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New Guinea through the eyes of *WALS*

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1. Introduction[1]

It is commonplace in linguistics to describe the New Guinea area as the linguistically most diverse area on the planet. And there is a clear sense in which this is true. No area of comparable size or population is home to as many distinct languages, and this presumably remains true, whatever plausible consistent definition of the language/ dialect divide one adopts. If one counts populations and numbers of languages for the relevant countries and administrative areas for which separate statistics are given in Gordon (2005), the results are as follows. First, taking a broad definition of the New Guinea area to include all of Papua New Guinea, the Solomon Islands, East Timor, and the Indonesian administrative areas of Papua, Maluku, and Nusa Tenggara, we have a total population of 19,695,077 and about 1,380 first languages, giving an average number of speakers per language of 14,272. If we exclude Maluku and Nusa Tenggara, large parts of which do not form part of the New Guinea area, then we are left with a population of 9,284,083 people speaking 1,178 languages, or an average of 7,796 speakers per language.[2]

Of course, there are other ways in which one could define the linguistic diversity of an area; for instance, in terms of the number of distinct language families represented within the area in question. In this sense, genealogical diversity will depend, of course, on one's views on the validity of macro-families.[3] For those who believe that Papuan or Indo-Pacific is a valid genealogical grouping, the New Guinea area contains basically only two families, Papuan (Indo-Pacific) and Austronesian (excluding languages introduced as the result of European contact). If, instead, we adopt the more conservative classification proposed by Matthew Dryer, with Papuan

being only a cover term for some 46 distinct language families, then the New Guinea would also be a highly diverse area in genealogical terms.[4] One might compare this situation with Vanuatu, where the average number of speakers per language is actually even smaller than for the New Guinea area. Again following Gordon (2005), Vanuatu has a population of 202,609, representing 109 distinct languages, i.e. on average 1,859 speakers per language. But all of these languages belong to one subdivision of the Oceanic subdivision of Austronesian, i.e. the range of genealogical diversity is clearly many magnitudes lower than that found in the New Guinea area.

Yet another way in which one could attempt to assess the diversity of the New Guinea area is in terms of the typological variation across the languages spoken in this area. Until recently, it has been very difficult to carry out such a characterisation in any systematic way, i.e. by looking systematically at a wide enough range of features from different parts of the grammar in a wide enough range of languages spoken in the area, so that opinions on typological variation across languages of the New Guinea area, or sub-areas within this area, have usually been impressionistic, as when a colleague remarked (perhaps not entirely seriously, but also perhaps not entirely in jest) that the Highland languages are all the same—verb-final with switch-reference.

The publication of the *World Atlas of Language Structures* (Haspelmath *et al.* 2005, hereafter WALS) has radically changed the feasibility of such studies for the better. WALS is an attempt to map some 140 typological features—ranging from phonetics to syntax and including the semantics of morphological categories—across the languages of the world.[5] The mapping, in the literal sense of the cartography, is grounded in an extensive database that can also be used for other purposes, such as testing correlations among typological features—and measuring degrees of typological variation within particular sets of languages. The project was guided, in part, by a proposed sample of 200 languages reasonably representative of the world's genealogical diversity. In the body of this paper, we show how the WALS materials can be used to give an answer at a high level of reliability to the question: How diverse is the New Guinea area typologically, including in comparison with other parts of the world?

Although the publication of WALS provides us with an immensely powerful new tool to study cross-linguistic structural variation, some limitations of this new tool should nonetheless be borne in mind. In section 2, some questions relating to choice

of languages in the New Guinea area, including their relation to the features selected for inclusion in WALS, will be discussed. But there are also issues relating purely to the features. The features covered in WALS were selected on the basis of a number of criteria, including the desire to cover a range of different kinds of features from different areas of grammar, but also on the basis of practical considerations, such as availability of reliable material from across the languages of the world and feasibility of identifying a small number of feature values that could be mapped conveniently. As it turns out, certain features that might be considered important for the New Guinea area, such as presence versus absence of switch-reference – not to mention subtypes of switch-reference – are not covered by WALS.

A second point to note with regard to the features is that not all of the features are independent. In some cases, the dependence is logical, as when there are separate maps for the order of subject and verb, of object and verb, and of subject, object, and verb. Although it would, in principle, have been possible to exclude or minimise such logical overlaps, we decided in this preliminary assessment to adhere more literally to the database in its current form, leaving it to others to check whether taking different decisions would materially affect the results. But, in addition to such logical dependencies, there are also correlations between different features that have been claimed in the literature, for instance, that the relative order of verb and object correlates with that of adposition and noun phrase, or with that of noun and adjective. Many of these correlations remain to be tested, and indeed it is only with a database of the kind provided by WALS that they can be tested reliably against the languages of the world.[6] Especially given that many correlations remain to be tested, we have not excluded features on the basis of (possible) correlations. Again, later work will need to assess to what extent this decision is justified.

In Section 2 of this paper, we will first discuss some aspects of using WALS for typological research. In particular, our choice of languages from the wealth of data in WALS will be explained, and the possible influence of missing data will be examined.

Section 3 consists of a short digression on the occurrence of typologically rare features in New Guinea languages. As will be argued, the languages in and around New Guinea are—from a worldwide perspective—relatively poor in rare characteristics; in other words, they are relatively ‘normal’ languages (given the selection of features included in WALS).

In section 4, we will use all the data in WALS to make an overall analysis of the similarities between the languages in the New Guinea area. We found a remarkable split between the Austronesian and West Papuan languages on the one side, against the remaining 'Papuan' languages on the other.

Section 5 investigates the interrelation between typological similarity, genealogical relatedness and geographical proximity. These three factors are normally all correlated, which makes it difficult to decide what kind of influence each of these factors has. We will suggest that the observation of a strong mismatch between typological similarity and geographical proximity has interesting repercussions for historical hypotheses. Further, the observed split between Austronesian plus West Papuan against the remaining 'Papuan' languages is argued to be primarily a typological distinction, and only secondarily caused by the geographical distribution of the languages involved.

Finally, in Section 6, all typological characteristics listed in WALS are investigated individually as to whether they are particularly prominent in the New Guinea area, or in any subparts of this area. It will be shown here that the separation of the Austronesian and West Papuan languages is basically due to their word-order profile and their morphological structure. This split is apparently not an incidental typological split of the New Guinea area, but the repercussion of a typological pattern attested more widely among the world's languages.

2. Selecting Languages

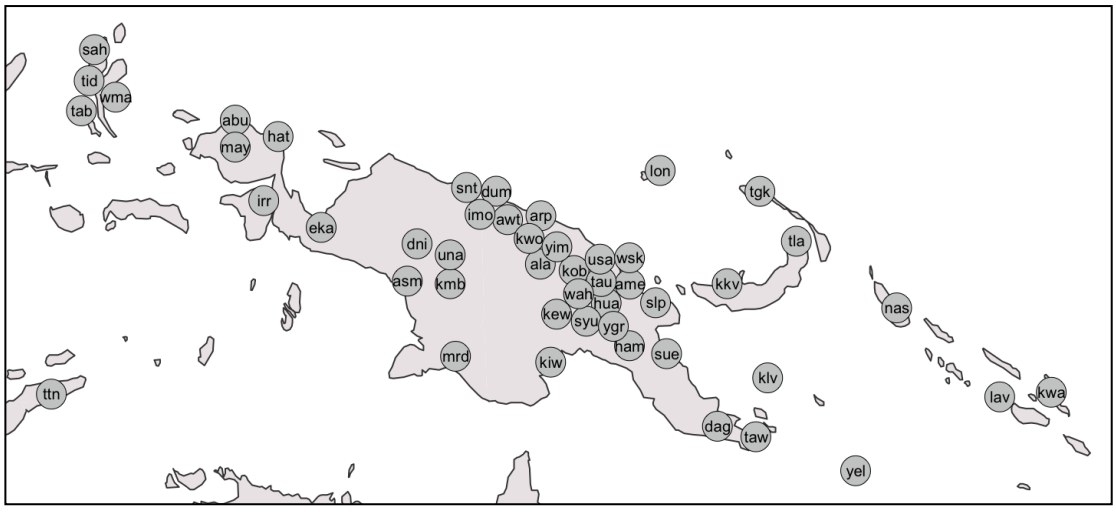
The WALS is an extremely rich source of information, including data for about 140 linguistic characteristics and more than 2,500 languages. However, information on all 140 characteristics is only available for a few of those languages. Most of the languages included in WALS are only coded for very few characteristics. This means that for every investigation based on WALS data only a selection of the available data can be used. The languages chosen for the present investigation are shown in Table 1. Their approximate geographical location is indicated in Map 1.[7]

In total, this selection includes 48 languages from New Guinea and the immediately surrounding areas. The primary consideration in choosing these languages was the availability of information. We sorted all languages of the New Guinea area in WALS by the number of available data points and chose a cut-off point rather arbitrarily at a level that still showed a reasonable amount of available

information. One subsidiary consideration to choose this cut-off point was that enough Austronesian and West Papuan languages should be part of the sample, to be able to investigate the internal variation within these groups.

Family	Language
Austronesian	Irarutu (irr), Kaliai-Kove (kkv), Kilivila (klv), Kwaio (kwa), Loniu (lon), Taba (tab), Tawala (taw), Tetun (ttn), Tigak (tgk), Tolai (tla)
Trans-New Guinea (Lowlands)	Amele (ame), Asmat (asm), Suena (sue), Usan (usa), Waskia (wsk)
Trans-New Guinea (Highlands)	Ekari (eka), Hamtai (ham), Hua (hua), Kewa (kew) Kobon (kob). Kombai (kmb), Lower Grand Valley Dani (dni), Salt-Yui (syu), Selepet (slp), Tauya (tau), Una (una), Wahgi (wah), Yagaria (ygr)
West Papuan	Abun (abu), Hatam (hat), Maybrat (may), Sahu (sah), Tidore (tid), West Makian (wma)
Sepik	Alamblak (ala), Awtuw (awt), Kwoma (kwo)
Border	Imonda (imo)
Dagan	Daga (dag)
East Bougainville	Nasioi (nas)
Kiwaian	Kiwai (kiw)
Sepik-Ramu	Yimas (yim)
Marind	Marind (mrd)
Sentani	Sentani (snt)
Sko	Dumo (dum)
East Papuan	Lavukaleve (lav)
Torricelli	Arapesh (arp)
Yele	Yelî Dnye (yel)

Table 1. Selection of languages (the three-letter language-identification code from WALS is added in brackets).



Map 1. Approximate geographical location of the languages in our sample. The abbreviations used are the three-letter language identification codes as used in WALS.

On average, there are 66.5 characteristics available per language for this set of 48 languages. This is a useful amount of information for computational purposes, though the available data are not very evenly distributed over the languages. The number of available characteristics per language ranges from a maximum of 129 for Amele to a minimum of only 36 for Selepet and Irarutu. To investigate whether this large variation should be considered a problem, we looked at the relation between available information and language similarity. For every pair of languages in our sample of 48 languages, we computed two parameters. First, the number of WALS-characteristics that is available for both languages was counted. Second, the similarity for every pair of languages was established (the measure of similarity used will be discussed in more detail in section 4). Fortunately, there is no correlation between these two parameters (Mantel Test $p > .4$). This means that the similarity between two languages is not obviously correlated to the amount of information that is available for the measurement of similarity.

The chosen selection of 48 languages allows us to investigate various groups of languages in New Guinea and the surrounding areas. For the purpose of this paper, we considered the following groups of languages. First, the whole group of 48 languages, comprising both Austronesian and non-Austronesian languages, can be compared to the worldwide variation, to see whether the larger New Guinea area can be considered a linguistic area. Further, there are three more or less accepted genealogical groups of languages that can be investigated: Austronesian, West Papuan and Trans-New Guinea. The Sepik family is left out of this investigation, because there are only three languages available in the present sample, which we considered an insufficient base for reliable conclusions. We also considered the languages spoken in the Highlands of New Guinea as a possible areal group. The Highlands languages mainly are a subgroup of the Trans-New Guinea languages, though also including the Border language Imonda.[8]

3. Something Special?

Although the number of languages and the genealogical diversity in New Guinea and its surroundings are particularly high, such diversity does not necessarily imply that the languages themselves are in any sense unusual from a worldwide perspective. To investigate whether the large diversity also implies that the languages of New Guinea are typologically unusual, we asked, to what extent the languages sampled have rare

characteristics, where rarity is defined as being of low frequency in the WALS data. A rarity-index is proposed in Cysouw (2011) to give an indication of the overall rarity of the characteristics of a language. This index includes the relative frequency of each characteristic, the number of possible characteristics, and controls for the number of characteristics on which data are available. The index is normalised in such a way that the values range evenly between 0 and 100, and the median should be around 50 for all data considered. Computing the Rarity Index for all languages in WALS gives the expected distribution as shown in the leftmost boxplot in Figure 1.

Only considering our set of 48 languages from New Guinea and the surrounding areas gives a radically different picture. As shown in the rightmost boxplot in Figure 1, about three-quarters of the rarity indices are now below 50, and the median lies below 20. This distribution is significantly different from the overall distribution (t-test $p < .001$). This indicates that the languages of our New Guinea area sample show relatively fewer unusual characteristics (i.e. they are relatively more 'normal'), compared to the world's languages as a whole. However, note that the whiskers of the rightmost boxplot in Figure 1 extend all the way up to 100. This means that the range of Rarity Index values in our New Guinea sample extends through the whole range of possible values. So, although the New Guinea area languages tend to have just very few rare characteristics in general, there are some languages that have many of them. In particular, Kombai is among the top 10 of languages of all WALS languages, according to the rarity indices.[9]

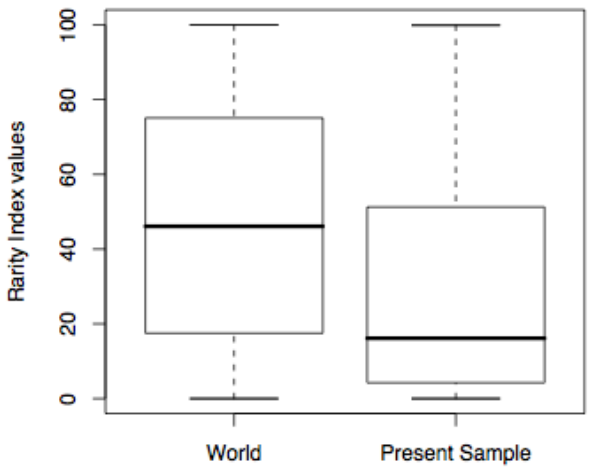


Figure 1. Rarity Index compared between the whole world and the New Guinea area.

4. Overall typological comparison

As a next step, we will now turn to the comparison of the overall typological profile of the New Guinea languages. Instead of selecting specific typological characteristics that are known, or expected, to be telling for the linguistic structure of New Guinea languages, we simply take all typological characteristics, as available in WALS, to investigate typological similarity. In this way, we avoid the problem of self-fulfilling typological prophecies; viz. finding clusters of typologically similar languages on the basis of a selection of characteristics that were expected to show these clusters to begin with. To compare languages using the complete WALS data, we took relative Hamming distance as a measure for language comparison. The relative Hamming distance between two languages is the number of differences between these two languages relative to the total number of characteristics coded for both languages.[10] For example, the languages Abun and Alamblak appear together in 41 maps in WALS (Abun alone is found in 50 maps and Alamblak alone in 114 maps). Out of these 41 shared maps, there are 31 maps in which Abun and Alamblak are of a different type. The distance between Abun and Alamblak is then taken to be 31/41 (= 75.6 %).[11] This distance is computed for each pair of languages under investigation. This results in a large table of relative differences (a 'distance matrix'), much like a table of distances between towns as often found in road maps. Such a distance matrix is then used to investigate quantitatively the structure of typological similarity between the languages under investigation.

The first question we addressed was whether or not the 48 languages in our sample form a consistent group when compared to a random sample of other languages from the world. For this purpose we selected a random worldwide test set by the following procedure. First, we took the best-coded 150 languages from WALS, taking maximally one language per genus (where a genus is a group of languages with roughly the internal genealogical diversity of the Romance languages). Then we randomly selected 47 languages out of this set of 150.[12] For the total set of 95 languages (i.e. the 48 New Guinea area languages plus the 47 randomly selected languages), we computed all pairwise distances, using the relative Hamming distance as explained above. The structure of the resulting distance matrix is illustrated by using a NeighbourNet (Bryant & Moulton 2004), shown in Figure 2. A NeighbourNet is an example of a so-called 'split decomposition tree', which is an attempt to make a hierarchical clustering (i.e. a tree-like object) of the languages, but it does not force a

decision for one particular tree structure. Instead, when it is unclear from the data whether to consider a language as belonging to one group or the other, both possibilities are drawn using parallel lines (called 'reticulations'), with the length of the lines being inversely proportional to the amount of information arguing for that particular grouping (cf. Bryant *et al.* 2005 for a more extensive explanation of this approach).

It will not come as a surprise that the random selection of the world's languages does not clearly separate into hierarchically organised groups. A first inspection of the resulting network in Figure 2, in fact, shows that the structure of the typological distances is not tree-like at all. In the middle there is a rather complex network of roughly equally likely alternative possibilities of subgrouping. To the outside, there appear to be some groups, though in general these are not very strongly supported by the data. This lack of grouping can visually be discerned from the fact that most branches separate individually from the central network. An example of a relatively good group, indicated by a longish pair of parallel lines, is the pairing of Russian and French in the centre bottom of Figure 2 (both are, of course, Indo-European languages). Notwithstanding the general impression of lack of structure, some of the (weak) groups, as indicated by the nearness of the languages in the network, seem to make linguistic sense (e.g. the nearness of the Austronesian languages Maori, Tagalog and Malagasy at the bottom left or the nearness of the Australian languages Gooniyandi, Kayardild and Ngiyambaa at the bottom centre).

Further, there seems to be a slight separation of the whole network into two groups, separating a group ranging from Zulu to Guarani on the left from a group, ranging from Marind to Gooniyandi, to the right. We will return to an explanation for this separation in Section 6.

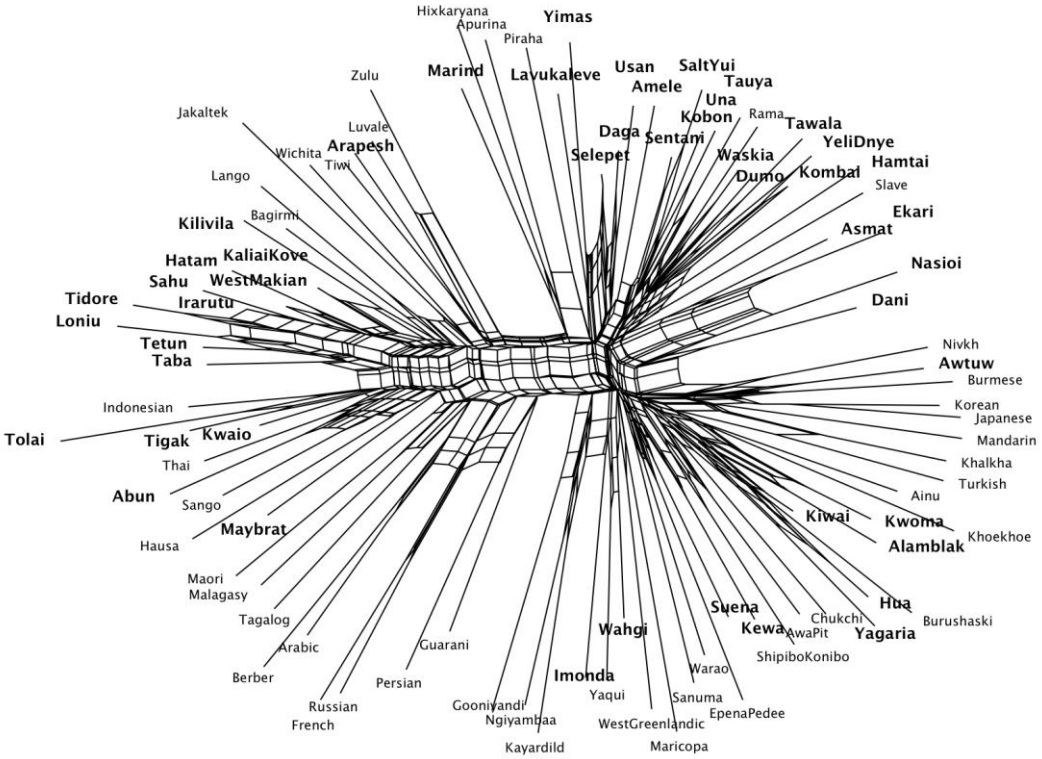


Figure 2. NeighbourNet of the languages from the New Guinea area (in boldface) together with a selection of 47 semi-randomly selected other languages from all over the world.

Related to our current investigation of New Guinea area languages, it is noteworthy that the languages in our present sample do not represent a single subgroup within the worldwide linguistic variation. Our 48 languages are found distributed throughout the network in Figure 2 (the names of the New Guinea area languages sampled are shown in boldface in the figure). There is a relatively coherent group of New Guinea languages to the left (ranging from Maybrat to Kilivila in the figure) consisting of all Austronesian languages combined with all West Papuan languages. The only missing language in this group is Tawala, which is an Austronesian language, but it appears amidst mainland Papuan languages to the top right of Figure 2. Still, there is apparently a typological similarity between Austronesian and West Papuan (this similarity will be further discussed in Section 6).

Further, there is a less pronounced cluster of New Guinea languages to the top right (ranging from Marind to Dani in the figure), which does not obviously show any coherence as far as any accepted genealogical grouping or areal distribution is concerned. Other New Guinea languages are found all over the network. The basic

distribution of Austronesian plus West Papuan against the rest can clearly be discerned in Figure 3, which shows the same network as shown in Figure 2, though restricted to the languages from our New Guinea sample.

In Figure 4, a NeighbourNet is shown of only the Austronesian and West Papuan languages (we have also included Tawala in this figure). There are some rather pronounced typological groups discernible in Figure 4 (e.g. Kilivila + Kaliai Kove + Tawala, or Sahu + Irarutu + Tidore). However, it is not possible to distinguish between the two main groups, viz. Austronesian and West Papuan. Typologically speaking, these two groups appear to be too similar to be distinguishable.

Finally, in Figure 5 a NeighbourNet of the remaining languages of our New Guinea sample is shown. There is no tree-like structure at all visible in the graph, indicating—as might have been expected—that the typological similarity between the 'Papuan' languages cannot properly be modelled by the tree metaphor as used in historical approaches.

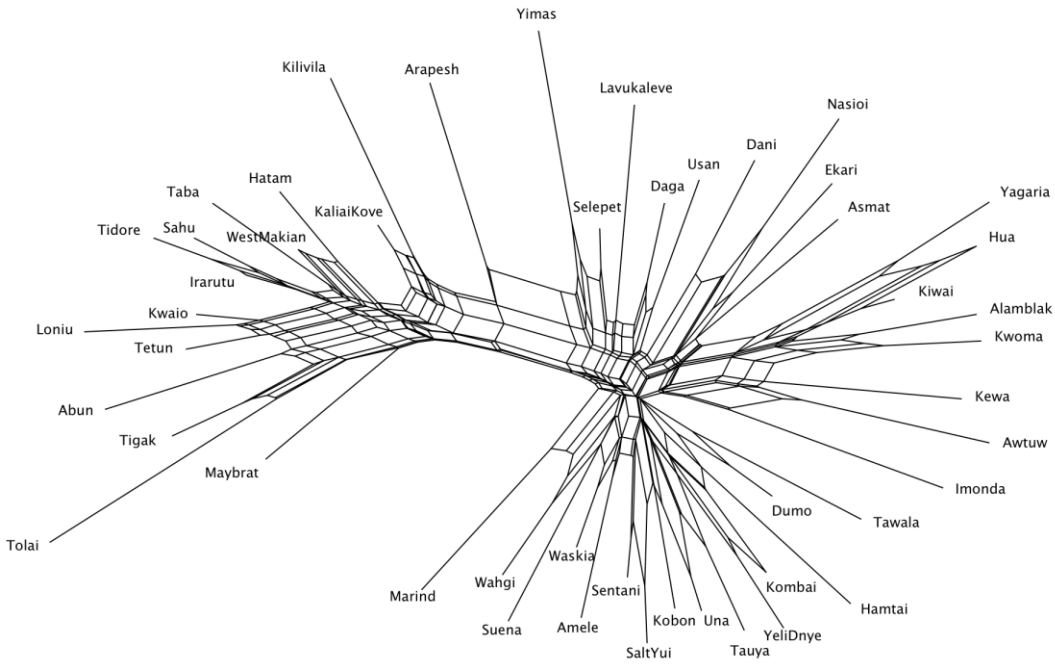


Figure 3. NeighbourNet of the languages from the New Guinea area.

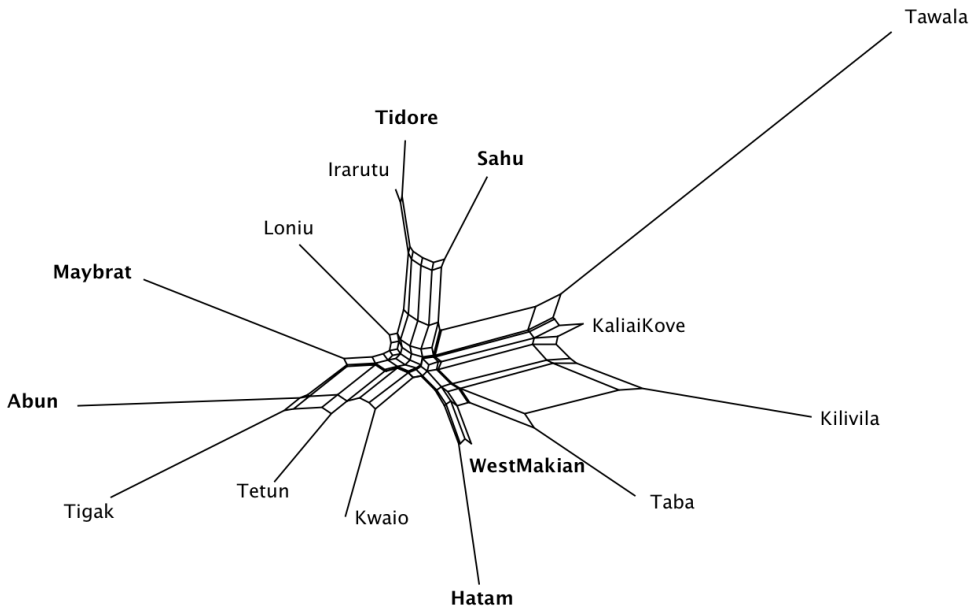


Figure 4. NeighbourNet of the Austronesian and West Papuan languages.

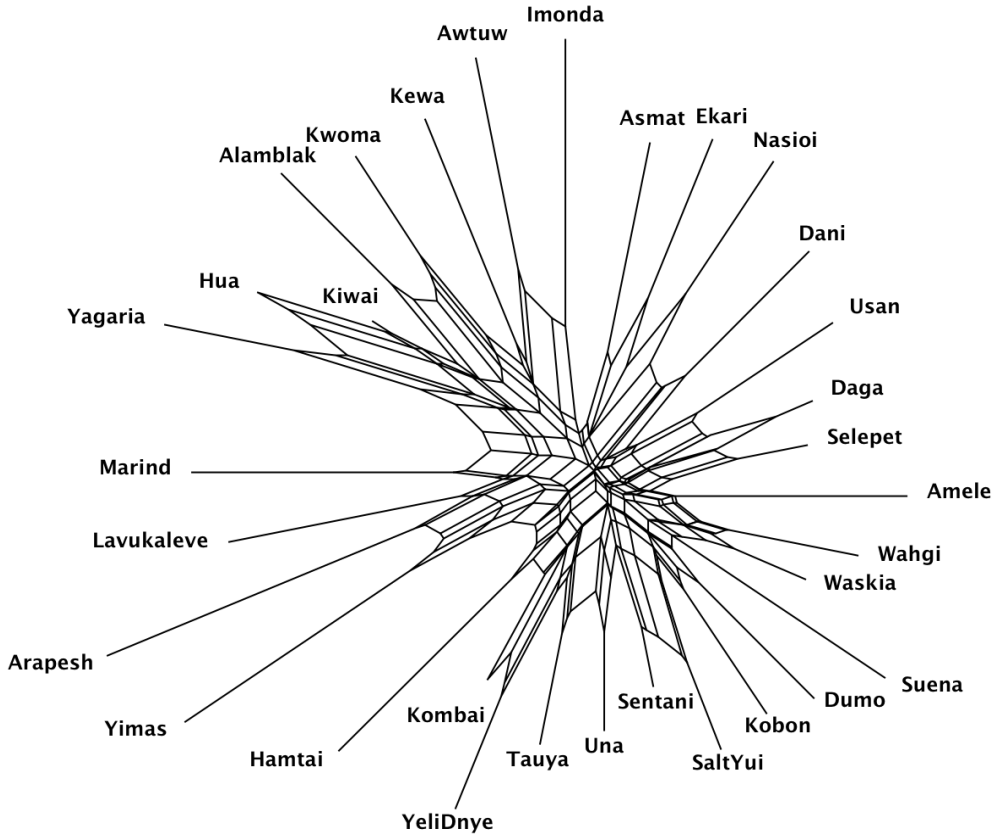


Figure 5. NeighbourNet of the remaining ‘Papuan’ languages (i.e. non-Austronesian and non-West Papuan).

5. Typology and Geography

On the basis of typological data as collected in WALS, we are thus able to make some rough genealogical distinctions: Austronesian and West Papuan, on the one hand, against Trans-New Guinea, Sepik, and the other non-Austronesian languages, on the other. This indicates that typological patterns might be useful to recover genealogical relationships (cf. Dunn *et al.* 2005). However, one of the problems of proposing a direct link between typology and genealogy is the possible intermediate parameter of geographical distance. In this section, we will present some observations about the relationship between typology, genealogy and geography for the languages of New Guinea.[13]

In general, there is a clear tendency for genealogically related languages to be also typologically similar, which indicates that typological similarity might be inherited from a common ancestor. However, there is also a general tendency for geographically close languages to be typological similar, possibly influenced through borrowing and other processes of language convergence. So, as there is also a strong tendency for genealogically related languages to be geographically close, the typological similarity of related languages might also be due to convergence because of geographical proximity.

The impact of both geographical proximity and typological similarity on genealogical relatedness for our New Guinea languages is shown in Figures 6 and 7. For these figures, we took the matrix of pairwise typological distances for all pairs of languages in our sample (cf. Section 4) and divided these distances into two groups. One group consists of those distances between pairs of related languages, and one group consists of those distances between pairs of unrelated languages.

In Figure 6, it is shown that the **typological** distance between related languages is in general smaller than the typological distance between unrelated languages. Likewise, in Figure 7, it is shown that the **geographical** distance between related languages is smaller than the geographical distances between unrelated languages. Both distinctions are highly significant (t-test $p < 10^{-15}$).

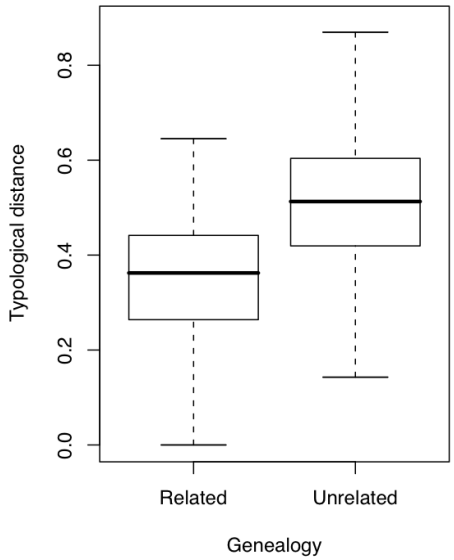


Figure 6. Typological distances compared between pairs of genealogically related languages and pairs of unrelated languages in our New Guinea sample.

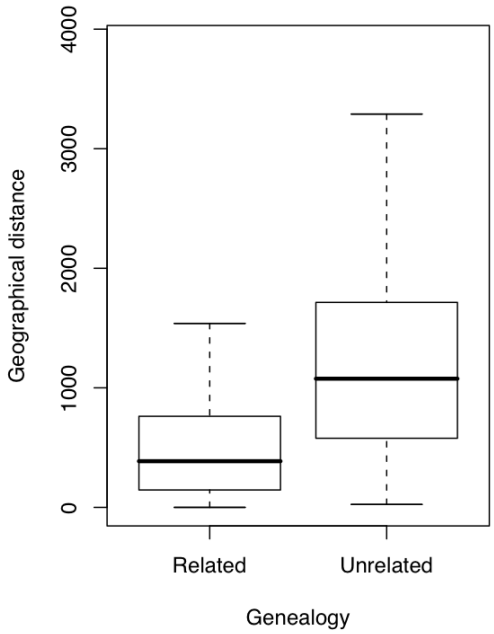


Figure 7. Geographical distances compared between pairs of genealogically related languages and pairs of unrelated languages in our New Guinea sample.

The direct comparison between geographical distance and typological distance is shown in Figure 8. In this scatterplot, every dot stands for a possible pairing of two languages from our New Guinea sample. With 48 languages in total, there are (48*47)/2 = 1128 pairs. For every pair of languages, the geographical and the typological distances are established separately. These two distance values determine one dot in the figure. Visually, there is a slight correlation discernable, which turns

out to be statistically weak but significant (Pearson $r = .21$, Mantel test $p < .001$). This means that—in general—the typological difference between two languages is larger, the farther the languages are geographically separated.

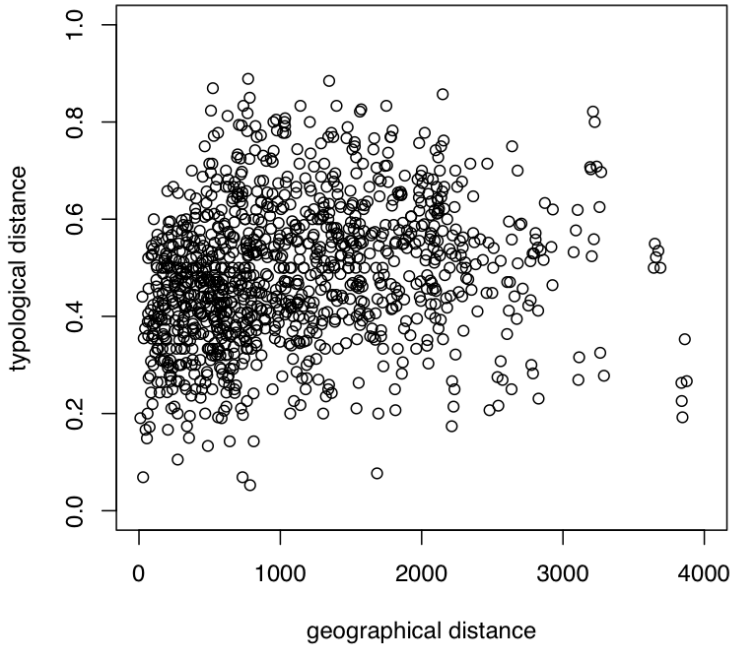


Figure 8. Scatterplot of the correlation between geographical distance and typological distance for all possible pairs of languages from our New Guinea sample.

Although there is a general tendency for geography and typology to be correlated, this correlation is not necessarily equally strong for all languages involved. To investigate which languages show the strongest mismatch, we removed each of the 48 languages from our sample one at a time and then computed the Pearson's correlation coefficient for the remaining geographical and typological distances. If the coefficient rises when a particular language is removed, this indicates that this language contributes little to the initial correlation between geographical distance and typological distance. The languages resulting in a rising coefficient after removal are shown in Table 2, ordered by the strength of the correlation after removing. It turns out that the languages with the strongest mismatch between geography and typology are all Austronesian languages (though not all Austronesian languages end up at the top of the list). When all Austronesian languages are removed from our sample, the correlation between geography and typology becomes much stronger, compared to the correlation for all languages (without Austronesian: Pearson $r = .40$, Mantel test $p < .00001$).

This effect can be explained by the fact that the Austronesian languages are the result of a relatively recent episode of language dispersal. The non-Austronesian languages from New Guinea have been geographically stable for a relatively much longer period, which made it possible for these languages to exchange more typological features locally, and thus enhance the geography-typology correlation. In contrast, the Austronesian languages have had less time to assimilate linguistically to their 'new' neighbours. This result indicates that it might be worthwhile to investigate recent language dispersals by looking for mismatches between typological and geographical similarity.

Language Removed	Pearson *r*
Loniu	0.253
Kwaio	0.248
Kaliai-Kove	0.227
Tigak	0.226
Tolai	0.226
Kilivila	0.225
West Makian	0.219
Arapesh	0.219
Yimas	0.216
Lavukaleve	0.214
Tetun	0.212
Irarutu	0.209

Table 2. Correlations between geographical distance and typological distance when one single language is removed, ordered by the strength of the correlation. The Austronesian languages are shown in boldface.

In Section 4, we found that there is a typological separation of the Austronesian and the West Papuan languages from the other languages in our sample (cf. Figure 3). In the light of the present discussion of the relation between geography and typology, this separation becomes somewhat suspicious, because both the Austronesian and the West Papuan languages are also geographically outliers to our sample. In fact, both geography and typology correlate highly with the separation of Austronesian plus West Papuan from the other languages in our sample. So, the question remains whether the typological separation—as shown in Figure 3—really is a typological separation, or simply an effect of the geographical location of these languages.

To investigate the relative effect of typological distance and geographical distance on the separation of the languages in two groups, one ideally would like to perform a

regression-like analysis, including both typology and geography as factors. However, to our knowledge, there is currently no worked out regression-like analysis available for distance matrices (cf. Cysouw, forthcoming, for an in-depth discussion). To get, nonetheless, an impression of the relative importance of the two factors, we performed a little trick. We first turned the distinction between the group 'Austronesian plus West Papuan' and the group consisting of the remaining languages into a distance measure. To achieve this, we set the distance between two languages from the same group to 'one' and a distance between two languages from different groups to 'two'. This admittedly rather coarse distance-measure is then used to perform a regression to the corresponding geographical and typological distances.[14] Both factors turn out to be highly significant in the regression, though the t-value of the typological distances (t = 22.4) is more than twice as large as the t-value for geographical distances (t = 10.9). This suggests (though not more than that) that the distinction in the two groups as found in Figure 3 is to a large extent the result of the typological profile, and only to a lesser extent the result of the geographical distance.

6. Noteworthy Characteristics

Besides investigating the combined structure of all typological structures in WALS, we also wanted to find out whether there are any special characteristics that are specifically found in New Guinea or in smaller groups from this area. For this part of our study, we delimited various groups of languages to investigate in more detail. Among these groups, there are genuine or hypothesised genealogical groups (Austronesian, West Papuan, Trans-New Guinea), areal groups (our complete New Guinea sample, non-Austronesian, New Guinea Highlands) and the typological separation that turned up earlier in this paper (Austronesian plus West Papuan, cf. Figure 3).

For all these groups, we investigated each typological characteristic listed in WALS. Specifically, for each value from each map in WALS, we computed the Fisher's Exact probability opposing a specific area against the rest of the world. An example of such a computation is shown in Figure 9. In this example, the first value (small consonant inventory) from the first WALS map (size of the consonant inventory, Maddieson 2005*a*) is investigated for the whole New Guinea area, in contrast to the rest of the world. In the WALS map on consonant inventories, there are in total 562 languages listed, of which only a minority has a small consonant

inventory (viz. 91 = 16 %). From the 48 languages in our New Guinea sample, only 19 occur in this specific map, but among these 19 the large majority has a small consonant inventory (viz. 16 = 84 %). This implies a large difference between the New Guinea area and the whole world; namely, in and around New Guinea, there is a much larger proportion of languages with small consonant inventories than expected from the totality of the world's languages (Fisher's Exact $p < 10^{-10}$).

		New Guinea	Others	Total
Consonant Inventory	Small	16	75	91
	Others	3	468	471
	Total	19	543	562

Figure 9. Example interaction.

Such Fisher's Exact probabilities are computed for all values of all maps in WALS, separately for all of the following groups of languages in contrast to the rest of the world's languages:

a) The whole New Guinea sample (including Austronesian)
b) Austronesian
c) non-Austronesian ('Papuan')
d) West Papuan
e) Trans-New Guinea
f) New Guinea Highlands
g) Austronesian plus West Papuan
h) All except Austronesian and West Papuan

In total, there are 643 different values throughout all maps in WALS, each of which was investigated for all 8 groups; this means that we had to wade through the results of a total of 5,144 Fisher's Exact tests. From all these probabilities, we only selected those that were smaller than 0.01 as being interesting enough for further investigation. We then performed one further selection to deal with the many existing overlaps between these groups. The problem is that, for example, a typological characteristic that is typical of the Trans-New Guinea languages will sometimes also turn out to be typical for the whole group of non-Austronesian ('Papuan') languages. For all such cases in which the groups show overlap, we selected the group that shows the strongest interaction (as instantiated by the lowest Fisher's Exact probability). For example, a particular characteristic might be typical (i.e. $p < .001$) for three different

groups: the whole set of 48 languages, Austronesian, and Austronesian plus West Papuan. However, when the probability is lowest for Austronesian, the characteristic is said to be typical of Austronesian only.

The first selection of typical characteristics is shown in Table 3. In this table, all those characteristics are shown that are typical for our whole sample of 48 languages. The most typical characteristic of all these languages, independent of areal or genealogical grouping, is the fact that the languages have a small consonant system (cf. Figure 9). Each of the other features listed in this and the following tables are likewise highly interesting, though we choose only to discuss a selected set of features in some detail because of limitations of space.

Typical Austronesian characteristics—or, more precisely, typical characteristics of the Austronesian languages in and around New Guinea—are summarised in Table 4. It is immediately obvious that there are far fewer typical characteristics for these languages, compared to the whole New Guinea area (though there is possibly a slight effect here, caused by the small number of languages available for this test, as there are only 10 Austronesian languages in our sample). The most noteworthy characteristic of the Austronesian languages is the usage of a separate word for the marking of plurality (cf. Dryer 2005*a*). The moderate preference for prefixing will be discussed in more detail below.

WALS Map ('Feature')		Characteristic ('Value')	
1	Consonant Inventories	1	Small
103	Third Person Zero of Verbal Person Marking	2	Overt third person S forms
120	Zero Copula for Predicate Nominals	2	Zero copula is possible
91	Order of Degree Word and Adjective	2	Degree word follows adjective
7	Glottalised Consonants	1	No glottalised consonants
62	Action Nominal Constructions	8	No action nominals
110	Periphrastic Causative Constructions	1	Sequential type but no purposive type
112	Negative Morphemes	2	Negative auxiliary verb
21	Exponence of Selected Inflectional Formatives	5	No case
76	Situational and Epistemic Modal Marking	3	No markers for both situational and epistemic modality

Table 3. Typical characteristics of the New Guinea area (inclusive Austronesian).

WALS Map ('Feature')		Characteristic ('Value')	
33	Coding of Nominal Plurality	7	Plural word
26	Prefixing vs. Suffixing in Inflectional Morphology	5	Moderate preference for prefixing
101	Expression of Pronominal Subjects	4	Subject pronouns in different syntactic position from full noun phrase subjects

Table 4. Typical characteristics of Austronesian languages.

In Table 5, various groups of 'Papuan' languages are summarised. For West Papuan, only one characteristic is listed, and even this one is probably better considered an epiphenomenon of the separation of values in WALS. It appears to be typical for West Papuan languages to be **predominantly** prefixing. However, as noted in Table 4, it is also typical for Austronesian languages to be **moderately** prefixing. If the definition of these values in WALS would have been different, it would have come out as a typical characteristic of Austronesian **and** West Papuan to prefer prefixing (cf. Dryer 2005*b*). This also makes sense from a wider typological perspective, as discussed below in the context of the discussion of the typical characteristics of the combination of Austronesian and West Papuan.

The typical characteristics of the Highland languages are particularly interesting. First, the absence of voicing contrasts in both plosive and fricatives (Maddieson 2005*b*) is clearly an instantiation of the widespread characteristic of small consonant inventories in New Guinea. However, when looking at the WALS map, it turns out that the absence of voicing contrasts is a typical 'circumpacific' characteristic (cf. Nichols 1997). It is highly tempting to speculate about a connection between the New Guinea Highlands and a circumpacific typological distribution as a leftover of ancient migration. Further, the extended body-part counting system is already known to be a typical 'Highland' characteristic (cf. Comrie 2005).

For Trans-New Guinea, we find another widely quoted 'typically Papuan' characteristic: various degrees of remoteness in the marking of past tense (Dahl & Velupillai 2005). Also note the occurrence of accusative alignment in verbal person marking as a typical Trans-New Guinea characteristic. Of course, accusative alignment is common worldwide (occurring worldwide in 212 languages out of a sample of 380 languages in WALS, cf. Siewierska 2005). However, it is especially common among Trans-New Guinea languages, reaching almost 100 % (just as, for example, among Indo-European). The opposite situation occurs with the lexical stress system that shows up as a specific characteristic of Trans-New Guinea languages. Lexical stress is by no means a typical phenomenon among Trans-New Guinea languages. It is only listed in WALS for about 35 % of the Trans-New Guinea languages. However, this fraction is still much higher than the worldwide occurrence of lexical stress, which is listed only for about 8 % of the world's languages in WALS (cf. Goedemans & Van der Hulst 2005).

For all non-Austronesian ('Papuan') languages, the absence of a passive is the most typical characteristic. Looking at the map in WALS, it looks more like this is a typical characteristic of the whole New Guinea area, but because of the passive in the Austronesian language Taba, the statistics just barely favoured listing this characteristic as typical non-Austronesian (cf. Siewierska 2005*b*). This should be considered a close call. For the order genitive-noun the odds are clearer. This is, of course, in no way a special characteristic from a worldwide perspective, but it clearly separates Austronesian from non-Austronesian (cf. Dryer 2005*c*). Specifically, the West Papuan languages are also genitive-noun, although they otherwise pattern with Austronesian in questions of word order (see below).

WALS Map ('Feature')		Characteristic ('Value')	
	Typically West Papuan		
26	Prefixing vs. Suffixing in Inflectional Morphology	6	Predominantly prefixing
	Typically Highlands		
4	Voicing in Plosives and Fricatives	1	No voicing contrast
131	Numeral Bases	5	Extended body-part
64	Nominal and Verbal Conjunction	2	Different
	Typically Trans New Guinea		
37	Definite Articles	4	No definite article but indefinite article
104	Order of Person Markers on the Verb	3	P precedes A
66	The Past Tense	2	2-3 degrees of remoteness
84	Order of Object, Oblique, and Verb	3	Oblique-object-verb
100	Alignment of Verbal Person Marking	2	Accusative alignment
16	Weight Factors in Weight-Sensitive Stress Systems	6	Lexical: lexical stress, diacritic weight
	Typically non-Austronesian ('Papuan')		
107	Passive Constructions	2	There is no passive construction
86	Order of Genitive and Noun	1	Genitive-noun
93	Position of Interrogative in Content Questions	2	Not obligatorily initial
46	Indefinite Pronouns	2	Generic-noun-based indefinites
33	Coding of Nominal Plurality	9	No plural
106	Reciprocal Constructions	1	No non-iconic reciprocal constructions
34	Occurrence of Nominal Plurality	1	No nominal plural
89	Order of Numeral and Noun	2	Numeral follows noun
54	Distributive Numerals	1	No distributive numerals
40	Inclusive/Exclusive Distinction in Verbal Inflection	3	No inclusive/exclusive opposition

Table 5. Typical characteristics of 'Papuan' languages.

Finally, we now turn to the characterisation of the apparent split between Austronesian plus West Papuan against the other languages in our sample. From the previous discussion in Sections 4 and 5, there appears to be a typological distinction between these two groups (cf. Figure 3). In Table 6, a survey is presented of those characteristics from WALS that are typical for this distinction. From this table, it is immediately obvious what causes this typological division. The Austronesian and West Papuan languages are of the word-order type verb–object (VO) with prepositions. In contrast, the other languages have object–verb (OV) and postpositions. In WALS, there are various maps about different word-order characteristics, which are all to some degree correlated with each other. Because of this 'bias' towards maps on word order in WALS, the effect of a difference in word-order type—as found in our New Guinea sample—is probably to some extent artificially enhanced.

WALS Map ('Feature')		Characteristic ('Value')	
	Typically Austronesian and West Papuan		
69	Position of Tense-Aspect Affixes	5	No tense-aspect inflection
70	The Morphological Imperative	5	No second person imperatives
51	Position of Case Affixes	9	Neither case affixes nor clitics
84	Order of Object, Oblique, and Verb	1	Verb-object-oblique (VOX)
81	Order of Subject, Object and Verb	2	Subject-verb-object (SVO)
85	Order of Adposition and Noun Phrase	2	Prepositions
88	Order of Demonstrative and Noun	2	Demonstrative word follows noun
124	'Want' Complement Subjects	2	Expressed overtly
83	Order of Object and Verb	2	Object follows verb (VO)
116	Polar Questions	6	Interrogative intonation only
	Typically non-Austronesian/non-West Papuan		
81	Order of Subject, Object and Verb	1	Subject-object-verb (SOV)
83	Order of Object and Verb	1	Object precedes verb (OV)
85	Order of Adposition and Noun Phrase	1	Postpositions
74	Situational Possibility	1	Expressed with affixes on verbs
118	Predicative Adjectives	2	Nonverbal encoding
67	The Future Tense	1	Inflectional marking
53	Ordinal Numerals	1	Zero: Ordinal numerals do not exist
29	Syncretism in Verbal Person/Number Marking	2	Subject marking is syncretic
69	Position of Tense-Aspect Affixes	2	Tense-aspect suffixes
55	Numeral Classifiers	1	Numeral classifiers are absent
90	Order of Relative Clause and Noun	2	Relative clause precedes noun (RelN)
8	Lateral Consonants	1	No laterals

Table 6. Typical characteristics distinguishing Austronesian plus West-Papuan from the other non-Austronesian languages.

However, in Table 6, there is a second kind of characteristic attested that distinguishes the two groups. The Austronesian and West Papuan languages appear to be characterised by relatively little inflectional marking (highly significant are no tense-aspect inflection, no morphological imperative, and no case affixes), while the remaining 'Papuan' languages typically have morphological marking (highly significant are morphological marking for situational possibility, and for tense and aspect marking). Further, note that the Austronesian and West Papuan languages both have a preference for prefixes (as noted previously in the discussion of individual characteristics of these groups), while the other languages have a preference for suffixes (e.g. tense-aspect suffixes). The typological distinction between Austronesian plus West Papuan and the remaining 'Papuan' languages is thus not only the result of a different word-order type, but also an effect of a different morphological type of languages in these groups.[15]

As noted in Section 4 (cf. Figure 2), there is also a **worldwide** separation of languages into two groups along the lines of the distinction of Austronesian plus West Papuan versus the remaining 'Papuan' languages. And indeed, this worldwide distinction also follows the OV/VO pattern observed (with the exception of Wichita, which is listed as OV in WALS, but is found on the VO side). As noted already by Greenberg (1963), the OV/VO distinction is strongly linked to the usage of postpositions vs. prepositions (and other word order phenomena). However, several of the other characteristics that show up in Table 5 also hold for the worldwide data. For example, there is a strong worldwide (one-sided) asymmetrical dependency (Fisher's Exact $p < 10^{-15}$) between OV/VO and a preference for suffixes/prefixes, respectively, in the WALS data (cf. Bybee *et al.* 1990 for a discussion of this typological observation). Second, there is an almost equally strong worldwide (two-sided) asymmetrical dependency between OV/VO and inflectional / non-inflectional tense-aspect marking (Fisher's Exact $p < 10^{-11}$). Likewise, there is a slightly less strong, though still significant, worldwide symmetrical dependency between OV/VO and inflectional/non-inflectional future marking (Fisher's Exact $p = .007$).[16]

In general, there appear to be strong typological connections between OV, much inflectional marking, and a preference for suffixing, on the one side, against the combination VO, less inflectional marking, and a preference for prefixing (with the proviso that prefixing is less common than suffixing overall), on the other side. As most of the word order parameters are related to the OV/VO distinction, and the

presence vs. absence of inflectional marking permeates the characteristics in WALS, these correlations have a broad impact, resulting in a rough typological bipartite distinction of the languages according to WALS. Consequently, this distinction is also found in our New Guinea sample. The distinction between Austronesian plus West Papuan against the remaining 'Papuan' languages is thus not so much a special feature of the New Guinea area in need of an idiosyncratic or historic explanation, but a specific instance of a worldwide typological pattern in need of a general cognitive explanation; to provide such an explanation, however, would go beyond the scope of this article.

7. Conclusions

Large databases with linguistic information about many of the world's languages are a new tool for exploratory cross-linguistic research. In this article, we have used one such database, the *World Atlas of Language Structures* (WALS, Haspelmath *et al.* 2005), to investigate the languages of New Guinea and the surrounding areas. There are still many unknowns concerning the methodological aspects of such research, and we see this article as a contribution to the development of this approach.

Investigating all features from WALS for a sample of languages from the New Guinea area, we did not find evidence that these languages make up a single group from a worldwide perspective. Trying to group languages according to their linguistic similarity, the New Guinean languages did not end up as one group, but were found dispersed among the world's languages (cf. Figure 2). As for the internal structure of the linguistic similarities among the New Guinean languages in our sample, we found a basic two-way distinction between Austronesian and West Papuan, on the one side, and the remaining 'Papuan' languages on the other side (cf. Figure 3). This division turned out to be the result of a more general typological division among the world's languages between languages with a verb-object word-order profile, which are at the same time low on affixal morphology and have a preference for prefixing, in contrast to languages with an object-verb word order profile with more morphology and a preference for suffixation.

As for specific 'New Guinean' characteristics, we found that, overall, there are fewer unusual characteristics in the New Guinea area than expected from the worldwide distribution. The languages from New Guinea appear to be relatively 'normal' languages (at least as far as the characteristics covered in WALS are

concerned). Of course there are still some linguistically unusual phenomena to be found in New Guinea. The most outstanding feature for all languages in our New Guinean sample is the presence of a small consonant inventory. For various subsamples of our sample, we found different special characteristics, like no voicing contrasts for plosives and fricatives, as well as extended body-part numerals for the languages spoken in the New Guinea Highlands, or degrees of remoteness marked in the past tense, as specifically found in Trans-New Guinean languages.

References

Altmann, Gabriel; Köhler, Reinhard; and Piotrowski, R. (eds.). 2005. *Quantitative Linguistics: An International Handbook.* Berlin: de Gruyter.

Bryant, David; and Moulton, Vincent. 2004. "Neighbor-Net: An agglomerative method for the construction of phylogenetic networks." *Molecular Biology and Evolution* 21: 255-265.

Bryant, David; Filimon, Flavia; and Gray, Russell D. 2005. "Untangling our past: Languages, trees, splits and networks." In: Mace *et al.* (eds.) 2005: 67-84.

Bybee, Joan; Pagliuca, William; and Perkins, Revere D. 1990. "On the asymmetries in the affixation of grammatical material." In: Croft (ed.) 1990: 1-42.

Comrie, Bernard. 2005. "Numeral bases." In: Haspelmath *et al.* (eds.) 2005: 530-535.

Croft, William. (ed.). 1990. *Studies in Typology and Diachrony.* Amsterdam: Benjamins.

Cysouw, Michael. 2002. "Against implicational universals." *Linguistic Typology* 7: 89-10.

Cysouw, Michael. 2005. "Quantitative method in typology." In: Altmann *et al.* (eds.) 2005: 554-578.

Cysouw, Michael. 2011. "Quantitative explorations of the world-wide distribution of rare characteristics, or: the exceptionality of northwestern European languages." In: Horst Simon & Heike Wiese (eds.). 2011: 411-431.

Cysouw, Michael. forthcoming. "Disentangling geography from genealogy." In: Benedikt Szmrecsanyi (ed.).

Dahl, Östen; and Velupillai, Viveka. 2005. "The past tense." In: Haspelmath *et al.* (eds.) 2005: 270-273.

Dryer, Matthew S. 2005*a*. "Coding of nominal plurality." In: Haspelmath *et al.* (eds.) 2005: 138-141.

Dryer, Matthew S. 2005*b*. "Prefixing versus suffixing in inflectional morphology." In: Haspelmath *et al.* (eds.) 2005: 110-113.

Dryer, Matthew S. 2005*c*. "Order of genitive and noun." In: Haspelmath *et al.* (eds.) 2005: 350-353.

Dunn, M.; Terrill, A.; Reesink, G.; Foley, R. A.; and Levinson, S. C. (2005). "Structural Phylogenetics and the Reconstruction of Ancient Language History." *Science* 309: 2072-2075.

Goebl, Hans. 1984. *Dialektometrische Studien.* Tübingen: Niemeyer.

Goedemans Rob; and Van der Hulst, Harry. 2005. "Weight factores in weight-sensitive stress systems." In: Haspelmath *et al.* (eds.) 2005: 70-73.

Gordon, Raymond G., Jr. 2005. *Ethnologue: Languages of the world.* 15th ed. Dallas: SIL International.

Greenberg, Joseph H. (ed.). 1963. *Universals of Language.* Cambridge, Mass.: MIT Press.

Greenberg, Joseph H. 1963. "Some universals of grammar with particular reference to the order of meaningful elements." In: Greenberg (ed.) 1963: 73-113.

Haspelmath, Martin; Dryer, Matthew; Gil, David; and Comrie, Bernard (eds.). 2005. *The World Atlas of Language Structures.* Oxford: oxford University Press.

Mace, Ruth; Holden, Clare J.; and Shennan, Stephan. (eds.). 2005. *The Evolution of Cultural Diversity: A Phylogenetic Approach.* London: UCL.

Maddieson, Ian. 2005*a*. "Consontant inventories." In: Haspelmath *et al.* (eds.) 2005: 10-13.

Maddieson, Ian. 2005*b*. "Voicing in plosives and fricatives." In: Haspelmath *et al.* (eds.) 2005: 22-25.

Maslova, Elena. 2002. "A case for implicational universals." *Linguistic Typology* 7: 101-108.

Nichols, Johanna. 1997. "Modeling ancient population structures and movement in linguistics." *Annual Review of Anthropology* 26: 359-384.

Siewierska, Anna. 2005*a*. "Alignment of verbal person marking." In: Haspelmath *et al.* (eds.) 2005: 402-405.

Siewierska, Anna. 2005*b*. "Passive constructions." In: Haspelmath *et al.* (eds.) 2005: 434-437.

Simon, Horst & Heike Wiese (eds.) 2011. *Expecting the Unexpected*. Berlin: De Gruyter Mouton.

Szmrecsanyi, Benedikt (ed.).*Space in language and linguistics: geographical, interactional, and cognitive perspectives*. Berlin: Walter de Gruyter.

Notes

[1] This paper was originally written in the fall of 2006 in response to the first call for papers for the relaunch of the current journal. We are grateful that the relaunch of this journal finally materialised, and we would like to wish LLM good fortune and high-quality submissions. We decided against rewriting this paper, although both the WALS data itself has been updated and the proposed statistic analysis of such data have been discussed extensively in the intermediate years. Finally, we thank Hans-Jörg Bibiko and Mihai Albu for assistance with the selection of the languages and conversion of the data.

[2] The population figures were reached by adding together the population figures for each country or administrative area in Gordon (2005). Some error is inevitably introduced from the fact that the figures relate to censuses taken in different years. The number of languages is the total of the numbers of living first languages for each country or administrative area in Gordon (2005). These numbers are very slightly too high because some languages are spoken in more than one country or administrative area and therefore get counted twice.

[3] We use the term "genealogical" rather than "genetic" to avoid confusion with biological genetics. Nothing crucial hinges on this terminological choice.

[4] Matthew Dryer's summary of the Papuan genetic classification is available online at http://linguistics.buffalo.edu/people/faculty/dryer/dryer/papuan (consulted on 17 September 2006).

[5] In the terminology as used in WALS, a feature is a particular dimension of linguistic variation (e.g. the order of object and verb) and a feature-value (or 'value' for short) is a particular instantiation of this dimension (e.g. object-verb order).

[6] For the record, the correlation between verb–object and adposition–noun phrase is validated, with 81.7% of the languages in the relevant sample having either verb–object and preposition–noun phrase or object–verb and noun phrase–postposition orders, only 4.6% having object–verb and preposition–noun phrase or verb–object and noun phrase–postposition orders; that between verb–object and noun–adjective is not significant, with 51.7% having either verb–object and Noun–adjective or object–verb and adjective–Noun orders, but as many as 33.1% having verb–object and adjective–noun or object–verb and noun–adjective orders.

[7] The location of the circles in Map 1 only approximates the geographical location of the speaker communities, for reasons of presentation.

[8] The arguments for considering a language part of the New Guinea Highlands is rather *ad hoc*. It is not even obvious that this group would make linguistic sense, though we wanted at least to include some areal group in our investigation to show the possibility of investigating such groups. We originally defined an altitude of 1,500 meters as the arbitrary cut-off point between the Lowlands and the Highlands (a boundary suggested, when pushed, by William A. Foley, p.c.). However, although the Selepet airstrip is located at 1,340 meters, many of the Selepet live higher (Ger Reesink, p.c.), so we included this language as a marginal Highland language. Tauya is spoken only at an altitude of about 200 meters above sea-level, but Lorna MacDonald (p.c.) informs us that most contact of the Tauya is directed towards the Highlands, and also their stories and diet seem to indicate a strong Highland influence. We will here consider Tauya to be a Highland language. Further thanks for discussing the delimitation of a concept 'Highland' are due to Les Bruce, Andrew

Pawley and Malcolm Ross. None of the colleagues mentioned in this note bears any responsibility for our decision on this issue.

[9] For the present sample, we also considered the basic two-fold division that was found in the NeighbourNet analysis as shown in Figure 3. There seems to be a slight difference between the Austronesian-West Papuan group and the rest, as the Austronesian-West Papuan languages are even more 'normal' than the other languages in our sample. However, the difference between these two groups is not really significant (t-test $p = .06$)

[10] Our relative Hamming distance is basically the same as the 'relativer Identitätswert' (RIW) as discussed by Goebl (1984). The only difference is that our measure is formulated as a measure of distance, where the RIW is formulated as a measure of similarity (which means that our measure is the same as 1-RIW).

[11] This is one of the simplest methods to determine a distance on the basis of the WALS data. There are many ways in which this measure could be improved upon. For example, with gradient parameters, like the number of consonants (Maddieson 2005*a*), not all differences are equally different: a small consonant inventory is more similar to an average inventory than to a large inventory. Further, there are many maps in WALS that could be separated into independent parameters. However, for reasons of methodological clarity and ease of analysis, we decided not to add any information to WALS just for the purpose of this paper, but simply use the data exactly as they are specified in WALS.

[12] The reason to take the best coded 150 was that after these 150 there was a strong drop in the amount of available data per language. The reason to select randomly the rather odd number of exactly 47 languages is due to a late recognised error. We originally selected the best 48 (the same as the number of languages in our sample), but only later did we notice that one language of our New Guinea area sample accidentally was also present in the random sample. We decided to remove this language without redoing the calculations needed for Figure 2.

[13] The notion of geography that will be used in this section is rather impoverished. The landscape of New Guinea and the surrounding areas is full of natural barriers that make travel and contact often much more likely in one direction that in another, a phenomenon that we ideally would like to model in some way. However, in this first attempt to investigate geographical patterns quantitatively, we will only use geographical distance in the sense of a direct line from one speech community to the other.

[14] Statistically, this approach is highly suspect. The problem is that a set of pairwise distances is not a set of independent measurements. If the pairs (A,B) and (B,C) are close, then normally also the distance between A and C is small. However, we use this approach here awaiting statistical improvements from colleagues more proficient in such matters.

[15] In Figure 3, there were two languages that did not fit into the distinction Austronesian plus West Papuan against the rest. First, the Austronesian language Tawala ended up on the side together with the other 'Papuan' languages. As it turns out, Tawala has an atypical word-order type for an Austronesian language (OV, genitive-noun), though it is—as expected—weakly prefixing. Second, the non-Austronesian language Arapesh is found inbetween the two groups, with a tendency towards Austronesian and West Papuan. And indeed, Arapesh is listed in WALS with

typical word-order characteristics of Austronesian and West Papuan (VO with prepositions) and having a weak preference for prefixing.

[16] The terms ‘one-sided asymmetrical dependency’ and ‘two-sided asymmetrical dependency’ are proposed in Cysouw (2005) to capture distributions that would traditionally be interpreted in typology as a statistical implicational universal, like OV -> suffixes, or the equivalent prefixes -> VO. These new notions were originally proposed under the name ‘weak’ and ‘strong’ directional implication, respectively, in Maslova’s (2002) reply to Cysouw (2002). However, as there is nothing weak or strong in either kind of correlation, Cysouw (2005) proposed the names used here. The name ‘symmetrical dependency’ is proposed as a statistically sound replacement for what is traditionally called a statistical equivalence.