ON THE CALCULUS OF CONTROL
AND LACK OF OVERT AGREEMENT MORPHOLOGY*

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1.   Introduction

The finite/nonfinite distinction has been playing a crucial role in explaining properties of obligatory control (OC) [e.g., (1a)] and of raising [e.g., (2a)]. A well-accepted way of describing the relevant generalization is by saying that OC and raising are only found with nonfinite subordinate clauses. That is, finite clauses — those inflected for tense and agreement — do not allow either process [(1b), (2b)].

(1) a.   Lisa promised [PRO to leave].

   b. *Lisa promised [PRO would leave]. (cf. Lisa promised she would leave.)

(2) a.   Lisa seems [*t* to have left].

   b. *Lisa seems [*t* has left]. (cf. It seems that Lisa has left.)

This traditional notion of finiteness has been challenged by Landau (2004, 2006). Putting huge data from various languages in perspective, Landau observes that environments allowing OC do not form a natural class and that "the only generalization in this domain that appears to be universal is the incompatibility of indicative clauses with OC" (Landau 2004:849-50).

Landau's typology, as well as a simplified version of it proposed by Nunes (2008) and Boeckx, Hornstein and Nunes (2010) (to which we will turn in section 2), crucially uses semantic tense ([T]) and agreement ([Agr]) to correctly predict when OC is possible and when it fails. In a theory of this type (which we call a Landau-style typology of control), the "incompatibility of indicative clauses with OC" is explained by saying that the Infl head specified [+Agr] and [+T] necessarily licenses a lexical subject. Taking Landau's typology as the point of departure, the present paper asks what a Landau-style typology of control can say about a language without overt agreement morphology. More specifically, the paper attempts to seek a minimally modified version of the theory that can accommodate Japanese, a

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language that exhibits no overt morphological agreement but does exhibit overt tense morphology.

In what follows, it is claimed (i) that due to the lack of overt agreement morphology in Japanese, it is not immediately clear whether the Landau-style typology, as it stands, can account for the distribution of OC in the language; and (ii) that the theory can be made to empirically work by revising the feature [Agr] in such a way that it can deal with overt tense morphology as well as overt agreement morphology.

The organization of the paper is as follows. Section 2 introduces the background assumptions concerning Landau's 'scale of finiteness' proposal. We review Landau's theory and the modified version of it that has been proposed by Nunes (2008) and Boeckx, Hornstein and Nunes (2010). Section 3 examines the behavior of OC and non-control complements containing overt tense markers in Japanese, proposing the generalization that independent tense complements, unlike untensed and dependent tense complements, resist OC. Section 4 seeks a way of making a Landau-style typology with this generalization, given that Japanese apparently lacks [Agr]. Three alternatives are considered. Section 5 concludes the paper.

2.   The Calculus of Control (Landau 2004, 2006)

This section lays out the assumptions employed in Landau's proposal and Nunes/BH&N's version of it. Proposing that [T(ense)] and [Agr(eement)] determine the distribution of OC PRO, Landau (2004, 2006) pursues the hypothesis that "an Infl head positively specified for both features [+T, +Agr] will necessarily license a lexical subject" while "an Infl head with any negative specification — [+T, −Agr], [−T, +Agr], [−T, −Agr] — will necessarily license PRO" (Landau 2006:160). This 'calculus of control' predicts that clauses are classified into four types, as the two binary features can be combined in four ways. In Landau's more elaborate implementation of the theory, though, [Agr] and [T] on C° are also taken into consideration for the "calculus of control". Nunes (2008) and Boeckx, Hornstein and Nunes (2010) (BH&N, henceforth) propose to simplify Landau's original proposal by restricting the locus of clause type variation to T° (or Infl°), rather than both T° and C°. The present paper assumes with Nunes and BH&N that we need no reference to C, mainly because the system without [T] and [Agr] on C° still seems rich enough to address the issue of interest that arises in Japanese.[1]

Another significant difference between Landau's and Nunes/BH&N's version has to do with the meaning of the symbols [+Agr] and [−Agr], as noted in Nunes (2008) and BH&N. For Landau, "+" reflects overt morphological agreement inflection. Thus infinitival T°, being *uninflected*, is specified [−Agr] in the original proposal. For Nunes/BH&N, the meaning of "+" and "−" is somewhat more abstract: [+Agr] indicates that the relevant φ-features of T° are fully specified while [−Agr] indicates that they are φ-deficient or null. An example of

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[1] See Polinsky and Potsdam (2006) for another way of simplifying Landau's proposal. They consider the features on C exclusively, in contrast to Nunes (2008) and BH&N.

φ-deficiency of this sort comes from Brazilian Portuguese. Analyzing finite control and hyper-raising in Brazilian Portuguese in which OC PRO and NP-trace occur with clearly inflected complements, Nunes (2008) and BH&N argue the following: the T° of Brazilian Portuguese "finite" clauses is marked [+Agr] when it enters the numeration with both person and number features. "Finite" T°, however, is sometimes marked [−Agr] when it lacks a number feature in the numeration. On the surface, the two kinds of T look the same due to the weakening of finite verbal morphology of the language. The point is that the characterization of "−" in terms of deficiency allows us to avoid analyzing finite control as involving a T° specified [+T, +Agr].[2] This helps to make the "calculus of control" considerably simple (BH&N: 66). Throughout the paper, I assume Nunes's and HB&N's interpretation of "+" and "−".

Landau and Nunes/BH&N also differ on how these feature specifications lead to determine the distribution of OC PRO. Although this difference between the two theories does not affect the conclusions of this paper, let us take a brief look in order to complete the picture. For Landau, a clausal head, if specified [+T, +Agr], is assigned a feature (called [+R]) that makes the T° require a referential DP, yielding no control. Elsewhere, T° is assigned [−R] and thereby requires an anaphoric DP like OC PRO as its specifier. For Nunes/BH&N, OC PRO is NP-trace, and NP-movement is allowed only from a non-case position. By assuming that only T° with [+T, +Agr] assigns nominative case, NP-movement can be made to apply when T° has any of the three other feature combinations.

Given these caveats, let's review fundamental data points that lead Landau (2004, 2006) to posit the four clause types. Consider the examples given in (3)–(7).

(3) [−T, −Agr]: Untensed infinitives in English = OC (Landau 2000)

    a.   John managed to solve the problem.

    b. ＊Yesterday John managed to solve the problem tomorrow.

(4) [+T, −Agr]: Dependent tense infinitives in English = OC (Landau 2000)

    a   John decided to solve the problem.

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[2] Hebrew 3rd-person subjunctives, as reported in Landau (2004), lead to the same situation. Examples are given below. (ib) involves OC even though the embedded predicate is inflected. See Landau (2004), Nunes (2008), and BH&N (p. 67).

(i)   a.

	Hem$_1$	kivu	še-atem$_2$ /	pro$_2$	telxu	ha-bayta	mukdam.
	they	hoped	that-you (pl.) /	pro	will-go.2pl	home	early

'They hoped that you (pl) would go home early.'

    b.

	Hem$_1$	kivu	še-hem$_{1/2}$ / pro$_{1/*2}$	yelxu	ha-bayta	mukdam.
	they	hoped	that-they / pro	will-go.3pl	home	early

'They hoped that they would go home early.'

b.   Yesterday John hoped to solve the problem tomorrow.

(5)   [−T, +Agr]: Untensed subjunctives in Greek ≠ OC (Varlokosta 1994)

a.   o   Yanis   kseri/arxizi   na   kolimba.
     the   John   knows/beings   Sbj   swims

     'John {knows how, begins} to swim.'

b. *tora,   o   Yanis   kseri/arxizi   na   kolimbai   avrio.
     now   the   John   knows/beings   Sbj   swims   tomorrow

     'Now, John {knows how, begins} to swim tomorrow.'

(6)   [+T, +Agr]: Dependent tense subjunctives in Greek ≠ OC (Varlokosta 1994)

a.   o   Yanis   elpizi/theli   na   figi.
     the   John   hopes/wants   Sbj   leaves

     'John {wants, hopes} to leave.'

b.   tora,   o   Yanis   elpizi/theli   na   figi   avrio.
     now   the   John   hopes/wants   Sbj   leaves   tomorrow

     'Now John {wants, hopes} to leave tomorrow.'

(7)   [+T, +Agr]: Indicatives in English ≠ OC

a.   John hoped that he will win.

b.   Yesterday, John hoped that he will win tomorrow.

Let us begin with the English infinitive constructions given in (3) and (4). In both examples, the complements are infinitives, so their T heads are specified [−Agr]. They do not inflect. (3) and (4) are different in terms of semantic tense, though. (3a) is an example of what is called an *untensed* complement. Here the embedded T° is negatively specified for [T]. The value of [T] is diagnosed by looking at the (im)possibility of a tense mismatch. As indicated by the ungrammaticality of (3b), the implicative verb *manage* does not allow the matrix and the embedded event to contain conflicting time expressions. Thus the embedded T° is specified [−T].

(4a) is an example of *dependent tense* complements, which occur with verbs like *hope*. Since these complements always receive a future-oriented or irrealis reading, their interpretation is not as flexible as that of indicative (i.e., fully inflected) complements. Despite that, however, the dependent tense complement is not untensed, as evidenced by the grammaticality of the tense mismatch example in (4b). Therefore the embedded T° in (4) is positively specified for [T]. The point is that when T° bears [−Agr], OC is possible regardless of the value of [T]. (The reader is referred to Landau (2000) for detailed classification of various selecting predicates.)

(5) and (6) are examples of Greek subjunctive complements. Each embedded T° is specified [+Agr], since subjunctive verbs exhibit overt agreement morphology (see Iatridou 1993, Terzi 1992, Varlokosta 1994 and others). As for their semantic tense, the complements of *begin* and *know (how)* are untensed exactly like the English implicative complement seen above, as shown in (5b). Hence their embedded T° bears [−T]. The complements of *hope* and *want*, however, allow a tense mismatch, as exemplified by (6b) (Varlokosta 1994). Since [Agr] is invariantly marked "+" in (5) and (6), only when the other feature, i.e., [T], bears negatively valued is OC possible, as predicted by the calculus of control.

Finally, indicative complements like the one in (7) are considered to have an inflected T° (i.e., specified [+Agr]) and to be tensed (i.e., specified [+T]). Indicatives are different from dependent tense infinitives in that their tense is not dependent on the matrix verb in the relevant sense; E.g., *Monique decided to be in Paris* does not have the simultaneous reading that *Monique decided that she was in Paris* does have, as noted in Abusch (2004). As far as specification of [T] on T° is concerned, however, they are treated the same, being specified [+T].

The four categories and their category members are presented below (see BH&N, p.38).

(8)

Obligatory control			No control
[+T, −Agr]	[+T, −Agr]	[−T, +Agr]	[+T, +Agr]
• Untensed uninflected infinitives, etc.	• Tensed infinitives, • Hebrew 3rd-person subjunctives, • Brazilian Portuguese finite clauses, etc.	• Balkan untensed subjunctives, etc.	• English indicatives, • Balkan tensed subjunctives, etc.

Assuming that the Landau style approach to the scale of finiteness is correct, I will turn to Japanese in next section.

3.   The Basic Japanese Data: OC into *Ru/Ta*-Clauses

Japanese does not exhibit overt person/gender/number morphology on predicates. The language instead has overt agglutinative tense morphology in which the so-called present tense marker *-ru* and the past tense marker *-ta* are contrasted. In (9a) and (9b), *-ru* and *-ta* respectively attach to the verbal root *tabe-* 'eat'.

(9) a.   tabe-ru
        eat-Prs

     b.   tabe-ta
        eat-Pst

Also important to note about Japanese verbal morphology is that it is not clear that the language has the morphological verbal category "infinitive". The fact that the citation form of a verb is the present tense form may be taken as an anecdotal indication that the language lacks infinitives. The language also has no indication of having the morphological category "subjunctive". In a nutshell, therefore, it is not straightforward at all to make a three way distinction among indicative, subjunctive and infinitive based on overt morphological evidence in Japanese.[3]

Given these, it may be less surprising that some OC complements, in terms of verbal morphology, do not look much different from non-control complements that can be translated into other languages as indicatives: Whether controlled or not, complements can be marked with *-ru* or *-ta*. We will review core data in Japanese below; see Fujii (2008) and references cited therein for fuller discussion.

(10)–(13) illustrate how the *ru*-complement of *tikau* 'swear' differs from that of *kangaeru* 'think/consider' with respect to some well-known diagnostics for OC. Consider the (a)-examples first.[4]

(10)   karera-wa kantoku-ni   [*ec* otagai-o   naguri-aw-u   koto]-o
         they-Top   director-Dat   e.o.-Acc   hit-Recip-Prs   C-Acc
         {a. *tikat-te,   b. kangae-te}   hosikatta.
            swear-Grnd   think-Grnd   wanted

         'They wanted the (movie) director to {a. swear to hit each other, b. think about them hitting each other}.'

(11)   [Mary-no   titioya]-wa   [*ec* sono   byooin-de   syussansu-ru   koto]-o
          Mary-Gen   father-Top   that   hospital-in give birth-Prs   C-Acc
         {a. #tikatta, b. kangaeta}.
            swore   thought

         'Mary's father {a. swore to give birth in that hospital, b. thought about her giving birth in that hospital}.'

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[3] This does not mean that we cannot make such a mood distinction at a more abstract, syntactic level for Japanese. See Watanabe (1996) and Uchibori (2000) for such attempts. See also Landau's (2004, 2006) analysis of Hebrew 3rd-person subjunctives.

[4] In those examples, the nominalizing complementizer *koto* can be replaced by another nominalizing complementizer *no*, though native speakers' judgments may vary; see Kuno (1973). We abstract away from the issue of complementizer choice.

(12)   Mary-wa   [*ec*   zibun-no   peesu-de   sigoto-o   tuzuke-ru   koto]-o
         Mary-Top   self-Gen   pace-at   work-Acc   continue-Prs C-Acc
         {a. tikatta, b. kangaeta}.   Butyoo-mo   da.
            swore   thought   manager-also Cop.Prs

         'Mary {a. swore to continue her work, b. thought about continuing her work} at her
         own pace. And the manager, too.'
         Strict reading possible with (b), but not with (a).

(13)   sono kiokusoositu   kanzya-wa   [*ec* taiinsu-ru koto]-o   {a. tikatta,   b. kangaeta}.
         that amnesiac   patient-Top   leave-Prs C-Acc   swore   thought

         'The amnesiac {a. swore to leave the hospital, b. thought about leaving the
         hospital}.'
         *Non-*de se *possible with (b), but not with (a).*

These (a)-examples clearly show that the verb *swear* takes a *ru*-complement and induces OC.
The null subject of the *ru*-clause cannot be bound long distance [(10a)]; A non-c-commanding
NP cannot antecede the *ec* [(11a)]; the *ec* does not support a strict reading [(12a)]; and the *ec*
cannot be interpreted in a non-*de se* manner [(13a)]. All these indicate that the null subject is
OC PRO. (I will return to the (b)-examples shortly.)

    A parallel set of examples can be constructed with *ta*-complements, which are
past-oriented. In the (a)-examples in (14)–(17) with the verb *kuyamu* 'regret', the
complements are in the past tense.

(14)   karera-wa   [kantoku-ni   [*ec* otagai-o   naguri-at-ta   koto]-o
         they-Top   director-Dat   e.o.-Acc   hit-Recip-Pst   C-Acc
         {a. *kuyan-de,   b. kangae-te}   hosikatta.
            swear-Grnd   think-Grnd   wanted

         'They wanted the movie director to {a. regret having hitting each other, b. think
         about them having hit each other}.'

(15)   [Mary-no   titioya]-wa   [*ec* sono   byooin-de   syussansi-ta   koto]-o
          Mary-Gen father-Top   that   hospital-in   give birth-Pst C-Acc
         {a. #kuyanda,   b. kangaeta}.
            regretted   thought

         'Mary's father {a. regretted having given birth in that hospital, b. thought about her
         having given birth in that hospital}.'

(16)   Mary-wa   [*ec* zibun-no peesu-de sigoto-o   tuzuke-ta   koto]-o
           Mary-Top   self-Gen pace-at   work-Acc continue-Pst C-Acc
           {a. kuyanda, b. kangaeta}.   Butyoo-mo   da.
             regretted   thought   manager-also Cop.Prs

           'Mary {a. regretted having continued her work, b. thought about having continued her work at her own pace}. And the manager, too.'
           Strict reading possible with (b), but not with (a).

(17)   sono kiokusoositu kanzya-wa [*ec* taiinsu-ta koto]-o {a. kuyanda, b. kangaeta}.
           that   amnesiac   patient-Top   leave-Pst C-Acc   regretted   thought

           'The amnesiac {a. regretted having left the hospital, b. thought about having left the hospital.'
           Non-de se *possible with (b), but not with (a).*

In (14)–(17), the (a)-examples exhibit a sharp contrast with their counterparts given in (b). While *kuyamu* 'regret' yields OC, *kangaeru* 'think (about)' does not.

     What is the exact nature of the cut between the (a)-examples and (b)-examples? Building on observations made in the past literature, Fujii (2006) observes that OC ensues when the tense morphology of the relevant clause is "fixed", i.e. does not allow alternation of *-ta* and *-ru* (Nakau 1973:225, Kuno 1973:219, Ohso 1976:90ff., Saito 1985:267, n34, Sakaguchi 1990, Ueda 1990:76, Watanabe 1996, among others). He states the generalization as follows:

(18)   If the T of a subordinate clause cannot have *-ta* or cannot have *-ru* in environment E, it bears [−finite] in E.

Note, as shown in (19), that *tikau* 'swear' and *kuyamu* 'regret' resist occurring with a *ta*-complement and a *ru*-complement, respectively. Therefore, those complements are [−finite], according to (18). This is a good result since these are OC complements, as we saw above.

(19) a. *Mari-wa   issyookenmei   hatarak-u koto-o   kuyanda.
        Mari-Top hard   work-Prs   C-Acc   regretted

    b. *Mari-wa   issyookenmei   hatarai-ta koto-o   tikatta.
        Mari-Top hard   work-Pst   C-Acc   swore

Now return to the (b)-examples of (10)–(17). Since *kangaeru* allows both *ru*-complements [(10)–(13)] and *ta*-complements [(14)–(17)], (18) accounts for the fact that the complements of the verb in these examples cannot be [−finite] and thus is not subject to OC.

     The data in (19) suggest that *kuyamu* and *tikau* take dependent tense complements. (20a) and (21) confirm it. (Also, it is not surprising that the complement of *kangaeru* 'think' has its own tense domain, as shown in (20b), since it is an independent tense complement.)

(20)   Mari-wa   asita   hatarak-u koto-o   kinoo   {a. tikatta, b. kangaeta}.
        Mari-Top   tomorrow   work-Prs C-Acc   yesterday swore   thought

        'Yesterday Mari {a. swore to work tomorrow, b. thought about working tomorrow}.'

(21)   Mari-wa   kinoo   hataraki-ta koto-o   asu   kuyam-u   daroo.
        Mari-Top   tomorrow   work-Prs   C-Acc   yesterday regret-Prs will

        'Tomorrow Mari will regret having worked yesterday.'

It is not only dependent tense complements that (18) correctly predicts to allow OC. Untensed OC complements also do not have the ability to support both *-ru* and *-ta*. Nakau (1973:278) notes that the aspectual verb *hazimeru* 'begin' can take a *ru*-complement and induces OC (and raising). As evidenced by the ungrammatical tense mismatch in (22a), the *ru*-complement with *begin* is untensed, even though a tense marker is overtly present. That is, the complement of *begin*, unlike a dependent tense complement [(22b)] does not have its own tense domain. Now it should be noted that, as shown in (23), the past tense marker is disallowed in a CP complement of *begin*. Thus the proposed relationship between OC and the "fixed tense" phenomenon holds for untensed complements containing an overt tense marker.

(22)   Mari-wa   asita   hatarak-u koto-o   kinoo   {a. *hazimeta, b. kessinsita}.
        Mari-Top   tomorrow   work-Prs C-Acc   yesterday   began   decided

        'Yesterday Mari {began, decided} to work tomorrow.'

(23)   Mari-wa   {a. hatarak-u, b. *hatarai-ta}   koto-o   hazimeta.
        Mari-Top   work-Pst   work-Pst   C-Acc   began

        'Mari began to work.'

To summarize:

(24)   In Japanese, while untensed and dependent tense complements are compatible with OC, independent tense complements are not.[5]

Japanese is different from Balkan languages because as noted in section 2, in these languages, untensed subjunctives induce OC but dependent tense subjunctives do not. Instead, Japanese is on a par with Hebrew, where OC is found with 3rd-person future-oriented complements (fn. 2). The main point is that the picture for Japanese looks quite close to the one that Landau puts forth, namely, "the incompatibility of OC with indicatives". In next section, I ask how it is possible to express a language like Japanese in the Landau-style calculus of control.

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[5] It is not the case that dependent tense complements always exclude non-OC complements. The reader is referred to Fujii (2006, 2008), which investigate the conditions under which NOC dependent tense complements are obtained.

4.   Putting Japanese into the Calculus of Control

4.1.   Overt Tense Inflection

Now we are in a position to ask where the relevant Japanese constructions are placed in the table that Landau proposes and that Nunes (2008) and BH&N modify. (8) is repeated below as (25).

(25)

Obligatory control			No control
[−T, −Agr]	[+T, −Agr]	[−T, +Agr]	[+T, +Agr]
• Untensed uninflected infinitives, etc.	• Tensed infinitives, • Hebrew 3rd-person subjunctives, • Brazilian Portuguese finite clauses, etc.	• Balkan untensed subjunctives, etc.	• English indicatives, • Balkan tensed subjunctives, etc.

The issue is obvious, given that Japanese has no overt agreement morphology. How can we know whether a given Japanese clause should be specified [+Agr] or [−Agr]? The specification needs to be done independently of whether the clause in question is subject to OC or not. Namely, if we labeled a clause [+Agr] or [−Agr] by looking at whether the clause is obligatorily controlled or not, then the typology in question would stop predicting anything. Below I first consider two alternative answers to the question and show that they do not work very well. I, then, propose that Japanese data lead us to modify the feature [Agr] in a way that allows the system to refer to overt tense morphology in addition to overt agreement morphology.

The first alternative can be depicted as in (26). Based on their behaviors with regard to OC, Japanese untensed and dependent tense complements are placed under "Obligatory control" while Japanese independent tense complements under "No control". Untensed complements bear [−T], and dependent tense complements [+T], as we have seen above.

(26)

Obligatory control			No control
[−T, −Agr]	[+T, −Agr]	[−T, +Agr]	[+T, +Agr]
• Untensed uninflected infinitives, etc.	• Tensed infinitives, • Hebrew 3rd-person subjunctives, • Brazilian Portuguese finite clauses, etc.	• Balkan untensed subjunctives, etc.	• English indicatives, • Balkan tensed subjunctives, etc.
(• Untensed *ru*-complements)	• Dependent *ru*- or *ta*-complements	(• Untensed *ru*-complements)	• Independent *ru/ta*-complements

Note that in (26), dependent *ru*- and *ta*-complements are specified [−Agr] and independent *ru/ta*-complements are specified [+Agr]. This is so because the former induce OC and the

latter do not. One serious problem with this alternative is that there is no independent evidence for these specifications. In order to determine which complements go with which feature specifications under this analysis, one would need to know whether or not a given complement induces OC.

The second alternative is somewhat more interesting. Let us think about what this 'calculus of control' table will look like if Japanese lacks the feature [±Agr]?[6] To answer this question, let us recall how exactly the distribution of OC PRO is determined in a system of this sort (section 2). Under Nunes/BH&N's case-based approach, only a T° with [+T, +Agr] assigns nominative case. So when combined with this case theory, the result would be that every Japanese clause would induce OC (or raising), given that T° would be specified either [−T, ∅] or [+T, ∅]. This is clearly an unwanted result. Under Landau's (2004:842) system, on the other hand, R-assignment Rule is formulated in such a way that no [R] value is assigned to the relevant functional head if the head lacks [Agr] or [T]. (Recall that [+R] and [−R] are associated with referential DPs and with "anaphoric" DPs like OC PRO, respectively.) Thus, it follows that neither T° nor C° in Japanese carries [+R] or [−R]. It is thus clear enough that this second alternative fails to distinguish between OC and no control cases.

Having seen how the two alternatives fail, I would like to propose one way of making the typology work for Japanese. The final alternative poses some questions as well (see below) but it, unlike the previous two, provides the right cut between OC and no control. Let us see how this is so. The key is to allow the feature [Agr] to speak of overt tense morphology as well as overt agreement morphology. Let us call the feature [Infl], instead of [Agr], for the current purposes. First, the T° of untensed *ru*-complements [(22)–(23)] and that of dependent *ru*- or *ta*-complements [(10a)–(17a)] both can be considered "deficient" even though verbs of the *ru*-form or the *ta*-form are inflected for tense. This is because in those environments, either *-ru* or *-ta* is blocked. Under the 'deficiency' interpretation of "−", the T° of those complements are specified [−Infl]. This way, the leftmost two cells in the last row in (27) are filled in. Next, recall that the T° of independent tense complements has the ability to support both *-ru* and *-ta*. It is not deficient. We take this ability to mean that the 'independent tense' T is specified [+Infl]. Hence complements of verbs like *kangaeru* 'think' [(10b)–(17b)] fall under [+T, +Infl], as desired, as in (27).[7]

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[6] Kuroda (1983) notes this very possibility. He suggests that even tense heads may not have anything to do with the distribution of PRO. His suggestion is based on the distribution of arbitrary controlled null subjects. I cannot afford to discuss this intriguing issue here.

[7] A somewhat similar idea about finiteness can be found in Huang (1989), which discusses finiteness in Chinese, another language without overt verbal agreement morphology. Huang argues that finiteness is encoded in terms of potential occurrence of a Tense or Aspectual expression under T° in Chinese. In his 'Generalized Control' theory, though, the relationship between finiteness and OC is less direct than in the framework assumed here.

(27)

	Obligatory control		No control
[−T, −Infl]	[+T, −Infl]	[−T, +Infl]	[+T, +Infl]
• Untensed uninflected infinitives, etc.	• Tensed infinitives, • Hebrew 3rd-person subjunctives, • Brazilian Portuguese finite clauses, etc.	• Balkan untensed subjunctives, etc.	• English indicatives, • Balkan tensed subjunctives, etc.
• Untensed *ru*-complements	• Dependent *ru*- and *ta*-complements		• Independent *ru*/*ta*-complements

Before closing this subsection, let us note non-trivial questions that are left with no answer in this paper. I mention two of them here. First, notice that we have not found an untensed complement that exclusively selects the past tense marker *-ta*, as can be observed by the last row under [−T, −Infl]. The question of why untensed *ta*-complements do not exist arises, given that dependent *ta*-complements nonetheless exist; see (19). Second, as seen in the column under [−T, +Infl], we do not seem to find an untensed complement allowing *ru*/*ta*-alternation. Put another way, it is somewhat hard to imagine an example in which, say, an aspectual verb's complement allows *-ta* as well as *-ru*. These gaps in the paradigms seem to suggest that the *ru*-form of a verb is default morphology and that the minus value of [T] triggers it. Then the fact that no untensed *ta*-complements can be found is accounted for. Notice, however, that under the variant of Landau style typology that I am considering, [T] and [Infl] are assumed to be independent variables. Then it is never clear why the material implication "if T° is [−T] then T° is [−Infl]" should hold in Japanese. In fact, a similar observation might apply to English: implicatives (e.g. *manage*), aspectuals (e.g., *begin*) and modals (e.g., *be able*), which select [−T], do not seem to allow finite complements. I cannot afford to explore the issue any further here. I, instead, continue to use [T] and [Infl] as independent features, keeping to the criterion according to which a T head is specified [−Infl] if and only if either *-ru* or *-ta* is blocked.

4.2. OC Complements Containing No Tense Marker

[Infl] can be proved to be useful, independently from the data discussed above, by looking at OC environments in which neither *-ru* nor *-ta* occurs. There are two such classes of complement. One includes the so-called mood constructions, where complements contain a mood marker and exclude a tense marker. (28) is an example of decisive mood complement, and (29) an imperative mood complement. They involve OC, and an overt tense marker does not occur with those mood markers [(28b)/(29b)].[8]

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[8] See Fujii (2010) and references cited therein.

(28) a. Mari-wa   yasai-o   tabe-yoo   to   omotta.
          Mari-Top   vegetable-Acc   eat-Decisive   C   thought

          'Mary thought she would eat vegetables.'

     b. *Mari-wa   yasai-o   tabe-ru-yoo   to   omotta.
                                 eat-Prs-Decisive

(29) a. Mari-wa   Hiroshi-ni   yasai-o   tabe-ro   to   itta.
          Mari-Top   Hiroshi-dat   vegetable-Acc   eat-Imperative   C   said

          'Mary told Hiroshi that he should eat vegetables.'

     b. *Mari-wa   Hiroshi-ni   yasai-o   tabe-ru-ro   to   itta.
                                                 eat-Prs-Imperative

The other class of complements lacking overt tense marking includes various complex predicate constructions.[9] (30) exemplifies implicative, aspectual and modal constructions. In these constructions involving "bare clausal complements", the head of a complement clause is a bare verbal root and is morpho-phonologically integrated with the matrix verb. Thus, there is no room for a tense marker to occur in between the first verb and the second verb [(30b)].

(30) a. Mari-wa   yasai-o   tabe   {-wasure,   -hazime,   -rare}   -ta.
          Mari-Top   vegetable-Acc   eat   -forget   -begin   -can   -Pst

          'Mari {forgot, began, was able} to eat vegetables.'

     b. *Mari-wa   yasai-o   tabe-ru   {-wasure,   -hazime,   -rare}   -ta.
                                 eat-Prs   -forget   -begin   -can   -Pst

OC complements of these two classes thus don't even have a chance to exhibit *ru*/*ta* alternation. Hence the T° heads of them are all specified [−Infl] straightforwardly.

Now let's look at how their semantic tense behaves. Under the Landau-style typology, it will not be surprising if these complements are tensed, because they, being [−Infl], already qualify to be OC environments. In fact, many of these non-overtly-tense-marked complements are tensed. The mood complements exhibit a property of dependent tense. A tense mismatch is allowed both with the embedded decisive [(31)] and the embedded imperative [(32)]. Many bare complements are untensed [(33)]. Bare dependent tense complements, however, exist as well: the complement of the desiderative adjective *-tai* 'want' is clearly irrealis [(34)].

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[9] See Kageyama (1993), Koizumi (1995), Bobaljik and Wurmbrand (2005, 2007), Kuroda (2003), among others.

(31)   Mari-wa   asita   yasai-o   tabe-yoo   to   kinoo   omotta.
       Mari-Top   tomorrow   vegetable-Acc eat-Decisive C   yesterday thought

       'Yesterday Mary thought she will eat vegetables tomorrow.'

(32)   Mari-wa   Hiroshi-ni   asita   yasai-o   tabe-ro   to
       Mari-Top   Hiroshi-dat   tomorrow   vegetable-Acc eat-Imperative C
       kinoo   itta.
       yesterday   said

       'Yesterday Mary told Hiroshi that he should eat vegetable tomorrow.'

(33)   *kinoo   Mari-wa   asita   yasai-o   tabe {-wasure, -hazime, -rare} -ta.
       yesterday Mari-Top tomorrow   vegetable-Acc eat   -forget   -begin   -can -Pst

       'Yesterday Mari {forgot, began, was able} to eat vegetables tomorrow.'

(34)   kinoo   Mari-wa   asita   yasai-o   tabe-takat-ta.
       yesterday Mari-Top   tomorrow   vegetable-Acc eat-want-Pst

       'Yesterday Mari wanted to eat vegetables tomorrow.'

All these data taken together, the table can be updated as in (35):

(35)

Obligatory control			No control
[−T, −Infl]	[+T, −Infl]	[−T, +Infl]	[+T, +Infl]
• Untensed uninflected infinitives, etc.	• Tensed infinitives, • Hebrew 3rd-person subjunctives, • Brazilian Portuguese finite clauses, etc.	• Balkan untensed subjunctives, etc.	• English indicatives, • Balkan tensed subjunctives, etc.
• Untensed *ru*-complements, • Untensed bare complements	• Dependent *ru*- and *ta*-complements, • Dependent mood complements, • Dependent bare complements		• Independent *ru/ta*-complements

This way, we have successfully put five Japanese OC environments and one non-control environment in the Landau-Nunes/BH&N style 'calculus of control' table.

5.   Conclusions

In conclusion, the present paper has shown (i) that due to the lack of overt agreement morphology, Japanese poses a potential problem for the calculus of control (Landau 2004, 2006, Nunes 2008, BH&N); and (ii) that the theory can be made to work by assuming that [Agr] (or [Infl]) is responsible for overt tense morphology as well. Despite the fact that the

exact relationship between semantic tense and overt tense morphology is left to be worked out in the paper, the modification added here provides a way of dealing with agreement-less languages of the Japanese type in the calculus of control.

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