Farming/Language Dispersal
Food for thought

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1. Agriculture-driven language spread

Just as plant and animal lineages are not uniformly distributed around the world, the same is true for the distribution of language families. As of 2017 the Ethnologue list includes around 50 distinct language families covering 7099 living languages, some of which, like Austronesian, have spread over a huge geographical range while others, like Amuric, have only a single living member (i.e., Nivkh) and are geographically very restricted. The uneven geographical distribution of language families across the world calls for an explanation of why some languages wither and die, while others prosper and spread. A major reason proposed to explain the spread of many of the world's large language families is agriculture. This proposal, advanced by Renfrew (1987), Bellwood & Renfrew (2002), Diamond & Bellwood (2003) and Bellwood (2005, 2011) is known under the label "Farming/Language Dispersal Hypothesis". The hypothesis posits that many of the world's major language families owe their dispersal to the adoption of agriculture by their early speakers. In this context, farming or agriculture is generally understood in its restricted sense of economic dependence on the cultivation of crops and does not usually include the raising of animals as livestock.

Since farming can unquestionably support far greater population densities than hunting and gathering, the basic logic behind this hypothesis is that population growth steadily pushed the early farmers and their language into wider territories, displacing the languages of preexisting hunter-gatherer populations. Indeed, agriculture is argued to be one of the major factors causing dispersal in families such as Indo-European (Renfrew 1987; Comrie 2002; Gray & Atkinson 2003) in Europe, Bantu (Philipson 2002) and Semitic (Diakonoff 1998) in Africa, Austronesian (Blust 1995, 2013; Pawley 2002; Bellwood & Dizon 2008), Sino-Tibetan (Janhunen 1996: 222; LaPolla 2001; Sagart 2008, 2011), Tai-Kadai (Ostapirat 2005: 128), Austroasiatic (Higham 2002; Diffloth 2005; Sidwell & Blench 2011; Sagart 2011) and

Dravidian (Fuller 2002) in Asia and Tupian, Arawakan (Aikhenvald 1999:75) and Otomanguean (Kaufman 1990; Brown et al. 2013a/b, 2014a/b) in the Americas.[1]

In this volume, we would like to investigate to what extent the economic dependence on plant cultivation impacted language spread in various parts of the world, reassessing some of the above proposals and paying attention to language families that cannot unequivocally be regarded as instances of Farming/Language Dispersal, even if subsistence may have played a role in their expansion.

In the contribution on Eskimo-Aleut by Anna Berge, it is clear that the expansion could not have been driven by agriculture because this widely spread language family never developed farming in the first place. Nevertheless, a hunter-gatherer subsistence strategy that provided access to relatively rich food resources had linguistic effects equivalent to those brought by agriculture.

There are also contributions on widely spread language families, for which the ancestral vocabulary at best provides only a glimpse of agriculture, such as Trans-New Guinea by Schapper, Transeurasian by Robbeets, Turkic and Altaic by Savelyev and various macrofamilies in Eurasia by Starostin.

Moreover, we find widespread families, for which an agricultural lexicon can be confidentially reconstructed, but where it remains unclear whether agriculture is indeed the reason for their spread. This is, for instance, the case for the Quechuan and Aymaran languages discussed by Emlen and Adelaar and for the Hmong-Mien languages discussed by van Driem. It is arguable that proto-Hmong-Mien had rice agricultural vocabulary and its homeland was situated in the Mid-Yangtze Valley where *japonica* rice was first domesticated. However, the prevalent view (Ratliff 2004:158–159; Sagart 2011:127–128) that most of its rice vocabulary has been borrowed from Sinitic and that it has a relatively shallow time-depth (500 BC) is in conflict with the direction of borrowing and time depth suggested by van Driem. Uncertainty about agriculture-driven expansion despite the reconstruction of some agricultural vocabulary also marks the debate in Indo-European between the Anatolian hypothesis, suggesting that farmers migrated out of the Middle East around 7000 BC, on the one hand, and the Steppe hypothesis, suggesting that herders migrated out of the Eurasian steppe around 4000 BC, on the other. Whereas the former hypothesis is in accordance with Renfrew's (1987) traditional view of Farming/Language Dispersal, the contributions by Joseph, Kümmel and Garnier et al. supporting the latter hypothesis should not necessarily be in conflict with the model of subsistence-driven linguistic expansion in general.

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1.   Brown (2015) now challenges his earlier proposal that agricultural vocabulary can be reconstructed back to proto-Otomanguean, arguing that the Otomanguean languages are not yet conclusively demonstrated to descend from a common ancestor.

Next, there is the Bantu spread discussed by Koen Bostoen and Joseph Koni Muluwa, previously claimed to be "one of the most dramatic examples of language/farming dispersal in world history" (Bellwood 2005: 222). However, as the authors show, Bantu turns out to be a less convincing case of agriculture-driven spread than initially anticipated.

Finally, this volume also includes a discussion of a language family for which there seems to be a relative consensus about Farming/Language Dispersal, notably Austroasiatic. Regardless of the controversy about the location of the homeland, be it in the Mekong Valley (Sidwell & Blench 2011: 318) or as van Driem suggests in his contribution, in the Brahmaputra Valley, there seems to be a consensus that the dispersal of the Austroasiatic languages could have been motivated by the spread of rice agriculture.

As such, the contributions to this volume differ from the influential works mentioned above in that they do not perfectly fit into a framework of agriculture-driven language spread, but invite us to relativize the importance of the factor of agriculture, without completely rejecting it. Taken together, our case studies make it clear that farming is neither a necessary nor sufficient condition for language spread and that we need to abandon one-factor explanations and consider many other causes that may have influenced linguistic expansion. Moreover, this volume shows that a dualistic concept of a proto-language either having or lacking agricultural vocabulary is untenable and urges us to think in terms of a continuum-distribution of agricultural proto-lexicon.

2. Data and questions

The language families discussed in this volume are very diverse and widely distributed across continents, from Africa to Europe, Asia and Oceania to the Americas. In Africa, we find the homeland of West-Coastal Bantu, situated between the Bateke Plateau and the Bandundu region in Congo and that of Afroasiatic, situated in the Eastern Mediterranean by Militarev (2002) but in the western Red Sea Coast by Ehret (2003). In Eurasia, the location of the assumed homelands ranges from the Pontic Steppe north of the Black Sea for Indo-European, the region south of the Caucasus for Nostratic and the area around the Aral Sea for proto-Indo-Iranian, over to the Brahmaputra Valley area for Austroasiatic, the mid-Yangtze River Basin for Hmong-Mien to the West Liao River Basin for Transeurasian and the Liaodong Peninsula for Japano-Koreanic. In Oceania, the homeland of Trans-New Guinea is situated in the central highlands of Papua New Guinea. In the Americas, we find the original location of Eskimo-Aleut on the North American Pacific Coast and the

homelands of Quechua and Aymara in central Peru. Figure 1 shows the proposed locations for the homelands of the language families discussed in this volume.
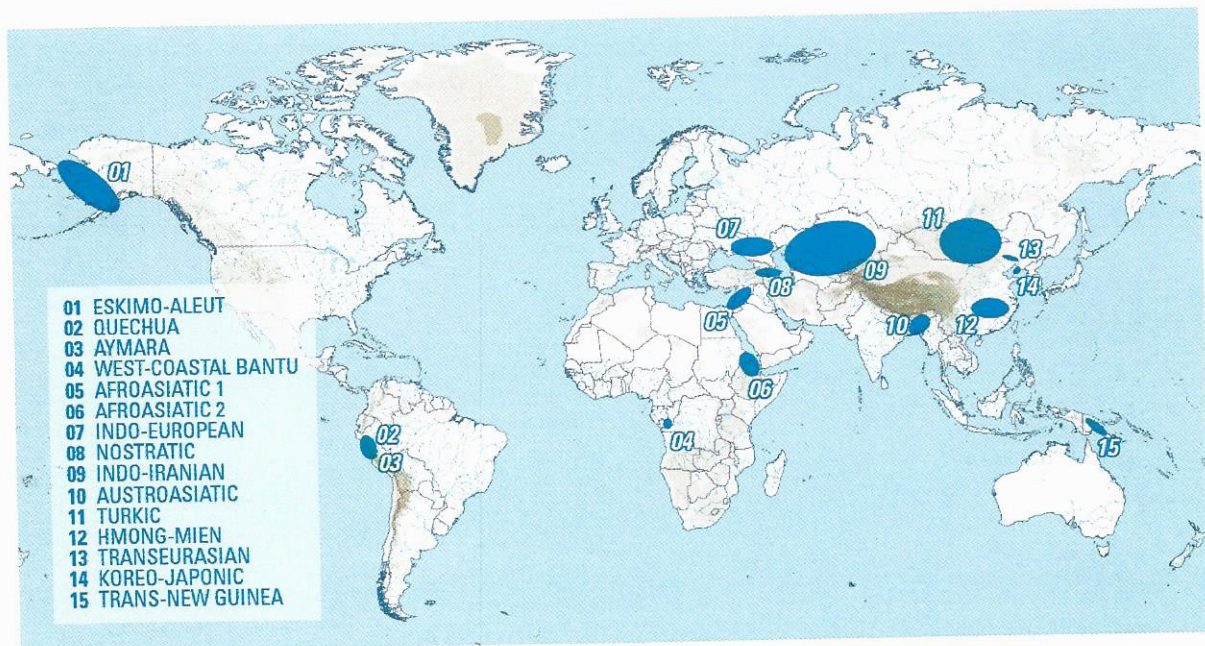

Figure 1. Distribution of the homelands proposed in this volume

Not only the presumed locations but also the estimated time-depths of the ancestral languages under discussion show much variety. The shallowest time-depths are situated around the beginning of our era with Quechua, Aymara, West-Coastal Bantu and Hmong-Mien. Other families such as Indo-Iranian, Japano-Koreanic and Eskimo-Aleut go back to between 2000 and 3000 BC, while Indo-European, Austroasiatic, Transeurasian and Trans-New Guinea lie between 4000 and 6000 BC. Long-range families under discussion, situated around 10,000 BC and beyond include Sino-Caucasian, Afroasiatic and Nostratic.

The questions we address in this volume are in the first place linguistically oriented, investigating language in order to draw inferences about early subsistence strategies and causes of dispersal. However, we are also interested in how our knowledge about early subsistence and demography can help us to draw inferences about language. The following questions are related to the use of language as a window on early subsistence in individual case studies.

1. What was the subsistence component of a given ancestral language like? What words did the ancestral speakers use to designate the environment they lived in, the plants they cultivated, the animals they raised, the food they consumed and the technology they used in their daily lives?

2. Can we estimate the time depth and the location of a given ancestral language?

3. What kind of linguistic evidence is required to conclude that a proto-language was spoken by farmers?
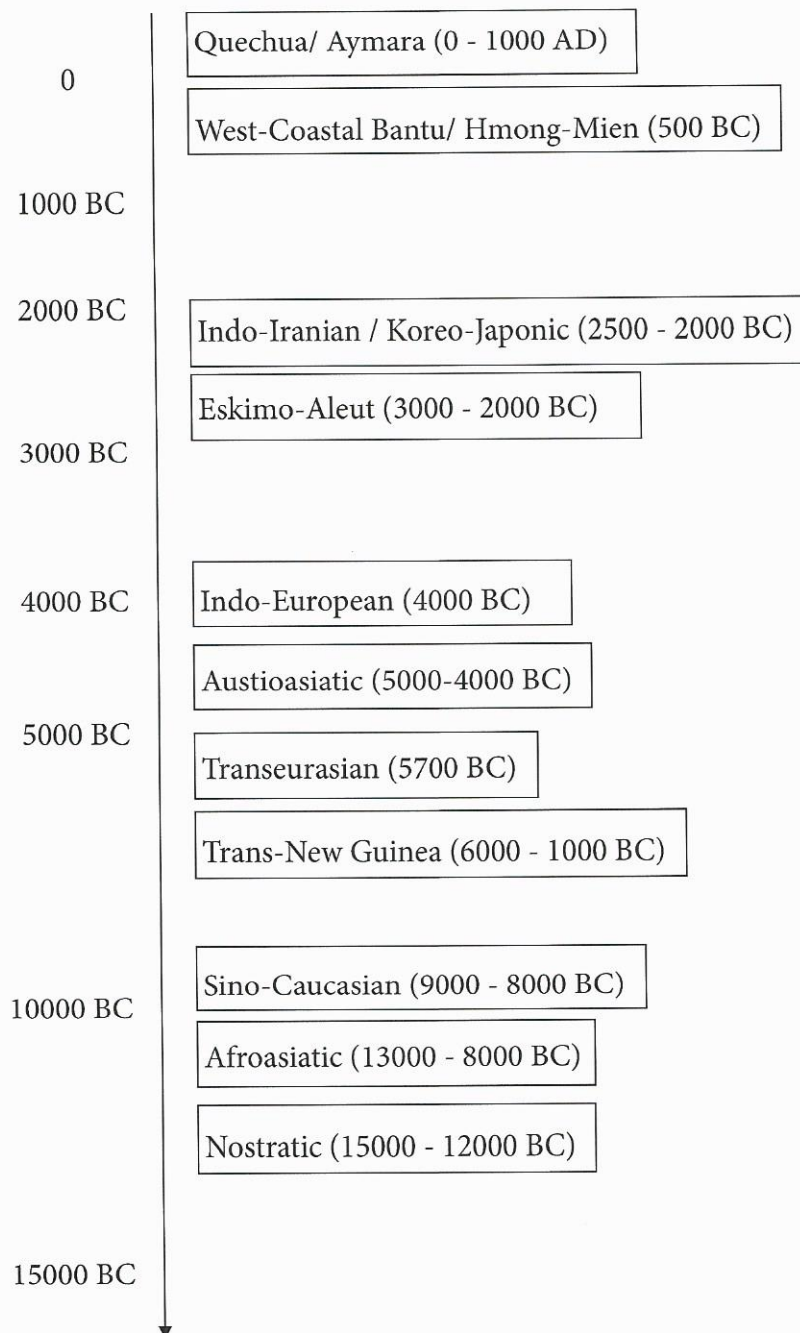
Figure 2. Range of time depths estimated for the language families discussed in our volume

4. Does the reconstruction of agricultural vocabulary to the proto-language of a widespread language family necessarily imply that the language spread was driven by agriculture?

5. Are there any linguistic traces of interactions between the ancestral speakers of a given proto-language and other groups? Who was involved? What was their relationship like? Did the relationship involve the transfer of subsistence strategies or technologies?

By contrast, the following questions draw on what we know about prehistoric demography and subsistence and use this information as a window on language.

1. Does the archaeological information about early subsistence at the proposed time and location of the linguistic homeland tie in with the reconstructed terms for subsistence, technology and natural environment?
2. Are there any indications for a switch from a less successful subsistence style to a lifestyle based on more successful subsistence strategies, e.g., from hunting and gathering to agriculture? Is there any evidence that this change was mirrored by language replacement?
3. Which demographic transitions have occurred at the estimated time and in the homeland of the ancestral language and are these changes mirrored in linguistic effects such as splits and spreads of the language family? Can they be attributed to a change in subsistence style?
4. Are there indications that relativize the importance of agriculture as a factor behind the expansion of language families? What other processes can account for early language spread?

3. Methods

The tools that can help us to find an answer to our questions are situated at the interface between linguistics and other disciplines, such as archaeology and genetics. Such tools include, notably, the diversity hotspot principle, phylolinguistics, mapping demographic dispersal on linguistic phylogeny, cultural reconstruction and contact linguistics. The integration of these different methods and principles will result in a clearer window on the past than would the individual application of one or another method. Each approach has its own pitfalls, but we can gain more from applying and integrating the various methods than we can lose from disregarding them.

3.1   The diversity hotspot principle

The "diversity hotspot principle" is not so much a method, but rather a principle that can help us in locating the original homeland of a language family. The notion was originally Edward Sapir's (1916:87), who referred to it as the "centre of gravity principle", but it is also known as the "focus of diversity" principle (Heggarty 2015:612–613). Assuming that the deepest splits within a family reflect the greatest age, the location of these splits on the map is thought to point to the area where the proto-language began to diversify. The principle is thus based on the assumption

that the homeland is closest to where one finds the greatest diversity with regard to the deepest subgroups of the language family. A schoolbook example is the Austronesian family, that extends across a huge geographical range, all the way from Madagascar to Easter Island, but the deepest subgroups are found on just one Island, Taiwan. In Chapter 7, Schapper applies the principle to the Trans-New Guinea family, indicating that the eastern highlands of Papua New Guinea is the best candidate for a homeland because it has the highest concentration of primary subgroups.

Although the diversity hotspot principle can provide some clues about the homeland of a language family, it must also contend with certain limitations. First, the identification of the homeland depends on the location of the deepest subgroups and therefore, on how robustly the internal structure of a given family has been established. In the case of Austroasiatic, for instance, van Driem finds that the concentration of the deepest phylogenetic divisions in the family tree points to the northern Bay of Bengal littoral, but if Sidwell and Blench (2011) are correct in establishing a "flat array" structure of Austroasiatic, in which Munda would not be a primary branch, this would shift the center of gravity of the family towards the Mekong Valley, as they suggest.

A second limitation of this principle is that the contemporary hotspot of linguistic diversity may diverge from the earlier one. Looking at the present map of Indo-European with the Balkan Peninsula hosting the highest diversity of deep subgroups, we might conclude that the homeland is there, instead of the Pontic Steppe or Anatolia. A possible way out is to return to the earliest language distributions we know of. In this volume, van Driem, for instance, uses the historically attested distribution of the early Hmong-Mien tribes during the Eastern Zhōu dynasty (770–256 BC) to push the homeland of the family further north, towards the middle Yangtze and Robbeets proposes a location for the Transeurasian homeland on the basis of records of ethnic and linguistic diversity in Chinese historical sources. However, earlier diversity may also have been lost long before recorded historical times. This observation is at the basis of Starostin's discussion of the various homeland theories for the Afroasiatic stock. Some scholars such as Ehret (2003) favor a homeland in the Horn of Africa on the grounds that, except Semitic, all subgroups occur only in Africa, while others, such as Militarev (2002), support it having originated in the Levant, where earlier diversity may simply have been lost. This example makes it clear that the application of the diversity hotspot principle at profound time-depths is highly speculative because the elapse of time may have erased earlier diversity and the proposed genealogical relationships are not reliably established.

Finally, linguistic diversity is a function not only of time but also of other factors such as environmental change and disease. These may have made the original homeland unsuitable for human habitation at a certain point in time. In this way

original linguistic diversity may have been erased and it may no longer be possible to pinpoint the homeland using the diversity hotspot principle. However, even if the principle is not foolproof, it offers valuable clues for the location of a homeland at less remote time-depths.

3.2   Phylolinguistics

A second tool that is useful for our linguistic window on the past is "phylolinguistics", a cover term for all quantitative approaches to language change, based on the historical behavior of cognate sets. This includes distance-based approaches, such as the lexicostatistic method mentioned by Starostin as well as character-based approaches, such as the Bayesian method, which became widely applied to linguistics since Gray and Jordan (2000) and is here applied by Robbeets to the Transeurasian languages. These methods estimate the relationship between two languages, the former from the amount of difference in their shared cognate proportion and the latter by inferring the pathways by which each developed from their common ancestor (Dunn 2015). Such computational techniques can be useful in double-checking the internal structure of a linguistic family previously established on the basis of classical historical linguistics, providing us with absolute dates for the nodes in a given family and by giving us an idea of the robustness of our inferences. The assumptions are, first, that the amount of language change between two related languages is in relation to their divergence time and, second, that we can calibrate the divergence time against known cases of language divergence over attested timespans. Among the challenges of phylolinguistics for classical historical linguists, we can first mention the "garbage in, garbage out" principle, meaning that our inferences will depend on the quality of the inserted data and how we interpret their coding. Second, the "mathemagic" these methods involve is at times difficult to access for classically trained historical linguists. In order to evaluate the quality and reliability of these methods, many linguists would like more transparency about what the algorithm is really doing.

3.3   Mapping demographic dispersal on linguistic phylogeny

Mapping demographic dispersal on linguistic phylogeny, we try to correlate expansive processes revealed by archaeological or genetic research with language split and spread, visible in language classifications and current linguistic geography. It can be expected that formative processes in population prehistory, such as those motivated by successful subsistence strategies, will shape language relationships. The prehistoric population movements out of Taiwan and through Island South-East

Asia into the Pacific discussed by Gray et al. (2009), for instance, display pulses and pauses that closely match the stages of splits and spreads in the phylogenetic tree of Austronesian languages.

Several chapters in this volume draw connections between demographic and linguistic processes. Schapper proposes to correlate the active population dynamics pulsing out of New Guinea at a time before the Austronesian migrations with the dispersal of the Trans-New Guinea languages. Van Driem associates the spread of the paternal lineage O in human genetics with the linguistic ancestors of the so-called "East Asian linguistic phylum", which unites the Sino-Tibetan, Hmong-Mien, Austroasiatic, Austronesian and Kradai families. Robbeets proposes a scenario that links the developmental stages of agriculture and its effects on demographic transitions in southern Manchuria to the dispersal of the Transeurasian languages. Garnier et al. suggest that the strong population expansion of the Yamnaya culture around 4000 BC can be connected with the spread of the Indo-European languages through the favorable demography of herders having the unique capacity to digest animal milk in adulthood.

When mapping demographic dispersal on linguistic phylogeny, there is the pitfall of drawing a straightforward relationship between material culture, ethnic groups and language. However, instead of the conservative, static approach linking one monolithic archaeological culture to one mono-ethnic and mono-lingual group, this volume attempts to develop a more dynamic framework of inference whereby demographic processes are mapped on change in the archaeological record and these become in their turn associated with linguistic dispersals.

3.4   Cultural reconstruction

Cultural reconstruction, the investigation of the cultural vocabulary revealed in the reconstructed vocabulary of a proto-language is a major tool to investigate the correlations between language and farming and, therefore, frequently applied in this volume. It is a subfield of comparative historical linguistics that enables us to study human prehistory by correlating our linguistic reconstructions with information from archaeology about the possible cultural and natural environment of the speakers of the proto-language. As explained by van Driem in Chapter 7, the method was first introduced under the label "linguistic paleontology" by Adolphe Pictet (1859), who was inspired by Julius von Klaproth's (1830: 112–113) pioneering work.

In addition to "cultural reconstruction" (Crowley & Bowern 2010: 299; Epps 2015; Heggarty 2015) and "linguistic paleontology" (Hock 1991: 573–578), this method is also known as "Wörter und Sachen" (Campbell 2004 [1998]: 367–368) or "linguistic archaeology" (Southworth 2005). We also find terms such as "linguistic

ethnobiology" (Hunn & Brown 2011) or "paleobiolinguistics" (Brown 2015) in the literature, but this approach is more specifically directed at correlating linguistic reconstructions with archaeobotanical insights about plants.

Cultural reconstruction relies on two assumptions, specifically, first, that words and their meanings can be confidentially reconstructed to the proto-language and second, that reconstructed words allow us to make direct inferences about the nature of the ancient speech communities that used these words. Related to these assumptions is the inference that cultural items that have cognates widely spread across the languages in the family have existed in the associated cultures longer than items that lack such a wide distribution. In Chapter 6, for instance, Schapper observes striking linguistic similarities in terms for 'sugarcane' and 'banana' across widely dispersed groups of the Trans-New Guinea family. This enables her to reconstruct the terms back to proto-Trans-New Guinea and to infer that sugarcane and banana must have been part of the agricultural package possessed by early Trans-New Guinea populations. This situation contrasts with the distribution pattern of the word for 'taro', which can only be reconstructed to some low-level families and shows clear signs of later cultural diffusion.

Inventorying the reconstructed vocabulary in its entirety can contribute to a fuller picture of prehistory than the study of individual cultural reconstructions. Much information about the culture and society of the speakers of the proto-language can be recovered by paying attention to the clustering of different cultural items in a specific semantic domain or the unequal distribution of cognates in different semantic domains. In Chapter 3, for instance, Berge draws inferences on the basis of a gender difference in the distribution of Eskimo cognates in Aleut.

Among the limitations and challenges of cultural reconstruction are the potential lack of accuracy in semantic reconstruction, the occurrence of lexical recycling, the deception of a single item not backed up by a semantic domain and the shakiness of inferences made on the basis of absence.

3.4.1   *The accuracy of semantic reconstruction*

It is a fact that semantic reconstruction is less precise than phonological reconstruction. Therefore, we should be cautious not to be semantically overpermissive in our reconstructions. In Chapter 8, George Starostin suggests that a layer of agricultural lexicon may be reconstructable to the Sino-Caucasian macrofamily. However, some Sino-Caucasian agricultural reconstructions have rather ambiguous semantics. The Sino-Caucasian root *$\lambda w\ddot{i}\math\ref{?}w\acute{V}$ 'millet, rice' reconstructed by Sergei Starostin (2005 <http://starling.rinet.ru>), for instance, is based on Sino-Tibetan *$l\bar{i}wH \sim$ *$\lambda\bar{i}wH$ 'rice grain' and North Caucasian *$\lambda w\ddot{i}\math\ref{?}wV$ 'millet', which in its turn involves a speculative semantic reconstruction as it is based on comparing the meaning 'grain' in Nakh, 'mown crops' in Lak, 'bread' in Lezghian and 'millet' in West Caucasian.

Since the meaning assigned to a reconstructed form can be no more specific than the meaning shared by all the cognate forms, the common denominator here is at best as concrete as 'any plant used for consumption'. Building semantic reconstructions upon semantic reconstructions, our hypotheses risk collapsing like a house of cards.

By contrast, comparisons enjoying a high degree of semantic stability across different subgroupings of a language family may be particularly telling. The point is that when a particular meaning did not get replaced by a new meaning in the daughter languages, it is likely that the corresponding item or activity likewise did not get substituted by a newly introduced one. Such stable semantics appear in Schapper's study of the meanings 'banana' and 'sugarcane', as well as in Starostin's discussion of some North Caucasian agricultural reconstructions such as the verb 'to thresh'.

3.4.2   *Lexical recycling*

"Lexical recycling" is a process whereby words with a general, non-cultural meaning become repurposed as words with a specific, cultural meaning after the importation or invention of the corresponding innovation. As a result, reconstructions with an agricultural meaning could have existed before the agricultural inventions with a non-agricultural meaning. In Aleut, for instance, the agricultural verbs 'to plant' and 'to sow' are recycled from hunter-gatherer terminology such as 'to drop a fishing line' and 'to distribute sea-catch', while in Proto-Quechua the verbs 'to irrigate' and 'to sow' are derived from 'to fall (water), wet' and 'to hit, knock, push'. Names for domesticated crops often derive from their wild predecessors, as Bostoen and Koni Muluwa show for West-Coastal Bantu. Moreover, the names of agricultural imports may be derived from native domesticates, such as the development of rice agricultural vocabulary from dry crop vocabulary in Korean, discussed by Francis-Ratte. Savelyev finds that many pastoralist terms in Turkic are derived from non-pastoralist vocabulary in the proto-Turkic period, such as the derivation of 'kid' from 'son, child', or 'dried quark, cheese' from 'to dry'. The same may be true for pastoralist terms in Indo-European as indicated by the reanalysis of a noun meaning 'one who collects (liquids)' into the Indo-European verb 'to milk', studied by Garnier et al. Joseph takes it one step further, not just analyzing the particular derivation or reanalysis of a single word, but trying to detect derivational patterns in the creation of agricultural vocabulary as a whole. He suggests that reduplication is commonly used as a strategy to extend previously non-agricultural vocabulary into agricultural vocabulary in proto-Indo-European.

3.4.3   *The deception of a single item*

If we can only reconstruct a single cultural item that is not backed up by other members of the semantic domain to which it belongs, there is reason for suspicion.

In this volume, Kümmel warns us of the deception of single items, pointing out that only very few grain terms in Indo-Iranian can be shown to be inherited from Indo-European, while pastoralist vocabulary is clearly inherited. This is taken as an indication that the spread of Indo-European can be motivated by pastoralism rather than by farming. In contrast, Schapper strengthens the argument that the spread of the Trans-New Guinea languages is driven by agriculture adding 'sugarcane' and 'banana' to the reconstructed package of crops, which so far consisted only of 'taro'.

3.4.4   *The shakiness of inferences made on the basis of absence*

As the traditional aphorism goes, "absence of evidence is not evidence of absence." The observation that an agricultural lexicon cannot be reconstructed for a certain proto-language may be explained by the fact that the proto-speakers simply were not familiar with farming, but it could also be due to the lack of the necessary exhaustive research or to the attrition of agricultural cognates over time. Therefore, inferences made on the basis of absence are not necessarily wrong, but they should not be taken as absolute proof for an argument.

In this volume, for instance, Robbeets maintains that common rice vocabulary is completely absent from Japano-Koreanic, while Francis-Ratte suggests a cognate for 'dry rice' on the basis of internal segmentation of some Middle Korean words. Given the presence of agricultural cognates in Transeurasian, Savelyev argues that the near absence of agricultural cognates found only in Altaic (i.e., Turkic, Mongolic and Tungusic) may be explained by the loss of agricultural terms, which may have swept away by or recycled as pastoralist terms. He supports this by contrasting the secondary or areal nature of pastoralist vocabulary with the absence of identifiable borrowings and the primary nature of agricultural terms in proto-Turkic. Similarly, assuming the presence of some agricultural vocabulary in Nostratic, Starostin proposes that traces of an earlier agricultural lexicon may have been lost in Uralic together with the practice itself, as former agriculturalists switched back to hunting-gathering.

3.5   Contact linguistics

A final set of tools at our disposal to determine the correlation between language and subsistence is offered by contact linguistics, the study of the ways in which languages influence each other when their speakers interact. The study of prehistoric borrowing and diffusion can be useful to shed light on past interactions and help us

determine the chronology of our data. If there is an exchange of loanwords between two or more languages, the assumptions are, first, that the speakers of the languages in question were directly in contact with each other either directly or indirectly through mediation of an intermediate population, and, second, that the loanwords cannot be dated to a time earlier than the established time of transmission of the relevant concept. In this volume, Savelyev argues that the borrowing of terms relating to horse pastoralism from proto-Turkic into proto-Mongolic must have taken place after 1200 BC, when horse-ridden pastoralism first appeared on the eastern steppes. Two of the challenges of contact linguistics are distinguishing between borrowing and inheritance, and determining the direction of the borrowing.

3.5.1   *The distinction between borrowing and inheritance*

If a word and its meaning correspond across various daughter languages, this does not necessarily imply that the word ultimately originated in the common ancestral language. It is quite possible that the word entered the relevant family by way of borrowing, either at the proto-stage or in a chain of transmissions after its break-up. The distinction between borrowing and inheritance in common subsistence vocabulary is therefore a serious concern, which is taken up in the chapters by Emlen and Adelaar, Berge, Savelyev, Schapper, van Driem and Kümmel. Criteria used in this volume to distinguish between borrowed and inherited items include the following.

1. When a given root corresponds beyond the presumed language family or a probable donor word exists in an unrelated language, borrowing is the most likely explanation. For instance, Schapper argues for diffusion of the term 'taro' across the Trans-New Guinea languages because reflexes of the form are found in numerous non-Trans-New Guinea languages as well.

2. The distributional pattern of borrowing is typically linear, progressing from one contact language into the other. Genealogical divergence, however, may be pictured as the rings formed when a stone is thrown into the water: innovations start in the center and push the older forms towards the periphery. Therefore, a distributional pattern whereby cognates leave traces in remote, unconnected areas is consistent with inheritance, but inconsistent with borrowing. In contrast to the term for 'taro', for instance, reflexes of the term for 'sugarcane' extend from the extreme east to the extreme west, with a gap in central New Guinea.

3. Correspondences between cultural items that show a remarkable semantic stability, whereby all reflexes of a certain protoform appear with exactly the same meaning as the protoform, are likely to be inherited. Borrowed items display more frequent semantic changes and substitutions than inherited cultural items do. This recalls Starostin's findings about the semantic stability of the cognate verb 'to thresh' across the North Caucasian languages.

4. Borrowing is a likely explanation in cases when the similarity concerns a morphologically complex form in one language that cannot be analyzed as such in the other language. For example, Berge argues that Unangam Tunuu (Aleut) *angaaĝu-x̂* 'single-bladed paddle for skin boat' is a borrowing from the Alutiiq (Eskimo) word *anguarun* 'single bladed paddle' because only the latter can be derived from *anguar-* 'to row'.

5. Irregular sound correspondences are indicative of borrowing, an argument used by Kümmel in his demonstration that the agricultural lexicon of Indo-Iranian is not inherited from Indo-European, but rather points to borrowing.

6. Correspondence sets that refer to innovations post-dating the proto-language split are arguably borrowings. For example, current findings that the kayak may have been a recent technological advance that reached the Aleutians within the past 1500 years supports Berge's suggestion that all nominal correspondence sets related to the kayak, including the very term 'kayak' itself, are borrowings from neighboring Yupik languages to Unangam Tunuu (Aleut), rather than being inherited from Eskimo-Aleut.

3.5.2   *The directionality of the borrowing*

Especially in cases of prehistoric contact, it may be a challenge to determine the direction of the borrowing. One objection against van Driem's proposal to regard Hmong-Mien as the source of borrowing for Sinitic rice agricultural vocabulary, for instance, comes from the observation that some of the alleged loans include characteristic Chinese morphology (Sagart 2011). Berge re-examines a list of probable borrowings of uncertain direction in Bergsland (1994: 655), supporting borrowing from Unangam Tunuu (Aleut) into Alutiiq or Yupik (Eskimo), rather than the other way around.

4.   Organization of this volume

This volume is organized into 13 chapters, mostly case studies, reflecting on subsistence-based language spread on various continents around the world.

In Chapter 2, Nicholas Emlen and Willem Adelaar reconstruct proto-Quechua and proto-Aymara lexical items related to cultivation and herding to draw some inferences about the relationship between language and subsistence in the ancient Andes. Stripping away the many layers of Quechua-Aymara lexical borrowings, they find that the early speakers of both lineages were engaged in sophisticated cultivating and herding economies before their initial contact. Since both proto-languages exhibited terms for cultivation and herding at a wide range of ecological and elevational zones before their first contact, the early speakers appear to have

sustained contact across elevations and engaged in various subsistence practices. In spite of the presence of ancestral agropastoral vocabulary in both proto-languages, the authors question whether these families really owe their wide geographical range to the adoption of agriculture, pointing to the fact that the languages replaced the languages of pre-existing small-scale cultivators, rather than those of hunter-gatherers.

In Chapter 3, Anna Berge studies the motivation for the spread of Eskimo-Aleut languages after their split around 2000 BC. She pays special attention to the advance of Alutiiq (Eskimo) and the retreat of Unangam Tunuu (Aleut) in the Aleutian and Kodiak Islands around 500–1000 AD. To this end, she analyzes the distribution of Eskimo-Aleut cognates and Alutiiq borrowings in the subsistence terminology in Unangam Tunuu. She finds that agriculture was responsible neither for the original spread of Eskimo-Aleut, nor for the more recent instance of borrowing from and shift to Alutiiq in the previously Aleut region. Rather, the comparison of borrowing versus inheritance patterns suggests an influx of Alutiiq men, resulting in borrowing as well as language replacement as a result of warfare. Interestingly, in support of subsistence-driven language spread, prestige-triggered wars seem to have led to borrowing, while wars involving a struggle for insufficient resources seem to have led to replacement.

In Chapter 4, Alexander Francis-Ratte examines agricultural vocabulary shared between Japanese and Korean. In spite of the presence of various etymologies for 'field', Japanese and Korean share barely any words relating to rice agriculture. Proposing cognate sets for 'rice', 'buckwheat' and 'millet', Francis-Ratte suggests that Japanese and Korean may have diverged at a time when field rice was already being cultivated in Northeast Asia alongside millet, while paddy rice was not introduced yet. He further proposes that pre-rice vocabulary has undergone a process of lexical recycling in Korean to refer to later rice-related practices.

In Chapter 5, Martine Robbeets investigates to what extent agriculture impacted the dispersal of the Transeurasian language family, i.e. the genealogical grouping consisting of the Turkic, Mongolic, Tungusic, Koreanic and Japonic languages. In addition to disagreeing on their genealogical relatedness, previous scholarship has called into question the claim of agriculture-driven language spread for these languages. Applying techniques such as the diversity hotspot principle, phylolinguistics, mapping demography on linguistic phylogeny and cultural reconstruction, Robbeets finds indications that proto-Transeurasian was spoken by people gradually adopting farming and that its dispersal was indeed driven by agriculture.

In Chapter 6, Alexander Savelyev compares the origin of farming-related and pastoralism-related vocabulary across the Altaic (i.e., Tungusic, Mongolic and Turkic) languages with special attention to the developments in Turkic. He finds that in proto-Turkic, pastoralist vocabulary can often be shown to result from

secondary derivation or borrowing, whereas agricultural terms include more primary roots and cannot easily be identified as borrowings. On the basis of this observation, he explains the limited reconstructability of agricultural vocabulary in Altaic as opposed to Transeurasian, by a loss of agricultural terms after the break-up of Altaic, whereby pastoralist terms were borrowed or recycled from preexisting agricultural terms.

In Chapter 7, Antoinette Schapper investigates whether the Trans-New Guinea Phylum, a language family comprising a large number of the languages of New Guinea that remains largely untested by the traditional methods of historical comparative linguistics, can be considered to be an instance of Farming/Language Dispersal. In addition to previous comparative research focussing on taro, she compares the terms for two different crops, sugarcane and banana across the Trans-New Guinea languages. Stressing the great cultural and economic importance of these crops throughout the Papuan language area, she proposes linguistic evidence that not taro but rather banana and sugarcane were associated with the expansion of the Trans-New Guinea languages.

Challenging the traditional view of a single domestication of rice in the Yangtze River Basin in Chapter 8, George van Driem brings together linguistic, archaeobotanical and genetic evidence supporting three separate domestication events. He associates the paternal lineage O in human genetics with the linguistic ancestors of the so-called "East Asian linguistic phylum", which unites the Sino-Tibetan, Hmong-Mien, Austroasiatic, Austronesian and Kradai families. He suggests that at least two of these families, Austroasiatic and Hmong-Mien, owe their wide distribution to their involvement in rice domestication events, the former in the Brahmaputra Valley area and the latter located further east, south of the Yangtze River.

In Chapter 9, George Starostin surveys some of the more developed hypotheses on Eurasian macrofamilies such as Nostratic, Sino-Caucasian and Afroasiatic and examines whether agricultural vocabulary can be reconstructed back to the ancestral languages. He concludes that the most convincing case of an early linguistic stock with a reconstructible layer of agricultural lexicon is the Western subdivision of Sino-Caucasian. This follows from his observation that agricultural terminology can be convincingly reconstructed to proto-North Caucasian and from the existence of plausible Euskaro-Caucasian connections in the agricultural lexicon, which suggests that the original speakers of Basque once dwelled in close proximity to speakers of North Caucasian languages. In this connection, he points to the possible Caucasian origins of some of the substrate lexicon, found in various branches of the Indo-European languages across Europe. He further finds that evidence of ancient agricultural lexicon in the Afroasiatic stock remains at best circumstantial, whereas evidence of early agricultural vocabulary in Nostratic is completely lacking.

In Chapter 10, Koen Bostoen and Joseph Koni Muluwa question the plausibility of agriculture as the main driving force behind the initial Bantu Expansion. Instead, they propose that the early language spread was facilitated through climate-induced openings of the Central African rainforest block. The first Bantu-speaking populations that, following savannah corridors, arrived south of the rainforest were the West-Coastal Bantu speakers. Bostoen and Koni Muluwa review subsistence-related plant-vocabulary that can be reconstructed in Proto-West-Coastal Bantu to assess the question of whether the Bantu speakers had become farmers by the time that they reached the area south of the rainforest. They find that even if the first Bantu speakers south of the rainforest knew how to cultivate certain crops, they were still largely dependent on plant resources that they could collect in their natural environment. As the West-Coastal Bantu speakers were only gradually moving from foraging to plant cultivation to domestication, the emergence of agriculture in early Bantu speech communities is characterized as a slow revolution.

Using examples from Indo-European historical comparison in Chapter 11, Brian Joseph reviews the methods by which we infer that the lexicon of a certain proto-language contains agricultural items. In addition to paleolinguistics, including cultural reconstruction, etymological derivation and loanword detection of lexical items relating to agriculture, he proposes two further types of lexically based argumentation. The first type reconstructs derivational processes involved in the creation of agricultural words and their meanings, such as for instance a process of reduplication that is found to be a productive strategy in the derivation of agricultural vocabulary in Indo-European. The second type of argumentation examines the embedding of agricultural vocabulary into the religious practices and mythological tales associated with early Indo-European culture. In this way, he proposes to expand our methodology of examination of agricultural vocabulary to the larger word-formational patterns and cultural context of the words involved.

Comparing pastoralist to agricultural reconstructions in Chapter 12, Martin Kümmel makes inferences about the significance of farming for the spread of the Indo-Iranian languages. He finds that pastoral terminology, such as words for cattle, horses, sheep and goats is clearly inherited from Indo-European. This is in contrast to the lack of genealogical continuity for plant cultivation terms, such as words for cereals, pulses and vegetables, which reflect several layers of loanwords. Observing that the agricultural terminology of Indo-Iranian is largely divergent from that of most European branches of Indo-European, Kümmel argues that the Indo-Iranian languages have mainly spread through pastoralism.

Finally, in Chapter 13, Sagart, Garnier and Sagot reconcile the idea of pastoralist and subsistence-driven language spread by associating the spread of the Indo-European languages with the origins of dairying. To this end, they bring together archaeological, genetic, ethnographic and linguistic evidence. Their observations

give additional support to the Pontic Steppe hypothesis that identifies the ancestral group of proto-Indo-European speakers with pastoralists in the steppes north of the Black Sea around 4000 BCE. Examining reconstructed Indo-European dairying vocabulary in addition to ancient texts, they find evidence that the ancestral speakers of Indo-European were the first in Eurasia to develop the ability to drink milk in adulthood, which conveyed a serious advantage in subsistence. As a result of boosting demography, lactase persistence increased the need for pasture land and is thus thought to have driven the expansion of the Indo-European languages.

5.   Findings

Like the three aspects of a crime that must be established to prove guilt, language spread usually involves an opportunity, a means and a motive. The opportunity has to do with the conditions of the time and space in which the proto-language is situated and over which the ancestral speakers have little or no control. Conditions that may invite speakers to spread include outside population pressure, disease, volcanic activity, climate change, vegetation or other ecological change, etc. The initial Bantu expansion, for instance, was facilitated by climate-induced openings of the Central African rainforest and the separation of the Transeurasian languages was triggered by climate change.

The means refers to the force or the instrument that drives the spread. Advantages in transport, weaponry and state organization are what empower speech communities to spread and to dominate other communities. For instance, as discussed in this volume, increased mobility through horse riding was instrumental in the spread of the Turkic, Mongolic and the Indo-European languages, while an advantage in weaponry was a major factor in the spread of Alutiiq (Eskimo).

Finally, language dispersal also requires a motive, a mechanism that causes the dispersal. Among the mechanisms proposed by Renfrew (1987: 123–131) are (a) demography/subsistence, (b) elite dominance and (c) system collapse, but not all of these mechanisms have an equal likelihood of causing language shift and replacement. In fact, elite dominance, whereby the incomers are demographically insignificant relative to the local population, is rarely seen to cause shift. When a dominating group is relatively small in comparison to the dominated speech community, the expected outcome of language contact is instead language maintenance with borrowing (Thomason & Kaufman 1988; Heggarty 2015). This is supported by historical cases of elite dominance, such as the Normans leaving an extensive layer of loanwords in English, without ever replacing English with French in Britain. Similarly, Berge finds that the language of the Alutiiq (Eskimo) elite heavily influenced Unangam Tunuu (Aleut) spoken on the Aleutian Islands but did not replace

it. However, as illustrated in this volume, cases of elite dominance can involve language replacement, especially when the elites benefit from a particularly favorable opportunity or have an acute advantage in means. Examples in our volume include Eskimo replacing Aleut on Kodiak Island or Turkic and Indo-European replacing pre-existing local languages. In addition to a crucial advantage in means for transportation or warfare, these language shifts may also have been facilitated by biological advantages such as immunity to diseases like the plague or lactase persistence. By definition, the elite are a small group of persons who exercise influence over a larger one, but these physical advantages may have allowed the elite to survive an event that decimated the local population, thus providing a favorable demography for language shift. In addition, the resource surpluses on Kodiak Island and dairying among the Indo-Europeans suggest that subsistence played a role as well. Therefore, these cases seem to be situated at the interface of the Subsistence/Demography and the Elite Dominance model.

The contributions to this volume relativize the importance of agriculture as a motive for language spread by showing that Farming/Language Dispersal is just one instantiation of the Subsistence/Demography model and by viewing subsistence regimes and the reconstructed agricultural lexicon in which they are mirrored as a continuum rather than a discrete division.

Some language families such as Eskimo-Aleut have no farming, but subsistence played a role in their development in that the language spoken by the population gaining access to the food resources replaced the pre-existing language spoken by the population losing access. Other families such as Turkic and Indo-European may have been familiar with farming but their spread was caused by food surpluses and mobility associated with horse-ridden pastoralism. Yet other language families such as West-Coastal Bantu and Transeurasian initially occupied a middle ground between farming and foraging. Next, there are families such as Quechua, Aymara, Japano-Koreanic and Trans-New Guinea, which demonstrably had agriculture, but replaced pre-existing languages of populations that were already familiar with farming, be it on a smaller scale. An indisputable case of Farming/Language Dispersal in this volume may be represented by Austroasiatic, but even here controversy remains about the homeland and whether rice indeed was the original crop (Sidwell & Blench 2011). Therefore, the more general Subsistence/Demography model seems to be more widely applicable than the Farming/Language Dispersal Hypothesis. The key issue is an advantage in subsistence strategy and thus expansive potential – be it related to foraging, farming or pastoralism – that eventually makes the incoming population demographically more successful than the local one.

Moreover, considering that the transition to an agricultural lifestyle must have taken place over centuries, if not millennia, including a lengthy pre-domestication stage, we find that a dualistic concept whereby a subsistence regime is either

agricultural or not is not tenable and neither is the characterization of a proto-language as either having or lacking agricultural vocabulary. As shown in Figure 3, our contributions suggest a continuum distribution, whereby some proto-languages such as Eskimo-Aleut completely lack agricultural vocabulary, others like Indo-European languages inserted agricultural vocabulary from the languages they supplanted, while yet others such as Aleut and possibly Hmong-Mien borrowed terms for agricultural innovations in their lexicons. Families such as Transeurasian and West-Coastal Bantu then, represent a transitional stage between foraging and farming, cultivation and domestication. Even if such families as Japano-Koreanic, Quechua, Aymara, Trans-New Guinea and Austroasiatic clearly reflect an agricultural lexicon, this does not necessarily imply that the language spread is driven by agriculture alone.
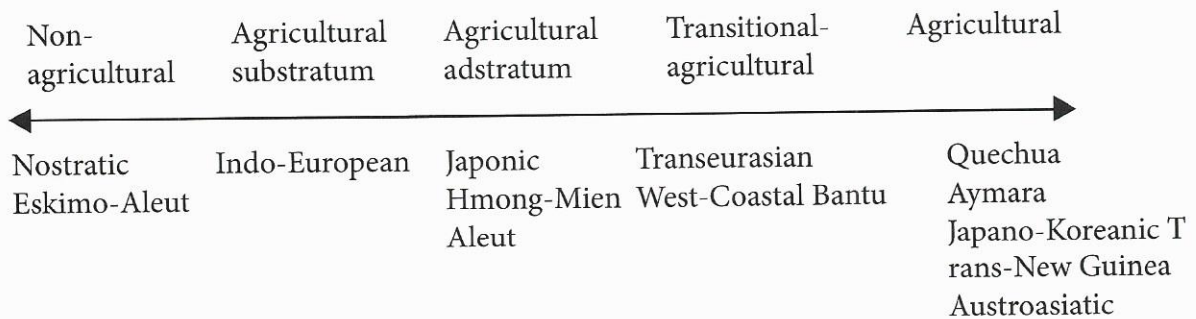
Non-agricultural	Agricultural substratum	Agricultural adstratum	Transitional-agricultural	Agricultural
Nostratic Eskimo-Aleut	Indo-European	Japonic Hmong-Mien Aleut	Transeurasian West-Coastal Bantu	Quechua Aymara Japano-Koreanic Trans-New Guinea Austroasiatic

Figure 3. A continuum-distribution for agricultural lexicon discussed in this volume

In sum, farming is not a magic wand that can be waved to explain all instances of language spread, but Farming/Language Dispersal remains a useful working hypothesis because especially in Neolithic times, when human societies tended to be smaller in size and less complex in technology, the transition to farming must have held the promise of a better life. Thinking more broadly of farming as a relatively successful subsistence strategy involving potential for demographic growth and assessing language spread in terms of the three aspects of a crime – opportunity, means and motive – may help us to abandon one-factor explanations and consider many more factors that stimulated linguistic expansion.

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