The Ecology of a Semantic Space
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# The ecology of a semantic space

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In recent years, a growing number of researchers have been examining the recurrent extensional structures of grammatical constructions.[1] Grammatical markers typically extend historically from function to function along often predictable pathways. These (near) universal pathways of development extend out from a prototype function via metaphor, image schema transformation, simple analogy, or various other mechanisms. Combining these pathways, we can create a network of potential functional extensions for each prototype construction. The nature of these extensions is well-treated in other works. For example, Kemmer (1988) provides a significant study of the typical extensions of reflexive markers to "middle" functions such as *books selling themselves well* and *branches breaking themselves in the wind.* Each language that has a prototype reflexive (*He hit himself*) will have some coherent subset of all possible, node-by-node extensions along this network (cf. Pederson 1991).

While we can accurately *describe* the diachronic (and possibly synchronic) extensions of a grammatical marker in this way, we have no means to *motivate* the particular subset of all possible extensions that one language selects. In other words, we still need to ask why does a construction extend one way in one language and another way in another language? Why, for example, is the English reflexive construction relatively limited in its functions while the Spanish reflexive marker has extended to middle, passive, and even impersonal constructions? I see four likely factors affecting each language's particular pattern of extensions:

1. Idiosyncrasy. Any language may have a particular set of extensions because it is a unique language and not all changes are strictly determinable. However, we should always attempt to determine a richer causal explanation for change in a language. If we cannot explain something, it should not be for lack of trying.

2. Type of marking. We may notice that, e.g., affixed reflexive markers seem to be more richly polyfunctional than reflexive pronouns. Theories of iconicity (cf. especially Haiman 1980, 1983) might be invoked to explain this. On the other hand, polyfunctionality can also be a simple function of age of the marker. Older markers will have had more time to become affixal (assuming that to be the most general morphological drift) and more functions may be acquired largely as a function of time. Such an account would still fail to fully motivate cross-linguistic differences and similarities.

3. Areal influence. A language may extend grammatical constructions by borrowing a use of a similar construction or it may calque a neighboring language's construction which uses a similar morpheme. Many examples of this can be found (e.g. the Dutch reflexive and its origin and divergence from the Standard German reflexive, cf. van der Leek 1991). While interesting, I will not consider such cases in this paper.

4. Influence from other constructions in the same language. This paper considers the systemic influence of various constructions, "neighboring" in the same general area of type of expression, on the functional range of individual constructions.[2]

I examine the semantics of several valence affecting constructions in a small range of typologically contrastive languages. Each of these constructions can be used to describe the same event which we might characterize as highly transitive (cf. Hopper and Thompson 1980, Rice 1987). That is, an agent does something to a patient, and the patient undergoes some change of state. For example, an event where someone acts upon a branch, which breaks in the process (cf. Talmy 1976 and 1985 for detailed discussions of the subparts of a causative event).

Each of these constructions, by denoting the same real-world event, may have the same truth-value. A speaker chooses from the set of constructions to construe the event or scene as having a particular structure. The structure ascribed by the speaker may, of course, be different from reality or it may emphasize just select aspects of the event. Though the constructions may have considerable functional overlap, each construction asserts a specific nuance for which the substitution of another construction would be less appropriate.

Consider Modern Hebrew, which, in addition to intransitives, has a three-way distinction among those constructions which do not specify agent. (For a summary of the *binyan* system, cf. Berman 1979a. The following Hebrew examples and semantic analysis are from Berman 1979a:1-2,11 and 1979b:3.) Functionally, these constructions vary according to the construal of agency. The active impersonal (1) marks the existence of an agent (+human) but declines to specify that agent.

1) ye'argenu šney cvatim bekarov
(they)-will-organize two teams soon

The agentless passive (2) "[focusses] on the patient, which [it serves] to foreground – and although passives imply the logical existence of an agent, the latter's role is deliberately ignored" (Berman 1979b:19).

2) šney cvatim ye'urgenu bekarov
two teams will-be-organized soon

Contrastively, the reflexive or middle paradigm (3) characterizes the event as occuring autonomously – that is, with only internal causation and no external agent.

3) šney cvatim yit'argenu bekarov
two teams will-get-Ref-organized soon

Semantically and structurally, middle paradigm constructions are quite similar to the simple intransitive constructions as in (4).

4) hacvatim yit'argenu lahem
the-teams will-organize(Intr) to-them

Similarly, for explicit agent constructions, Modern Hebrew may choose between periphrastic causative constructions (5), agent-patient causative/transitive verbs (6), and oblique-agent passives (7).

5) hama'ase asa oti xole
the-deed made me sick

6) hama'ase hexli oti
the-deed sickened me

7) hakad nišvar al ydey haxatul
the-vase was-broken by the-cat

Causative constructions highlight an agent external to the event. Transitive verbs express the agent without any special emphasis. "Demoted" agent passives mention an agent, but downplay its importance to the event.

We can organize the relationships between these constructions by plotting them on a two dimensional space where their location indicates the construals they best represent. This space represents the range of expressions dedicated to causal/inchoative events. The horizontal dimension of this space is the core argument expression of the number of participants (or *transitivity* in short) – that is, how many participants are construed as relevant. Prototype causatives are quite highly transitive. Similarly prototype simple transitive verbs are highly transitive. On the other end of this scale, prototype reflexives are low transitivity: they are used to explicitly deny a second participant to the scene (*It was myself that I hit*) or to assert that one participant fills two roles. Prototype passives are fairly low in this sense of transitivity (cf. Shibatani 1985): they delete (or in some languages may demote) agents from reference. However, passives do not deny the existence of an outside agent, as do prototype reflexives, so I place them not as far towards the low end of the transitivity scale. Prototypical impersonal constructions are middling transitive in that they express an agent, but so generically as to not reflect a fully salient participant. Finally, simple intransitives are definitionally low in transitivity. This horizontal dimension seems critically important for distinguishing the functions of these constructions since speakers appear particularly keen to express the number of relevant participants in an event.

The vertical dimension of this space represents the degree to which the construction construes the grammatical subject of the construction as *responsible* for the event. Does the construction answer the question "Whose fault is it?" (or "Who gets the credit?")? Did the branch break because the subject was leaning on it (*I made the branch break*)? Did it break because it was flimsy (*The branch just broke itself in my hands*)? Or is it irrelevant what caused it; the speaker is only concerned with the result (*The branch broke*)? The notion of responsibility

appears conceptually central to any discussion of change of state and causation.[3] Thus causatives prototypically mark exact ultimate responsibility on the subject. With reflexive constructions, the subject is construed as responsible, or at least the reflexive marks that there is no other agent or actor responsible for the event (*I hit myself, no one else did*). Conversely, passives usually assume the subject is the patient of actions of a distinct responsible party (which may sometimes be expressed in a grammatically demoted form). Simple transitives and intransitives are relatively neutral for this parameter. Impersonal constructions may attribute responsiblity to an agent which is not a distinct and explicit referent, but they often seem used to beg the question of who is responsible.

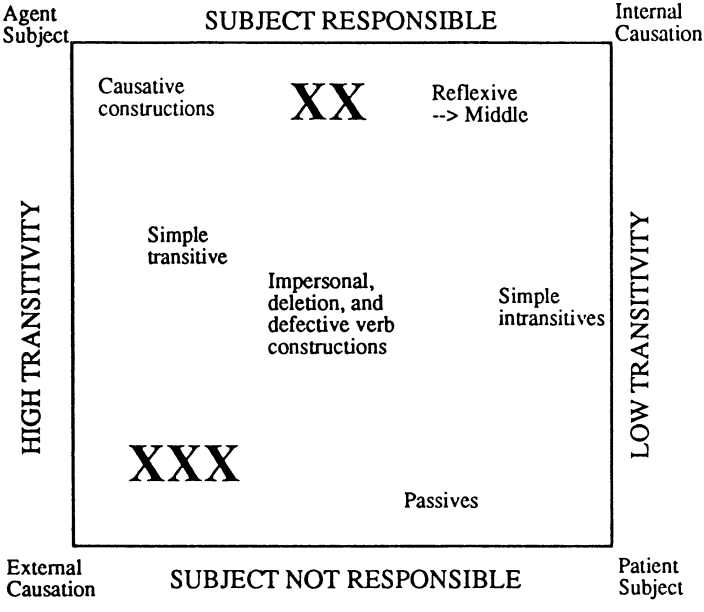


**Fig. 1 The semantic space of change of event constructions With prototypes for each construction in place**
(X indicates little expressed regions.)

So in Figure 1, I plot each of these constructions according to the values on these two dimensions of their prototypes. Note that there can be any number of other dimensions with which to differentiate the uses of these constructions. A useful third dimension could represent the constructions' use for switching or maintaining topic. However, a third dimension would complicate the diagram immensely and these two dimensions are the most critical for characterizing the contrasts of the prototypes of these constructions. Note that these common constructions almost entirely fill the semantic space except for the spots marked with X's. There appears to be a universal need to have basic constructions to express construals for all regions in this space not marked with X's.[4] Note that two

diagonal dimensions naturally follow from the horizontal and vertical values: Highly transitive constructions with responsible subjects have agent subjects; whereas passives have patient subjects. Reflexives/middles are associated with internal causation. Causatives, many transitives, and agentive passives suggest external causation.

In Figure 2, I plot the approximate range of expressive construal for the various Hebrew constructions. The space is tidily divided among the constructions in a way closely resembling the array of presumed universal prototypes of Fig. 1. To wit, all primary regions are expressable by one construction or another. The overlap areas represent areas where a speaker might vacilate between two constructions to represent that particular degree of construal. Thus, each construction has its own core and extended region in the space and slight overlap is tolerated.

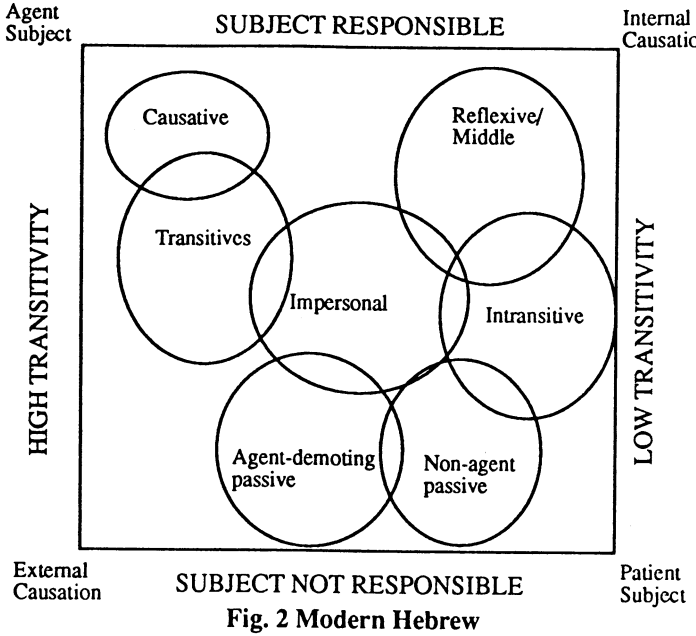


**Fig. 2 Modern Hebrew**

This introduces an analytically useful metaphor:

*a semantic space is populated by various constructions which stand in an* **ecological** *relationship to one another.*

We can best apply this ecology metaphor by examining languages which do not regularly use all of these basic grammatical constructions to represent each prototype area in the space. English (Fig. 3), with its relatively impoverished range of reflexive functions and its flexibility to use simple verbs transitively and intransitively, uses simple intransitives for "middle" functions typically marked in other

European languages with the reflexive. In ecological terms, the simple predicate construction claims a large percentage of the semantic space, inhibiting the presence of other constructions around that space. Conversely, we could say that the absence of a reflexive-derived middle motivates the use of the simple intransitive for this function.

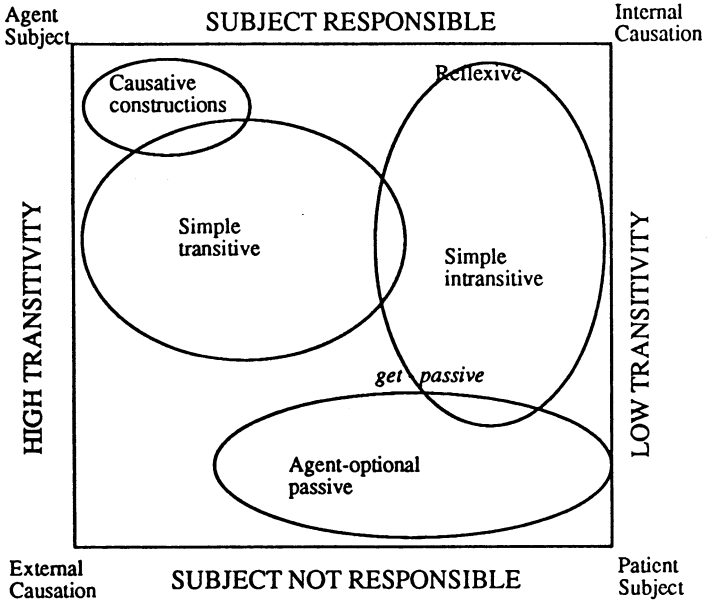


**Fig. 3 English**

I don't circle relatively minor constructions in these figures, but include them to suggest new or less prevalent constructional "species" which may eventually vie for more wide-spread use.[5] For example, the get-passive often combines the qualities of passive with a notion of partial responsibility of the subject (cf. R. Lakoff 1971, Chapell 1980).

These synchronic examples respresent ecological systems in a fairly stable state: there are no important unexpressed regions, and there is minimal overlap or synonymy between constructions. Effectively, there is little strong competition. As such, this space looks similar to Anderson's "maps" of the semantic spaces of evidentials (1986) and perfects (1982). As with his diagrams, diachronic change can be represented by redrawing the regions expressed by each construction to reflect changes in function. This ecological model goes beyond mapping however. Since much of this causative / inchoative space is necessarily filled, we can actually determine competition between constructions to express various regions and see how the ecology of the space helps *effect* the extensional shifts of the

constructions.

Now consider Figures 4 and 5 for Tamil. Over the last 2,000 years there has been a noteworthy decline in the frequency and functional range of simple intransitive Tamil verbs. Along with this, there has been a rise in the frequency and range of transitive verbs.[6] This can be explained in terms of the overall shifts in the ecologically-governed causative/inchoative space. In oldest Classical Tamil (Fig. 4 circa 200 AD), if an event was represented as dyadic, a morphological causative was typically suffixed to one of the many intransitive verbs. For example, **kāṇpi** "show" from **kāṇ** "see". Further, the language had effectively no reflexive construction – though it had a logophoric pronoun. It occasionally used passive-like constructions through the regularized use of verbs such as **paṭu** "to suffer" and **peṟu** "to experience, beget", but patient subject functions were by-and-large expressed by simple bare stem intransitives. Thus events of *washing, breaking*, and *finding (be.found)* were all expressed as basically intransitive. (Classical Tamil also had a few "defective" verbs, which, like impersonals, could only inflect for a generic third person neuter singular subject.)

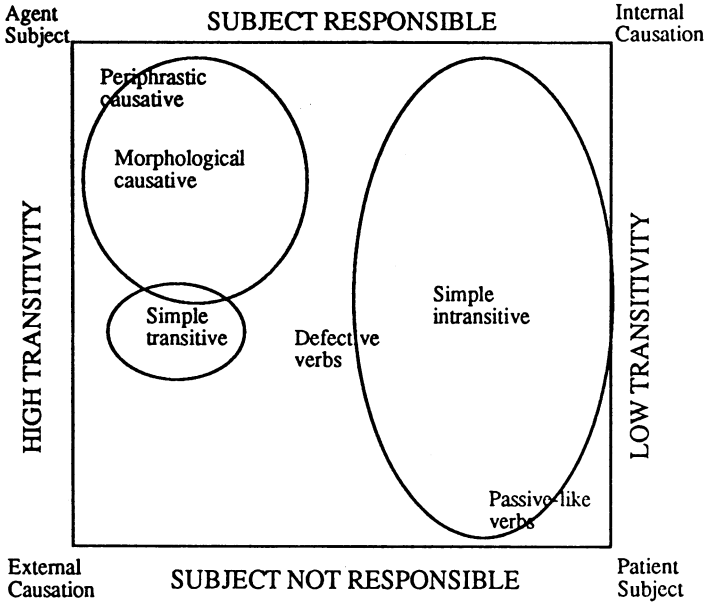


**Fig. 4 Classical Tamil**

Morphological causatives, though common and productive, were complex morphophonemically, and one morpheme had been phonologically reduced in many verbs to simple gemination or devoicing of the root-final consonant or the following tense morpheme.[7] For example, **mēy-nt-** "graze-Past-, X grazed"

becomes mēy-tt- "graze-Past-, Y put X to pasture". Thus the common causative construction had very little ability to markedly emphasize that an event should be construed as highly causative. Serial verbs (vai, "to place purposefully" or paṉṉu / cey "to do") were suitably grammaticized by metaphor to create an emphatic causative construction highly marking that the grammatical subject and no other participant was responsible (perhaps contrary to expections) for the event.

8) ... vēntarai aṇaṅkarum paṟantalai uṇaṅkap paṇṇi ...
kings-Acc frightening battle.ground wither-Inf do-AvP
"and (he) made the kings suffer on that terrible battle field"
(Puṟanāṉūṟu 25:5-6, c. 200-300AD)

This paraphrastic causative came into competition with the morphological causative. This competition and the phonological inelegance of the various causative allomorphs eventually created a situation where the old morphological causative verbs ceased to be productive (one could no longer causativize any intransitive). Such verbs eventually became reanalysed as monomorphemic transitive verbs.

During the latter part of this gradual transition,[8] the serial verb koḷ "to take and retain" (cf. Pederson 1990) came to be associated with reflexive contexts (action done for/to oneself). This grammaticized as a full-fledged reflexive marker and has, over the centuries extended inexorably along some of the paths of extension which reflexive markers typically take (cf. again, Kemmer 1988, Pederson 1991), pushing down the range of the simple intransitive verb. Recently, the reflexive construction has begun to acquire a deagentive function which construes an event as having internal causation or at least no animate responsible agent:

9) nāṉ kaṭavait tiṟantēṉ. "I opened the door."
I door-Acc open-Ps-1s (from Pederson 1990)

10) kaṭavu tiṟantukoṇṭatu. "The door opened by itself [or wind]."
door(Nom) open.Avp-Ref-Ps-3sn (Deangentive/Anti-causative)

This is in contrast to the still used simple intransitive which is more neutral with repect to responsibility:

11) kaṭavu tiṟantatu. "The door opened. [Cause unspecified]"
door(Nom) open-Ps-3sn

Since a crowded region of semantic space will not maintain multiple expression for long, the range of the simple intransitive has been reduced to some simple inchoatives (agent-neutral) and patient subjects

Most recently, after continual contact with European languages developed (and passive-laden prose needed translation), Tamil has renovated the old passive-like verb paṭu to use as a passive construction.[9] Its use is still restricted to specific genres, such as academic discourse, but its entry into that region of the semantic space may well contribute to a further reduction of the functional range

for intransitives. All these developments give us a state of the system something like Figure 5.

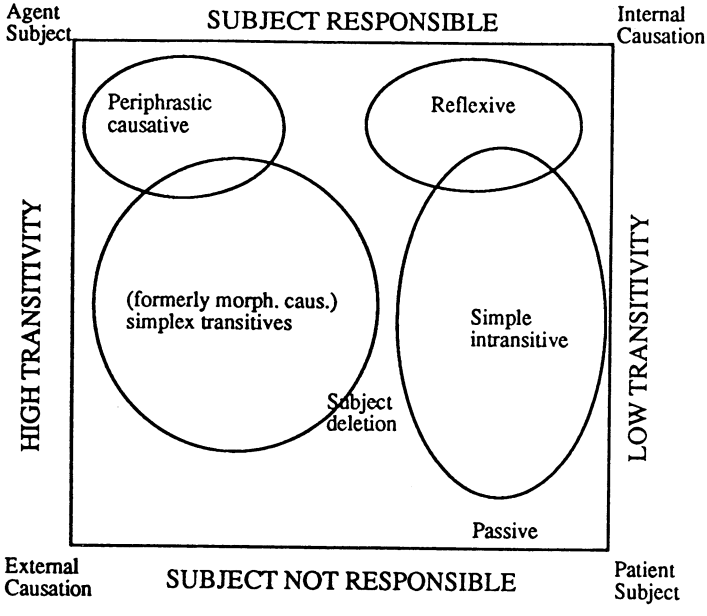


**Fig. 5 Modern Tamil**

While the *potential* range of a construction in a language depends upon the type of the construction and its particular history, we have seen how the *actual* range of usage is determined in large part by the ecology of the overall system of expressively related constructions. To borrow a term from evolutionary theory, relatively stable systems can have "punctured equilibrium". We have seen this come from:

| | |
|---|---|
| 1. reanalysis of morphemes, | (Tamil causative) |
| 2. loss of productivity, | (Tamil causative) |
| 3. innovation of new constructions, | (Tamil reflexive) |
| 4. language contact | (Tamil passive) |

This punctured equilibrium often precipitates fundamental changes among the sets of competing constructions.

While I have focussed on the semantic space of causative / inchoative events, a similar ecological perspective (where changes are seen as the result of competition in an often changing semantic environment) could apply to the study of other interactive sets of grammatical constructions. I suggest modals, tense and aspect systems, case marking, and spatial markers as promising candidates.

## Notes

1. I owe much of this paper to the fruits of discussion with Dan Slobin, Eve Sweetser, Leonard Talmy, and Ceil Toupin. I must credit Kausalya Hart for her patience and assistance with my faltering Tamil. Errors, I claim as my own.

2. I must provide a few important disclaimers for the following discussion: 1) This analysis is deliberately simplified. Space is limited, and I am trying to present a somewhat complicated theoretical mechanism rather than apply that mechanism to all possible data. Further complications must be considered under separate work. 2) I have thus far only tested "accusative" languages with my approach – and I have not tested enough of those to make any strong universal claims. 3) For space limitations, I don't provide example sentences for all of what I diagram. While you will need to take much on faith, greater exemplification would prove little since any invalidity to my approach would only be demonstrated by counter-examples, which I urge the readers to provide for themselves. None of the data I am drawing on is particularly controversial. 4) The diagrams represent thumbnail sketches of phenomena plotted somewhat impressionistically. It should be possible, though difficult, to draw such diagrams to represent exact results of statistical analysis.

In short, this paper focuses less on particulars and more on the systemic principles I wish to present.

3. For a discussion of the centrality of the notion of responsibility in common sense reasoning about causal events, cf. chap. 3 of Hart and Honoré 1985. (My thanks to Ceil Toupin for this reference.)

The notion of responsibility should not be confused with volitionality. One can non-volitionally be responsible for an event, and inanimate objects may by their nature be construed as responsible for an event's occurrence. In general, speakers tend to seek out a volitional (or at least human) agent from among the set of factors necessary for an event onto which to ascribe responsibility. This need not be the case, especially when there is something unusual about an inanimate's characteristics.

4. One can see that we seldom both express two or more relevant participants of a causative event and have the non-responsible one be subject (the XXX area). The agentive passive is closest to this but the agent is seldom expressed as a core argument. Additionally, the XX area of medium transitivity (one explicit participant and one less-than-explicit participant implied) seldom is expressed with constructions which imply a responsible subject. A causative with a deleted or backgrounded patient or causee would approximate such a construction.

5. I leave out the various English impersonal constructions. No one of them is used with great frequency and each has a different nuance beyond the scope of this study.

6. The language could be said to be shifting over from a fundamentally intransitive language (in the sense of Nichols 1982) toward being a more transitive

language.

7. Readers who have some knowledge of Classical Tamil will, I hope, excuse the simplified discussion of the causatives. Both -pi/-vi and -tt- can be treated as causative morphemes, -tt- (both suffix and alternate inflectional paradigm) being older and minimally productive by the time of the earliest records.

8. Exact dating of the use of koḷ as a reflexive marker is difficult. Karthikeyani (1980) claims tenth century inscriptions have koḷ used reflexively. However, such inscriptions as I have been able to examine do not unimpeachably use koḷ as a reflexive, but only as a less than fully grammaticized metaphorical "taking" or as an aspectual auxiliary. I urge caution ascribing reflexive function to such an early period.

9. Interestingly, the other passive-like verbs which were common in Classical Tamil have not been renovated. One was apparently sufficient to emulate the European model.

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