

Acquisition of Japanese high applicative expressions and its implications for syntax

Comparative Syntax, Semantics, and Language Acquisition #3 (March 9, 2025)

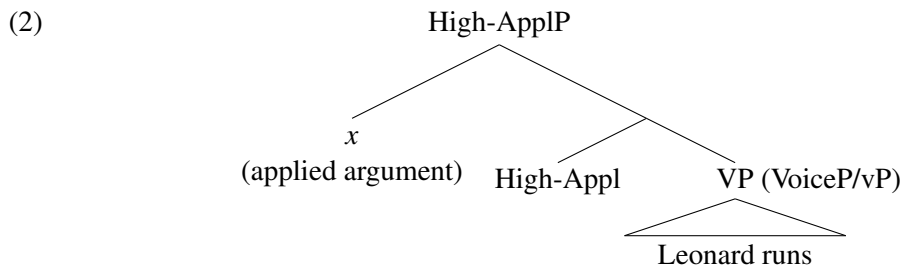
Akitaka Yamada (Osaka University)

1 Introduction

- The formal theory of (high-)applicatives has greatly developed since the 2000's, when applied arguments in a wide range of genealogically unrelated languages started being analyzed under a unified treatment (McGinnis 2001; 2005; McGinnis & Gerdts 2003; Jeong 2006; Pylkkänen 2002; 2008; Aoyagi 2010; 2020, amo).

- (1) $N\text{-}\acute{a}\text{-}\acute{i}\text{-}ly\grave{i}\text{-}\boxed{\acute{i}}\text{-}\grave{a}$ $\boxed{m\text{-}k\grave{a}}$ $k\text{-}\acute{e}ly\acute{a}$.
 FOC-1SG-PRS-eat-APPL-FV 1-wife 7-food
 'He is eating food for his wife.' (Chaga, Pylkkänen 2008: 11)

- A commonly-adopted assumption about high-applicatives shared in the literature is that a specific head (e.g., High-AppI) introduces an applied argument:



- (3) $\exists e.run(e) \wedge AG(e, Leonard) \wedge BEN(e, x)$.

- Examining two high-applicative constructions in Japanese, namely, *-te kure* and *-te moraw*, I challenge the aforementioned apparently uncontroversial understanding of high-applicatives.

Main claims

– Empirical contribution:

- * Japanese high-applicatives are split into two subcategories.
 - Type 1: syntactically introduces an argument
 - Type 2: semantically introduces a beneficiary, but does not syntactically introduce an argument
- * The relation between Type 1 and Type 2 has a lot in common with the active/passive alternation.

– Theoretical contribution:

- * Burzio's generalization is not limited to VoiceP.

– Acquisition:

- * Postsyntactic rules are responsible for language variation.

2 Data

2.1 Japanese high-applicative expressions

- Two distinct strategies to introduce an applied argument:

i. Adjunct strategy

- (4) a. *Leonard-ga* *hasit-ta.*
 Leonard-NOM run-PST
 ‘Leonard ran.’
- b. *Leonard-ga* [*Sheldon-no tame-ni*] *hasit-ta.*
 Leonard-NOM Sheldon-GEN sake-for run-PST
 ‘Leonard ran for (the sake of) Sheldon.’

ii. High-applicative strategy

Example 1: adversity passive (Pylkkänen 2008).

- (5) a. *Leonard-ga hasit-ta.*
 Leonard-NOM run-PST
 ‘Leonard ran.’
- b. *Sheldon-ga Leonard-ni hasir-are-ta.*
 Sheldon-NOM Leonard-DAT run-PASS-PST
 ‘Leonard ran, which malefactively affected Sheldon.’

Example 2: benefactive high-applicatives: *-te moraw* ‘-CV APPL’

- (6) a. *Leonard-ga hasit-ta.*
 Leonard-NOM run-PST
 ‘Leonard ran.’
- b. *Sheldon-ga Leonard-ni hasir-te morat-ta.*
 Sheldon-NOM Leonard-DAT run-CV APPL-PST
 ‘Leonard ran, which benefactively affected Sheldon.’

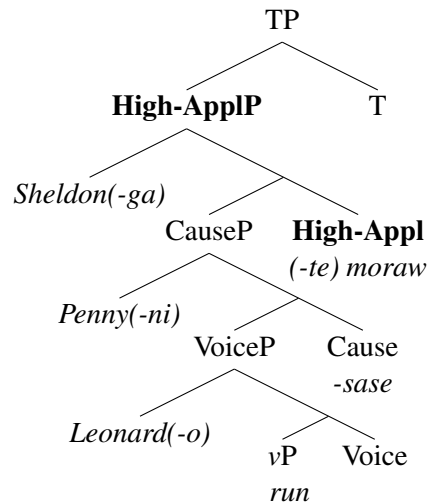
- Positions of high-applicatives:

- Pylkkänen (2008): proposes that applicative suffixes project an independent ApplP head below Voice—two positions higher or lower than VP.
- Hasegawa (2018): applies this line of analysis to Japanese applicatives.
- More recent studies: however, argue that the high ApplP can appear in a position even higher than VoiceP (Aoyagi 2010; 2020; Bosse et al. 2012).
 As illustrated in (7), in Japanese *-te moraw* occupies a position higher than the causative suffix *-(s)ase*.

- **-te moraw**: Following Aoyagi (2010; 2020), let us consider that it is positioned higher than VoiceP, as shown below.

- (7) *Sheldon-ga Penny-ni Leonard-o hasir-ase-te morat-ta.*
 Sheldon-NOM Penny-DAT Leonard-ACC run-CAUS-CV APPL-PST
 ‘Sheldon has Penny let Leonard run, from which Sheldon benefited.’

(8)



- **-te kure**: is synonymous with **-te moraw**:

- (9) a. *_{[p} *Leonard-wa hasir-te kure-ta*] *ga*, [_Q *watasi-wa Leonard-ni hasir-te moraw*]-*anak at-ta.*
 Leonard-TOP run-CV APPL-PST but I-TOP Leonard-DAT run-CV
 APPL-NEG COP-PST
 ‘*Leonard ran, from which I benefited, but he did not run, although I would have benefited from his running.’
- b. *_{[p} *Watasi-wa Leonard-ni hasir-te morat-ta*] *ga*, [_Q *Leonard-wa hasir-te kure*]-*nak at-ta*
 I-TOP Leonard-DAT run-CV APPL-PST but Leonard-TOP run-CV
 APPL-NEG COP-PST
 ‘*Leonard ran, from which I benefited, but he did not run, although I would have benefited from his running.’

N.B., since the logical form $P \wedge \neg Q$ behaves as a contradiction iff P and Q are semantically equivalent ($P = Q$), the core meaning of **-te moraw** and **-te kure** must be the same.

2.2 Fundamental properties of **-te kure**

2.2.1 Observation 1: Position within a sentence

(10) Order of morphemes

- a. *Penny-ga Sheldon-o hasir-ase-te i-ta ka naa?*
 Penny-NOM Sheldon-ACC run-CAUS-CV PRG-PST Q SFP
 ‘Was Penny making Sheldon run?’
- b. *Penny-ga Sheldon-o hasir-ase-te kure-te i-ta ka naa?*
 Penny-NOM Sheldon-ACC run-CAUS-CV APPL-CV PRG-PST Q SFP
 ‘Was Penny making Sheldon run for me?’

- c. *Penny-ga Sheldon-o hasir-ase-te i-te kure-ta ka naa?*
 Penny-NOM Sheldon-ACC run-CAUS-CV PRF-CV APPL-PST Q SFP
 ‘Was Penny making Sheldon run for me?’

• *-te*:

- In some literature, this *-te* is analyzed and presented as being fused with the following element (e.g., *-temoraw* and *-tekure*).
- We do not examine the status of this *-te* in any depth and leave this issue to future research, because the choice of notation does not affect the core discussion of this paper.
- The rationale behind this separation comes from the following observations.
 - * First, when the particle *-wa* is placed to focalize the causing event, it is distributed between *-te* and *kure*, as shown below:

- (11) *Penny-ga Sheldon-o hasir-ase-te-wa kure-te i-ta.*
 Penny-NOM Sheldon-ACC run-CAUS-CV-FOC APPL-CV PRG-PST
 ‘Penny was making Sheldon run for me (as opposed to doing something else).’

- * Second, two *te*-marked phrases can be coordinated, as shown below:

- (12) *Penny-ga Sheldon-o tabe-ase-te-mo tomar-ase-te-mo kure-te i-ta.*
 Penny-NOM Sheldon-ACC eat-CAUS-CV-FOC stay-CAUS-CV-FOC APPL-CV PRG-PST
 ‘Penny was having Sheldon eat and stay (at her house) for me.’

2.2.2 Observation 2: Overtness of the beneficiary

- While *-te moraw* explicitly introduces an applied beneficiary, as we saw in (6), *-te kure* cannot have an overt benefactive participant, as in (14).
- Note that Shibatani (1994: 43), Shibatani (1996: 161) and Tomioka & Kim (2017: 235) made a similar observation for other Japanese applicative constructions (e.g., *-te yar* and *-te age*):

i. Adjunct strategy: ✓

- (13) a. *Leonard-ga [Sheldon-no tame-ni] hasir-te kure-ta.*
 Leonard-NOM Sheldon-GEN sake-for run-CV APPL-PST
 ‘Leonard ran, which benefactively affected Sheldon.’
 b. *Leonard-ga [Sheldon-no tame-ni] hasit-ta.*
 Leonard-NOM Sheldon-GEN sake-for run-PST
 ‘Leonard ran for Sheldon.’

ii. High-applicative strategy: *

- (14) a. *Leonard-ga hasit-ta.*
 Leonard-NOM run-PST
 ‘Leonard ran.’
 b. *Leonard-ga (*Sheldon-ni) hasir-te kure-ta.*
 Leonard-NOM Sheldon-DAT run-CV APPL-PST
 ‘Leonard ran, which benefactively affected Sheldon.’

- Possible counterargument:
 - If (15) is presented together with (16)a, some might think that an applied argument is introduced via *-te(de) kure* (cf., Hasegawa 2018):

(15) *Leonard-ga Sheldon-ni hon-o yon-de kure-ta.*
 Leonard-NOM Sheldon-DAT book-ACC read-CV APPL-PST
 ‘Leonard ran, which benefactively affected Sheldon.’

- However, the underlined *ni*-marked phrase in (15) should not be treated as an applied argument introduced by *-te(de) kure* for many reasons.
 - * First and foremost, the *ni*-phrase is, in fact, acceptable even without *-te kure* when the verb *yom-* is used, as illustrated in (16)b. This suggests that the *ni*-phrase in (15) is an indirect object introduced by the verb *yom-*.

(16) a. *Leonard-ga hon-o yon-da.*
 Leonard-NOM book-ACC read-PST
 ‘Leonard read a book.’
 b. *Leonard-ga Sheldon-ni hon-o yon-da.*
 Leonard-NOM Sheldon-ni book-ACC read-PST
 ‘Leonard read Sheldon a book.’

- * Yet some might propose that (16)b is ambiguous between the indirect object (low-applicative) reading and high-applicative reading, trying to maintain the view that *-te kure* can introduce an applied argument.
- * However, if so, it is predicted that two *ni*-marked phrases can coexist, but this prediction is not borne out, as shown in (17).

(17) **Leonard-ga Penny-ni Sheldon-ni hon-o yon-da.*
 Leonard-NOM Penny-ni Sheldon-ni book-ACC read-PST
 ‘Leonard read Sheldon a book for Penny (or, Penny a book for Sheldon).’
 (intended)

Take home lesson

Despite the apparent benefactive meaning, *-te kure* (unlike *-te moraw*) CANNOT syntactically introduce an argument.

2.2.3 Observation 3: Case assignment

- In **the *te moraw*-construction**: the beneficiary is the subject and *ga*-marked, and it is the *doer* that receives the dative marker *-ni*.
- In contrast, in **the *te kure*-construction**, the case-assignment does not change from the baseline sentence.

(18) Intransitive

- a. *Leonard-ga hasit-ta.*
Leonard-NOM run-PST
'Leonard ran.'
- b. *Leonard-ga hasit-te kure-ta.*
Leonard-NOM run-CV APPL-PST
'Leonard ran, from which I benefited.'
- c. *Sheldon-ga Leonard-ni hasir-te morat-ta.*
Sheldon-NOM Leonard-ACC run-CV APPL-PST
'Sheldon had Leonard run, from which I benefited.'

(19) Transitive

- a. *Leonard-ga hon-o kat-ta.*
Leonard-NOM book-ACC buy-PST
'Leonard bought a book.'
- b. *Leonard-ga hon-o kat-te kure-ta.*
Leonard-NOM book-ACC buy-CV APPL-PST
'Leonard bought a book, from which I benefited.'
- c. *Sheldon-ga Leonard-ni hon-o kat-te morat-ta.*
Sheldon-NOM Leonard-ACC book-ACC buy-CV APPL-PST
'Sheldon had Leonard buy a book, from which I benefited.'

(20) Ditransitive

- a. *Leonard-ga Amy-ni hon-o okut-ta.*
Leonard-NOM Amy-DAT book-ACC give-PST
'Leonard sent a book to Amy.'
- b. *Leonard-ga Amy-ni hon-o okut-te kure-ta.*
Leonard-NOM Amy-DAT book-ACC send-CV APPL-PST
'Leonard sent a book to Amy, from which I benefited.'
- c. *Sheldon-ga Leonard-ni Amy-ni hon-o okut-te morat-ta.*
Sheldon-NOM Leonard-ACC Amy-DAT book-ACC send-CV APPL-PST
'Sheldon had Leonard send a book to Amy, from which I benefited.'

2.2.4 Observation 4: Person restriction (point-of-view expression)

- **Adversity passive:** the (gapless) adversity passive (or malefactive) suffix *-(r)are* (Kubo 1992; Kitagawa & Kuroda 1992; Hoshi 1999; Pylkkänen 2008; Aoyagi 2020, *amo*) is used regardless of the person feature of the subject.

(21) Adversity passive

- a. *watasi-ga* {*watasi-zisin/anata/Leonard*}-*ni hasir-are-ta.*
I-NOM myself/you/Leonard-DAT run-PASS-PST
'{I/you/Leonard} ran, which unfortunately matters to me.'
- b. *anata-ga* {*watasi/?anata-zisin/Leonard*}-*ni hasir-are-ta.*
you-NOM I/yourself/Leonard-DAT run-PASS-PST
'{I/yourself/Leonard} ran, which unfortunately matters to you.'
- c. *Penny-ga* {*watasi/anata/Leonard*}-*ni hasir-are-ta.*
Penny-NOM I/you/Leonard-DAT run-PASS-PST
'{I/you/Leonard} ran, which unfortunately matters to Penny.'

- **-te kure**: has a restriction on the subject (Iori et al. 2000; Hasegawa 2018): the subject must not be the first person (Yamada to appear).

(22) *-te kure*

- **watasi-ga hasit-te kure-ta.*
I-NOM run-CV APPL-PST
'I ran, from which I benefited (intended).'
 - anata-ga hasit-te kure-ta.*
you-NOM run-CV APPL-PST
'You ran, from which I benefited.'
 - Leonard-ga hasit-te kure-ta.*
Leonard-NOM run-CV APPL-PST
'Leonard ran, from which I benefited.'
- **-te moraw**: has a person restriction. However, the restriction is imposed on the dative-marked object, not the subject: the first person dative object is illicit.

(23) *-te moraw*

- **Sheldon-ga watasi-ni hasit-te morat-ta.*
Sheldon-NOM I-DAT run-CV APPL-PST
'I ran, from which Sheldon benefited (intended).'
- Sheldon-ga anata-ni hasit-te morat-ta.*
Sheldon-NOM you-DAT run-CV APPL-PST
'You ran, from which Sheldon benefited.'
- Sheldon-ga Penny-ni hasit-te morat-ta.*
Sheldon-NOM Penny-DAT run-CV APPL-PST
'Penny ran, from which Sheldon benefited.'

2.2.5 Observation 5: Idiom test

- (24) a. *Kankodori-ga nai-ta.*
cuckoo-NOM sing-PST
Reading 1: 'A cuckoo sang.' (Literal reading)
Reading 2: 'A depression started.' (Idiom)
- b. *Kankodori-ga nai-te kure-ta.*
cuckoo-NOM sing-CV APPL-PST
Reading 1: 'A cuckoo sang, from which I benefited.' (Literal reading)
Reading 2: 'A depression started, from which I benefited.' (Idiom)
- c. *Sheldon-ga kankodori-ni nai-te morat-ta.*
Sheldon-NOM cuckoo-DAT sing-CV APPL-PST
Reading 1: 'A cuckoo sang, from which Sheldon benefited.' (Literal reading)
*Reading 2: 'A depression started, from which Sheldon benefited.' (Idiom)

2.2.6 Observation 6: Volitionality

- **-te moraw**: requires that the event in the preadjacent is carried out under the volition of the participant.
- **-te kure**: has no such constraint.

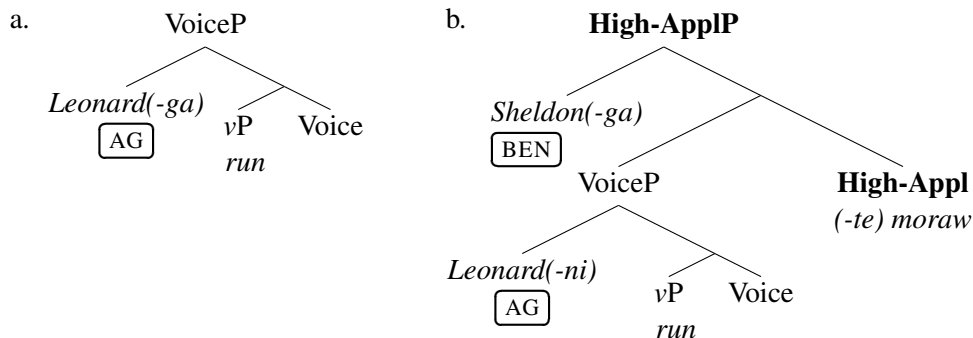
- (25) a. *Musiba-ga katteni naot-ta.*
cavity-NOM on its own heal-PST
'Cavities healed themselves.'
- b. *Musiba-ga katteni naot-te kure-ta.*
cavity-NOM on its own heal-CV APPL-PST
'Cavities healed themselves, from which I benefited.'
- c. *?*Sheldon-ga musiba-ni katteni naot-te morat-ta.*
Sheldon-NOM cavity-DAT on its own heal-CV APPL-PST
'Cavities healed themselves, from which Sheldon benefited.' (intended)

3 Syntax

3.1 Analysis of *-te moraw*

- (26) a. *Leonard-ga hasit-ta.*
Leonard-NOM run-PST
'Leonard ran.'
- b. *Sheldon-ga Leonard-ni hasit-te morat-ta.*
Sheldon-NOM Leonard-DAT run-CV APPL-PST
'Leonard ran, from which Sheldon benefited.'

(27) The structure for *-te moraw*

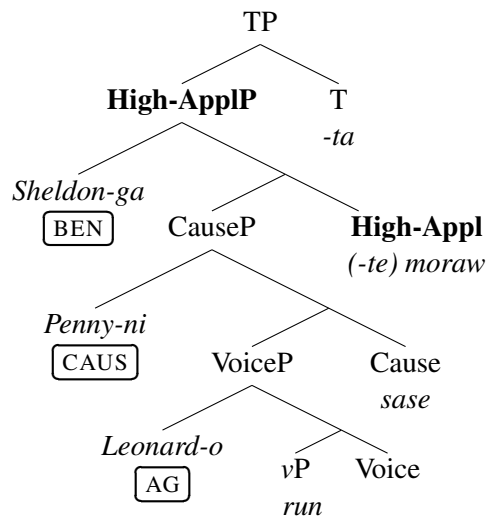


Case. Under the standard Agree-based case assignment analysis (Chomsky 2000; 2001), the configuration in (27) enables us to easily explain and capture the relevant data.

- First, the beneficiary, which is introduced in Spec of High-AppIP, receives the nominative case, because it is the closest noun phrase probed down by T.
- Second, the nominative case cannot be assigned to AGENT (Leonard), due to the intervening beneficiary noun phrase in Spec of High-AppIP. But High-AppI is another case assigner giving a dative case marking to the first noun it finds by downward probing. Hence, AGENT is given the dative case marking *-ni*.
- Prediction: if there is an additional layer with a specifier between High-AppI and Voice, it must also be realized with a dative marking. This prediction is, in fact, borne out.

- (28) *Sheldon-ga Penny-{*ga/ni/*o} Leonard-{*ga/*ni/o} hasir-ase-te morat-ta.*
Sheldon-NOM Penny-DAT Leonard-ACC run-CAUS-CV APPL-PST
'Penny made Leonard run, from which Sheldon benefited.'

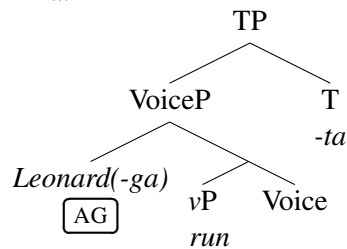
(29)



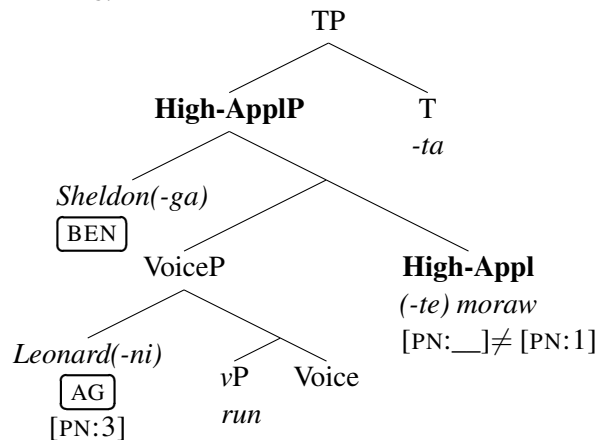
Person restriction. The relevant restriction matters between the head of High-Appl and the NP with which High-Appl agrees by downward probing.

- If CauseP is present, the restriction is imposed on the Spec of CauseP, and if it is absent, it is imposed on the Spec of VoiceP.
- This is unified if we assume that the person restriction is established via Agree: the first noun phrase probed down by the High-Appl must not have the first person referent.

(30) a.



b.



- There are two—unvalued and valued—person features (Pancheva & Zubizarreta 2018) in High-Appl.
- In (27)b and (29), the first PN feature on High-Appl eventually gets valued as 3.
- Finally, there is a condition that these two features are to be distinct. Thus, if the unvalued feature is valued as 1, it violates the condition; hence, the person restriction.

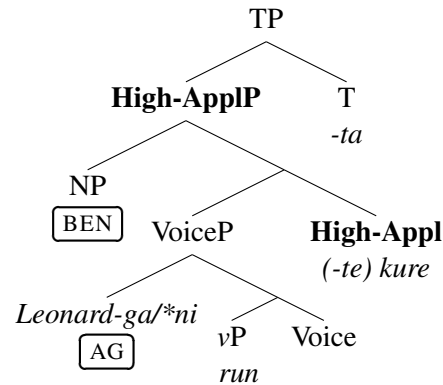
Volitionality and idioms.

- Since the Spec of CauseP (or VoiceP) is interpreted as a volitional entity, the *cuckoo* in (24)c is forced to be interpreted as a real bird, preventing the idiomatic reading.
- Furthermore, when an unaccusative verb phrase is used, the inanimate subject is also forced to be a volitional, personified individual; hence (25)c sounds infelicitous.

3.2 Analyses of *-te kure*

3.2.1 Analysis to be rejected: the same as *-te moraw*

(31)



- First, if there is an applied argument in Spec of High-ApplP, it is a mystery why it is always unpronounced.
- Second, even if we concede to acknowledge an adhoc obligatory argument ellipsis (a deletion rule) that makes it invisible at PF, an argument ellipsis is known to be triggered after a Case assignment.
 - N.B., an argument ellipsis does not affect the Case assignment, and if we change the case alignment, an intervention effect is observed, as shown in (32)c.

- (32) a. *Sheldon-ga Mary-ni hon-o okut-ta.*
 Sheldon-NOM Mary-DAT book-ACC send-PST
 ‘Sheldon sent a book to Mary.’
- b. *Mary-ni hon-o okut-ta.*
 Mary-DAT book-ACC send-PST
 ‘He (Sheldon) sent a book to Mary.’
- c. * *Mary-ga hon-o okut-ta.*
 Mary-NOM book-ACC send-PST
 ‘He (Sheldon) sent a book to Mary (intended).’

- If the noun phrase in Spec of High-ApplP is elided at PF, it is predicted that it still causes an intervention effect when T agrees with *Leonard* in (31). So the sentence should be as bad as (32)c. But this prediction is not borne out.

3.3 Analysis to be adopted

- *-te moraw*: is a realization of High-Appl that projects a specifier.
- *-te kure*: is a realization of High-Appl that does not project a specifier.

Volitionality and idioms.

- Not only the ability of assigning a case, but also the ability of imposing a volitional requirement is missing in *-te kure*.
- Hence, idioms are preserved, and an unaccusative verb describing a volition-less event can be used with this high-applicative suffix.

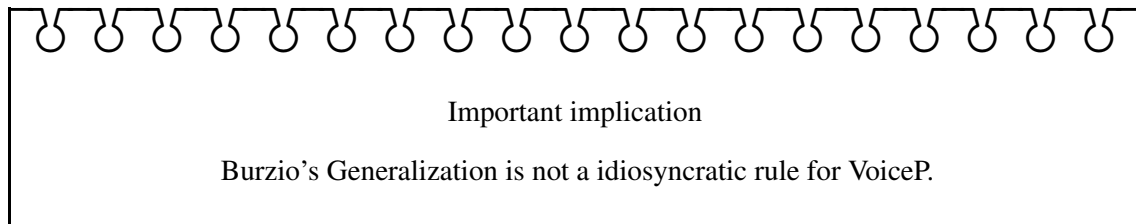
3.4 Discussion: Extended Burzio's Generalization (EBG)

Now that the peculiar properties of *-te kure* are all explained, let us consider what it implies. At the descriptive level, we have arrived at the following generalization, which we would like to call the Extended Burzio's Generalization (EBG).

(37) Extended Burzio's Generalization (EBG)

A functional head is a case assigner iff it projects a specifier.

- First, **T** can project a specifier (aka EPP), and is a licenser of the nominative; as has been discussed, it is the position for the subject.
- Second, **Voice** can project a specifier and if it does, it gives the accusative case.
- Third, **Cause** introduces an external argument, and it assigns the accusative case.
- Fourth, **High-Appl** can project a specifier, and if it does, it is the dative case assigner.
- Finally, we know there are many more functional projections in the VoiceP periphery, such as **AspP** and **NegP**. They do not introduce an argument; they simply carry some semantic information that manipulates the meaning expressed by the preajacent. Hence, they are not case assigners.



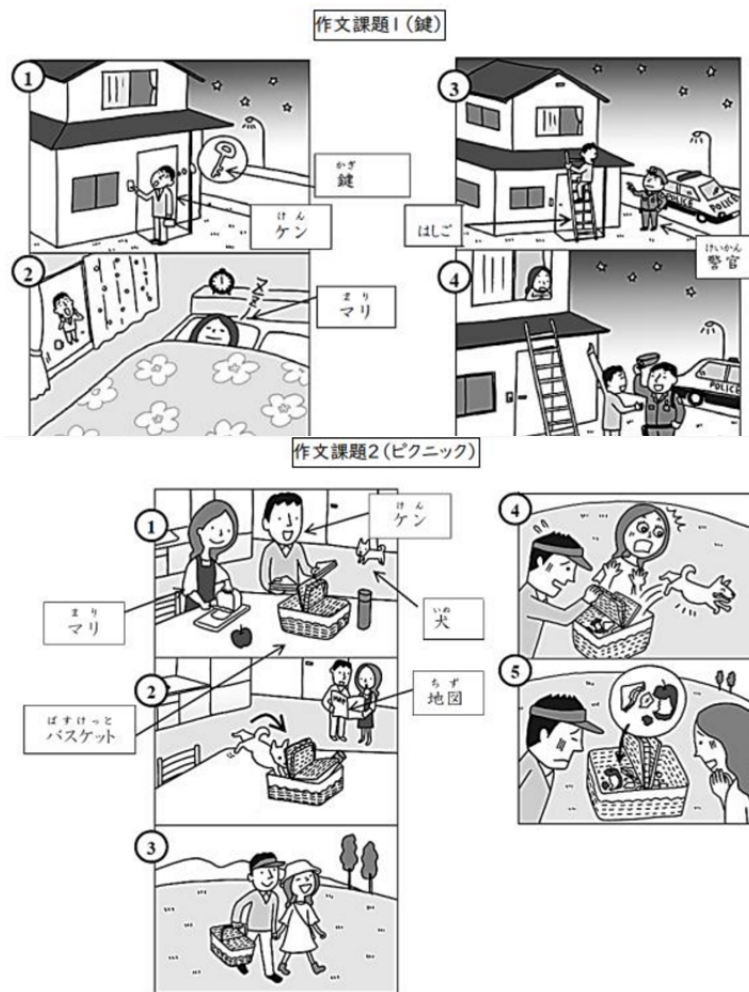
4 Acquisition of High-ApplPs

4.1 Data

4.1.1 Picture description task

- In the 1970s, it was discovered that not only L1 (Brown 1973; Pinker 1984) but also L2 learners (Krashen 1982; 1985) acquire morphosyntactic patterns in certain orders.
- Such early research findings are, however, often criticized for their small/unbalanced samples or inappropriate uses of statistics.
- Recently, however, I-JAS (Sakoda 2020) and JASWRIC (Ishikawa et al. 2023)—two well-designed corpora of L2 and L1 learners of Japanese—were released, enabling us to conduct cross sectional corpus research in a well-controlled circumstance.
 - **JASWRIC**: is a collection of picture description tasks of L1 learners (from the first grade of elementary school to the first grade of college).
 - **I-JAS** contains the L2 learners' results for the same tasks. The pictures used in these corpora are shown in (38) (Ishikawa et al. 2023: 397-398).
- Since the same pictures are used for each group, we can compare the narratives of L1 and L2 learners in a controlled setting.

(38) Pictures used in the tasks



• Examples:

(39) *-te kure*

- a. *keisatukan-wa yurusi-te kure-ta.*
policeman-TOP forgive-CV APPL-PST
'The policeman forgave (him), from which Ken benefitted.' [Task 1]
- b. *Ken-wa [Mari-ga tuku-te kure-te i-ru] tyuusyoku-o basuketto-ni tume-masi-ta.*
Ken-TOP Mary-NOM make-CV APPL-CV PRF-PRS lunch-ACC basket-into put-AH-PST
'Ken put the lunch [Mary made into the basket, from which Ken benefitted].' [Task 2]

(40) *-te moraw*

- a. *[Mari-ni ake-te mora-oo-to] omoi-masi-ta-ga, [...]*
Mari-DAT open-CV APPL-will-COMP think-AH-PST-although
'[Ken] decided to have Mary open [the door], from which he would have benefitted but ...' [Task 1]
- b. *Hutari-tomo [kyuuzitu na node], petto-no inu-ni orusuban-o si-te morai, yukkuri pikuniku-o tanosimu yoo des-u.*
two-both holiday COP since pet-GEN dog-DAT staying at home-ACC do-CV APPL, relaxed picnic-ACC enjoy seem COP-PRS
'Since it is a holiday, they both seem to have the dog—which is their pet—stay at home, from which they would have benefitted, and enjoy the picnic in a relaxed manner.' [Task 2]

4.1.2 Statistical model: the State-Space Model

- **Participants:** were asked to describe the pictures in their own words; some were imaginative, while others just provided an objective recounting of the images.
 - **At the individual level:** we would be overwhelmed by the variation among participants with the same language proficiency.
 - **At the group level:** by averaging the results, we would expect participants' idiosyncrasies to level out, and hence we could easily detect how the overall tendency grows and changes as language acquisition proceeds.
 - **Prediction:** when one is young or at the beginner phase, the production rate starts at almost 0%, which, however, grows substantially to converge into a percentage by which the average competent language user produces constructions when describing the pictures.
 - In what follows, we will test this hypothesis by estimating an average production rate per
 - * each grade (for L1 learners) and
 - * proficiency level (for L2 learners).
- **State-Space Model:** in order to analyze how the frequency of their uses of *V-te kure* and *V-te moraw* changed over grade (L1 learners) and proficiency (L2), we use:

$$(41) \quad y_i^{(t)} \sim \text{Poisson}(\lambda_i^{(t)})$$

$$\frac{\lambda_i^{(t)}}{a_i} = \exp(\eta_i^{(t)})$$

$$\eta_i^{(t)} = \beta_0^{(t)} \sim N(\beta_0^{(t-1)}, \sigma^2)$$

Note that $y_i^{(t)}, \lambda_i^{(t)}, a_i^{(t)}$ are the frequency of HAs, the parameter of Poisson Distribution, and the offset of the i -th learner at time t . In our context, this t refers to the grade (for L1 learners) and proficiency level (for L2 learners). $\beta_0^{(t)}$ is designed to follow a random walk with Variance σ^2 .

4.2 Results

- The posterior distributions were estimated based on the Hamiltonian Monte Carlo Simulation, using Stan on R (Hagiwara 2021; Yamada 2022; 2023a; b; R Core Team 2023; Stan Development Team 2023).
- Table 1 summarizes the values of the parameters set up for this numerical computation. All the R-hat values were checked to be lower than 1.01 (Vehtari et al. 2021), which we take to be an indication of convergence (Gelman et al. 2013).

setting	value
warm-up period	4,000
iteration	15,000
thinning	2
adapt_delta	0.995
chain	4

Table 1: Values specified when running Stan on R

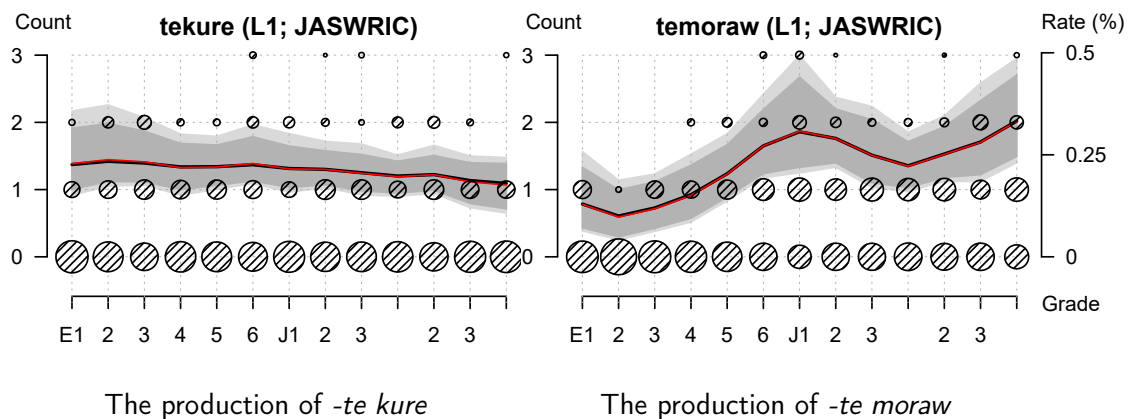


Figure 1: Growth of high-applicatives in L1 grammar

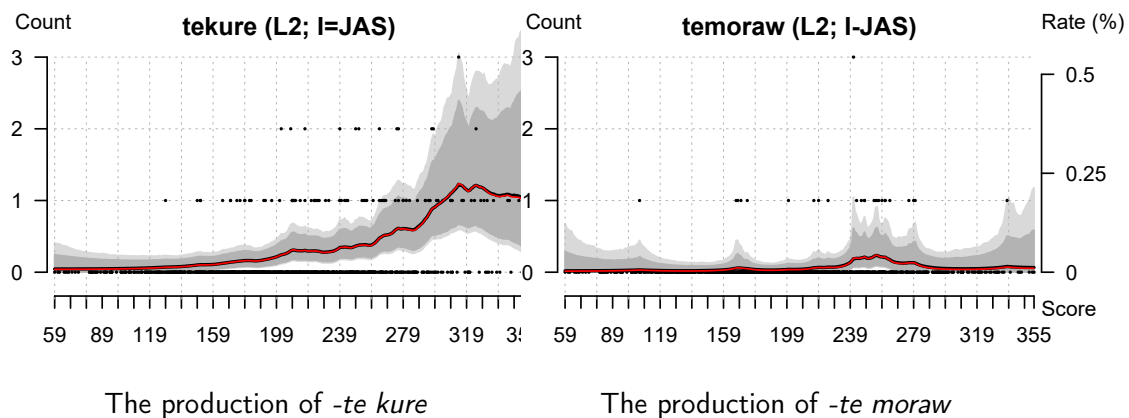


Figure 2: Growth of high-applicatives in L2 grammar

- The estimated posterior distributions of $\lambda^{(t)}$'s are shown in Figures 1 through 2. They are plotted according to the following conventions:
 - The horizontal axis is the grade of the L1 learners (JASWRIC) and the proficiency level of the L2 learners measured by the J-CAT score (I-JAS).
 - The y-axis (on the left) represents how many HAs were used during the tasks. [descriptive stats]
 - * The bubbles (Figure 1) and dots (Figure 2) represent how often participants used HAs. For example, Figure 1(a) shows that most of the first year students did not use *-tekure*, but some used it just once, and a few used it twice in their writing tasks.
 - The y-axis (on the right) represents estimated $\lambda^{(t)}$ (the production rate) [inferential stats]
 - * The solid line is the posterior mean for each grade/score.
 - * The grayed areas represent the 95% and 99% posterior Credible Intervals.

4.3 L1 learners

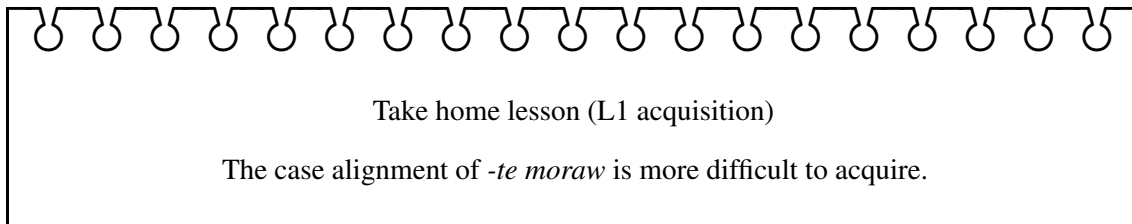
- Interpretations:
 - **Competent users:** The production rate of U1 (first year university students) is reasonably seen as representing the rate at which a competent adult native speaker uses an HA to describe the aforementioned pictures.

– **Learners:**

- * **Figure 1(left):** shows that even the first year elementary students (E1) have already acquired the grammar of *-te kure* at much the same rate as adults.
- * **Figure 1(right):** suggests that the E1 learners' rate of *-te moraw* is lower than that of the baseline adult speakers, and the acquisition of *-te moraw* takes time to complete over the elementary school days.

• Previous literature:

- Preschool children are said to have already become accustomed to the viewpoint restrictions (Ohba & Deen 2020; 2022).
- So the asymmetry shown here is considered to be associated with the acquisition of case alignment (Uyeno et al. 1978; Ishiguro 1985; Okabe 2005; 2019).

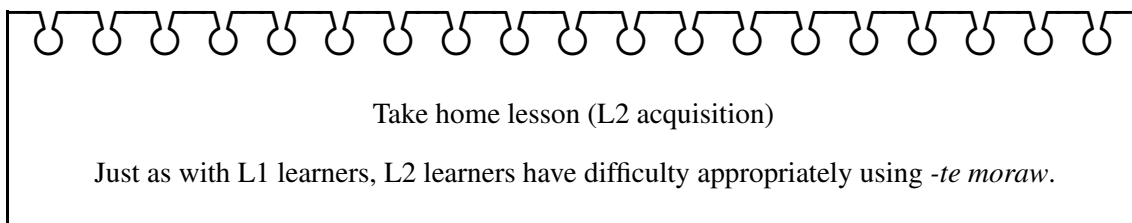


4.4 L2 learners

4.4.1 Overall tendency

• Interpretations:

- **Figure 2(left):** demonstrates that L2 learners gradually acquire the use of *-te kure* in their intermediate stages (around the 200s in the J-CAT score).
- **Figure 2(right)** shows that even the advanced L2 learners (students in the 300s) avoid using *-te moraw*.



4.4.2 Error analysis

- First, out of the 29 instances of *-te moraw* of L2 learners, 11 examples were incorrectly used, which amounts to 38.0% of the *-te moraw* instances. In nine of these cases, *-te moraw* is used when *-te kure* is expected, as in (42).

(42) *Yatto, keisatu-san-wa rikaisi-temorai-masi-ta.* (intended: *rikaisi-tekure-masi-ta*)
 finally policeman-Mr.-TOP undertand-APPL-AH-PST understand-APPL-AH-PST
 ‘The policeman understood [that], from which [Ken] benefited.’ (I-JAS, IID11-SW2)

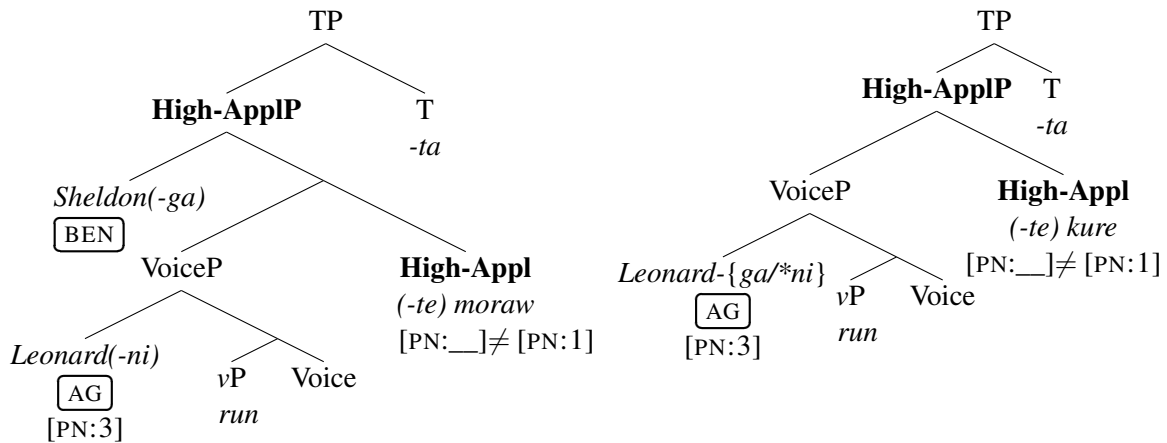
- Second, and conversely, *-te kure* had 112 instances but only 7 examples were erroneous (e.g., (43)) (6.2%). Although no clear error trend was found, it is safe to conclude that L2 learners make mistakes much less frequently.

- (43) *Tuma-ga doa-o ake-tekure-tehosii* (intended: *ake-tehosii*)
 wife-NOM door-ACC open-APPL-want open-want
 ‘[Ken] wants his wife to open the door for him.’ (I-JAS, CCH50-SW2)

5 Discussion

- Question: Why is *-te moraw* more difficult to acquire?

- (44) a. The structure for *-te moraw* b. The structure for *-te kure*



- **Syntax:** The same syntactic machinery is used. So, it can't be syntax.

- **Morphology:** Vocabulary Insertion Rules:

– Early stage:

(45) $K \leftrightarrow ga / [_{KP} NP_{AG} _]$

– Competent users:

(46) $K \leftrightarrow ga / [_{KP} NP_{[CASE:NOM]} _]$

Theoretical implication

Syntax is not the locus of variation.
 Postsyntactic rules are language-dependent.
 Hence, **Morphology** is responsible for language variation.

6 Conclusion and future directions

SUMMARY

- **Empirical contribution:**
 - Japanese high-applicatives are split into two subcategories.
- **Theoretical contribution:**
 - Extended Burzio’s Generalization: Burzio’s generalization is not limited to VoiceP.
- **Acquisition:**
 - Postsyntactic rules are responsible for language variation.

FUTURE ISSUES AND IMPLICATIONS:

- **Prediction:** non-valency-changing applicatives are observed beyond Japanese.
 - Some African languages seem to suggest that this is the case (*Yamada & Nagano to appear*).
 - For example, in Swahili some applied constructions do not augment valency. Consider the sentences below (*Marten 2003: 215*).

- (47) a. *Juma a-li-va-a kanzu.*
 Juma SCD1-PST-wear-FV kanzu
 ‘Juma was wearing a Kanzu’
- b. *Juma a-li-val-i-a {nguo rasmi/ #kanzu}.*
 Juma SCD1-PST-wear-APPL-FV clothes official/ kanzu
 ‘Juma was dressed up in {official clothes/#kanzu}.’

- **Remaining question:** why does the EBG hold in natural languages?

- (48) a. What grammatical principle determines the distribution of case assigners, or the introduction of a specifier?
- b. Why are the case assignment and the presence of a specifier related?

References

- Aoyagi, Hiroshi. 2010. On the asymmetry in passives between Japanese and Korean. In *Papers from the 27th national conference of the English Linguistic Society of Japan (JELS 27)*. 11–20.
- Aoyagi, Hiroshi. 2020. How high is high applicative in Japanese and Korean? In *Japanese/Korean linguistics*, vol. 28. 1–14.
- Bosse, Solveig & Bruening, Benjamin & Yamada, Masahiro. 2012. Affected experiencers. *Natural Language and Linguistic Theory* 30(4). 1185–1230.
- Brown, Roger. 1973. *A first language*. Cambridge, Mass: HUP.
- Chomsky, Noam. 2000. Minimalist inquiries: The framework. In Martin, Roger & Michaels, David & Uriagereka, Juan (eds.), *Step by step: Essays on minimalist syntax in honor of Howard Lasnik*, 89–155. Cambridge, MA: MIT press.
- Chomsky, Noam. 2001. Derivation by phase. In Kenstowicz, Michael (ed.), *Ken Hale: A life in language*, 1–52. Cambridge, MA: MIT Press.
- Gelman, Andrew & Carlin, John B. & Stern, Hal S. & Dunson, David B. & Vehtari, Aki & Rubin, Donald B. 2013. *Bayesian data analysis [3rd edition]*. London: CRC Press.
- Hagiwara, Junichiro. 2021. *Time series analysis for the state-space model with R/Stan*. Singapore: Springer.

- Hasegawa, Nobuko. 2018. Benefactives. In Hasegawa, Yoko (ed.), *The Cambridge Handbook of Japanese Linguistics*, 509–529. Cambridge: Cambridge University Press.
- Hoshi, Hiroto. 1999. Passives. In Tsujimura, Natsuko (ed.), *The handbook of Japanese linguistics*, 191–235. Oxford: Blackwell.
- Iori, Isao & Takanashi, Shino & Nakanishi, Kumiko & Yamada, Toshihiro. 2000. *Syokyu o osieru hito no tame no nihongo bunpo handobukku [the handbook for Japanese teachers]*. Tokyo: 3A Corporation.
- Ishiguro, Hiroaki. 1985. Developmental study of the comprehension of giving and receiving sentences in Japanese children: case and point of view. *The Japanese Journal of Psychology* 56(4). 192–199.
- Ishikawa, Shin'ichiro & Tomonaga, Tatsuya & Onishi, Ryohei & Okamoto, Toshiaki & Katsube, Naoki & Kawashima, Hisayo & Kishimoto, Tatsuya & Muranaka, Reiko. 2023. Syootyukoodaisei ni yoru nihongo ebyoosya sutoorii raitengu koopasu [japanese students' 11 story writing corpus (jaswric): A new dataset for analysis of 11/12 japanese]. In *Proceedings of language resources workshop*. 393–416.
- Jeong, Youngmi. 2006. *The landscape of applicatives*: The University of Maryland dissertation.
- Kitagawa, Yoshihisa & Kuroda, Sige-Yuki. 1992. Passives in Japanese. [https://ykling.sitehost.iu.edu/Resource%20files/Publication%20pdfs/KitagawaKuroda\(1992\)JPP.pdf](https://ykling.sitehost.iu.edu/Resource%20files/Publication%20pdfs/KitagawaKuroda(1992)JPP.pdf), Accessed Nov 10, 2022.
- Krashen, Stephen D. 1982. *Principles and practices in Second Language Acquisition*. Pregramon: OUP.
- Krashen, Stephen D. 1985. *The Input Hypothesis: issues and implications*. New York: Longman.
- Kubo, Miori. 1992. Japanese passives. In *Working papers of the Department of Languages and Cultures*, vol. 23. 231–302. Sapporo: University of Hokkaido.
- Marten, Lutz. 2003. The Dynamics of Bantu Applied Verbs: An Analysis at the Syntax-Pragmatics Interface. In Lébibkaza, K. K. (ed.), *Actes du 3e congrès mondial de linguistique africaine (lomé 2000)*, Cologne: Rüdinger Köppe.
- McGinnis, Martha. 2001. Phases and the syntax of applicatives. In Mchombo, Sam (ed.), *Proceedings of NELS 31*. 183–199. Amherst, Mass: GLSA.
- McGinnis, Martha. 2005. UTAH at Merge: evidence from multiple applicatives. *MIT Working Papers in Linguistics* 49. 183–200.
- McGinnis, Martha & Gerdts, Donna B. 2003. A phase-theoretic analysis of Kinyarwanda multiple applicatives. In *Proceedings of the 2003 annual conference of the canadian linguistic association*. 154–165. Département de linguistique et de didactique des langues, Université à Québec à Montréal.
- Ohba, Akari & Deen, Kamil Ud. 2020. Acquisition of perspective and empathy verbs in Japanese. In *Proceedings of the 44th Boston University Conference on Language Development [BUCLD 44]*. 430–443.
- Ohba, Akari & Deen, Kamil Ud. 2022. Acquisition of empathy in child Japanese. *Language Acquisition* 29(3). 260–295.
- Okabe, Reiko. 2005. Children's acquisition of benefactives and passives in Japanese. In *Proceedings of the 29th annual Boston university conference on language development*. 437–447. Somerville, MA: Cascadilla Press.
- Okabe, Reiko. 2019. Juyo doshi kobun no kakutoku saiho: kopasubunseki [revisiting the acquisition of applicative constructions: a corpus analysis]. *The journal of the Senshu University Research Society [Senshu Jinbun Ronshu]* 105. 219–245.
- Pancheva, Roumyana & Zubizarreta, Maria Luisa. 2018. The Person Case Constraint: the syntactic encoding of perspective. *Natural Language and Linguistic Theory* 36. 1291–1337.
- Pinker, Steven. 1984. *Language learnability and language development*. Cambridge, Mass: HUP.
- Pylkkänen, Liina. 2002. *Introducing arguments*: MIT dissertation.

- Pylkkänen, Liina. 2008. *Introducing Arguments*. Cambridge, MA.: MIT press.
- R Core Team. 2023. *R: A language and environment for statistical computing*. R Foundation for Statistical Computing Vienna, Austria. <https://www.R-project.org/>.
- Sakoda, Kumiko. 2020. I-JAS tanjo no keii. [the background of compilation of I-JAS]. In Sakoda, Kumiko & Ishikawa, Shinichiro & Lee, Jaeho (eds.), *Phrase Structure and the Lexicon*, 2–13. Kuroshio Publishers.
- Shibatani, Masayoshi. 1994. Benefactive constructions: a Japanese-Korean comparative perspective. *Japanese/Korean Linguistics* 4. 39–74.
- Shibatani, Masayoshi. 1996. Applicatives and benefactives: a cognitive account. In Shibatani, Masayoshi & Thompson, Sandra A. (eds.), *Grammatical constructions: their form and meaning*, 157–194. Oxford: Clarendon Press.
- Stan Development Team. 2023. RStan: the R interface to Stan. R package version 2.32.3. <https://mc-stan.org/>.
- Tomioka, Satoshi & Kim, Lan. 2017. The give-type benefactive constructions in Korean and Japanese. *Journal of East Asian Linguistics* 26. 233–257.
- Uyeno, Tazuko & Harada, S. I. & Hayashibe, Hideo & Yamada, Hiroshi. 1978. Comprehension of sentences with giving and receiving verbs in Japanese children. *Annual bulletin of Research Institute of Logopedics and Phoniatrics* 12. 167–185.
- Vehtari, Aki & Gelman, Andrew & Simpson, Daniel & Carpenter, Bob & Bürkner, Paul-Christian. 2021. Rank-normalization, folding, and localization: An improved \hat{R} for assessing convergence of MCMC (with discussion). *Bayesian Analysis* 16(2). 667–718.
- Yamada, Akitaka. 2022. Diachronic constructional alternation of high-applicative forms: a time-series analysis using a state-space model for the choice among sasete itadak, sasete moraw, sasete kudasar, and sasete kure [tekiyokei no tuziteki kobun kotai: “saseteitadaku” “sasetemorau” “sasetekudasaru” “sasetekureru” no sentaku nitaisuru zyotai kukan moderu o motiita zikeiretubunseki]. In *Proceedings of the 66th conference of mathematical linguistics society of japan*. 12–17.
- Yamada, Akitaka. 2023a. Constructionalization of the Japanese addressee-honorification system. In *Proceedings of the 23rd meeting of the Japanese cognitive linguistics association*. 171–180.
- Yamada, Akitaka. 2023b. Looking for default vocabulary insertion rules: diachronic morphosyntax of the Japanese addressee-honorification system. *Glossa: a journal of general linguistics* 8(1). 1–47.
- Yamada, Akitaka. to appear. A modal approach to the Japanese high-applicative expression *-temoraw*. In *Proceedings of the 17th meeting of the wafl*.
- Yamada, Akitaka & Nagano, Taika. to appear. Not always introducing arguments: the syntax of high-applicative constructions in Japanese. In *Proceedings of the 17th meeting of the wafl*.

