Middle Transitive Alternations in English: A Generative Lexicon Approach

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1. Introduction: Current approaches

Over the last fifteen years, following Perlmutter and Postal's (1983) work, there has been constant interest in the problem raised by transitivity alternations. Perlmutter and Postal argued that the single argument of intransitive verbs may either be generated as an object of the verb (unaccusative verbs) or as a subject (unergative verbs) (cf. Bassac 1997). A sub-class of unaccusative verbs show both transitive and intransitive use, as in (1) and (2):

(1)   The artillery sank two ships.
(2)   Two ships sank.

This transitive/ergative (or causative/inchoative) alternation must be distinguished from another alternation, the transitive/middle alternation exemplified in (3) and (4):

(3)   I read this book.
(4)   This book reads well.

Prima facie middle constructions such as (4) appear as more constrained forms of (2): syntactically they need an adverbial, and semantically their time reference cannot be specific. More specifically, the middle variant of the alternation exhibits the following two basic characteristics: the agent theta-role is not projected in the syntax, and semantically a middle construction is a generic statement. The syntactic characteristic that the agent theta-role is not projected in syntax is shared by passive constructions (with no agentive *by* phrase) and by ergative constructions such as (2). However, unlike in passive constructions no

morphological change affects the verb of the middle construction, and similarly to what happens in ergative constructions such as (2) the unprojected agent theta-role is not accessible for control:

(5)   a.   *This book sells to shock.
       b.   *This book reads well by everybody.

Semantically, a middle construction is a generic statement, whatever the genericity of the surface structure subject may be – either generic as in (6a), or specific as in (6b):

(6)   a.   Minced food does not freeze well.[1]
       b.   Your new hair dryer stores away neatly.

Consequently the genericity of statements such as that in (6) cannot come from the genericity of the surface subject.

To account for these characteristics crucially involving the interplay between the lexicon and syntax (cf. Levin and Rappaport Hovav 1995), two basic approaches are possible, depending whether the surface form of middles is interpreted as resulting from a syntactic or a presyntactic (i.e., lexical) process. The former type of analysis, which is very similar to that proposed for the derivations of passives or unaccusatives (cf. Burzio 1986, for instance), is developed in Stroik 1992 or in Keyser and Roeper 1984. Obviously, this kind of analysis is far from unexpected, given the similarities between the three constructions. The latter type of analysis is developed in Ackema and Schoorlemmer 1995 or in Fagan 1988, and there it is argued that the unprojected argument is not overtly expressed as the result of some lexical (or presyntactic) principle. In what can be called syntactic analyses, it is suggested (cf. Stroik 1992) that the unprojected argument, which bears the implicit agent theta role, is PRO adjoined to VP. The s-structure of (4) would then be:

(7) $[_{IP}$ This book$_i$ $[_{I'}$ I $[_{VP}$ $[_{VP}$ $[_{V'}$ reads t_i well]] PRO]]]

For Keyser and Roeper, the surface subject is generated as a deep object and then moves to its subject position to receive its case. The motivation for this movement is that if the deep object did not move, this would result in a violation of the Case Filter as it would not be assigned case in its d-structure position.

In what can be called lexical analyses, Fagan (1988) offers counter arguments to Keyser and Roeper's proposal and contends that a syntactic

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1. This example is attested, as are most examples from this point on. This is important insofar as some middle constructions may be unexpected (e.g., (14)) and yet must be accounted for.

derivation of middles is untenable. Ackema and Schoorlammer (1995) offer counter-arguments to Stroik's analysis: one of their most compelling arguments is that of auxiliary selection. According to Perlmutter's analysis, unergative verbs select cognates of *have* and unaccusatives select cognates of *be*. If middles are syntactically derived by movement of the internal NP, this means that by definition middles are unaccusatives, and therefore should select cognates of *be*. Contrary to this expectation, in Dutch they take *hebben* 'have' thereby behaving like unergatives; consequently the subject NP of middles is not moved but is generated as an external argument. This leads them to the conclusion that only "presyntactic analyses of middles are on the right track."

The analysis we want to develop here is definitely of the latter type. We claim that the syntactic mapping of middles follows from the lexical representation provided and from operations on the elements of this representation. We also claim that these representations offer an explanatory account for some phenomena poorly explained in the analyses previously outlined, such as the lexical distribution of verbs exhibiting middle/transitive alternations, and for other empirical data that have been more or less extensively described or have passed unnoticed.

2. Phenomenology

2.1. *The constraints on middle constructions*

Among other long-established facts about middle constructions, the best known is certainly that these constructions are syntactically constrained. One constraint is that the agent theta role is not projected. This is exemplified in (8):

(8)   *This book reads easily by John.

Yet Stroik (1992) argues that in some cases the agent can be syntactically expressed in the guise of a *for* phrase, as in (9):

(9)   a. That book reads quickly for Mary.
      b. No Latin text translates easily for Bill.

Obviously this kind of evidence supports Stroik's syntactic derivation of middle constructions, since here the agent argument seems to be overtly expressed. However, this argumentation does not seem conclusive. First, as Ackema and Schoorlemmer (1995) shows, the construction with the *for* phrase is not productive as indicated by (10) (taken from Fagan 1988).

(10) These books don't sell (??for the average shopkeeper).

Second, it seems obvious to us that what is expressed in the *for* phrase in (9) is not so much an agent role as the opinion or the feelings of a person who is not necessarily the agent of the event identified by the verb. We therefore contend that in middle constructions no agent role can be syntactically expressed.

Middle constructions are also constrained aspectually. From the fact that middle constructions express generic statements, it follows that they normally cannot describe particular events fixed in time. Thus (11a) (taken from Keyser and Roeper 1988) and (11b) are not acceptable.

(11) a. *Yesterday the mayor bribed easily according to the newspapers.
      b. *The major bribes easily at 5 PM.

From this point of view middle constructions behave like stative predicates and consequently cannot occur in the progressive aspect, which shows a strong tendency toward a particular interpretation (Krifka et al. 1995):

(12) a. *The baby is resembling his father.   (stative)
      b. *The manuscript is reading well.   (middle)

Finally, it has long been observed that an adverb (or an adjective in some cases) is necessary for the well-formedness of middle constructions. But this adverbial paradigm is strongly constrained, as (13a) and (13b) show:

(13) a. Neutrogena rinses away completely/easily/well.
      b. *Neutrogena rinses away carefully/professionally/patiently.

This restriction on adverbs also extends to the PP that may appear in middle constructions:

(14) a. It keeps best in an ivory jar/in a mahogany keg.
          (from Lewis Carroll, *The Hunting of the Snark*)
      b. ??It keeps best in winter/in England.

2.2. *The lexical distribution of verbs exhibiting middle constructions*

Two distinct verbal items with identical reference may exhibit different syntactic behavior, one being incompatible and the other being fine with middle constructions. This is the case for *buy* and *sell*, for instance, exemplified in (15) and (16):

(15) *This book/car/garment buys well.
(16) This book/car/garment sells well.

A fortiori we can expect that the same goes for pairs of verbs whose references more or less differ. This is exactly the case for *write* and *read* in (17) and (18):

(17) *This book writes easily/well.
(18) This book reads easily/well.

What this shows is that the factors that can explain such facts are not transparent and cannot be adequately explained with a coarse-grained approach to semantics.

Such apparently idiosyncratic phenomena also appear in the gaps of productivity of middle constructions for a given verbal item which manifests middle/transitive alternations, as (19) and (20) show:

(19) a. He washes this dress.
      b. This dress washes well.

(20) a. The sea washes the white cliffs of Dover.
      b. *The white cliffs of Dover wash well.

This gap in productivity in middle constructions is also displayed in examples (21) to (24):

(21) I read this book.
(22) This book reads easily.
(23) She wants to read my palm.
(24) *My palm reads easily.

Despite these idiosyncrasies, some clear tendencies seem to organize the lexical distribution of verbs undergoing the transitive/middle alternation. A relevant organizational feature of the lexical distribution of these verbs seems to be the degree of lexical specialization of the verbal lexeme. Observe the following pairs of sentences in which both verbs are referentially identical but differ in their degree of lexical specialization:

(25) *This car uses well.
(26) This car handles well.
(27) *Your new hair dryer puts away neatly.
(28) Your new hair dryer stores away neatly.
(29) ??I injure easily.
(30) I bruise easily.

These phenomena seem to be captured by the generalization that the more specialized the verbal item is, the more likely it is to appear in the middle variant of the alternation. Apart from insufficiently specialized verbal items, other verbs

such as *know*, *understand*, *realize*, *give*, *say*, *declare*, and *ask* never occur in middle constructions.

We have seen that an adverb or a PP is required to license a middle construction. It can be observed that in addition to these, negation also licenses middle constructions. With negative middle constructions, the presence of an adverb is no longer necessary. Observe (31), (32), and (33):

(31) I took a self-portrait, but it would not develop.
       (from *The Idler* 5, July–August 1994)
(32) The association broke new ground, but it did not build on the new ground.
       (from D. Thomson, *England in the nineteenth century*)
(33) He tried to tear the program up, but it would not tear.

The presence of negation also allows the middle construction of verbs that otherwise would be ruled out in middle constructions. We already noticed, for instance (cf. (17) and (18)), that *write* (vs. *read*) normally is not allowed in middle constructions. In an appropriate context (here if the speaker is actually writing) however, it does allow middle constructions like in (34):

(34) I am at a sentence that will not write.
       (from Jespersen 1909-1949: III, 16.8).

Why should this be the case? Suffice it to say at this point of our analysis that it is highly instructive to notice that one of the consequences of the presence of negation in a sentence is to add specification to the event structure and to transform any action identified by the verb into a state. In non-formal intuitive terms, not doing something is equivalent to being static. This view is illustrated in (35) and (36):

(35) Today I have been running (for two hours).
(36) *Today I have not been running (for two hours).

It is our belief that any adequate treatment of middle constructions should offer an explanatory account for all the facts outlined here, and we contend that a Generative Lexicon can aptly meet this requirement.

3. A Generative Lexicon

A Generative Lexicon aims at developing underspecified representations which become more fully specified in context (Pustejovsky 1995, Bouillon 1997, Busa 1996, etc.). Instead of enumerating the different senses of the words as in a monomorphic approach, the theory adopts a generative (or semi-polymorphic) point of view (Récanati 1997). The word has a lexical sense that

can be manipulated by a set of generative devices which derive an infinite number of senses in context.

The lexical sense consists of a set of predicates which define the word. As the predicates are typed, the lexical sense can be seen as a kind of *reserve of types* which allows for different interpretive strategies. Its description involves three orthogonal levels of representation, as shown in (37): the argument structure (ARGSTR), the event structure (EVENTSTR), and the qualia structure (QUALIA):

$$
(37) \begin{bmatrix} \alpha \\ \text{ARGSTR} = \begin{bmatrix} \text{ARG1} = \dots \\ \text{D\_ARG1} = \dots \end{bmatrix} \\ \text{EVENTSTR} = \begin{bmatrix} \text{E1} = \dots \\ \text{E2} = \dots \\ \text{RESTR} = \text{temporal relation between events} \\ \text{HEAD} = \text{prominence relation} \end{bmatrix} \\ \text{QUALIA} = \begin{bmatrix} \alpha\text{-lcp} \\ \text{FORMAL} = \dots \\ \text{CONST} = \dots \\ \text{TELIC} = \dots \\ \text{AGENTIVE} = \dots \end{bmatrix} \end{bmatrix}
$$

The same levels of semantic description are involved in the representation of all major syntactic categories. For verbs, the list of arguments distinguishes between obligatory arguments (ARG1), which must be syntactically realized, and default arguments (D_ARG1), which can be optionally realized in syntax. The event structure describes the subeventual structure of the event (state, process, or transition) denoted by the verb, i.e., the different events which are involved in its semantics, their temporal relation (RESTR), and their relative prominence (HEAD). Finally, the qualia structure links arguments and events together and defines their role in the lexical semantics of the word.

The four qualia roles are interpreted features that provide the basic vocabulary for lexical description and determine the structuring or clustering of the information associated with a given lexical item (Pustejovsky 1995, Bouillon 1997, Busa 1996, Busa et al. 2001). They correspond to the four Aristotelian modes of explanation. The FORMAL role is the identity function, which provides the most general information about the type of the entity being defined: it links the entity to its broader semantic class, such as process for a verb like *use* or the resulting state for complex event structures representing transitions. The CONST(ITUTIVE) role provides the internal constitution of the event. The TELIC role expresses the purpose for carrying an event. It is interpreted as a modal operator and it is not required to take place. A typical example of TELIC for

verbs is the event denoted by the complement of *attendre* 'wait' in *j'attends pour partir* 'I'm waiting to leave' (Bouillon and Busa 2001). Conversely, the AGENTIVE expresses the mode of coming of an event: it is interpreted as the existential quantifier, since the occurrence of the event it expresses is a precondition for every other property of the entity. For example, it will encode the action that causes the resulting state for transitions.

In this way, the qualia structure makes explicit two kinds of information necessary to explain the behavior of the items:

1. It defines the semantic type denoted by the word – simple or complex (Pustejovsky 1998a, 1998b). Some words like *use* are defined by simple types. Their semantics only say that they are processes. Most verbs, however, cannot be represented by simple types. *Sink*, for example, is a causative verb. It has different facets and is defined by the conjunction of two basic events in ordered overlap (38): the initial act of sinking an object, defined in the AGENTIVE role, and its resulting state, described in the FORMAL role: the state of the object being sunk. None of them are prominent as indicated in the head attribute (Pustejovsky 1995):

$$(38) \begin{bmatrix} \textbf{sink} \\ \text{ARGSTR} = \begin{bmatrix} \text{ARG1} = x{:}\text{ind} \\ \text{ARG2} = y{:}\text{ind} \end{bmatrix} \\ \text{EVENTSTR} = \begin{bmatrix} \text{E1} = e_1{:}\text{process} \\ \text{E2} = e_2{:}\text{state} \\ \text{RESTR} = <_\alpha \\ \text{HEAD} = e_1, e_2 \end{bmatrix} \\ \text{QUALIA} = \begin{bmatrix} \text{causative-lcp} \\ \text{FORMAL} = \text{sink\_result}(e_2, y) \\ \text{AGENTIVE} = \text{sink\_act}(e_1, x, y) \end{bmatrix} \end{bmatrix}$$

2. Reciprocally, the semantic type explains the syntactic behavior (or grammaticality) of the item. As *sink* involves two different sub-events (that can both be headed) in its semantics, both of them are therefore projectable at the syntactic level. The mapping principles are as follows: only an element that is headed can be projected in syntax. The projection of an unheaded element is shadowed. These principles give rise to the transitive/inchoative alternation illustrated in (1) and (2) in the way described in (39):

(39) a. Q_{formal}: shadowed
          $Q_{agentive}$: sink_act(e_1*,x,y) → x:subject, y:object
          ⇒ the enemy sank the boat

      b. Q_{formal}: sink_result(e_2*,y) → y:subject
          $Q_{agentive}$: shadowed
          ⇒ the boat sank

In (39a), the agentive is headed (as indicated by the asterisk) and the template SINK_ACT(E_1*,X,Y) is projected; in (39b) the formal is headed and it is the template SINK_RESULT(E_2*,Y) that is saturated at the syntactic level. On the contrary, *use* – being a simple type with no binary event structure – can only appear as a transitive verb.

In the following section, we want to show how this expressive power of the qualia-based components previously defined, together with three essential constraints, offer an explanation for syntactic and semantic characteristics of middle constructions.
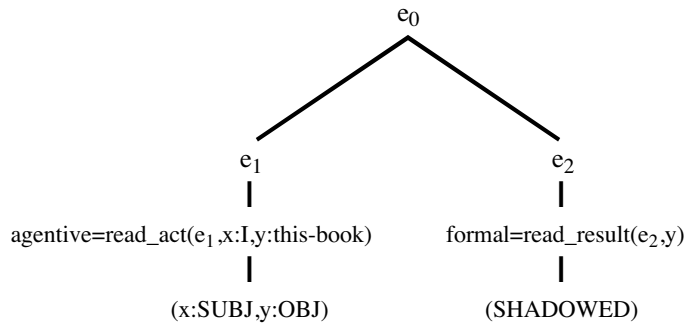
4. Transitive/middle constructions in a Generative Lexicon

In a Generative Lexicon, the syntactic behavior of a word derives from its qualia structure. Here we consider that the polymorphism of verbs showing the middle/transitive alternation can be accounted for by their complex semantic type. The lexical structure of these verbs displays an event structure like (40) with two sub-events: a prominent event encoded as the agentive (e_1) and a resultative state encoded as the formal (e_2):

(40)

e_0 branches into e_1 and e_2; agentive=??_act(e_1,x,y) and formal=??_result(e_2,y)
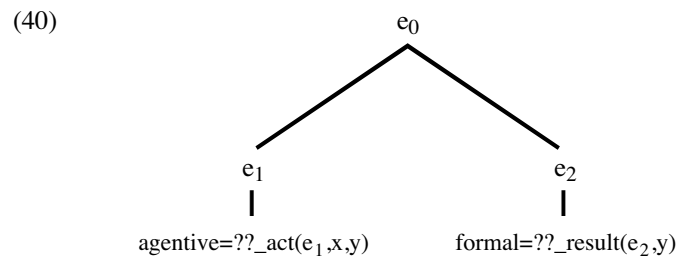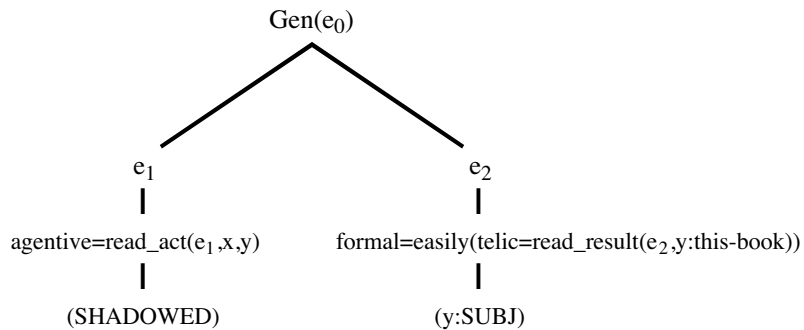
The fact that this structure is a complex one allows two different syntactic projections (provided some conditions are met): the transitive variant of the alternation is the lexically-driven projection of the initial sub-event, whereas the middle variant of the alternation is a forced projection of the final resultative state of this structure (hence the constraints on the middle). This is exemplified in (41) and (42) for *I read this book* and *this book reads easily* respectively.

(41) e_0

e_1 e_2

agentive=read_act(e_1,x:I,y:this-book)   formal=read_result(e_2,y)

(x:SUBJ,y:OBJ)   (SHADOWED)

(42)   Gen(e_0)

e_1 e_2

agentive=read_act(e_1,x,y)   formal=easily(telic=read_result(e_2,y:this-book))

(SHADOWED)   (y:SUBJ)

In the second structure, which is the representation of the middle construction, the generic quantification of the event denoted by the sentence (e_0) is indicated by the GEN operator (in the sense of Chierchia 1995). It is introduced in the lexical structure by the modifier which saturates the formal role and introduces a position which is bound to telic genericity. Here, for example, *easily* embeds the resulting state in the telic role. (42) can be glossed as 'whenever someone reads the book it is easily read.'

The essential conditions for the projection of a middle structure are the following: (1) the transitive verb must be an accomplishment; (2) the final state or change of state must be syntactically determined in order to allow a shift on the head on the sub-event; and (3) the modifier must introduce a position which is bound to telic genericity, so as to be compatible with the generic interpretation of the event denoted by the verb of the middle construction. These conditions will be examined now.

4.1. Accomplishments

Only verbs with the correct event structure (cf. (40)) can display the transitive/middle alternation: they must have a left-headed event structure on the initial process and a resultative state such as those illustrated in (43) (with subclassification taken from Dowty 1979: 69).

(43) a. I drive this car. → This car drives well.
           (transitive verb with extent NP)

      b. I tan Peter's leather. → Peter's leather tans well.
           (transitive change of state)

      c. I hammer this metal flat. → This metal hammers flat.
           (factitive)

Therefore, states (44a) and processes (44b,c) will not display the transitive/middle alternation as by definition the verbs belonging to these sub-classes do not have a complex event structure.

(44) a. I know Latin. → *Latin knows well.
      b. I use the car. → *The car uses easily.
      c. The sea washes the cliff. → *The cliff washes well.   (see (20))

States such as *know* do not have a complex event structure and do not refer to an agentive as they are not artefactual (created). They are therefore encoded in the formal, as shown in (45):

(45) $\begin{bmatrix} \textbf{know} \\ \text{ARGSTR} = \begin{bmatrix} \text{ARG1} = \text{x:ind} \\ \text{ARG2} = \text{y:ind} \end{bmatrix} \\ \text{EVENTSTR} = \begin{bmatrix} \text{E1} = e_1\text{:state} \end{bmatrix} \\ \text{QUALIA} = \begin{bmatrix} \text{state-lcp} \\ \text{FORMAL} = \text{know}(e_1,x,y) \end{bmatrix} \end{bmatrix}$

Mutatis mutandis, the same goes for processes like *use* that do not refer to a result event. For that reason, processes have no agentive and are encoded in the formal:

(46) $\begin{bmatrix} \textbf{use} \\ \text{ARGSTR} = \begin{bmatrix} \text{ARG1} = \text{x:ind} \\ \text{ARG2} = \text{y:ind} \end{bmatrix} \\ \text{EVENTSTR} = \begin{bmatrix} \text{E1} = e_1\text{:process} \end{bmatrix} \\ \text{QUALIA} = \begin{bmatrix} \text{process-lcp} \\ \text{FORMAL} = \text{use}(e_1,x,y) \end{bmatrix} \end{bmatrix}$

Similarly, and contrary to what happens in (19), *wash* in (44c) is ruled out of the middle construction because here it is an activity. In French this opposition is associated with two distinct verbal lexemes: the equivalent for *wash* in (19a) is *laver* whereas in (44c) the equivalent is *baigner*.

Achievements such as (47) are also excluded from middle constructions:

(47) a. I reach the summit → *the summit reaches easily
      b. I buy this book → *this book buys well   (see (15))

Achievements share a characteristic with accomplishments as both have a complex event structure with two sub-events: process and state. Yet they differ from accomplishments in the heading of the sub-event: whereas accomplishments are headed on the initial process sub-event, achievements are headed on the final state sub-event (as shown by the attribute HEAD in the qualia structure). Consequently, the representation of an achievement like *reach* is as follows:

(48)
$$
\begin{bmatrix}
\textbf{reach} \\
\text{ARGSTR} = \begin{bmatrix} \text{ARG1} = \text{x:ind} \\ \text{ARG2} = \text{y:ind} \end{bmatrix} \\
\text{EVENTSTR} = \begin{bmatrix} \text{E1} = e_1\text{:process} \\ \text{E2} = e_2\text{:state} \\ \text{RESTR} = <_\alpha \\ \text{HEAD} = e_2 \end{bmatrix} \\
\text{QUALIA} = \begin{bmatrix} \text{achievement-lcp} \\ \text{FORMAL} = \text{at}(e_2,x,y) \\ \text{AGENTIVE} = \text{reach\_act}(e_1,x,y) \end{bmatrix}
\end{bmatrix}
$$

It appears, then, that verbs can be excluded from the set of candidates for the middle alternations for two reasons: either they do not display the right event structure, or if they do, they are not headed on the right sub-event.

4.2. *The presence of a modifier*

As they have a left-headed event structure, verbs showing the transitive/ middle alternation should not normally be projected via the resultative state. The projection of the final state of a binary event structure is then possible only if it is explicitly specified by the context: this is achieved by the presence of an adverb as in (49a) that indicates how the resulting state has been achieved, of a PP as in (49b) which saturates one of the arguments of the state, an adjective (49c), or even by a negation whose function is to specify that the resulting state cannot be reached as in (49d):
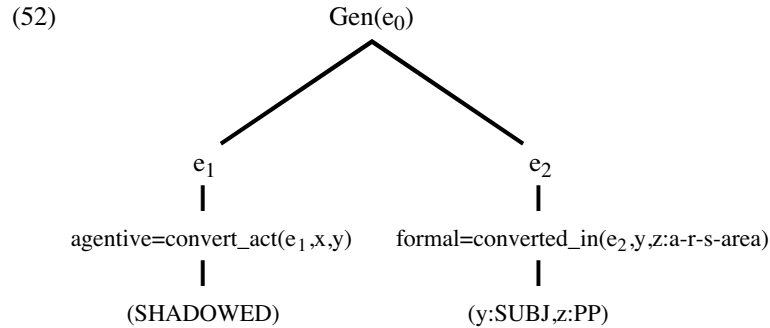
(49) a. I read this book. → This book reads easily.
      b. I convert this interior. → This interior converts into a roomy seating area.
      c. I hammer the metal. → This metal hammers flat.
      d. I read this book. → This book does not read.

For example, in (49b) we can distinguish the following two steps in the derivation of the middle: the verb *convert* is an accomplishment with the correct left-headed structure for the transitive/middle alternation. Basically, it has the following structure, with a default (facultative) argument z that indicates how y is converted:

(50)
$$
\begin{bmatrix}
\textbf{convert} \\
\text{ARGSTR} = \begin{bmatrix} \text{ARG1} = x{:}ind \\ \text{ARG2} = y{:}ind \\ \text{D\_ARG1} = z{:}ind \end{bmatrix} \\
\text{EVENTSTR} = \begin{bmatrix} \text{E1} = e_1{:}process \\ \text{E2} = e_2{:}state \\ \text{RESTR} = <_\alpha \\ \text{HEAD} = e_1 \end{bmatrix} \\
\text{QUALIA} = \begin{bmatrix} \text{transition-lcp} \\ \text{FORMAL} = converted\_in(e_2,y,z) \\ \text{AGENTIVE} = convert\_act(e_1,x,y) \end{bmatrix}
\end{bmatrix}
$$

As the PP *into a roomy seating area* indicates the result of a change, it can co-compose with the structure of the verb as in (51). In that way, it saturates the default argument of the verb and makes the state explicit and projectable, as in (52).

(51)
$$
\begin{bmatrix}
\textbf{convert into a roomy seating area} \\
\text{ARGSTR} = \begin{bmatrix} \text{ARG1} = x{:}ind \\ \text{ARG2} = y{:}ind \\ \text{D\_ARG1} = z{:}ind \end{bmatrix} \\
\text{EVENTSTR} = \begin{bmatrix} \text{E1} = e_1{:}process \\ \text{E2} = e_2{:}state \\ \text{RESTR} = <_\alpha \\ \text{HEAD} = e_1,e_2 \end{bmatrix} \\
\text{QUALIA} = \begin{bmatrix} \text{transition-lcp} \\ \text{FORMAL} = converted\_in(e_2,y,z{:}a\text{-}r\text{-}s\text{-}area) \\ \text{AGENTIVE} = convert\_act(e_1,x,y) \end{bmatrix}
\end{bmatrix}
$$

(52) $\text{Gen}(e_0)$

e_1 e_2

agentive=convert_act(e_1,x,y) formal=converted_in$(e_2,y,z\text{:a-r-s-area})$

(SHADOWED)   (y:SUBJ,z:PP)

Our interpretation of the middle construction is then the following: it is a projection of the final state made possible only by the forced shift of the head from the initial sub-event to the final state. It is the function of the modifier to force this shift.

4.3. Binding to telic genericity

Together with the previous conditions on event structure and the presence of a modifier, a third constraint concerns genericity: when specifying the formal role, the modifier must also add a binding to the telic role, so as to be compatible with the generic interpretation of the middle. To make this notion clear, observe first that the following sentence is not correct:

(53) *This room converts into an area.

This is explained by the fact that one converts something in order to use it in some way, for example for seating or for sleeping. A more complete representation of *convert into a seating area* would then be:

(54) ⎡ **convert into a seating area**   ⎤
     ⎢   ⎡ transition-lcp   ⎤ ⎥
     ⎢   ⎢ FORMAL = converted_in$(e_2,y,z\text{:area})$ ⎥ ⎥
     ⎢ QUALIA =   ⎢ TELIC = TELIC(z) = SEATING   ⎥ ⎥
     ⎣   ⎣ AGENTIVE = converted_act$(e_1,w\text{:ind},y\text{:room})$ ⎦ ⎦

In this revised representation of (50), the formal contains a pointer to the telic: the room is converted for seating in it. The predicate in the formal is then naturally bound to telic genericity and it is this information that makes the middle possible. The same goes for the other sentences in (49). In (49a), it is the adverb *easily* that embeds the contents of the formal role in the telic role, as represented in (55):

(55) $\left[\begin{array}{l}\textbf{this book reads easily}\\[2pt]\text{QUALIA} = \left[\begin{array}{l}\text{transition-lcp}\\\text{FORMAL} = \text{easy}([1])\\\text{TELIC} = [1] = \text{read\_result}(e_2,y)\\\text{AGENTIVE} = \text{read\_act}(e_1,w{:}\text{ind},y{:}\text{this-book})\end{array}\right]\end{array}\right]$

This is similar to (49d), where the negation indicates that the resulting state has not been reached:

(56) $\left[\begin{array}{l}\textbf{this book does not read}\\[2pt]\text{QUALIA} = \left[\begin{array}{l}\text{transition-lcp}\\\text{FORMAL} = \neg\ [1]\\\text{TELIC} = [1] = \text{read\_result}(e_2,y)\\\text{AGENTIVE} = \text{read\_act}(e_1,w{:}\text{ind},y{:}\text{this-book})\end{array}\right]\end{array}\right]$

The last constraint is then that the formal must have a position which is bound to telic genericity. For singular definite nouns like *this book*, this is only possible if the following condition is met: the main predication of the sentence must refer to a telic (generic) property of the subject noun. In (49b), for example, the verb *read* refers to a telic (generic) property of the subject noun. Hence (49b) is acceptable, as *read* is encoded as the telic role of *book*[2] and consequently is generically quantified, and (57) is ungrammatical (at least when the context is not extremely specified):

(57) ?*This book writes well.   (see (17))

In (57), *write* is encoded as the agentive role of *book* and it describes the event that brings it into existence. By definition this event of creation cannot be repeated for this particular book, hence the unacceptable character of (57). The same goes for the following examples where *compose*, *produce*, *build*, and *bake*

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2. The qualia structure for *book* is given below with its logical interpretation (Pustejovsky 1995, 1998b):

$\left[\begin{array}{l}\textbf{book}\\[2pt]\text{ARGSTR} = \left[\begin{array}{l}\text{ARG1} = y{:}\text{info}\\\text{ARG2} = x{:}\text{physobj}\end{array}\right]\\[2pt]\text{QUALIA} = \left[\begin{array}{l}\text{info-physobj}\\\text{FORMAL} = \text{hold}(x,y)\\\text{TELIC} = \text{read}(e,w,x.y)\\\text{AGENTIVE} = \text{write}(e,v,x.y)\end{array}\right]\end{array}\right]$

$\lambda x,y[book(x{:}\text{physobj}.y{:}\text{info}) \wedge hold(x,y) \wedge \lambda w\lambda e[read(e,w,x.y)] \wedge \exists e'\exists v[write(e',v,x.y)]]$

all express the event that brought the object denoted by the subject NP into existence:

(58) a. ?*This sonata composes easily/well.
      b. ?*This honey produces easily/well.
      c. ?*This computer builds easily/well.
      d. ?*This cake bakes easily/well.

   As a rule, the telic role expresses a characteristic which is widespread and stable in a given culture. Yet it can sometimes be built through the context in a particular situation for a particular speaker. Consequently a verb which normally does not express the telic role of an object can sometimes actually be interpreted as a telic in a very specialized context such as in (59) (cf. (33)):

(59) He tried to tear the program up, but it would not tear.

In this example, the first part of the sentence explicitly builds the telic role which can subsequently be negated. Here, as previously stated, the function of the negation is to force a shift of the head from the initial sub-event to the final resultative state, thereby allowing the projection of this state under the form of the middle construction.

5. Predictive power of our analysis

5.1. Modification of the sub-events

   If the analysis we suggest here is on the right track, only the projected sub-event – here the final state – should be accessible to modification (Pustejovsky 1995), the initial process being shadowed. This is exactly the case and agent-oriented adverbs are forbidden as (13b), here repeated as (60), shows. Control infinitives are also forbidden, as already noticed in (5b).

(60) *Neutrogena rinses away carefully/professionally/patiently.

We could also expect process modifier adverbs like *quickly* to be excluded. Yet examples such as (61) are fine.

(61) This book sells quickly.

However, it should be noted that here the adverb is not so much a modifier of the initial process of *selling* as an indication of the duration of the entire event, thereby behaving as a wide scope modifier that takes scope over the entire transition (cf. Pustejovsky 1992: 71).
   Other instances of such phenomena are exemplified in (62a), in which the PP bears not on the initial process of transformation (which could be possible in

the transitive variant given in (62b)) but on the resulting state, in this case the state of the space having been converted into a conference area.

(62) a. This space converts into a conference area for four hours (only).
b. I have converted this space into a conference area for four hours.

Note that this is the default interpretation for achievements as in (63) where the PP refers to the final state (the possession of the books) and not to the initial process (sending the book).

(63) The company sent John the book for 10 days.

5.2. *Cross-linguistic variation*

We have analyzed the middle construction as the projection of the resultative final sub-event which is the forced head of the event structure (cf. (40)). Insofar as they also display the right-headed event structure (although in this case the head is not forced on the final state but is there by definition) achievements should then potentially accept middle constructions. This is exactly what happens in French (64) in which the equivalent for (47) is fine:

(64) Ce sommet s'atteint facilement.

We suggest that this phenomenon could be accounted for if we accept Nishida's hypothesis (Nishida 1991), according to which the Spanish *se* in transitive constructions can be interpreted as an aspectual marker of the generic quantification of the event identified by the verb. This claim is borne out by the following pair:

(65) a. *El mago se sacaba un conejo del bolsillo cuando lo vi.
'The magician was pulling out one rabbit from his pocket when I saw him.'

b. El mago se sacaba un conejo del bolsillo cada vez que hacia el truco.
'The magician would pull out one rabbit every time he did the trick.'

In (65b) it is the presence of *se* that licenses the generic interpretation; hence the ungrammaticality of (65a). Thus there should be no ambiguity with achievements in French because, due to the presence of *se* (or here *s'*), the reading of (64) is unambiguously generic. Contrary to this, in English where no construction with a clitic like *se* is available, other constructions such as an adjectival construction must be used to convey the generic reading:

(66) This summit is easy to reach.

6. Conclusion

We have shown that both syntactic and semantic relevant characteristics of middle constructions can be readily accounted for, provided that verbal items exhibiting the middle/transitive constructions are accomplishments, whose internal event structure is headed on the initial sub-event. Hence the exclusion of the class of stative verbs (such as *know*) and achievement verbs (such as *reach*).

The shift of head from the initial to the final sub-event allows the projection of the final state, and consequently allow middle constructions. The syntactic and semantic constraints on middle constructions can be interpreted as a reflex connected with this shift of head. Conversely, insofar as the transitive variant of the alternation is a lexically-driven projection of the headed initial sub-event, it is not constrained.

To license this shift of head, there must be an adverbial modifier (the constraints on this adverbial paradigm result from the event structure of middle verbs) or negation. In each case, the function of this syntactic element is to specify the final state and to create a position subsequently bound to the telic role, thereby accounting for the generic reading of middle constructions. Moreover, the major predication of middle constructions must represent the telic role of the subject noun, as only the telic role can be generically quantified and therefore express a generic property of an object. Conversely, the agentive being existentially quantified, as a rule verbs representing the agentive of the subject are ruled out. Our analysis accounts for speaker-oriented variations of acceptability of middle constructions such as those in (59) or (33–34). It also predicts that cross-linguistic variations may be possible, especially regarding achievement verbs (for instance in French), which have the right event structure and consequently should be potential candidates for the middle/transitive alternation.

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Questions for authors:

1. For the citations in examples 14, 31, and 32, these should be full references as is done in (34). We'll need the full references for each, and page numbers for the citations in the text. I'm not sure that a citation is needed for an example like (14), however, where it's adapted from the original. It's up to you.

In example (14), the original is "keeps best" rather than just "keeps", so "best" should be included in the example. In (14b), I'd suggest something other than

"in winter": I think you'd find that many people would accept a sentence like "Milk keeps best in winter".

2. We've changed the title of the first section to start with "Introduction" to keep it consistent with the other papers in this book. Would you prefer it be simply "Introduction" instead of "Introduction: Current approaches"?