Telicity makes or breaks verb serialization

Kazuhiko Fukushima
Kansai Gaidai University
kaz.zisin@gmail.com

1. Introduction: Lexical V-V compounds and telicity

Lexical V-V compounds have attracted much theoretical attention (inter alia, Kageyama 1993; Matsumoto 1996; Nishiyama 1998; Himeno 1999; Fukushima 2005/2007; Yumoto 2005). However, much research addresses the matters of "argument-synthesis", i.e. how arguments of component verbs are/are not inherited or realized in the argument structure of the compound. Some non-exhaustive examples of such compounds are given in (1) reflecting a descriptive type classification such as cause, manner, etc. [1] For example, the subject arguments of *odor* 'dance' and *tukare* 'get.tired' are matched and inherited as the subject argument of the compound *odori-tukar* in (1a).

(Im)possible patterns of argument-synthesis have been identified and have given accounts of various sorts which are not reviewed here.[2] Anticipating the exposition below, I indicate the aspectual types of component verbs in the examples here and below. A standard telicity test (cf. Vendler 1967 and Dowty 1979), like using duration expressions like *itizikan* 'for an hour' and *itizikan-de* 'in an hour' suffices to determine (unmarked) telicity of verbs. For example, the adverbs give different results regarding telicity: *itizikan/*itizikan-de odor* 'dance for an hour/in an hour' or *itizikan-de/*itizikan tukare* 'become tired in an hour/for an hour'. Also, simply "telicity" is employed here due to (i) stative and activity being atelic and (ii) achievement and accomplishment being telic. Actually, the absence of an incremental theme (or VP, a crucial factor for accomplishment), which is unavailable for lexical word-formation, renders accomplishment rather irrelevant to lexical word formation (see note 5).[3]

(1)   a.   Cause/resultative compounds:
          Hanako-ga   odori-tukare-ta. (atelic-telic)
          Hanako-NOM   dance-get.tired-PAST
          'Hanako got tired from dancing.'
          obore-sin 'drown(telic)-die(telic), i.e. die from drowning',
          sini-tae 'die(telic)-get.extinct(telic), i.e. become extinct by dying', etc.

      b.   Manner compounds:
          Ziroo-ga   gohan-o   tabe-nokosi-ta. (atelic-telic)
          Ziroo-NOM   rice-ACC eat-leave-PAST
          'Ziroo left rice after eating (some).'
          koroge-oti 'roll(atelic)-fall.down(telic), i.e. fall down rolling',
          taore-kakar 'fall(telic)-cover(telic), i.e. cover (something) by falling onto (it)', etc.

      c.   Coordinating (dvandva) compounds:
          Taroo-ga   naki-saken-da. (atelic-atelic)
          Taroo-NOM   cry-scream-PAST
          'Taroo cried and screamed.'

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[1] The type-classification here, though convenient for illustration, is not directly relevant to this paper, since the aspectual properties of the component verbs are the central concern.
[2] For the intricacies of the compounds and theoretical issues arising from them, see the sources cited above.
[3] The lexical (as opposed to syntactic) nature of "lexical" V-V compounds is demonstrated by Kageyama (1993).

hikari-kagayak 'shine(atelic)-glitter(atelic), i.e. shine and glitter',
itari-tuk 'reach(telic)-arrive(telic), i.e. arrive-reach', etc.

Adapting the assumptions of the Optimality Theory, Fukushima (2007) investigates the productivity of such compounds, but the perspective is argument-centered as well.

Compared with the situation above, the contribution of the aspectual (telicity) or the temporal properties of the component verbs has received rather sporadic attention. In this connection, a classic temporal account of V-V compounds in Chinese and Japanese is found in Li (1996). Additionally, there have been several observations and accounts focusing on telicity/temporal properties like Matsumoto (1996), Hasegawa (2000), Yumoto (2005), and Asao (2007) (see below for additional remarks on these predecessors). This paper is another contribution to the exploration of the role of telicity of V_1 and V_2 in lexical V-V compound formation. In particular, (i) it investigates (im)possible V_1-V_2 combinations by looking at the aspectual properties of component verbs, (ii) it shows that V_1 cannot be telic (achievement/accomplishment) *unless* V_2 is also telic (given that V_2 is the head); any other patterns are possible: i.e. atelic-atelic, atelic-telic, telic-telic, and (iii) (im)possible aspectual combinations are shown to be a consequence of aspectual composition for V-V compounds based on the classification of verbal telicity by Dowty (1986).

2. Telic verbs as spoilers

What is described here regarding the aspectual properties of V_1 and V_2 should be considered to be an additional necessary condition for lexical V_1-V_2 compound formation. In that sense, other constraints, such as proper argument-synthesis in particular, have to be satisfied independently. Accordingly, examples employed in this paper are constructed by observing these non-aspectual constraints noted by researchers mentioned above.

The current observation is simple and straightforward: telic V_1 (non-head) is an unacceptable component (i.e. a "spoiler") as long as V_2 (head) fails to be telic as (2) demonstrates.

(2) a. **Taroo-ga   terebi-o   naosi-tukat-ta.*
        Taroo-NOM TV-ACC repair(telic)-use(atelic)-PAST
        '(Int.) Taroo repaired and (then) used a TV.' or
        '(Int.) Taroo used a TV by repairing it.'
     b. **hiroge-ur* 'spread(telic)-sell(atelic), (Int.) sell after spreading (merchandise) or sell by spreading (merchandise)'
     c. **koware-nokor* 'break(telic)-remain(atelic), (Int.) remain after going out of order'
     d. **taosi-fum* 'knock.down(telic)-step.on(atelic), (Int.) step on after knocking (something) down' or '(Int.) step on by knocking (something) down', etc.

All the examples here involve telic verbs as V_1 and atelic verbs as V_2. Actually, excluding instances where component verbs are used non-literally/figuratively, in 1157 examples of V-V compounds in Tagashira and Hoff (1986), there is one potential counter-example, namely, *kati-hokoru* 'win-boast'. Though there are a few more apparent/potential counter-examples to be mentioned below, the generalization seems to be solid, demanding an explanation as to why it holds. It is interesting to note that a contraposition version of (2d), *fumi-taos* 'step.on(atelic)-knock.down(telic)', turns out to be an actual/legitimate compound, suggesting that argument-synthesis –since two semantically identical verbs are involved– is simply one of the factors (i.e. a necessary but not sufficient condition) determining the outcome.

We also note, as shown in (3) for example, that there is no intrinsic inconsistency in the combination of *naos* and *tukaw* or *hiroge* and *ur* with the former (temporally) preceding the latter and being construed as a (temporally preceding) factor/manner for the action indicated by the latter.

(3) a. *Taroo-ga   terebi-o   [naosi sosite tukat-ta]*.
Taroo-NOM TV-ACC   repair CONJ use-PAST
'Taroo repaired and used a TV.'
    b. *Taroo-ga   syoohin-o   [hiroge sosite ut-ta]*.
Taroo-NOM   merchandise-ACC   spread CONJ sell-PAST
'Taroo spread and sold merchandise.'

3. A proposal to capture the telicity restriction: a compositional approach

Given the empirical exposition and generalization offered above, let me outline the current account of the role of telicity found in lexical V-V compound formation.

3.1 Assumptions and aspectual composition

The account proposed here follows the aspectual characterization of predicates (verbs) due to Dowty (1986) given in (4):[4]

(4) a. A predicate is stative (atelic) iff it follows from the truth of a sentence ϕ to which the predicate gives rise to is true at an interval *I* that ϕ is true at all subintervals of *I*.
    b. A predicate is activity (atelic) iff it follows from the truth of a sentence ϕ to which the predicate gives rise to is true at an interval *I* that ϕ is true at all subintervals of *I* down to a certain limit in size.
    c. A predicate is achievement/accomplishment (telic) iff it follows from the truth of a sentence ϕ to which the predicate gives rise to is true at an interval *I* that ϕ is false at all subintervals of *I*.

According to (4a,b) both statives and activities can have subevents that can also be classified as stative and activity (both atelic), respectively. For the latter, the size of such subevents has to satisfy a certain size limit. For example, just lifting one leg slightly may not qualify as the act of walking. Basically, for example, we can "chop up" the state of knowing one's own name and still have a state where he/she knows his/her own name. Or an activity of swimming for five minutes qualifies as a subevent of swimming for 10 minutes and the latter of swimming for one hour, etc.

Due to (4c), the same story is inapplicable to achievement and accomplishment (both telic) –these do not have proper subevents. For example, there is no subevent of dying or arriving somewhere. One could have been involved in a sub-process (like pounding nails and sawing, i.e. activity) of building a house but that does not automatically mean that one completed an event of building a house. While the fact that someone was building a house for five days does not entail that a house was built, the fact that someone was swimming for an hour does entail that swimming indeed took place.

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[4] Dowty originally classifies sentences as stative, activity, achievement, and accomplishment types. His definitions are adapted here for defining predicates instead. Though formalization of the proposal is possible along the lines of the algebra of events framework of Bach (1986) and Krifka (1998) –both of which draw heavily on Link's (1983) mereological approach in the nominal domain– or Filip (2008) for that matter, I am not going to pursue such a direction in this paper.

Based on the aspectual properties of predicates above, I propose the following:

(5) a. A V-V compound represents a single event belonging to a single aspectual type with subevents attributed to V_1 and V_2.

  b. When V_1 and V_2 differ in telicity, either (i) or (ii) holds. (i) If the head (usually V_2) is telic, a termination-point (distinct from an inception-point) is imposed on the interpretation of the non-head (usually V_1). Or (ii) if the head is atelic, the truth-at-all-subintervals requirement is imposed on the interpretation of the non-head.

  c. Otherwise, the aspectual type the whole compound is identical to those of V_1 and V_2.

Some remarks are due regarding (5). First, while the term "aspectual type" encompasses telic and atelic, the former is a category with some width. According to Krifka (1998), telic predicates are either "quantized" ("strongly" telic, so to speak) or just telic ("weakly" telic). Quantized predicates are telic and have no proper sub-part other than itself. For example, *die* is a predicate with no proper sub-part (e.g. no proper sub-part of it counts as dying). In contrast, atelic *run* (being "cumulative" and not quantized) comes with proper sub-parts (e.g. two instances of running together count as running). *Run* is atelic but can be rendered telic by, for example, adding *for an hour* (see Krifka's proof to this effect). Thus an atelic predicate like *run* is compatible with both atelic and telic readings. The introduction of a termination-point (distinct from an inception-point) in (5b-(i)) captures the weaker notion of telic-ness and the falsity-at-all-subintervals requirement in (5c) above the stronger one.[5]

Second, Japanese is generally morphologically head-final and V-V compounds are no exception. Thus (5) mostly picks V_2 as the determiner of the aspectual property of the whole compound. However, the formulation in (5) is not biased a priori regarding headedness. The reason is that there are some instances where both V_1 and V_2 are the heads (i.e. dvandva compounds) like *naki-sakeb* 'cry-yell'. In some other cases V_2 behaves as if it is a non-head adverbial modifier as in *mi-oros* 'look-lower, i.e. look down' where V_1 is the semantic head (Matsumoto 1996). For the former type, due to (5c), the compound inherits the (identical) telicity of V_1 and V_2. For the latter, V_1 has to be designated as the head for the purpose of aspectual composition.

Third, since the formation of these V-V compounds takes place in the lexicon (see note 3), the process depends on the kind and amount of lexical information available to the lexical process. For example, as mentioned above in connection with the distinction between achievements and accomplishments, the latter requires a VP with an incremental theme to qualify as such. But such information is not available for lexical word formation –no structure like VP is available yet. To accommodate this situation, we proceed in the following way: we apply the traditional telicity tests (like the one mentioned at the onset of this paper) and criteria like (4) to verbs and determine their "basic" telicity. Given the possibility that some verbs can eventually be construed as accomplishment, it may be necessary to appeal to a post-lexical semantic adjustment in some cases. For example, when forming a VP with an incremental theme, *tabe* 'eat' (basically activity) is quantized (i.e. turned accomplishment) in *hitotu-no ringo-o tabe* 'eat an apple'.

According to (5), there are two cases to consider: when the telicity of the respective component verbs is different, and when it is identical. In the latter case, the whole compound simply inherits the telicity of the components as mentioned above in (5c) –a situation that is expected and hardly remarkable. On the other hand, if we encountered a literal dvandva V-V

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[5] Filip (2008) goes farther and claims that "accomplishment" verbs are atelic lexically. They qualify as telic only when their incremental theme arguments are present (in a VP).

compound with different telicity from that shared between V_1 and V_2, that would be truly surprising.

The strength of (5) is (b-i) and (b-ii) covering the second case above. When the head is telic (b-i), the non-head is interpreted as having a termination point, i.e. treated as giving rise to a culminating (telic) event. This does not go against (4a,b), since both state and activity qualify as state and activity, respectively, even when they are terminated at one point or another (recall Krifka's conception of a "weakly" telic predicate). In contrast, when the head is atelic (b-ii), the non-head must be interpreted as satisfying (4a,b) but that goes against (4c) due to the fact that there is no subinterval where "strongly" telic (quantized) predicates can qualify as such.

3.2 Demonstration

Some well-/ill-formed V-V compounds are repeated in (6).

(6) a. Matching telicity:
       obore-sin (1a) 'drown(telic)-die(telic), i.e. die from drowning'
       hikari-kagayak (1c) 'shine(atelic)-glitter(atelic), i.e. shine and glitter'
     b. Atelic-telic combination:
       odori-tukare (1a) 'dance(atelic→telic)-get.tired(telic)'
       tabe-nokos (1b) 'eat(atelic→telic)-leave(telic), i.e. leave (food) after eating'
     c. Telic-atelic combination:
       *naosi-tukaw (2a) 'repair(*telic→atelic)-use(atelic), (Int.) use after/by repairing'
       *koware-nokor (2c) 'break(*telic→atelic)-remain(atelic), (Int.) remain after having been broken'

The ones in (6a) are those with V_1 and V_2 matching in terms of telicity. They pose no problem due to (5c). Those in (6b) are just fine as well. For example, for *odori-tukarer*, according to (5b-(i)), a termination point is imposed on the verb *odor* (activity) but the action denoted by this verb can be terminated at some point without going against (4b) (up to a certain limit in size). The same goes for examples like *omoi-itar* 'think-reach' with a stative verb as V_1 and achievement V_2. Now, for those in (6c), the story is a bit different. For instance, since V_2 *tukaw* is atelic, *naos* (telic) in *naosi-tukaw is supposed to be interpreted as having sub-intervals where the action of fixing (of V_1) holds due to (5b-(ii)). But this contradicts the demand of (4c) above.

4. What others have said

In this section we briefly review what other researchers have said about temporal/aspectual combinations of verbs in lexical V-V compounds. I am not commenting on their proposals regarding other dimensions.

In this domain, a classic approach in this domain is found in Li (1993). The concept of "temporal iconicity" is central to his theory about Chinese/Japanese resultative V-V compounds. He claims that the temporal ordering of subevents e_1 and e_2 of e must be directly reflected in the surface linear order of the elements denoting the subevents. As we have seen above, however, this seems too restrictive. Though the account holds up as far as resultative ones like *odori-tukarer* (1a) go, there are other types of V-V compounds where the concept of result is irrelevant. One example is *koroge-oti* (1b) where V_1 is most naturally construed as manner. So it is either Li's account is restricted to resultatives and not having anything to say about the manner type (or others), or the term "resultative" is extended to include manner that

is relevant for bringing about a certain result. If the latter choice is made, the ill-formed examples in (2) would be mysterious. As we know from (3) above, there is nothing wrong about *naos* 'fix' temporally preceding *tukaw* 'use' in *naosi-tukaw.

Another temporal account is found in Matsumoto (1996) where the "coextensiveness condition" is designated as one of the necessary factors in V-V compound formation. The condition states that the main component event (i.e. the one expressed by the head) must be temporally coextensive with (i) the subordinate component's (i.e. non-head's) event itself, or (ii) its result or effect, or (iii) an intention to execute or actualize it. For his account to be viable, first, the notion of "coextensiveness" has to be clarified. Does it mean that for example, two events overlap (completely or partially) or can occur adjacent to each other (with/without any temporal gap in between)? The latter consideration is relevant to examples like *tabe-nokosu* (1b). Second, a precise definition of "an intention to execute or actualize it" has to be offered. Would such an intention need to be expressed by a component verb or can be inferred from other information relevant to the sentence? In any case, conceptual unclarity has to be addressed so that the consequences of the condition can be tested adequately.

Hasegawa (2000) suggests a syntactic account employing the abstract predicate Res (for "result"). This abstract predicate is invisible in English but heads its own projection. It raises and attaches to a verb and creates a resultative counterpart of the verb. In Japanese the predicate is absent as an independent element, but telic verbs function as Res does in English. One such verb is *nob* 'flatten' (intransitive) which is raised and combined with *tataki* 'hit' to render a resultative compound *tataki-nob*. The compound finally combines with *as(ita)* (i.e. a "transitivizer") as in (7b,c) for (7a).

(7) a. *Hanako-ga   kinzoku-o   tataki-nobasi-ta.*
        Hanako-NOM   metal-ACC   hit-flatten-PAST
        'Hanako flattened the metal by hitting it.'
     b. [$_{vP}$ Hanako [$_{v'}$ [$_{VP}$ kinzoku-o [$_{V'}$ [$_{VrP}$ taira-ni [$_{Vr}$ nob]] tataki]] as(ita)$_{v+Tr}$]]
     c. [$_{vP}$ Hanako [$_{v'}$ [$_{VP}$ kinzoku-o [$_{V'}$ [$_{VrP}$ taira-ni t_i] t_j]] [tataki-nob$_i$]$_j$ as(ita)]]

Being similar to Li's account above, the focus is on resultatives; consequently, the coverage of Hasegawa's account is restricted to the cases where V_2 is telic. Since telic verbs can be V_1 as well, e.g. *obore-sin* in (1a) but not all such cases can give rise to a legitimate compound, e.g. *obore-nagare '(Int.) drown(telic)-float(atelic)', there has to be something more said to extend her coverage.

What is observed by Yumoto (2005) comes very close to the current observation. Her supposition can be labeled as the "avoid-telic-V_1 condition". She states that (i) for the dvandva type, V_1 and V_2 are of the same telicity, and (ii) for the modifying (cause/manner) type, it is very rare to find telic verbs as V_1. Though her observation seems to be on the right track, V-V compounds with telic V_1 are not that difficult to find, e.g. *obore-sin*, *sini-tae* in (1a), and *itari-tuku* in (1c). As was made clear above, however, not all instances with telic V_1 are acceptable, in particular, the ones with atelic V_2. Though Yumoto's approach is correct in focusing on telicity of the component verbs (contra Matsumoto 1986), the scope of investigation needs to be broadened to include the aspectual properties of both V_1 and V_2. Thus the current proposal can be considered to be an extension based on Yumoto's lead.

Finally, again based on the notion of temporal iconicity, Asao (2007) suggests another temporal condition -the "no complex V_1 without a complex V_2 condition"- which states that in V-V compound formation, if V_1 has a subordinate state of affairs, then so must V_2. Employing Lexical Conceptual Structure (LCS) to establish "complexity", he assumes that the left-hand side of the predicated CAUSE (i.e. a superordinate state of affairs) of LCS is temporally prior to the one of the right-hand side of it (i.e. a subordinate state of affairs). The

event attributed to V_2 must not precede the one attributed to V_1 due to temporal iconicity. If V_1 alone has a subordinate state of affairs, it would be referred to after the state of affairs presumably of V_2 with the superordinate state of affairs of V_1 and simple state of affairs of V_2 being identified (though this point is not made explicit by Asao). But this goes against the temporal iconicity supposition above.

In any case, to make his condition viable, Asao classifies verbs and designates "causative transitives" (e.g. *naos* 'repair' and *otos* 'drop'), "unaccusatives" (e.g. *make* 'lose'), and "reflexive unergatives" (e.g. *ik* 'go') as the complex type with CAUSE and a subordinate state of affairs. For example, *ik* is defined as [*x* ACT] CAUSE [BECOME [*x* BE-AT *y*]]. But "non-causative transitives" (e.g. *os* 'push') and "unergatives" (e.g. *yorokob* 'be.pleased' and *nak* 'cry') are the simplex type without CAUSE (or a subordinate state of affairs). So examples like **naosi-yorokobu* '(Int.) repair-be.pleased' and **make-naku* '(Int.) lose-cry' are predicted to be impossible, where V_1s are complex and V_2s are simplex.

This outcome, however, crucially depends on the way verbs are defined, in particular, with or without CAUSE (plus a subordinate state of affairs). In this connection, Asao's definition seems to be arbitrary. *Naos* is supposed to come with CAUSE since there is an agent (or an agentive event) that causes repairing but so should *yorokob* or *nak* since there is a factor/agent (or an event as such) responsible for pleasing and crying. True, there may not be an agent with a definite intention in the latter, but then there is no need for such an intentional agent for *otos* either –we may drop things unintentionally– which is defined as complex by Asao. Without independent evidence regarding what counts as being complex or simplex, the empirical consequences of the account cannot be tested adequately.

5. Some apparent counter-examples

Let me comment on apparent/potential counter-examples, though they are few. The first one is *yake-nokor* 'burn(telic)-remain(atelic), i.e. remain after having burned' which seems to be going against the aspectual generalization about compounding above. Two cases have to be considered here: (i) when "burning" and "remaining" concern a single object, and (ii) when "burning" and "remaining" are applicable for separate objects (as pointed out by Hiroaki Tada, p.c.). Under (i) burning is incomplete (i.e. without culmination) to the extent that some portion of the object escapes burning. In such a situation, V_1 *yake* is not telic but rather used as being equivalent to *moe* 'be.on.flame' (atelic). That is contrasted with *yake-oti* 'burn(telic)-crumble(telic), i.e. crumble after having been burned' where burning is complete or at least to the extent that the original state of the object burned cannot be deciphered. In the second case, the object is not affected by burning at all, e.g. a house escapes a town fire. This is similar to *Ie-ga ne-sizumar-u* 'The house becomes quiet due to (its occupants') falling asleep' where V_1 is irrelevant to the subject *ie-ga*.

As mentioned above, *kati-hokoru* 'win(telic)-boast(atelic)' found in Tagashira and Hoff (1986) is a potential counter-example along with *kati-nokoru* 'win(telic)-remain(atelic)' (by Saeko Urushibara, p.c.). In these instances, what regularly appears to be a telic verb *kat* seems to be reinterpreted as an atelic verb. Evidence for this comes from ambiguity when the suffix *-iru* is employed. *Katte-iru* can be ambiguous; it could mean, for example, in a context of competitive sport 'be winning' (progressive) or 'have won (and have been in that state)' (perfective). Thus the verb in question can be construed as either atelic or telic. The same situation does not obtain with strongly telic (quantized) verbs like *sin* 'die', for example *sinde-iru* exclusively indicates a resulting perfective state.

Another potential problem is *sini-isog* 'die(telic)-hurry(atelic), i.e. hurry to die'. As the translation suggests, this example may have a syntactic control structure where V_1 (or VP) serves as a complement of V_2. We note that unlike the typical examples of V-V compounds

seen above, V_1 in this case does not function as cause, manner/means, or any other "modifier" for V_2. Nor is the compound double-headed (i.e. not dvandva). In fact the following VP coordination seems to be fine with only one V_2 *isog* taking within its semantic scope a VP complement made up of two smaller VPs.

(8)   *Taroo-ga*   [$_{VP}$ [$_{VP}$ *zairyoo-o*   *kai*] (*sosite*) [$_{VP}$ *seihin-o*   *uri*]]*-isoi-da*.
     Taroo-NOM   material-ACC buy   and   product-ACC sell-hurry-PAST
     'Taroo hurried to [buy materials and sell products].'

6. Conclusion

This paper has investigated the role of telicity in lexical V-V compound formation. The current observation is that the aspectual interaction between V_1 and V_2 needs to be taken into account. More specifically, telic V_1 is a spoiler if V_2 is not telic as well. To capture this generalization, aspectual composition was proposed based on Dowty's conception of verb aspect. If valid, aspectual composition can be counted among the conditions for lexical V-V compound formation. This paper is also a contribution to research in not only the aspectual properties of V-V compounds but also the nature of aspectual composition of complex eventualities.

Acknowledgements

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