Multiple Sluicing and Coordinated Sluicing in Mandarin: A Cross-linguistic Investigation

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Multiple sluicing (MS) is an elliptical construction where two or more *wh*-words survive in the elided clause, as in (1) for English. Coordinated sluicing (CS), as in (2), resembles MS but has two coordinated *wh*-words. Citko & Gračanin-Yuksek (2020) argue that MS and CS are not derivationally related since they exhibit significant differences. First, as in (3), MS in English is at best marginal if both *wh*-remnants are simplex; however, coordination as seen in (2) can improve the grammaticality.

(1) I know that in each instance one of the girls got something from one of the boys. But they didn't tell me which from which. (Bolinger 1978)
(2) Someone saw something, but I can't remember who **or** what. (Citko & Gračanin-Yuksek 2020)
(3) ?* Someone saw something, but I can't remember who what. (Lasnik 2014)

Second, as noted in Abels & Dayal (2017), MS can generate a pair-list reading with appropriate antecedents. In contrast, CS never yields such a reading under the same configuration, as in (5).

(4) Every student has published on some topic, but I couldn't tell you which student on which topic.
(5) # …., but I couldn't tell you which student **and** on which topic. (no pair-list reading for CS)

Third, MS cross-linguistically is known to exhibit the clausemate condition, requiring both *wh*-remnants to originate from the same clause. Conversely, CS does not adhere to this constraint.

(6) *One of the students said that Mary spoke to one of the professors, but I don't know [which student$_i$ to which professor$_j$ [t_i ~~said~~ [~~that Mary spoke~~ t_j]]. (MS: Lasnik 2014)
(7) One of the students said that Mary spoke to one of the professors, but I don't know which student **or** to which professor. (CS: Citko & Gračanin-Yuksek 2020)

The comparison is particularly relevant to Mandarin MS as provided in (8), as it has been argued that Mandarin MS, in addition to the movement-deletion approach (e.g., Wang 2018) in (9), can also be derived via covert coordination of pseudo-sluicing, as in (10) (cf. Adams & Tomioka 2012).

(8) Lisi shuo ta yujian-le yi-ge ren, danshi ta bu shuo shi shei zai nali.
Lisi say he meet-ASP one-CL person but he NEG say SHI who at where
Lit. 'Lisi said that he met someone, but he didn't say who where.'
(9) [$_{\text{antecedent}}$ …], … [[$_{\text{FocP}}$ *shi* ***wh*^{1}**] [$_{\text{TopP}}$ ***wh*^{2}**] [$_{\text{TP}}$ ~~… t_{wh1} … t_{wh2} …~~]] (movement-deletion)
(10) [$_{\text{antecedent}}$ …], … [*pro* (*shi*) ***wh*^{1}**] $_{\text{COORDINATION}}$ [*pro* (*shi*) ***wh*^{2}**] (coordinated pseudo-sluicing)

However, the situation is even more complex, as Mandarin MS appears to exhibit properties of both scenarios. First, as in (11), an otherwise ungrammatical example with two simplex *wh*-remnants in reverse order to their antecedents can be salvaged by overt coordination. This suggests that covert coordination is not readily accessible in this context, making an analysis like (10) relying solely on covert coordination untenable.

(11) Lisi zhi jide you yi-ge ren$_x$ mai-le dongxi$_y$, danshi ta wang-le
Lisi only recall have one-CL person buy-ASP thing but he forget-ASP
shi shenme$_y$ ***(yiji)** shi shei$_x$.
SHI what and SHI who
'Lisi only recalled someone$_x$ bought something$_y$, but he forgot what$_y$ *(and) who$_x$.'

Second, Bai & Takahashi (2024) observe that Mandarin MS can generate a pair-list reading when the first antecedent correlate is a universal quantifier, indicating that Mandarin MS cannot be derived via coordination since a coordination configuration like (10) always produces a single-pair reading.

On the other hand, it is reported that the clausemate condition is not observed in Mandarin MS (cf. Adams & Tomioka 2012, Wang 2018). This seems to suggest that Mandarin MS involves covert coordination, under which the two *wh*-remnants would have to originate in two separate clauses.

In this study, I would like to offer an analysis to explain the divergence noted above. By reviewing different previous analyses on Mandarin MS (Chiu 2007, Takahashi & Lin 2012, Wang 2018, Wang & Han 2018), I follow the proposal put forth in Wang (2018) that Mandarin MS is derived via movement and deletion. Particularly, simplex *wh*-words (i.e., *shei* 'who' and *shenme* 'what') and complex ones like D-link *wh*-phrases take up overt focus movement and topicalization, respectively, to escape from the elliptical site prior to deletion. Then the first thing to clarify is that the clausemate condition is not what defines MS, even though MS across languages generally observe the condition. As reported in Lasnik (2014) for Serbo-Croatian and Abels & Dayal (2023) for Romanian, speakers of the two languages who accept multiple *wh*-fronting to originate in different clauses also accept violation of the clausemate condition in MS. Crucially, the two languages have overt multiple *wh*-fronting (Rudin 1988). In addition, Abels & Dayal (2023) argue that the derivation of English MS should involve overt movement for the first *wh*-word and covert movement for the additional one. They then subsume the clausemate condition in English MS under some general constraints on covert movement of the additional *wh*-word. Granted these, since Mandarin MS fails to obey the clausemate condition, it indicates that no covert movement is involved in deriving MS, as the adopted analysis proposes. Importantly, it is observed that Mandarin can have MS that does not obey the clausemate condition but still generates a pair-list reading. This further proves that Mandarin MS cannot be derived via covert coordination, because, as previously noted, CS never generates such a reading.

(12) Banshang mei-ge xuesheng$_x$ dou renwei [jiaoshi qiangbi yingai tushang yi-zhong yanse$_y$],
in.class every-CL student all think classroom wall should paint one-kind color
suoyi laoshi qing banzhang liechu na-ge xuesheng$_x$ na-yi-zhong yanse$_y$.
so teacher ask class.leader sort which-CL student which-one-kind color
'Every student in the class thinks that the classroom wall should be painted with a kind of color, so the teacher asks the class leader to sort out which student which kind of color.'

Finally, since covert coordination is not readily available for cases under investigation, CS in Mandarin then must be built on overt coordination, as seen in (11). However, contrary to the analysis of Adams & Tomioka (2012), I propose that CS in Mandarin is also derived through movement and deletion. Specifically, the sluice in Mandarin CS consists of two independent clauses, each resulting from single sluicing via movement and ellipsis. Consider (13a), a typical instance of CS in Mandarin. Crucially, it is also possible to spell out one of the two conjuncts, as shown in (13b). Given that the displaced *wh*-word must target a left-peripheral projection, it follows that the first conjunct, even with only a *wh*-remnant, involves a parallel full-fledged structure as required by coordination.

(13) Banshang you yi-ge xuesheng chang-le yi-shou ge, danshi wo wang-le
class.in have one-CL student sing-ASP one-CL song but I forget-ASP
a. [$_{CP}$ na-yi-ge xuesheng] **yiji** [$_{CP}$ na-yi-shou ge].
which-one-CL student and which-one-CL song
b. [$_{CP}$ na-yi-ge xuesheng] **yiji** [$_{CP}$ na-yi-shou ge ta chang-le].
which-one-CL student and which-one-CL song he sing-ASP
'A student in the class sang a song, but I forgot [$_{CP}$ which student] and [$_{CP}$ which song (he sang)].'

Revisiting the Main Clause Structure in Japanese under Labeling Theory

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Introduction: This presentation revisits the main clause structure in Japanese in terms of Labeling Theory (Chomsky (2013, 2015)). As shown in (1a, b), main clauses in Japanese prefer to topicalize elements like subjects and objects by marking them with the topic particle *-wa* and putting them in the sentence initial position.

(1) a. Taro$_i$-wa t_i pizza-o tabeta. [subject topic]
Taro-TOP pizza-ACC ate
'As for Taro, he ate pizza.'

b. Sono hon$_i$-wa Taro-ga t_i katta. [object topic]
that book-TOP Taro-NOM bought
'As for that book, Taro bought it.'

Topicalization is also permitted in subject-prominent languages such as English, as in (2), but its use is considered marked and marginal, compared with Japanese (Li and Thompson (1976)).

(2) That book, John bought.

Based on these facts, Japanese has long been classified as a topic-prominent language.

Subjects in Japanese are marked with the nominative marker *-ga* as well as *-wa*. As is well known, nominative subjects bear two interpretations: exhaustive listing (EL) (3a) and neutral description (ND) (3b).

(3) a. Taro-ga gakusei-des-u.
Taro-NOM student-COP-Pres.
'(Only) Taro is a student.'

b. Ame-ga fu-ttei-mas-u.
rain-NOM fall-Asp-MAS-Pres.
'It is raining.'

A large number of researchers claim that nominative subjects in Japanese are located in Spec-T, as in the way that those in English are.

Issues: Main clauses in Japanese have traditionally been analyzed in the same way as those in subject-prominent languages such as English. It is standardly assumed that C and T are separately introduced and that topic elements are displaced to Spec-C while nominative subjects are displaced to Spec-T (Kishimoto (2009)). Given the same syntactic treatments, however, questions arise as to what derives differences such as the one regarding the markedness and applicability of topicalization. In addition, if nominative subjects in Japanese are uniformly hosted in Spec-T, questions remain as to what gives rise to the two different interpretations for nominative subjects.

Proposal 1: This presentation proposes that main clauses in Japanese select the External Pair-Merge (hereafter, EPM) of T to C by default (Epstein, Kitahara, and Seely (EKS) (2016), Otsuka (2017)). That is, they take the structure of (4a) instead of (4b), which applies to subject-prominent languages.

(4) a. $[_{\beta} < C(\text{-}T) > [_{\alpha} \ldots]]$ b. $[_{\gamma} C [_{\beta} T [_{\alpha} \ldots]]$

In (4a), as the consequence of EPM of T to C, T becomes invisible in syntax: < C(-T) > is on a

par with C, so C retains its features including [*v*Top] and [Tense]. Meanwhile, topic elements bear an unvalued topic feature, [*u*Top], which is valued as [*v*Top] at Spec-C(-T) through agreement with C(-T) with [*v*Top]. Under this proposal, topic elements are uniformly located in Spec-C(-T) regardless of whether they are subjects or objects, as shown in (5).

(5) a. [$_{<Top, Top>}$ Taro$_i$-wa$_{[uTop]}$ [$_{AspP}$ t$_i$' [$_{vP}$ t$_i$ pizza-o tabe] Asp] -ta-C(-T)$_{[vTop]}$]

b. [$_{<Top, Top>}$ Sono hon$_i$-wa$_{[uTop]}$ [$_{AspP}$ Taro$_j$-ga [$_{vP}$ t$_j$ t$_i$ ka] Asp] -tta-C(-T)$_{[vTop]}$]

As the result, the root sentence obtains the label of <Top, Top>, whereby the combination of Spec-C(-T) and the remaining parts is interpreted as a topic-comment structure.

Proposal 2: This presentation proposes that the two nominative interpretations are attributed to the different structural positions for nominative subjects, as shown in (6) and (7).

(6) EL *-ga* subject: [$_{<Foc, Foc>}$ SUBJ$_i$ [$_{AspP}$ t$_i$' [$_{vP}$ *t*$_i$ OBJ V] Asp] C(-T)]

(7) ND *-ga* subject: [$_{C(-T)P}$ OP [$_{AspP}$ SUBJ$_i$ [$_{vP}$ *t*$_i$ OBJ V] Asp] C(-T)]

EL *-ga* subjects end up in Spec-C(-T) due to their property as focus, as in (6); on the other hand, ND *-ga* subjects are displaced to Spec-Asp, which is located right above vP (Moriyama et al. (2022)). When ND subjects are located in Spec-Asp, Spec-C(-T) is occupied by the spacio-temporal topic operator OP (Erteschik-Shir (1997), Nishioka (2019)). The subject DPs are assigned nominative Case via agreement between the unvalued case feature [*u*Case] on DP and the tense feature [Tense] on C(-T).

Advantage 1: Since Japanese is classified as a topic-prominent language, it is typical for topic elements marked by *-wa* to appear at the initial position of the main clause. This characteristic of Japanese can be straightforwardly captured under the current analysis: in Japanese, the highest category in the main clause structure is C(-T)P, where T is hidden and deactivated. This highest category, even in the declarative main clause, corresponds not to the subject position as in English, but rather to a position related to discourse. This structural property makes topicalization unmarked and readily applicable in Japanese, the topic-comment composition being denoted in the syntactic level. Furthermore, the distinct positions for nominative subjects depending on whether they are discourse-related or not contribute to their interpretational differences.

Advantage 2: It has been proposed that EPM is applied to C and T in certain clause types such as *to*-infinitive and ECM clauses in English, which differentiates the clause types from others. The current proposal has the same spirit as clause typing. Under the current proposal for Japanese main clauses, the uniform application of EPM to C and T results in C(-T), and this unique head helps specify the clause type as the main clause.

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Exploring the Sound Symbolism of Size in American English with the XGBoost Algorithm using Phonemes and Phonological Features

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This study builds machine learning models to classify American English words based on their sound-symbolic associations with size (large/small). Sound symbolism is the phenomenon where the sounds of words are associated with certain meanings, often linked to sensory or perceptual qualities. In many languages, certain phonemes or sound patterns are associated with specific attributes, such as size (e.g., Sapir, 1929), shape (e.g., Ćwiek et al., 2022), or other sensory perceptions (e.g., Winter et al., 2017; Ćwiek et al., 2024). This phenomenon challenges the traditional view of language as a purely arbitrary system, offering insights into cognitive and perceptual processes that shape the connection between sound and meaning across languages. Studies in this area demonstrate the potential for cross-linguistic research, because some sound symbolic patterns have been observed across languages (e.g., Dingemanse, 2012).

Drawing upon the Glasgow Norms (Scott et al., 2021), we extend the methodology of Winter & Perlman (2021), who used the random forest algorithm to classify the Glasgow Norms according to size. Unlike their approach, we use the XGBoost algorithm, incorporating cross validation to improve predictive accuracy and reduce overfitting. Our research not only uses phonemes but also explores phonological features as classifiers, aiming to test each method's efficacy. Algorithms built purely on phonemes have limited cross-linguistic application due to non-overlapping phonemic and phonetic inventories. By splitting up phonemes into features, we have created a method to test cross-linguistic sound-symbolic associations. This study tests this new method by constructing both algorithms and measuring them against each other.

All the data, the code, and the models are available here. Data was processed using R (R Core Team, 2024), employing the XGBoost (Chen & Guestrin, 2016) and caret (Kuhn, 2008) packages. We cross-referenced the Glasgow Norms corpus (N = 5553) with the Carnegie Mellon University Pronouncing Dictionary (Weide, 1998) for phoneme counts, normalized by word length. A set of 24 phonological features, extracted from the PanPhon database (Mortensen et al., 2016), was applied to the dataset. Classification was based on a mean split of size scores in the Glasgow Norms. Our XGBoost models, constructed with 5-fold cross-validation, demonstrated significant predictive power ($p < 0.001$). Feature importance was determined using the caret package and directionality was analyzed using the distribution of phonemes into the large/small dimensions while taking word length ratio between the words classified as small/large into consideration.

The phoneme-based algorithm (accuracy = 62.9%, *SD* = 1.2%) outperformed the phonological feature-based one (accuracy = 61.3%, *SD* = 0.5%), both surpassing the random forest model (Winter & Perlman, 2021: 57.7%). Focusing on the top and bottom 10% of size scores, both models showed improved performance: the phoneme model (accuracy = 68.7%, *SD* = 2.2%) and the phonological feature model (accuracy = 67.2%, *SD* = 1.4%). Feature importance and directionality results for the 10% phoneme model are reported in Table 1 and Table 2 reports the feature importance and directionality results for the 10% feature model.

Despite the Glasgow Norms not being a size-specific, but rather a general corpus of nouns, verbs, adjectives, and adverbs, our algorithms achieved around 60% accuracy using the entire dataset and approximately 70% with the top and bottom 10% scores. The phonological feature model's relative accuracy, though slightly lower than the relative accuracy of the phoneme

model, suggests potential for cross-linguistic application. This study reinforces and expands upon Winter & Perlman's (2021) finding, highlighting the effectiveness of the XGBoost algorithm in size sound symbolism research.

Feature	Importance	Directionality
/t/	90.9	Small
/n/	88.3	Large
/ʌ/	85.2	Large
/s/	80.4	Small
/l/	77.1	Small

Table 1: Phoneme model feature importance score and majority distribution (Directionality) in the 10% phoneme algorithm.

Feature	Importance	Directionality
Voiced	93.9	Large
High	88.9	Small
Continuant	84.5	Large
Back	83.4	Large
Coronal	74.4	Large

Table 2: Phonological feature model feature importance score and majority distribution (Directionality) in the 10% phonological feature algorithm.

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Are Genitive and Accusative Subjects Allowed in Noun Complements in Mongolian?

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1. Introduction: Harada (1971) originally discussed a nominative/genitive case marker alternation phenomenon in Japanese, as illustrated in (1).

(1) [doyoobi-ni tamago-ga/**-no** yasui] mise 'the store where eggs are cheap
[Saturday-on egg-Nom/**-Gen** cheap] store on Saturdays'

Since his seminal work, the phenomenon has been discussed by many linguists, such as Miyagawa (1993, 2011, 2012, 2013), Watanabe (1996) and Hiraiwa (2001). In Japanese, genitive subjects are not allowed in noun complements, as shown in (2).

(2) Ichiroo-wa [[kinoo Shoohee-ga/***-no** odot-ta] to-iu/to-no
Ichiro-Top [[yesterday Shohei-Nom/***-Gen** dance-Past] that-say/that-Gen
uwasa]-o shinjiteiru.
rumor]-Acc believe 'Ichiro believes [the rumor that [Shohei danced yesterday]].'

This study investigates whether genitive subjects are allowed in noun complements in Mongolian, which, like Japanese, is a language that allows genitive subjects. At the same time, this study also examines whether accusative subjects are allowed in noun complements in Mongolian. The research questions to be addressed in this study are stated in (3).

(3) a. Are genitive subjects allowed to appear in noun complements in Mongolian?
b. Are accusative subjects allowed to appear in noun complements in Mongolian?

2. Background: First, Maki et al. (2016) propose (4) to capture the distribution of genitive subjects in Mongolian and Japanese, which must satisfy (4a) and (4b) simultaneously.

(4) **Conditions on Genitive Subject Licensing**
a. The genitive subject must be c-commanded by a nominal element in the local domain.
b. The genitive subject must be in a local relationship with the adnominal form of the predicate.

Second, Maki et al. (2015) present generalization (5) about the distribution of accusative subjects in Mongolian.

(5) **Generalization about the Distribution of Accusative Subjects in Mongolian**
Accusative subjects may occur in non-matrix clauses whose heads are **not** genuinely **nominal** in nature. Thus, they may occur in temporal, conditional and reason clauses as well as complement clauses, but **not in relative clauses**.

3. Data: Here are some relevant examples. First, genitive subject examples are listed in (6)-(11). (6) and (7) show that a genitive subject requires the adnominal form of a predicate.

(6) Ulaɣan-**ø** tere nom-i biči-**jai**.
Ulagan-**Nom** that book-Acc write-**Past.Con** 'Ulagan wrote the book.'

(7) [Ulaɣan-ø/**-u** biči-**gsen**/*biči-**jai**] nom
[Ulagan-Nom/**-Gen** write-**Past.Adn**/*write-**Past.Con** book 'the book Ulagan wrote'

However, (8) and (9) show that in noun complements, genitive subjects are allowed, even if Condition (4b) is violated.

(8) Baɣatur-ø [[öčügedür Ulaɣan-**u** büjigle-**gsen**/büjigle-**jei**]
Bagatur-Nom [[yesterday Ulagan-**Gen** dance-**Past.Adn**/dance-**Past.Con**]
gedeg čoorqal]-i itege-jü baina. 'Bagatur believes [the rumor
that rumor]-Acc be.believe-CVS be.Con that [Ulagan danced yesterday]].'

(9) Baɣatur-ø Batu-eče [[öčügedür Ulaɣan-**u** büjigle-**gsen**/büjigle-**jei**]
Bagatur-Nom Batu-from [[yesterday Ulagan-**Gen** dance-**Past.Adn**/dance-**Past.Con**]
gedeg čimege]-yi ol-jai. 'Bagatur got [the information that
that information]-Acc get-Past.Con [Ulagan danced yesterday]] from Batu.'

(10) shows that the same is true with a transitive verb.

(10) Baɣatur-ø [[öčügedür Ulaɣan-**u** tere almurad-i qudaldun-abu-**ɣsan**/
Bagatur-Nom [[yesterday Ulagan-**Gen** that apple-Acc buy-take-**Past.Adn**/
qudaldun-ab-**čai**] gedeg čoorqal]-i itege-jü baina.
buy-take-**Past.Con**] that rumor]-Acc believe-CVS be.Con
'Bagatur believes [the rumor that [Ulagan bought the book yesterday]].'

However, a genitive subject is disallowed in an embedded clause in a noun complement.

(11) * Baɣatur-ø [Batu-ø [[öčügedür Ulaɣan-**u** tere almurad-i
Bagatur-Nom [Batu-Nom [[yesterday Ulagan-**Gen** that apple-Acc
qudaldun-abu-**ɣsan**/qudaldun-ab-**čai**] gejü kele-**gsen**/kele-**jei**] gedeg
buy-take-**Past.Adn**/buy-take-**Past.Con**] that say-**Past.Adn**/say-**Past.Con**] that
čoorqal]-i itege-jü baina. 'Bagatur believes [the rumor that [Batu says that
rumor]-Acc believe-CVS be.Con [Ulagan bought the book yesterday]]].'

Second, accusative subject examples are listed in (12)-(14). (12a, b) show that while it is disallowed in a matrix clause, an accusative subject is allowed in a temporal clause.

(12) a. Yaɣarau-bar Ulaɣan-ø/***-i** almurad-ø ide-jei. 'Ulagan ate
hastily Ulagan-Nom/-**Acc** apple-Acc eat-Past.Con an apple hastily.'
b. Yaɣarau-bar Ulaɣan-ø/-**i** almurad-ø ide-gsen-ü daraɣa,
hastily Ulagan-Nom/-**Acc** apple-Acc eat-Past.Adn-Gen after
Baɣatur-ø jürji-ø ide-jei. 'After Ulagan had eaten an apple
Bagatur-Nom orange-Acc eat-Past.Con hastily, Bagatur ate an orange.'

An accusative subject cannot appear in a relative clause (whose head is clearly nominal), as shown in (13).

(13) [[Öčügedür Ulaɣan-ø/***-i** qudaldun-abu-**ɣsan**] nom]-i nama-du üjegül.
[[yesterday Ulagan-Nom/-**Acc** buy-take-**Past.Adn**] book]-Acc me-to show
'Please show me [the book [which Ulagan bought yesterday]].'

However, an accusative subject may appear in a noun complement clause, as shown in (14).

(14) Baɣatur-ø [[öčügedür Ulaɣan-ø/-**i** büjigle-**jei**/büjigle-**gsen**]
Bagatur-Nom [[yesterday Ulagan-Nom/-**Acc** dance-**Past.Con**/dance-**Past.Adn**]
gedeg čoorqal]-i itege-jü baina. 'Bagatur believes [the rumor that
that rumor]-Acc be.believe-CVS be.Con [Ulagan danced yesterday]].'

4. Discussion: The above data help us answer the research questions in (3a, b). The answer to (3a) is positive, as genitive subjects are allowed to appear in noun complements in Mongolian. The answer to (3b) is also positive, as accusative subjects are allowed to appear in noun complements in Mongolian. Let us now consider what the above facts might suggest for the theory of syntax. First, the fact that (8) and (9) with the conclusive form of the predicate are grammatical suggests either (i) that Condition (4b) is incorrect, and needs to be revised/abandoned, or (ii) the essence of the condition should be maintained, and some other factor is involved in noun complements. Although it is hard to choose either one of these, as (4b) as well as (4a) is general enough, we would like to suggest that (4b) should be maintained, and what is actually taking place in (8) and (9) is that the complementizer *gedeg* 'that' is an adnominalizer, which can make the conclusive form of the preceding predicate an adnominal form. The ungrammaticality of (2) with a genitive subject suggests that the predicate that precedes C is in the conclusive form. Second, (14) with the adnominal form of the predicate and (13) suggest that "nominality" in Generalization (5), which states that an accusative subject may appear in non-matrix clauses whose heads are not genuinely nominal in nature, is irrelevant, and an accusative subject is only allowed in a CP, and a relative clause is not a CP, but an IP, in Mongolian. This supports the idea that accusative Case in Mongolian can be assigned by C.

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