**Syntactic Gradience between Finite Clauses and Small Clauses:
Evidence from a Diachronic Change in Genitive Subject Clauses in Japanese**

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1. Generative Syntax and Language Change

Every linguistic theory has dealt with language change in one way or another. Among others, generative syntax, under the Principles and Parameters Theory since Chomsky (1981), has attributed the linguistic typology to a set of parameters that are incidental to the universal grammar and whose values are to be fixed within four or five years after birth. Alongside, language changes have been assumed to be triggered by a change in the value of a relevant parameter, as Lightfoot (1991) argues.

Such a parametric theory of language change is argued against by functional linguists such as Joan Bybee. Thus, Bybee (2015) argues that given a parametric change, any diachronic language change must have occurred abruptly in the grammar, which is in conflict with the actual tendency of language change:

(1)   In a generative grammar, verbs and auxiliaries are quite different categories, so a change of one to the other is a major syntactic change. Since there are no gradient categories between verb and auxiliary, the change must have occurred abruptly in the grammar, as a reanalysis made by a generation of language learners.   (Bybee (2015: 243))

However, this kind of criticism is against an older version of parameters that was called macroparameters so that the value of a single parameter would cause a drastic language change that could be a change from one extreme to the other. In at least the last two decades, more fine-grained theories of language variation and change have cropped up. For example, microparametric syntax such as Kayne (2000) and Baker (2017) is an attempt to find the nature of syntax and syntactic variations based on microparameters that were found on the basis of comparison between two geographically close languages or dialects. Alternatively, Lightfoot and Westergaard

(2007) suggest that if we take parameters and cues to be of a smaller scale than has previously been thought, we can explain the gradualness of language change in such a way that each change may affect one (micro-)cue at a time, but a series of smaller scale bumps gives the impression that there is gradual change over centuries. Look at (2) as their original statement:

(2)   If parameters and cues are of a smaller scale than has previously been thought, then one will not say, for example, that a V2 language changes into a non-V2 language from one generation to the next, [...] On the other hand, it is also not necessary to argue that change is always gradual, spanning several hundred years. On our view, change may affect one (micro-)cue at a time, a series of smaller scale bumps, giving the impression that there is gradual change over centuries.   (Lightfoot and Westergaard (2007: 411))[1]

Another point in which generative syntax is different from other theories of language change is that it has little, if no, clear mention to the question of whether and how the frequency of each construction or syntactic form, where I mean both token frequency and type frequency, can affect the language change in question. By contrast, Bybee (2015), for example, suggests that (3) is the general tendency of language change:

(3)   High-frequency forms are resistant to change on the basis of the structure of other forms or patterns, and more likely to serve as the basis of such change in low-frequency forms.   (Bybee (2015: 102))

This does not mean, however, that generative syntax has totally ignored the influence of frequency on language change. In fact, Snyder (2017) recently argues that if an older form and a newer form are mixed in a single language community, and if the two forms are grammatically *incompatible*, the low frequency of one may lead to its obsolescence, because a language learner can be expected to adopt the grammatical option corresponding to the first type of evidence encountered and because what is more frequently used by the child's caretakers can reach the learner earlier than the other competing form, as in (4):

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[1] See also Westergaard (2014), Cournane (2017) and Karimi and Palmarini (2017), among others, for a microparametric syntactic analysis of syntactic changes and variations. On the other hand, see Chomsky (1995, 2005, 2017) for a general thesis against these views in terms of biolinguistics and language evolution.

(4)   Crucially, when the learner's input contains conflicting data, the GCr learner[2] can be expected to adopt the grammatical option corresponding to the first type of evidence encountered. [...] The evidence that reaches the learner is used more frequently by the child's caretakers. Hence, it is precisely when two types of sentences are grammatically *incompatible* that the low frequency of one may lead to its obsolescence.   (Snyder (2017: 241))

In short, recent views on language change in generative syntax are more or less along the same lines as what the functional linguists have repeatedly argued and have incorporated many of their insights.

With these general changes in the trend of generative syntax, in this paper, we will discuss a phenomena language change that can be dealt with in generative syntactic terms but not in others, in terms of microparametric syntax.

2. Nominative/Genitive Conversion (or NGC) in Japanese

More specifically, we will propose a theory that can explain a syntactic change in Nominative/Genitive Conversion (or NGC) in Japanese. NGC is illustrated as in (5):[3]

(5)   a. Taro-**ga**   sun-dei-ru   mati
           Taro-**Nom**   live-Prof-Nonpast   town
           'the town where Taro is living'
        b. Taro-**no**   sun-dei-ru   mati
           Taro-**Gen**   live-Prof-Nonpast   town
           'the town where Taro is living'

In (5a), the subject of a relative clause is in the Nominative Case, while in (5b), the subject in the same syntactic environment is marked for the Genitive Case.

In the modern Japanese, as well as in all the other Nominative-Accusative languages in the world, the subject of a clause is usually marked for the Nominative Case

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[2] GC is the abbreviation for "Grammatically Conservative" and GCr is for "Grammatically Conservative (revised)". See Snyder (2011, 2017) for more detailed discussions.
[3] See Harada (1971, 1976), Watanabe (1996), Ochi (2001), Hiraiwa (2002, 2005), Kim (2009), Maki and Uchibori (2008), Kornflit and Whitman (2008), Miyagawa (2011), among others, for various syntactic analyses of the NGC in Japanese. See Hale (2002), Kornflit and Whitman (2008), and Maki, Bao, Bao and Hasebe (2015) among others, for the NGC in other languages than Japanese.

morphology *ga*. In Japanese, however, especially in adnominal clauses, there is another option of morphological Case-marking such that the subject is marked for the Genitive Case *no*, as in (5b). We will henceforth refer to the Genitive Subject Clause in (5b) as simply GSC.

Ogawa (2016, 2018) shows that, in the last 130 years or so, the total token frequency of the GSC has radically declined, and that it has also decreased its frequency when we see it construction-specifically, as well as its type frequency. We mean that the GSC occurs in several different constructions, with different types of functional categories, but any pairing of a Genitive subject and a functional category has decreased its frequency in the last 100 years. As a result, the GSC has been getting limited to the construction in which a Genitive subject is exclusively co-occurring with a stative verb or an adjective. Ogawa (2016) refers to the phenomenon as "strativization." Using a more general term of a theory of language change, it could be called "specialization," though the two notions are somewhat different from each other.[4]

Ogawa's (2018) study is based on a survey of 130 books that were published between the 1890s and the 2010s.[5] More specifically, I manually collected 15723 examples of the GSCs from a total of 130 books from the following three genres: (i) books for education and/or cultivation that are newly published to let people know the recent situation and/or ways of thinking, science, culture, way of life, history, and so on (the so-called *sinsho* in Japanese) (45 volumes), (ii) novels and essays, which include fictions and nonfictions (57 volumes), and (iii) biography and autobiography, written by celebrities from every genre, including academics, sports, public entertainments, and entrepreneurs (28 volumes). From the collected data, Ogawa found a lot of construction-specific changes as summarized in (6a-i):

(6)   During the 130 years between the 1890s and the 2010s, the frequency of:
        a. the GSCs is gradually declining and was reversed with that of the
           Nominative subject clauses in the middle of the 20th century.
        b. the Genitive subject clauses headed by an overt complementizer sharply
           declined **by 99%** and almost disappeared in the 2000s.
        c. the Genitive subjects of a passivized verb has declined **by 80%**.
        d. the Genitive subject followed by an adverb and/or an internal argument

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[4] However, specialization usually refers to the semantic narrowing of lexical items such as *starve*, which meant "to die" in OE but has come to mean "to die of hunger." What we observe with the GSC is the semantic narrowing of a construction rather than a lexical item, and hence, we call it "clause shrinking" so as not to be confused with the semantic narrowing of a lexical item.
[5] See Nambu (2007, 2014) for another corpus investigation of the NGC.

has declined **by 90%**.

 e. the Genitive subjects with a nominal predicate has declined **by 95**%.

 f. the Genitive subjects of a property-describing adjective has declined **by 95%**.

 g. the Genitive subjects of a past tense predicate has declined **by 80%**.

 h. the Genitive subjects of an unaccusative eventive verb has declined **by 80%**.

 i. the Genitive subject clauses have been more and more limited to statives: the ratio of GSCs with stative predicates has raised **from 50% to 75%**.

From these data, Ogawa (2018) has proposed a hypothesis of diachronic syntactic change that we call here "clause shrinking." Clause shrinking is the phenomenon in which the syntactic size of a clause, which was originally as large as CP, is gradually shrinking to TP, vP, and ultimately to as small as VP or AP. We take it as microparametric change that successively truncates a full clause from the higher functional categories to lower ones. The four different stages of language change are referred to as Dialect A to D in (7a-d), and each of the four dialect speakers, will have the syntactic structures in (8a-d), respectively:[6]

(7) a. Dialect A: those who adopt (8a) as the unmarked structure of their GSC.

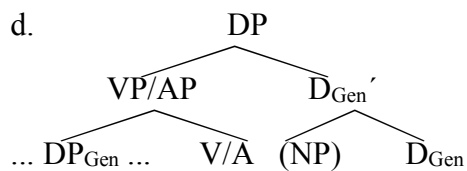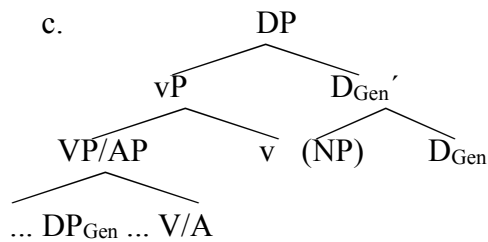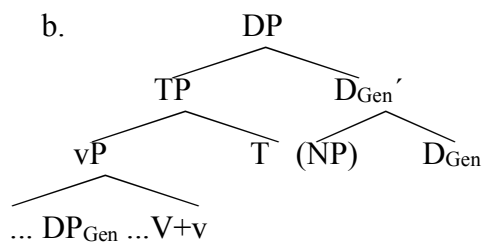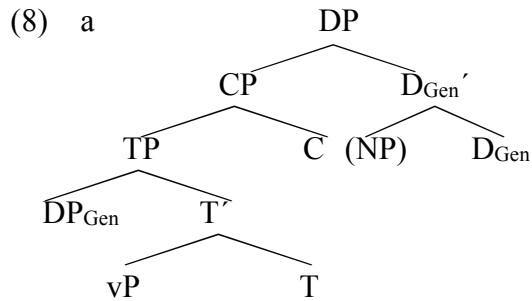 b. Dialect B: those who adopt (8b) as the unmarked structure of their GSC.[7]

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[6] Ogawa (2018) suggests that this diachronic clause shrinking is parallel to the synchronic varieties of various relative clauses in English that could range from CP to AP, as in (ia-d), although the extent to which each of these (reduced) relative clauses projects higher functional categories partially depends on the syntactic theory one adopts (see Williams (1975), Kayne (1994) and Bošković (1997) for relevant discussions):

(i) a. the man [$_{CP}$ *(that) saw Mary]
  b. the book [$_{CP/TP}$ (that) John read] (cf. Bošković (1997))
  c. the man [$_{vP}$ (*who is) knowing the rumor] (cf. Williams (1975))
  d. the man [$_{AP}$ still alive] (cf. Kayne (1994))

Incidentally, we are not claiming that the clause shrinking is a universal principle, or that it can take place in the root clause too. For example, given that the event denoted by the matrix verb must always have its temporal reference fixed by the clause-mate T, the root clause always has to project up to TP, and given that the matrix clause must always have a Nominative subject, it always has to project up to CP, under the assumption (we also adopt) that the C-T amalgam licenses the Nominative Case. Hence, in general, there will be less, if any, variation in the syntactic size of the root clause than the relative clause.

[7] The naming of the four different grammars which are supposed to be grammars of different age groups is based on Harada's (1971) proposal: discussing only two "dialects" of the speakers who are identical in their geographic or sociological divisions among his informants and differ only in the age groups they belong, Harada (1971:35) concluded that "Dialect A is on the edge of losing its status as the majority dialect, and the newcomer, Dialect B, is spreading among the speakers of the Tokyo dialect." He also states that "Dialect A was the majority dialect some forty years ago, although at present Dialect B is the majority dialect among speaker in their twenties," which means that Dialect B speakers were in their twenties some forty five years ago, and are now in their mid sixties to mid seventies.

c. Dialect C: those who adopt (8c) as the unmarked structure of their GSC.

d. Dialect D: those who adopt (8d) as the unmarked structure of their GSC.

(8) a

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                    DP
            CP            D_Gen´
        TP       C  (NP)      D_Gen
    DP_Gen   T´
         vP       T
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b.

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                    DP
            TP            D_Gen´
        vP       T  (NP)      D_Gen
    ... DP_Gen ...V+v
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c.

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                    DP
            vP            D_Gen´
        VP/AP       v  (NP)      D_Gen
    ... DP_Gen ... V/A
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d.

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                    DP
            VP/AP            D_Gen´
    ... DP_Gen ...   V/A  (NP)      D_Gen
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The GSC in (8a) is a full finite clause with three functional categories CP, TP, and vP. That in (8b) is a defective finite clause with two functional categories TP and vP. That in (8c) is a kind of small clause with only one functional category vP. And that in (8d) is the smallest small clause without any functional category included in the complement of D.

Now, let us compare the four types of NGCs as illustrated in (9a-d):

(9) a.   **Passivized Transitive (PT) Sentence**:

Boohan kamera-**ga/??no**   tuke-rare-tei-ru   ie

surveillance camera-NOM/GEN   attach_tr-PASS-PERF-NONPAST   house

'a house to which a surveillance camera has been attached'

b. **Eventive Unaccusative (EU) Sentence**:

Boohan kamera-**ga/?no** tui-tei-ru ie

surveillance camera-NOM/GEN attach$_{intr}$-PERF-NONPAST house

'a house to which a surveillance camera has attached'

c. **Stative Verb (SV) Sentence**:

Totte-**ga/no** tui-ta koppu

grip-NOM/GEN attach$_{intr}$-Past cup
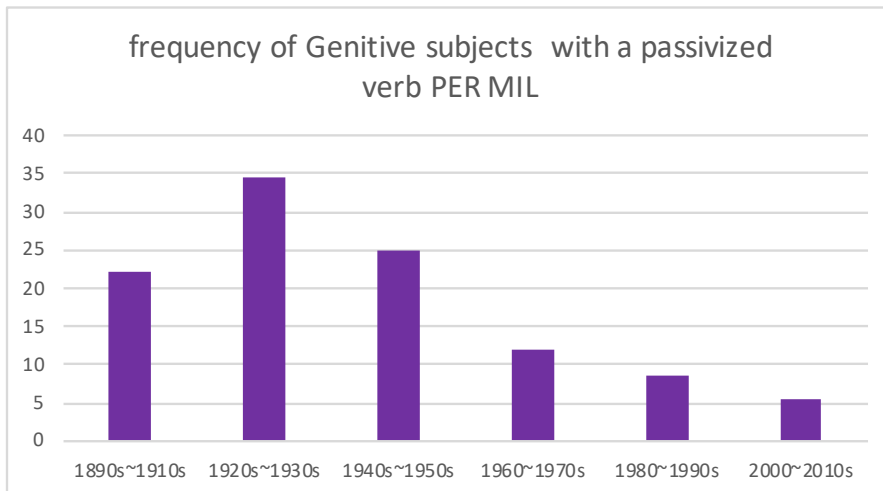
'a cup with a grip on it'

d. **Adjectival (ADJ) Small Clause**:
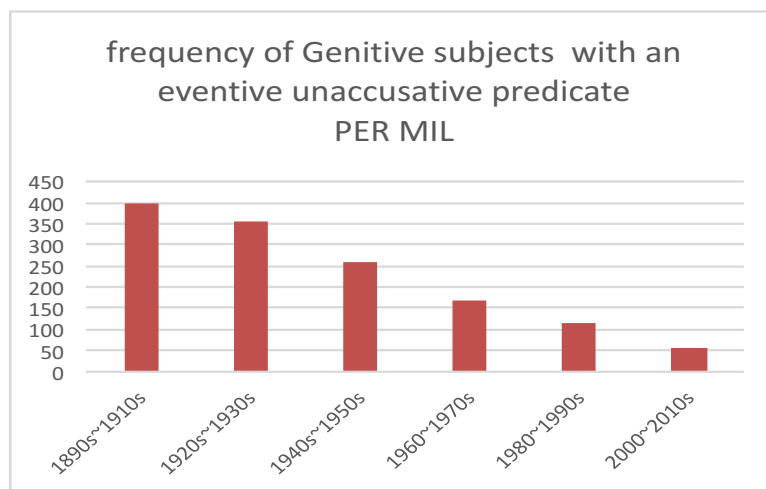
Kami-**ga/no** nagai hito

Hair- NOM/GEN long man

'a man whose hairs are long (i.e. longer than normal people)'

(9a) is the NGC in which a Nominative or Genitive subject co-occurs with a passivized transitive (PT) verb, and on our introspective judgments, a GSC here is most degraded. (9b) is the NGC in which a Nominative or Genitive subject co-occurs with an eventive unaccusative (EU) verb, and a GSC is slightly degraded. (9c) is the NGC in which a Nominative or Genitive subject co-occurs with a stative verb, and a GSC is perfectly acceptable; (9d) is the NGC in which a Nominative or Genitive subject co-occurs with an adjective, and a GSC is perfectly acceptable.

Figures 1 to 4 are diachronic changes in the frequency of the four sub-constructions of the GSC: Figure 1 shows that the frequency of a GSC with a passivized verb was originally lowest in frequency among the three types, as it was about 35 PER MIL in the highest two decades, and gradually declined to 5 PER MIL in the 2000-2010s.

<Figure.1: Frequency of genitive subjects with a passivized verb PER MIL between the 1890s and the 2010s>

<Figure.2: Frequency of genitive subjects with an eventive unaccusative verb PER MIL between the 1890s and the 2010s (cited from Ogawa (2018))>

Figure.2 shows that although the frequency of a GSC with an eventive unaccusative verb was about 400 PER MIL in the early 19th century, it decreased to 50 PER MIL in the 2000-2010s.

Figure.3 shows that although the frequency of a GSC with a stative verb was also about 400 PER MIL in the early 19th century and it decreased to 150 PER MIL in the 2000-2010s, it remains three times as much as the frequency of a GSC with an eventive

unaccusative verb, and it keeps 30 times as much as the frequency of a GSC with a passivized verb.

<Figure.3: Frequency of genitive subjects with a stative verb PER MIL between the 1890s and the 2010s (cited from Ogawa (2018))>

Figure.4 shows that although the frequency of a GSC with a stative verb was also about 850 PER MIL in the early 19th century and it decreased to 300 PER MIL in the 2000-2010s, it remains twice as much as the frequency of a GSC with a stative verb.
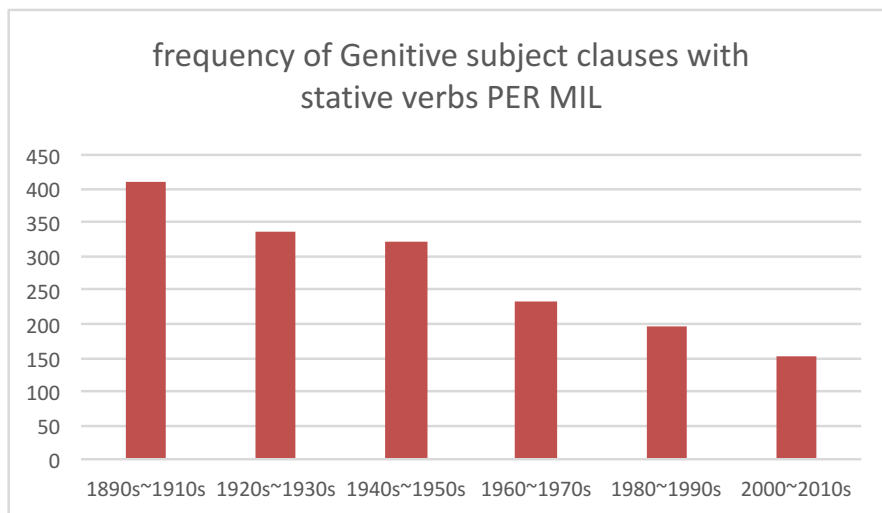
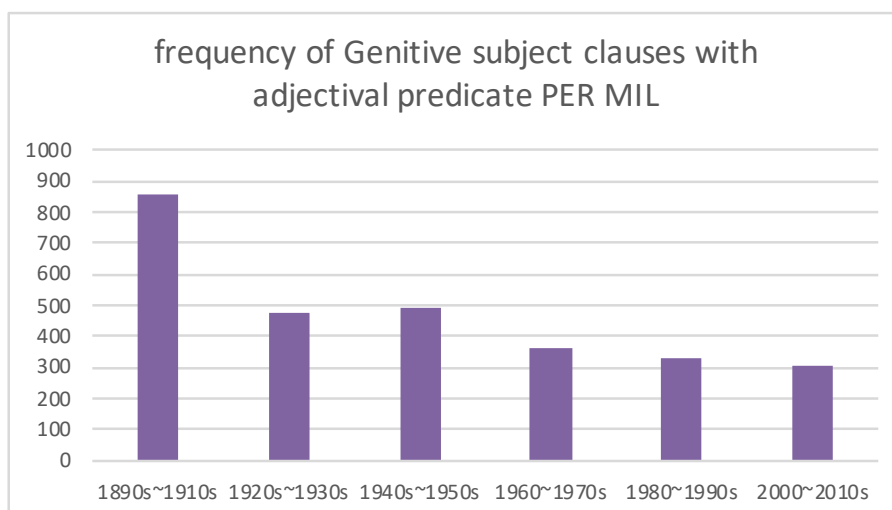
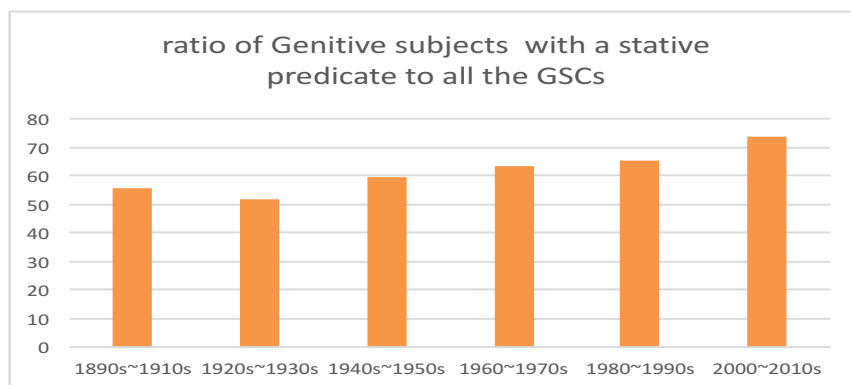
<Figure.4: Frequency of genitive subjects with an adjective PER MIL between the 1890s and the 2010s (cited from Ogawa (2018))>

Figure 5 shows that as a result of other sub-constructions of the GSC more steeply declining, the ratio of the GSCs with a stative predicate among all the tokens of the GSCs is gradually increasing in the 100 years.

<Figure 5: Ratio of the GSC with a stative predicate among all the GSCs between the 1890s and the 2010s (cited from Ogawa (2018))>

Figure 6 shows that due to the decrease in the frequency of the GSCs, the frequency of Genitive Subject Clauses and Nominative ones reversed in the mid of the 20th century.

<Figure 6: Frequency of the Genitive and Nominative Subject Adnominal Clauses between the 1890s and the 2010s (cited from Niikuni, Wada and Ogawa (2017))>
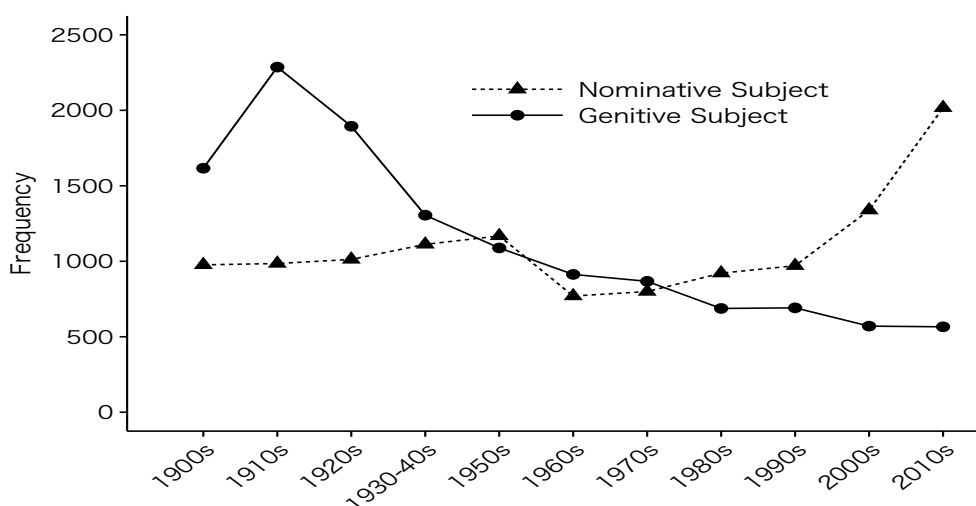
If the syntactic size of the GSCs has been shrinking from (8a) to (8d), under certain

assumptions, we will make a prediction that the older age groups that live now would show a relatively higher acceptability against a GSC of any type, but the younger age groups would allow only a Genitive subject to co-occur with a stative predicate. As a result, the GSC with a stative predicate has become highest in frequency and prevalent in the present-day Japanese (cf. Kim (2009), Miyagawa (2011), Nambu (2014)).

Suppose that the ongoing clause shrinking is correct and that there are a type of GSC that needs a higher functional head and another type of GSC that does not need such a higher functional head, what do we predict about the acceptability judgment of the former and the latter types of GSC by different age groups that live now? To see this, let us first compare (10a), which is a well-formed instance of the ECM construction in English and (10b), which is minimally different from (10a) by placing an overt complementizer at the left edge of the infinitive complement:

(10) a. John believes [$_{TP}$ Mary/her to be smart].
    b.*John believes [$_{CP}$ for [$_{TP}$ Mary to be smart]].

In (10a), it is usually assumed that the subject of the embedded clause is Case-marked by the matrix verb *believes* and that such an (exceptional) Case-marking is possible because the embedded clause lacks CP.[8] On the other hand, (10b) is ruled out because the existence of an overt complementizer *for* forces the embedded infinitive complement to be CP and the intervention of the CP-TP pair between the matrix verb and the embedded subject prevents the former from Case-licensing the latter properly. In other words, if the syntactic size of an embedded clause is larger than what is required, this leads to ungrammaticality due to a violation of a syntactic condition.

One might argue that he ill-formedness of (10b) can be attributed to Case Theory. However, consider (11a,b) and (12a,b):

(11) a. *John had Bill like French cooking.
    b. John made Bill like French cooking.
(12) a. *The mayor has more firemen altruistic during the summer.
    b. The mayor has more firemen available during the summer.

(11a,b) show Ritter and Rosen's (1993) observation that a small clause headed by an individual-level predicate can occur as the complement of the causative *make*, whose

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[8] "Case-marking" here can be innocuously replaced by "Case feature checking" in Chomsky (1995) or Agree and valuation in Chomsky (2001).

complement they argue is TP, but not the causative *have*, whose complement they argue is VP. Incidentally, (12a,b) show that the causative *have* can take a stage-level adjectival predicate as its complement.[9] The ill-formedness of (11a) and (12a) cannot be attributed to Case Theory, since the matrix verb have can Case-license the subject of the embedded small clause even if TP intervenes between them. Hence, we are led to adopt a more general selectional restriction on the syntactic size of an embedded clause for each embedded construction to the effect that a violation of the selectional restriction with the legitimate syntactic size being replaced by a larger (and illegitimate) one would lead to severe ill-formedness. In other words, if there is an additional functional projection in an embedded clause whose syntactic size is predetermined, then the native speaker will judge such a clause unacceptable.
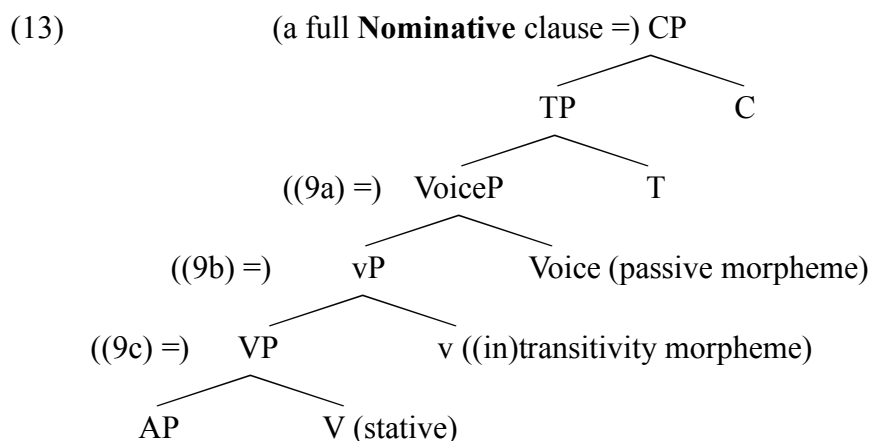
Next, let us consider a situation in which for a particular construction (i.e. embedded clause), the older native speakers will allow a larger syntactic size (with more additional functional projections) than the younger ones and that the particular construction needs a particular syntactic size, judging from the various overt elements realized in it. In such a case, we will predict that the older age group will accept such a construction, while the younger will not. In the process of clause shrinking, as in the case of the GSCs, this situation will occur successively and with gradualness, so that if there are a type of GSC which needs a functional category and another type of GSC which does not need it, it can be the case that the older age groups will accept both types of GSC, whereas the younger age group will accept only the smaller one without the relevant functional category. More concretely, given a GSC that needs TP and another GSC that needs vP but does not need TP, and if the unmarked structure of the GSC for the older age group is TP and that for the younger one is vP, then we will predict that the GSC with a vP will be accepted by both the two age groups, while the GSC with a TP will be accepted only by the older age group. If we compare three types of GSCs whose smallest possible syntactic sizes differ in a tripartite fashion, and if we compare three different age groups, then we will make a more fine-grained prediction with a certain kind of gradualness among sub-constructions and among age groups.

The main purpose of this article is to show that this prediction is exactly borne out, when we compare four types of GSCs: the GSC whose main predicate is (i) a passivized transitive verb (= (7a)), (ii) an eventive unaccusative verb (= (7b)), (iii) a simple stative verb (= (7c)), and (iv) an adjective (= (7d)).

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[9] See also Diesing (1992), who claims that a (small) clause with an existential subject and the stage-level predicate can be VP, while a (small) clause with an individual-level predicate must be TP with its subject base-generated in [Spec, TP] and controls a silent subject in [Spec, VP].

Suppose the universal functional hierarchy in (13) where the grammatical morpheme necessary for a passivized verb is Voice (cf. Collins (2005)), the grammatical morpheme necessary for transitivity is v (Chomsky (1995)), and no functional structure is necessary for simple stative verb or an adjective:

(13) (a full **Nominative** clause =) CP

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                                    CP
                                   /  \
                                  TP    C
                                 /  \
                   ((9a) =)  VoiceP    T
                            /      \
         ((9b) =)         vP        Voice (passive morpheme)
                        /    \
    ((9c) =)          VP      v ((in)transitivity morpheme)
                    /    \
                  AP      V (stative)
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Let us also adopt Bošković's (1997) Minimal Structure Principle (MSP) as in (14):

(14)   The Minimal Structure Principle (MSP) (Bošković (1997: 25))
       Provided that lexical requirements of relevant elements are satisfied, if two representations have the same lexical structure and serve the same function, then the representation that has fewer projections is to be chosen as the syntactic representation serving that function.

Then, it follows that the minimal structure necessary for (9a) is VoiceP as in (15a), that for (9b) is vP as in (15b), and that for (9c) is bare VP/AP as in (15c):

(15) Given the Minimal Structure Principle (MSP) in (9):
     a. The smallest possible GSC for (9a) is VoiceP.
     b. The smallest possible GSC for (9b) is vP.
     c. The smallest possible GSC for (9c,d) is VP/AP.

We proposed in (8a-d) that the older age group(s) tend to have a structure closer to (8a), while the younger age group(s) tend to have a structure closer to (8d). We also assume that a Nominative Subject Clause has been CP from the beginning. Hence, the Nominative Subject Clause can always contain any type of predicate, whether it is passive, eventive unaccusative, or stative.

If we combine these proposals and assumptions with the necessary consequences as stated in (15a-d), we will make the following four predictions:

I. Genitive subjects are judged less acceptable than Nominative ones when they are paired with eventive unaccusative verbs/passivized transitive verbs.
II. Genitive subjects are judged less acceptable when they are paired with passivized transitive verbs than when paired with an eventive unaccusative verbs.
III. Younger speakers judge the Genitive subjects paired with eventive unaccusative/ passivized transitive verbs as less acceptable than the older speakers.
IV. Genitive subjects are judged as acceptable as Nominative ones when they are paired with stative verbs/adjectives, regardless of the speakers' age.

The next section shows what experiment was conducted and how these predictions were borne out.

3. Experiment
3.1. Methods

Participants

Six hundred native speakers of Japanese were recruited through a Web-based survey administered on January, 2018. Each participant belonged to one of the following three age groups: (i) 65-74, (ii) 45-54 and (iii) 25-34 years old. The average ages (*SD*) of each age group were 67.4 (2.7), 49.1 (3.0), and 31.1 (2.7), respectively. All the participants met the following criteria: (i) born in the Tokyo metropolitan area (i.e., born in Tokyo, Saitama, Chiba, or Kanagawa Prefecture), (ii) raised in this area until the age of 15, (iii) now living in this area. The data were collected so that samples could be evenly divided by age group and by gender in each age group.[10]

Materials and Procedure

We created three types of sentences: (i) 12 of eventive unaccusative (EU)/passivized transitive (PT) type, (ii) 6 of stative verb (SV) type, and (iii) 6 of adjective (ADJ) type.

(16)   eventive unaccusative (EU)/passivized transitive (PT) type

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[10] See Ogawa, Niikuni and Wada (2017, 2018a, 2018b) for other experiments that support the "clause shrinking" hypothesis by means of other syntactic constructions.

a. Kaaten-ga/no   simar-tei-ru   heya-wa   titi-no
    curtain-Nom/Gen   close$_{unacc}$-Perf-Nonpast   room-Top   father-Gen
    syosai-desu.   (EU)
    study-is
    'The room whose curtain has (been) closed is my father's study.'

b. Kaaten-ga/no   sime-rare-tei-ru   heya-wa   titi-no
    curtain-Nom/Gen   close$_{tr}$-Pass-Perf-Nonpast   room-Top   father-Gen
    syosai-desu.   (PT)
    study-is
    'The room whose curtain has been closed is my father's study.'

(17)   stative verb (SV) type[11]

Totte-ga/no   tui-ta   koppu-wa   kodomoyoo-no   mono-desu.
grip-Nom/Gen   attach$_{unacc}$-Past   cup-Top   children.for-Gen   thing-is
'The gripped cup is for children.'

(18)   adjective (ADJ) type

Me-ga/no   ookii   onnanoko-wa   dansee-ni   suka-re-yasui
Eye-Nom/Gen   large   girl-Top   man-by   like-Pass-easy
'Girls whose eyes are large are easy to be liked by men.'

The Nominative-subject part (e.g., *Kaaten-ga simat-tei-ru…* 'curtain-Nom close$_{unacc}$-Perf-Nonpast') and the Genitive-subject part (e.g., *Kaaten-no simat-tei-ru…* 'curtain-Gen close$_{unacc}$-Perf-Nonpast') of a sentence were always presented in pairs, and participants were asked to rate the acceptability of each part on a 5-point Likert scale ranging from 0 (unacceptable) to 4 (acceptable). In regard to EU/PT type sentences, the sentence pairs were distributed over two lists using a Latin square design with EU and PT conditions counterbalanced across lists. [12] For all types of sentences, a Nominative-subject part of a sentence was presented above a Genitive subject one for half the participants of each age group, while for the other half, a Genitive-subject part

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[11] What appears to be the past-tense form of the verb *tui-ta* here is interpreted here like a perfective aspect, just as *crooked* of *a crooked nose* is. In both cases, there is no past event of a grip having been attached to a cup or a nose having been crooked implied. Hence, the morpheme *–ta* is not a realization of the head of TP (see Takahashi (1973) and Kinsui (1994) for relevant arguments) but is part of the complex word on V. Hence, we need no TP or AspP in the relative (small) clause in (17). See also note 6 for a relevant discussion.

[12] The Nominative-subject part and the Genitive-subject part of the identical pair were always presented in the same Predicate type condition.

was presented above a Nominative-subject one in each pair.

In addition to the 24 pairs of the target sentences above, we prepared 12 pairs of filler sentences. A total of 36 pairs of sentences were presented on a page on the Web browser in individually randomized order. Participants were allowed to change their answers unless they proceeded to the next page. In the questionnaire, two pairs of dummy items were mixed into the experimental items. Participants were instructed to make the specified answer (rating '0' or '4') for these dummy items. If a participant made a different answer from what was specified at least once for the dummy items, we excluded their data from the analyses.

The experiment was approved by the human ethics committee of the Graduate School of Information Sciences, Tohoku University

3.2. Results

Data Analysis

The data from 42 participants of 65-74 age group, 29 of 45-54 age group, and 29 of 25-34 age group were excluded from the analyses because they made an answer different from what was specified at least once for the dummy items. Then, taking the rating scores (0 to 4: larger values mean that the sentence is more acceptable) as an independent variable, we performed linear mixed effects model analyses with participants and items as random factors (Baayen, Davidson, & Bates, 2008), using the *R* programming language (R Core Team, 2017) and the *lmer* function within the *lmerTest* package (Kuznetsova, Brockhoff, & Christensen, 2017). We included random intercepts and slopes for the fixed factors and interactions (i.e., maximal random effects), unless the model failed to converge. The mixed model analyses were conducted separately by the sentence type. In the analysis for EU/PT type sentences, we included Predicate type (EU/PT), Case particle (Nom/Gen), and Age of the participant (continuous value) as fixed effects with interactions between the factors (i.e., Predicate type × Case particle, Predicate type × Age, Case particle × Age, and Predicate type × Case particle × Age) allowed. In the analyses for SV and ADJ type sentences, we included Case particle and Age as fixed effects with the interaction between them allowed. Categorical variables (i.e., Predicate type and Case particle) were centered with deviation coding, and a continuous variable (i.e., Age) was standardized by subtracting the mean value and dividing by the SD.
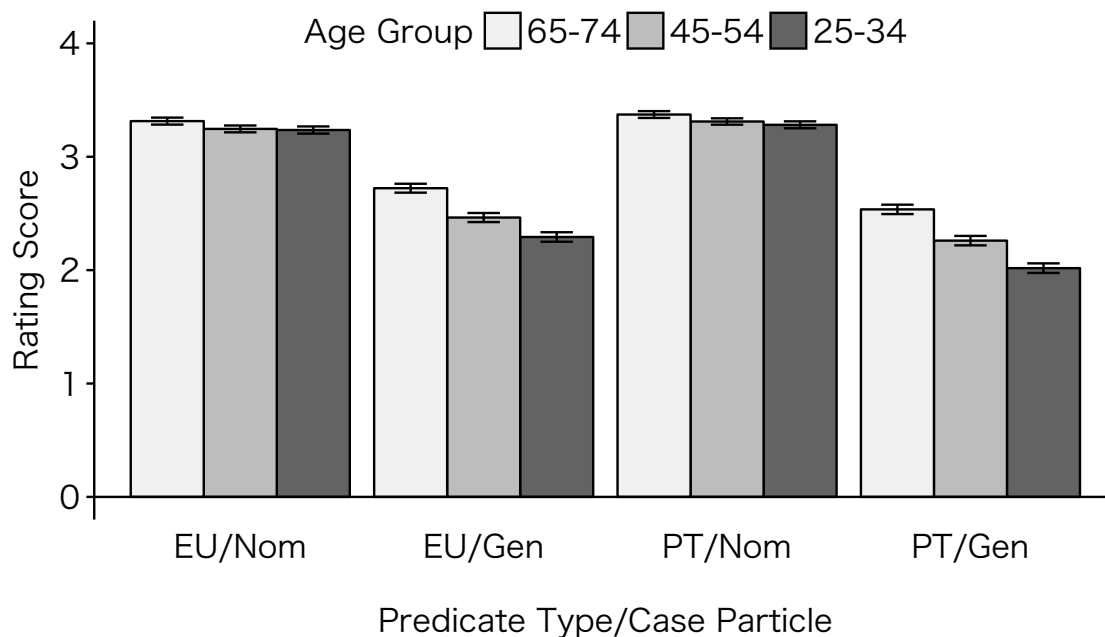
EU/PT Type

Figure 5. Mean rating scores for the EU/PT sentences. Error bars indicate standard errors of the mean by participant.

Figure 5 shows the mean rating scores for the EU/PT sentences by age group for each experimental condition, and Table x1 shows the results of the statistical analysis. As shown in Table x1, a mixed effects model found significant main effects of Predicate type ($p < .001$) Case particle ($p < .001$), and Age ($p < .001$). The mixed model also found significant interactions between Predicate type and Case particle ($p < .001$) and between Case particle and Age ($p < .001$). Neither the Predicate type × Age interaction ($p = .15$) nor the three-way interaction ($p = .41$) were significant.[13]

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[13] We also conducted by-participant and by-item 2 × 2 × 3 ANOVAs, treating Age as a categorical variable (65-74/45-54/25-34), and obtained the same results: significant main effects of Predicate type, Case particle, Age and significant interactions between Predicate type and Case particle and between Case particle and Age ($ps < .01$). A follow-up analysis showed that in the Genitive Case particle condition, all the rating score differences between age groups were significant (65-74 > 45-54 > 25-34, $ps < .05$, the Holm's correction was applied), but not in the Nominative Case particle condition.

Table x1. Results of the linear mixed effects model analysis for EU/PT type sentences.

	β	SE	t	p
(Intercept)	3.83	0.04	100.10	< .001
Predicate type	-0.08	0.02	-5.22	< .001
Case particle	-0.92	0.07	-12.26	< .001
Age	0.11	0.03	3.96	< .001
Predicate × Case	-0.28	0.04	-7.30	< .001
Predicate × Age	0.02	0.02	1.43	n.s.
Case × Age	0.17	0.05	3.45	< .001
Predicate × Case × Age	0.03	0.04	0.83	n.s.

For the significant Predicate type × Case particle and Case particle × Age interactions, we conducted follow-up analyses for examining simple-main effects of Predicate type/Age by each Case particle condition. The analysis revealed that the simple-main effect of Predicate type was significant in the Genitive Case particle condition (β = -0.22, SE = 0.03, t = -8.11, p < .001). Simple-main effect of Predicate type was also significant in the Nominative Case particle condition (β = 0.05, SE = 0.02, t = 3.30, p = .001), the coefficient suggesting that EU sentences were judged less acceptable than PT sentences, contrary to the case of Genitive Case particle condition[14]. It was also revealed that the simple-main effect of Age was significant in the Genitive Case particle condition (β = 0.20, SE = 0.05, t = 4.34, p < .001), but not in the Nominative Case particle condition (β = 0.03, SE = 0.03, t = 0.83, p = .41).

In summary, the results of the statistical analyses indicated that (a) in the Genitive Case particle condition but not in the Nominative Case particle condition, PT sentences were judged less acceptable than EU sentences, (b) in the Genitive Case particle condition, but not in the Nominative Case particle condition, younger participants judged the EU/PT type sentence less acceptable. These results correspond with the prediction II and III above, respectively. In addition, highly significant main effect of Case particle indicated that Genitive Case particle sentences were judged significantly less acceptable than Nominative Case particle sentences, supporting the prediction I.

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[14] We have no idea how to explain why the Nominative-subject EU sentences were judged less acceptable than Nominative-subject PT sentences, although the difference of the mean rating scores was slight (3.26 vs. 3.32).

SV and ADJ Types

Figure 6 and 7 show the mean rating scores for the SV and ADJ sentences by Age group for each Case particle condition. For both of these types of sentences, mixed effects models found no significant main effects of Case particle (SV: β = -0.03, SE = 0.07, t = -0.39, p = .70; ADJ: β = -0.10, SE = 0.06, t = -1.54, p = .15) or Age (SV: β = 0.05, SE = 0.03, t = 1.53, p = .13; ADJ: β = 0.04, SE = 0.03, t = 1.41, p = .16). It also found no significant interactions between the two factors (SV: β = 0.07, SE = 0.05, t = 1.43, p = .16; ADJ: β = 0.10, SE = 0.05, t = 1.97, p = .054). These results are consistent with the prediction IV.
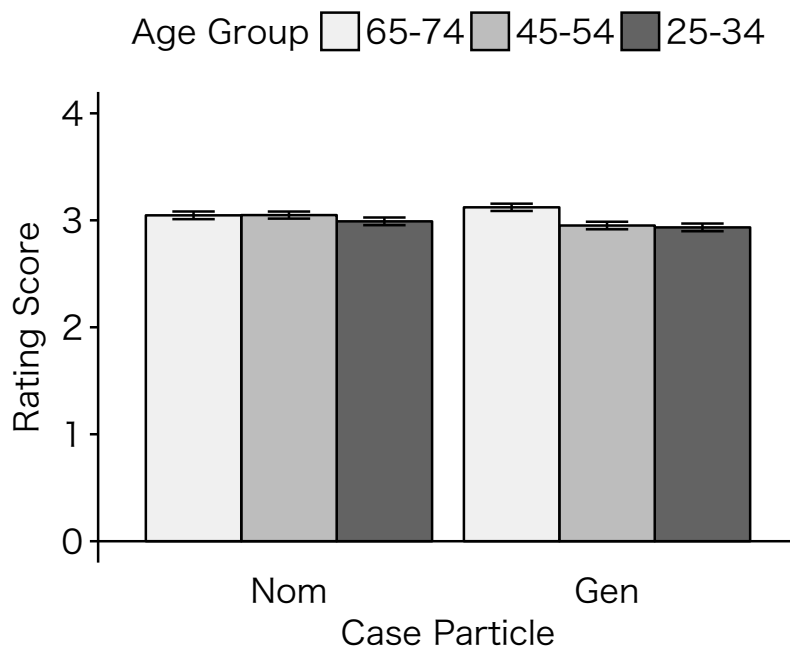
Figure 6. Mean rating scores for the SV sentences. Error bars indicate standard errors of the mean by participant.
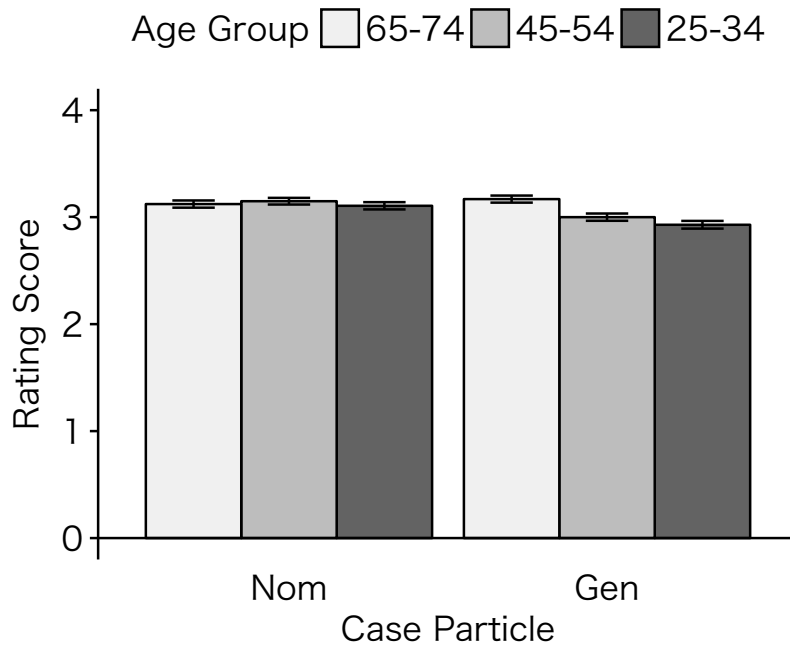
Figure 7. Mean rating scores for the ADJ sentences. Error bars indicate standard errors of the mean by participant.

4. Discussion

In the previous section, we obtained the following four results:

(i)   EU/PT type sentences were judged less acceptable in the Genitive case particle condition than in the Nominative Case particle condition.

(ii)   In the Genitive case particle condition, but not in the Nominative case particle condition, PT sentences were judged less acceptable than EU sentences.

(iii) In the Genitive case particle condition, but not in the Nominative case particle condition, younger participants judged the EU/PT type sentence less acceptable.

(iv)   For the SV and ADJ types, there were no significant effects of case particle or participant's age on the rating scores (no interactions were also found).

Among these, an explanation of the Nominative particle condition is immediate and simple: We assume, following Chomsky (2001) and Miyagawa (2011), among many others, that the Nominative Case is formally licensed by the functional head C, via Agree, feature inheritance to T, and movement of the Nominative subject to [Spec, T]

for EPP satisfaction. Given this general mechanism, the Nominative subject sentences must always be as large as CP. Given CP, not only the PT/EU sentences and the SV/ADJ sentences but also any other type of sentence can be generated in it. Hence, they should be perfectly acceptable for all age groups. This is why the Nominative Case particle condition shows no difference among age groups or among the predicate types.

On the other hand, the Genitive Case particle condition shows both the construction-dependent difference and the intergenerational difference. In our hypothesis, these are attributable to the diachronic "clause shrinking" of the GSC and the MSP, which allows the PT sentences to be VoiceP, and the EU sentences to be vP.

Note that in (13), VoiceP is larger than vP and VoiceP is headed by a passive morpheme (*rare* in Japanese), while vP is headed by an (in)tansitivity morpheme. This syntax-morphology correspondence is ensured from Baker's (1985) Mirror Principle, which is stated as below:

(19)   The Mirror Principle (Baker (1985: 375)):
        Morphological derivations must directly reflect syntactic derivations (and vice versa).

Given that there are a lexical head X and two functional heads Y and Z, where ZP dominates YP, which dominates XP, then (19) forces a morpheme that realizes on Y to appear closer to X than Z. Now that VoiceP is higher than vP and that the two heads are both morphologically realized, then (19) predicts that in Japanese, a head-final, agglutinative language, the morphological alignment should be: V-[(in)tansitivity morpheme]-[passive morpheme]. This prediction is indeed borne out:

(20) a. Kagi-ga   kak-ar-ta   heya
         key-Nom   lock-Intr.-Past room
         'the room that has been locked'   <eventive unaccusative (EU) predicate>

     b. Kagi-o   kak-e-ta   heya
         key-Acc   lock-Tr.-Past   room
         'the room that (someone) locked'   <eventive transitive predicate>

     c. Kagi-ga   kak-e-rare-ta   heya
         key-Nom   lock-Tr.-Pass-Past   room
         'the room that was locked.'   <passivized transitive (PT) predicate>

In (20a), *kak-ar-ta* 'locked_unacc' is a combination of a verb and an intransitive morpheme

ar, while in (20b), *kak-e-ta* 'locked$_{tr}$' is a combination of a verb and a transitive morpheme. Now, look at (20c), where *kak-e-rare-ta* 'lock$_{tr}$-Pass-Past' is a passivized transitive verb and the transitivizing morpheme is closer to the verbal root than the passivizing morpheme, which is explained under (19) only if we assume the structure in (13).

Now that the structure in (13) is well-established (Collins (2005)) and that the minimal projection necessary for the PT sentences to occur is larger than that necessary for the EU sentences, we can derive the lower acceptability of the PT sentences compared with the EU sentences from the Minimal Structure Principle (MSP), as introduced in (14).

The MSP was originally proposed not as a principle that work in the course of language acquisition but as an economy principle an adult native speaker uses in choosing one out of the potentially ambiguous synchronic structures for an expression in their native language. Consider (21):

(21)   the man [John likes *t*]
    a. the man [$_{CP}$ OP$_i$ [φ_C [$_{TP}$ John likes t_i]]]   (OP is moved to [Spec, C])
    b. the man [$_{TP}$ OP$_i$ [$_{TP}$ John likes t_i]]   (OP is adjoined to TP)

Given that the structure of (21) is potentially ambiguous between (21a) and (21b), the MSP forces the structure in (21b) to be chosen as "more economical," because (21a) and (21b) have the same lexical structure (i.e. phonological realization) and serve the same function (because a complementizer is semantically vacuous), and (21b), which contains only TP, has a smaller number of functional categories than (21a), which contains both CP and IP.

In this sense, (14) is not a principle on language acquisition. However, it has recently been proposed that a similar principle of "economy" on structure building is at work in the course of language acquisition. Westergaard (2014: 32-33) argues that it is not the case that children do not make any error in their spontaneous production, and yet, such an error is limited to a particular pattern: some elements tend to occur in a lower position than what the target language requires. In order to explain this pattern of errors, she claims that "children are *economical* in their production and will not produce an element, perform a movement operation or build syntactic structure, unless there is clear evidence for it in their input." She attributes the children's economical production to what Chomsky (2005) refers to as "third factors."

If some economy principle is at work in both adults' syntactic computation and

children's speech production, and if such an economy condition is based on "third factors," then it will inevitably play some role in language change, under the situation that more than one structural analyses are available for a single set of terminal nodes. In other words, suppose that there is a child who is unintentionally searching for cues necessary for fixing the value of a relevant parameter, and that the relevant part of the grammar of their language is now undergoing gradual syntactic change, so that there are an increasing number of constructions that allow a simpler structural analysis, which were unavailable when the caretakers were children themselves. In such a situation, it is naturally expected that the children exposed to such a variable set of linguistic utterances will be led to set the value of a single parameter that is different from that of their caretakers.

To be more concrete, let us look back to Figures 1 to 4. Here, we can see that although the GSCs with either type of predicate have all been decreasing their frequency in the last 100 years, both of their original frequencies and the gradients of decline differ from each other: the frequency of the GSCs with a passivized verb has been the lowest, that of the GSCs with an eventive unaccusative verb has been second lowest, and these two constructions have steeply decreased their frequencies (from about 35 PER MIL in the highest point to about 5 PER MIL in the lowest in the former; from about 400 PER MIL in highest point to about 50 PER MIL in the lowest), while the gradient of the decline of the two types of stative predicates is relatively slow (i.e. the frequency of the GSC with a stative verb changed from about 400 PER MIL in the highest to 150 PER MIL in the lowest, and the frequency of the GSC with an adjective changed from about 800 PER MIL in the highest to 300 PER MIL in the lowest. As a result, you can see that the ratio of the GSCs with a stative predicate (verb or adjective) among all the tokens of the GSCs is gradually increasing in the 100 years (see Appendix for the relevant Tables).

Now that more and more tokens of the GSCs have been stativized and given the MSP, stative predicates can be the bare VP or AP. Then, children that were born more recently have been more frequently and more exclusively exposed to the GSCs with a stative predicate, and hence they will be more likely to identify the syntactic size of the GSC as (8d). This is why the diachronic clause shrinking has been ongoing.[15]

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[15] Incidentally, Ogawa (2018) shows that the GSC that contains an overt complementizer, as in (ia,b) below, was sporadically found in publications in the early 20th century (it was about 67 PER MIL, which was more frequency than the GSCs with a passivized verb, in the 1890s to 1910a), though it has steeply declined and almost totally disappeared in the 2000s to 2010s (0.34 PER MIL):
(i) a. Daiichi, densha-**no** tintin naru **node** odoroi-ta.
　　　first.of.all tram-**Gen** ting-ting make-sound **because** be.surprised-Past
　　　'First of all, I was surprised because trams (often) make a sound of ting-ting.'

Given the diachronic clause shrinking hypothesis of the GSC, let us now discuss why the younger age groups show lower acceptability for the EU and PT sentences and why the PT sentences are less acceptable than the EU sentences for each age group.

First, recall that the participants of our experiment belong to either of the following three age groups: 25-34, 45-54, and 65-74 years old, respectively. Also, recall from note 5 that Harada (1971) identified Dialect B speakers as people in their twenties some forty five years ago, which means that they are in their mid sixties to mid seventies as of the year 2018. Hence, we assume that the 65-74 group, 45-54 group, and 25-34 group are more or less equivalent to the Dialect B, C, and D speakers, respectively. Note also that while the Dialect B speakers will have TP as the unmarked structures for the GSC, the Dialect C and D speakers will have vP and VP/AP as the unmarked structures for the GSC, respectively.

With these in mind, let us first consider the PT sentences. For the Dialect C and D speakers, the PT sentences, whose smallest possible structure is VoiceP, cannot be generated by their grammar. By contrast, for the Dialect B speakers, both the PT sentences and the EU sentences can be generated by their grammar in which the unmarked GSC = TP. Hence, we can explain why Dialect B and C/D speakers should be different in their acceptability judgments of the PT sentences with a Genitive subject.

Second, let us consider the EU sentences. For the Dialect D speakers, whose unmarked structure of the GSC is VP/AP, not only the PT sentences but also the EU sentences, whose smallest possible structure is vP, cannot be generated by their grammar. By contrast, for the Dialect B and C speakers, whose unmarked structures for the GSC is TP and vP, respectively, the EU sentences can be generated by their grammar. Hence, we can explain why Dialect B/C and D speakers should be different in their acceptability judgments of the EU sentences with a Genitive subject.

Third, let us consider the SV/ADJ sentences. As the smallest possible structure for generating a GSC including either SV/ADJ is bare VP/AP, which can be generated by all the Dialect B, C, and D speakers. Hence, we can explain why the SV/ADJ sentences do not show any intergenerational difference in acceptability: all the three age groups judge the GSC with a SV/ADJ predicate as equally acceptable, and in fact, they judge the relevant GSCs as acceptable as the corresponding Nominative Subject Sentences (NSCs).

(Soseki Natsume (1908) *Sansiro*, p.21)

b. Yo-**no**   akeru   **toiu**   koto-ga … soo   hayaku   kite-wa   naranai   ...
    night-Gen break **Comp** fact-Nom so   early   come-Top must not
    'the situation in which a day breaks must not come so early, …'
    (Ryunosuke Akutagawa (1916), *Imogayu*, p.16)

The presence of intergenerational differences in the PT/EU sentences and its absence in the SV/ADJ sentences are explained in this way. However, the explanation so far is incomplete, since we have not yet explicated why Dialect C and D speakers are different in their acceptability of the PT sentences with a Genitive subject, and why Dialect B and C speakers are different in their acceptability of the EU sentences with a Genitive subject. In order to solve this potential problem with our hypotheses, let us suppose (22) as a way to correlate the degree of deviance from one's unmarked structure to the degree of lower acceptability of the target sentence shown by him or her:

(22)   The Markedness Condition on Acceptability Judgment:[16]
         The larger the degree of deviance is from the unmarked structure that can be
         generated by the speaker, the less acceptable the generated structure is judged
         to be.

(22) is a hypothesis about how (adult) native speakers tend to rate the acceptability of a sentence they are asked to judge in reflection to their own grammar, which was fixed in their childhood: more concretely, it says that a sentence is judged less acceptable if the degree of deviance from the unmarked structure their grammar generates is larger. Recall our hypothesis, which states that the structure of a GSC has been shrinking from (8a) to (8b) to (8c) to (8d) in the last 130 years, where (8a,b,c,d) are assumed to be the "unmarked" structure for the speakers of each of the Dialect A, B, C, and D, respectively.

Given the four different dialects and (22), our prediction of how each of the three different dialect speakers will judge the PT sentence (which requires at least VoiceP) will be as follows: for Dialect B speakers, for whom the unmarked GSC is TP, a Genitive subject PT sentence needs no deviance from their unmarked structure, while it is deviant from the unmarked structure of a GSC for Dialect C speakers (= vP) by one projection and for Dialect D speakers (= VP/AP) by two projections. Given (22), the further degree of deviance will lead to a lower acceptability. We can thus explain why the three different dialects' speakers will make the three-way distinct ratings for PT sentences with a Genitive subject.

In the following table, the numbers 0 to 2 show the degree of deviance each GSC sentence shows against the unmarked structure for each of the three age groups, where

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[16] Ogawa (2018) assimilates (22) to a kind of condition that judges cumulative violations of multiple conditions as more deviant expressions, which was prevalent in the P&P framework. Thus, a violation of Subjacency and the ECP was assumed to be more severely degraded than a mere violation of Subjacency.

the larger numbers show a larger deviance, and hence a lower acceptability:

Age groups	25-34	45-54	65-74
Unmarked GSCs	VP/AP	vP	TP
PT (VoiceP)	2	1	0
EU (vP)	1	0	0
SV/ADJ (VP/AP)	0	0	0

<Table 2: the degree of deviance (the first approximation)>

As for the question of why each of the three different dialect speakers will judge the EU sentences (which requires at least vP), even an application of (22) would escape a natural explanation of it, as far as the EU sentence in (16a) would have the structure of vP. However, if we look at the sentences presented to the participants more carefully, we find that the EU and PT verbs are followed by the aspectual suffix –*teiru*, which here implies the persistence of the result state of the event denoted by the verb. Thus, *X-ga simar-teiru* 'X has closed' means that there was an event of X closing in the past and the result state of X being closed has continued; *X-ga sime-rare-teiru* 'X has been closed' also means that there was an event of X being closed by someone in the past and the result state of X being closed has continued. In order to express the information of aspect syntactically, something additional needs to be introduced.

Smith (1991) makes a distinction between viewpoint aspect and situation aspect. The former is usually expressed morphologically by *have + V+en* (perfective) or *be + V+ing* (imperfective) in English and *V+teiru* (perfective or imperfective) in Japanese, while the latter can also be referred to as Aktionsart. However, *V+teiru* in Japanese is different from the viewpoint aspect morphemes in English in several respects: first, in Japanese, there are some verbs for which –*teiru* is obligatory in a simple root clause, which Kindaichi (1950) referred to as "*dai-yonshu doosi* 'the forth kind of verb'" (cf. also Ogawa (2004)):

(23) a.   Taro-wa   sono   uwasa-o   sir-tei-ru/*si-ru.
        Taro-Top   that   rumor-Acc   know-Asp-Nonpast/*know-Nonpast
        'Taro knows the rumor.'
      b.   Taro-wa   okaasan-ni   ni-tei-ru/*ni-ru.
        Taro-Top   mother-to   resemble-Asp-Nonpast/*resemble-Nonpast
        'Taro resembles his mother.'

c. Tooku-ni   takai yama-ga   sobie-tei-ru/*sobie-ru.

far.place-at   high mountain-Nom soar-Asp-Nonpast/*soar-Nonpast

'A high mountain soars in a distant place.'

As the translations into English show, the verbs corresponding to *sir-teiru, ni-teiru,* and *sobie-teiru* are simple stative verbs for which the aspectual morpheme is unnecessary (in fact, impossible). However, these verbs are always used with an aspectual morpheme *–teiru* in Japanese. In this sense, the morpheme *–teiru* attached to these stative verbs can be regarded as part of Aktionsart.

On the other hand, the same morpheme can also be used to express a viewpoint aspect, such as perfective, as in (24a), or progressive (i.e. imperfective), as in (24b); many combinations of *V+teiru* are ambiguous in this way, and which situation they are expressing is usually determined either contextually or by the modifiers on the verb:

(24) a. Kareha-ga   kawamo-ni   ochi-tei-ru.

Dead-leaf-Nom surface.of.the.river-on   fall-Asp-Nonpast

'Dead leaves have fallen on the surface of the river.'

b. Kareha-ga   hirahirato   ochi-tei-ru.

Dead-leaf-Nom flutteringly   fall-Asp-Nonpast

'Dead leaves are falling flutteringly.'

Because of the complex uses of the aspectual morpheme *–tei(ru)* in Japanese, we can reasonably assume that if there are more than one syntactic position for aspectual morphemes, the morpheme *–tei(ru)* can be mapped into such different syntactic positions, depending on the semantic interpretation and in line with the Mapping Hypothesis.

Among proponents of the variable syntactic mapping of aspectuality are Cinque (1999, 2006), Ramchand (2008), and Travis (2010). Among others, Travis (2010) proposes that there are two verbs in a simple sentence corresponding to the initiating event and the changing event, respectively, and that there are two aspectual functional heads, Higher-Aspect (or H-asp) and Lower aspect (or L-Asp), interleaving with them, as in (25):

(25)

```
                        TP
                   /         \
              H-AspP          T
             /      \
           VP       H-Asp
          /   \
        SBJ    V′
              /    \
          L-AspP    V
          /    \
        VP     L-Asp
       /   \
     OBJ    V
```

Moreover, given (13), where we have splitted VoiceP and vP, it seems we need an additional AspP between VoiceP and vP, as there are following examples, where the aspectual morpheme occurs higher than the transitivity morpheme and lower than the passive morpheme:

(26) a.   Soko-ni anata-ni tat-tei-rare-ru   to, meiwaku da.
          there-at you-by   stand-Asp-Pass-Nonpast if annoyance Cop
          'I am annoyed if I have you stand there.'
     b.   Soko-de anata-ni mi-tei-rare-ru   to, yari-nikui.
          there-at you-by   look-Asp-Pass-Nonpast   if do-hard
          'It is hard to do (it) if I have you look at me there.'
     c.   mado-o   sime-tei-rare-ru   to, naka-ga   mie-nai   janaika.
          Window-Acc close$_{tr}$-Asp-Pass-Nonpast   if inside-Nom see-Neg   Mod
          'If I have the window closed, I cannot see into (the room), can I?'

Incidentally, the order between the passive morpheme and the aspect morpheme can be interchangeable, as you can see from the comparison between (26) and (27):

(27) a.   Soko-ni anata-ni tat-rare-tei-ru   to, meiwaku da.
          there-at you-by   stand-Pass-Asp-Nonpast if annoyance Cop
     b.   Soko-de anata-ni mi-rare-tei-ru   to, yari-nikui.
          there-at you-by   look-Pass-Asp-Nonpast   if do-hard
     c.   mado-o   sime-rare-tei-ru   to, naka-ga   mie-nai   janaika.
          Window-Acc close$_{tr}$-Pass-Asp-Nonpast   if inside-Nom see-Neg   Mod

This means that there are at least three syntactic positions for *–teiru* in Japanese.

In order to accommodate (26) and (27) in line with Travis's (2010) structure in (25), we assume (28), where three aspectual functional heads are called L-AspP, M-AspP, and H-Asp, and the higher verb in (25) can be innocuously replaced by vP:

(28)

```
                                  TP
                         ┌─────────┴──────┐
                      H-AspP              T
                ┌────────┴──────┐
             VoiceP          H-Asp (= teiru in (16b) and (27a-c))
        ┌───────┴──────┐
     M-AspP          Voice (= rare)
    ┌────┴─────┐
   vP        M-Asp (= teiru in (16a) and (26a-c))
 ┌──┴──┐
SBJ    v'
   ┌────┴─────┐
L-AspP      v (= transitivity morpheme)
 ┌──┴─────┐
VP       L-Asp (= teiru in (23a-c))
┌─┴──┐
OBJ  V
```

(28) differs from (13) in that we postulate three syntactic positions for the aspectual morpheme, one lower than vP, a second between vP and VoiceP and a third higher than VoiceP, and the the intermediate AspP is represented as M-AspP.

Now, given (28), let us consider where the morpheme –*teiru* in (16a,b) can occur in (26). As for (16b), where the morpheme follows the passive morpheme, the answer is relatively clear, as the Mirror Principle forces the aspectual morpheme to be higher in syntax than the passive morpheme. Thus, -*teiru* in (16b) should occupy the head of H-AspP. By contrast, there are potentially two different positions for the aspectual morpheme –*teiru* to occur for (16a), as it simply follows the transitivity morpheme –*ar*-.

Given the MSP, however, we can disambiguate the syntactic position as the head of M-AspP, as it enables (16a) to have the smaller structure of M-AspP than the larger structure of H-AspP.

If –*teiru* in (16a) occupies M-Asp and the particular EU sentence can minimally be M-AspP, while –*teiru* in (16b) occupies H-AspP and the particular PT sentence can minimally be H-AspP, then we can attribute the different acceptability of (16a) among Dialect B, C, and D speakers to the Markedness Condition on Acceptability Judgment in (22). The argument goes as follows: first, for Dialect B speakers, whose unmarked structure for the GSCs is TP, the minimal EU sentence with –*teiru*, which is M-AspP, can be generated by their grammar. Hence, there is no violation of (22). Second, for Dialect C speakers, whose unmarked structure for the GSCs is vP, the minimal EU

sentence with –*teiru*, i.e. M-AspP, is deviated from their unmarked structure by one functional projection: M-AspP. Third, for Dialect D speakers, whose unmarked structure for the GSCs is VP/AP, the minimal EU sentence with –*teiru*, i.e. M-AspP, is deviated from their unmarked structure by three functional projection: M-AspP, vP, and L-AspP. Hence, there are three different variations in acceptability of the EU sentence with –*teiru* in (16a).

The discussion so far is summarized in the following table, where the number 0 to 4 shows the degree of deviance each GSC sentence shows against the unmarked structure for each of the three age groups:

Age groups	25-34	45-54	65-74
Unmarked GSCs	VP/AP	vP	TP
PT+*teiru* (H-AspP)	4	2	0
EU+*teiru* (M-AspP)	3	1	0
SV/ADJ (VP/AP)	0	0	0

<Table 3: the degree of deviance (the final version)>

5. Conclusion

We have argued that a combination of the Minimal Structure Principle in (14), the Mirror Principle in (19), and the Markedness Condition on Acceptability Judgment in (22), along with the assumption on tripartite aspectual functional heads L-AspP, M-AspP, and H-AspP, we can explain the following facts in a principled way: (i) the PT sentence with a Genitive subject shows a lower acceptability than the EU sentence with a Genitive subject, which shows a lower acceptability than the SV/ADJ sentences with a Genitive subject for all the three age groups; (ii) the younger age groups show a lower acceptability for both the PT and EU sentences than the older age groups, but not for the SV/ADJ sentences with a Genitive subject, which is judged as acceptable as their Nominative subject counterparts for all the three age groups; and (iii) there is no significant difference in acceptability between the PT and EU sentences with a Nominative subject. All these facts are explained by our basic claim that the GSCs have been undergoing diachronic clause shrinking from CP to TP to vP to VP/AP in the last 100 years, while the NSCs continue to be CP throughout the period. Hence, we can safely conclude that the diachronic clause shrinking hypothesis receives an additional empirical support.

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Appendix:

Table 8: the diachronically changing frequency of the GSC per million characters (sorted by the year of publication)							
Publication years	1890s~1910s	1920s~1930s	1940s~1950s	1960~1970s	1980~1990s	2000~2010s	total
birth years of authors on average	1872.29	1889.22	1898.31	1914.95	1936.44	1959.77	
Total volumes of the source of GSCs	7	9	14	18	32	50	130
the number of characters counted	906197	750616	1966381	2479676	4906921	5557522	16567313
the total number of GSCs counted	2080	1172	2682	2330	3979	3480	15723
the frequency of GSCs PER MIL	2295.31	1561.38	1363.93	939.64	810.90	623.44	decreasing
the frequency of Genitive subjects in a past tense clause PER MIL	461.27	373.03	269.02	180.67	171.19	95.86	decreasing
the frequency of Genitive subjects non-adjacent to the predicate PER MIL	226.22	151.88	118.49	36.30	20.99	15.86	decreasing
the frequency of Genitive subjects whose predicate is stative PER MIL	1270.14	810.00	812.15	594.84	527.62	459.82	decreasing
the frequency of Genitive subjects whose predicate is an unaccusative eventive verb PER MIL	496.58	362.37	216.64	159.30	115.75	63.27	decreasing
the frequency of Genitive subjects whose predicate is a transitive or unergative verb PER MIL	486.65	335.72	295.47	170.18	157.13	93.79	decreasing
the frequency of Genitive subjects whose predicate is an individual-level predicate PER MIL	62.90	41.30	25.43	10.89	4.69	2.59	decreasing
the frequency of Genitive subjects whose predicate is nominal PER MIL	19.86	18.65	14.75	3.23	1.63	0.86	decreasing
the frequency of Genitive subjects whose predicate is a passivized verb PER MIL	22.07	34.64	24.92	12.10	8.76	5.69	decreasing
the frequency of GSC headed by a formal noun or an adnominal form of a predicate PER MIL	1377.18	873.95	681.96	375.45	319.30	208.96	decreasing
the average number of the kinds of formal noun that takes a GSC	48.29	24.11	29.50	23.11	22.36	12.34	decreasing
the frequency of GSC headed by an overt complementizer	67.31	14.65	5.09	2.42	1.22	0.34	decreasing

Table 9: the diachronically changing ratio of GSCs in a particular construction to all the GSCs (%; by year of publication)							
Publication years	1890s~1910s	1920s~1930s	1940s~1950s	1960s~1970s	1980s~1990s	2000~2010s	total
birth years of authors on average	1872.29	1889.22	1898.31	1914.95	1936.44	1959.77	
Total volumes of the source of GSCs	7	9	14	18	33	49	130
the number of characters counted	906197	750616	1966381	2479676	4906921	5557522	16567313
the total number of GSCs counted	2080	1172	2682	2330	3979	3480	15723
the percentage of Genitive subjects in a past tense clause / all the GSCs	20.10	23.89	19.72	19.23	21.11	15.38	decreasing
the percentage of Genitive subjects non-adjacent to the predicate / all the GSCs	9.86	9.73	8.69	3.86	2.59	2.54	decreasing
the percentage of Genitive subjects whose predicate is stative / all the GSCs	55.34	51.88	59.55	63.30	65.07	73.76	increasing
the percentage of Genitive subjects whose predicate is an unaccusative verb / all the GSCs	21.63	23.21	15.88	16.95	14.27	10.15	decreasing
the percentage of Genitive subjects whose predicate is a transitive or unergative verb / all the GSCs	21.20	21.50	21.66	18.11	19.38	15.04	decreasing
the percentage of Genitive subjects whose predicate is an individual-level predicate / all	2.74	2.65	1.86	1.16	0.58	0.41	decreasing
the percentage of Genitive subjects whose predicate is nominal / all the GSCs	0.87	1.19	1.08	0.34	0.20	0.14	decreasing
the percentage of Genitive subjects whose predicate is a passivized verb / all the GSCs	0.96	2.22	1.83	1.29	1.08	0.91	decreasing
the percentage of GSC headed by a formal noun or an adnominal form of a predicate / all the GSCs	60.00	55.97	50.00	39.96	39.38	33.52	decreasing
the percentage of GSC headed by an overt complementizer / all the GSCs	2.93	0.94	0.37	0.26	0.15	0.06	decreasing

Table 10: the diachronically changing frequency of the GSC per million characters (sorted by the birth year of the author)								
birth years of the authors	1830~1870s	1880~1890s	1900~1910s	1920~1930s	1940~1950s	1960~1970s	1980~1990s	total
Total volumes of the source of GSCs	6	19	14	34	29	16	12	130
average birth years of the authors	1868.14	1890.25	1908.38	1928.06	1948.75	1965.88	1983.83	
averege years of publication of the books	1916.86	1941.83	1961.31	1983.04	2003.89	2004.63	2013.08	
the number of characters counted	716844	2102695	1892541	4967581	3826931	1803304	1551879	16567313
the total number of GSCs counted	1551	3101	2310	4384	2592	1200	746	15723
the frequency of GSCs PER MIL	2163.65	1474.77	1220.58	882.52	677.31	665.45	480.71	decreasing
the frequency of Genitive subjects in a past tense clause PER MIL	412.92	339.56	233.02	167.89	112.88	104.25	74.10	decreasing
the frequency of Genitive subjects non-adjacent to the predicate PER MIL	302.72	106.53	77.14	32.01	13.85	13.86	10.31	decreasing
the frequency of Genitive subjects whose predicate is stative PER MIL	1141.11	811.34	766.17	591.84	465.12	501.86	332.50	decreasing
the frequency of Genitive subjects whose predicate is an unaccusative eventive verb PER MIL	486.86	304.37	172.26	130.45	82.57	56.01	60.57	decreasing
the frequency of Genitive subjects whose predicate is a transitive or unergative verb PER MIL	467.33	330.53	251.51	148.56	120.98	98.15	83.13	decreasing
the frequency of Genitive subjects whose predicate is an individual-level predicate PER MIL	76.73	27.11	20.61	9.06	0.78	0.55	0.64	decreasing
the frequency of Genitive subjects whose predicate is nominal PER MIL	23.72	12.84	9.51	2.62	0.52	2.22	0.64	decreasing
the frequency of Genitive subjects whose predicate is a passivized verb PER MIL	44.64	15.69	21.14	9.06	8.10	7.21	3.87	decreasing
the frequency of GSC headed by a formal noun or an adnominal form of a predicate PER MIL	1516.37	747.14	561.68	316.25	222.63	226.25	165.61	decreasing
the average number of the kinds of formal noun that takes a GSC	44.71	27.00	27.92	20.69	14.86	12.06	11.42	decreasing
the frequency of GSC headed by an overt complementizer	79.52	10.94	3.17	1.41	0.26	0.00	0.64	decreasing

Table 11: the diachronically changing ratio of GSCs in a particular construction to all the GSCs (%; sorted by birth year of the author)								
	1830~1870s	1880~1890s	1900~1910s	1920~1930s	1940~1950s	1960~1970s	1980~1990s	total
Total volumes of the source of GSCs	6	19	14	34	29	16	12	130
average birth years of the authors	1868.14	1890.25	1908.38	1928.06	1948.75	1965.88	1983.83	
averege years of publication of the books	1916.86	1941.83	1961.31	1983.04	2003.89	2004.63	2013.08	
the number of characters counted	716844	2102695	1892541	4967581	3826931	1803304	1551879	16567313
the total number of GSCs counted	1551	3101	2310	4384	2592	1200	746	15723
the percentage of Genitive subjects in a past tense clause / all the GSCs	19.08	23.02	19.09	19.02	16.67	15.67	15.42	decreasing
the percentage of Genitive subjects non-adjacent to the predicate / all the GSCs	13.99	7.22	6.32	3.63	2.04	2.08	2.14	decreasing
the percentage of Genitive subjects whose predicate is stative / all the GSCs	52.74	55.01	62.77	67.06	68.67	75.42	69.17	increasing
the percentage of Genitive subjects whose predicate is an unaccusative verb / all the GSCs	22.50	20.64	14.11	14.78	12.19	8.42	12.60	decreasing
the percentage of Genitive subjects whose predicate is a transitive or unergative verb / all the GSCs	21.60	22.41	20.61	16.83	17.86	14.75	17.29	decreasing
the percentage of Genitive subjects whose predicate is an individual-level predicate / all the GSCs	3.55	1.84	1.69	1.03	0.12	0.08	0.13	decreasing
the percentage of Genitive subjects whose predicate is nominal / all the GSCs	1.10	0.87	0.78	0.30	0.08	0.33	0.13	decreasing
the percentage of Genitive subjects whose predicate is a passivized verb / all the GSCs	2.06	1.06	1.73	1.03	1.20	1.08	0.80	decreasing
the percentage of GSC headed by a formal noun or an adnominal form of a predicate / all the GSCs	70.08	50.66	46.02	35.83	32.87	34.00	34.45	decreasing
the percentage of GSC headed by an overt complementizer / all the GSCs	3.68	0.74	0.26	0.16	0.04	0.00	0.13	decreasing