

PREFIXATION ABILITY INDEX AND VERBAL GRAMMAR CORRELATION INDEX PROVE THE REALITY OF THE BUYEO GROUP

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Abstract

All suggestions about reality of the Buyeo group were based on the representation of a language as a heap of lexemes: such method allows different scholars to make different conclusions and does not suppose verification. Language is first of all structure/grammar, but not a heap of lexemes, so methods of comparative linguistics should be based on comparison of grammars. Prefixation Ability Index (PAI) and Verbal Grammar Correlation Index (VGCI) are typology based tools of comparative linguistics. PAI allows us to see whether languages are potentially related: if values of PAI differ more than fourfold, it's a sign of unrelatedness, if PAI values differ less than fourfold, there is a possibility for some further search to find proves of relatedness. VGCI completely answers questions about relatedness/unrelatedness: if VGCI value is 0.4 and more then languages are related, if VGCI is 0.3 and less then languages are unrelated. PAI of Japanese is 0.13, PAI of Korean is 0.13; it means they can be related. VGCI of Japanese and Korean is 0.57, it's almost the same as VGCI of English and Afrikaans that is 0.56, so it means that Japanese and Korean belong to the same group, but not just to the same family.

Keywords: the Buyeo group; Japanese; Korean; comparative linguistics; linguistic typology

Povzetek

Dosedanji predlogi o jezikovni skupini Buyeo so povečini osnovani na osnovi leksemov raziskovanih jezikov. Takšna metoda omogoča raziskovalcem različne zaključke in ne zahteva njihovih preveritev. Članek poudari, da jezik ni le kopica leksemov, temveč je primarno definiran s svojo strukturo/slovnico, zato bi morale metode v primerjalnem jezikoslovju temeljiti predvsem na primerjavi slovnice primerjalnih jezikov. Index možne uporabe predpon (Prefixation Ability Index ali PAI) in Korelacijski index glagolske slovnice (Verbal Grammar Correlation Index ali VGCI) sta dve orodji primerjalnega jezikoslovja, ki temeljita na jezikovni tipologiji. PAI nam omogoča vpogled v možnost jezikovne povezanosti raziskovanih jezikov; ko njegova vrednost preseže 0.4, le-ta nakazuje njihovo nepovezanost, njegova vrednost pod četrtno pa obuja možnost, da z nadaljnjimi raziskavami dokažemo povezanost med raziskovanimi jeziki. Nadalje pa orodje VGCI dokončno odgovori na vprašanje o jezikovni povezanosti med jeziki; če je njegova vrednost višja od 0.4, lahko rečemo, da so jeziki med seboj povezani, v nasprotnem primeru pa ne. PAI tako japonskega kot korejskega jezika je 0.13. To nakazuje, da obstaja možnost o njuni medsebojni povezanosti. Njun VGCI pa je 0.57, kar nakazuje, da jezika ne pripadata samo isti jezikovni družini, ampak jih lahko uvstimo v isto jezikovno skupino, podobno kot isti skupini pripadata angleščina in jezik afrikaans, katerih VGCI je 0.56.

Ključne besede: skupina Buyeo; japonsščina; korejščina; primerjalno jezikoslovje; jezikovna tipologija



1 Problem introduction

Buyeo is a conventional name of hypothetical stock that includes Japanese language, Ryukyuan languages and Korean language.

Ogura Shimpei, Sergei Starostin, Cristopher Beckwith have suggested the reality of the Buyeo stock (Beckwith, 2007; Ogura, 1934; Starostin, 1991). Alexander Vovin has suggested that Japanese and Korean are not related (Vovin, 2010).

Main problem of all these suggestions (as well as of most of hypotheses about certain languages relationship) is that they are not based on any verifiable methods. All such suggestions are based mainly on the idea that language is just a heap of lexemes but not grammar. Such approach does not suppose any verification and so different scholars are allowed to make contradictory conclusions about the same material: probably some conclusions are right, but the absence of appropriate methods of verification makes it impossible to understand what is right and what is wrong. Actually it pushes comparative linguistics outside of the field of science: science always supposes verification and also supposes rejection of unproven hypotheses, while methodology based on "artist sees so" principle does not suppose any verification and so contradictory conclusions can coexist.

As long as language is first of all grammar, conclusion about genetic affiliation of certain language should be made on the base of analysis of grammar (Akulov, 2015d).

Current paper are represents the proofs based on typology/grammar which show that Japanese and Korean are closely related.

2 Methods

2.1 Prefixation Ability Index (PAI)

Prefixation Ability Index (PAI) allows us to see whether two languages can potentially be genetically related.

PAI is a method to estimate the percentage of prefixes in a language. It presupposes that any language has its own prefixation ability, which is then measured as percentage of prefixes among affixes. In order to estimate percentage of prefixes (PAI), the following steps should be undertaken:

- 1) Count total number of prefixes;
- 2) Count total number of affixes;
- 3) Calculate the ratio of total number of prefixes to the total number of affixes.

It is generally believed that PAI of genetically related languages is close in its values; and tests of PAI on the material of firmly assembled stocks (Indo-European, Austronesian, Afroasiatic) show that PAI values of distant relatives can differ maximum fourfold. (A detailed description of PAI method can be seen in Akulov, 2015a.)

Thus PAI can be used as a tool that allows us to see whether certain languages can potentially be related: no conclusions can be made when PAI values differ fourfold or less (for instance in the case of Indo-European and Austronesian), but if PAI values of certain languages differ, for instance, tenfold (the case of Ainu and Nivkh; see Akulov, 2015a, p. 13) it is an evidence that considered languages are not related.

PAI could be called a safety valve of comparative linguistics: if its values do not differ more than fourfold then there are no obstacles for further search for genetic relationship; if values differ about fourfold then should be found ferroconcrete proves of genetic relationship (like for instance those that were shown in the case of Semitic group and Coptic language); if values differ sevenfold – tenfold or even more then considered languages belong to completely different stocks.

It is possible to say that PAI shows direction in which looking for potential relatives of certain language can be perspectives.

2.2 Unrelatedness

An important point of current consideration is possibility of proving the unrelatedness of languages.

This is a necessary tool of any classification as well as possibility of proving of relatedness: if there would be no possibility to prove unrelatedness then even a single stock hardly could be assembled.

Possibility of proving of unreltedness is discussed and proved in the following papers: Akulov (2015c) and Brown (2015).

2.3 Verbal Grammar Correlation Index (VGCI)

VGCI is thought to be the main tool in a search for language relatedness, so a more detailed description of VGCI method is given below.

2.3.1 VGCI method background

As seen in a previous section, PAI allows us to see whether languages are potentially related. However, in order to be able to say whether two languages are related, we need the that would pay attention to grammar and consequently give precise results.

As long as language is structure, i.e. grammar, language relatedness should be understood on the comparison of their grammars.

Grammar is first of all positional distributions of grammatical means, i.e. ordered pair of the following view: $\langle A; \Omega \rangle$ where A is a set of grammatical meanings and Ω is a set of operations defined on A or positional distributions.

In order to understand whether two languages are genetically related we should analyze the degree of correlation among sets of grammatical meanings and estimate the proximity of positional distributions of common grammatical meanings.

2.3.2 Why does the method entail verbs?

Why is it possible to give conclusions on the relatedness or unrelatedness of languages considering only verbal grammar? The answer lies in the fact that there are many languages with a poor or almost no grammar of nouns while there is no language without verbal grammar. In other words, there are languages with no grammatical case or gender (even very closely related language can differ in that case, for instance, English and German, or Russian and Bulgarian), but there are no languages without modalities, moods, tenses, and aspects. Therefore a verb is thought to be the backbone of any grammar, and the backbone of comparative method.

2.3.3 General scheme of VGCI calculation

As written in section 2.3.1, the following steps should be taken to estimate grammar correlation:

1. Correlation of grammar meanings sets is estimated in the following way. First, the intersection of two sets of grammatical meanings should be found. After calculating the intersection ratio to each set, arithmetical mean of both ratios should be taken. The value represents the index of sets of grammar meanings correlation.
2. Sets of meanings alone do not yet fully describe grammar systems. The second step is to estimate the correlation of positional distributions of common grammatical sets of meanings. Intersection of two sets of grammatical meanings would give us information on the degree of positional correlation.
3. In order to calculate values of VGCI we should take a logical conjunction of the correlation of the degree of grammatical meanings and the degree of correlation for positional distributions of common grammatical meanings. In other words, VGCI as a multiplication of the two indexes.
4. It is obvious that languages which are genetically closely related demonstrate higher values of VGCI – the more sets of grammatical meanings are alike, the higher the intersection ratio, and consequently, the more alike positions of common grammatical meanings –, while languages with low or no relatedness will demonstrate low values of VGCI.
5. According to the previous step, there should be a threshold value of VGCI which determines the border of stocks, i.e.: if certain languages execute values lower than the threshold, such language evidently do not belong to the

same stock. In order to determine the threshold I will compare distant languages of well assembled stocks.

The above method enables a direct comparison of natural languages that exist or have existed, but not of their reconstructions or constructed languages. Descriptions of the latter are under the influence of personal views of the authors and can not be verified anyhow.

I am also to note that the method supposes comparison of meanings and their positional distributions only an does not pay any attention to material exponents at all. It is not a response to radical adepts of *megalocomparison* (the term introduced by James Matisoff: see Matisoff 1990), which harshly ignores typological issues. It is rather a matter of reality and practice since material correlation (regular phonetic correspondence) between languages that are only related weakly can be very complicated. The method is intended to prove genetic relatedness or unrelatedness by pure typology.

Therefore the attention is not paid to technical meanings such as markers of transitivity for example, but rather to the so-called contentive grammatical meanings such as markers of tenses, aspects, modalities etc. In other words, the attention is paid to those grammatical categories that have certain contents expressed by lexical means. Only if necessary, items that express technical meanings (meanings of agreement) can also be taken into account.

It can be a rather complicated task to distinguish obligatory features of verbs from the facultative ones, so first of all attention should be paid to the following categories:

- a) tense and aspect;
- b) mood and modality;
- c) voice;
- d) agent, patient, object, subject, numbers

There can be certain categories used as evidences for a kind of modality or spatial orientation/versions, and are considered as a development of triggers system. Therefore it is very important to make precise descriptions of the languages compared though sometimes same items can be described in a slightly different way.

2.3.4 Results of VGCI testing: values of thresholds

Tests of VGCI on the material of firmly assembled stocks have given us the following values:

- VGCI of English and Russian ≈ 0.52 ;
- VGCI English and Lithuanian ≈ 0.43 ;
- VGCI English and Latin ≈ 0.41 ;
- VGCI English and Persian ≈ 0.38 ;
- VGCI of Khmer and Vietnamese ≈ 0.53 ;

VGCI Hawaiian and Lha'alua ≈ 0.39 ;

VGCI (Chinese and Tibetan) ≈ 0.39 .

On the other hand, tests of VGCI on the material of unrelated languages have shown us the following:

VGCI (Chinese and English) ≈ 0.32 ;

VGCI (Chinese and Latin) ≈ 0.30 ;

VGCI (Khmer and Latin) ≈ 0.29 ;

VGCI (English and Tibetan) ≈ 0.13 .

If value of VGCI is around or above 0.4 then languages are related, i.e. they belong to the same stock). If on the other hand value of VGCI is about 0.3 or less than 0.3 then languages are not related. Values such as 0.39 and 0.38 are closer to 0.4, while 0.31 and 0.32 are closer to 0.3. The closer languages are related the higher is their corresponding VGCI.

2.3.5 Measurement error

Details on measurement error are described in a separate paper (Akulov 2015b). It was calculated to about 2%.

3 Applying PAI and VGCI methods to the Buyeo problem

The main problem of the Buyeo stock is the question of relatedness of Japanese and Korean. In this paper I try to show the relatedness of Japanese and Korean with the use of PAI and VGCI methods.

3.1 PAI suggests that Japanese and Korean can potentially be related

Lavrent'yev (2002) calculated the PAI for Japanese to be 0.13, and Mazur (2004) reported that the PAI for Korean is 0.13.

It is rather interesting that the PAI values demonstrate such similarities. However, as it has been noted in section 3.2.1, no conclusions can be made from similar PAI values. Nevertheless, such similarity is promising and further research might bring us to the proofs of their relatedness.

3.2 VGCI proves close relationship of Japanese and Korean

3.2.1 VGCI of Japanese and Korean

3.2.1.1 List of Japanese forms

The following list of Japanese forms has been compiled by Lavren'tyev 2002.

1. Active: zero marker
2. Agent: [prp-]
3. Attemptive: -sfx + -pp
4. Causative: -sfx
5. Conditional (real): -sfx
6. Conditional (unreal): -sfx
7. Centrifugal version: -sfx + -pp
8. Centripetal version: -sfx + -pp
9. Deontic1 -sfx + -pp + -pp
10. Deontic2 -sfx + -pp + -pp + -pp
11. Deontic3 -sfx + -pp
12. Desiderative: -sfx/-sfx + -pp
13. Directive (benefactive): -sfx + -pp₁/-sfx + -pp₂
14. Directive (from subject): -sfx + -pp
15. Directive (to subject): -sfx + -pp₁/-sfx + pp₂
16. Hortative: -sfx
17. Imperative: -sfx/inner fusion + -sfx
18. Indicative: zero marker
19. Iterative/Frequentative: -sfx + -pp
20. Interrogative: -pp
21. Negation: -sfx + -sfx₁/-sfx + -sfx₂
22. Passive: -sfx
23. Passive causative: -sfx
24. Past continuous: -sfx + -pp
25. Past perfect: -sfx + pp/-sfx + pp/-sfx + -pp/-sfx + -pp
26. Past simple: -sfx/-inner fusion + -sfx
27. Patient: [prp-]
28. Permissive: -sfx + -pp
29. Politeness (formal) -sfx
30. Politeness (plain) -sfx
31. Potential: -sfx + -sfx/-sfx + -pp + -pp + -pp
32. Present continuous: -sfx + -pp
33. Present-Future: -sfx
34. Present perfect: -sfx + -pp/-sfx + -pp/-sfx + -pp/-sfx + -pp
35. Prohibitive: -sfx + -pp₁/-sfx + -pp₂
36. Subject: [prp-]

It is obvious that each grammatical meaning is followed by certain schemes of letters and signs. These are notations representing general schemes of positional implementation for the grammatical meaning concerned.

Notations of positional implementations are the following: prp- – preposition; prfx- – prefix; -infx- – infix; crfx-crfx – circumfix; crp-crp – circumposition; -RR- – reduplication; inner fusion – irregular changes inside the root; suppletivism; R – root; -sfx – suffix; -pp – post position. In case of a different form of one position (i.e. forms

used in different contexts), they are numbered as prp_1 -/ prp_2 -/ prp_3 - and distinguished by slash. Positional elements that are components of the same implementation are expressed as prp - + $-sfx$., where - means that certain positional element can optionally be omitted and if written in square brackets, it is not obligatory.

Such a notation shows grammatical meanings and their positions in relation to a nuclear position rather than their absolute positions in a linear model of word or phrase. To state an example, it is of no importance which prefix is placed closer to the nuclear position; for the current tasks it is sufficient to know that all prefixes are placed left from the nuclear position.

It is important to note that this way of notation carries information on places and technical means of expressions concerning grammatical meanings. The so-called "school grammar" offering the number of verbal stems in a certain language, for example, is not of my interest. I consider language as something like a dark box with many holes, and implementation of certain grammatical meanings is the light coming out of those holes. My task is to record in what holes the light appears, and then to compare recordings of different boxes (i.e. different languages).

3.2.1.2 List of Korean forms

List of Korean forms has been compiled by Mazur 2004.

1. Active: zero marker
2. Agent: [prp -]
3. Attemptive: $-sfx$ / $-sfx$ + $-sfx$
4. Causative: $-sfx$
5. Conditional (real): $-sfx$ + $-pp$
6. Conditional (unreal): $-sfx$ + $-sfx$ + $-pp$
7. Deontic: $-sfx$ + $-sfx$ + $-pp$ / $-sfx$ + $-pp$
8. Desiderative1: $-sfx$ + $-pp$ + $-pp$
9. Desiderative 2: $-sfx$ + $-pp$
10. Directive: (from subject) $-sfx$ + $-pp$ + $-pp$ / $-sfx$ + $-pp$
11. Future simple 1: $-sfx$
12. Future 2: $-sfx$ + $-pp$ +
13. Hortative: $-sfx_1$ / $-sfx_2$ / $-sfx_3$ + $-sfx$
14. Imperative: $-sfx_1$ / $-sfx_2$ / $-sfx_3$ /R
15. Indicative: zero marker
16. Interrogative: $-sfx$
17. Negation: $-sfx$ + $-pp$
18. Passive: $-sfx$
19. Past simple: $-sfx$ /inner fusion + $-sfx$
20. Patient [prp -]
21. Permissive: $-sfx$ + $-sfx$ + $-pp$ / $-sfx$ + $-pp$
22. Plain style: $-sfx$ /R
23. Polite style (middle) $-sfx$ / $-sfx$ + $-sfx$
24. Polite style (very formal): $-sfx$ + $-sfx$

25. Potential: -sfx + -pp + -pp
26. Present continuous: -sfx + -pp
27. Present simple: -sfx
28. Prohibitive: -sfx + -pp + -pp
29. Subject [prp-]

3.2.1.3 Japanese^Korean

"^" is a sign for VGCI operation.

1. Active: J: zero maker ~ K: zero marker 1
2. Agent: J: [prp-] ~ K: [prp-] 1
3. Attemptive: J: -sfx + -sfx ~ L: -sfx/-sfx + -sfx 0.75
4. Causative: J: -sfx ~ K: -sfx 1
5. Conditional (real): J: -sfx ≠ K: -sfx + -pp 0
6. Conditional (unreal): J: -sfx ≠ K: -sfx + -sfx + -pp 0
7. Deontic: J: -sfx + -pp + -pp/-sfx + -pp + -pp + -pp/-sfx + -pp ~ K: -sfx + -sfx + -pp/-sfx + -pp: 0.66
8. Desiderative: J: -sfx/-sfx + -pp ~ K: -sfx + -pp + -pp/-sfx + -pp 0.5
9. Directive (from subject) J: -sfx + -pp ~ K: -sfx + -pp + -pp /-sfx + -pp 0.75
10. Hortative: J: -sfx ~ -sfx₁/-sfx₂/-sfx+ -sfx 0.66
11. Imperative: J: -sfx/inner fusion + -sfx ~ -sfx₁/-sfx₂/-sfx₃/R (1/2 + 1/4)/2 = 0.375
12. Indicative: J: zero marker ~ K: zero marker 1
13. Interrogative: J: -pp ~ K: -sfx 1
14. Negation: J: -sfx + -sfx₁/-sfx + -sfx₂ ~ K: -sfx + -pp 0.75
15. Passive: J: -sfx ~ K: -sfx 1
16. Past simple: J: -sfx/inner fusion + -sfx ~ K: -sfx/inner fusion + -sfx 1
17. Patient: J: [prp-] ~ K: [prp-] 1
18. Permissive: J: -sfx + -pp ~ K: -sfx + -sfx + -pp/-sfx + -pp 0.75
19. Politeness (formal): J -sfx ~ K: -sfx + -sfx 0
20. Politeness plain: -sfx ~ K: -sfx/R 0.75
21. Potential: J: -sfx + -sfx/-sfx + -pp + -pp + -pp ~ K: -sfx + -pp + -pp 0.75
22. Present continuous: J: -sfx + -pp ~ K: -sfx + -pp 1
23. Present simple: J: -sfx ~ K -sfx 1
24. Prohibitive: J: -sfx + -pp₁/-sfx + -pp₂ ~ K: -sfx + -pp + -pp 0.75
25. Subject: J: [prp-] ~ K: [prp-] 1

$$(25/29 + 25/36)/2*(11 + 7*0.75 + 2*0.66 + 0.5 + 0.37)/25 \approx 0.57$$

The following is the brief explanation of notation scheme: first comes the name of a grammatical meaning that is common for both the compared languages (or meanings that are correlated), which is then followed an abbreviation of the name of the first of the compared languages and first language schemes of expressions of the grammatical meaning. A sign of correlation "~" or anti-correlation "≠" comes in between the two languages, then abbreviation of the name of the second language and

its ways of expressions of the grammatical meaning. Finally, the number that expresses degree of correlation is written down. If a certain meaning can be expressed in several ways, options are separated by a slash; in case there are some similar items expressing the same meaning, they are marked by lower index numbers. Also, if there is no difference in positional expressions schemes, this point is counted as 1, and if there is no correlation, corresponding point is counted it as 0, while in other cases particular degree of correlation is estimated. It is supposed that, for instance, the case of -sfx and -pp execute the same full correlation as -sfx and -sfx; while -sfx and -sfx + -sfx show zero correlation.

VGCI of Japanese and Korean is higher than VGCI of Khmer and Vietnamese (VGCI=0.53) or VGCI of English and Russian (VGCI = 0.52), and this brings us to the conclusion that Japanese and Korean belong to the same group rather than just to the same stock. In order to verify if this is so, VGCI of Japanese and Korean is compared with VGCI of languages that evidently belong to the same group.

3.2.2 VGCI values of closely related languages: English and Afrikaans

3.2.2.1 List of English forms

The list of English forms has beend compiled by Barhkhudarov et al., 2000.

1. Active voice: zero marker
2. Agent: prp-/ [prp-] +6 -sfx
3. Causative: prp-
4. Conditional mood: prp-
5. Deontic: prp₋₁/prp₋₂/prp₋₃/prp₋₄
6. Desiderative: prp₋₁/prp₋₂
7. Future continuous: prp + prp + -sfx
8. Future perfect: prp- + prp- + inner fusion/ prp- + prp+ -sfx
9. Future perfect continuous: prp + prp + prp- + -sfx
10. Future simple: prp-
11. Horative: prp-
12. Imperative: R
13. Impossibility: prp-
14. Indicative: zero marker
15. Interrogative: prp-
16. Negation: prp-
17. Optative: prp-
18. Passive voice: prp- + -sfx/prp- + inner fusion
19. Past continuous: prp + -sfx
20. Past perfect: prp + -sfx / prp + inner fusion
21. Past perfect continuous: prp- + prp + -sfx
22. Past simple: inner fusion/suppletivism/-sfx
23. Patient: -pp

24. Plural number: prp- / [prp-] +3 -sfx
25. Possibility: prp-
26. Present continuous: prp + sfx
27. Present perfect: prp + sfx/ prp + inner fusion
28. Present perfect continuous: prp- + prp + -sfx
29. Present simple: 6 -sfx
30. Prohibitive: prp₋₁/prp₋₂
31. Singular number: prp- / [prp-] +3 -sfx
32. Subject: prp- / [prp-] +6 -sfx
33. Subjunctive mood: prp-

3.2.2.2 List of Afrikaans forms

List of Afrikaans forms compiled by Mironov, 2000.

1. Active: zero marker
2. Agent: prp-
3. Causative: prp-
4. Conditional: prp-
5. Deontic: prp-
6. Desiderative: prp₋₁/prp₋₂
7. Future perfect: prp + prfx-/prp-/prp- + prfx + inner fusion
8. Future simple: prp-
9. Imperative: R
10. Interrogative: prp-
11. Negation: -pp
12. Passive prp- + prfx/prp-/prp- + prfx- + inner fusion
13. Past simple: inner fusion/-sfx
14. Patient: -pp
15. Plural number: prp-
16. Potential: prp₋₁/prp₋₂
17. Present perfect ~ Past simple: prp- + prfx-/prp-/prp- + prfx- + inner fusion
18. Present simple: [prp-] + R
19. Prohibitive: crp-crp
20. Singular number: prp-
21. Subject: prp-
22. Subjunctive: prp-

3.2.2.3 English^Afrikaans

1. Active: E: zero marker ~ Af: zero marker 1
2. Agent: E: prp- / [prp] +6 -sfx ~ Af: prp- 0.75
3. Causative: E: prp- ~ Af: prp- 1
4. Conditional: E: prp- ~ Af: prp- 1
5. Deontic: E: prp₋₁/prp₋₂/prp₋₃/prp₋₄ ~ Af: prp- (1+1/4) / 2 ≈ 0.62
6. Desiderative: E: prp₋₁/prp₋₂ ~ prp₋₁/prp₋₂ 1

7. Future perfect: E: prp- + prp- + inner fusion/ prp- + prp+ -sfx ~ Af: prp + prfx-/prp-/prp- + prfx + inner fusion $(1/2 + 1/3) \approx 0.42$
8. Future simple: E: prp ~ Af: prp 1
9. Imperative: E: R ~ Af: R 1
10. Interrogative: E: prp- ~ Af: prp- 1
11. Negation: E: prp \neq Af: -pp 0
12. Passive: E: prp- + -sfx/prp- + inner fusion ~ Af: prp- + prfx/prp-/prp- + prfx- + inner fusion 0
13. Past simple: E: inner fusion/suppletivism/-sfx ~ Af: inner fusion 0.66
14. Patient: E: -pp ~ Af: -pp 1
15. Plural number: E: prp-/ [prp-] +3 -sfx ~ Af: prp- 0.75
16. Potential: E: prp- ~ Af: prp₋₁/prp₋₂ 0.75
17. Present perfect: E: prp + sfx/ prp + inner fusion ~ Af: prp- + prfx-/prp-/prp- + prfx- + inner fusion $(1/2 + 1/3) / 2 \approx 0.41$
18. Present simple: E: 6 -sfx \neq Af: [prp-] + R 0
19. Singular number: E: prp-/ [prp-] +3 -sfx ~ Af: prp- 0.75
20. Subject: E: prp- / [prp-] +6 -sfx ~ Af: prp- 0.75
21. Subjunctive: E: prp- Af: prp- 1

$$(21/22 + 21/33) / 2 * (9 + 5 * 0.75 + 0.62 + 0.66 + 0.42 + 0.41) / 21 \approx 0.56$$

3.3 Buyeo languages form a group

These are the calculated VGCI values:

Japanese^Korean ≈ 0.57

English^Afrikaans ≈ 0.56

VGCI values of Japanese and Korean show a very similar relation as is attested by languages of firmly established language groups, which brings us to the conclusion that Buyeo languages belong to the same language group.

Schemes and diagrams represented below graphically show proximity of Japanese and Korean grammars. Schemes of English and Afrikaans are shown to illustrate similarities.

	A	B	C	D	E	F	G
1		prp	prfx	inner fus. R		sfx	pp
2	Agent	J1; K1					
3	Attempt.					K3; J0,5	J0,5; K0
4	Causative					J1; K1	
5	Centrifug					J0,5; K0	J0,5; K0
6	Centrip.					J0,5; K0	J0,5; K0
7	Cond. R.					J1; K0,5	K0,5; J0
8	Cond. Un.					J1; K0,66	K0,33; J0
9	Deontic1					J1/3; K2/3	J2/3; K1/3
10	Deontic2					J0,25; K0	J0,75; K0
11	Deontic3					J0,5; K0,5	J0,5; K0,5
12	Desid.1					J1; K0,33	K0,66; J0
13	Desid.2					J0,5; K0,5	J0,5; K0,5
14	Direct 1					J2; K0	J2; K0
15	Direct 2					J2; K0	J2; K0
16	Direct 3					J0,5; K0,83	J0,5; K1,1
17	Fut. S.					K1; J0	
18	Fut. 2					K0,5; J0	K0,5; J0
19	Hortative					J1; K4	
20	Imp.			J0,5; K0	K1; J0	J1,5; K3	
21	Interrog.					K1; J0	J1; K0
22	Iterative					J0,5; K0	J0,5; K0
23	Negation					J4; K0,5	K0,5; J0
24	Passive					J1; K1	
25	Pass.Caus					J1; K0	
26	Past. Con.					J0,5; K0	J0,5; K0
27	Past. Perf					J2; K0	J2; K0
28	Past. S.			J0,5; K0,5		J1,5; K1,5	
29	Patient	J1; K1					
30	Permiss.					J0,5; K1,1	J0,5; K0,83
31	Pol. Form					J1; K2	
32	Pol. Mid.					K4; J0	
33	Pol. Plain				K1; J0	J1; K1	
34	Potential					J1,5; K0,33	J1,5; K0,66
35	Pres. Con.					J0,5; K0,5	J0,5; K0,5
36	Pres. S.					J1; K1	
37	Pres. Perf					J2; K0	J2; K0
38	Prohibit.					J1; K0,33	J1; K0,33

Figure 1: Positional distributions of Japanese and Korean grammars.

Lines 1–38 represent grammar meanings whereas columns B–G are positional realizations. Japanese (J) is marked green and Korean (K) is marked red. Common positions are marked yellow. Numbers inside cells show the degree of use of corresponding positions by the two languages respectfully.

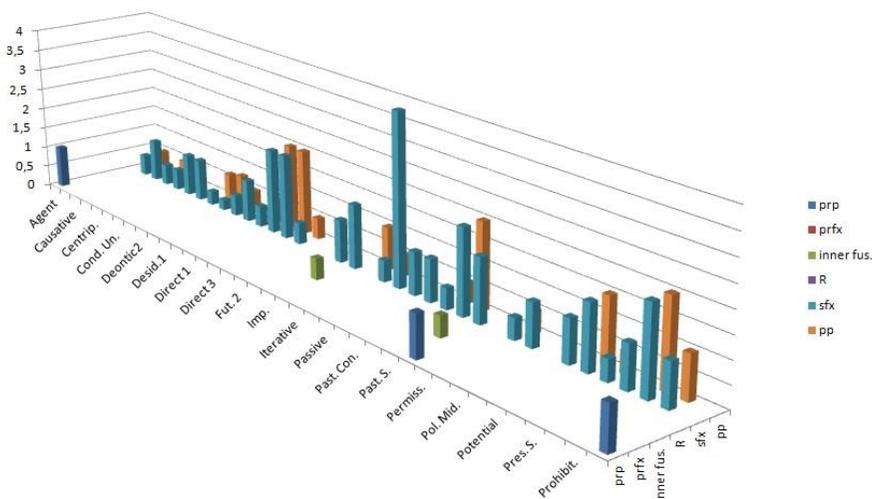


Figure 2: Positional distribution of Japanese grammar and its comparison with Korean.

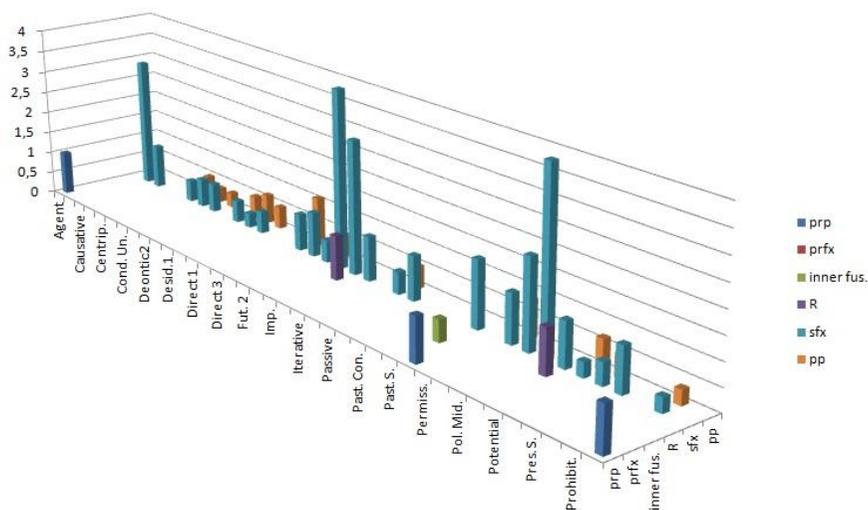


Figure 3: Distribution of Korean grammar and its comparison with Japanese.

3D diagrams are just unfolding of "conspectus" way of recording represented in 2D tables. Axis X shows the list of grammar meanings, axis Y signs of positional distributions, and axis Z shows to what degree a certain position is used by the two languages respectively. Such 3D representations are useful in a sense that they show grammars of compared languages in the most illustrative way.

	A	B	C	D	E	F	G	H	I	J
1		prp	prfx	crp(h)	inner. F.	suppl.	R(n)	crp(e)	sfx	pp
2	Agent	Af1; E1							E6; Af0	
3	Causative	Af1; E1								
4	Cond.Md.	Af1; E1								
5	Deontic.	Af1; E4								
6	Desid.	Af2; E2								
7	Fut.Cont.	E0.66; Af0							E0.33; Af0	
8	Fut.Perf.	Af1.8E1.3	Af0.83; E0		Af0.33E0.33				E0.33; Af0	
9	Fut.Prf-C.	E0.75; Af0							E0.25; Af0	
10	Fut.S.	Af1; E1								
11	Hortative	E1; Af0								
12	Imp. Md.						Af1; E1			
13	Imposs.	E1; Af0								
14	Interrog.	Af1; E1								
15	Negation	E1; Af0								Af1; E0
16	Optative	E1; Af0								
17	Passive	Af1.83E1	Af0.83		E0.5; Af0.33				E0.5; Af0	
18	Past. Cont	E0.5; Af0							E0.5; Af0	
19	Past.Perf.	E1; Af0			E0.5; Af0				E0.5; Af0	
20	Past Prf-C	E0.66; Af0							E0.33; Af0	
21	Past S.				Af1; E1	E1; Af0			Af1; E1	
22	Patient									Af1; E1
23	Plural	Af1; E1							E3; Af0	
24	Possib.	Af2; E1								
25	Prs.Cont.	E0.5; Af0							E0.5; Af0	
26	Prs.Perf.	Af1.83; E1	Af0.83		E0.5; Af0.33				E0.5; Af0	
27	Prs.Prf-C.	E0.66; Af0							E0.33; Af0	
28	Prs.S.						Af1; E0		E6; Af0	
29	Prohib.	E2; Af0		Af0.5				Af0.5		
30	Singular	Af1; E1							E3; Af0	
31	Subject	Af1; E1							E6; Af0	
32	Subjunct.	Af1; E1								

Figure 4: Positional distributions of English (E) and Afrikaans (Af) grammars. English is marked red, common positions are marked yellow.

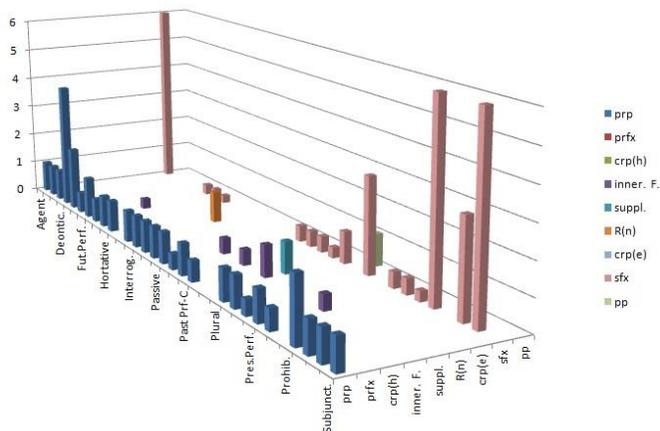


Figure 5: Positional distribution of English grammar compared to Afrikaans.

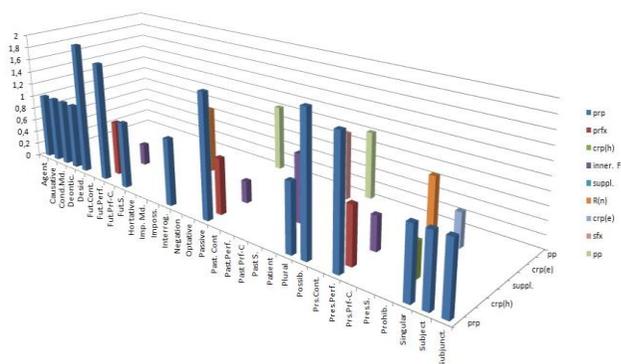


Figure 6: Positional distribution of Afrikaans grammar compared to English.

4 Conclusion and further perspectives of the Buyeo group

First, I suppose that it has been shown rather evidently that Japanese and Korean are not just languages of the same stock, but rather languages of the same language group.

Second, Ryukyuan languages show great proximity with Japanese so there is no problem at all to show their closeness with Korean.

Third, in the context of Altaic hypothesis it is traditionally supposed that the Buyeo group is related with Tungusic languages, Mongolian languages and Turkic languages. However, I suppose that the reality of the so-called Altaic stock/family is a highly doubtful issue since the PAI value of Buyeo languages is about 0.13, while Turkic languages show PAI value of around 0.012 (Tenishev, 1996), cf. a tenfold difference. According to section 3.2.1, such a difference of PAI values is a serious reason to doubt the relatedness of the languages considered. Anyway, whether the Buyeo group is related to other the above mentioned groups/stocks is matter of further research.

And finally, I suppose that the close relatedness of Japanese and Korean is a good evidence for the fact that Buyeo languages are not as ancient as argued by several scholars. The whole history of the Buyeo group probably counts about 1500 years only.

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