The geography of case
Balthasar Bickel and Johanna Nichols

1. Introduction

Cases are of course not evenly distributed worldwide. It is generally known, for example, that cases are common in Eurasia and much less common in Africa. Modern typological research aims at capturing and understanding such continent-wide frequency differences (Nichols 1992; Bickel 2007a), and it has becomes standard practice in universals research to control for confounding factors from continent-wide linguistic areas (Dryer 1989; Cysouw 2005). A fundamental problem of linguistic geography, however, is that it is all too easy for the human eye to detect spatial patterns on a map even when they are artifacts of chance or when they arise simply because some regions have many more different people and languages than others (cf. Siberia with Cameroon; e.g. Nettle 1999).

Our approach to linguistic geography starts from biogeographical and culture-historical theories of population movements and contact patterns that define a constant set of areas as predictor variables for statistical modeling (Predictive Areality Theory: Bickel and Nichols 2006). Thus, areas are not defined linguistically, and this avoids circularity when used in linguistic surveys. Hence the present chapter does not fish for areas by visual inspection of maps, but assumes areas as hypotheses and asks what, if any, aspects of case structure and case behavior are significantly different across the hypothesized areas.

In this chapter we test a set of previously established areas against 35 typological variables that concern case inventories and various morphological and syntactic properties of case and are drawn from the Autotyp database (Bickel and Nichols 1996ff), the data from selected chapters of Haspelmath et al. 2005 (henceforth WALS), or, when variables and their coding were identical or near-identical in the two databases, a merged set.

We begin by describing the areas (Section 2) and the typological variables (Section 3) tested. After explaining our method of sampling and testing (Section 4), Section 5 discusses the results.

2. Areas

All area definitions are based on previous work (for detailed maps, see the Autotyp web site):  

• Africa, including the Arabian peninsula, which has well-established historical continuities with Africa. This large area is generally accepted on the basis of the strong historical connections of the entire region. As such, the African macroarea figures as a standard control in universal research. We assess the areality of Africa by comparing its profile to to the rest of the world.

1 www.uni-leipzig.de/~autotyp
• Europe, delimited in the east by a line starting from the northern coast of the
Black Sea, following the northern slopes of the Carpathians and then following roughly
the Wisła up to the Baltic Sea and including Scandinavia but not Finland. The region
is defined so as to include the major internal spreads in historical times (cf. Haspelmath
2001 for some discussion in typological perspective) and to exclude the north Eurasian
steppe, but we note that the population history of the steppe has always had deep inroads
into Central Europe. The areality of Europe is assessed by comparing it both to the rest
of the world and to the rest of Eurasia, including Southeast Asia.

• Eurasia: all of Eurasia, except the north Asian Coast, which we assign to the
Circum-Pacific region (cf. below). The areality of Eurasia has first been argued for by
Jakobson 1931 on linguistic grounds, but it has robust nonlinguistic support: the history
of Eurasia shows frequent criss-crossing spreads throughout the area in known history, cf.
the various east-to-west spreads through Central Asia (Uralic, Indo-European, Turkic,
etc.), the spreads associated with Silk Road and its multiple branches, the migrations into
South Asia, and the strong cultural ties to and within the Ancient Near East.

• Southeast Asia, including insular Southeast Asia up to the Wallace Line,
delimited in the west by the western slopes of the Pāktai and Chin ranges and then,
following the eastern limits of the Tibetan Plateau up to about 36° N and then across the
plains to the Yellow Sea. Therefore, Southeast Asia includes the Yunnan and Sichuan
hills, regions that played a vital role in the population history of Southeast Asia (cf.
Enfield 2005 for recent discussion of Southeast Asian areality). This area is compared to
both the rest of the world and to the rest of Eurasia, including Europe.

• The Eurasian enclaves: the Himalayas and the Caucasus. The enclaves are
located at the fringes of the major Eurasian spreads through steppe, through Southwestern
and South Asia, and through Southeast Asia. This location leads us to expect that the
regions will deviate from the surrounding spread areas in their typological profile, an
expectation confirmed by an earlier study (Bickel and Nichols 2003). Since the enclaves
are part of Eurasia, our survey compares them to the rest of Eurasia (but not to the rest of
the world).

• Sahul: Southern Australia and highland and southern New Guinea. This
discontinuous area is demonstrated by Nichols 1997a and Maddieson 2006. It appears to
be the result of coastal settlement activity bringing in distinctive types around the area,
which had been settled earlier by the ancestral Sahul population. Our test compares
Sahul to the rest of the world.

• Australia. Apart from exhibiting Sahul areality (see just above), it is possible
that Australia as a whole is areally distinct from the rest of the world.

• The Circum-Pacific (CP) area: the Americas, Australia, New Guinea, Oceania,
and the north Asian coast. This large and old area is motivated by the general population
history of the Americas, as reflected for example by the Haplogroup B distribution (for
some recent discussion, see Bickel and Nichols 2005b, Bickel and Nichols 2006). The
area is continuous in the sense that no other area splits it, though many of its parts are
separated by water. Note that Southeast Asia is not part of the CP area because its current
linguistic population shows strong historical continuities with more interior Asian regions
throughout China and South Asia.
3. Variables surveyed

We define *case* as overt marking of the syntactic or semantic function of a nominal or pronominal argument or adjunct, marked on the nominal or pronominal itself or its dominating N or NP by an affix, clitic, or case word (by which we mean a morpheme which is an independent word phonologically and prosodically but not syntactically, i.e. it is not an adposition, relational noun, or other word having syntactic properties such as licensing or assigning case, triggering agreement, heading a phrase, etc.). Some variables, however, gloss over the case vs. adposition distinction, surveying any kind of dependent marking of arguments in a clause or NP. We note this in the prose for those variables below. A zero-marked case category in an otherwise overtly marked case paradigm is counted as a case and as having the properties of its overt counterparts (examples are the nominative singular of Turkish or the genitive plural of Russian in some declensions).

In the following we give brief descriptions of all variables, beginning with those the concern the basic presence vs. absence of cases and then proceeding to their morphological form, behavior, syntax, and alignment. Space limits prohibit more extensive discussion or exemplification, but all variables are published and we indicate the relevant source.

Some of the variables taken from WALS have been recoded in order to target specific issues, e.g. the base frequency of accusative vs. any other alignment (cf. explanations in Section 3 below). Some of the separately listed variables have similar substance but are differently defined (e.g. one binary and one 4-way, one from Autotyp data and one from WALS data, etc.), as we cannot know in advance which structural patterns are most strongly affected by biogeographical factors. Each variable is numbered here according to the order of its presentation below. In the prose (but not in tables), these variable numbers (and no others) are always in square brackets. In the listing below each variable is given a name that is mnemonic but not a full grammatical characterization of the variable.

2. **1 Presence of cases**

[1] Presence of cases/adpositions. Binary: presence vs. absence of cases/adpositions. Source: Dryer 2005, recoded as value 9 ("no cases/adpositions") vs. all others.

[2] Number of cases (nouns only). Scalar: values run from zero to 10+ (the number of distinct cases in any one number paradigm). Source: Iggesen 2005, recoded with "zero" and "exclusively borderline case marking" (value 9) grouped as Ø.

2.2 **Morphological form of cases.** Fusion, position, exponence, and flexivity are discussed in Bickel and Nichols 2007, and two of these (fusion and exponence) are also discussed in Bickel and Nichols 2005a, 2005c, respectively.

2.2.1 Fusion: Fusion is defined in strictly phonological terms and assesses whether, and if so how, case markers show phonological interaction with their host. We distinguish between the absence of such interaction ("isolating"), concatenative affixal marking, and marking on or in stems, including tonal ablaut (also cf. Bickel and Nichols
Phonological interaction can go together with morphological integration (‘affixes’), but it can also affect independent syntactic units (e.g. when case adpositions phonologically cliticize to their host).


[4] Fusion. 3-valued: Phonologically isolating vs. concatenative effects vs. tone. (The variable also distinguishes additional values, such as (pure) stem ablaut, replacive markers, prosodic word form templates or reduplicative morphology, but our sample of case markers only contains isolating, concatenative and tonal marking.)

2.2.2 Position: whether the case marking precedes, is internal to, or follows its host. Position covers both independent grammatical words (adpositions) and case affixes.


[6] Position. 3-valued: Preposed vs. postposed vs. internal (ablaut apart from tonal ablaut, which was not included).

2.2.3 Exponence: Expression of categories other than case in the same morpheme as case. In Bickel and Nichols 2005a and subsequent survey work we found case to share exponence only with number, tense/aspect/mood (TAM), or referential specification about topicality, definiteness or specificity. Case+TAM coexponence is attested in only two languages, Logbara (Central Sudanic) and Kayardild (Tangkic) (see Crazzolara 1960 and Evans 1995, respectively for the primary analysis and Bickel and Nichols 2005a for a summary presentation). The pattern is not included in any further tests here. What we count as case+reference coexponence are cases that are obligatorily used, i.e. where speakers do not have a choice of not using a case marker. An example is the nominative in Tagalog which must be assigned to one of the arguments and entails topicality of that argument. The distribution of differential case-marking, where speakers have a choice of using vs. not using a particular case marker, is likely to be very different from that of case+reference coexponence, but we are not aware of a world-wide and sufficiently sampled database on differential case-marking. Indo-European languages are sometimes analyzed as showing case+gender coexponence, but in all cases we surveyed, this is actually the result of declension class allomorphy in case markers.

[7] Mono/polyexponence. Binary: monoexponential marker (case only) vs. polyexponential (case plus one or more other categories).

[8] Case + number. Binary: case+number coexponence vs. all other case forms.


2.2.4 Flexivity: Allomorphic alternation in the morpheme(s) marking one and the same case category, governed by either lexical stem classes (i.e. declension classes) or cross-classifying categories (e.g. different case allomorphs on nouns vs. pronouns or different plural allomorphs depending on whether there is also an article or possessive agreement, etc.)

2.2.5 Tone: Case marked by tone.

[11] Tonal case. Binary: one or more of the cases is marked exclusively by tonal ablaut vs. all other. Source: merged Autotyp and WALS (Dryer 2005) datasets (which exhibit complete agreement in coding)

2.3. Morphological behavior of cases

2.3.1 Host. These variables have to do with whether the case morpheme is restricted to a specific stem class, i.e. a true affix, or whether it is unrestricted and attaches to phrases of variable category, i.e. a true clitic. Because phrasal category structure and the exact distribution of case markers are often underanalyzed in grammars (especially older grammars), the coding differs in Autotyp and WALS to a degree that merging the datasets is unwarranted.

[12] Restricted case A. Binary: case is selectionally restricted to the stem of the head word in the argument phrase vs. positioned relative to the phrase boundary and compatible with hosts of any category.

[13] Restricted case W. Same variable; source: Dryer 2005, recoded as binary with values 1-5 (various kinds of affixation) vs. 6-8 (phrasal clitics); value 9 (absence of case) removed.

2.3.2. Spreading. These variables have to do with whether case marking spreads from the head noun to other words in the NP, e.g. to an agreeing attributive adjective or otherwise ends up not on the head but on another word or at the NP boundary.

[14] Case spreading. 4-valued: Case spreads vs. is limited to phrase-initial vs. to phrase-final vs. to the head.


2.4. Core cases

[16] Core cases. Binary: no overt case marking on core arguments (S, A, O) vs. some case marking on one or more core arguments.

[17] A ≠ O. Binary: case or other dependent-marking differentiates A from O vs. no differentiation (either no marking or neutral alignment). Source: merged from information in Autotyp and WALS (Comrie 2005).

[18] A case. Binary: the A does vs. does not have case or other dependent marking.

[19] O case. Binary: the O has vs. does not have case or other dependent marking.

[20] A and/or O case. Binary: A and/or O does vs. does not have case or other dependent marking.

2.5. Alignment

2.5.1. Noun alignment, i.e. overt alignment of noun case inflection. Variables [21-25] have to do with the alignment of S with A or O; [26-27] have to do with alignment of objects (direct/indirect vs. primary/secondary, following Dryer 1986).


[23] Alignment A. Same; source: Autotyp only.


[26] PO alignment. Binary: primary object alignment vs. other (excluding neutral alignment and caseless languages).

[27] Object alignment. 4-valued: direct object vs. primary object vs. three-way vs. split.

2.5.2. Pronoun alignment, i.e. overt alignment of pronoun case inflection. These variables are otherwise identical in definition and ordering here to those for nouns in §3.5.1. [28-32] have to do with subject alignment, [33-34] with object alignment.


[30] Pro alignment A. Same; source: Autotyp only.

[31] Pro alignment W. Same; source: Comrie 2005 only.

[32] Pro alignment 5. 5-valued: Accusative vs. ergative vs. marked accusative vs. three-way vs. split.

[33] Pro PO alignment. Binary: primary object alignment vs. other (excluding neutral alignment and caseless languages).

[34] Pro object alignment. 4-valued: direct object vs. primary object vs. three-way vs. split.

2.6. Syncretism in cases
Syncretism in cases involves the identical coding of argument roles in some but not other lexically-defined paradigm classes. If coding is identical in core roles only (i.e. S and either O or A) this amounts to a lexical split in alignment, where one lexically-defined paradigm class codes S like O, while the other codes S like A. However, because of the small number of relevant examples, we limit the survey to the base frequency of any kind of syncretism.

[35] Syncretism. Binary: syncretism (between different paradigms) in one or more cases vs. none. Source: Baerman and Brown 2005, recoded to conflate values 2 (syncretism in only core cases) and 3 (syncretism in core and non-core cases) and removing 1 (no case).
3. Methods

A number of the variables described above are coded in both Autotyp and WALS. Where there is parallel coding, we checked the coding for consistency. In those cases where coding was consistent to 95% or higher, we merged the datasets, giving preference to the Autotyp coding in the handful of mismatches (variables [5], [6], [11], [17], [21], and [28]). Where coding consistency was higher than 90%, we report results of the individual as well as the merged datasets (variables [22] and [29]). Where coding was less than 90% consistent we did not merge datasets. This was only the case with the variables coding host restrictions, i.e. those capturing the notoriously difficult clitic vs. affix distinction (variables [12] and [13]).

The Autotyp datasets are all pre-sampled for genealogical balance, i.e. they include at most one representative per major branch.\(^2\) The WALS and the merged datasets are not pre-sampled. In order to control for inflationary effects of possibly over-represented stocks, we performed a genealogical distribution analysis following Bickel 2007b. In this analysis, each variable is first cross-tabulated with each areal predictor variable (e.g. presence of case * Eurasia, etc.). Then, for each cell in these tables, we tested whether any of the genealogical levels registered in our database (stock, major branch, subbranch, sub-subbranch, lowest subbranch; cf. Nichols 1997b), shows statistically significant skewing, e.g. 9 out of 10 languages from the same group showing case. If this is so, the number of languages with the same typological value in the same genealogical group is reduced to one, assuming that the skewing could be caused by shared inheritance instead of the areal factor of interest. If there is no skewing in a given genealogical group, all languages from that group are included in the sample. For the one scalar variable (number of cases: [2]) we performed pre-sampling, randomly selecting one representative of each major branch, because we have currently no good algorithm at our disposal that would allow sampling of interval distributions based on genealogical distribution analysis.

The genealogically pre-sampled or genealogically controlled tables were then submitted to significance testing, applying the distribution-free methods proposed in Janssen et al. 2006. For categorical variables, we used the Fisher Exact Test, and where the dataset was too large for an exact computation of \(p\)-values, we relied on the approximation methods for this test implemented in the statistical software package R (R Development Core Team 2006). The one scalar variable in our survey ([2], number of cases) was tested in a randomization-based analysis of variance, as developed by Janssen et al. 2006.

Since we simultaneously tested each typological variable for 10 possible area effects, we needed to control for familywise error, i.e. for the risk that some variables reach significance because of the sheer number of possibly significant associations. In order to control for this, we applied Holm corrections to each set of 10 test results (Holm 1979, as implemented in R). This yields fairly conservative \(p\)-values, and we therefore set the level of rejection at .05.

Table 1 reports the \(p\)-value of each test but also indicates those tests that reached significance before the Holm adjustment was applied (marked by asterisks). These call

\(^2\) A complete listing of our genealogical sample is available on the Autotyp web site (www.uni-leipzig.de/~autotyp).
for further analysis of richer samples and follow-up research on the relevant areal hypotheses.

4. Results and discussion

Table 1 shows the typological variables, the areas, and all frequency differences that were statistically significant at $p < .05$. All of the statistical comparisons pit the macroarea, area or enclave in question against the rest of the world’s languages, unless otherwise indicated.

Table 1 about here

FOOTNOTE to Table 1: The data behind Table 1 is available online at the Autotyp website: www.uni-leipzig.de [Note to editors: we will make the data, as well as maps of the areas tested here, all available online by the time of publication.] [Note 2 to editors: The legend to Table 1 is at the end of the paper. The table itself is a separate Excel file.]

There is no appreciable difference between binary and larger-valued variables in their significance levels or the number of times they yield significance, and this suggests that our results do not depend on the arity of variables (indicated in the column ‘Values’ in Table 1).

About half of the variables (18/35) yield significance somewhere, most of them in more than one area. Those that do chiefly have to do with presence and number of cases (variables [1], [2], [16], [18-20]); the clearest aspects of morphological form, namely fusion (isolating vs. concatenative vs. tonal: variables [3-4]) and position (preposed vs. postposed, etc: variables [5-6], [11]); and alignment, chiefly subject alignment (variables [22-25], also [28-32]). (The absence of significant areal effects in object alignment could well be due to the low number of datapoints in our sample, and therefore our results do not support any strong inference in this case.)

Case presence (variable [1]) and the number of cases ([2]) show frequency peaks in Eurasia (59% of the languages have case, mean number: 4.6) and Australia (81%, mean: 6); the number of cases is significantly depressed in Southeast Asia (28%, mean: 2.4) and, with a borderline effect, Africa (45%, mean: 2.5).³ (The significant effect of CP*[1] in Table 1 is the indirect result of the frequency depression in Southeast Asia and Africa, which lowers the total frequency in the non-CP languages.) Case or other dependent marking (variables [18-20]) for A and/or O again show frequency peaks in Eurasia (86% for variable [20]) and Australia (80%). The Circum-Pacific region shows significantly less dependent marking (49%) on A and/or O, preferring instead head marking (Nichols 1992). (Maps on the presence of cases are available in WALS.)

³ For the datasets that were genealogically sampled based on a distribution analysis within genealogical taxa (cf. Section 2), we report percentages and odds from the genealogically balanced numbers (not the raw data) since (a) these were also the numbers that entered the tests, and (b) these are the only numbers that are comparable to the genealogically pre-sampled datasets in Autotyp.
The fusion variables ([3] and [4]) show a strong and well-established preference for isolating case morphology in Southeast Asia where isolating case morphology rises to a 5-to-5 tie (contrasting with a 16.4-to-1 chance in the rest of the world and 31-to-0 in the rest of Eurasia). Tonal case marking (variable [11]) is represented only in Africa (with 6 examples: in Maba, the Nilotic languages Maa, Nandi and Shilluk, and the Benue-Congo languages Nande and Yoruba).\(^4\) Perhaps it is a singularity unique to Africa (like phonemic clicks), or perhaps it occurs there simply because Africa is the only macroarea where both tones and cases occur with any frequency in the same languages. (Exclusively tonal marking of other inflectional categories, namely those of verbs, does occur in the Iau language of New Guinea: Bickel and Nichols 2005c:88, 89. It possibly occurs elsewhere, as the sample for that survey was not large.)

The position variables ([5] and [6]) reveal a strong (9.8-to-1) universal dispreference against preposed case, but this trend is reversed in Southeast Asia, where prefixed or procliticized cases outnumber other cases by 6 to 4; cf. Table 2.

<table>
<thead>
<tr>
<th></th>
<th>preposed case</th>
<th>case not preposed</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southeast Asia</td>
<td>6 (60%)</td>
<td>4 (40%)</td>
<td>10</td>
</tr>
<tr>
<td>Rest of the world</td>
<td>29 (14%)</td>
<td>185 (86%)</td>
<td>214</td>
</tr>
<tr>
<td>Sum</td>
<td>35</td>
<td>189</td>
<td>224</td>
</tr>
</tbody>
</table>

Table 2. Prefixal case marking. Source: genealogically balanced sample from merger of Autotyp and WALS (Dryer 2005)

All other significant effects of variables [5] and [6] in Table 1 are a side effect of this since, on the one hand, Eurasia contains Southeast Asia, artificially increasing the number of preposed cases in Eurasia, and, on the other hand, all other areas were tested against the rest of the world, which again included Southeast Asia. Case marking by stem-internal ablaut alone does not reach appreciable frequencies anywhere. There are seven such cases attested in total in the combined Autotyp and WALS dataset, four from Australia (Anindilyakwa, Bunuba, Nyulnyul, Yawuru) and three from Africa (Dinka, Nuer, Yoruba).

Alignment patterns (variables [21-34]) show increased frequencies of ergativity in Australia (92%) and Sahul (75%, plus 10% split). There are also appreciable frequency increases of ergativity in the Circum-Pacific (46% in the Autotyp sample) and the Eurasian enclaves (56%), but the statistical effects of this are borderline: the effects are only clearly present before controlling for multiple testing and they disappear when the sample becomes richer (i.e. when the Autotyp and WALS samples are merged). In Bickel & Nichols (this volume) we propose that alignment patterns need to be surveyed relative to lexical classes and valence structure, and in general require much more empirical groundwork than the summary data provided in current databases. Future research will show whether the Circum-Pacific and enclaves reveal robust distributional differences once alignment patterns are surveyed in more detail.

Variable [25] (from Comrie 2005) distinguishes accusative alignment with an unmarked nominative vs. accusative alignment with a marked nominative. Marked

\(^4\) The significant effect of CP* [11] is again an artefact because the non-CP languages contain the tonal cases of Africa.
nominatives are rare worldwide, but the presence of four such cases in Africa (Middle Atlas Berber, Igbo, Murle, and Oromo) is statistically significant despite the small numbers of cases in Africa in general. This is confirmed by a post-hoc analysis, testing marked nominatives against all other alignments in Table 3.

<table>
<thead>
<tr>
<th></th>
<th>marked nominative</th>
<th>other</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>4 (36%)</td>
<td>7 (64%)</td>
<td>11</td>
</tr>
<tr>
<td>Other</td>
<td>2 (3%)</td>
<td>63 (97%)</td>
<td>65</td>
</tr>
<tr>
<td>Sum</td>
<td>6</td>
<td>70</td>
<td>76</td>
</tr>
</tbody>
</table>

Table 3. Marked nominatives. Source: genealogically balanced sample from WALS (Comrie 2005)

The significance effect of Circum-Pacific in Table 1, by contrast, results from different distributions of ergative and split marking; it is not confirmed by a post-hoc analysis (Fisher Exact test, \( p = .39 \)). (The two non-African languages with marked nominatives in the sample are Maricopa in North America and Aymara in South America.)

Case spreading (variable [14-15]), flexivity (variable [10]), and syncretism (variable [35]) show no area signals, perhaps because the datasets for these variables are so small. However, these features are also known to be fairly resistant to areal spread, and it is therefore likely that the absence of significant test results points to the absence of macro-areal distributional skewings. Another variable which is likely to resist spread, but which is better surveyed, is case exponence (variables [8] and [9]). Any kind of polyexponence is relatively rare worldwide, showing up in only 13% of the languages surveyed (\( N=137 \)). In a pattern too localized to show up at the level of macroareas in Table 1, case+number coexponence occurs in all morphologically conservative languages of the Uralic and Indo-European families (Bickel and Nichols 2005a).

5. Conclusions

Our overall conclusion is that the worldwide geographical distribution of case inflection and its various grammatical properties mirrors global linguistic geography reasonably well and indicates that aspects of position and fusion of case markers, their presence vs. absence, and their alignment are prone to areal spread while aspects of exponence, flexivity, syncretism, and phrasal behavior tend to resist spread.

Most geographical areas tested show some distributional effect, which is however borderline for the Eurasian enclaves. Only one area did not reveal any distributional effect: Europe. In Table 1, there is borderline indication for increased frequencies of cases (variable [1]) but this recapitulates the increased frequency in the larger Eurasian area, as shown by the fact that testing Europe against the rest of Eurasia did not reveal any significant difference. Thus, in none of the variables surveyed is Europe significantly different from either the rest of the world or just Asia. Statistically speaking, the overall strong similarity of Europe and Asia makes their composite macroarea Eurasia both large enough and monolithic enough to reach significance on several variables. Linguistically speaking, the similarity of Europe to Asia supports – as far as case marking is concerned – the decision to regard Eurasia as a single macroarea. Historically speaking, it confirms
that Europe is the endpoint of the population movements along the Eurasian steppe, which is not separated from it by any major discontinuity.
Acknowledgments
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References


--- (2007b), 'A refined sampling procedure for genealogical control.' *Sprachtypologie und Universalienforschung*, #, ## - ##.

--- (2005b), 'Inclusive/exclusive as person vs. number categories worldwide', in E. Filimonova (ed.), *Clusivity*, Amsterdam: Benjamins, 47 – 70.


Table 1. Results of testing structural variables for areal distributions. Figures report adjusted p-values of significant results; * indicates distributions that were significant before application of the Holm correction. Under ‘Values’ we list the number of possible values of each variable (its ‘arity’); A = data from Autotyp, W = from WALS, A&W = merged data from both sources. N gives the number of languages that entered the analysis (including both the genealogical analysis and the hypothesis testing, as described in Section 3).
<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>Values</th>
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<th>Europe</th>
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<th>Eurasia</th>
<th>SEA</th>
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<th>Australia</th>
<th>Sahul</th>
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<td>1</td>
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<td>2</td>
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<td></td>
<td></td>
<td></td>
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<tr>
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<td>Number of cases</td>
<td>scalar</td>
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<td></td>
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