just static participant features but instead event-level features specifying the actual course of the interaction of participants over time. Despite some overlap between these concepts, as well as some uncertainty about their status as primitives, they are all likely candidates for direct representation in event and interactional structure.

Some concepts are clearly embodied:

force dynamics Talmy (1988) provides a thorough taxonomy of the kinds of force-dynamic interactions possible between an **agonist** and **antagonist** (roles he puts on a par with traditional agent, patient, etc.). Features that vary include the intrinsic tendency of the agonist toward action or rest; the balance of strengths; the result of the interaction; and whether they are in opposition. These can be used to capture fine-grained distinctions in interactions needed to represent concepts like those lexicalized in English as *let, help, prevent, despite,* etc.

transmission of energy Langacker (1991) introduces the notion of an **action chain**, or series of interactions involving the transmission of energy from one (active or passive) participant to the next. The major semantic roles can be analyzed along two axes, one distinguishing source (agent, instrument) and target (theme, experiencer) domain of energy transmission, and the other distinguishing active (agent, experiencer) and passive (instrument, theme) participants.

contact Participants can come into both physical and mental contact; Langacker (1991) defines an experiencer as establishing mental or perceptual contact with other entities, and a mover as taking a path of motion to reach other entities.

The following concepts are of a more attentional/intentional nature:

focus of attention Syntax and pragmatic factors appear to be linked through the notion of focus of attention: Langacker (1991) analyzes the subject as the primary focus and head of the action chain (furthest upstream within scope), and the object as the secondary focus and tail of the action chain (furthest downstream within scope).

volition Volition should not be seen as merely a property of some participant; it is more specifically the intentional state of a participant *toward* a particular event or action. Even more precisely, it may be necessary to distinguish volition along two dimensions: whether it is *present* (in a participant with regard to an event), and whether it is *required*. The latter distinction is particularly useful for explaining some restrictions on causative alternations (as in Levin & Rappaport Hovav (1995)):[6]

    (6) Differing requirement of volition
        a. Marc threw the ball. / *The ball threw.   *[volition required]*
        b. Marc broke the ball. / The ball broke.   *[volition not required]*
        c. Marc broke the promise. / *The promise broke.   *[volition required]*

goal (achievement, result) In some languages, direct objects expected to be in the absolutive (e.g. Warlpiri) or the accusative (Maori) case appear instead in the dative case, which "indicates that the action was unsuccessful, or incompletely carried out, or that it affected only part of the object, etc." (Anderson 1985:185), conditions intimately tied to non-achievement of an intended perfective action. Note that these components of interactional structure might best be handled as part of the general aspectual representation of event structure.

intention It is not entirely clear how to disentangle intention from the notions of volition and goal. Intention may simply refer to the fact that a participant has or perceives a goal that they may or may not be actively trying to achieve. That is, unlike volition, which may be applied as a type of resource for particular actions, intention is an attitude, a state linking a participant with a goal.

Note that some of these concepts are directly expressible using familiar Neural Theory of Language **x-schema** representations, which can accommodate application of force, existence/achievement of goal states and the use of resources like energy and volition. Image-schematic notions like contact may not yet have a definitive interpretation in this context, but they can easily be treated as goal states. Focus of attention and intention also have yet to be explicitly represented, but they are by no means insurmountable obstacles. X-schematic representations of these basic concepts may serve as the primitives that can be combined to provide a precise description of more complex interactions; we examine one of these in more detail in the next section.

5.2 Causation

Across languages, the notion of causation seems to play an important semantic role, often determining lexical or construction choice, in addition to the markings focused on so far. It has proven notoriously resistant to both logical and cognitive analysis, encompassing a range of ways in which one event (or entity) can bring about another. As a complex and pervasive range of interactional phenomena, it serves as fertile ground for testing the adequacy of the more primitive concepts we have proposed.

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    [6]Note that (6) demonstrates the interplay of properties of both the verb and its arguments, just as described in Section 4.3.

control Comrie (1981) analyzes causation using the same hierarchy of semantic roles mentioned in Section 3.3. Variation in degree of control is said to characterize the difference between true causatives, in which an entity has the power to *effect* a situation, and permissives (e.g. English *let*), in which an entity has the power to *prevent* a situation. Comrie also tries to account for differeng markings of the "causee" in terms of control: English *We fell to the ground*, which is ambiguous about control, can be translated into Bats by either *Txo:*ABSOLUTIVE *naizdrax kxitra* or *Atxo:*ERGATIVE *naizdrax kxitra*; the former indicates that the faller had no control over the event, while the latter indicates that the fall was either intentional or potentially preventable by the faller (and thus includes a causative element).

internal/external Levin & Rappaport Hovav (1995) categorize verbs of internal causation (e.g. English *run, jump*) as attributing responsibility for and control over the event to the participant engaging in the action; and verbs of external causation (e.g. *break, throw*) as requiring some external cause that controls the event.

directness The variety of surface forms for expressing causation reflects a cline of decreasing directness of causation, from **lexical** causatives (e.g., English *kill*) to **morphological** causatives (e.g., as in the Turkish suffix *dür*, which attaches to inherently non-causative *öl* 'die' to form causative *öl-dür* 'kill') down to **analytic** causatives (e.g., English *She caused him to fall*) (Comrie 1981).

implicativity Song (1996) offers a tripartite typology: COMPACT causatives are equivalent to lexical causatives; AND causatives assert that one event brings about another; and PURP (purpose) causatives assert only that the goal of one event is to bring about another. This categorization is based partly on the cline of directness mentioned above, but it also incorporates a cline of **implicativity** corresponding to the degree to which one clause's semantics include the another's:

> (7) Differing implicativity (Song 1996)
>   a. John made Mary kick the man. $[\Rightarrow Mary\ kicked\ the\ man.]$
>   b. John told Mary to come over. $[\not\Rightarrow Mary\ came\ over.]$

causal event structure Croft (1991) presents a comprehensive analysis of how the causal structure of events provides the basic semantic features that in turn determine role markings. He defines each of the primary roles in terms of its position (initiator or endpoint) in the event and whether its participation is of a mental or physical nature; these roles produce some of the causation types listed by Talmy (1985): volitional, physical, affective, inducive, etc. For instance, a physical event is one both initiated and ended with physical interaction; volitional events, on the other hand, are initiated mentally by one entity and realized physically on another. This approach sheds some light on syncretism, which he claims favors grouping roles that occupy neighboring positions in event structure, or at least remain on the same general "side" (antecdent or subsequent) of the main event.

A quick survey of the kinds of causative distinctions to be made suggests that the primitives of Section 5.1 may be on the right track. Both control and internal/external causation seem reducible to a combination of force-dynamic interactions (prevention) and volition/intentional state. Directness of causation must indeed be represented somehow, but it may have some relation to directness of contact, perhaps in conjunction with simple contiguity in time. Similarly, the PURP type of causative and the cline of implicativity appear closely related to goal/intention.

Croft's analysis is closest in spirit to the kind of representation we are aiming for, since his focus is on causal (and interactional) event structure. He employs primitives quite like those listed in the Section 5.1, representing the transmission of energy, mental/physical contact and volition. As such, his approach may serve as a useful starting point for an x-schema interpretation of interactional event structure.

5.3 The ubiquity of clines

Finally, we briefly note a rather different constraint on the form of representation needed that stems from the already and oft-noted presence of clines, or scalar features. They have appeared in diverse contexts throughout the paper; we review them here:

- graded lower-level semantic features of roles (e.g., animacy, definiteness)

- hierarchies of semantic roles (e.g., control, affectedness, agent-patient similarity)

- continuum of conceptual content (e.g., instrument-comitative, containment-support)

- degree of correlation of syntax and semantics (e.g., influence of syntax in mediating role marking, degree of ergativity)

- types of causation (e.g., directness, implicativity)

Other clines not discussed here include that of grammaticizability (Hopper & Traugott 1993; Slobin 1997), between lexemes and function words; and that of Russian numeral-marking (Comrie 1981), between adjectives and nouns.

The pervasiveness of clines has representational consequences. Gradedness of isolated features may pose little difficulty, but most of the clines discussed here are rather more complex, involving the interaction of several factors. For instance, some languages will require detection of relative animacy to determine whether marking is necessary. Capturing the interaction of whole systems, such as the influence of grammatical roles on semantic marking, may require the use of weighted features as well. These phenomena pose significant representational challenges for most current linguistic theories, including the constructional approach discussed in Section 4.3. But they do lend themselves to neural interpretations and representations, underscoring the need for a neural interpretation of construction grammar.

6 Some conclusions

Perhaps the major conclusion we can draw at this point is that this paper is in many ways doomed to remain a work in progress: even this mere sampling of the vast literature demonstrates the diversity and complexity of the data, the subtleties of the semantic distinctions to be made, and the difficulty of making generalizations that are robust in the face of cross-linguistic evidence. In particular, both overt markings and their underlying concepts exhibit a striking dearth of absolute concepts and strict bounds; a dominance of relativity, scalar phenomena and prototype effects; and high degree of sensitivity to contextual factors jointly imposed by semantic features of the participants and their interaction on the one hand, and the expectations of the construction on the other. These characteristics are a natural outgrowth of the tension between the two functions of markings: differentiating entities, especially non-prototypical ones, within constructions, and generalizing across similar entities in different constructions.

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Speculation in Section 5 about representational requirements must be fleshed out by more concrete proposals, but the suggested list of primitives offers some encouragement: such concepts as those involved in force-dynamics, energy transmission and goal achievement appear conducive to x-schematic representation, and it appears that a range of more complex causative interactions can be rendered more precisely in terms of interactional primitives. This more precise representation may provide the structure for explaining otherwise mysterious and arbitrary mappings from meaning to form, and, with any luck, shed light on underlying cognitive representations that constrain cross-linguistic variation.

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