

The Semantics of Transitivity Alternations¹

Edit Doron, The Hebrew University of Jerusalem

In theoretical linguistics, causative and middle verbs are usually derived by independent operations. But cross-linguistically, both mark the same transitivity alternations. This paper proposes a unified syntactic system for the derivation of both types of verbs, which, moreover, sheds new light on problems in the interface of semantics and morphology. One problem is the impossibility, mostly ignored in linguistic theory, of deriving the semantics of middle verbs from that of the corresponding transitive verbs. The second is explaining the identity found cross-linguistically between middle and reflexive morphology. The third is providing an alternative to the “event-decomposition” account of derived causative verbs.

The paper develops a non-lexicalist unified analysis of the semantics of causative and middle morphology. Both causative and middle verbs are derived from *roots*. In the Semitic languages, this derivation is morphologically marked by different templates. These templates denote *voice* (of which *middle* is one possible value) and *agency*, the thematic role of the verb’s external argument (of which *causative* is one possible value). According to the present analysis, this form-meaning correspondence is mediated by syntax, which allows the parallel compositional construction of the form and the meaning of a verb from the forms and the meanings of its root and template.

I take a root R to denote either a property of events $\lambda e[R(e)]$ or a relation between individuals and events, e.g. $\lambda x\lambda e[R(e,x)]$. The root and its arguments are optionally embedded under a *light verb* v (Hale and Keyser 1993, Kratzer 1994) which relates an event to its Agent (more precisely Proto-Agent in the sense of Dowty 1991): $\lambda y\lambda e[Agent(e,y)]$. Whether or not a root is embedded under v is a syntactic property of the root. But this is only the unmarked case (morphologically encoded by the *simple* template). Two dimensions of markedness are introduced into a derivation by two additional types of syntactic heads: (a) *agency-heads* and (b) *voice-heads*.

(One) *Agency-heads* modify agency: The agency-head γ relates an eventuality to its cause: $\gamma = \lambda y\lambda e[Cause(e,y)]$, and is morphologically realized as the *causative* template. Another agency-head, ι , classifies the eventuality as an action: $\iota = \lambda e[Action(e)]$, and is morphologically realized as the *intensive* template.

(Two) *Voice-heads* modify voice: The voice-head μ (realized as the *middle* template) replaces the light head v in the derivation, which precludes the insertion of an additional Agent argument and results in the derivation of an intransitive verb. Another voice-head, the passive voice-head π (which is not discussed in the present paper), is morphologically realized as the *passive* template.

The present analysis of causative verbs in terms of a causative template is not equivalent to an analysis in terms of an additional causative predicate. A causative template is restricted to denote a particular thematic relation, which is not the same as introducing a predicate in general. For example, if a causative verb involves a single predicate, we expect it to denote an event, rather than a relation between events. The present analysis views a causative verb as denoting an event which has a causer participant. The paper reviews and rejects the purported evidence found in the literature (Parsons 1990, Pustejovsky 1995) for the analysis of causation in terms of event decomposition (based on the scope of temporal adverbials). Instead, I view the causal origin of an event as part of its characterization. Another type of event characterization is action (marked morphologically in Semitic by the intensive template). Clearly, event

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decomposition would not be appropriate for this latter type of characterization. Rather, cause and action are thematic concepts which characterize an event. Philosophically, both of these concepts are central, and none is reducible to the other (Davidson 1971).

The decomposition approach to causativity has additional drawbacks as an account for transitivity alternation. Under this view, the transitive verb is derived from the intransitive verb by means of the operator CAUSE. Since the transitive verb is derived, we expect a more highly marked morphology for it, yet sometimes it is the other verb which is morphologically marked, by the middle morpheme. Second, under the decomposition approach, the identity of the middle morpheme with the reflexive morpheme is completely unexpected. The reflexive morpheme presumably denotes the reflexive operator $\lambda P\lambda x[P(x,x)]$, which applies to transitive verbs irrespective of CAUSE.

Chierchia 1989 goes in the opposite direction from that of event decomposition. He takes the transitive verb as basic, and derives the middle verb from it. This approach overcomes the shortcomings of the decomposition approach, but it runs into the converse of the first problem: even in languages with middle morphology, it is not necessarily the case that the transitive verb is unmarked; often, it is the transitive verb which is marked (as causative). Moreover, this direction of derivation faces a serious semantic problem. The problem is that there is no way to “eliminate” the semantic contribution of the transitive verb’s external argument. This problem is usually ignored in the literature, but not by Chierchia, who is well aware of it, and nevertheless wants to derive the meaning of the middle verb from that of the transitive verb. His proposal is to analyze middle verbs as reflexive. Though this reduction of the middle voice to reflexivity accounts for the observation that reflexives are often derived by middle morphology, it is not independently motivated. Levin and Rappaport Hovav 1995 propose to maintain Chierchia’s transitive-to-middle direction of derivation only for a subset of verbs, those which denote what they call “externally caused” events, and they reverse the direction of derivation for verbs which denote what they call “internally caused” events. But this distinction is ad-hoc, and moreover fails to account for pairs where both transitivity alternants are morphologically marked.

In sum, neither direction of derivation is tenable which operates on the causative and middle verbs themselves. Neither is derived from the other, but at the same time, neither is underived, which explains why there exist examples of the transitivity alternation where both verbs are morphologically complex. I claim that both causative and middle verbs are derived from a basic predicate, the root. A transitive verb is derived by combining the root with a morpheme which contributes an additional argument. In the unmarked case, this argument is an agent. A morpheme which specifically contributes a cause marks the derived verb with causative morphology. A middle verb is derived by combining the root with a morpheme which precludes the agent. All these different derivations from a single root are marked in the Semitic languages by a unified system of templates.

All verbs, nouns and adjectives in the Semitic languages are derived from (tri-) consonantal roots by intercalation with different *templates*, which are morphemes that consist of CV skeleta, vowel sequences and affixes. The root is usually the only common element shared by derivationally related forms. What is striking about the Semitic system is that while there are scores of templates which derive nouns from roots, the verbal system is extremely limited. Though the verbal system is on principle the same in all the Semitic languages, the actual forms vary from language to language. The present study is based on the forms found in Hebrew. Setting aside voice variation for the moment, each active verb in Hebrew is derived by one of exactly *three* templates. These templates, also found in Akkadian, Syriac, Arabic, are traditionally known as (a) the **simple** template, (b) the **intensive** template, and (c) the **causative** template. Since each and every active verb in Hebrew is derived by one of exactly three templates, it is natural to suspect that the choice of template is not arbitrary, but that it indicates some factor of the meaning of the

derived verb. This indeed is the traditional view concerning the templates, as is suggested, for example, by the term **causative**. Modern linguists, on the other hand, have noted numerous examples where the semantic contribution of the template is unpredictable, and have concluded that these examples doom to failure any attempt at a systematic analysis. Yet the semantics of the templates is totally systematic if one looks only at roots which derive more than a single verb, i.e. which derive contrastive pairs or triplets of verbs. The roots in (1), for example, all derive intransitive simple verbs, and also intensive and causative verbs. I point to the fact that for each such root in the language, the causative verb is transitive, i.e. induces an increase in valence by adding a *Cause* argument, whereas the intensive verb is intransitive, i.e. does not involve a change of valence, but only reclassifies the described event as an *Action*. Accordingly, the subject of an intensive verb must be animate, whereas simple and causative verbs are equally good with animate and inanimate subjects, as shown in (2):

(1) root	simple verb (intransitive)		intensive verb (intransitive)		causative verb (transitive)
[q][p][c]	[q]a[f]a[c] <i>jump</i>		[q]i[p]e[c] <i>jump up&down</i>		hi[q][p]i[c] <i>make jump</i>
[r][q][d]	[r]a[q]a[d] <i>dance</i>		[r]i[q]e[d] <i>actively dance</i>		hi[r][q]i[d] <i>make dance</i>
[ʻ][p]	[ʻ]a[f] <i>fly</i>		[ʻ]o[f]e[f] <i>actively fly</i>		he[ʻ][i]f] <i>fly</i>
[h][l][k]	[h]a[l]a[x] <i>walk</i>		[h]i[l]e[x] <i>actively walk</i>		ho[l][i]x] <i>make walk</i>
[x][z][r]	[x]a[z]a[r] <i>return</i>		[x]i[z]e[r] <i>court</i>		he[x][z]i[r] <i>return</i>
[p][q][d]	[p]a[q]a[d] <i>command</i>		[p]i[q]e[d] <i>be in command</i>		hi[f][q]i[d] <i>put in charge</i>

(2)a ha-yeladim/ ha-mexirim qafcu
the children/ the prices jumped -SIMPL
 ‘The children jumped.’ ‘The prices raised.’

b ha-yeladim/ * ha-mexirim qipcu
the children/ the prices jumped -INTNS
 ‘The children/*the prices jumped up and down.’

The distinction in (2b) is expressible in English by using the main verb *do*, which, unlike the auxiliary *do*, only has an action meaning (as noted by Ross 1972):

(3)a The girls jumped up and down after the boys did it.
 b * The prices jumped up and down after the taxes did it.

In the examples above, the simple verb is unergative. But if the simple verb is unaccusative, as in (4) below, then the corresponding intensive verb involves valence increase, in addition to the reclassification of the event as an action. The intensive verbs in (4) are therefore just as transitive as the equi-rooted causative verbs:

(4) root	simple verb (unaccusative)	intensive verb (transitive)		causative verb (transitive)
[p][n][y]	[p]a[n]a[] <i>turn</i>	[p]i[n]a[] <i>turn out</i>		hi[f][n]a[] <i>turn</i>
[g][d][l]	[g]a[d]a[l] <i>grow</i>	[g]i[d]e[l] <i>grow</i>		hi[g][d]i[l] <i>increase</i>
[p][x][t]	[p]a[x]a[t] <i>reduce</i>	[p]i[x]e[t] <i>devalue</i>		hi[f][x]i[t] <i>reduce</i>
[t][b][ʻ]	[t]a[v]a[ʻ] <i>drown</i>	[t]i[b]ea[ʻ] <i>drown</i>		hi[t][b]ia[ʻ] <i>drown</i>
[y][c][ʻ]	[y]a[c]a[] <i>come out</i>	[y]i[c]e[] <i>export</i>		ho[c][i]i[] <i>take out</i>
[t][ʻ][m]	[t]a[ʻ]a[m] <i>match</i>	[t]e[ʻ]e[m] <i>coordinate</i>		hi[t][ʻ]i[m] <i>match</i>
[b][š][l]	[b]a[š]a[l] <i>ripen</i>	[b]i[š]e[l] <i>cook</i>		hi[v][š]i[l] <i>ripen</i>

Again, intensive verbs indeed denotes actions. An intensive verb in (4) can only be predicated of an animate subject. The causative verb, on the other hand, may be predicated of any kind of cause (including abstract causes):

(5)a ba’alat-ha-bayit/ ha-avtala hifneta et-ha-dayarim
the landlady lunemployment turned-CAUS ACC the tenants
 le-liškat-ha-avoda
to the employment agency

b	ba'alat-ha-bayit <i>the landlady</i>	pinta <i>turned-out-INTNS</i>	et-ha-dayarim <i>ACC the tenants</i>
c *	ha-avtala <i>unemployment</i>	pinta <i>turned-out-INTNS</i>	et-ha-dayarim <i>ACC the tenants</i>

Given a system of templates, there is no need to assume that the lexicon consists of morphemes as fine grained as verbs. Rather, the lexicon consists of coarser grained *roots*, whereas verbs are constructed from the roots by merging them with the *light verb* v and with *agency-heads*, ι and γ , which, first, determine whether the derived verb is a verb of action, a verb of causation or unclassified for these dimensions, and which, second, introduce an external argument. By principles of distributed morphology (Halle and Marantz 1993), the syntactic output is supplied a Vocabulary form by the morphological component of the grammar. Under the simplest conceivable form-meaning correspondence, every root R fused with ι should always be realized as an intensive verb, a root fused with γ should always be realized as a causative verb, and a root in isolation (in a verbal environment) should always be realized as a simple verb. Yet this is true only in the default case. The default features of the templates are [+ ι] for INTNS, [+ γ] for CAUS, and [- ι - γ] for SIMPL. Crucially, non-contrastive features are redundant, and therefore not marked, which clarifies why it is that verbs which are the unique derivational output from the root, i.e. verbs which are not part of a contrastive pair, tend to be idiosyncratic.

v denotes the thematic role Agent: $\lambda y \lambda e [\text{Agent}(e,y)]$. The licensing of v is a syntactic property of the root. In addition, the agency head ι also licenses v , but γ does not. ι classifies events as Actions: $\lambda e [\text{Action}(e)]$, whereas γ denotes the thematic role Cause: $\lambda y \lambda e [\text{Cause}(e,y)]$. The Cause thematic role is never identified with the thematic role of Agent, since causative morphology signals a marked Cause, i.e. a Cause which is not an Agent, whereas unmarked Causes are realized by default as Agents.

Functional heads combine with their complements not by function application, but by the rule of “identification” (Higginbotham 1985). For example, identification applies in (7) in the subtree where v and R are combined, in the way shown in (6), where s is the type of situations:

$$(6) \quad \text{ident} (\alpha_{\langle e, \langle s, \langle s, \rangle \rangle}, \beta_{\langle s, \langle s, \rangle \rangle}) = \lambda P \lambda y_e \lambda e_s [\alpha(e,y) \ \& \ P(e)] (\beta)$$

The other subtrees in (7) combine by function application. In addition, I assume that the event argument is bound by a tense operator higher in the tree, and I use x , y , z ambiguously for both variables and names. The roots in (7) and (8) are roots that license v , whereas the root in (9) does not:

$$(7) \quad y \text{ raqad} \\ y \text{ dance-SIMPL} \quad \text{'y danced'}$$

$$\begin{array}{c} v \quad \lambda e [\text{dance}(e) \ \& \ \text{Agent}(e,y)] \\ / \quad \backslash \\ y \quad v \quad \lambda y \lambda e [\text{dance}(e) \ \& \ \text{Agent}(e,y)] \\ / \quad \backslash \\ \lambda y \lambda e [\text{Agent}(e,y)] \quad v \quad [R \ [r][q][d]] \quad \lambda e [\text{dance}(e)] \end{array}$$

$$(8) \quad y \text{ šavar} \quad \text{et } x \\ y \text{ break-SIMPL} \quad \text{ACC-}x \quad \text{'y broke } x \text{'}$$

$$\begin{array}{c} v \quad \lambda e [\text{break}(e,x) \ \& \ \text{Agent}(e,y)] \\ / \quad \backslash \\ y \quad v \quad \lambda y \lambda e [\text{break}(e,x) \ \& \ \text{Agent}(e,y)] \\ / \quad \backslash \\ \lambda y \lambda e [\text{Agent}(e,y)] \quad v \quad R \quad \lambda e [\text{break}(e,x)] \\ / \quad \backslash \end{array}$$

et-x [R [š][b][r]] λx λe [break (e,x)]

(9) x yaca
x go-out-SIMPL 'x went out'

R λe [go-out (e,x)]
 / \
 x [R [y][c][']] λx λe [go-out (e,x)]

ι licenses *v*, whether or not the root does. From the familiar requirement that the Agent role is assigned at most once per event, the Agent of (7), for example, is the same as the Agent of the corresponding intensive verb in (10) (the same is true of (8) as well). But in (9), the root does not license *v*, therefore the Agent of the corresponding intensive verb in (11) is an additional argument, since *v* in this case is licensed by ι only:

(10) y riqed
y dance-INTNS 'y actively danced'

v λe [dance (e) & Action (e) & Agent (e,y)]
 / \
 y v λy λe [dance (e) & Action (e) & Agent (e,y)]
 / \
 λy λe [Agent (e,y)] v ι λe [dance (e) & Action (e)]
 / \
 λe [Action (e)] ι [R [r][q][d]] λe [dance (e)]

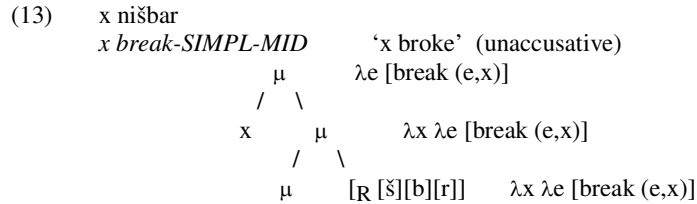
(11) y yice et x
y go-out-INTNS ACC-x 'y exported x'

v λe [go-out (e,x) & Action (e) & Agent (e,y)]
 / \
 y v λy λe [go-out (e,x) & Action (e) & Agent (e,y)]
 / \
 λy λe [Agent (e,y)] v ι λe [go-out (e,x) & Action (e)]
 / \
 et-x ι λx λe [go-out (e,x) & Action (e)]
 / \
 λe [Action (e)] ι [R [y][c][']] λx λe [go-out (e,x)]

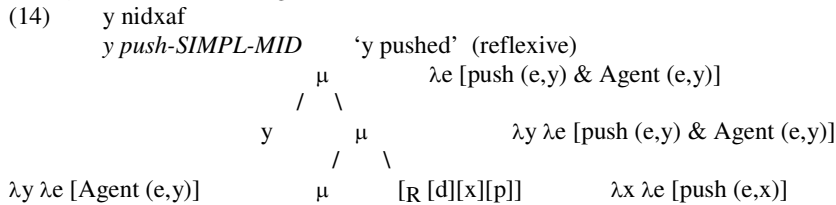
Unlike (10), in (12) there is an additional argument, γ's argument, which, as explained above, is different from the Agent:

(12) z hirqid et y
z dance-CAUS ACC-y 'z made y dance'
 γ λz λe [dance (e) & Agent(e,y) & Cause (e,z)]
 / \
 z γ λe [dance (e) & Agent (e,y)]
 / \
 λz λe [Cause (e,z)] γ v λe [dance (e) & Agent (e,y)]
 / \
 et-y v λy λe [dance (e) & Agent (e,y)]
 / \
 λy λe [Agent (e,y)] v [R [r][q][d]] λe [dance (e)]

As is also true cross-linguistically, some middle verbs are unaccusative and others are reflexive. The middle template is the realization of a voice-head μ which modifies the root by voiding its licensing of v . This precludes the insertion of an additional Agent argument and results in the derivation of an unaccusative verb:



The reflexive reading of a middle verb results from the fact that, for some roots, μ itself relates the event to one of the root's own arguments by the Agent relation. In (14), since μ is a modifier, its argument is identified with the root's:



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