

On the Semantics of the Japanese Infinitive/Gerund-Clause Constructions: Polysemy and Temporal Constraints*

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Summary. The Japanese infinitive-clause construction (InfCx) and gerund-clause construction (GerCx) may represent a wide range of interclausal semantic relations, including ‘temporal sequence’, ‘cause’, and ‘manner’, largely due to pragmatic enrichment. This work addresses the question of what the core meaning(s) of the two constructions is (are), and demonstrates (i) that, contrary to previous claims in the literature, the InfCx and GerCx pose a semantic constraint on the temporal order between the two described eventualities, and (ii) that the GerCx has a distinct sense that the InfCx lacks, which gives rise to the ‘resulting state’ interpretation.

Keywords: Japanese, infinitive-clause constructions, gerund-clause constructions, interclausal semantic relations, conversational implicature

1 Introduction

This paper examines the semantic properties of the Japanese infinitive/gerund-clause constructions (sometimes considered coordination constructions), which are the most basic means of clause-linking in the language. Comparable to the English *and*-coordination (e.g., *John pressed the button and the engine started*) and free adjunct/absolute constructions (e.g., *John started the engine pressing the button; The nurses having arrived, the doctor started the surgery*), the Japanese infinitive-clause construction (InfCx) and gerund-clause construction (GerCx) may represent a wide range of interclausal semantic relations, including ‘temporal sequence’, ‘cause’, and ‘manner’, largely due to pragmatic enrichment.

This work addresses the question of what the core meaning(s) of the two constructions is (are), and demonstrates (i) that, contra authors such as Lee and Tonhauser (2010), the InfCx and GerCx pose a semantic constraint on the temporal order between the two described eventualities, and (ii) that the GerCx has a distinct sense that the InfCx lacks, which gives rise to the ‘resulting state’ interpretation.

2 Basic facts

2.1 Morphological and syntactic properties of the InfCx/GerCx

The InfCx refers to a kind of complex clause where a clause headed by a predicate in its infinitive form (also called *ren’yookei*) is subordinated to another clause (typically the matrix clause). The GerCx refers to a similar structure where the head of the subordinate clause is a gerund form (also called *te*-form). Gerund forms are formed by attaching the particle *te* to infinitive forms,¹ although they are not always realized as the mere concatenation of the infinitive form and *te* due to morphophonological processes. (1) exemplifies the two constructions:

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¹ Some scholars consider that a gerund form consists of a stem and the inflectional affix *te*.

- (1) **Hiroshi-ga booru-o {nage/nagete}**, Akira-ga uketa.
 H.-Nom ball-Acc throw.Inf/throw.Ger A.-Nom receive.Pst
 ‘Hiroshi threw the ball and Akira caught it.’

Infinitive and gerund clauses are functionally similar and in many cases interchangeable. They stylistically differ, however, the former being more formal.

Infinitive/gerund clauses are non-finite (untensed), and in this regard the InfCx and GerCx are more similar to English free adjunct/absolute constructions than to *and*-coordination constructions. Some scholars (e.g., Fukushima, 1999:297–298; Hirata, 2006:72–76; Lee and Tonhauser, 2010:308) nevertheless regard the two constructions as coordination structures.² One piece of evidence against this view is the possibility of the ‘dislocation’ out of the second (right) clause; under the coordination analysis, (2a,b) would be wrongly predicted to ill-formed due to the Coordinate Structure Constraint, a type of the strong island effect.

- (2) a. [S Ensoku-ga chuushi-ni nari/natte GAP_i ichiban
 excursion-Nom cancellation-Dat become.Inf/Ger most
 zannengatta] gakusei_i-wa Hiroshi_i-da.
 be.disappointed.Pst student-Top H.-Copula.Prs
 ‘The student who was most disappointed when the excursion was canceled is Hiroshi.’
 cf. *The student_i who [[the excursion was canceled] and [GAP_i was most disappointed]] is Hiroshi_i.
- b. [S sensoo-ga {owari/owatte} GAP_i kakki-o torimodoshita] machi_i
 war-Nom end.Inf/end.Ger liveliness-Acc regain.Pst city
 ‘a city that regained its liveliness after the war ended’
 cf. *a city_i that [[the war ended] and [GAP_i regained its liveliness]]

2.2 Semantic properties of the InfCx/GerCx

An infinitive/gerund clause may stand in a wide variety of semantic relations with the main clause. The reference work by Nihongo Kijutsu Bunpoo Kenkyuukai (NKBK; 2008) lists eight such relations: (i) simultaneity, (ii) sequence, (iii) cause, (iv) contrast, (v) accompanying circumstance, (vi) concession, (vii) preliminary remark, and (viii) condition (the last three of which are available only in rather limited configurations).

Note that comparably wide ranges of interpretations are available for similar constructions in other languages. Kortmann (1991:121ff) lists fifteen semantic relations that can be expressed by English free adjunct/absolute constructions. Also, it is well-known that conjunctive coordination structures may conversationally implicate such semantic relations as ‘sequence’ and ‘cause’ (*conjunction buttressing*; Levinson, 2000:117).

- (3) John pressed the spring and the drawer opened.
 +> John pressed the spring and then the drawer opened. (sequence)
 +> John pressed the spring and thereby caused the drawer to open. (causality)
 +> John pressed the spring in order to make the drawer open. (intentionality)

The most parsimonious account of the diverse interpretations of the InfCx/GerCx would be to assign to them a single simple meaning, say logical conjunction, and let the pragmatics do the rest of the job. Fukushima (1999) and Lee and Tonhauser (2010), among others, take this position. In the following, however, I will point out (i) that the basic meaning shared by the InfCx and GerCx is not the mere logical conjunction but involves a constraint regarding the temporal order between the two described eventualities, and (ii) that the GerCx has a distinct meaning that the InfCx lacks.

² From the functional viewpoint, the InfCx/GerCx may correspond better to the English *and*-coordination rather than the free adjunct/absolute constructions, being the most unmarked means to link two clauses.

3 Temporal constraints

As noted earlier, the first (left, subordinate) clause in an InfCx or GerCx lacks a tense. There has been some discussion in the literature as to how the temporal location of the first-clause eventuality is restricted.

Fukushima (1999) proposes that the ‘missing’ tense in the first clause is recovered by the tense of the second clause, through a version of the ellipsis resolution process along the lines of Dalrymple et al. (1991). Sentence (4a), for example, is assigned the logical form (4b) where P is an underspecified functor. (4b), then, is resolved into (4c).

- (4) a. Taro-ga utai odotta.
 T.-Nom sing.Inf dance.Pst
 ‘Taro sang and danced.’
 b. $P(\text{sing}(\text{Taro})) \wedge \text{PAST}(\text{dance}(\text{Taro}))$
 c. $\text{PAST}(\text{sing}(\text{Taro})) \wedge \text{PAST}(\text{dance}(\text{Taro}))$

He also notes that when a temporal adverbial occurs in the first clause as in (5), the functor P is recovered from the adverbial, rather than the tense of the second clause (pp.308–309).

- (5) Taro-ga kinoo-wa utai, kyoo-wa odoru.
 T.-Nom yesterday-Top sing.Inf today-Top dance.Prs
 ‘Taro sang yesterday and will dance today.’

Lee and Tonhauser (2010) maintain that in the InfCx and GerCx, the temporal order between the two described eventualities is not semantically fixed but is resolved by the joint effects of (i) temporal adverbials (if any occurs), (ii) the contextual information, and (iii) the independently motivated discourse principle that, by default, event descriptions (dynamic predicates) update the reference time by putting it forward while state descriptions (stative predicates) leave it unaffected (e.g., Dowty, 1986).

To demonstrate that the first-clause eventuality in the InfCx/GerCx may temporally follow the second-clause eventuality, Lee and Tonhauser provide three examples, presented below with some trivial modifications (pp.318–319).

- (6) a. Kyoo-wa hareteite, kinoo-wa ame-ga futta.
 today-Top clear.up.Ipfv.Ger yesterday-Top rain-Nom fall.Pst
 ‘It is sunny today, and it rained yesterday.’
 b. Hiroshi-wa shikkari rihabiri-o shiteite, shujutsu-wa senshoo
 H.-Top hard rehabilitation-Acc do.Ipfv.Ger surgical.operation-Top last.week
 uketa.
 receive.Pst
 ‘Hiroshi is in a tough rehabilitation program and had the operation last week.’
 c. Imiron-no gakkai-ga atte, ima-wa happyoo-no
 semantics-Gen conference-Nom exist.Prs now-Top presentation-Ger
 junbi-o shiteiru.
 preparation-Acc do.Ipfv.Prs
 ‘There will be a conference on semantics and I am preparing for my presentation now.’

As an alternative to these authors’ claims, I propose that the InfCx and GerCx require that the first-clause eventuality either precedes or temporally subsumes the second-clause eventuality ($E_1 < E_2$ or $E_1 \supseteq E_2$). This roughly amounts to saying that the two constructions require that the second-clause eventuality do *not* precede the first-clause eventuality. While sentences like (6a–c)

appear to evidence that the order of ‘ $E_1 > E_2$ ’ is possible, it can be shown that they are exceptional cases that call for a separate treatment.

In sentences (7a–c), the temporal interpretation of ‘ $E_1 > E_2$ ’ is impossible, even with the presence of temporal adverbials (note that the *and*-coordination constructions, provided under (7a–c) to illustrate the intended interpretations, are compatible with the ‘reversed’ temporal order; see also Levinson, 2000:123).

- (7) a. *Hiroshi-wa chichi-ni man’nenhitsu-o purezento-shi(te), sono man’nenhitsu-o
 H.-Top father-Dat fountain.pen-Acc present.Inf(Ger) that fountain.pen-Acc
 Ginza-no depaato-de katta.
 G.-Gen department.store-Loc buy.Pst
 (Hiroshi {gave/will give} his father a fountain pen, and he bought it at a department store in Ginza.)
- b. *Hiroshi-wa ima asagohan-o tabeteite, shichi-ji-ni okita.
 H.-Top now breakfast-Acc eat.Ipfv.Ger 7-o’clock-Dat wake.up.Pst
 (Hiroshi is eating his breakfast now, and woke up at 7 o’clock.)
- c. *Raishuu imiron-no gakkai-ga kaisai-sare(te), ima junbi-o
 next.week semantics-Gen conference-Nom hold.Pass.Inf(Ger) now preparation-Acc
 shiteiru.
 do.Ipfv.Prs
 (A conference on semantics will be held next week, and I am preparing for my presentation now.)

The unacceptability of (7a–c) contradicts Fukushima’s analysis, as well as Lee and Tonhauser’s. The acceptability of (6a–c), on the other hand, is at odds with my claim, suggesting that the proposed temporal constraint is not always present.

I propose that the crucial factor for the acceptability of sentences like (6a,b) (but not (6c); see below) is the rhetorical relation (Asher and Lascarides, 2003; Zeevat 2011) of *contrast*. In (6a), the weather of yesterday and that of today are explicitly contrasted. In (6b), *wa*-topicalization of the direct object of the second clause induces contrast, and the whole sentence naturally translates as ‘Hiroshi is in a tough rehabilitation program, and as for the operation, he had it last week’.³ Without topicalization of the object of the second clause, the sentence becomes unacceptable.

- (8) *Hiroshi-wa shikkari rihabiri-o shiteite, shujutsu-o senshuu
 H.-Top hard rehabilitation-Acc do.Ipfv.Ger surgical.operation-Acc last.week
 uketa.
 receive.Pst
 (Hiroshi is in a tough rehabilitation program and had the operation last week.)

Even if the two clauses are in the relation of contrast, the InfCx/GerCx cannot describe a situation where E_1 takes place in the future and E_2 takes place in the past.

- (9) a. Hiroshi-wa kinoo toochaku-shi(te), Akira-wa ototoi
 H.-Top yesterday arrive.Inf(Ger) A.-Top the.day.before.yesterday
 toochaku-shita.
 arrive-Pst
 ‘Hiroshi arrived yesterday and Akira arrived the day before yesterday.’
- b. Hiroshi-wa kinoo toochaku-shi(te), Akira-wa ashita toochaku-suru.
 H.-Top yesterday arrive.Inf(Ger) A.-Top tomorrow arrive-Prs

³ As discussed in Oshima (2010), *wa*-marking on a direct object has a similar information-structural effect as English *as for*-topicalization, while *wa*-marking on a subject does not.

‘Hiroshi arrived yesterday and Akira will arrive tomorrow.’

- c. *Hiroshi-wa ashita toochaku-shi(te), Akira-wa kinoo toochaku-shita.
 H.-Top tomorrow arrive.Inf(Ger) A.-Top yesterday arrive-Pst
 (Hiroshi will arrive tomorrow and Akira arrived yesterday.)

Sentence (6c), where there is no clear contrast between the two clauses, requires a different explanation. I suggest that the eventuality referred to by the existential predicate *atte* (*aru*), here used in the sense of ‘occur, take place’,⁴ has a temporal extent that is not limited to the time when the conference takes place, but includes the preceding temporal stretch overlapping with the second-clause eventuality (preparing for the presentation). There is independent evidence that *aru* predicated of an expression denoting an event (a conference, a party, etc.) could have such a temporally extended denotation. Compare (10a–d):

- (10) a. Kinoo-no enkai-de-wa, kuruma-de {kaeru/*kaetta}-node
 yesterday-Ger banquet-Loc-Top car-by go.home.Prs/go.home.Pst-because
 non’arukooru biiru-o nonda.
 non.alcoholic beer-Acc drink.Pst
 ‘At the banquet yesterday, I drank non-alcoholic beer because I was going to drive home.’
- b. Kinoo-wa hisashiburi-ni kazoku minna-ga yoru uchi-ni
 yesterday-Top after.a.long.time family everyone-Nom evening home-Dat
 {iru/*ita}-node, hirusugi jootoo-na niku-o
 be.present.Prs/be.present.Pst-because early.afternoon high.quality meat-Acc
 kai-ni-itta.
 buy-go.Pst
 ‘Yesterday, I went to buy some quality meat in the early afternoon because all members of my family were going to be home in the evening for the first time in a long time.’
- c. Kinoo-wa ame-ga {?futteiru/futteita}-node kuruma-de itta.
 yesterday-Top rain-Nom fall.Ipfv.Prs/fall.Ipfv.Pst-because car-by go.Pst
 ‘Yesterday, I went there because it was raining.’
- d. Kinoo-wa yoru boonenkai-ga {aru/atta}-node hiru-wa
 yesterday-Top evening year.end.party-Nom occur.Prs/occur.Pst-because lunch-Top
 karuku sumaseta.
 lightly finish.Pst
 ‘Yesterday, I had a light lunch because there was an year-end party in the evening.’

When an adjunct reason-clause with *node* is subordinated to a past-tensed clause, it must be present-tensed if the subordinate eventuality temporally follows the main-clause eventuality (as in (10a,b)), and is preferred to be past-tensed if the subordinate eventuality temporally subsumes the main-clause eventuality (as in (10c)). In (10d), the embedded tense can be past, and this implies that the eventuality denoted by *atta* (*aru*) could have a temporal extent that subsumes some period preceding the actual year-end party and the time of the lunch – perhaps the period in which the party *is planned* to take place. As such, sentence (6c) is expected to have a reading on which E_1 does not actually follow but temporally subsumes E_2 .

In sum: (i) the InfCx and GerCx as a rule entail that the temporal relation of ‘precedence or inclusion’ ($E_1 < E_2 \vee E_1 \supseteq E_2$) holds between the two described eventualities, but (ii) the reverse order interpretation ($E_1 > E_2$) becomes available when the rhetorical relation of contrast holds between the two clauses, but (iii) it is never possible for the first clause to refer to a future

⁴ *Aru* could also mean ‘exist, be present’, predicated of an expression denoting an object (rather than an event).

eventuality with the second clause referring to a past eventuality. A possible way to account for these facts is to postulate that there are two varieties (each) of the InfCx/GerCx, or perhaps two distinct senses (each) of these constructions: one variety poses a temporal restriction, and the other poses a rhetorical-structural restriction. In Section 5, I illustrate a formal analysis of the former kind of InfCx and GerCx associated with a temporal constraint.

4 The ‘resulting state’ interpretation of the gerund-clause construction

As mentioned above, infinitive and gerund clauses are functionally similar and in many cases interchangeable. There are, however, cases where the choice between the two constructions leads to an interpretative difference. Specifically, the GerCx, but not the InfCx, allows the interpretation that the *resulting state* of the event described in the first clause, rather than the event itself, temporally subsumes the eventuality described in the second clause, when the first-clause predicate is one of certain telic verbs including *tatsu* ‘stand up’, *kiru* ‘put on (clothes)’, and *motsu* ‘grab, take in one’s hand’ (NKBK, 2008:286–287). Consider the following pair of sentences:

- (11) a. Hiroshi-wa booshi-o **kaburi** e-o kaita.
 H.-Top hat-Acc put.on.Inf picture-Acc paint.Pst
 ‘Hiroshi put on a hat and painted a picture.’
 b. Hiroshi-wa booshi-o **kabutte** e-o kaita.
 H.-Top hat-Acc put.on.Ger picture-Acc paint.Pst
 ‘Hiroshi put on a hat and painted a picture.’
 OR: ‘Hiroshi painted a picture wearing a hat.’

(11a) is evaluated as true in scenario (12a) but false in scenario (12b). (11b), on the other hand, allows a second interpretation on which it is evaluated as true in scenario (12b) as well as (12a).

- (12) a. Hiroshi came to a beach to paint a picture. The sun was strong. He put on his hat before starting painting.
 b. Hiroshi always wears his hat, except when he is in bath or bed. This afternoon, he painted a picture in his art class, wearing his hat as usual.

On the second interpretation, (11b) does not imply that Hiroshi’s putting on a hat occurs within the topic time (the interval serving as the temporal setting for the discourse segment; Klein, 1994) but rather that the resulting state of his putting on hat – i.e., his wearing a hat – holds then.

Possible logical translations of (i) (11a,b) on the ‘precedence or subsumption’ reading and (ii) (11b) on the ‘resulting state’ reading are provided in (13), where τ = the trace function that maps an eventuality to the time in which it occurs/holds (Krifka, 1998), TT = the topic time, and **RS** = the relation of ‘is a resulting state of’:

- (13) (i) $\exists e_2[\exists e_1[\text{put.on.hat}(e_1, \text{hiroshi}) \wedge \tau(e_1) \subseteq \text{TT} \wedge [\tau(e_1) < \tau(e_2) \vee \tau(e_1) \supseteq \tau(e_2)]] \wedge \text{draw.picture}(e_2, \text{hiroshi}) \wedge \tau(e_2) \subseteq \text{TT} \wedge \tau(e_2) < \text{now}]]$
 (ii) $\exists e_2[\exists e_1[\exists e_3[\text{put.on.hat}(e_1, \text{hiroshi}) \wedge \text{RS}(e_3, e_1) \wedge \tau(e_3) \supseteq \text{TT} \wedge \tau(e_3) \supseteq \tau(e_2)] \wedge \text{draw.picture}(e_2, \text{hiroshi}) \wedge \tau(e_2) \subseteq \text{TT} \wedge \tau(e_2) < \text{now}]]]$

5 A Sign-Based Construction Grammar analysis

This final section briefly illustrates a formal analysis of the InfCx and GerCx in a version of Sign-Based Construction Grammar (Sag, 2010, forthcoming) coupled with Montague-style semantics.

(14) shows a construction that licenses the versions of the InfCx and GerCx with the ‘precedence or subsumption’ sense. The type *suspensive* is the immediate supertype of *infinitive* and *gerund*, and the definition of **R** is provided in (15). The up and down arrows with a subscript are

metavariables over logical expressions; \uparrow_n in the LF value of a daughter sign should match \downarrow_n in that of the mother sign.

$$(14) \left[\begin{array}{l} \text{suspensive-clause-cxt} \\ \text{MTR|SEM|LF} \quad \left(\lambda P_{\langle v,t \rangle} [\lambda Q_{\langle v,t \rangle} [\lambda e_2 [\exists e_1 [P(e_1) \wedge \mathbf{R}(P, \tau(e_1), \mathbf{TT})] \wedge [\tau(e_1) < \tau(e_2) \vee \tau(e_1) \supseteq \tau(e_2)] \wedge Q(e_2)]]]] (\downarrow_1)(\downarrow_2) \right) \\ \text{DTRS} \quad \left\langle \text{S:} \left[\begin{array}{l} \text{SYN|CAT|FORM} \quad \text{suspensive} \\ \text{SEM|LF} \quad \uparrow_1 \end{array} \right], \boxed{1} \text{S:} \left[\begin{array}{l} \text{SEM|LF} \quad \uparrow_2 \end{array} \right] \right\rangle \\ \text{HD-DTR} \quad \boxed{1} \end{array} \right]$$

$$(15) \quad \mathbf{R}(P, i_1, i_2) = \begin{cases} i_1 \supseteq i_2 & \text{if } P \text{ is stative} \\ i_1 \subseteq i_2 & \text{if } P \text{ is dynamic} \end{cases}$$

It is assumed here (i) that an infinitive/gerund clause modifies the main clause (rather than the main predicate), (ii) that linear word order does not necessarily reflect constituent structure, and variation in relative order between an adjunct clause and complements of the main clause is to be dealt with a Reape-style linearization mechanism, and (iii) a matrix sentence denotes a property of eventualities and its truth/falsehood is determined by the Truth Definition presented in (16) (cf. Ogihara, 1996).

$$(16) \quad \mathbf{Truth\ Definition:} \text{ The logical expression } \phi_{\langle v,t \rangle} \text{ serving as a translation of a natural language matrix sentence is true with respect to context } c, \text{ world } w, \text{ and assignment } g \text{ iff } \llbracket \exists e_0 [\phi(e_0)] \rrbracket^{c,w,g} = 1$$

In the case of (11a), the slots of $\uparrow_1 / \downarrow_1$ are filled by ‘ $\lambda e_4 [\mathbf{put.on.hat}(e_4, \mathbf{hiroshi})]$ ’, and the slots of $\uparrow_2 / \downarrow_2$ ‘ $\lambda e_5 [\mathbf{paint.picture}(e_5, \mathbf{hiroshi}) \wedge \tau(e_5) \subseteq \mathbf{TT} \wedge \tau(e_5) < \mathbf{now}]$ ’; by existentially binding the lambda-bound event variable in the resulting expression (Truth Definition), (13i) is obtained.

A key feature of the presented analysis is that it regards the temporal meaning of the InfCx/GerCx as contribution by the clause-linking construction, rather than by the infinitive/gerund form. This move is motivated by the fact that infinitive and gerund forms occurring in other environments do not necessarily convey temporal information (e.g., a gerund form occurring as part of a complex predicate with the auxiliary *kureru*, as in *shite-kureru* ‘do for X’s sake’ where *shite* is the gerund form of *suru* ‘do’).

(17), finally, shows a construction that licenses the version of the GerCx with the ‘resulting state’ sense.

$$(17) \left[\begin{array}{l} \text{result-gerund-clause-cxt} \\ \text{MTR|SEM|LF} \quad \left(\lambda P_{\langle v,t \rangle} [\lambda Q_{\langle v,t \rangle} [\lambda e_2 [\exists e_1 [\exists e_3 [P(e_1) \wedge \mathbf{RS}(e_3, e_1) \wedge \tau(e_3) \supseteq \mathbf{TT}] \wedge \tau(e_3) \supseteq \tau(e_2) \wedge Q(e_2)]]]] (\downarrow_1)(\downarrow_2) \right) \\ \text{DTRS} \quad \left\langle \text{S:} \left[\begin{array}{l} \text{SYN|CAT|FORM} \quad \text{gerund} \\ \text{SEM|LF} \quad \uparrow_1 \end{array} \right], \boxed{1} \text{S:} \left[\begin{array}{l} \text{SEM|LF} \quad \uparrow_2 \end{array} \right] \right\rangle \\ \text{HD-DTR} \quad \boxed{1} \end{array} \right]$$

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