Mother Tongue

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In Memory of Heinz-Jürgen Pinnow (1925–2016)

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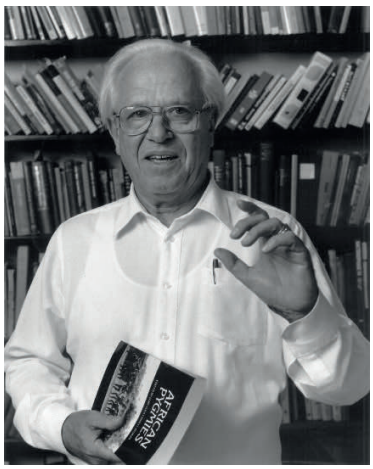

Luigi Luca Cavalli-Sforza (1922–2018), who was on ASLIP / *Mother Tongue*'s Council of Fellows, died at his home in Belluno, Italy, at the ripe age of ninety-six years. Professor Cavalli-Sforza was a titan in the field of human genetics, and little will be said here about his achievements, since so much information about him is available elsewhere. Cavalli-Sforza was keenly interested in how the field of genetics might correlate with other sciences of human history, archaeology and genetic linguistics. Some of his major works along these lines include *The History and Geography of Human Genes* (with Paolo Menozzi and Alberto Piazza; 1994) and *The Great Human Diasporas: The History of Diversity and Evolution* (with Francesco Cavalli-Sforza; 1995). Cavalli-Sforza has been hailed as a visionary "of the genome as a prism for understanding the history of our species" by a present-day 'rock star' geneticist, David Reich of Harvard, who adds that recently "the genome revolution, with the help of ancient DNA, has realized Luca Cavalli-Sforza's dream, emerging as a tool for investigating past populations that is no less useful than the traditional tools of archaeology and historical linguistics."

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Eric Pratt Hamp (1920–2019) was one of the most prolific and respected scholars in Indo-European studies. Hamp was not known as being sympathetic to long-range ("macrocomparative") studies, but to his credit he worked with a large variety of obscure and endangered languages, like Quileute, Gaelic, and Eskimo. Naturally, Hamp has been celebrated in many eulogies easily accessible on the Web (for example, "Eric P. Hamp, renowned linguist of lesser-known languages, 1920–2019"),[1] so here I shall just tell some anecdotes that show how he helped and influenced the editor of this journal (yours truly).

At about the age of seventeen I was having a discussion about language with my father, a Christian pastor and theologian, who then introduced me to Grimm's Law, as briefly described in my family's dictionary. I was immediately astonished on learning that there was a scientific control – sound correspondences – on linguistic change, and set about learning all I could about Indo-European (IE) and historical linguistics. Somehow I found out about Eric Hamp, who had already been at the University of Chicago some fifteen years by then, and wrote a letter to him requesting information on IE. Professor Hamp kindly sent me a 56-page bibliography (dated June 1964) which he had compiled for his students in his classes on IE.

In March 1988 my co-author of "Global Etymologies" (GE),[2] Merritt Ruhlen, initiated a discussion of these putative world-wide lexemes with Hamp, and the Chicago professor responded with a handwritten three-page letter in which he politely, but firmly, refuted the proposed etymologies.

> Remember that Bopp in 1816, & probably Jones, before him, started with morphology. It's never enough to look for roots; you have to look at totally accountable words & phrases with their morphologies & syntactic markings. Only then are the semantics justified against all formant increments. – That's what I urge as a goal for cleaning up (or rejecting) these proposed etymologies. Often disappointing, yes, but terra firma. So for me all 25 fail.

[1] https://news.uchicago.edu/story/eric-p-hamp-renowned-linguist-lesser-known-languages-1920-2019

[2] Bengtson, John D. & Merritt Ruhlen. 1994. Global etymologies. In: Ruhlen, Merritt, *On the Origin of Languages*, 277–336. Stanford, Calif.: Stanford University Press. It is often incorrectly stated that Ruhlen alone was the author of GE, but in fact it was a true collaboration initiated when Ruhlen and I first met (at Rice University in 1986). The first plan was to include the article in a proposed book edited by Vitaly Shevoroshkin, but this never materialized. We submitted GE to the journal *Language*, but it was rejected by the editors. Finally Merritt was able to include GE in his 1994 book.

The final 1994 version of GE proposed twenty-seven etymologies. The first time I saw Eric Hamp in person was later in 1988, at the International Symposium on Language and Prehistory at the University of Michigan (November 1988), where I presented a report on global etymologies, and Hamp stood up and disputed my citation of Proto-Indo-European **kost-* 'bone'. I thanked Professor Hamp for his comments. Hal Fleming remarked privately, with a grin, that the encounter was my 'baptism by fire'.

The last time I saw Eric Hamp was at the Athabascan (Dene) Languages Conference, at Berkeley in July 2009. Then in his late eighties, the professor looked physically frail, but that did not hinder his strong participation in the conference, in which he heartily endorsed Edward Vajda's Dene-Yeniseian as a "demonstration [which] ranks amongst the great discoveries of this type of productive inferential reasoning."[3] He repeatedly emphasized the phrase "total accountability," as in the 1988 letter quoted above. I could finally agree with my old mentor that Vajda's work was important and has convinced a significant number of linguists that there can, indeed, be convincing evidence of linguistic relations between North America and the 'Old World'. *Requiescat in pace*, Eric Pratt Hamp. [JDB]

Postage stamp issued by Albania, in honor of Hamp's extensive work in Albanian (*gjuha shqipe*).

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[3] Hamp, Eric P. 2010. On the First Substantial Trans-Bering Language Comparison. In: J. Kari and B.A. Potter (eds.), *The Dene-Yeniseian connection*, 285–298. Fairbanks: Department of Anthropology, University of Alaska Fairbanks.

Stephen L. Zegura (1943–2019) was born in San Francisco, California. In 1965, Steve earned his BA in anthropology, *magna cum laude* and with departmental honors, at Stanford University. He received his master's degree and doctorate in human biology in 1971 from the University of Wisconsin (Madison), where he was a Woodrow Wilson Fellow. In 1972 he moved to Tucson, Arizona, where he was a professor at the University of Arizona and taught physical anthropology and human genetics for over forty years. He authored many important research papers during his long career, including groundbreaking work on the peopling of the Americas; the Y chromosome as a marker of human pathways; and the origins, genetics, and evolution of all humanity. He was also honored to write the physical anthropology entry for the Britannica Book of the Year for over a decade.

Readers of *Mother Tongue* will recall Steve Zegura's occasional articles keeping us informed on the latest breakthroughs in physical anthropology, including, most recently, "Ode to our 'randy' ancestors: an essay in honor of Hal Fleming" (*Mother Tongue* XX). A few years earlier Steve contributed "Current topics in human evolutionary genetics" to the *Festschrift* in honor of Hal Fleming.[4]

University of Arizona obituary: https://anthropology.arizona.edu/news/memoriam-stephen-l-zegura

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[4] *In Hot Pursuit of Language in Prehistory: Essays in the four fields of anthropology in honor of Harold Crane Fleming*. Bengtson, John D., Ed. 2008. Amsterdam: John Benjamins.

Murray Gell-Mann (1929–2019) was best known as a renowned physicist (Nobel Prize 1969), but anyone who met and talked with him found that he had many other deep interests, including historical (genetic) linguistics. In fact, as a young scholar his primary interest was historical linguistics, but (as Murray told it) his father did not believe he could make a living in that field, and eventually convinced him to concentrate on physics. But all along he continued to study historical linguistics. In 2001 Gell-Mann finally was granted his chance to make his mark on genetic linguistics. Thanks to a generous endowment from the John D. & Catherine T. MacArthur Foundation, and support from the Santa Fe Institute (which he had co-founded in 1984), he collaborated with Sergei A. Starostin and Merritt Ruhlen to organize the Evolution of Human Language project (EHL). The goal of this project has been "integrating data from all of the world's major and minor language stocks in order to push our knowledge of linguistic prehistory as far back as possible." See the following links for more information about Gell-Mann's thoughts about genetic linguistics, and the activities of the EHL project.

Murray Gell-Mann and the Evolution of Human Languages: The Burden of Proof. Narrated by George Starostin (1:06.31) https://www.youtube.com/watch?v=EgDdu-zdqEk
Ted Talk: The ancestor of language. (2007) (2.02) https://www.ted.com/talks/murray_gell_mann_on_the_ancestor_of_language
Ted Talk: Do all languages have a common ancestor? (2.16) https://www.youtube.com/watch?=gR4UlNoOrlc
The EHL project: http://ehl.santafe.edu/
In memoriam: Murray Gell-Mann: https://www.santafe.edu/news-center/news/murray-gell-mann-passes-away-89

The Evolution of Human Languages (EHL)[5]

By Murray Gell-Mann

Comparative and historical linguists have succeeded in classifying attested languages in families, each of which consists of daughter languages descended from a common proto-language spoken a long time ago. Occasionally that proto-language is itself attested (like Latin, the ancestor of the Romance languages). Otherwise, it has had to be reconstructed by linguists from their knowledge of the daughter languages. Much of the work consists of comparing items of basic vocabulary (words or meaningful parts of words) of similar meaning.

In classifying languages this way, one is concerned with "vertical transmission" of language from parent (or other care giver) to child. One has to watch out for "borrowing" or "horizontal transmission" from other languages, which can complicate the picture. In addition, there are more or less regular sound changes over the generations, different in different branches, that are studied carefully by historical linguists. For example, in the Indo-European family of languages, an original initial *p* sound becomes an *f* sound in the Germanic languages but remains a *p* sound in Latin and the Romance languages. Compare Latin *pater* and English *father* or Latin *pullus* and English *foal*.

The oldest universally recognized families (except in Africa) go back some seven thousand years (like Indo-European). A few linguists, such as the ones involved in the EHL project, go beyond this stage and classify the families into super-families and even super-super-families, where the age of the proto-language may be ten or even fifteen thousand years. These "long-range" relationships are not accepted by most "mainstream" linguists in North America and Western Europe, although treated quite seriously in Russia and Eastern Europe. For some reason the four African super-families are exempt from condemnation by the "mainstream" crowd and so articles on them appear in the standard encyclopedias, which do not have similar articles on the superfamilies of Eurasia, which are carefully studied by EHL linguists. Yet the African super-families could be criticized on the same grounds as the others. What are those grounds? Mainly that when the age of the superfamily is ten or twelve thousand years or more, it is thought to be too difficult to weed out borrowing, similarity by accident, and faulty detection of the patterns of sound change. But if that objection were correct, then, as the age of the proto-language increases, there should be a steady decrease in the amount of information available for language classification, and at seven thousand years the evidence for families such as Indo-European should have dwindled to a small amount, in order that it be inadequate at ten or twelve thousand years. That, however, is not the case. The evidence for the Indo-European family is in fact overwhelming. If it were reduced by a factor of ten, it would still be convincing.

[5] From http://tuvalu.santafe.edu/~mgm/Site/Front_Page.html (now a dead link). Apparently Gell-Mann's homepage has been taken down.

The EHL project consists of several parts. One is the continued growth of the database, covering the languages of most of the world and their relationships. Nearly all the languages of Eurasia, Northern Africa and the Pacific and Indian Ocean islands (except for some in the vicinity of New Guinea and Australia), have been found to form four superfamilies, which in turn form a single super-super-family. Some of the indigenous languages of the Americas certainly fit into this scheme, and it may turn out that all of them fit into the afore-mentioned super-super-family. One important EHL activity consists of reviewing the evidence on the classification of the American languages. Another important activity involves seeing whether a relationship can be established with the two major super-families of Black Africa, Nilo-Saharan and Niger-Kordofanian.

It is important to improve the arguments for acceptance of long-range relationships, especially by critical examination of the arithmetical arguments that have been put forward as allegedly showing that the observed similarities of lexical items in super-families could be explained by chance.

A fascinating topic is the prevalence of "bottlenecks." For example, the native Australian languages form a family that appears to be less than twelve thousand years old, judging by lexical similarities. However, there have been modern humans in Australia since the first successful explosion out of Africa, which peopled almost all of the Old World. That took place around fifty thousand years ago, and the Australian language family is certainly not fifty thousand years old. The most appealing explanation is that a particular language, spoken either by a group of Australians or else by a group of invaders from New Guinea, spread their language over the whole continent, leaving only minor traces of the earlier languages.

It is conceivable that a similar bottleneck involved all or nearly all of the world's languages. Say that some eighteen or twenty thousand years ago, at the height of the last ice age, when there were very few refugia for human beings on the planet, one of the languages then spoken eliminated all or most of the others. We would then see a number of lexical similarities over all or most of the world. In fact, there is some evidence for such "global" words and roots. It is important to follow up these clues and see if they withstand careful (but not bigoted) examination. Etymological dictionaries are being produced covering some large families and some superfamilies as well.

This project employs quite a few people, some in the US, some in Russia, and one or two who commute between Santa Fe and Moscow. They perform various tasks, including putting dictionary information into the database, working out language relationships based on lexical information, interacting with specialists in other fields, refining the ideas of lexicostatistics and glottochronology (measuring closeness of relationships and times of separation of languages by using overlaps in basic vocabulary), etc.

The project convenes workshops every couple of years at which the linguists interact with leading geneticists, archaeologists, physical and cultural anthropologists, and earth

scientists. The object is to understand the migrations of early modern humans and the relation of those migrations to the history of languages.

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Some of Murray Gell-Mann's works on historical linguistics

Gell-Mann, Murray, Ilia Peiros & Sergei Starostin. 2008. Lexicostatistics Compared with Shared Innovations: The Polynesian Case. In *Aspects of comparative linguistics 3 / Aspekty komparitivistiki 3*, ed. by A.V. Dybo, V.A. Dybo, O.A. Mudrak & G.S. Starostin, 13–44. (*Orientalia et Classica*. *Trudy Instituta vostočnyx kul'tur i antičnosti*, Vypusk XIX.) Moscow: Russian State University for the Humanities.

Gell-Mann, Murray, Ilia Peiros & George Starostin. 2009. Distant Language Relationship: The Current Perspective. *Journal of Language Relationship / Вопросы языкового родства* 1: 13–30.

Turchin, Peter, Ilia Peiros & Murray Gell-Mann. 2010. Analyzing genetic connections between languages by matching consonant classes. *Journal of Language Relationship / Вопросы языкового родства* 3: 117–126.

Gell-Mann, Murray & Merritt Ruhlen. 2011. The origin and evolution of word order. *Proceedings of the National Academy of Sciences* 108: 17290–5.

HEINZ-JÜRGEN PINNOW, NA-DENE AND BEYOND

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1. HEINZ-JÜRGEN PINNOW

Heinz-Jürgen Pinnow has passed away. He was born on January 22nd, 1925 in Danzig, studied and became a professor in Berlin, and died on the Frisian island of Sylt on July 1st, 2016.

Heinz-Jürgen Pinnow started out with work on languages of India and adjacent areas. Later he moved on to Native American languages. Here he has made far-reaching contributions to the question of Na-Dene, in fact so many as probably no other scholar, considering the fact that he wrote several monographs on the topic. Pinnow was an Honorary Member of the SSILA (Society for the Study of the Indigenous Languages of the Americas). He was a polyglot, very gifted in didactic matters (which can be gathered from many of his works) and extraordinarily well-versed in historical linguistics. Later on in his life, he called himself only Jürgen Pinnow.

A "Festschrift" for Pinnow with contributions from renowned Na-Dene scholars exists: Dürr / Renner / Oleschinski (1995). It says a lot about Pinnow's life, but it must be remarked that also an autobiography, Pinnow (2009), is available which informs us that some statements in Dürr / Renner / Oleschinski (1995) are incorrect according to Pinnow himself (Pinnow 2009: 22–25). Dürr / Renner / Oleschinski (1995) contains a curriculum vitae authored by Pinnow himself which will therefore be reliable (Pinnow 1995).

As a reaction to Pinnow's death, having been a colleague and friend, I wrote a paper about him and his work: Holst (2017). It appeared in the periodical *Amerindian Research*, which, despite its English name, is a German periodical publishing in German. There had earlier, in 1992, been a mistaken obituary on Pinnow already in Mother Tongue Newsletter 17 (briefly mentioned at Holst 2017: 110). This time, unfortunately, the news is true.

Holst (2017) is a combination and mixture of an obituary, some personal recollections, a homage, and putting forward some new thoughts on research, for instance on Na-Dene and on the attempts to combine American language families, most of all Na-Dene and Eskimo-Aleut, with languages to the west of Bering Strait. One of my concerns in Holst (2017) was to point out that Pinnow was an underestimated scholar, that attention should be drawn to his legacy, and that we should carefully study what he left us. I give justifications in more detail there. The fact that Pinnow mostly wrote in German should not keep

anyone off from studying his works. It should, on the contrary, be an encouragement to improve one's reading abilities in this language, if not yet done. In my view, Holst (2017) exemplifies why after all we write obituaries: it is not only about remembering a dear person, but also to continue, in whatever way, from where this person regrettably had to stop.

The question may be asked how the paper presented here relates to the paper in German, i.e. Holst (2017). There is some overlap, but in fact only extremely little so: what follows here is an entirely different paper.

In the following, two topics intimately connected with Pinnow's research will be discussed, and new thoughts will be brought into the debate. Section 2 deals with Na-Dene. Section 3 deals with possible language relationships beyond Na-Dene.

2. NA-DENE

Na-Dene (henceforth ND), having been treated time and again, probably requires merely a very brief introduction here. In North America there is the large Athabaskan group of languages (Navajo etc.), and there are three single languages on the West Coast and nearby islands, from north to south Eyak, Tlingit, and Haida. Na-Dene is the genealogical unit that unites these languages.

The ND hypothesis was launched by Sapir (1915). It received support from Hymes (1955, 1956) with a method he called positional analysis, showing that the morphemes in the verb occur in a very similar order in the languages concerned, which speaks against chance and for their relationship (see also Pinnow 1976: 47–49). Heinz-Jürgen Pinnow became the leading figure in the second half of the 20th century to contribute evidence to Na-Dene; he wrote various monographs as well as articles on these languages. Greenberg (1987: 321–330) declared himself a supporter of ND. Enrico (2004) contributed new evidence. A couple of other scholars worked on ND as well. As to me personally (J. H. Holst), I underlined the existence of ND on several occasions in my own works; I have not, however, contributed any new evidence anywhere so far.

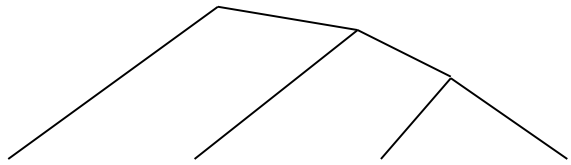
There have also been, and there still are, doubters as to ND. That Eyak is related to Athabaskan is generally accepted since the work of Michael E. Krauss. Doubts exist, however, concerning Tlingit (though they have decreased), and fierce opposition still exists in some quarters to the inclusion of Haida. From my own study of the languages and the literature on them, however, my impression, and my conviction, is that the ND family is real (including both Tlingit and Haida). The insight into this fact is in my opinion open to any trained historical linguist by studying the question – especially, among other sources, by studying Pinnow's works. For more details justifying this view see Holst (2017: 111–113). The fact that Campbell (1997), for instance, rejects ND, is in my opinion a pity, since many readers unfamiliar with the ND question will turn to works such as Campbell (1997) – and in many *other* issues they will find authoritative information there, since Campbell is otherwise extraordinarily well-informed about the indigenous languages of the Americas. The non-acceptance of ND by some leading experts on Native American languages – another

example is Mithun (1999) – is also remarkable when compared with the fate of Algic (Wiyot + Yurok + Algonquian): in this case Sapir's starting-point (Sapir 1913) has stood the test of time and the relationship is nowadays accepted by all scholars. The same sort of development should have happened, in my view, to Na-Dene.

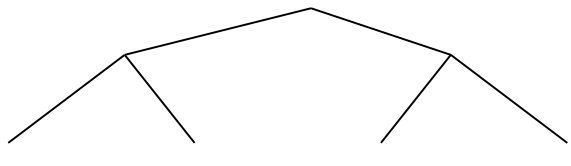
The situation just outlined with the ND controversy is probably too well-known to be laid out in more detail here. It is an interesting question whether this situation will ever change, and if so, when and into which direction. This is the point where I would like to add some reflections.

They evolve from an idea expressed in a somewhat hidden place in a book on Eskimo-Aleut: Holst (2005: 230). What I wrote there was that possibly Haida is not opposed to the rest of the ND family but may rather form a branch together with Tlingit. Thus, I drew the attention to *subgrouping*, and I challenged the established subgrouping of ND. The very short passage adds that checking this issue may give new impetus to ND studies.

It is rewarding to elaborate on this point. The "traditional", if one may say so, family tree of ND is (tree A):



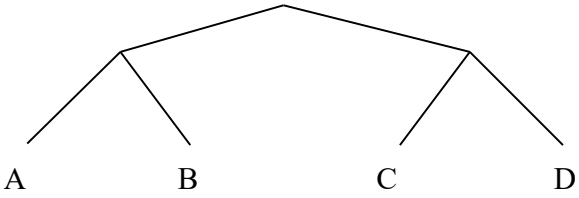
Based on the idea that actually Haida and Tlingit may form a branch together, the tree Holst (2005: 230) brings into play is (tree B):



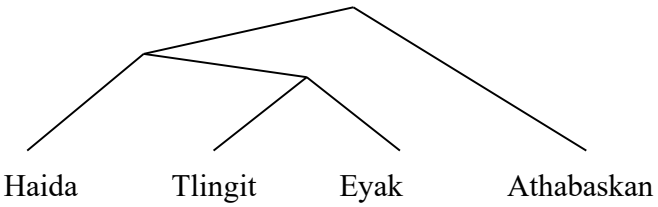
Haida is usually described as being the most deviating language within ND. However, this fact does not automatically mean that Haida has to be the language that split off first (as tree A would suggest). The special character of Haida may also have come about due to extensive change. Irrespective of whether language contact – a frequent cause in such cases – is at work or some other factor: a language can step out of line from a family, change more rapidly and more profoundly than others and thereby loosen its ties with its relatives. In such situations it may become difficult to determine the position of the language within its family correctly.

Once some sensitivity for this issue has developed, the insight occurs that it is also possible to readdress Eyak. As mentioned, Krauss demonstrated that Eyak and Athabaskan

are related. This does not automatically entail, however, that Eyak must be the *closest* relative of Athabaskan – something that scholarship so far has tacitly taken for granted. Consider relationships of four languages (of whatever family) with a tree which looks like this:



If now a scholar provides proof (or evidence) that B is related to D, this may be an excellent advance in historical linguistics, but interestingly it does not guarantee that he has hit a correct subgroup. In this hypothetical case correct subgroups would only be A and B, or C and D. Applying this to ND, it means that Eyak's position could theoretically be elsewhere. Eyak could be part of the other branch (i.e. the one of Tlingit and Haida), or it could be somewhere in the tree outside both branches. The following diagram shows one of the possible positions, next to Tlingit (tree C):



There would be several other possible positions for Eyak which will not be illustrated with trees here.

Future research could continue investigating these questions with concrete data. Some hints must suffice here. There are nowadays Swadesh lists for some ND languages on the internet. A cursory examination of them shows that the traditional tree A is not necessarily confirmed. The data may also speak for tree B, tree C, or another solution. Of course it is not only the vocabulary which is relevant in such issues (and Swadesh lists are moreover only short excerpts of the vocabularies). Considering the prefixes for person presented in a table by Pinnow (2006: 52), it becomes clear that sometimes Tlingit and Eyak exhibit related morphemes which the other languages do not share. This may be meaningful. It should be stressed that these are preliminary observations which may not be decisive. It is only that it is necessary to report them, for further research to explore the matter further, which otherwise could not be taken up.

Thus, the truth seems to be that we do not know the family tree of ND at all. It is time to realize this crucial fact. A problem in research so far was that a certain tree, called tree A here, has always been taken for granted – by supporters and by some skeptics alike. The

issue should be investigated and the data should be approached in a neutral way. It is possible, and even probable, that new insights arise. This gives new fuel to all debates on ND. Even if it should turn out that the idea to question the established subgrouping ought to be abandoned, there will still be a gain.

It would be possible to use mathematics to study word lists, e.g. Swadesh lists, in order to see what this yields. However, one must not expect too much from such an investigation. Cognates on the Swadesh lists of the ND languages, if taken as raw material without any deeper understanding of these languages, are only very few. There are nowadays many scholars who may be mathematicians but who unfortunately lack any expertise of the languages whose data they absorb. I hasten to add that the fact that cognates on Swadesh lists are few in the case of ND does by no means signify that these languages are unrelated. Languages can very well be related without this being visible with rather primitive surveys of limited and unanalyzed or underanalyzed data. Moreover, mathematical assessments of word lists, of whichever family, do not reveal a large array of facts. They do not reveal, for example, where shared sound laws exist, as well as all issues with grammar (which are highly important, of course, in relationship issues).

I expressed the idea that the family tree of ND may be incorrect to Pinnow in a telephone conversation some years ago. To report the events in the conversation truthfully: he tended not to believe in the worthiness of the idea and defended tree A. However, this does not deter me from mentioning the issue here. The impression I get from various ND data has made me return to the idea repeatedly. Even if the basic idea – to question the family tree – should turn out to be incorrect, it may very well be that interesting insights develop along the way. This is not to say, however, that the idea is likely to be incorrect.

These issues lead, finally, to some general thoughts about subgrouping. Interestingly, there are problems, and often serious ones, with the subgrouping of astonishingly many language families. This affects every continent. Turkic, for instance, is a language family for which subgrouping is largely unclear, and there are further examples wherever one looks. Uralic has only few problems, but some remain (e.g. the position of Mari, also known as Cheremis). Even for Indo-European we do *not* know the subgrouping; in recent decades some progress has been made, but many claims with insufficient backing have seen the light as well. For each family mentioned, more research is needed. The question can even be asked the other way round: for which families or branches *do* we know the subgrouping with certainty? An example is Kartvelian, but this group is rather small with its four languages, and it is thus not so surprising that the correct subgrouping has been known since Deeters (1930: 2). On the uncertain subgrouping for most of the world's language families see also Holst (2005: 143).

All of this makes the insight arise that frequently subgrouping is crucial in historical linguistics today. A question is often how to get ahead in historical linguistics. There are moments in which the impression prevails that no real progress can be made any longer.

Then the possibility to (re)investigate subgrouping can frequently be a helpful idea, but it is often not made use of.

There are several reasons why correct subgrouping is so important. When language families diverge, sound laws, grammatical changes and other innovations often affect intermediate proto-languages, and it is therefore essential to know which these are. The possibility to identify innovations and retentions is dependent on whether one grasps the structure of the family well.

In the case of Na-Dene, the ideas put forward here could lead either to the old tree, but with more confirmation then, or to a new tree. In the latter case, the possibility then opens up to reconstruct the proto-languages of subgroups – or, to be more exact, it is more likely that certain features of them will be reconstructed, i.e. not the entire linguistic systems. This is the new impetus for ND.

3. BEYOND

Pinnow was not only concerned with establishing Na-Dene. He was also interested in the question what ND in turn may be related to; he sought to "look beyond Na-Dene". This was part of his general interest in distant language relationships. On the one hand Pinnow was very well aware of the fact that attempting to go beyond the established language families often leads into the realm of speculation, on the other hand he was such a knowledgeable scholar that in some cases he was able to adduce tantalizing evidence that is worth being studied by us.

Bengtson (1999: 173) describes this research interest of Pinnow's as follows: "Pinnow is a Long Ranger. That is, he allows himself to think and hypothesize about distant relationships between the traditionally accepted language families. He thinks there is evidence for remote relationships between Na-Dene and certain other language families."

It is natural to look to Asia when looking for relatives of ND – also because the urheimat of ND was in Alaska, thus so to speak at the entry of the continent. In one of our telephone conversations Pinnow said to me several years ago that there are two language families in Asia he would like to see combined with Na-Dene: they were on the one hand *Yenisseian*, on the other hand *Sino-Tibetan*. I instantly agreed since I had arrived independently (but in part by reading his works and those of other authors) that these were the two reasonable families. We both agreed on the phone too that other hypotheses were not as promising: one should add these two families in Asia but at present go no further than that. Note that there is a difference here to Dene-Sino-Caucasian, or shorter, Dene-Caucasian, a more inclusive grouping advocated by other researchers. I particularly would like to deny an inclusion of Burushaski, on the basis of lack of sound evidence. My (rather extensive) work on Burushaski has led me to this position, see e.g. Holst (2014: 16). Moreover, see Tiffou (1995) in the same vein.

As to *Yenisseian*, Vajda (2010) has done work to combine it with Na-Dene which raised attention. There is no unanimous agreement on whether Vajda has managed what he

intended. Something that strikes any expert on ND with Vajda's work is that he understands only Eyak-Athabaskan plus Tlingit by the term "Na-Dene"; he does not incorporate Haida. This is somewhat weird and not really pleasant for those who studied the evidence published so far, nor for those who have even worked themselves on ND. As far as I can see, there are two possible reasons for Vajda's decision. Firstly, Vajda was certainly aware of the fact that influential scholars do not count Haida as Na-Dene and continue to express doubts on its inclusion. Incorporating Haida would have meant for him to get involved into this discussion, which is something he possibly wanted to avoid, since scholars who propose language relationships are often in a situation where they have to defend themselves and thus are not eager to be saddled with additional problems. However, if this applies, it should be remarked that one should stick to one's convictions. Secondly, and alternatively, it may have been that Vajda did not fully realize that Haida does in fact constitute part of Na-Dene. This, however, would not speak for the work of a scholar who claims to be able to point out evidence for a much more distant relationship, that between Na-Dene and Yenisseian. Either way, including Haida may very well be relevant for Vajda's case. There is also work attempting to link Na-Dene and Yenisseian, less widely known than Vajda's, by Ket specialist Heinrich Werner (Werner 2004).

As to *Sino-Tibetan*, Pinnow contributed very interesting evidence himself. The hypothesis goes back to Sapir, as is well known. Later, Robert Shafer and others added to the evidence. Pinnow (1976: 94–105) has extraordinarily interesting data and observations on this matter.

A detail on the term *Sino-Dene*, which is sometimes used for this combination, should be intercalated here. I called it (Holst 2017: 113) an infrequent term and a spontaneous creation by Bengtson (1999). The term is indeed not so frequent. However, as kindly pointed out to me by John Bengtson (p. c.), the claim that the term is his spontaneous creation does not hold: the term is actually older, and it was already used, for instance, by Golla (1991: 139) in an editorial note to Sapir's work. See also Bengtson (1994).

In my personal notes, a possible unit of Na-Dene, Yenisseian and Sino-Tibetan bears the name *Lakitisch*, thus in English *Lakitic*. I coined the term from a shared word for "hand" which is *lak* or similar in these families:

Na-Dene	Haida *s-tla*, *s-tláay* (*s-* is a prefix, lacking in the plural) Mattole *la?*
Yenisseian	Ket *l'aŋat*, pl. *l'aŋen'* (*'* palatalization, velar nasal *ŋ* possibly < velar stop)
Sino-Tibetan	Burmese *lak* Tibetan *lag-pa*

All these words mean "hand". Compare also interrelated words for "five", which exist in Na-Dene and Sino-Tibetan, such as Tibetan *lŋa*. Of course this is only a single etymon which is not probative for the genealogical unit, nor is there a need that it delimits the unit

correctly. No families outside Lakitic with a similar word for "hand" are known to me. In Burushaski, for instance, "hand" is Yasin *-rén*, Hunza *-ríiŋ*. The Hunza form has repeatedly, but erroneously, been compared to Yenisseian (apparently going back to Toporov 1971: 114f.), ignoring the Yasin dialect. However, Hunza *-ríiŋ* is actually historically a plural form, to be segmented *-rí-iŋ*, in which *-iŋ* is a plural suffix; the Hunza singular *-ríiŋ* corresponds to the Yasin plural *-réiŋ*. In Hunza the singular must have been **-rín*. The reconstruction for Proto-Burushaski must refer to this **-rín* and to the *-rén* of Yasin, and will then be **-rín*, since *i* is the older vowel with the correspondence Yasin *e* / Hunza *i* (Holst 2014: 70–81). For details on this analysis of "hand", which is unavoidable, see Berger (2008: 97), Holst (2014: 100).

Na-Dene, Yenisseian and Sino-Tibetan all have vowel alternations in roots, often called ablaut. This is a typological trait. Further research will have to show whether the patterns exhibit similarities and whether there are differences to ablaut in, for instance, Indo-European and Kartvelian.

There is one major problem when wanting to evaluate Sino-Tibetan for a relationship hypothesis: it's huge. I would like to dwell on this point for a while and study some of its implications. (Some points are essentially similar for all large language families.)

Sino-Tibetan comprises more than 300, or possibly more than 400, languages. This means that it is an enormous task to reconstruct the proto-language. A reconstruction should, if possible, be consistent with all daughter languages. It is true that some languages are in a special situation. Tibetan has an old attestation, is highly important and conservative in many respects – but despite all this one must not rely too much on Tibetan. If one took a form from Tibetan and acted as if it was Proto-Sino-Tibetan, this would be what R. L. Trask has called "reaching down". Another language with some older documentation is Burmese. Chinese has the oldest attestation but the script does not do researchers a favour. There are competing reconstructions of the phonology of earliest Chinese, and anyone interested is forced to take a stand or to develop still another view. Knowledge of Japanese and Korean, due to their massive loan word layers from Chinese which provide various insights, is an advantage. It is also possible to do fieldwork on various Sino-Tibetan languages (though there are some places where governments do not allow you to travel).

Subgrouping of Sino-Tibetan would profit from further research. It will then be possible to reconstruct the proto-languages of subgroups, and later compare such reconstructions with each other. One may wonder whether there are any shortcuts towards a more or less reliable Proto-Sino-Tibetan. However, these may not exist.

Thus, unfortunately, Sino-Tibetan provides more work than what is possible in a lifetime, and a scholar may get stuck within this family and die before he is able to, or ventures to, "look beyond it". Consolation may come from the fact that there are often typologically interesting structures in this family, e.g. cross-referencing systems of person and number, to name but one field of inquiry. Scholars engaged with distant language relationships often

feel that it is more thrilling to do their type of work than to enhance understanding of existing families. In such a situation, a hint to typological beauty makes sense.

There is more to add here. Work within established families is usually more reliable, and a person can draw much satisfaction from the fact that his (or her) results are rather reliable, instead of being shaky. An advantage of reliable results is also that it is less likely that colleagues will have different opinions on them. Recognition and praise are easier to obtain here.

This all is of course not to say that one should refrain from any work across the established language families. Especially when good progress can be made, such work should be done.

All potential discussions will often be connected to discussions of *methods*. There is nothing wrong with this, but this is a necessity, since with flawed ideas about methods one is likely to arrive at incorrect results. A question that is never raised, however, is: Where do methods come from? Were they already there before the Big Bang? This is a highly interesting question. Some scholars act as if methods were fixed and would then just have to be followed, and results will then be arrived at (or the result is that no results can be gained on a particular question). This is not quite the way things are. Rather, it can sometimes be an impediment to view methods as being chiseled in stone. Methods can be subjected themselves to study, to doubts and to scholarly discussion. There are no limits for intellectual freedom. I do defend much of the paradigm of historical-comparative linguistics as it has developed over time, I do subscribe to most of what textbooks such as Campbell (1998) proclaim, and I encourage everyone to take the established methods, with their long history, quite seriously. Sometimes, however, it is a tiny being ahead in open-mindedness that enables one to see, or to hypothesize, a point which others may be unable to reach.

It is such open-mindedness that can often be observed when reading Pinnow – which brings us back to the scholar we started out with and who should be remembered.

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COMMENTS ON 'NA-DENE AND BEYOND'; SINO-DENE (UPDATED); THE POSITION OF HAIDA

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I. NA-DENE AND BEYOND

It is an opportune event that Jan Henrik Holst has chosen to contribute his article, "Heinz-Jürgen Pinnow, Na-Dene and beyond," to this issue of *Mother Tongue*, and to allow discussants to submit their comments. I agree wholeheartedly with the main thrust of Holst's essay, that "Pinnow was an underestimated scholar, that attention should be drawn to his legacy, and that we should carefully study what he left us." Longtime readers of *Mother Tongue* may recall that I have expressed similar opinions in the past (*e.g.*, Bengtson 1999).[1] I would especially emphasize that it is a real pity that most of the North American specialists in Na-Dene have chosen to disregard Pinnow's vast output in the field of Na-Dene studies, and act as if his copious evidence that Haida belongs to the family did not exist.

As noted correctly by Holst, the fact that Pinnow mostly wrote in German is not a good excuse to ignore his work, especially by linguists, who, one expects, should have some German since so many important linguistic works are in that tongue. Even a very rudimentary command of German is enough to follow, for example, Pinnow's lexical comparisons, in which Na-Dene words are generally glossed in English.

Regarding the Na-Dene family itself, I also concur with Holst's belief that "the ND family is real (including both Tlingit and Haida)." He cites the agreement of Joseph Greenberg and John Enrico, probably the foremost current expert on Haida. Another who should be mentioned is Alexis Manaster Ramer (*e.g.*, 1996).[2] (See **Appendix: The Taxonomic Position of Haida Revisited**.)

In the third part of Holst's commentary he discusses Pinnow's, and his own, interest in "looking beyond Na-Dene" to discover what other families it is related to. I also share this interest, and would first emphasize that, since all human language families are probably ultimately related at some point, the question might better be phrased as "to what other language families is Na-Dene *most closely* related?"

[1] Pinnow himself reprinted my 1999 commentary in one of his books (2006a).
[2] "I believe that Sapir's brief for the relatedness of Haida with Athabaskan (which we now know goes with Eyak) and Tlingit should be treated seriously. The arguments against it seem to be methodologically unacceptable and intellectually unfair, to say the least" (Manaster Ramer 1996: 208).

In one of our telephone conversations Pinnow said to me several years ago that there are two language families in Asia he would like to see combined with Na-Dene: they were on the one hand *Yenisseian*, on the other hand *Sino-Tibetan*. I instantly agreed since I had arrived independently (but in part by reading his works and those of other authors) that these were the two reasonable families. We both agreed on the phone too that other hypotheses were not as promising: one should add these two families in Asia but at present go no further than that.

I suggest that a better approach, scientifically, might be to multilaterally compare *all* (or as many as possible) language families of Eurasia to determine which of them are most likely, based on diagnostic criteria, to belong in a superfamily with Na-Dene.[3] To simply look at one family at a time, not considering any other family's possible interrelationships with others, is not a very good way to "build" a superfamily, if you will. In the words of G. Starostin (2012: 118) "it is substantially incorrect to explore the possible genetic connection between Yeniseian and Na-Dene without an equally thorough look at other potential members of the same deep-level language family." (As to what "diagnostic criteria" may consist of, see section **IV** below about Eastern *vs*. Western Dene-Caucasian.)

Holst very briefly mentions *ablaut*, which is attested in Na-Dene, Yeniseian and Sino-Tibetan. He correctly adds that "this is a typological trait," and as such not, *by itself*, an indicator of genetic relationship, since many language families also have ablaut. Indeed, S.A. Starostin (2005a: 19) states that:

[A]ll subgroups of Sino-Caucasian possess more or less productive systems of Ablaut (vocalic alternations), both in nominal and verbal stems. This adds additional problems that can be resolved only after extremely thorough morphonological analysis of all individual subgroups and languages.

In my book (2017) and recent papers I have tried to show that Proto-Euskaro-Caucasian (the westernmost branch of Dene-Caucasian: see below) had an ablaut system that, from the Caucasian side,

can still be reconstructed in [Proto-Nakh and Proto-Lezgian] and (in a relic shape) in [Proto-Tsezian]. Apparently there is a connection between the ablaut in these languages and the [Proto-West-Caucasian] ablaut *ə/a (NCED 81).

In Basque this ablaut system lost productivity long ago, but traces can still be found. For example, in the Basque adjective ***o**śo* 'whole, complete' and the verb ***a**śe* 'to be filled, satiated' we see vestiges of an ablaut alternation cognate with that seen in PNC **=**ɦ̆ŏ**ç̣V* / **=**ɦ̆ă**ç̣V* 'full, to fill' (NCED 525), as in Chechen *=**ü**z*-na 'full' / *=**e**za* 'heavy', corresponding to Bsq **o**ś**o* / **a**ś**e* (BCR 106–110). As another example, the Basque word for 'tears, weeping' has the root vowel /e/, generally, in southwestern dialects (*n**e**gar*), but /i/ in northeastern dialects (*n**i**gar*), a distribution that has not been explained by Vasconists. It is interesting that East Caucasian has the ablaut variation *e/i* in the putative cognate ***nĕ**wq̓ŭ*

[3] "The first step has to be to look very broadly, on at least a continent-wide scale, to see what the obvious groupings are. How can one start to apply the comparative method until one knows what to compare?" (Greenberg 1990: 8).

[direct] / **nɨ̌wq̇V̌-* [oblique] 'tear; pus' (NCED 848), so it appears that what originated as ablaut allomorphs were redistributed as regional variants in Basque, the direct allomorph in the West, oblique in the East (BCR 107). To cite ablaut as a genetic feature there must be a combination of sound + meaning.

While Holst and I agree with Sapir, Pinnow, and others about Sino-Dene, my most salient divergence from Holst concerns his suggested subgrouping of Na-Dene, Yeniseian, and Sino-Tibetan in a group called "Lakitic," which, in my opinion is incorrect in at least two ways, (a) the exclusion of Burushaski (which Holst prefers to group with Kartvelian), and (b) the term "Lakitic" is based on an etymology that is only partially valid. Concerning (a), I concur with the EHL consensus classification,[4] in which Kartvelian belongs to a different ("Nostratic") superfamily while the closest relative of Burushaski is Yeniseian (see the table in Kassian 2010: 424, and below in sections **II** and **III** about the proposed taxonomy of Dene-Caucasian). As to the term "Lakitic," while I agree that (ST) Burmese *lak* 'hand' and Tibetan *lag*-pa 'hand, arm' (Kinnauri *lag*, etc.) are probably related to (ND) Mattole *laʔ*, Haida s-*tɬa*, etc., Yeniseian **ŕaʔŋ* 'hand' and Burushic **=reŋ* 'hand' (or, as Holst prefers, **=rin*) look like reflexes of a completely distinct etymon.[5] I propose that investigators carefully and objectively consider the evidence for both models (Burusho-Kartvelian *vs.* Burusho-Yeniseian) and determine which of them is the better explanation of the facts. (See below about the 'best explanation' approach.)

Holst makes a good point about the immensity of the Sino-Tibetan (or Tibeto-Burman) family,[6] which implies that "it is an enormous task to reconstruct the proto-language. A reconstruction should, if possible, be consistent with all daughter languages." Ideally, of course. But historically the initial reconstructions of proto-languages have been based on a selective few languages. The earliest Indo-European reconstructions were based mainly on Sanskrit, Greek, and Latin, and were heavily weighted toward Sanskrit. Dempwolff's pioneering reconstruction of Proto-Austronesian was based mainly, at first, on three languages, Tagalog, Toba Batak, and Javanese, with eight others gradually added (Blust 2009). In like manner Benedict's (1972) Tibeto-Burman reconstruction was based on five

[4] EHL = Evolution of Human Language Project (http://ehl.santafe.edu/intro1.htm), begun by the late Murray Gell-Mann and the Santa Fe Institute in 2001. It was soon merged with the Russian project Tower of Babel (TOB, a web-based project on historical and comparative linguistics developed by S. A. Starostin & Yu. Bronnikov http://starling.rinet.ru/main.html). The etymological databases (some of which are controversial) are frequently cited in this paper.

[5] /=/ in my notation is used in words (bound morphemes) that require either a possessive prefix or class prefix. Whether the Burushic protoform is **=reŋ* (S.A. Starostin) or **=rin* (Holst) is worthy of discussion. Even if the comparison should be Yeniseian **ŕaʔŋ* 'hand' = Burushic **=rin* 'hand', the correspondence **-ŋ* = **-n* can be verified by several other etymologies, notably Yeniseian **gāŋ* '(hunting) path' = Burushic **gan* 'road' ('straße, Weg'); or Y **seŋ* 'liver' = B **=sán* 'spleen'. G. Starostin's updated reconstruction as PY **ŕaʔŋ* 'hand' is slightly different from his father's **ŕɔŋ* 'hand'; the initial phoneme **ŕ-*, phonetically probably a 'soft' or palatalized /r/, is based on the correspondences of Ket *l-, ĺ-* = Kott *ḱ-* = Arin *t-/d-* = Pumpokol *l-*, while PY initial **l-* did not exist, and PY **r* is based on the correspondences of Ket *l, ĺ* = Kott, Arin, Pumpokol *r* (Starostin 1982).

[6] I am sympathetic to van Driem's (2005) preference for the term "Tibeto-Burman," since he finds no good evidence that Chinese is taxonomically opposed to all other ST/TB languages.

languages, Written Tibetan, Written Burmese, Jingpho (Kachin), Lushai (Mizo) and Garo, with Chinese evidence (Karlgren's 'Archaic Chinese') brought in secondarily. The Sino-Tibetan reconstruction by Peiros & Starostin (1996) is based on the same set of languages, but using the Old Chinese reconstruction by S.A. Starostin. In both cases (Benedict and Peiros–Starostin) numerous other ST languages were also consulted. All of these authors are/were well aware of the need to eventually include "all daughter languages," but one has to start somewhere, on a reasonably achievable scale. The problem mentioned by Holst is also discussed by Bengtson & G. Starostin (2015: 30):

> We have certainly come a long way towards understanding the basic structure of this [Sino-Tibetan] proto-language in the interim between P. Benedict's pioneering studies and Peiros & Starostin's comparative dictionary (1996), but an enormous number of languages and even whole branches have so far remained unused in the reconstruction.

Holst laments that "[t]hus, unfortunately, Sino-Tibetan provides more work than what is possible in a lifetime, and a scholar may get stuck within this family and die before he is able to, or ventures to, 'look beyond it'." On the other hand, I prefer the wisdom expressed by Dell Hymes (1971: 265):

> [S]ome linguists have wanted to work as if each level of relationship had to be fully reconstructed before a deeper level of relationship could be broached. … I believe this approach to be demonstrable wrong. Certainly it was not the way of working of Sapir and Swadesh who moved back and forth between the immediate and remote levels of prehistory, finding the two mutually illuminating.

It has recently been fashionable to ignore or overlook the accomplishments of Edward Sapir, and to try to dismiss the deeper linguistic relationships he proposed. But recall that the Algic hypothesis he proposed in 1913 was denounced by the foremost Algonquianist of the time, then bolstered by Mary Haas, with new data, more than four decades later, endorsed yet again (1975) by the prominent Algonquianist Ives Goddard, and today Algic is universally accepted as the standard model.[7] In a similar manner Holst and I agree that Sapir was right about Na-Dene, including Haida. One should think twice, or thrice, before setting out to dispute Sapir. This is not to say that we should not always maintain a critical or skeptical attitude in our studies, from "big" hypotheses all the way down to single etymologies (which are themselves small hypotheses).

And I agree fundamentally with Holst that "sometimes, however, it is a tiny being ahead in open-mindedness that enables one to see, or to hypothesize, a point which others may be unable to reach." Indeed, this is the only way science can advance to improved paradigms.

[7] The history of this taxonomic dispute was recounted in detail by Ruhlen (1994: 111–126).

II. CURRENT TAXONOMY OF DENE-CAUCASIAN

Such an improved paradigm, or better explanation, in my opinion, is the Dene-Caucasian hypothesis, which is not, as some have alleged, a "catchall" superfamily, but is based entirely on lexical and grammatical evidence, as shown in detail below. As one who has studied distant language relationships intensively over the past four decades, I do not find the concept of "burden of proof" to be the most useful, or even the most valid, approach to the problems of language classification. (How much "proof" is enough? What kinds of evidence constitute this "proof"?) As submitted in several of my earlier essays (*e.g.*, Bengtson 2008), the concept of "best explanation" is much more in harmony with the scientific tradition. I find it refreshing to turn to the linguists who work on African languages, where the working concept of best explanation is, it seems, widely understood and accepted; *e.g.*, by Paul Newman, the Chadic specialist: "The job of the comparative linguist is to provide the **best explanation** possible consistent with the facts. In proposing a classification, it is *not* necessary that the linguist 'prove' that the classification is absolutely certain by the presentation of conclusive evidence" (Newman 2000: 26; **bold** type added).

From Omotic specialist Richard J. Hayward: "Any claim that a given set of languages has a genetic affinity is a hypothesis. Linguists who subscribe to the *A A* [Afroasiatic] *Hypothesis* do so because they believe that it offers the **best explanation** for the linguistic facts as we know them" (Hayward 2000: 83; **bold** type added). The Moscow Nostraticist George Starostin makes the same argument in a different way:

> One point that seems to constantly escape the detractors of Greenberg and his methodology is that there is only one possible way to make 'Amerind', 'Indo-Pacific', 'Nilo-Saharan' and other macrohypotheses founded on 'multilateral comparison' make a steady retreat from the sphere of both scientific and popular discourse, never to return again: that is, to present **better alternatives** to Greenberg's classification (G. Starostin 2009: 171; **bold** type added).

My own training over some five decades or more has drawn on two major strains of historical linguistic thought, (a) what Dell Hymes (1971) termed "the First Yale School" (Edward Sapir, *et al*.), and (b) "the Moscow School" (V.M. Illič-Svityč, *et al*.), both of which can trace their roots back to "the Prague Circle" of the 1920s and 1930s (Hymes 1971; Bengtson 2019). From each of these schools I have tried to glean the best methods and principles for the genetic classification of languages, which can be summarized as follows:

a. Only linguistic evidence, and only specific resemblances involving both sound and meaning, are relevant to genetic classification. Resemblances in typology alone are not relevant to genetic classification.
b. Multilateral comparison of languages is more effective for genetic classification than comparisons between pairs of languages.
c. Evidence should be drawn from both lexicon (basic vocabulary) and grammar (morphology), and the conclusions from both should lead to the same results.
d. Grammatical paradigms, or parts of paradigms, and especially suppletive paradigms, are especially convincing in genetic linguistics.

e. Semantic changes must be expected, but they should be plausible, and whenever possible typologically similar changes should be cited.
f. Comparative phonology is a subsidiary but important component of etymology that helps the linguist to test etymologies, to detect false cognates and distinguish loanwords from genuine cognates.
g. The goal of genetic linguistics is to provide the *best explanation* possible consistent with the facts, rather than to attain some arbitrary threshold of absolute "proof."

Apart from the principles outlined above, some practical procedural advances have recently been introduced, of which one, the "50-item ultra-stable" lexical list, originated by S.A. Starostin (2007b) and further developed by his son (G. Starostin 2010b), is emphasized here and will be used in assessing the lexical cognates discussed below in sections **II** through **IV**. The 50-item list has at least two major uses, (a) for lexicostatistics, as a more precise substitute for the original "Swadesh list" of the 1950s, or (b) as a guide to finding and assessing the best lexical cognates between languages or sets of languages. In other words, if one is seeking the oldest, and native (not borrowed), lexical cognates, it makes sense to look within the 50-item list.[8] Since I do not perform lexicostatistical calculations my use of the 50-item list is restricted to purpose (b).

Criticisms of purely superficial lexical comparisons are quite appropriate, but here there is always the danger of supposing that seemingly inconsistent sound correspondences can, in and of themselves, 'disprove' an etymology and subsequently the larger hypothesis itself. In reality, basic lexical etymologies are primary, and it is only from these that sound correspondences can be deduced. Even in long-established families like Indo-European there are well-known basic etymologies with inconsistent correspondences, so it is not a good practice to summarily dismiss a particular lexical comparison on this basis alone.[9] Nevertheless, I completely agree with the principle that phonetic correspondences are important and should be worked out to the best of our ability.

On the basis of the seven principles (a – g) outlined above, and from collaboration with researchers from both the First Yale School and the Moscow School, under the auspices of the Evolution of Human Language Project (EHL), we have arrived at a classification of Dene-(Sino-)Caucasian, which, as always, should be regarded as a provisional best explanation, subject to future modifications based on evidence. According to a tree (see **Figures 1 & 2**) by G. Starostin[10] (based on a 50-item stable word list) the split between Euskaro-Caucasian and Burusho-Yeniseian has been dated to about 10,000 years ago; the

[8] "None of the 50 items — not even personal pronouns — are 100% immune to borrowing, but, in general, this 'core' is much more resilient to being replaced by words of foreign origin than even the remaining half of the Swadesh wordlist" (G. Starostin 2010: 110).
[9] "[I]t would probably not be a stretch to say that at least half of all accepted Indo-European etymologies suffer from 'non-corresponding sound correspondences' in at least one branch, and that's putting it rather mildly" (G. Starostin 2009: 166).
[10] Russian Presidential Academy of National Economy and Public Administration, School for Advanced Studies in Humanities; Russian State University for the Humanities, Institute for Oriental and Classical Studies (Moscow).

split between Sino-Tibetan and Na-Dene ca. 11 kya., and Dene-Caucasian as a whole has a time-depth of 12.6 ky (using S.A. Starostin's model of glottochronology).[11]

A. 'Sino-Dene' or 'Eastern Dene-Sino-Caucasian'
  A.1. Sino-Tibetan
  A.2. Na-Dene
B. 'Western Dene-Sino-Caucasian'
  B.1. Burusho-Yeniseian = Yeniseian + Burushaski
  B.2. Euskaro-Caucasian = North Caucasian + Basque

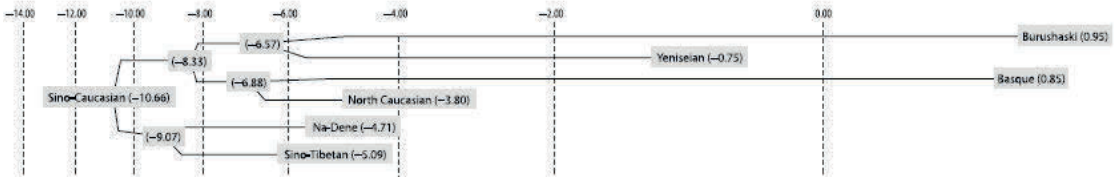

Figure 1: The EHL Model of Dene-(Sino-)Caucasian as a glottochronological tree (Kassian 2010: 424).

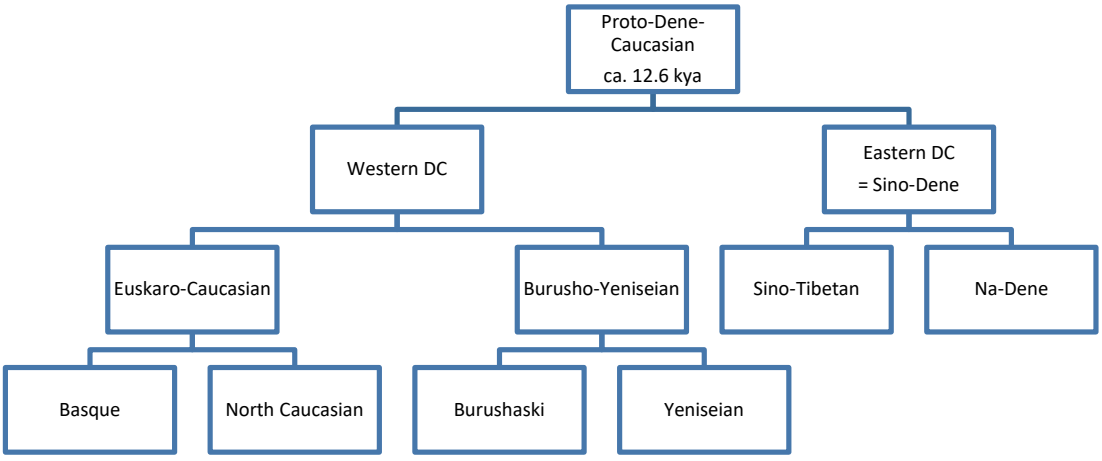

Figure 2: Taxonomy of Dene-Caucasian expressed as a vertical tree.

According to this model, note that (a) it agrees with Sapir's (1920) proposal a century ago, when he suggested the Sino-Dene connection (Bengtson 1994); (b) the so-called "Dene-Yeniseian" link (Ruhlen 1998; Vajda 2000, 2010, etc.), while partly correct in providing some additional evidence that Na-Dene and Yeniseian are "related," is taxonomically imprecise, since Na-Dene and Yeniseian each have closer relatives (Sino-Tibetan and Burushaski, respectively) before they are related to each other (Bengtson 2010; G. Starostin

[11] Slightly modified from Bengtson & G. Starostin (2015: 5).

2010a, 2012); (c) while "Karasuk" for B.1 is a convenient designation (alternatively, "Burusho-Yeniseian"), it is not a good match to the archaeological culture of the same name.[12]

> The first preliminary model of classification of this [Sino-Caucasian] macro-phylum based on recalibrated glottochronology was realised by George Starostin (2010, p.c.), who confirmed the so-called Karasuk hypothesis about a closer relationship between Yenisseian and Burushaski languages, formulated by George van Driem (2001: 1186–1201) and supported by John Bengtson (2010), although the chronological level of the Karasuk culture (1500-800 BC) does not correspond with the hypothetical Yenisseian-Burushaski unity. On the other hand, the time and area of the culture widespread from the Upper Yenissei to the Aral sea ... may be connected with ancestors of Yenisseian before their break up ... (Blažek 2017: 71–72).

While George Starostin's glottochronological results are based only on lexical material, I believe it is important (in accord with principles **c** and **d**, above) to adduce grammatical evidence as well. The following outline of diagnostic characteristics of Sino-Dene, Euskaro-Caucasian and Burusho-Yeniseian will include both lines of evidence, lexical and grammatical.

'Family tree' or 'network': There has been a long-standing discussion within historical linguistics whether genetic connections should be expressed as 'trees', with sharply defined and discrete 'families', or as a 'network' or 'web', with neighboring dialects gradually merging into each other. There must be some truth in both models. However, if speakers of a given family or subfamily migrate to a distant location, as, for example, the Apacheans did to southwestern North America, far away from their former Dené neighbors, this will create sharp linguistic borders that disrupt what might have been a network. (In this case previous movements among 'Amerind' subfamilies had already disrupted whatever network might once have existed in the Southwest.)

In assessing external relations of Na-Dene Pinnow seemed to favor the 'network' model: "Whether one or both Caucasian groups and/or the Yenisei languages belong here in a chain or network [with Na-Dene and Sino-Tibetan] has to be examined in more detail" (Pinnow 2006a: 101). Pinnow thought that some of Greenberg's separations were too "sharp" and that "the exclusion of Na-Déné from his Amerind is somewhat forced and constrained" (Pinnow 2006a: 106). Instead Pinnow sketched out a vast network in which Na-Dene had likely connections with Sino-Tibetan and some 'Amerind' families and more tentative links (shown as broken lines) with Yeniseian and North Caucasian, each having secondary links with numerous other families (ibid., p. 104).

[12] Note that Alexei Kassian has suggested adding some extinct languages to the Karasuk family: "I tentatively include Hurro-Urartian and Hattic languages into the Yenisseian–Burushaski stock, although the formal lexicostatistic evidence remains insufficient so far ..." (Kassian 2010: 430). Kassian adduces some appealing lexical parallels, such as Hatti *alef* (~ *alep, alip, aliw*) 'tongue' = Yeniseian: Kott *alup*, Arin *álap, elep* 'tongue'. But on account of the very limited evidence available for these vanished tongues they will be ignored in the following discussion.

III. THE SINO-DENE HYPOTHESIS: A BRIEF SUMMARY.[13]

Sapir's Sino-Dene hypothesis, first broached by the eminent anthropologist in the 1920s, but subsequently rejected or ignored by most linguists, has recently (since the 1980s) been revived and supported by some Russian, Czech and American linguists. For the latter Sino-Dene is understood to be part of a more ancient (macro-)family, Sino-Caucasian or Dene-Caucasian. Jürgen Pinnow (especially 1985, 2006a, 2006b) also found the Sino-Dene connection plausible and offered some additional evidence for it.

A quarter-century ago (1994) I published a report about Sino-Dene in which I disputed Alan Kaye's claim that "Sapir was somehow led astray into this Indo-Chinese-Nadene hypothesis" and later "lost faith in it." I asserted that there is no evidence of a "loss of faith," and that evidence discovered since Sapir's time, much of it by Pinnow, has strengthened the case for this genetic link. The following is a brief résumé of some of the evidence.

III.a. Sino-Dene morphological correspondences

In 1921 Sapir declared that "[Classical] Tibetan ... is startlingly Nadene-like," meaning that Tibetan, which Sapir took to be representative of the "earlier stage [of Sino-Tibetan]," had a series of verbal prefixes similar in sound and meaning to the verbal prefixes in Na-Dene languages, formerly known commonly as "classifiers," and more recently as *extensors*. Sapir compared these elements as follows. (Some information in the two right columns has been updated):

Table 1: Sapir's Comparison of Sino-Dene verbal prefixes.

Tibetan prefix	Tlingit prefix (as cited by Sapir)	Athabaskan prefix (as cited by Sapir)	Current Na-Dene (PAET) reconstruction (Leer 2008)	Na-Dene function
s	**s**	**-**	***s-**	valence increase
r	**ɬ**	**ɬ**	*** ɬə-**	valence increase
d	**d**	**d**	***də-**	valence decrease
m	**m**	**n / ŋ**	***ñə-**	perfective/stative

Can the functional values of the Sino-Tibetan prefixes be related to those of the Na-Dene correlates postulated by Sapir?[14]

PST *s- : PND *s-: PST **s-* was/is "directive, causative, or intensive," contrasting with the intransitive pefix **m-* (see below), for example Tibetan ***m**-nam-pa* 'have an odor' (intransitive) vs. ***s**-nam-pa* 'sniff something'; Jingpho *lòt* 'be loose, free; escape' vs. ***šə**-lòt* 'set free'. Cf. Na-Dene examples such as Tlingit *χán* 'to love' / *χat **si-**χán* 'he loves me'. According to Jeff Leer (2008), in Athabaskan-Eyak the *s*-classifier and the *ɬ*-classifier merged as **ɬ,* while in Tlingit they remain distinct.

[13] This brief sketch is based on more detailed studies by the author (Bengtson 1994, 1999, 2008, 2009, 2010).
[14] Terms like "directive" were adopted by Benedict and Matisoff from their predecessor in the 1920s and 1930s, Stuart Wolfenden (Matisoff 2003: 100 ff.).

PST **r- ~*ɬ- : PND *ɬ-: PST **r-* seems more ambiguous than **s-*, appearing in transitive verbs, but also in adjectival / stative verbs. In Jingpho **r-* is regularly realized as *lə-*: ***lə-****gú* 'steal', ***lə-****gá* 'old'. In Na-Dene the prefix **ɬ-* is identified with valence increase: cf. Tlingit *ti·n* 'to see' vs. ***ɬi-****ti·n* 'to observe, watch', *ge·* 'big' vs. ***ɬi-****ge·* 'make big', etc. To Jingpho ***lə-****gá* 'old' compare the frequent appearance of Na-Dene **ɬ-* in "adjectival" verbs, e.g. Hupa ***ɬa-****xá·n* 'sweet', Navajo ***ɬi-****kan-* 'it is sweet', ***ɬi-****žin* 'it is black', etc.

PST **d-: PND **d-: PST **d-* originally had a "directive" [highly transitive] force with Tibetan verb roots. Elsewhere in ST there is some evidence of a transitive function, as in Nung, which has both *də-* and *śə-* as causative prefixes. In Na-Dene, however, **də-* (Sapir's "medio-passive") is instead identified with valence decrease: e.g. Tlingit *qa·-* 'to sew', *na·ʔát χa-qé·s'* 'I'm sewing clothes' vs. *χa-****da-****ké·s'* 'I'm sewing' (intr.).

PST **m- : PA *ñə-: PST **m-* generally signals *inner-directed states or actions*, including "middle voice" notions like stativity, intransitivity, durativity, reflexivity, as in Tibetan verbs like *mgu-ba* 'rejoice', *mŋa-ba* 'be, exist', *mnal-ba* 'sleep', etc. **m-* is sometimes found in paradigmatic opposition to the **s-* prefix, which marks *outer-directed action*, transitivity, causativity (see Tib. *mnam-pa* vs. *snam-pa***,** cited above). Sapir compared this ST **m-* prefix with Athabaskan **-n-/-ŋ-* "of mysterious value, but probably active intransitive," now reconstructed as PA **ñə-* [perfective, stative, adjectival]: cf. the PA perfective/statives such as **ñə-žu·-ñ* 'he is nice', **ñə-le·-ñ* 'he is', **ñə-då·z* 'he is heavy'. The phonetic correlation of PST **m-* with PA **ñə-* is also possible, since Proto-Na-Dene (PAET) probably had no initial **m-*; the development of **m-* > /ŋ/ is regular, for example, in the ST language Mikir: e.g. *iŋthin* 'liver' < **m-sin*, *iŋnim* 'smell' < **m-nam*.[15]

The functional correspondences between the Sino-Tibetan and Na-Dene prefixes are not always identical, but of course it would be extremely surprising if they were, after millennia of linguistic change. Sapir's suggestions remain thought-provoking, and possibly quite fruitful, but they are in need of more study. The basic similarity is a *series of valence-changing prefixes before the verb stem* in both families. As discussed in more detail in Bengtson (2008) this is apparently an archaic morphological feature found throughout the putative Dene-Caucasian languages.

Pinnow (1976, 2006a, 2006b) enumerated these and other morphological parallels between Sino-Tibetan (primarily Classical Tibetan) and Na-Dene (summarized in Bengtson 1999).

III.b. Sino-Dene lexical cognates

Sapir (1920, 1921) proposed a number of Sino-Dene lexical parallels, mostly unpublished. Robert Shafer (1952, 1957, 1969) independently posited some Sino-Dene etymologies.

[15] In lexical comparisons (cf. Table 3, 'eye') PST initial **m-* normally corresponds to Tlingit and PA **w-* in lexical roots, but it is not unusual for grammatical morphemes to have different correspondences from lexical roots, as for instance in Mikir, where PTB **m-* > *m-* in lexical roots, but **m-* > *iŋ* as a prefix.

The author has cited and discussed some of these in earlier papers (Bengtson 1994, 2009). Here we shall focus on the 50 most stable meanings (see section **III.b**). If languages are quite distantly related there is a better chance of finding lexical cognates by searching among the historically most stable word meanings.

01. we	11. hand	21. one	31. mouth	41. leaf
02. two	12. what	22. tooth	32. ear	42. kill
03. I	13. die	23. new	33. bird	43. foot
04. eye	14. heart	24. dry (clothes)	34. bone	44. horn
05. thou	15. drink	25. eat	35. sun	45. hear
06. who	16. dog	26. tail	36. smoke	46. meat (as food)
07. fire	17. louse (head)	27. hair (head)	37. tree	47. egg
08. tongue	18. moon	28. water	38. ashes	48. black
09. stone	19. fingernail	29. nose	39. rain	49. head
10. name	20. blood	30. not	40. star	50. night

Table 2: Sino-Dene lexical parallels with (±) exact semantic equivalence.[16]

stability rank	gloss	PTB (Benedict & Matisoff)	PST (Starostin & Peiros)	Old Chinese (Starostin 1989)	Tlingit	Eyak-Athabaskan[17]
1	we	***ŋa-y**	***ŋā-**	吾 ***ŋhā** [18]		***na-, *nu-**
3	I	Tib. **kho-** [19]		**-**	**χa / ʾaχ**	***šʸi / *ʾəšʸ**
4	eye	*s-**mik** ~ *s-**myak**	***myVk**	目 ***muk**	**waˀG** [20]	*-nə-**we·G-**
5	thou	***na**-ŋ	***nă-**	汝 ***nhaʔ** [21] 爾 ***nheyʔ**	**i· < *ŋi**	***ŋən**
6	who		***tŭ-**	誰 ***duy** 疇 ***dru**	ʾaˁ-**duˀ**	E **du·**-d
8	tongue		***lăt**	舌 ***lat**	**ɬʾutʾ**	E **laʔt' / ƛ'ət'** [22]
9	stone		***tiă(k)**	石 ***diak**	**te**	***ce·**
11	hand	*g-**l(y)ak**	***lə̆k**	(翼 ***lək**[23])		***laˀ**
12	what		***tŭ-**	-	**daˀ**(-sa)	***də**
13	die	***səy**	***sĭy(H)**	死 ***siyʔ**		E **sịh** PA ***-zə-**[24]

[16] In general, Tibeto-Burman/Sino-Tibetan reconstructions and material come from Matisoff (2003) and Peiros & Starostin (1996; now also in database format in TOB), in columns 3 and 4, respectively. Na-Dene material comes mainly from Leer (1993, 2008). Throughout the tables I have changed (Muscovite) /j/ (high front glide) to /y/, in accord with North American practices, and for uniformity with the mainly North American transcriptions in columns 3 (Tibeto-Burman), 6 (Tlingit), and 7 (Eyak-Athabaskan).

[17] (Pre-)Proto-Athabaskan unless designated as E (Eyak).

[18] 'I / we'.

[19] Proto-Sino-Tibetan first person pronouns are usually reconstructed as **ŋa-y* (Matisoff) or **ŋā-* (Peiros-Starostin: see 'we' in Table 3) but a significant number of languages has **k*-forms: besides Tibetan *kho*-bo cf. Lepcha *kă,* Miju *ki* 'I'; Kanauri *gö* 'I'; Lush. *ka* 'me, my', *kei* 'myself'; Dhimal *ka*, Mantshati *gye*, Chamba-Lahuli *ge* 'I', Karen **khV* 'I', etc.

[20] For PST **m-* = PA **w-*, cf. PST **mīł* 'sleep' ~ PA **wəł* 'sleep'; *PST **mă̆H(-k)* 'war, army' ~ PA **wå·ɢ-* 'raid, war'; PST **mĕ̆yH* 'wash' ~ PA **we·* 'swim', etc. (Bengtson 1994).

[21] 'you' (pl.).

[22] See the analysis in section **IV**.

[23] 'wing'.

[24] 'to kill' (Leer 2008).

stability rank	gloss	PTB (Benedict & Matisoff)	PST (Starostin & Peiros)	Old Chinese (Starostin 1989)	Tlingit	Eyak-Athabas-kan[17]
16	dog	***d-k^{w}əy-n**	***qh^{w}īy / *qh^{w}īn**	**犬 *kh^{w}ī-n**		E **χəwa·**
24	dry	***kan**	***kār**	**乾 *kār**		***-ɢañ**
28	water	***twəy ~ *dwəy**	***tuyH**	**水 *tuyʔ**		***tu·**
31	mouth	*m-**ka**	***Qa**	**-**	**χʾe** [25]	(***qʾaʾ**)[26]
40	star		***sēŋ**	**星 *sēŋ**		***səŋ^{wʔ} = *səmʾ**
43	foot	***krəy**	***k(h)rey**	**(蹄 *k(r)ay)** [27]	**-iɢ-** [28]	***qe·**
48	black	***syim**[29]				***šəŋ**

Note that in **Table 2** twelve of the tentative cognates involve the 25 most stable meanings, while the remaining five come from the 25 next most stable.[30] This distribution is consistent with the probability of the most stable terms surviving longer than those that are somewhat less stable.

With somewhat looser semantic criteria (but still within a plausible range) more possible cognates may be found within the most basic list (**Table 3**):

Table 3: Sino-Dene lexical parallels with plausible semantic shifts.

stability rank	gloss	PTB (Benedict & Matisoff)	PST (Starostin & Peiros)	Old Chinese (Starostin 1989)	Tlingit	Eyak-Athabaskan
5	thou ~ you		***K^{w}a-** ‘2nd person’ [31]	-	**ÿi / ÿi·** ’you’ (2nd pers. pl.) [32]	***χ^{w}- / *χ^{w}ə** ‘2nd pers. pl.’
7	fire ~ smoke	***kəw-**n/t ‘smoke’	***ghiw** ‘smoke, smell’	**臭 *khiw-s**[33]		***q^{w}ənʾ ~ *qunʾ** ‘fire’
14	heart ~ chest		***Tuk** ‘belly, chest’ [34]	-	**teχʾ** ‘heart’	
20	blood ~ flesh		***t(h)ǝlH** ‘meat, flesh’	**脤 *dərʔ** [35]	**(-dinł)** [36]	***dəł** ‘blood’

[25] ‘(outer) mouth’; cf. ‘edge’ in Athapaskan & Eyak.
[26] ‘edge’.
[27] ‘foot (of an insect)’.
[28] ‘foot’ (in compounds).
[29] Benedict ‘black, blue, dark’, based on Lushai *thim*; Dimasa *sim-ba ~ sum-ba*.
[30] As usual, true cognacy can only be firmly established after sufficient work on comparative phonology can confirm regular correspondences between the languages concerned.
[31] Tib. *khyi-d, khyo-d* ‘thou, you’; Burm. *kway* ‘you’, *kha-ŋ* ‘thou’; Lepcha *hó* ‘thou’, etc.
[32] /ÿ/ stands for a voiced velar continuant, IPA /ɯ/. There are indications (*e.g.* old transcriptions as *g*) that it comes from a velar fricative or stop.
[33] ‘smell, fragrance, stench’.
[34] Kanauri *s-tug* ‘chest’, Magari *tuk* ‘belly’, Chepang *tuk’* id.
[35] ‘sacrificial meat’; otherwise attested only in Lushai *tāl* ‘flesh, muscle’.
[36] *gug-ÿig-dinł* ‘plug of earwax? [epithet: deaf]’, if < ‘blood clot’ (Leer 1993).

stability rank	gloss	PTB (Benedict & Matisoff)	PST (Starostin & Peiros)	Old Chinese (Starostin 1989)	Tlingit	Eyak-Athabaskan
22	tooth ~ mouth	***ku(w)** 'mouth'	***khuā(H)** 'mouth'	口 ***khōʔ** 'mouth'	**ʔuˈχ** 'tooth'	***χʷuʔ** 'tooth'
27	hair ~ eyebrow[37]	***sam ~ *tsam** 'hair (head)'	***chām** 'hair (head)'	彡 ***s̲rām** 'hair, feather'	**sʔeˈ, sʔiˈ, sʔiˈÿ** 'eyebrow'	E **cʔā·χ** 'eyebrow'
34	bone ~ joint, limb		***[ʒ]eŋ** 'joint'[38]	-	**sʔaˈn** 'limb (of body)' **sʔaˈɢ** 'bone'	***cʔən** 'bone'
37	tree ~ stick	***ku:ŋ** 'tree/branch/stem'	***kūŋ** 'tree, branch'	-		*(də)-**kən** 'tree, stick, wood'

Other basic Sino-Dene comparisons have been proposed, by Sapir, Shafer, and others. A selection of them appears in **Table 4**. As usual, only further study and analysis will determine whether these are true cognates, or not.

Table 4: More basic Sino-Dene lexical parallels.

gloss	PTB (Benedict & Matisoff)	PST (Starostin & Peiros)	Old Chinese (Starostin 1989)	Tlingit	Eyak-Athabaskan
belly ~ vomit	*m-**pat** 'vomit'	***Pat** 'vomit'	-		***wə̀tʔ** 'belly'[39]
burn (tr.)	***ka(:)ŋ** 'roast/toast/burn/be dry'	***kăŋ** 'to fry, roast'	-	**χʔan** 'fire', ɬ-**χʔaˈn** 'smoulder'	***-qʔa·n** 'burn, catch fire'
child$_1$	***tsa ~ *za**	***ʒhə̆H**	子 ***cəʔ** 'son, daughter, child'	**si·** 'daughter'	***ceʔ-ə** 'daughter [of male]'
child$_2$	***syu(w)** 'grandchild'	***śū** 'grandchild'	孫 ***sūn** 'grandchild'		***ya·žʷə** 'little; (woman's) child'
kin, in-law	***krwəy** 'son-in-law, daughter-in-law'	***Kʷriy** 'child-in-law'	-		***qʔe·y** 'brother-in-law'
liver	*(m)-**sin, *tsin**	***sĭn**	辛 ***sin** 'bitter, pungent' (< '*gall')		***-sənt'**
many ~ all		***lăŋ** 'all, together'	-		***ła·ŋ, * -la·ŋ** '(to be) many'

[37] This ST root is also found in some words for 'eyebrow', *e.g*. Garo *mik-sam* < **mjV̌k-chām* 'eye-hair'. Cf. North Caucasian forms like Lezgi *r-c'am*, Rutul *uli-zen* 'eyebrow' (with a different root for 'eye').
[38] Bugun a-*zeŋ* 'bone'; Kachin: *lə-siŋ, lə-seŋ* 'carpus and metacarpus of the fore-arm; wrist'; Lushai *čaŋ, čāŋ* 'joint (of finger, bamboo)'.
[39] cf. Eyak *wut', wət'* 'vomit' (older 'belly' [1805]); Haida (S) *ʔwādə-* 'guts' (Enrico). 8For PST **p* = PA **w*, see also 'wide', below.

gloss	PTB (Benedict & Matisoff)	PST (Starostin & Peiros)	Old Chinese (Starostin 1989)	Tlingit	Eyak-Athabas-kan
sand	***sa**	***srāy**	**沙 *srāy**		***sa·x ~ *sa·y**
sit, set	***da ~ *ta** 'to put, place'	***dhăH ~ *thăH** 'to put, place'	**署 *da(ʔ)s** 'to place, posi-tion', **處 *thaʔ** 'dwell, stay, place'	**ti** 'lie, handle (sg.), be (so); (s-) be'	***-da·** 'sit' (sg.)
snake, eel, leech	*m-**li:t** 'horse-leech'	***lit** 'leech'	-	**ƛ̓ʔikʔχʷ** 'worm'	***-ƛ̓ʔəɣəš(ʷ)** 'eel, leech, snake'
stay, dwell	*g-**na**-s / ***na**(k) 'be, live, stay; rest perch'	***ney (-t)** 'be, rest'	-	**naˁ** 'nation, moiety', **na-**χ [human numeral suffix]	***na· / *ne·** 'move camp'; *də-**nay** 'human being, person'
weave, twist	***t(r)ak** 'weave'	***tə̆k** 'weave'	**織 *tək** 'weave'	**tixʔ** 'twist into rope'	E **-tåkʔ** 'twist'
wide		***pāk** 'wide, broad'	**博 *pāk** 'wide, ample'	**wuχʔ** 'be wide'	E **wəχʔ** 'wide, broad'

IV.a. Some diagnostic lexical features of Sino-Dene, contrasted with Western Dene-Caucasian.

The following is an exercise in subgrouping, based on diagnostic features which are usually considered to be common innovations.

While the idea of mass comparison of vocabulary conjures up some kind of quantitative method, it is really an immersion technique in which after looking at huge quantities of data from language after language, one begins to develop a sense of what is diagnostic for one group as opposed to another (Newman 1993).

Here we discuss the putative Dene-Caucasian words for 'eye', 'thou', 'tongue' and 'star', all of which figure within Starostin's list of the 50 most stable lexical meanings (see section **I**). It soon becomes apparent in **Table 5** that the lexical roots almost sort themselves into clear regional categories.

Table 5. Some diagnostic basic roots in Dene-Caucasian

	Eastern Dene-Caucasian		**Western Dene-Caucasian**	
gloss	Na-Dene	Sino-Tibetan	Burusho-Yeniseian	Euskaro-Caucasian
eye	Tlingit **wa:q** PA ***-we·ɢ-**	*s-**mik** ~ *s-**myak**	B ***il-** / ***=ĺ-**ći Y ***de-**	NC ***ʔwĭlʔi** B ***le**-t-[40], ***ułe**-r-[41]

[40] Only in the compound **le-t-hagin* 'eye tooth'; **le-t-* represents the root + fossilized oblique stem marker, cognate with PNC oblique **ʔwĭlʔi-dV-* (BCR A.12).

[41] In the Basque verb **ułer-tu* understand, comprehend', (B) 'foresee, suspect', (G) 'feel, sense'. A derivation from 'eye', typologically like Greek ὑπόψομαι 'I shall suspect', with -όψ- < PIE **okʷ-s-* 'eye' (Buck 17.44). For the form **ułe-r-*, cf. Archi *lur* 'eye', originally plural, < Proto-Lezgian **ʔʷil-Vr* 'eyes', Tabasaran, Agul, and Rutul *ul* 'eye' (NCED 250). Hypothesis by G. Starostin.

thou	PA ***ŋən**	***na**-ŋ	B ***u**-n / ***gu**-|***go**- Y ***ʔaw**|***ʔu** / ***kV**-|***ʔVk**	NC ***uō**-n / ***ʁwV̄** B - / ***hi** |***-ga**-
tongue	Tlingit **ɬ'ú:t'** Eyak **laʔt'**	***lăt**	B *=yú-**mus** (Y *ʔey / *ʔalVp)	NC ***mělc̲ĭ** B ***minhi**
star	PA ***səm'**	***sēŋ** ***q(h)ār**	B *a=**súm**-/*a=**sí[m]** Y ***qōqa**	NC ***ʒwhărī** B *i=**saṙ**

EYE: stability rank 04: This comparison highlights a clear difference between Eastern and Western DC, with Eastern preferring a root with an initial labial /m/ or /w/ followed by a velar or postvelar second consonant. As already mentioned in a footnote above, earlier stages of Na-Dene languages tend to lack initial labial stops and nasals (though these may appear in later stages), so that PND **w-* seems to be the normal correspondence to PST **m-*. Western DC, on the other hand, favors a root for 'eye' with a root somewhat like *+ʔile* (the /w/ or /u/ in PNC **ʔwĭlʔi* and Basque **ułe-* could reflect an incorporated or lexicalized class prefix). In Basque the root **(u=)le-* survives only in the compound noun **le-t-hagin* and verb **ułe-r-tu*, while the everyday word for 'eye' has been replaced by an innovation, **b=egi*, from a Euskaro-Caucasian root 'to see' (see BCR A.8, A.12, V.14). Proto-Yeniseian lacks initial **l-* and **d-* is the normal correspondence to **l-* elsewhere.

Table 5.a. Dene-Caucasian 'thou' (2nd person singular).

	Eastern Dene-Caucasian		**Western Dene-Caucasian**	
gloss	Na-Dene	Sino-Tibetan	Burusho-Yeniseian	Euskaro-Caucasian
thou	PA ***ŋən**	***na**-ŋ	B ***u**-n / ***gu**-|***go**- Y ***ʔaw**|***ʔu** / ***kV**-|***ʔVk**	NC ***uō**-n / ***ʁwV̄** B - / ***hi** |***-ga**-

THOU: stability rank 05: Here again is a clear contrast between Eastern and Western DC. Most of the Eastern languages employ a single root with an initial nasal, PST ****ŋa-*** = PAET ****ŋi***, in some languages of both families with a nasal suffix: Burmese *naŋ*, Jingpo *naŋ*[1] 'thou', Dimasa *niŋ* id., Lushai *naŋ* 'thou, you' ~ Athabaskan: Ingalik *ŋən*, Carrier *nyən*, Hupa *nən*, Hagwilgate *yən* 'thou'. In the West we find instead a probable underlying suppletive paradigm, with a direct form based on a high rounded vowel (NC **uō-n*, Burushic **u-n*, Yeniseian **ʔu*) opposed to an oblique form containing a velar or postvelar (NC **ʁwV̄,* Burushic **gu-|*go-*, Yeniseian **kV-|*ʔVk*). Basque seems to have lost the direct stem and generalized the oblique form, forming the new nominative **hi*, the familiar form of 'thou' which "is confined to an extraordinarily limited range of functions" (Trask 2008: 215). Convergently, some NC languages have formed a new direct form in a similar way (Dargi *ħu* 'thou'; Chechen *ħo* 'thou' alongside *aħ* [ergative] and *ħa-* [oblique] from the same root). Conversely, West Caucasian has generalized the **uō*-stem (Abkhaz *wa*-rá, Circassian *wa* 'thou'), and lost the **ʁwV̄*-stem. There seem to be traces of the (post-)velar 'thou' stem in Sino-Tibetan (Lepcha *hó* 'thou', Tibetan *khyi*-d, *khyo*-d 'thou, you', Burmese *kway* 'you',

khaŋ ‘thou’),[42] and Athabaskan has a plural stem PA *χ^w- / *nə-χ^wə [2nd person plural subject / 2nd person plural object, possessive]. But the Western languages innovated by forming a suppletive paradigm with the (post-)velar root restricted to the oblique forms.

Table 5.b. Dene-Caucasian ‘tongue’.

		Eastern Dene-Caucasian	Western Dene-Caucasian		
gloss	Na-Dene	Sino-Tibetan	Burusho-Yeniseian		Euskaro-Caucasian
tongue	Tlingit **ɬ’ú:t’** Eyak **(laʔt’ / ƛ’ət’)**	***lăt**	B *=yú-**mus**		NC ***mělc̲ĭ** B ***minhi**
			Y *ʔey	Y *ʔalVp	

TONGUE: stability rank 08: The root ***lăt** has a very limited distribution in ST, as far as we know. Matisoff (2003) cites four Tibeto-Burman roots for ‘tongue’, all of which have initial *l-: ***l(y)a** (*e.g*. Tibetan *lće*); ***lay** ~ ***ley** (*e.g*. Lepcha [a-]*li*, Meithei *ləy*); ***lyak** (*e.g*. Tibetan [respectful] *lʒags*); and ***lyam** (*e.g*. Bahing *liam*). In their Sino-Tibetan dictionary, and in the almost identical Tower of Babel database, Peiros & Starostin (1996) list the following roots, all with initial laterals: ***lăj(H)** / ***lăt** ‘tongue’ (ST III #26); ***ƛiăk** ‘tongue, lick’ (ST III #254 = ***ƛăk** in TOB); ***ƛep** ‘tongue, lick’ (ST III #232);[43] and [***lem**] ‘tongue’ (ST III #56).[44] Of these ***lăt** is attested only in Chinese ***lat** ‘tongue’ (Baxter’s ***m-lat**), Magar *let*, and Jingpho (Kachin) šiŋ-*let* ‘tongue’.[45] But in Na-Dene the root corresponding to PST ***lăt** ‘tongue’ is well attested with some time-depth in Tlingit *ɬ’ú:t*’ and Eyak *laʔt*’ ‘tongue’. Pinnow (1966) also cited the old (ca. 1861) Yakutat-Eyak form kha-*leth* ‘tongue’ [qa·laʔt’].[46] At the Western end, Euskaro-Caucasian, and possibly Burushic, have a completely different word for ‘tongue’: Basque ***minhi** (cf. ***minco** ‘speech, voice’) and PNC ***mělc̲ĭ** ‘tongue’ have a high probability of cognacy (BCR A.9, with phonetic development explained on pp. 219–24); and S.A. Starostin postulated that Burushic *=yú-*mus*- ‘tongue’ was related to them (SCG 141); indeed, the last segment is very similar, ostensibly by

[42] To the Lepcha pronoun *hó* cf. the convergent North Caucasian forms, Chechen *ħo*, Dargi *ħu* ‘thou’ (Basque ***hi**).

[43] The root ***ƛep** seems to be supported only by Tibetan *gźab* ‘to lick’ and Jingpho šiŋ-*lep* ‘tongue’. Matisoff (2003: 533–34) however regards Jingpho *-lep* as a phonetic variant of the original *-let*: “Jingpho shows synchronic variation between -t and -p, or a final -p where a -t would be expected by the comparative evidence” in *šìŋ-lèt* ~ *šìŋ-lèp* ‘tongue’.

[44] Reflexes of ***lem** (= Matisoff’s ***lyam**) seem to be restricted to the East and West Himalayan languages.

[45] Matisoff, who prefers to cite Karlgren’s older reconstruction of Old Chinese (“Archaic Chinese”), derives both OC舌 *d̂’i̯at* ([dʰi̯at] = Starostin’s ***lat**) and OC膿 *g’i̯ok* from PTB ***s/m-lyak** (Matisoff 2003: 528). See also the note to ***ƛep**, above.

[46] A caution: Leer (1993) does not match Tlingit *ɬ’ú:t*’ with Eyak *laʔt*’, but with Eyak -g-*ƛ’ət*’ ‘clitoris’, a better fit phonetically and semantically plausible. Eyak *laʔt*’, on the other hand, is related to *-’naʔt*’ ‘to lick’ = PA *-*na·t*’ ‘lick’ and Tlingit *-nut*’ ‘to swallow’; there is a well-known alternation of *l* ~ *n* in Eyak, and Eyak *l* often corresponds to Athabaskan ***n***.

convergence, to Udi *muz* 'tongue', but the first segment *=*yú*- is more difficult to explain.[47] The Yeniseian words for 'tongue' are not related to any of the other words for 'tongue' in this table. **ʔalVp*, attested in Kott and Arin, strongly resembles the Hatti form *alef ~ alep ~ alip ~ aliw* 'tongue' (Kassian 2010), while the **ʔey* of Ket, Yug, and Pumpokol remains mysterious

Table 5.c. Dene-Caucasian 'star'.

	Eastern Dene-Caucasian		Western Dene-Caucasian	
gloss	Na-Dene	Sino-Tibetan	Burusho-Yeniseian	Euskaro-Caucasian
star	PA ***səm'**	***sēŋ**	B *a=**súm**-/*a=**sí[m]**[48]	NC ***ʒwhărī**
		***q(h)ār**	Y ***qɔ̄qa**	B *i=**saṙ**

STAR: stability rank 40: Here we have three roots, **ciŋwV*, **q'ārq'V̄*, and **ʒwhắrī* (SCG 21, 174, 250) that are not neatly distributed into the Western and Eastern categories (except **ʒwhắrī*, which is restricted to Euskaro-Caucasian). In the East **ciŋwV* is predominant within Athabaskan (Ahtna *son?*, Tanaina *sin ~ səm ~ sim*, Central Carrier *ɣum*, Hupa *cən?*, Mattole *ciŋ*, Wailaki *saŋ?*, Navajo *sǫ*', etc.) but is unknown in Eyak, Tlingit, and Haida. The corresponding root **sēŋ* is rather sporadically attested in Sino-Tibetan (Mandarin *xīng = śiŋ*[11], Cantonese *šìŋ*[11]; Hruso li-*coŋ* 'star'; Lepcha kŭr-*sóŋ* 'a planet; morning star'; Kaling *sɔŋ*-gɔr 'star', etc.), and a likely cognate is found in Burushic **a=súm-/*a=sí[m]* 'star' (if **a*= is a fossilized class prefix). The root **q'ārq'V̄* is attested more widely (*e.g.* Tibetan *skar*, Jingpho *šəgan*[1], Lushai *ār*-śi, Lepcha *să-hór*, Mishing *tă-kăr* 'star', etc.) than **ciŋwV* in Sino-Tibetan, and also in Yeniseian (Ket *qɔ?*, Yug *xɔ:hx*, Arin il-*xok*, Pumpokol *káken*, etc.).[49] The Kiranti languages have a word for 'star' that is a compound of **ciŋwV* + **q'ārq'V̄*, *e.g.* Kaling *sɔŋ-gɔr* 'star'. In the far West (Euskaro-Caucasian) neither of the Eastern roots is found and, as with 'tongue', North Caucasian and Basque agree on a different root: PNC **ʒwhărī* (Akhwakh *c':ʷari*, Tindi *c:aru*, Bagwali *c':ʷara*, Chiragh *zure* 'star', etc.) and Basque **i=saṙ* (*izar, izer, ixer, ixar*, etc.).[50] So generally, **ciŋwV* and **q'ārq'V̄* in Eastern DC and Burusho-Yeniseian, and only **ʒwhắrī* in the far West.

IV.b. "Pan-Dene-Caucasian" lexical roots

Given the sharp lexical heteroglosses just discussed, why should we believe that "Western DC" and "Eastern DC" are parts of the same macrofamily? In spite of the heteroglosses,

[47] ? A fossilized class prefix, as in Burushic *y=ult* 'time, right moment' (beside **ultu /*b=ultu* 'day'); *y=eéś* 'dwelling' (cf. Tsakhur *yic'a* 'sty, cattle-shed'; Basque **e=će* 'house, home': NCED 364; BCR Q.1; Bengtson & Starostin 2015: 12).

[48] The Yasin dialect has *asúmun* (Berger), *asúmen* (Zarubin 1927), *hasúman* (Hayward 1871); the Hunza-Nager form is *asií*, plural *asiímuc*, also suggesting an underlying /m/, eventually causing a nasalized vowel in Hunza-Nager, later denasalized *+asimi* > *+asĩi* > *asíi* (?).

[49] Starostin (2005a: 45) explained the change of PDC **q'ārq'V̄* to PST **q(h)ār* as one of a few rare cases of "non-disappearing" **-r-* in which the syllable after **-r-* drops off.

[50] *x* in Basque spelling denotes the shushing sibilant /š/.

there are also significant "pan-Dene-Caucasian" lexical roots that span the macrofamily from Basque to Na-Dene, though naturally with some gaps due to normal lexical attrition. These lexical roots are basic and can be considered as diagnostic of Dene-Caucasian in general.

Table 6. "Pan-Dene-Caucasian" lexical roots.

stability rank	gloss	Eastern Dene-Caucasian			Western Dene-Caucasian	
		Tlingit	Eyak-Athabaskan	PST (Starostin & Peiros)	Burusho-Yeniseian	Euskaro-Caucasian
5	thou ~ you (pl.)	**ÿi / ÿi·** 'you' (2nd pers. pl.) [51]	***χʷ- / *χʷə** '2nd pers. pl.'	***Kʷa-** '2nd person' [52]	B ***gu-/*go-** Y ***kV-/*ʔVk**	NC ***ʁwV̄** B ***hi |*-ga-**
7	fire 1 ~ smoke 2		***qunʔ** 1	***ghiw** 2	Y: Kott **kiŋ** 'smell'	NC ***k̲wĭnhV** 2 B *(e=)**kē** 2
16	dog		E **χəwa·**	***qhʷīy / *qhʷīn**	B ***hu**-k	NC ***χ̲Hwĕye** B ***ho-**r
20	blood 1 ~ flesh	(**-dinł**) [53]	***dəł** 1	***t(h)ə̆lH** 'meat, flesh'		B *o=**dol** 1
22	tooth 1 ~ mouth 2	**ʾuˈχ** 1	***χʷuʔ** 1	***khuā(H)** 2	Y ***χ̲owe** 2	NC ***χwi**-m(V)ṗV 'mouthful B *a=**ho** 2
27	hair 1 ~ eye-brow 2	**sʔeˈ, sʔiˈ, sʔiˈÿ** 2	E **cʔã·χ** 2	***chām** 1	B ***śe[m]** 'wool' Y ***cəŋe** 1	NC ***çɦwĕme** 2 B ***sama-**ṙ 'fleece; hide'
34	bone ~ joint, limb	**sʔaˈn** 'limb (of body)' **sʔaˈɢ** 'bone'	***cʔən** 'bone'	***[ʒ]eŋ** 'joint' [54]	B *=**śáŋ** 'limbs, body parts'	NC ***Hc̲wēynə** 'leg bone' B ***śoin**[55]
[Swadesh list 'belly']	belly 1 ~ vomit 2		***wə̀tʔ** 1	***Pat** 2	B *=**pháṭ**[57]	NC

[51] /ÿ/ stands for a voiced velar continuant, IPA /ɯ/. There are indications (*e.g.* old transcriptions as *g*) that it comes from a velar fricative or stop.
[52] Tib. *khyi-d, khyo-d* 'thou, you'; Burm. *kway* 'you', *kha-ŋ* 'thou'; Lepcha *hó* 'thou', etc.
[53] *gug-ÿig-dinł* 'plug of earwax? [epithet: deaf]', if < 'blood clot' (Leer 1993).
[54] Bugun a-*zeŋ* 'bone'; Kachin: *lə-siŋ, lə-seŋ* 'carpus and metacarpus of the fore-arm; wrist'; Lushai *čaŋ, čāŋ* 'joint (of finger, bamboo)'.
[55] 'shoulder, upper back'
[57] 'gizzard, stomach (of fowl)'.

stability rank	gloss	Eastern Dene-Caucasian			Western Dene-Caucasian	
		Tlingit	Eyak-Atha-baskan	PST (Starostin & Peiros)	Burusho-Ye-niseian	Euskaro-Cauca-sian
			E **wut'** 2 [56]			***pHVrṭwV**[58] B *e=**purdi** [59]
	child		***ya·ž^{w}ə** 'little; (woman's) child' E **=yahš** [60]	***śū** 'grandchild'	B ***=ś́s** 'young (of animals), child'	PNC ***=ĭšwĔ** 'son, daughter'[61] B ***śe-**me 'son' ***śe-**me-**śo** 'grandson'[62]
[Swadesh list 'liver']	liver 1 spleen 2 gall 3		***-sənt^{ʔ}** 1	***sĭn** 1	B ***=sán** 2 Y ***seŋ** 1	NC ***c̲wă̆ymĕ** 3 B ***-sun** 3 [63]

V. WHAT ABOUT "DENE-YENISEIAN"?

The so-called "Dene-Yeniseian" hypothesis (Ruhlen, Vajda, Werner) has generated great interest among historical linguists and scientists in general (see, *e.g.,* Diamond 2011). We think it is highly probable that Na-Dene and Yeniseian are ultimately related as members of different branches of the Dene-Caucasian macrofamily. However, in our estimation they probably do not *by themselves* form a genetic unit, since our studies strongly indicate that Na-Dene is closest to Sino-Tibetan (as Sapir proposed nine decades ago), and Yeniseian is closest to Burushaski (See **Figures 1 & 2**).[64] In recent papers and discussions with us Vajda has emphasized that "Dene-Yeniseian" should be viewed as a "link" rather than a taxon (Vajda 2012).

[56] cf. Eyak *wut', wət'* 'vomit' (older 'belly' [1805]); Haida (S) *ʔwādə-* 'guts' (Enrico). For PST **p* = PA **w*, see also 'wide', below.

[58] 'some inner organ': Archi *pąrt'i* 'one of the large intestines'; Inkhokwari *put'e*-ru 'urinary bladder', Bezhta, Hunzib *pirt'i* 'lung', Batsbi *pħaytĭ* 'lung'.

[59] 'buttocks, arse', a semantic extension (metonymy) from 'intestine' (Archi *pąrt'i*).

[60] To PA **ya·žwə* and E *=yahš* cf. North Caucasian forms with feminine class prefix **y=*: Andi *yo=ši* 'daughter', Karata *ya=še* 'daughter', etc.

[61] Kabardian *śā*-wa 'son'; Andi wo=*šo* 'son', yo=*ši* 'daughter', Karata wa=*ša* 'son', ya=*še* 'daughter'; etc. (with changing class prefixes).

[62] Basque has a host of kinship terms with the elements **-śa-* and **-śo*: *osa-ba* 'uncle', *gura-so* 'parent', *asa-ba* 'ancestor', *al(h)aba-so* 'grand-daughter', etc. (BCR J.13).

[63] Basque **-sun* in the compound **beha-sun* 'bile, gall'; dial. *beazuma*; 'gall, anger' is the universal meaning in NC.

[64] The "we/our" terminology refers to the general consensus on these issues between G. Starostin (2010a) and me.

ABBREVIATIONS

ANLC	Alaska Native Language Center, Fairbanks
EHL	Evolution of Human Language Project http://ehl.santafe.edu/intro1.htm
NC	North Caucasian
ND	Na-Dene
PA, PPA	Proto-Athabaskan; pre-Proto-Athabaskan
PEC	Proto-East Caucasian (see NCED)
PNC	Proto-North Caucasian (see NCED)
PST	Proto-Sino-Tibetan
PTB	Proto-Tibeto-Burman
ST	Sino-Tibetan
TB	Tibeto-Burman
TOB	Tower of Babel http://starling.rinet.ru/main.html

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APPENDIX: THE TAXONOMIC POSITION OF HAIDA REVISITED

In his article "Heinz-Jürgen Pinnow, Na-Dene and beyond" Jan Henrik Holst raises some interesting questions about the subgrouping of the Na-Dene (ND) language family, and states that "the truth seems to be that we do not know the family tree of ND at all." About a decade ago I addressed some of these issues in a different way (Bengtson 2008b: 211–213): "Recently an anthropologist colleague asked me if I thought Haida might be a branch of Dene-Caucasian, but not part of Na-Dene. I thought it was a stimulating question." Since that time the consensus model of Dene-Caucasian taxonomy has changed, as a result of collaboration with the EHL team, including George Starostin, who has conducted lexico-statistical studies (see Bengtson & Starostin 2015).[65] Our team now prefers a taxonomy roughly as follows:

A. 'Sino-Dene' or 'Eastern Dene-Caucasian'
  A.1. Sino-Tibetan (= Tibeto-Burman)[66]
  A.2. Na-Dene
B. 'Western Dene-Caucasian'
  B.1. Burusho-Yeniseian (Burushaski + Yeniseian)
  B.2. Euskaro-Caucasian (Basque [*euskara*] + North Caucasian)

In line with the suggestion I made in Bengtson 2008c, the same scheme could perhaps be modified as follows:

A. 'Sino-Dene' or 'Eastern Dene-Caucasian'
  A.1. Sino-Tibetan
  A.2. Haida
  A.3. Na-Dene
B. 'Western Dene-Caucasian'
  B.1. Burusho-Yeniseian (Burushaski + Yeniseian)
  B.2. Euskaro-Caucasian (Basque [*euskara*] + North Caucasian)

This does not contradict the most recent report of the "state of affairs" of the EHL project:[67]

The Na-Dene family itself, according to old models of classification (E. Sapir, etc.), consists of three branches: the large Eyak-Athapaskan family and two remote outliers — Tlingit and the extinct

[65] EHL = Evolution of Human Language Project (http://ehl.santafe.edu/intro1.htm), begun by the late Murray Gell-Mann and the Santa Fe Institute in 2001. It was soon merged with the Russian project Tower of Babel (TOB, a web-based project on historical and comparative linguistics developed by S. A. Starostin & Yu. Bronnikov http://starling.rinet.ru/main.html).

[66] "Tibeto-Burman" in the sense of van Driem (2005), a language family that includes Chinese (Sinitic) as one of many branches.

[67] http://ehl.santafe.edu/EhlforWeb.pdf

Haida. Most specialists in these languages today, such as M. Krauss and J. Leer, accept the relationship between Eyak-Athapaskan and Tlingit, but not between either of them and Haida. Lexicostatistical analysis of Na-Dene data corroborates that position: there is too little evidence to regard Haida as a certified member of this family. However, a broader «Dene-Caucasian» affiliation for Haida remains an open possibility, to be explored further.

Haida-Dene-Caucasian lexical cognates: Just from inspection it is evident that Haida has diagnostic Dene-Caucasian cognates. I shall start with Enrico's (2004) list of 91 'lexical resemblance sets' (pp. 246–58), which Enrico regards as unlikely to have been borrowed by Haida from neighboring Na-Dene languages, especially Tlingit. In other words, these would be genuine (genetic) Na-Dene cognates, in a model of Na-Dene that includes Haida as its most outlying branch. In other sections of the paper Enrico lists extensive evidence of borrowing in multiple directions. These three examples are part of a larger set of Haida-DC resemblances.

A. In Enrico's **set 89** Haida (S) ***ʔwādə***-gāy 'guts, intestines'[68] is compared with Eyak *wut*' 'belly', Proto-Athabaskan ****wəʔt'*** 'belly' (predecessor of Ahtna *bet*', Hupa *mit*', Navajo *bìd* 'belly', etc.). Eyak *wut*' is usually glossed as 'vomit', with 'belly' as the older meaning (attested in 1805), and a common Tibeto-Burman word for 'vomit' is ****m-pat*** (Benedict-Matisoff reconstruction) or **Pat* (Peiros-Starostin), with reflexes such as Burmese *phat* 'to vomit', Jingpho n-*phat*[3], Lahu *phèʔ,* Konyak *pát*, etc.[69] Since labial stops are not reconstructed for older stages of Na-Dene, it seems probable that **w* is the ND correspondence to ST **p* (Bengtson 1994). There seems to be no Yeniseian cognate, but in Burushic there is ****=pháṭ*** with the specialized meaning 'gizzard, stomach (of fowl)', and a final retroflex /ṭ/ that suggests an origin from **-lt-* or **-rt-*, which led me to compare this word with some Northeast Caucasian words like Archi *pạrt'i* 'one of the large intestines' and Hunzib *pirt'i* 'lung' (which comparison was later accepted by Starostin). Note that the NC words have a glottalized coronal /t'/ as in Eyak-Athabaskan, and the Archi meaning is close to that of Haida. Finally there is a close phonetic match in Basque ****e=purdi*** 'buttocks, arse', with a probable fossilized class prefix **e*= that is lacking in the Baztan dialect where the form is simply *purdi*, and Gipuzkoan has the compound *ipurt-zulo* 'anus' ('arse' + 'hole').[70] (NCED 871; BCR A.45). S.A. Starostin posited Proto-Sino-Caucasian ****pHVrt'wV*** 'lung, gizzard' based on the Burushic, NC and Basque forms (SCG 160; TOB).

B. The Haida word for 'tooth' is (S) ***c'əŋ*** (= *ts'əŋ*)[71], (M) *c'aŋ*, (A) *c'áŋ* (Enrico **set 25**), related by Enrico, and others before him, to Tlingit *s'āɢ* 'bone', Eyak *c'el* (/l/ < **n*) 'bone',

[68] Where -*gāy* is probably an inalienable possessive suffix.

[69] For some unknown reason S. Starostin did not connect PST **Pat* with any external cognates. Perhaps he was not aware of the Eyak meaning 'vomit'.

[70] For the semantic typology of 'stomach, intestines' → 'anus' → 'buttock' cf. Old Indic *gudá-* 'intestine, bowels, anus' > Pali *guda* 'anus', Sindhi *guī* 'anus, posterior', etc.

[71] Throughout I prefer to use the symbol /c/ to designate the (hissing) *ts*-affricate, /c'/ if glottalized; if shushing the symbol /č/ is used, /č'/ glottalized.

c'ǟ (*ts'ą́*) 'be strong, tough', Ahtna *c'en* 'bone; be hard', Hupa *=c'iŋ / =c'in*-e' 'bone, leg', Navajo *c'ìn* (*ts'in*) 'bone', etc. (PPA ****c'ən***).[72] There is also Tlingit *s'a'n* 'limb (of body)', not included by Enrico, but cited by Leer (1993: bone1) as related to the Eyak and Athabaskan words for 'bone'. This word family shows a striking similarity to the Northeast Caucasian etymology reconstructed as ****Hc'wēynə̆*** 'leg bone' (NCED 555),[73] with varied reflexes such as Tsakhur *c'om* 'shin-bone', Archi *c'am*-mul 'ankle', and (with metathesis) Chechen *nosta* 'leg'. This similarity was not lost on Sergei Nikolaev, who had done field work in the Caucasus, and he included this comparison in his "Sino-Caucasian Languages in America" (1991, p. 147, no. 1.17). After I discovered the correspondence of PNC **c'* = Burushic **ś* (Bengtson 2008a) I added Burushic ****=śáŋ*** 'limbs, body parts' (semantically like Tlingit *s'a'n* 'limb') to the etymology, later approved by the Starostins (SCG 66). I have also connected this word family with Basque ****śoin*** 'shoulder; upper back' (BCR A.38). It is interesting that Enrico concludes that the PND final nasal is assumed to have been **ŋ* (as in Burushic), and S. Starostin independently reconstructed Proto-Sino-Caucasian ****Hc'wḗyŋə̆*** 'limb, bone',[74] also with the velar nasal. Starostin also suggested a Sino-Tibetan cognate, **[ʒ]eŋ* 'joint' → Jingpho *lə-seŋ*[1], *lə-siŋ* 'wrist, carpus, metacarpus', Lushai (Mizo) *čaŋ* 'a joint (of finger, bamboo)', Bugun a-*zeŋ* 'bone' (ST IV #509; SCG 66).[75]

C. Enrico (**set 19**) connects Haida (S) ***c'ək'i***, (M, A) *c'ak'* 'occiput, nape of neck' (which also occurs in compound words meaning 'pillow' and 'brain') with Tlingit *ša* 'head', Eyak *ciʔ*- (in *ciʔ*-lahł 'pillow') and PA **ci̓* (or ****ciʔ***) 'head' (*e.g.*, Hupa *=cee-, ci-* 'head', Mattole *=ciʔ*- id., Navajo *'a-tsii'* 'head; hair [on head]', *'a-tsii-ghąą'* 'brain', etc.). As far as I know nobody has suggested a Sino-Tibetan cognate of these Na-Dene words, but the comparison with Proto-Yeniseian ****ciʔɢ*** (S.A. Starostin's model) or **čiʔɢ* (Vajda's model) 'head' looks very promising as a look-alike and has been suggested by Ruhlen (1998), Werner (2004: 122–23), as well as Vajda (2011, *et alia*). S.A. Starostin proposed the Burushic cognate ****=ćáɣa***-nes, attested in the Yasin dialect as *=ćáɣanes* 'back of head, occiput' / 'Hinterkopf', and finally Proto-West Caucasian **SqIa* 'head' (*i.e.*, ****Sqˤa***, with an initial sibilant of uncertain quality followed by a pharyngealized uvular), attested in Abkhaz a-*χə́*, Abaza *qa*, Circassian *śħa*, and Ubykh *ša* 'head' (SCG 32). If this is well-founded, Tlingit and Ubykh have convergently arrived at (more or less) the same form, *ša* 'head'. Starostin posits its Proto-Sino-Caucasian **ɕ́V́qV̌* (*i.e.*, ****ć'V́qV̌***, with a glottal initial) as the ancestor of the

[72] The semantic correlation of 'tooth' and 'bone' is not very common, but Russian Nostraticists claim one between Altaic **p`èjńé* 'bone' (*e.g.* Old Japanese *p[w]one* > Tokyo *honé*) and Uralic **piŋe* 'tooth' (*e.g.* Mordovian *peŋ, pey*, etc.); maybe Austronesian **ipen* 'tooth' and Proto-Tai **fan* 'tooth' (TOB: Nostratic etymology).

[73] For simplicity, NCED's **Hçwējnə̆* has been changed to **Hc'wēynə̆*.

[74] Starostin's notation was **Hçwḗjŋə̆*; I have substituted *c'* for *ç* and *y* for *j*, in more accord with American practice.

[75] In Starostin's notation /ʒ́/ stands for a voiced "hissing-hushing" (apical) affricate. The notation [ʒ́], with brackets, indicates that the reconstruction is provisional, probably since the attestations are from only three languages.

Yeniseian, Burushic and Caucasian forms; note that the Haida forms also have an initial ejective,[76] and the Haida meaning, 'occiput', coincides with the Burushic semantics, suggesting that 'back of the head' might have been original.

Besides the three examples above, it seems that Haida has a fair number of words that are shared with other branches of Dene-Caucasian, but often not with Tlingit-Eyak-Athabaskan, for example:[77]

1. Haida *k'ud* 'lips, outside of mouth (fish and mammals); beak (of bird), spout (of teapot, kettle, etc.)' (Sapir 1923: 145, 147 [k'u·́dα] 'lip') || cf. Avar *k'^{w}et*' 'lip', Godoberi *k'ot'i*, Archi *k'^{w}ent*' 'lip', etc. < PEC **k'wēmt'ī* 'lip' (NCED 733).
2. Haida (A) *q'ulű́* 'leg, lap', *q'ulű́ qaǯ* 'knee' || cf. PEC **q'HwVlV* (~ **q'HwVɬV*) 'heel, ankle' [Tsezi *q^{w}ạla* 'ankle', Lezgi *q'ül* 'foot, kick', Tsakhur (dial.) *muq'^{ʕ}ule* 'heel', etc.]; PY **χɔlV-[č]iɢ* 'hoof' [Ket *qɔĺeś*, Kott *xalčik*, etc.] (SSEJ 304; NCED 927; SCG 176).
3. Haida *s=kuǯ* 'bone' (see below for *s*-prefix) || cf. Old Chinese **kūt* 'bone', Dumi *gutna* 'joint, knee'; PEC **kŏc'e/a* 'a kind of bone' [Hunzib *k'oc'u* 'back of the head'; Agul *k'ac*' 'vertebra'; Tsakhur *kɨc'a* 'upper part of shin'; Khinalug *kɨz* 'thigh, hip'; ? Chechen *k'es* 'nape']; Basque **-koce* 'nape' (in compounds) [Basque (Z) *gár-khotx* 'nape, back of neck', *gar-kotze, gar-kotz*, (BN) *kar-kotxi* 'nape', etc.] (NCED 698; BCR A.35).[78]
4. Haida *k'ĭ́ǯ* 'stomach, belly, abdomen' || cf. Yeniseian **kič* (or **gič*) 'meat' [Ket *kīt* 'meat, animal body', Yug *kīt́* id., Pumpokol *čič* 'meat']; PNC **k'wĭc'Ĕ / *c'ĭk'wĔ* 'internal organ' [Dargi *k'ac*' 'spleen'; Circassian *k'^{w}ac*' 'entrails, intestines'; (with metathesis) Tindi *c:ik:wa* 'small intestine', etc.]; Basque **bi=hoc* 'heart' (EB *bihotz*, Bzt, R *bigotz*, etc.) (SSEJ 238; NCED 735; BCR A.48).
5. Haida *s=λắn* 'intestines, guts, bowel' || cf. PST **λə̆w* or **T-lə̆w* 'belly, stomach'[79] [Old Chinese **lo* or **Ło* 'fat on belly; intestines; fat', Tibetan *lto* 'belly, stomach', etc.]; Burushic **=úl* 'belly'; PEC **=īr(a)ŁV* 'stomach; rennet, abomasum' [Agul *uray* 'rennet, abomasum', Rutul *ɣirɨɣ* id.; (with class prefixes) Karata *m=eλ':u* 'stomach', Andi *b=oλ':i* 'rennet, abomasum'; Tsezi, Hinukh *b=iλ* 'rennet, abomasum', etc.]; Basque **urda(-)il* 'stomach' [EB *urdail* 'stomach', (B) also 'abomasum', (B, G) 'womb', (Z) *urdai* 'stomach', *urdal*-min 'gall, bile']**[80]** (ST III: 77, #284 **λŏw*; SCG 112; NCED 670; BCR A.50).

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[76] Enrico guesses that "glottalization of the Haida initial is probably due to the PPA glottalized vowel by metathesis"; or the metathesis could have been in the opposite direction.

[77] Haida forms are mainly from Enrico (2005), supplemented by Lawrence (1977) and Lachler (2010). In the Haida words (and some words in other languages) the following symbols are used for laterals: **/ƛ/** = voiced lateral affricate (dɮ-type); **/ƛ̦/** = voiceless lateral affricate (tɬ-type); **/ƛ'/** = glottalized lateral affricate (tɬ'-type); **/ɬ/** = voiceless lateral fricative (hl-type).

[78] S.A. Starostin (e.g., SCG 238, TOB) preferred to compare Old Chinese **kūt* 'bone' and Lushai *kut* 'hand', etc., with PY **g[i]d* 'elbow, joint, to bend', and PEC **q'HwəntV* 'knee, elbow', which is an alternative possibility.

[79] Between **ST** (1996) and **TOB** and **SCG** (2005) S.A. Starostin modified many PST reconstructions, among other things wavering between positing a lateral affricate **λ-* or cluster **T-l-*; see also sets 9, 14, 16, 20, 21.

[80] Basque **-rd-* is in regular correspondence (in medial positions) with the PNC lateral affricates **Ł, *λ, *λ'* (BCR 154–58); see also sets 17 and 18, below. In initial and final positions Basque has instead the simple resonant **l-, *-l* (see sets 9, 15, 16, 17, 18, 20, 22).

6. Haida *łű́* 'whole body, carcass (of a whale), foot and body (of a razor clam); hull (of boat)' || cf. PST **law (~ *liw, *liw)* 'body, side of body' [Tibetan *lus* 'body', *lhu* 'portion of the body of an animal', Lepcha *lyŭ, lŭ, lyu* 'body', etc.]; Basuque (archaic) **lohi* 'body'; (with metathesis) PEC **xwōlʰV* 'bosom', Avar *łor* id.; Burushic **hál*-mun 'ribs' (**-mun* unexplained) (ST III: 21, #77 **lə[w] ~ *lā[w]*; NCED 1065; BCR A.37).
7. Haida *qáw* '(bird's) egg; testicle' || cf. PST **QəwH* (~ **QuH, *QiwH*)[81] 'egg' [Tibetan s-*go*-ŋa 'egg(s), spawn', Burmese *uʔ* 'egg'] (ST V: 171, #627 **Qo[w]H ~ *QuH*); with reduplication, cf. PEC **q'wāq'wV*(-ɬV) 'egg, grain, seed', Tsakhur *q'uq*' 'egg', etc. (NCED 932); Basque **koko* 'egg' (children's speech) (BCR P.13).
8. Haida (S) *sīga* 'snake', (Kaigani) *sik* id., (M) *sɨg* 'snake, grub' || cf. Yeniseian **c[ī]k* 'snake, fish' [Ket (South) *tiɣ*[4] 'snake', *u-tiɣ*[5,6] 'worm', (North) *ti:ɣə*[4] 'snake'; Yug *či:hk*[1] 'snake'; Kott *tēg, tēx* 'fish', etc.]; Basque **śuge* 'snake' [(EB) *suge* 'snake', (G) *suga*, (AN, B, BN, G) *sube* id., (B) *suga*-lindara 'lizard', etc.] (SSEJ 214; BCR B.25, Z.13).
9. Haida *łɢa, łɢá́* 'stone' (Sapir 1923: 151 [łga·] ~ [łχa·] 'stone') || cf. PST **ƛɨāŋ / *ƛɨāk* (or **T-ɬɨāŋ / *T-ɬɨāk*) 'stone' [Lushai *luŋ* 'stone, rock', Limbu *luŋ* 'stone', Burmese *kyauk* id., Old Chinese **Ł̲āŋʔ* 'a kind of precious stone', **Ł̲āŋs* 'veined stone', etc.]; PEC **ƛ'ănχwV* 'cobblestones, ruins' [Hinukh *ƛ'iχʷ*-in 'cobblestone'; Akhwakh *ƛ'aχa* 'ruins', Chamali *(ʔ)aχʷa* id., etc.]; Basque **lega*-ŕ 'pebble, gravel' [(B, G, BN, L) *legar* 'small stone, pebble, gravel, sand', (L) *legarri* 'pebbles' (**lega*- + **haŕi*), (AN, L) *legatx* 'gravelly land', (BN, L) *legartsu* id.] (ST III: 67, #250 **ƛāŋ / *ƛāk*; NCED 774; BCR D.16).
10. Haida (S) *q'ó·ɣa* 'rock' (Sapir 1923: 151) || cf. PST **Qər* 'stone' > Tibetan *gor* 'a general name for stone; stones, rubble'; Burushaski (H, N) *qoqór* 'soft, porous stone; small stones'; PEC **ɢŏrɢV* 'stone' [Chechen *ʁorʁ* 'coarse sand', Karata *ʁarʁa* 'gravel', Dargi *q:arq:a* 'stone', Agul *qˁarqˁ* 'rock', etc.]; Basque **gogoŕ* 'hard' (cf. Chechen *ʁorʁa* 'rough, coarse'), **goŕ* 'deaf' ('stone deaf'; 'duro de oído') (SCG 55; NCED 467; BCR R.28).
11. Haida *xila* 'to be dry', *xíl*-gał 'to become dry' || cf. PST **χiəl* 'dry' [Lushai *hil* 'nearly dry', Proto-Kiranti **hè[r] ~ *xè[r]* 'dry' > Kulung *har*-ma 'be dry (grains, leaves, grass, etc.)', Old Chinese **xəy* 'first light of the sun; to dry', etc.] (ST V: 179, #655 **χial*).
12. Haida *q'in* 'summer (from early April to late September)' || cf. PNC **ʁwĭnʔV* 'name of a season' [Chechen (oblique base) *ʕäna*- 'winter', Ingush *ʕano*- id., Dargi Chiragh *ha* 'summer', *hane* 'in summer', Kubachi *hani*-ši 'summer', Circassian yə-*ʁʷa* 'time, season, term', etc.]; (with metathesis and *e/i* ablaut: **nʔeʁwV* >) Basque **negu* 'winter' [(c) *negu* 'winter', (Z) *nə́gü*, (G, AN) *neu* id.] (NCED 482; BCR G.2).
13. Haida *ƛű́* 'boat, ship, canoe', *ƛű́*- 'by boat, canoe' || cf. PST **liy* (~ **ƛiy*), or **T-liy* 'boat' [Burmese *hliy* 'boat', Kachin *li*[1], Pwo, Sgaw *khli*, Taungthu *phri* id., etc.] (ST III: 25, #90 **lij ~ *ƛij*).
14. Haida *ƛá́s* 'tree limb, branch; (one's) limb' (Sapir 1923: 147 [tła·s] 'branch') || cf. PEC **ƛ̲'VćV* 'log, pole' [Tsezi, Hinukh *ƛ'iš* 'pole(s) for planking the ceiling', Bezhta *ƛ'ešä* 'board, step (of stairs)'; Akhwakh *ƛ':eč'a* 'log', etc.]; Basque **las* [(L) *laz* 'beam, rafter'] (NCED 781; BCR Q.61).
15. Haida *ƛamad* 'crossbrace or thwart in a canoe, seat in a rowboat or canoe' || cf. PST **ƛam* or **T-lam* 'a kind of stick' [Tibetan *lćam* 'lath, pole, rafter', Burmese *hlam* 'spear']; PEC

[81] **Q* is a cover symbol for 'any postvelar or uvular'.

**ƛ'VɦVmV / *ƛ'VɦVnV* 'shelf' [Avar *ƛ':oʕén* 'shelf'; Tsezi, Khwarshi *ƛen* 'shelf', Inkhokwari *ƛɨn* id.; Lak *č'amu* 'shelf'] (ST III: 58, # 214; NCED 781).

16. Haida *s=qam* 'trap; to trap' (see below for *s*-prefix) || cf. PST **k(h)ăm* or **ɢ(h)ăm* 'trap': Kachin mə-*kham*[3] to trap, Lushai *kam* 'to set (a trap)' (ST V: 87, # 319).
17. Haida (A) *ƛ'a-* 'thin, flat object' || cf. PEC **=iƛ'ɨ̆lV* 'thin' [Andi *=elora* 'thin', Akhwakh *=aƛara-*, Karata *=eƛ'ara-*, Avar *t'eréna-* 'thin'; Lak *k'ụla-* 'thin', etc.]; Burushaski **tharén-*um 'narrow, tight (of clothes)' (cf. Avar *t'eréna-*); Basque **lirai-*n 'slim, slender, svelte, lithe', **lerde-*n 'straight, upright, vertical' (SCG 105; NCED 639; BCR R.52).[82]
18. Haida (S) *ƛ'ad-* 'too wide' (classifies objects which are perceived as too wide, or large in some unpleasing way), Haida (A) *ƛ'an* 'place' || cf. PST **ƛoŋ* or **T-loŋ* 'wide, spacious' [Tibetan *śoŋ, gśoŋ* 'to have room in or on', Burmese *khyauŋ* 'to be broad, wide, spacious', Kiranti **lùŋ* > Kaling *luŋ*-pä 'rich, strong, large', etc.]; PEC **ɦwVnƛ'V* 'wide, spacious' [Bezhta *hũƛ'ƛ'o* 'wide, spacious'; Bezhta (dial.) *huƛ'*-iyo id.; Avar (Keger) *ʕilli*-d- 'wide']; Basque **ordo-* 'flat, level' [(L) *ordo* 'flat, level; plain', (AN, L, Z, R) *ordo*-ki 'plain, flat ground', (G) *orde*-ka 'plain, sown field'] (ST III: 75, #277; NCED 541; BCR D.6).
19. Haida (A) *q'ut* '(be) hungry', *q'udaal* 'famine', *q'ut'áa–* 'to beg for food', (S) *q'ud* 'hungry' || cf. Yeniseian **qɔqante* 'hunger' [Ket *qɔ:t* (19th century Ket *qoʁat*), Yug *xɔxat*, Kott *kajante* id., Assan *kajauinan, kajajnan* 'hungry', Arin *q́ogat* 'hungry', etc. (Haida-Yeniseian comparison by Ruhlen 1998).
20. Haida *q'ál* 'skin, bark' (Pinnow 2006: 77, #59) || PEC **q'wăɬV* 'bark, crust' [Tsezi *q'ʶul* 'bark', Bezhta *q'eq'el*-ba 'birchbark'; Akhwakh *q'oli* 'crust, rind', etc.; Basque **kal / *kol* [(Bzt) *akal* 'empty (of a chestnut shell)', (B) *mokol* 'shell (of egg, nut), husk (of maize)', *mokolo* 'husk (of maize)', (B-Zigoitia) *kakol* 'shell', etc.]; cf. Navajo 'a-*kał* 'leather' (NCED 931; BCR C.38).
21. Haida *s-λo* 'to put inside, arrange', *-λo* 'motion in a vehicle' || cf. Sino-Tibetan **ƛəwH* or **T-ləwH* 'to do, make' [Lushai *tlo?* 'to do', Kachin *gəlo*[1] 'to do, perform', etc.]; PEC **=iŁV* 'to put' [Chechen *=ā̆l-* 'to become, get', Tsezi *erʷ-* 'to put', (with preverb **g=*) Hinukh *g=or-*, Khwarshi *g=il-* id., etc.]; Basque **lan* 'work, labor, job', etc. (ST II: 78, #289 **ƛuaH*; NCED 641; BCR L.6).
22. Haida (A) *ƛ'a'ā́w* 'to sit down, be sitting (of plural)' || cf. Sino-Tibetan **ƛə̆y* 'to tarry' [Old Chinese **Łhəy* 'to tarry, delay', Burmese *liyh* 'be slow, sluggish', Kachin *la*[2] 'to wait, tarry']; PNC **=ä̆ƛĔw* 'to lie, put; lead' [Chechen *ʕ-ill-* 'to lie', *=ill* 'to put', Hunzib *li / lo* 'to be', Archi e*=ɬ:a-* 'to put, lie', Ubykh *-łə-* 'to lie', etc.]; Basque **e=aurti / =aurdi* 'to throw, hurl, launch' (ST III: 65, # 240; NCED 278; BCR V.35).
23. Haida *ƛ'a-*da, *ƛ'a-*dáa 'to kill (O plural)' || cf. Burushaski **=ĺ-* 'to hit, kill'; PNC **=iwƛ'E̋* 'to die, kill' [Chechen, Ingush *=al-* 'to die', Karata *=il?-* 'to die', Akhwakh *=iƛ'-*, Avar *=al?-* id., Bezhta, Hunzib *=iƛ'-* 'to kill'; etc.]; Basque **hil* [(BN, L, Z) *hil* 'to die; dead', (B, G. AN, R, Sal) *il* id.; also (G, BN, L, R, Bzt, Sal) 'to kill'; and also as a noun: 'death; dead person; corpse'] (NCED 661; BCR R.19; SCG 108).

To these lexical matches, a caution. For the present, they can be regarded as "proto-etymologies," *i.e.* potential etymologies that should be subjected to all possible tests (phonetic

[82] I find S.A. Starostin's inclusion of PST **ral* 'thin (of liquids), watery' (SCG 105) unconvincing.

compatibility, whether or not they are loanwords, etc.) before being accepted as "true" etymologies in the orthodox sense.

Phonetic notes: Haida *k'* = PNC **k'* (1, 4); Haida *q'* = PNC **q'* (2, 20); Haida *k* = PNC **k* (3); Haida *ƛ'* = PNC **ƛ'* (17, 18, 23); Haida *ƛ* = PNC **Ł* (5, 21). But there are also counter-examples in which laryngeal qualities do not match: Haida *ƛ* / PNC **ƛ'* (14, 15); Haida *ƛ'* / PNC **ƛ* (22). In cases of two similar consecutive consonants there could have been metathesis or dissimilation of laryngeal qualities: Haida *qáw* / PNC **q'wāq'wV-* (7); Haida *q'ó·ɣa* / PNC **ɢŏrɢV* (10). These are rather remote comparisons, so much remains to be known.

Haida-Dene-Caucasian grammatical cognates: In addition to the lexical peculiarities, Haida also naturally has grammatical differences from the rest of Na-Dene. One of these is the prefix *s=* on nouns which is not found in other Na-Dene languages but is frequent in Sino-Tibetan languages, notably in Tibetan and Old Chinese. This *s=* seems to be a fossilized remnant of a class/gender morpheme, article, or demonstrative (Bengtson 2002); "Initial *s-* in the Haida nouns is assumed to be a classifying prefix similar to classifying prefixes on nouns in Eyak; it occurs in a significant number of body part terms" (Enrico 2004: 251).

1. Haida ***s=qál*** 'shoulder; front quarter of animal' (S *sqəl*, M *sqal*, A *sqál*) || cf. Tibetan ***s=gal***-pa 'small of the back', Garo dźaŋ-*gal* 'back', Lushai *ēl* 'the part of the back behind the abdomen' (*q > Ø) < PST **qālH* 'back, small of the back' (ST V: 152, #560).[83]
2. Haida ***s=gu*** 'back' || cf. Tibetan ***s=ku*** 'body', *s=go* 'body, face' (both from PST **khăw* 'body', per ST V: 97, #357).
3. Haida ***s=k'yā́w*** 'tail, coccyx, tailbone'; *k'i-d, ł=k'i-d* 'tail (of bird), flukes (of whale)' || cf. Tibetan ***s=kyi-***ša 'anus'; Tlingit *k'í* 'rump, buttocks'; Basque *uzki* 'anus' (if from **u=s=ki*).[84]
4. Haida ***s=q'ut*** 'armpit' || cf. Tibetan ***s=ked***-pa 'waist'; Burushaski **=ʹqat* 'armpit'; PY **qot-* 'in front, before'; PEC **qVdV* 'brisket': Avar me-*héd*, Bezhta *ʁade* (SCG 170).[85]
5. Haida ***s=kyū́*** 'shoulder; collarbone (of halibut)', *s=kyū́-* 'on one's shoulder' || cf. Tibetan ***s=gu***-stegs 'elbow, angle' < PST **kĭw* 'curved, bent': Lushai *kiu* 'elbow, point of the elbow' (ST V: 55, #204); Tlingit *kìy* 'knee'.
6. Haida ***s=t'a*** 'foot' || cf. Tibetan ***s=ta*** 'hip bone'; Old Chinese **təʔ* 'foot, heel'; Jingpho lə=*tho*^{3} 'the leg just above the ankles' (SCG 207).[86]

[83] The semantic change 'shoulder ~ back' is commonplace, e.g., Spanish *espalda* 'back' ~ Italian *spalla* 'shoulder', etc. (Buck 4.19, 4.30).

[84] Enrico (2004: 289, no L138) cites the Haida-Tlingit match as an example of "Haida and Tlingit resemblances with no evidence for a source language." The semantic link of 'tail' ~ 'anus' is quite ordinary (Buck 4.18).

[85] For semantic range, cf. the IE etymology with Irish *coss* 'foot, leg' ~ Latin *coxa* 'hip' ~ Tocharian B *kakse* 'midriff loins' ~ Dutch *haas* 'tenderloin' ~ Persian *kaš* and Old Indic *kákṣa* 'armpit' > Bengali *kā̃kh* '**armpit**; flank, hip, **waist**', etc. (Buck 4.35).

[86] For semantic typology of 'foot' ~ 'hip', cf. Irish *coss* 'foot, leg' ~ Latin *coxa* 'thigh' (see foregoing footnote).

7. Haida ***s=gíl*** ‘navel, umbilical cord’ || cf. Balti ***s=kil*** ‘center’, Ladwags *s=kyil* id. (with a different prefix: Tibetan *d=kyil-ma* ‘middle, center’); cf. Tlingit *kùl* ‘navel, umbilical’, Eyak *ǯiʔƛ̓* [dzhiʔtl’] ‘navel’ (Enrico 2004: 252, citing Haida + Eyak, but not Tlingit).

S= also has (or had) a verbal function. Cf. Haida *kún* ‘nose, snout, muzzle; beak (of puffin); end, tip, point’ : *s=gún*-ula ‘to smell good’, *s=gun*-á̱ ‘to be smelly stinky’ (Lach 189, 319, Law 254).[87] “Pre-Haida, according to the picture developed here, therefore had a classifier-extensor [*s=, ɬ=*] system in verb stems, but shed it very early . . . most Haida instances of verb stems retaining “classifiers” are borrowings from Tlingit” (Enrico 2004 261; see also notes 15 and 16). On the other hand Pinnow tried to demonstrate a classifier-extensor system in Haida, which is, according to Enrico, “in part misguided.” Nevertheless, Enrico thinks there are “relics” of such a system in such forms as Haida (S, M) *ɢāl*, (A) *ɢá̱l* ‘night’ ~ Haida *ɬɢəɬ*, *ɬɢaɬ* ‘black’ (*i.e.*, *ɬ=ɢəɬ, ɬ=ɢaɬ*), which he regards as genetic cognates with Eyak *ɬ=χeʔƛ̓* ‘get dark’, *χəʔƛ̓* ‘darkness, night’; Ahtna *ɬ=ʁēƛ̓* ‘be(come) dark’, *ʁēƛ̓* ‘darkness’, etc. (Enrico 2004: 256, set 78); cf. Navajo *di=ɬ=hiɬ* ‘dark, jet-black’, *xiɬ* ‘night; a date’; Hupa *xiɬ* ‘dark, murky color’, *wiɬ-* ‘darkness (of night)’, *=l=wiɬ-* ‘to become night’ (/w/ < *$\gamma^{(w)}$); Chipewyan *xíɬ* ‘darkness’; Carrier *ɣeɬ* ‘darkness (after sunset)’.

[87] Cf. PST [**Kuŋ*] ‘nose’: Bodo-Garo **guŋ / *kuŋ*, Konyak **kuŋ*, Naga: Mao oŋ-*huŋ* ‘nose’, Lepcha *kŭŋ* ‘ridge (of mountain, nose)’ (TOB).

HEINZ-JÜRGEN PINNOW, NA-DENE AND BEYOND[1]

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1. HEINZ-JÜRGEN PINNOW

For several years I was connected to Heinz-Jürgen Pinnow by an informal, very interesting correspondence, during which he aroused my interest in the languages and way of thinking of the North American Indians. Navajo, Tlingit, Haida, and Na-Dene in general were our most important topics. In his letters, however, he also spoke with great concern about the negative attitude of English-speaking linguists towards his work and research results. He was deeply hurt at that time by Robert Levine's almost devastating article in Levine (5). This led to years of 'paralysis', Pinnow said, before he devoted himself again to this topic, which finally led to his four-volume work *Das Haida als Na-Dene-Sprache* (4).

2. NAVAJO

Since Navajo, or *Diné bizaad* in Navajo itself, is probably the most important representative of the Athapaskan and the Na-Dene languages, I would like to briefly outline some of the peculiarities of the language for illustration purposes.

The linchpin of Navajo – and this basically applies to all Athapaskan languages and to Tlingit as well – is the verb. In Navajo, an action (here as an umbrella term for an action, an event, a state, etc.) within the verb, must be depicted in the most precise way possible, almost in photographic form. This description reaches down to the smallest nuances, and the verb must exactly picture many informational details, especially in which way an action takes place in space and time. In addition to elements that express verb aspects and types of action, mainly in the form of prefixes, there are a number of other elements, most of them prefixes, that express various nuances of action that are important and obligatory for the representation of an action. One could say that the verb articulated represents the realized point of intersection in a multidimensional coordinate system, with time and space as one of the main axes. It becomes clear – also in a philosophical sense – how strongly language and geographical and temporal space are interwoven and how strongly the rootedness of tribal soil influences the functioning of this language. The meticulous description

[1] (a) Pronunciation information is given in square brackets in IPA transcription; (b) examples in Chinese are given in Pinyin transcription and, where possible, in Chinese simplified characters; (c) instead of Heinz-Jürgen Pinnow I use only Pinnow as abbreviation in the following text, instead of Jan Henrik Holst only Holst; (d) E. = English, G. = German, ND = Na-Dene.

of an action down to the smallest detail within the framework of experienced time and space makes Navajo a language very strongly oriented towards concrete reality, while abstractions out of the language are hardly representable. Forming an infinitive or verbal noun of a verb is not possible, not only as a grammatical process, but also as a concept of imagination, since in the linguistic thinking of the Navajo people there are only individual, concrete actions, but not a word for the abstraction of an action. There is no 'the walking' as an abstraction in the Navajo world of imagination, there is only 'I walk', 'I have walked', 'someone walks', etc.

I would like to illustrate the functioning of the Navajo verb by two examples from Pinnow (3). The verb consists of a verb stem, which itself can vary according to aspect, type of action and tense (verb stem variation). Some suffixes can also be added. All other important information outside the basic verb meaning is carried by a complex prefix chain divided into several slots. In Navajo this is aggravated by the fact that these prefixes merge strongly with each other in the current realization, so that the individual parts are often not recognizable directly, but only in the effect on each other.[2]

Example 1: 'see' (transitive)

Imperfect: *yiistséëh* I see (him)

Perfect: *yiiltsą* I saw (him)

Future Tense: *yideestséëł* I will see (him)

tséëh, tsą, tséëł: verb stems

Example 2: 'know; get to know' (transitive)

Static: *béëhonisin* I know him

Imperfect: *béëhonissįįh* I get to know him

Perfect: *béëhosésįįd* I got to know him

Future Tense: *béëhodeessįįł* I will get to know him

zin, zįįh, zįįd, zįįł: verb stems; basic meaning: 'thinking'; enhanced meaning 'know, get to know' by prefix chain *bi-á-wo-* = *béëho-* and *-ł-zin* etc. = *-sin* etc.

One can see that there are hardly any elements in the surface structure of the verb that directly relate to imperfect, perfect, etc., so that one basically has to learn the individual forms, tenses,

[2] Information on the Navajo orthography: *ł* = unvoiced L [ɬ]; *h* also pronounced at the end of a word as a h-sound [h]; *a, e, i, o* [a, ɛ, ɪ, ɔ]; *aa, ee, ii, oo* [a:, ɛ:, i:, ɔ:]; *ą* = nasal short a; *įį* = nasal long i. Vowel letter with accent, e.g. *á* = high tone, without accent, e.g. *a* = low tone

etc., for each verb. The prefix combination *-dee-,* for example, does not necessarily indicate future tense, but in connection with *-ɬ* at the end of the verb stem, the chances are high that it is this tense. However, the suffix *-ɬ* can merge with a preceding consonant, so that there are also future forms that do not end in *-ɬ*; and not every *-ɬ* at the end of the verb stem necessarily hints at future tense.

3. PINNOW: REJECTION OF HIS RESULTS (SEE HOLST, SECTION 1: HEINZ-JÜRGEN PINNOW)

3.1 Tlingit, verb stem variation, slot system, spelling

As Holst quite rightly points out, Pinnow's research results in the field of American Indian studies were misjudged throughout his life or never really appreciated, so that today he is almost one of the unknown linguists. The consequence of this is that today it is almost impossible to find him in bibliographical references. This may be due to the fact that he wrote in German, but it may also be due to the fact that his research results were often rejected.

His first researches about Tlingit (or *Lingít* in their own language), e.g. in Pinnow (1), were already early on a high level in methodology and results, although from today's perspective partly outdated and of course not always correct. However, his research results were hardly taken note of and were predominantly rejected as pure speculations by the experts. Also his ablaut theory together with the results of his research in the field of verb stem variation in Na-Dene (Tlingit, Navajo), which were first published in Pinnow (1) and later in Pinnow (2), were mostly rejected as speculation. Pinnow's main aim here was to show that original diphthongs in verb stems often became monophthongs, whereby various vowels arose dependent on different strength on the first or second component of the diphthong, depending on tense or aspect, which characterizes the current image of the different verbal stem vowels. E.g. (from Pinnow (2)):

**goed* (digging) > Imperfect *geed* > Future tense *god*

**tɬoex* (to be wet) > Imperfect *tɬeeh* > Future tense *tɬoh*

**tcaex* (crying) > Imperfect *tcééh* > Perfect *tca* (*tc* = Pinnow's spelling for *ch* = [ʧ])

Pinnow's findings on the ablaut system and of the verb stem variation (Pinnow himself calls them 'preparatory works'), which basically already contained the solution to the problem of the vowel change, were initially rejected by Krauss and Leer. But notwithstanding their massive criticism, Michael E. Krauss and Jeff Leer (6), (7) and other linguists later apparently adopted Pinnow's ablaut theory largely and continued it, without referring in their publications to Pinnow (1) as the predecessor of this line of thought.

Another quite descriptive example of Pinnow's practical approach to Athapaskan is the numbering of the prefix slots. These slots are numbered on the basis of their successive order, so that one can then say a prefix **ni* is in slot 3 or possibly even more precisely in slot 3.1. or 3a etc. This classification has proven itself and is used in Navajo, in the other Athapaskan languages and in Tlingit, too. Also in other languages with a similar prefix structure, like Sumerian, such a prefix slot system is used. It is understandable of course that different slot segmentations exist depending on the language and also on the researcher and state of research, and that thus the assignment of prefixes and suffixes to certain slots can be different.

Its disadvantage, however, especially for sake of comparability, is that these prefix slots are numbered with position 0 or 1 at the extreme left end and are then counted up to the verb stem, e.g. **ni-ho-wo-sh-LAA* as 1-2-3-4-5 with 5 (*LAA*) as verb stem slot. A linguist, who considers certain prefixes as subgroups or builds the system differently or does not consider the leftmost prefix as part of the verb body, then counts e.g. 1-2-3-4, now with 4 as the number of the verb stem slot. This means that the part that is always the most important element and center of the verb, namely the verb stem itself, constantly gets a different number. But the verb stem is actually the fulcrum of the whole verb body.

For good reason Pinnow therefore recognized this counting direction as impracticable and changed the numbering order by specifying the verb stem slot invariably as 0. A chain like **ni-ho-wo-sh-LAA* above is then numbered as 5-4-3-2-1-0, and, no matter how the prefixes are regrouped, the verb stem, even the prefixes close to the verb, which are rarely questioned in their position, remain unchanged in their numbering. Suffixes are appended with negative numbers, e.g. **ni-sh-LAA-d* as 2-1-0-[-]1.

Another positive side effect of Pinnow's slot numbering system is that this numbering basically also represents the chronological succession of the inclusion of these elements in the verb body, since we know that the most recent elements that have been added at the latest are on the far left (or far right). This simple, practical system with a high degree of comparability, however, has not been followed.

His criticism of the spelling systems of Navajo and Tlingit, which are in part strongly oriented towards English writing, also was not heard. He complained, for example, that sound pairs like voiceless [ʧ] vs. voiced [ʤ] are written as *ch* and *j*, respectively. Depending on the prefix structure the spelling of the stem-initial sound varies between *sh* and *j*, e.g. by the so-called d-effect (as in passive-constructions). The formula of this d-effect is: *d* + *s* = *dz*, *d* + *ɬ* = *dl*, but *d* + *sh* = *j*. The English-based orthography disturbs this symmetry and conceals the d-effect in *sh* > *j*, whereas in *d* > *dz, d* > *dl* it is apparent in writing.

He also judged the spellings *sh* and *zh* to be impractical, which is shown for example by the fact that because of *sh* meaning [ʃ] the sound-combination [s] + [h] must be written as *sx* to distinguish it from *sh* [ʃ], although *x* is not used anywhere else and alien to the spelling system of Navajo.

He considered Tlingit's official spelling of the long vowels to be particularly detrimental, as it differs from their short-vowel partners – this also influenced by English. Since there is a grammatical change in the verb stem vowels between long and short, a verb stem vowel is alphabetically differently written depending on the vowel quantity, which Pinnow regarded as extremely unfortunate, which I can only endorse. Example: [u] = *u*, but [u:] = *oo*, [e] = *e*, but [e:] = *ei*, [i] = *i*, but [i:] = *ee*.

3.2 English and German as languages of publication

Holst mentions that Pinnow had written in German and that it was well worth it that interested persons should nevertheless take the trouble to read his work. I can fully agree with that.

In my opinion, however, the use of German as the language of his works is one of the main problems, and why Pinnow received so little attention. I find this all the more regrettable as especially in linguistics one should be more open-minded towards languages as a medium of communication.

However, this has not changed. The pressure to generally publish in English in the academic field has become even stronger and has basically affected all areas of scientific research. In my opinion, Pinnow's work will continue to lose importance and fall into oblivion in the future. His modest, but disadvantageous habit of titling his publications, as groundbreaking as they often were, often with the addition 'An Attempt' or 'Preliminary Work', was of course also very detrimental to a serious reception by linguists.

3.3 Language comparison and sound development in Pinnow (see Holst, Section 2: Na-Dene)

The charge against Pinnow's methodology of language comparison

Among other things, Levine (5) more or less accused him of accepting all kinds of sound developments or constructing sound equivalents in order to prove etymological relationships between Na-Dene languages and Haida. It was especially this reproach in Levine (5) that hit Pinnow hard, as he personally told me. The result of this blow was that Pinnow completely turned away from American Indian studies, but then finally, years later, Pinnow (4), published a complete phonetic-lexical-etymological comparative overview between Haida and the other Na-Dene languages. This should have convinced the critics at last, but this work received no attention, I think. I also suspect that, after Levine (5), this thematic 'discussion' about Haida was considered over and Haida was finally regarded as an isolated language with no connection to ND.

The following main arguments were put forward to reject Pinnow's research:

a) When Pinnow recognized words as related to each other, in which the current recognizable sound agreement involved one sound or even less, this word relationship was rejected and such a comparison was evaluated as inadmissible (the existing relationship between

the English word *gift* with the German equivalent and related word *Gabe* would then have been rejected as inadmissible; all the more, e.g., E. *I* and G. *ich*, E. *two* and G. *zwei*).

b) When Pinnow recognized kinship of words which resembled each other very strongly or which possibly even were homophonous, this words were also rejected, with the absurd reason that there was an 'over-resemblance' (a relationship between the English word *gift* with the completely identical and etymologically closely related German word *Gift* 'poison', which has only changed extremely in its meaning, would then also be rejected by this argumentation of 'over-resemblance'; so probably also E. *garden* and G. *Garten*). In Pinnow (4), Pinnow quite rightly called this a 'witch trial'.[3]

c) When Pinnow compared animal names with each other and recognized etymological kinship in them, this was also rejected as inadmissible in Levine as well as in Krauss & Leer, since this similarity was based solely on mutual borrowing – so their point (the English word *ox* with the irregular plural *oxen* would then be nothing more than a borrowing from German, where this animal is also identically called *Ochs(e)* (*chs* = *x*) with *Ochsen* being the regular plural of it.)

This all seems to be very arbitrary and has nothing to do with fruitful scientific discussion of research results. In my opinion, this is a deliberate attempt to discredit Pinnow in the professional world. However, I am not clear about the reason for this aggressive action against Pinnow and his research results.

But again back to the reproach Pinnow would have accepted all kinds of (necessary) sound correspondences and sound changes when comparing languages by constructing sound relationships or sound laws.

In the field of Indo-European languages there are a large number of contemporary well-known languages, many of them written for a long time already. Moreover there are many written documents of old preforms of those languages (e.g. Gothic, Latin, Old English) or testimonies of extinct languages and language branches such as Tocharian, Hittite, Luwian. For more than a hundred years, it has been possible to investigate in this language family languages, dialects, language change, sound changes and sound laws, so that the procedure of language investigation and development of working processes in Indo-European research not only form a sound basis for work over decades, but can also be applied to research on other language groups. Pinnow has worked and researched in the field of Na-Dene languages in the same way as we know it from Indo-European studies. He has carried out serious, meticulous research and delivered well-founded, verifiable results with regard to sound development and language kinship.

[3] Levine called this category "overresemblance", ignoring the fact that, for example, many modern Indo-European forms from diverse locations are still nearly identical after 6,000 years or so, e.g. English *cow* and Armenian *kov*; Latvian *sirds* and Armenian *sirt* 'heart', etc. [Ed.].

The fact that sounds are changing over time and can develop to all kinds of other sounds via certain intermediate stages is exactly what actually happens or what we actually discover – in Indo-European studies as well as in other language families. Compare the French word *eau* [o] 'water' with its Latin pre-form *aqua* 'water', or the word *sjauer* 'four' in the North Frisian dialect of the island of Amrum with the closely related German word *vier* 'four'. The rejection of working and research methods, as we find them in Levine (5), would hardly have led to the awareness of etymological kinship of these words.

These restrictions, which are obviously demanded here from language research, or at least from the research of a Pinnow, and which Pinnow in his polite manner calls 'extremely high demands with regard to the sound equivalents', lead basically to the obvious fact that linguistic research has to stop exactly at the point where research on the basis of the methodology of, for instance, Indo-European studies, just begins.

Finally, I would like to bring some evidence from Indo-European languages which show how far etymologically related forms can distance themselves from each other even after a relatively short time.

a) the numeral 'four': Gothic *fidwor* [ɸiđwɔr] > G. *vier* [fi:ɐ̯], E. *four*, North Frisian of the island of Föhr *fjauer* [fjauɐ] > of the island of Amrum *sjauer* [ʃauɐ]; Irish *ceathair* [kʲæ:rʲ] (Cois Fhairrge dialect), Welsh *pedwar* [pɛdwar]; Czech *čtyři* [ʧtɪɹi]; Ancient Greek *téttara*

b) Latin *est opus* > *est opere* 'it is an obligation' > Rhaeto-Romance *stuvair* [ʃtuˈvair] 'must'

c) Latin *aqua* 'water' > French *eau* [o].

d) Irish *codlaidh* [kołə] 'sleep' = G. *dulden* 'endure'

e) Latin *sequi* 'follow' = Ancient Greek *hépomai* 'follow' = Germanic **sehwan* 'follow' > 'follow with the eyes = see' > G. *sehen* [ze:ən], E. *see*, North Frisian *sä* [sɛ], all meaning 'see'

(f) the numeral 'five': G. *fünf* [fʏnf], Dutch *fijf* [fɛjf]; Latin *quinque*, Rhaeto-Romance *tschuntsch* [ʧunʧ]; Irish *cóig* [ko:gʲ], Welsh *pump* [pɨmp]; Czech *pět* [pjɛt]; Ancient Greek *pénte*.

I am convinced that, with the arbitrary restrictions imposed here by Krauss, Leer and others on language comparison and linguistic research, many of the above existing similarities would have been rejected (especially if one disregards any existing spelling, which is often more conservative, preserving ancient sound-states longer, e.g. Irish [kʲæ:rʲ] = *ceathair*). As a consequence one could probably never have gained such deep insights and knowledge regarding the Indo-European group and its individual languages, or an Indo-European language family would even never have been discovered or accepted.

3.4 Another argument for and against Haida as a Na-Dene language: the prefix structure

The Na Dene languages such as Navajo or Tlingit use complex prefix chains on the verb for flexion and differentiation, while Haida uses suffixes here. This difference has sometimes been used as an argument for Haida not being related to Na-Dene. I do not know whether this argumentation is still being heard today; in any case, I find this argument extremely weak.

The German language provides a good explanation for how both pure prefix chains and pure suffix chains can emerge in related languages, because German uses – in the broadest sense – both systems. German of course does not possess these kinds of affix structures. However, it is quite sufficient here to visualize the structure and sequence of the pronouns at the verb. Although these are independent in German, the structure can nevertheless be compared to the prefix structure of Haida, Navajo and others.

German is not as rigid as English as regards the word order in the sentence, but by far not as flexible as Latin, Ancient Greek or even Czech. In German, as basically in all Germanic languages, the inflected verb must always take second place in the standard sentence.

a) Main clause standard		Structure in German
Ich sage es ihm.	I tell it to him	p-V-p-p

p = pronoun(s), V = verb

As soon as another word comes to the beginning of the sentence, the subject is placed behind the verb that thus can keep its second place position:

b) Main clause with preceding word		Structure in German
Dann sage ich es ihm.	Then I tell it to him	V-p-p-p

In a subordinate clause on the other hand, this second position rule no longer applies; the conjugated verb must be placed at the end of the sentence, so all pronouns must get a position before it:

c) Subordinate clause		Structure in German
… weil ich es ihm sage.	… because I tell it to him	p-p-p-V

Example (b) is identical to the suffix order in Haida (V-p-p-p), example (c) is identical to the prefix order in Navajo or Tlingit (p-p-p-V). This means that a single language, here

German, can have both structures (here even with (a) three (p-V-p-p)) depending on grammatical conditions. One can easily imagine that in the course of time speakers could have agreed on one certain word order and on one pronoun- or prefix-sequence, respectively, in order to simplify the sentence structure, the others not being used any longer (basically nothing else happened in English after the Old English period). In Proto-Na-Dene variant b) was increasingly preferred, while Proto-Haida – probably because of its remote location – preferred variant c). I think this finally invalidates the argument that the different placement of affixes to the verb is an exclusion criterion for Haida as part of ND.

3.5. Haida: the family tree (see Holst, section 2: Na-Dene)

Those who see Haida as part of the Na Dene language family assume that Haida is a separate branch that diverged early from the Proto-Na-Dene tree. This opinion is based, among other things, on how strongly Haida differs from the other Na-Dene languages. From the outset, Pinnow himself, as Holst points out, was of the opinion that Haida was a separate branch of the Na-Dene family tree. My own knowledge of Navajo on the one hand, of Tlingit on the other hand, as well as of various materials that Pinnow had collected on Haida, make me still share Pinnow's opinion and see Haida as a language branch of Na-Dene in its own right.

Even though it will probably never be possible to provide complete proof in this or any other direction, it is of course sensible to keep putting old findings to the test and questioning them on the basis of newly obtained research data and methods.

Holst is of the opinion that despite strong linguistic differences between Haida and the other Na-Dene languages, the family tree of Na-Dene should be drawn differently. Such an opinion or suggestion is completely legitimate, but it must of course be supported. I am now very interested to know which exact findings lead to this opinion if the fact that Haida differs more from all others than they do from each other (which Holst probably also affirms) does no longer play any role in the genealogical structure of Na-Dene.

Of course, a clear, reliable factual situation must be created here, which supports this opinion. Perhaps this would be a future project for Holst?

Irish or Gaelic is a good example of a successful reassignment to a linguistic family tree. Due to its external strangeness and its sentence structure, which is unusual for Indo-European languages, and other circumstances, it was originally not assigned to the Indo-European language family. Only later research revealed that Irish as a Celtic language is an integral part of Indo-European and represents the current Celtic branch of the family tree together with Welsh, Breton, Cornish, Manx, and Scottish Gaelic.

4. LINGUISTIC MACRO-FAMILIES (SEE HOLST, SECTION 3: BEYOND)

4.1. Sino-Tibetan + Na-Dene > Sino-Dene: Chinese – Navajo

Should a common linguistic macro-family consisting of Na-Dene and Sino-Tibetan prove to be true, we would have established a macro-family that comprises such important languages as Chinese and Navajo as representatives of two completely different systems of language and thought: Chinese on the one hand with a very high degree of abstraction, with almost minimalistic expression of forms, references and other linguistic information, and Navajo on the other hand with a minimal degree of abstraction, with a system of almost photographic mapping of reality and an almost overwhelming variety of shapes in verbal forms.

If, one may ask, languages with such different, almost diametrically opposed language typologies can be part of a macro-family, to what extent can typologies serve to assign languages to specific families and macro-families (and possibly even beyond that)?

4.2. Lakitic

From my point of view, the assignment of languages to language families, e.g. Na-Dene, and these in turn to macro-families such as Sino-Tibetan, Dene-Sino-Caucasian, Yeniseian and even larger genetic entities such as Holst's Lakitic (= Sino-Dene-Yeniseian) mainly on the basis of linguistic typologies, as proposed by Holst for the Lakitic group (e.g. ablaut), is leading to a fairly high degree of uncertainty.

On the other hand, the assignment to language families on the basis of etymologies and word kinship, is – I think – quite promising, although of course plausible sound developments and sound laws have to be taken into account. The danger of misinterpretation naturally increases the deeper one looks back into the linguistic past, and the time-depth of that Lakitic family is already very large.

This I will show in the following.

4.3. Lakitic: the term 'hand'

Holst sees in the word for 'hand', an elementary word from the immediate basic vocabulary of each language, a connecting etymological element of the three major language groups Sino-Tibetan, Na-Dene and Yeniseian, which finally leads to his decision to give the entire macro-family a name based on it. I find such an appellation on the base of common lexical features very useful and also quite conclusive (recalling to the once established Indo-European subgroups centum-languages and satem-languages on the base of the numeral 'hundred').

But in the Indo-European languages, for instance, the term 'hand' would not work as a basis for relationship research or even for an appellation. Already closely related Indo-European language groups use very different words for 'hand', which are not related to each other. In the Romance branch those words begin with M, which are derived from Latin *manus* 'hand': e.g. French *main*, Italian *mano*, Portuguese *mão*. In Old English there

also had been a word *mund* in the meaning ‘palm (of the hand)’. In the Germanic languages the words for ‘hand’ all begin with H, e.g. Gothic *handus*, English *hand*, German *Hand*, Icelandic *hönd* [hœnt], North Frisian *hun*, all of which are probably based on a Proto-Germanic verb **hinðan* ‘to reach for’. In Czech, as an example of a Slavic language, the word for ‘hand’ is *ruka*. These few examples already show that we cannot necessarily assume that common terms even for words of the basic vocabulary exist in cognate language, language families, and especially in linguistic macro-families with an even greater time depth. Therefore, a Swadesh list should of course also be interpreted carefully, too.

Holst’s finding that languages of the Lakitic group have similar names for the term ‘hand’ that begin with L does not, of course, exclude that other languages that do not belong to this presumed linguistic macro-family may also have names for the term ‘hand’ that begin with L or L-like sounds. I first think of the Celtic languages that use words beginning with L for ‘hand’: Irish, Scottish *lámh* [ɬãv], Manx (of the Isle of Man) *laaue* [lɛ:u], *Welsh llaw* [ɬau], Cornish *luef* [lœ:v]. Linguists know, of course, that these Celtic L-initial words come from an early Celtic pre-form with *PL at the beginning of the word (thus **plama*) and that these forms thus correspond to the Latin word *palma* (palm of hand, palm tree), whence English *palm*, French *paume* [pom] (palm of hand), or to the Old High German word *folm* (flat hand), that has not survived in modern German. But this is only apparent by research and language comparison and perception of certain sound developments and sound laws.

This of course leads to the possibility that in the worst case the L-forms of the Lakitic macro-family represent only a coincidental contemporary picture due to the very great time-depth and that some of such word examples have originated from completely different sounds or sound-combinations and thus would not be related to each other at all. On the other hand, pre-forms of languages with original L at the beginning of the word can also have developed this sound to another sound (e.g. r, voiceless l, sh, w), so that there can exist etymologically related forms which today no longer begin with L and are therefore not recognized as related.

Holst writes on the subject ‘hand’: ‘no families outside Lakitic with a similar word for ‘hand’ are known to me’. I am not assuming that Holst is saying that on the basis of the present facts, solely languages of the Lakitic group have words beginning with L for ‘hand’. I have already shown above that this is not the case. I suppose he means rather the typical phonetic structure L + vowel + velar plosive sound (laʔ, lak, etc.), which can be seen from his examples, I call this basic form L-A-K for short. But also this statement of Holst is in my opinion not convincing enough to derive from it an argument for a common linguistic macro-family. As I said, the main problem is and remains the enormous time-depth, and since especially plosive sounds are subject to profound sound changes, it is even almost doubtful whether the present examples prove at all phonetic kinship, or simply show an accidentally coinciding picture in our time.

Moreover, such a common etymological root L-A-K would not automatically exclude other languages that are not connected to those Lakitic languages. The Czech *ruka* or the Latvian *roka* for 'hand', for example, would fit in perfectly, since a change between L and R is abundantly documented in the history of languages. Also Gaelic *lámh* or Welsh *llaw*, both meaning 'hand', would meet the criteria if we did not know exactly about the etymological connections, because a velar plosive can certainly develop into a velar fricative sound with a further way up to a semivocal u-sound (lak > lag > lagh > labh > law).

In addition to Holst's examples, I will now bring three further examples of words with the meaning 'hand' from the environment of the presumed Lakitic:

Navajo: *-la'*

Tlingit: *-jín*

Han Chinese (Hàn-Yǔ): *shǒu* 手

While Holst's examples of Haida, Mattole (an Athapaskan language of the Californian branch), Ket, Burmese, and Tibetan seem to indicate a similarity of type L-A-K, the three examples of three languages I have mentioned, which are also typical of this group, do not show any visible similarities between one another.

The Indo-European languages have also shown that roots of various terms such as 'handle, hand, fist, claw, paw' can often serve as basis for a later, secondary meaning 'hand' which is a good reason for the often quite different words used to describe 'hand' in even closely related languages or language groups.

4.4. Lakitic: the numeral 'five'

It can often be seen that a linguistic – and of course mental – connection exists between the body part 'hand' and the number 'five'. The Roman numeral sign V for the numerical value 5 for example indicates the spread hand.

In addition to his explanations on the subject of 'hand' in the postulated Lakitic language group, Holst refers to terms for the number 'five' which relate to the word 'hand' in the Na-Dene and Sino-Tibetan languages. He mentions for instance the Tibetan word *lŋa* for the number 5.

The word for 5 in Navajo is *ashdla'*, which according to Pinnow (3) is to be broken down as **a-sh-t'aa-la'* meaning 'this is my hand', with *-la'* = 'hand', as we already saw above. This not only supports the statement that words for hand and 5 can be related; this short sentence 'this is my hand' also proves that here the idea '5 = hand' is consciously present and verbally expressed. On the other hand, the Navajo example *ashdla'* shows a certain problem to keep in mind: the word for 'hand', *-la'*, is indeed contained in the numeral for 5, *ashdla'*, and also starts with L, but *-la'* is part of a more complex word and not

word-initial. In such cases, of course, it is very difficult to recognize etymological connections. Moreover, one must be careful not to regard every word-internal L in a Lakitic numeral for 5 as part of a word ‘hand’.

Further examples of Lakitic numerals for 5 follow (source except for Chinese, Old Chinese, Navajo, Haida: www.zompist.com, last call 3.6.2019):

a) Na-Dene: Chipewyan *samsumláre*; Hupa *tshwula’*; Kuskokwim *tsehulo’* – all three most likely with a final part from a word stem for ‘hand’; Tlingit *kejín* (with *-jín* = hand); Haida (according to Pinnow (4)): *tleetl* from *(s)tla(a)* = ‘hand’ + *-etl* = ‘with’, so the basic meaning is ‘with the hand’, there are also *tleła*, *tlaheeł*.

b) Sino-Tibetan: Han Chinese: (Hàn-Yǔ) *wǔ* 五, Hakka: *ng*^{31} (31 is indication of the tone contour), Old Chinese: *nguo* ~ *ngux* 五; Tibetan: *ŋa*; Classical Tibetan: *lŋa*; Burmese: *ŋá*; Proto-Tibeto-Burmese: **l-ŋja*; Proto-Sino-Tibetan: **p-l-ŋa*.

c) Yeniseian: Ket *qa:ŋ*, Arin *qala*, Pumpokol *xejlaŋ*.

The Athapaskan languages have words beginning with L for the term ‘hand’, which we find also in the numeral for 5. Tlingit as a Na-Dene language uses another word for ‘hand’, but this is also contained in the numeral for 5, so that the view languages often use similar terms for ‘hand’ and ‘5’ is supported, especially as regards the Na-Dene languages.

This is different for the Sino-Tibetan languages, from my point of view. The basic form seems to be a word **ŋa*, which has evolved in Chinese to *wǔ* 五 . As regards the Tibeto-Burman language family, I don’t think it is entirely secure whether L or P-L, which we find at the beginning of some of these numerals for ‘five’, mentioned above, belong to a word-stem for ‘hand’, or represent a completely different prefix (or two prefixes) not associated with it or are simply an original part of the whole word later being lost for sake of simplifying word-initial sound structure.

The Chinese word for ‘hand’, *shǒu* 手, obviously has no etymological relation to the Chinese word for 5, *wǔ* 五; both words also do not contain any initial L-element. Therefore I do not conjecture – of course only on the basis of the data provided by Holst and myself above – an unambiguous connection between ‘hand’ and ‘5’, nor a phonetic proximity to the structure L-A-K in Sino-Tibetan, which should be typical for Sino-Tibetan, yet, when being a branch of Lakitic. Whether the two examples of the Yeniseian language group with final *-la* or *-laŋ* hint at a word for the term ‘hand’ can only be answered by further research.

The establishment of a Sino-Dene-Yeniseian language family mainly on the basis of common etyma for ‘hand’ – in the structure L-A-K – and with relation to the numeral 5 is in my opinion not yet sufficiently secured on the basis of the data available here, nor – resulting from that – the name ‘Lakitic’.

4.5. Lakitic: ablaut (vowel gradation / vowel alternation)

Ablaut, i.e. the vowel change in the root of the word, is a category on the basis of which Holst sees a relationship between Na-Dene, Sino-Tibetan and Yeniseian, or which he regards as a common characteristic of his proposed Lakitic language family. Ablaut in Navajo and other Athapaskan languages is an important topic especially in the area of the so-called verb stem variation. Pinnow (2), Krauss and Leer (6) have each made important contributions to this topic. Navajo verb stem variation means that a verb stem appears in different shapes depending on tense, aspect, and possibly even sub-aspects. Most of these variations concern quality and / or quantity of the stem vowel, variation of the stem vowel tone, and occasional changes between nasal vowel and oral vowel (see also the examples above in 3.1.).

Evidence of ablaut development can be seen in Chinese, but this is blurred or superimposed due to that language's development and as a consequence the emergence of a multitude of homophonic words. Such an ablaut is recognizable e.g. in 足 *zú* "foot" and 走 *zǒu* "walking; afoot", whereby the different tones originate in loss or fusion of original final consonants. To what extent ablaut was systematically used in the language, as in Navajo, cannot be determined with certainty. In current Chinese, ablaut hardly plays a role any more on a lexical level as a result of earlier sound changes, since ablaut phenomena were largely absorbed by the enormous sound changes. On a grammatical level, ablaut plays no role at all.

In Indo-European ablaut is a well-known phenomenon, too. In Germanic, especially, ablaut was systematically used to build up a system of verbs in which verbal tenses can be built by using certain vowel changes. We call these verbs 'strong verbs'.

Example: 'drink' (citing infinitive, past (Icelandic singular and plural), past participle)

German: *trinken trank getrunken* [trɪŋkŋ] [traŋk] [gəˈtrʊŋkŋ]

English: *drink drank drunk*

Icelandic: *drekka drakk drukkum drukkinn* [trɛhka] [trahk] [trʏhkʏm] [trʏhkjɪn]

North Frisian: *drank droonk dronken* [draŋk] [droːŋk] [drɔŋkɐn]

4.6. Typological traits

Since ablaut phenomena are present not only in the proposed Lakitic languages, but also in Indo-European languages, being deeply embedded in lexicon and grammar, especially in Germanic, it is questionable whether the presence of such a typological trait as ablaut can be a characteristic on the basis of which one is in a position to assign languages to language families, in particular to families with a very large time-depth. In my opinion, the time-depth for ablaut evolution cannot be very large due to the constant change of sounds in languages. Sound change will produce ablaut and then also diminish it again. On a gram-

matical level, ablaut can be systematically expanded and later reduced by analogical pressure. Theoretically – in my opinion – in every language or family a phase with developing and weakening ablaut could have been run through.

As a result of my research in this field I think that linguistic phenomena and typologies are not suitable for deriving arguments about the origin and affinities of languages. Assuming that languages change by influence of environment, culture, time and above all by human thinking, which may also be the reason for sprachbund phenomena, I believe that typological traits in languages can emerge and disappear at any time in any language and that such typologies also can or could have been present in other widely scattered languages which are not related to each other.

It may well be the case that certain linguistic characteristics are clustered in certain areas or language groups and are only sporadic or selective in others. But even here one cannot be sure whether it is a matter of chance, an areal characteristic or a proof of genetic kinship. Both the necessary time depth for the emergence of a certain feature, as well as the assumed time depth of a respective language family must be considered here, whereby the determination of time depth is based also only on empirical values, thus likewise very uncertain. If there are several distinctive linguistic traits with conspicuous accumulation in certain languages, the probability of a relationship is quite high, but here too, I think, these can only be accompanying factors for the determination of a genetic relationship. It has to be weighed up in each case to what extent such typological traits can be used for the determination of language relationship.

5. LINGUISTIC MACRO-FAMILIES AND THEIR FAMILY TREES (SEE HOLST, SECTION 3: BEYOND)

5.1. The Beringia-Theory

Research on the indigenous languages of North and South America is still very much oriented towards the Western perspective. This also applies to research about origin and relationship of languages. Holst's remarks in his present paper illustrate this Western view clearly. He says: 'It is natural to look to Asia when looking for relatives of ND – also because the urheimat of ND was in Alaska, thus so to speak at the entry of the continent'. With the following somewhat provocative questions, which arise for me from the above text, I would like to focus directly on the topic to be dealt with below.

a) Is looking to Asia really the natural or consequent approach? – No, if we do not ignore the current research results.

b) Does the view really only focus on Asia? – No, not only. Asia is possible, but not necessarily, or if possible, not necessarily Siberia, as being the part next to Alaska.

c) Was the urheimat (primordial homeland) Alaska? – No, not necessarily, if new research results are considered that do not necessarily assume a migration from north to south.

d) Was Alaska the entrance to the continent? – Perhaps, but if so, then not the only one.

The indigenous peoples of America are extremely critical or even renunciative towards the common theory that all American Indian peoples immigrated to America exclusively via a land bridge (called Beringia) over the Bering Strait from Asia, more precisely Siberia (= Beringia-theory) during the last Ice Age, and that there consequently was only one migration movement, namely from North to South.

Archaeological findings, some of which were already made at the end of the 20th century, show, however, that people or tribes who had arrived in North America via Beringia, the dry land bridge between Siberia and Alaska, met peoples who had already lived there long before. These peoples reached America much earlier by sea, as findings prove, on the one hand reaching southern South America and going ashore there, or, on the other hand, sailing along the South American coast to the north, in order to go ashore at other suitable landing sites partly migrating further north. The Beringia-theory with the assumption of a land bridge to Alaska as the only possible migration route is therefore no longer tenable.

The archaeologist Dr. Joe Watkins explains in the television broadcast "1491 – Amerika vor Kolumbus" ("1491 – America before Columbus"; Canada, 2017), which was transmitted on 23 April 2019 on the German TV channel ZDF Info, that we have to do with 'a highly complex history of migration to America'. And one can basically add that this statement holds good for the spread and origin of languages on both continents (or their later emergence in America itself), too.

This documentary clearly shows that the time of America's populating had to be pushed further and further into the past. For a long time the Clovis culture in North America was regarded as the first and oldest Indian culture with an age of approximately 13,000 years. It is now discovered that the Indian cultures are much older than previously assumed, which of course throws a far more complex picture on language movement, language development or language emergence. Meanwhile one has arrived already, after evaluation of many findings, at an age of 30,000 years. We will have to wait and see what further research will reveal.

5.2. Language families and linguistic macro-families

I consider research on the relationship of languages to be very meaningful, including grouping in families with respective superordinate or subordinate units and even creating language family trees. It provides deep insights into languages' birth and development, in sound changes and sound laws, and in migration movements of languages and peoples. It can help explain archaeological findings, and vice versa of course.

More critically, however, I see the efforts to search for remote relationships between individual language families and also isolated languages and to combine these into even larger units, linguistic macro-families. In my opinion, the time-depth is already too large to be able to find useful similarities here. Even the assignment of languages to already

established and well researched families, such as e.g. Sino-Tibetan or Finno-Ugric, is still difficult today, especially the establishment of related family trees and their branches.

The many and persistent attempts to establish such macro-families and to assign language families or isolated languages to them, attempts which were partly completely rejected or revised again or replaced by others, reveal that it is apparently not only very difficult, but – at least so my impression – almost impossible to show clear compelling research results which prove the existence of such hypothetical linguistic macro-families and their family trees.

5.3 One ursprache (primordial language) / theory of evolution and linguistics

The larger the linguistic macro-families to be created are, the more difficult or impossible is it to create linguistic evidence and the greater the abstractness of the results, so that an immediate benefit is basically no longer discernible in my view. Unless, of course, such a search for ever larger language family associations expresses the intention and the efforts to ultimately prove that all languages once developed from a single primordial language (i.e. ursprache), possibly even with the conclusion that the original home of that language lay in Africa.

If the linguists here are influenced by the so-called 'Out-of-Africa theory' and thus by the 'theory of evolution', it is important to keep in mind that both are still mere theories, which even today are not fully proven to be correct, even if representatives of this view and mass media like to present it that way.

There are views that speak against these two theories, but these can hardly make themselves heard in public or are quickly put in the corner of an extreme creationism.

I do not think we should get bogged down in proving the existence of one single primordial language from which all the languages of the world once originated. We should become familiar with the idea that a primordial language will probably never be provable (unless one wants to take it for granted as a natural consequence of language development) – or had even never existed.

It is perhaps possible to imagine that the ability of sound-based communication, the ability to use language (as a rather philosophical term), and, thus, the existence of the different languages (or their pre-forms of course) as articulated means of communication, can have originated independently from one another in several separate places in the world. Some isolated languages would then actually remain isolated and would indeed have developed completely independently.

There are many human inventions that were made simultaneously but uninfluenced by each other in different places of the world. Why should this not have been possible with language as well? Language, or languages, in this case, not as an evolutionary conditioned, biological stage of development, but as a conscious and deliberate human creative achievement. Thus, it is still important to be open-minded on all sides in this question.

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SIGNIFICANCE TESTING OF NA-DENE

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A computer-aided statistical lexical permutation test is applied to assess the validity of Na-Dene, a presumed extension of Athabaskan, as a linguistic family. As a result, the existence of Na-Dene is on the whole not supported. Eyak is the only external language whose connection to the Athabaskan family can be confirmed. Some methodological improvements of the permutation test, which in essence has been known for 20 years, are also proposed in this paper.

1. INTRODUCTION

The limits of certain language families, such as Indo-European, are clear-cut, while there are others whose precise extension has remained elusive. One example of the latter kind is the Bantu language family. Even though the characteristics of Bantu are overall well-defined and the relationship of the core Bantu languages is beyond doubt, the Bantu characteristics fade out as one moves towards the north-west of the area. This results in a number of Semi- or Para-Bantu languages whose genealogical position is still unresolved. Another example of the same kind is Athabaskan. The relationship of the approximately 50 core Athabaskan languages has never been controversial. But on the north-western fringe of the area, that is along the possible migration path on which the ancestors of Athabaskan might have entered their historical homelands, there are at least three languages, Eyak, Tlingit and Haida, whose relationship with Athabaskan has been the subject of debate. The whole grouping including these three doubtful candidates has been known as "Na-Dene" since Sapir (1915).[1]

Two issues make it particularly difficult to estimate the validity of the Na-Dene grouping, at least for an outsider to the field like the present writer: the neglect of negative evidence in the literature, and the exotic phonology of the languages concerned. What do I mean by neglect of negative evidence? Hundreds of positive lexical matches in favour of Na-Dene have been reported. For example, Pinnow (1966) proposes over 300 Na-Dene cognates in his seminal monograph on Tlingit external relations. This might seem almost a proof of genetic relationship. However, on consulting this and other works, it remains unclear to the reader to what extent negative evidence also exists, namely the absence of cognates within the basic vocabulary. It is easy to gather hundreds or even thousands of

[1] Still more far-reaching relations of Na-Dene to Asian languages, particularly to Sino-Tibetan, have also been claimed. This will not be discussed here.

cognates between unrelated languages such as English and Finnish,[2] yet this is no evidence of genetic relatedness. Positive evidence is not enough. We need to see also the negative evidence, that is the amount of basic vocabulary that lacks any similarity, in order to be able to weigh the two sets against each other.

A second psychological pitfall is, I believe, posed by the unusual phonological systems of the languages in the American Northwest. They are characterized by a proliferation of back consonants along with a paucity or even absence of labials.[3] Take the noun for "fat, grease", which is *-k'ah* in (Athabaskan) Navaho and *ɢaay* in Haida. Are they related? My hunch is that the velar ejective *k'* of Navaho and the postvelar lenis *ɢ* of Haida will seem quite similar to most European investigators, both of them being some unusual kinds of back stops. But it may well be that a native Athabaskan linguist, being more familiar with these phonemes, would hardly recognize any similarity between them. On a first glance, most words of any Na-Dene language contain at least either one odd back obstruent or one equally odd voiceless or ejective lateral consonant. This must give rise to many look-alikes in the eyes of a European researcher. The other way round, I could imagine that an equation such as English *to give* = Estonian *andma* would seem to be evidently related to a native Athabaskan linguist, since both of these words share such exotic sounds that are labials as well as voiced plosives.

Third, the notoric problem of semantic change, which is always present, may be aggravated in our case by the different cultural environment, under which at least my judgement of what semantic shifts are to be expected becomes rather shaky. The following are the cognate candidates presented by Pinnow (1966: 87) in order to support a sound correspondence Tlingit *d* = Navaho *d*:[4] T. *dís* "moon" = N. *-dis* "give it a roll"; T. *de* "now" = N. *díí* "this"; T. *dà(-sá)* "what?" = N. *daa* "what?"; T. *-da* "to flood, flow" = N. *-daah* "to menstruate for the first time"; T. *-dɛ* "to (movement towards an object)" = N. *dááh* "toward a moving object"; T. *du* "one's own" = N. *ʔadi* "reflexive pronoun"; T. *d-* "classifier" = N. *d-* (id.); T. *dɛ́X'* "back" = N. *dah* "(down) off"; T. *-dɑq* "to give food to guests" = N. *-daah* "to nurse"; T. *dúl* "sandhill crane" = N. *déłí* "sandhill crane". I am probably not the only one who feels that most of these equations do not seem compelling, apart from "what?" as the only really convincing case, and "sandhill crane", which looks so good that it is more probably a loan word.

In order to arrive at more objectivity and to eliminate any psychological bias, I propose here to tackle the problem by a formal statistical method called "permutation test".

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[2] E.g. Finnish *praktiikka*, *presidentti*, *prinsessa*, *professori*, *protesti*, to cite just a couple of words beginning with *pr-*.

[3] Due to the absence of labials, the Russian noun *pivo* "beer" was adapted in Tlingit as *giwa* (*g-* is a voiceless lenis).

[4] The symbol *d* stands for a voiceless lenis in both languages. I am reproducing here Pinnow's original transcription symbols as is.

2. THE PERMUTATION TEST

The statistical test employed here was initially sketched by Oswalt (1970) and subsequently improved in various ways particularly by Kessler (2001) and by Baxter & Manaster Ramer (2000). I will refer to this method as "permutation test". Recent applications of (varieties of) the permutation test include Turchin *et al.* (2010), Dunn & Terrill (2012), Kilani (2015), and Ceolin (2019). The permutation test attempts to estimate in an objective manner whether the observed number of lexical similarities between two languages significantly exceeds the level of chance resemblance. I will first describe the variety of the method as employed in the present paper, then explain my datasets, and finally draw conclusions about Na-Dene. The permutation test replaces earlier pre-statistical numerical methods that used to be employed to assess the significance of language relationship but are now outdated (see Doerfer 1974: 123–126 as one example).

The permutation test is based on Swadesh-like vocabulary lists of the languages to be compared. Standard Swadesh lists have mostly been used, but I employ a modified list that will be described in more detail below.

Second, some formal definition is needed to state what counts as a match. Given such a definition, the number of matches among the *n* compared lexical items can be counted. In order to decide whether this is significantly more than chance resemblance, the same procedure is repeated on permutated word lists, whence the name "permutation test". A comparison of randomly shuffled lists, in which the semantic relations are torn apart, must overwhelmingly lead to chance resemblances and reveals how many of them can be expected under random conditions, given the phonological properties of the two languages and the chosen definition of phonetic similarity. The match rate of the correct pairing should be in the far upper percentile of all possible permutations.

Both the data set and the match function can be designed in a variety of manners and give much freedom to the researcher. Their nature is not prescribed in any way by the statistical method; instead, their selection is a linguistic rather than a mathematical task.

For a brief practical illustration of the permutation test with a very simple data set and match function, consider the following word list. It consists of the first ten numerals of English and German:

English	**German: correct pairing**	**German: permutation A**	**German: permutation B**
one	*eins*	*acht*	*zwei*
two	*zwei*	*zwei*	*zehn*
three	*drei*	*drei*	*acht*
four	*vier*	*vier*	***f****ünf*
five	***f****ünf*	***f****ünf*	*eins*
six	***s****echs*	***s****echs*	*drei*

English	German: correct pairing	German: permutation A	German: permutation B
seven	***s**ieben*	***s**ieben*	*vier*
eight	*Acht*	***e**ins*	*neun*
nine	***n**eun*	***n**eun*	*sieben*
ten	*zehn*	*zehn*	*sechs*
	4 matches	5 matches	1 match

I assume here an extremely simple compare function which defines two items as matching if the initial letters are orthographically identical. Under this condition, the correct pairing yields 4 matches (second column). Among the permutated and consequently incorrect pairings, there are a few that achieve even five matches (as in permutation A), though this is exceptional. Much more frequently, a random permutation will destroy most matches and end up with only 0 or 1 of them (as in permutation B, a typical random permutation). The average number of matches for a random permutation of the dataset given here is 0.8, way below the value of 4 produced by the correct pairing. The value that is, however, significant in the permutation test is the percentage, among all possible permutations, of those permutations that produce a match rate at least as high as the rate of the correct pairing (= here 4). For the given dataset, this figure turns out to be 0.3%, as resulting from a computer calculation. Permutation A would thus belong among these rare 0.3%, whereas 99.7% of all permutations will more resemble permutation B. The conclusion is that the null-hypothesis stating that both languages are unrelated has a probability of only 0.3%, or in other words, that English and German are most probably related. We can see here that the permutation test is able to prove the relationship of English and German even with a tiny dataset and an extremely crude match function, thanks to the fact that the relationship of both languages is so close.

I define 1% ($p = 0.01$) as the maximal threshold of probability for the null-hypothesis to be valid.[5] If the probability falls below 1%, i.e. if the match rate of the correct pairing is within the top 1% of all randomly created match rates, I will consider the language relationship as (more or less) proven.

Published applications of Oswalt's permutation test have usually shown that even remote established relationships are recognized by the algorithm (such as Russian–Hindi in Oswalt's original paper), while unrelated languages are missed, as expected (e.g. Finnish–Hindi in Oswalt's paper).

While the essential idea of the procedure is straightforward, its practical application, requiring millions of shufflings and checks of the match criterion, must be left to a

[5] There is no predefined value for this threshold, but its choice depends on the researcher's taste and ambition. Several researchers have been more liberal in admitting a threshold of 5%. But this means that one test in twenty will return a false positive, i.e. a mistaken claim of language relationship.

computer program. I wrote such a program and applied it to two languages at a time.[6] A word list of length n can be permutated in $n!$ ways, and in theory, the computer should just create all these $n!$ permutations and count the matches each time. The 100-item list used below can be permutated in $100! \approx 10^{158}$ ways, a number that still exceeds the capabilities of current computers by far. The result is therefore approximated by a so-called Monte Carlo simulation, a random selection of a large number of permutations, which for all practical purposes is just as good as the exhaustive computation of them all. The data was rearranged 10^8 times, which is sufficient to provide percentages with the degree of precision given here.

3. THE MATCH DEFINITION

The definition of a phonetic match, which must be mechanical enough to be evaluated by a computer, is the trickiest part of the procedure. The match function can be designed in two fundamentally different manners. First, a match may rely on some definition of sound similarity. The simple example presented above was of such kind. In fact, most previous applications of the permutation method grounded it on sound similarity. Oswalt (1970) counted two words as matching if they shared a sufficient amount of phonetic features. Baxter & Manaster Ramer (2000) lumped the phonemes into ten broad "Dolgopolsky classes", matching two words if their initial consonants belong to the same class. Also Kessler & Lehtonen (2006: 37) proposed a similarity score that tries to quantify the phonetic similarity of two phonemes.

The other option is not to count sound similarity but sound recurrence. This accounts for the axiom of historical linguistics that recurring phonetic correspondences are essential to language relationship, even if the corresponding sounds may no longer be superficially similar. This was Kessler's (2001) approach, who entirely ignores the phonetic nature of sounds but only counts recurring consonant correspondences, whichever they are, and this is also what I opted for. It is a pleasant spin-off of this technique that it reports which correspondences contribute most to the overall probability value, and so creates hypotheses about valid sound correspondences.

In order to implement this second approach, each sound correspondence – whether real or apparent – is summed up and entered into a two-dimensional correspondence table. After that, all table entries are squared. This is an elegant mathematical operation in order to emphasize the recurrent matches, whereas isolated matches recede into the background.[7] The sum of all these squares figures as the match rate.

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[6] Most approaches in the literature have been bilateral. Only Kessler & Lehtonen (2006) propose a multilateral comparison of entire language families. I did not take up their approach, fearing that it would connect two families even if only a single language of one family has contact-based relations to the other. This kind of pattern would be more clearly recognizable from the bilateral comparisons.

[7] For more details on this see Kessler (2001: 148–150). Unlike Kessler, who computes $(n–1)^2$ for reasons that do not convince me, I apply the ordinary squaring n^2.

I judge it reasonable to focus on the comparison of consonants, which are known to be the diachronically most stable elements, to the exclusion of vowels as well as (pertinent to Na-Dene) tone. When words have several consonants, this should lead to multiple matches. For example, the comparison of English *belly* with its Japanese equivalent *hara* would lead to two entries *b*=*h* and *l*=*r*, whereas short words such as *(to) see* = Japanese *mi-* would create just one entry, here *s*=*m*.

A major and tricky problem in defining a phonetic match function is the comparison of words of unequal lengths. If the concepts for "belly" and "to see" are compared in the correct pairing, we would get 2 + 1 = 3 entries to the match table. To the extent that some of them will be confirmed by other equations, they will count as evidence for relationship. But what about the permutation which parallels *b-l* with *m-*, and *s-* with *h-r*? The easiest option would be to truncate the longer item to the length of the shorter one, yielding the matches *b*=*s* and *m*=*h*. The permutated arrangement will then make only two entries into the table instead of three for the original. This will give the original pairing more of an opportunity to build up recurrent matches than the permutated pairing, and thus introduces a bias in favour of the correct pairing, or more generally of pairings with equal lengths, which damages the statistical foundation of the method.

While the phonetic shape of a word is arbitrary with respect to its meaning, its length is not. There is a correlation in all languages between meaning and word length, with frequent words typically being shorter. This implies that short words in one language tend to correspond to short words in any other language. If the compare function is misdesigned so that there is a reward on matches between words of similar length, this will unintentionally increase the match rate even between unrelated languages. This pitfall comes easily, and several match functions proposed in the literature have fallen victim to it.

What we need is a match function that it unbiased as to word length, so that different word lengths do not have any systematic correlation with the number of contributed entries into the match table. Most researchers who understood this problem, among them Kessler,[8] solved it in a brute-force way by considering only the initial consonant of each word, ignoring all the rest. This obviously removes any length bias, and since the initial consonant is usually the diachronically most stable segment, this information is often sufficient to achieve good results. Nonetheless, it is unsatisfying that a major part of the evidence is simply thrown away by the algorithm.

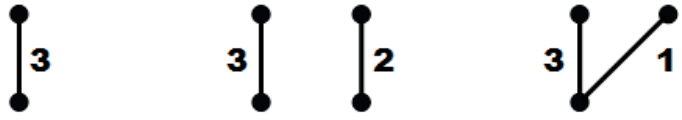
While I cannot propose a perfect and general solution to this dilemma, I propose here a compare function that considers not only one, but two phonemes of each word, while still avoiding a length bias.[9] Athabaskan roots tend to have the shape CVC and only rarely contain three or more consonants. While I still ignore all consonants other than the first

[8] See his detailed discussion in Kessler (2001: 158–174).

[9] Turchin *et al.* (2010) also measured two consonants per word but did not, I believe, successfully rule out the length bias.

two, as well as vowels, the restriction to two phonemes will hopefully not lose too much information in this linguistic area. I attempted to design a match function that accepts as input items of length 1 or 2 without creating a length bias, and that also fulfills two more criteria: (1) While two consonants are accounted for, preference should be given to the first one, which grasps the intuition that the initial consonant of a word is particularly stable diachronically. (2) The weight contributed by the first consonant should remain constant with no regard to word length.

This is achieved as follows: The match of the initial consonants contributes 3 points to the correspondence table. If both words contain a second consonant, their match contributes 2 points. In case of unequal lengths, the match of the second consonant of the longer word with the single one of the shorter word contributes 1 point; this accounts for the possibility that the longer word might include an unrecognized prefix at the beginning. Consider again the above-mentioned set of one monoconsonantal and one biconsonantal item in each language. In the correct pairing, they will contribute altogether 3 + 3 + 2 = 8 points to the table. In the permutated pairing, they will contribute 3 + 1 + 3 + 1 = 8 points. The sum of weights is therefore equal regardless of whether or not the list was permutated.



4. THE INPUT DATA

Along with the match definition, we need to agree upon a data set to be used as input for the permutation test. My first intention was to choose Swadesh's standard 100-item list. It turned out, however, that several of its items are not usable for the present purpose. The permutation test presupposes de Saussure's famous assumption of the arbitrariness of the linguistic sign, the lack of relation between sound and meaning. Violations of this assumption might result in a slight statistical bias, but I assume that no major problem can arise from this side.[10] What is more significant, particularly when used with a match function aiming at sound recurrence, the permutation test also requires that there be no systematic relation between any two linguistic signs within the list. Swadesh's list does not guarantee this kind of independence. For example, many languages use a single root for

[10] There are some items in the Swadesh list that may show phonetic symbolism, such as "nose", which contains a nasal /*n*/ in many – also Athabaskan – languages, or "bird", which at least in Navaho, where it is *tsidii*, "imitates a chirping sound" (Young & Morgan 1992: 1000). Kessler (2001: 95) saw this as a major problem and discarded up to 21 terms out of the Swadesh 200-item list for the possibility of sound-symbolic motivation ("nonarbitrary vocabulary"). Since my compare function does not rely on the phonetic nature of sounds but rather on recurrent correspondences, such cases would only pose a significant problem if more than one items of the list were onomatopoetic in the same way (so that not only "nose" but also other items would inherently favour the sound /*n*/). I assume that this is unlikely.

the two interrogatives "who?" and "what?",[11] as also for the demonstratives "this" and "that", four items that figure in Swadesh's original list. (Partial) homonymies like this will produce a higher rate of recurrent sound correspondences for word lists compared in the original order than in a permutated order, even if the languages are unrelated. In order to remove this undesirable statistical bias, I removed "what?" and "that" from the list.

Apart from the particularly problematic words "what?" and "that", I had to remove some more items for reasons more specific to the American languages in focus here. This is either, again, because of an evident interrelatedness at least in this particular linguistic area, or because of the fact that they lack clear translation equivalents or are not expressed by simple lexical units. The Athabaskan languages show a striking lack of some concepts for which straightforward equivalents exist in most other parts of the world: "All the languages in question show a strong tendency to use circumlocutions or descriptive terms even for simple, everyday objects" (Pinnow 1964: 157). For such reasons, I had to remove eleven more items from the Swadesh list: "all"[12], "ashes"[13], "bark"[14], "to come"[15], "feather"[16], "to give"[17], "moon"[18], "root"[19], "round"[20], "seed"[21], "yellow"[22].

I did retain terms that pose difficulties in just a single language. For example, the term for "tongue" in Mattole, *(ši-)sastaan*, is a descriptive expression "the long object in (my) mouth" according to Li (1930: 131). But since there appears to be an elementary noun for "tongue" in all my other languages, this item was allowed to remain in the list. Obviously, partial or total homophony of words is not rare even among the limited set of 100 Swadesh items, and my list still contains a number of such cases where two items are interrelated in just a single language.[23] With no more than one language being affected, these items can be kept in the list. Depending on which languages are to be compared, the decisions would have to vary, though. For example, a lexical relationship between "ear" and "to hear" as

[11] In many languages, interrogative pronouns share a characteristic initial "Schlüsselkonsonant" (key consonant), as Holst (2019: 22) puts it. For the same reason, Baxter & Manaster Ramer (2000: 175) included only "what?" into their list, removing "who?".
[12] Related to "big" in Navaho (Young & Morgan 1992: 612), not documented in Mattole.
[13] Expressed as "fire-dust" in Ahtna (Kari 1990: 275), as "soil-blows" in Navaho (Young & Morgan 1992: 393), as "which is grey" in Mattole (Li 1930: 126).
[14] Related to "skin" in several languages of the area.
[15] This verb shares its root with "to go" in most or all languages of the area.
[16] Appears to be related to "leaf" in several languages of the area.
[17] Athabaskan languages (also Tlingit) lack a general term for "to give", but rather select one out of a set of "classificatory verbs" which describe manipulating an object of a particular shape.
[18] The same word as "sun" in several languages of the area (cf. e.g. Li 1930: 126 for Mattole).
[19] Seems to be derived from "foot" in some languages of the area, e.g. "foot-string" in Navaho (Young & Morgan 1992: 997) and near-homonymy with "foot" in Mattole (Li 1930: 130, 135).
[20] Hard to find equivalents for that at least in Mattole and Tlingit.
[21] Difficult to translate into a number of languages of the area.
[22] Coincides with "green" in Mattole (Li 1930: 10, 110; cf. Starostin 2016) and has no elementary equivalent in Eyak.
[23] I noted "to burn" ~ "fire" in Eyak; "man" ~ "person" in German; "to die" ~ "to kill" in Hindi; "I" ~ "we" in Japanese; "fire" ~ "red" and "to lie down" ~ "to live" in Tlingit; "to drink" ~ "mouth", "ear" ~ "to hear", "green" ~ "leaf" and "to lie down" ~ "to sleep" in Swahili.

found in Swahili is harmless for the present purpose since no other of the test languages appears to share this feature. But if we were to compare languages of Africa, where this homonymy is widespread, one of the two terms would need to be removed from the list.

In order to make up for the omission of the cited 13 items, I added 13 replacement items to the list in order to push it again to the size of 100. I selected words that can easily be translated into Athabaskan languages, and that would be, I believe, suitable candidates for comparative purposes also in other parts of the world. I also aimed at items that seem to be cognate between Navaho, Mattole and Ahtna, my three Athabaskan test languages, so that they have a good chance of being diachronically stable in the entire wider area. But, at the time of selecting these items, I had not yet looked at their representations in Eyak, Tlingit and Haida. This point is vital, since it would of course be wrong to purposely manipulate the list so that the relationship, or lack of relationship, whichever favoured by the researcher, would receive better support. These are the 13 supplements that I added to the list: "to ask", "to count", "to fear", "four", "grass", "to laugh", "to live", "navel", "snake", "three", "to vomit", "wind", "winter"; most of them figure also in Swadesh's 200-item list.

5. TRANSCRIPTION AND PHONETIC LUMPING

Since our compare function measures sound recurrence rather than sound similarity, the choice of transcription symbols is immaterial. Nevertheless, I applied some normalizations of the various sources for the sake of readability. I avoided too specific Americanist traditions, giving preference to symbols that are more widely understood (e.g. *c* in Li 1930 → *š*).

The plosive system of all the American languages under examination here is very similar and is made up of three series: lenis, aspirate, and ejective. Some traditions, among them Starostin (2016), use voiceless symbols throughout, which comes closest to the phonetic reality: *t*, *tʰ*, *t'*. Another tradition, among them the conventional Navaho orthography, represents the lenis stops by voiced symbols and can therefore dispense with the aspiration mark: *d*, *t*, *t'*. This usage requiring less diacritics will be adopted here.[24] At the end of a syllable, the distinction of aspirate and lenis is neutralized to the profit of the latter. The resulting consonant should consequently be represented by the voiced symbol, which I will do here, even though most of my sources (including the Navaho orthography) write *-t* in this case.

Apart from all vowels, I also ignore the glide element of compound phonemes such as *gʷ* or *gʸ* in American languages (due to the likelihood that the concomitant articulations once arose from surrounding vowels), as well as the glottal stop *ʔ* in all positions (whose phonological status would often be uncertain). Many Eyak words contain a syllable-internal *-h-* or *-ʔ-*, which seems to be a prosodical phenomenon rather than a proper

[24] I represent the postvelar series as *ɢ*, *q*, *q'*, the lateral series as *ƛ*, *ɬ*, *ɬ'*. In Ahtna, I replace *c*, *k*, *gg* of my source by *k*, *q*, *ɢ*. Mattole has a special affricate written *tc̨* by Li (1930), represented here by the symbol *ʦ*.

consonant (cf. Pinnow 1966: 45 and borrowings such as *məšuhg* "sack" < Russ. *mešok*). For this language, I ignore not only *ʔ* but also the internal *h*.

It may be useful to reduce the phoneme inventory before performing the computation, a procedure called "phonetic lumping" by Kessler (2001: 77–79). Phonetic lumping is particularly beneficial if one is able to identify and re-unite sounds that are known to have split by secondary historical developments. This kind of knowledge is, however, not usually available for the languages treated here. Only in Japanese, I lump together *h* = *f* = *p*, *sh* = *s*, as well as *ch* = *ts* = *t*, because these sounds are almost allophones synchronically, if English loanwords are disregarded. Otherwise, I applied only a moderate phonetic lumping with the intention to eliminate those consonants that occur just once in the whole list, because isolates would never have a chance to participate in a recurring correspondence.[25]

I treat the nasal vowels of Hindi, Navaho and Eyak as nasal consonants homorganic with the following obstruent (if any; otherwise as *n*). The sequence nasalized vowel + glottal stop characteristic of Navaho and Eyak is taken as a realization of an underlying glottalized phoneme *n'*, which regularly appears in Athabakan cognates. In the few cases of words entirely devoid of consonants, the algorithm required me to insert one, so I selected the maximally weak sounds *h* ("to go" in Eyak, "to sit" in Tlingit, "this" in Haida), *y* ("good" in Japanese and "you" in Eyak, to represent a front vowel), or *w* ("many" in Japanese, to represent a back vowel).

6. THE LANGUAGES EXAMINED

Prior to evaluating the Na-Dene family proper, the functionality of the program was verified on an independent set of six test languages, including two closely related ones: English and German, one distantly related: Hindi, and three languages not (known to be) related to any of the others: Swahili, Japanese, and Klingon.

As for Athabaskan, it might have been desirable to use an ancestral Athabaskan reconstruction rather than modern forms. Leer (1996) would have been a possible resource for that. However, there are some objections. First, the lexicon would be very much incomplete, and I did not feel equipped to add any reconstructions on my own. Second, the reconstructed proto-language would then and again contain competing synonyms, which could involve the temptation of picking words that would fit best to the desired result (either supporting more remote language relationships or the lack thereof). Third, we cannot presuppose that Leer had a neutral point of view regarding the question of Na-Dene. Last but not least, the benefit would not have been too great overall since many of Leer's reconstructions differ from the modern forms only by systematic deviations in the transliteration symbols, and where the differences are more substantial, the reconstructions

[25] In order to remove such isolates, I applied the following mappings: English *ð* = *þ*, *p* = *b*, *ʃ* = *z* = *s*; German *pf* = *f*; Hindi *f* = *p*, *ɲ* = *n*; Navaho *č'* = *ts'*, *ƛ̂* = *ƛ*; Mattole *č'* = *ts'*; Ahtna *h* = *x*, *ƛ* = *ɬ*; Eyak *č* = *j*, *ŋ* = *n*, *m* = *w*; Tlingit *č* = *dz* = *j*, *č'* = *ts'*, *ŋ* = *n*; Haida *č* = *j*, *ƛ* = *ƛ̂*, *l'* = *ƛ̂'*.

tend to be less secure. I therefore decided not to include reconstructed Proto-Athabaskan, but to make up for that by including one representative out of each of the three commonly assumed Athabaskan branches: Navaho for the Southern group, Mattole for the Pacific group, and Ahtna for the Northern group, in addition – of course – to the three languages which are really under test here: Eyak, Tlingit and Haida.

The following sources were used for lesser known languages: AHTNA: Kari (1990); EYAK: Krauss (1970); HAIDA: Lachler (2010); KLINGON: http://klingonska.org/dict; MATTOLE: Li (1930); NAVAHO: Young & Morgan (1992);[26] TLINGIT: Edwards (2009). For all the American languages, I also considered Starostin (2016), who provides an insightful conspectus and interpretation of various sources for establishing Swadesh lists. His collection proved particularly helpful for Mattole, where the primary source lacks an English index. Finally, I wish to thank Jan H. Holst, who provided me with his Swadesh lists of four American languages and – last but not least – invited me to be a contributor to the present volume.

7. THE WORD LIST

All the input data are provided in the following two tables. Those one or two consonants per cell that actually went into the algorithm are marked in bold face. This is the word list of the six non-American test languages:

English	German	Hindi	Japanese	Swahili	Klingon
a**sk**, to	**fr**ag-	**pūch**-	**kik**-	-u**liz**a	**ghel**
belly	Bauch (**bw**)	**peṭ**	**h**a**r**a	**tum**bo	**chor**
big	**gr**oß	**baṛā**	ō**k**i-	-**k**u**b**wa	**tIn**
bird	Vogel (**fg**)	**ciṛiyā**	**tor**i	-**deg**e	**b**o?**D**egh
bite, to (**by**)	beiß- (**by**)	**kāṭ**-	**kam**-	-u**m**a	**chop**
black	schwarz (**ʃv**)	**kālā**	**kuro**-	-eusi (**ws**)	**qIj**
blood	Blut (**bl**)	**khūn**	**ch**i	**dam**u	?I**w**
bone	Knochen (**kn**)	**haḍḍī**	**hon**e	-**fup**a	**Hom**
breast[27]	Brust (**br**)	**chātī**	**mun**e	**ziw**a	**ngech**
burn, to	**br**enn-	**jal**-	**m**oe-	-**chom**a	**meQ**
cloud (**kl**)	Wolke (**vl**)	**bād**al	**kum**o	wingu (**wŋ**)	?e**ng**
cold (**kl**)	**kal**t	**ṭhaṇḍhā**	**sam**u-	**bar**idi	**bIr**

[26] Navaho was one of the test languages on which also Kessler (2001) applied his algorithm. His book includes a Navaho Swadesh list which I took into consideration. I cite Navaho verbs in the form that is given as the head entry in Young & Morgan (1992), usually the perfect stem.

[27] I prefer terms which also or primarily mean "female breast".

English	German	Hindi	Japanese	Swahili	Klingon
count, to (**kw**)	**z**ähl-	**g**in-	**k**azoe-	-**h**esabu	**t**o**gh**
die, to (**dy**)	sterb- (**ʃt**)	**m**ar-	**sh**in-	-**f**a	**H**e**gh**
do**g**	Hund (**hn**)	**k**u**t**tā	i**n**u	-**bw**a	**t**a**r**gh
drink, to	**tr**ink-	**p**ī-	**n**om-	-nywa (**ŋw**)	**tlh**u**tlh**
dry	**tr**ocken	**sūkh**ā	**k**a**w**aita	-**k**a**v**u	**Q**a**D**
ea**r**	Oh**r**	**k**ā**n**	**m**i**m**i	**s**i**k**io	**t**e**S**
earth (**rþ**) / soil	E**rd**e	**dh**a**r**tī	**ts**u**ch**i	udongo (**dŋ**)	**y**a**v**
ea**t**, to	e**ss**-	**kh**ā-	**t**a**b**e-	-**l**a	**S**o**p**
e**gg**	Ei (**y**)	a**ṇḍ**ā	**t**a**m**ago	yai (**yy**)	**QIm**
e**ye**	Auge (**wg**)	ãkh (**ŋ-kh**)	**m**e	-**ch**o	**mIn**
fat / grease	Fett (**ft**)	**c**a**r**bī	a**b**u**r**a	-fu**t**a	**tlh**a**gh**
fea**r**, to / be afraid	**f**ü**r**cht-	**ḍ**a**r**-	o**s**o**r**e-	-o**g**o**p**a	**vIp**
fire (**fy**)	Feuer (**fy**)	**āg**	**h**i	-o**t**o	**qul**
fish	Fisch (**fʃ**)	**m**a**ch**lī	**s**a**k**ana	**s**a**m**aki	**gh**o**t**I?
flesh / meat	Fleisch (**fl**)	mã̃s (**mn**)	**n**i**k**u	-**ya**m**a**	**Ha?DI**baH
fly, to	**fl**ieg-	u**ṛ**-	**t**o**b**-	-**r**u**k**a	**pu**v
foot	Fuß (**fs**)	**p**a**i**r	a**sh**i	-guu (**gw**)	**qam**
four	vier (**fr**)	**cār**	**y**o**n**-	-**nn**e	**l**o**S**
full	voll (**fl**)	**p**ū**r**ā	i**pp**a-	-**j**aa	**buy**?
go / walk, to	**g**eh-	**j**ā-	i**k**-	-e**nd**a	**yIt**
goo**d**	**gut**	a**cch**ā	i- (**y**)	-**z**u**r**i	**QaQ**
grass	Gras (**gr**)	**gh**ā**s**	**k**u**s**a	-**ya**s**i**	**magh**
green	**gr**ün	**h**a**r**ā	**mid**ori	-**j**a**n**i	**SuD**
ha**ir**	Haar (**hr**)	**bāl**	**k**a**m**i	-**yw**ele	**jIb**
ha**nd**	Hand (**hn**)	**hāth**	**t**e	-**k**o**n**o	**gh**o**p**
hea**d**	Kopf (**k-pf**)	**s**i**r**	a**t**a**m**a	-**ch**wa	**n**a**ch**
hea**r**, to	**h**ör-	**s**u**n**-	**k**i**k**-	-**s**i**k**ia	**Q**o**y**
hea**r**t	Herz (**hr**)	**d**i**l**	**sh**i**n**zō	-o**y**o	**tIq**
ho**rn**	Horn (**hr**)	**sīŋ**g	**ts**u**n**o	**pem**be	**gh**e**b**
ho**t** / warm[28]	warm (**vr**)	**g**a**r**m	a**ts**u-	**j**o**t**o	**tuj**
I (**y**)	ich (**x**)	mãi (**mn**)	**w**a**t**ashi	**m**i**m**i	**jIH**
ki**ll**, to	**t**ö**t**-	**m**ā**r**-	**k**o**r**os-	-ua (**w**)	**HoH**

[28] Swadesh hesitated between both terms, but "hot" figures in the most recent version of his list.

English	German	Hindi	Japanese	Swahili	Klingon
k**n**ee	Knie (**kn**)	**ghuṭ**nā	**hi**za	**go**ti	**q**I**v**
k**n**ow, to	wiss- (**vs**)	**jān-**	**shir-**	-jua (**jw**)	**S**o**v**
laugh, to (**lf**)	lach- (**lx**)	hãs- (**hn**)	**wa**ra-	**-ch**e**k**a	**Hagh**
leaf	Blatt (**bl**)	**p**a**t**tā	**h**a**pp**a	**j**a**n**i	**p**o**r**
lie (down), to (**ly**)	**lieg-**	**leṭ-**	**yo**ko	**-la**l**a**	**Q**o**t**
live / be alive, to	**leb-**	**jī-**	i**k**i-	-i**sh**i	**y**I**n**
liver	Leber (**lb**)	**ji**gar	**kanzō**	i**n**i	**ch**e**j**
long (**lŋ**)	lang (**lŋ**)	**la**mbā	**na**ga-	**-re**fu	**tIq**
louse (**lw**)	Laus (**lw**)	jữ (**jn**)	**shi**rami	**ch**a**w**a	**ghew**
man (male)	Mann (**mn**)	**ādmī**	o**t**o**k**o	-u**m**e	**loD**
man**y**	viel (**fl**)	**ba**hut	ō- (**w**)	-ingi (**ŋg**)	**la**w**ʔ**
mountain (**mw**)	Berg (**br**)	**pahāṛ**	**ya**m**a**	**-li**m**a**	**HuD**
mouth (**mw**)	Mund (**mn**)	mũh (**mn**)	**kuch**i	-nywa (**ɲw**)	**nuj**
nail (of finger)[29]	Nagel (**ng**)	**nakh**	**tsu**me	**-ku**c**h**a	**pach**
nam**e**	Name (**nm**)	**nām**	**na**mae	**-ji**n**a**	**pong**
navel	Nabel (**nb**)	**nābh**i	**he**so	**-to**vu	ʔe**Qw**ay
neck	Hals (**hl**)	**gar**dan	**kub**i	shingo (**sh-ŋ**)	**mong**
new (**ny**)	neu (**ny**)	**na**yā	a**t**a**r**ashi-	**-py**a	**ch**uʔ
night (**ny**)	Nacht (**nx**)	**rāt**	**yo**ru	u**s**i**k**u	**ram**
nose (**nz**)	Nase (**ns**)	**nāk**	**ha**n**a**	pua (**pw**)	**ghIch**
not	nicht (**nx**)	**nahĩ**	-nai (**ny**)	**h**a-	**-b**eʔ
one (**wn**)	ein (**yn**)	**ēk**	**hi**to-	**-mo**j**a**	**w**aʔ
person	Mensch (**mn**)	i**ns**ān	**hi**to	**-t**u	**ghot**
rain	Regen (**rg**)	**bāriš**	a**m**e	-vua (**vw**)	**SIS**
red	**rot**	**lāl**	a**k**a-	**-ek**u**n**du	**Doq**
sand	Sand (**sn**)	**ret**	**su**n**a**	-changa (**ch-ŋ**)	**Deb**[30]
say, to	**sag-**	**kah-**	i- (**y**)	**-se**m**a**	**jatlh**
see, to	**s**eh-	**dekh-**	**mi-**	-o**n**a	**legh**
sit, to	**sitz-**	**baiṭh-**	**su**war-	**-k**aa	**b**aʔ

[29] This is "claw" in Swadesh's original list. I believe that his selection of an animal body part was unfortunate, since human body parts are more basic and are also preferred everywhere else in his list. In many languages (including e.g. Navaho), "fingernail" and "claw" are homonyms, but in case of differentiation, I prefer the human term.

[30] For lack of a better alternative, I chose this noun for "desert".

English	German	Hindi	Japanese	Swahili	Klingon
skin	Haut (**hw**)	**tv**acā	**h**ifu	-**g**o**z**i	**D**ir
sleep, to	schlaf- (**ʃl**)	**s**o-	**n**e**m**ur-	-**l**a**l**a	**Q**o**ng**
small	**kl**ein	**ch**oṭā	**ch**īsa-	-**d**o**g**o	**m**a**ch**
smoke	Rauch (**rw**)	dhuã̄ (**dh-n**)	**k**e**m**uri	-o**sh**i	**tlhIch**
snake	Schlange (**ʃl**)	sã̄p (**sm**)	**h**e**b**i	-**y**o**k**a	**gh**a**r**gh
stand, to	steh- (**ʃt**)	**kh**a**ṛ**ā	**t**a**ts**-	-**s**i**m**ama	**Q**a**m**
star	Stern (**ʃt**)	**tā**r**ā**	**h**o**sh**i	-o**t**a	**H**o**v**
stone	Stein (**ʃt**)	**p**a**tth**ar	i**sh**i	-**w**e	**n**a**gh**
sun	Sonne (**sn**)	**sū**r**aj**	**h**i	jua (**jw**)	**j**u**l**
swim, to	schwimm- (**ʃv**)	**t**a**i**r-	o**y**o**g**-	-o**g**e**l**ea	**Q**a**l**
tail	Schwanz (**ʃv**)	pũ̄ch (**pŋ**)	**sh**i**pp**o	-kia (**ky**)	**tlh**u**Q**
this (**ðs**)	**d**i**e**s	**y**ē	**k**o-	**h**-	-**v**a**m**
three (**þr**)	**dr**ei	**tī**n	**mi**t-	-**t**a**t**u	**w**e**j**
tongue (**tŋ**)	Zunge (**zŋ**)	**jī**b**h**	**sh**i**t**a	-**l**i**m**i	**j**a**t**
tooth (**tþ**)	Zahn (**zn**)	dã̄t (**dn**)	**h**a	-i**n**o	**H**oʔ
tree	Baum (**bw**)	**p**e**ṛ**	**k**i	-**t**i	**S**o**r**
two	zwei (**zv**)	**dō**	**fut**a-	-**w**i**l**i	**ch**aʔ
vo**m**it, to	(er-)**br**ech-	u**lṭ**ī	**h**a**k**-	-**t**a**p**ika	ʔe**m**
water	Wasser (**vs**)	**pānī**	**mi**zu	-**j**i	**bIQ**
way / path / road[31]	Weg (**vg**)	**rāstā**	**mich**i	-jia (**jy**)	**t**a**w**
we	wir (**vr**)	**ham**	**wat**ashitachi	**sis**i	**maH**
white (**wy**)	weiß (**vy**)	**saf**ed	**shi**ro-	-eupe (**wp**)	**chIS**
w**h**o?	wer (**vr**)	**kaun**	**dar**e	**nan**i	ʔI**v**
wind	Wind (**vn**)	**hav**ā	**kaz**e	-**pep**o	**SuS**
winter	Winter (**vn**)	**sar**dī	**fuyu**	-**pup**we	**poH**[32]
woman	Frau (**fr**)	**aur**at	o**n**na	-**k**e	**b**eʔ
you (sg.)	**d**u	**t**ū	**anat**a	**wewe**	**SoH**

[31] Original “path”, but I prefer, as for English, the more common and general term “way”.
[32] For lack of a better alternative, I had to choose this noun for “period of time”.

The American word list:

English	Navaho	Mattole	Ahtna[33]	Eyak	Tlingit	Haida
ask, to	-**k**ee**d**	-**k**i**d**	-**q**ee**d**	-**q**eʔ**d**	-**w**uu**s'**	**k**^{y}aa**n**aŋ
belly	-**b**i**d**	-**b**i**ł'**	-**b**e**t'**	-**k**ə**m**ah	-**y**uu**w**a	**d**a**l**
big	-**ts**o**h**	-**ʦ**aaɣ	-**k**aa**x**	-ʔ**l**u**w**	-**g**ee	iʔ**w**aa**n**
bird	**ts**i**d**ii	ʔi**y**aa**x**	**G**aa**G**i	**G**ə**n**uh	**-ts'**i**dz**g^{w}	**χ**i**t'**iid
bite, to	-ɣa**ž**	-**g**i**j**	-aa**ƛ'**	-**q**a	-**y**ii**G**	**q'**u**s**gad
black	-žį̨ʔ (**žn'**)	-**x**i**n**	-**t'**uu**ts'**	-**t'**uu**č'**	**t'**uu**č'**	**ɬG**a**ł**
blood	**dił**	-**ts**ee**l**in-	**d**e**l**	**d**ə**ł**	še	**G**a**y**
bone	**ts'**i**n**	-**ts'**i**n**-	**ts'**e**n**	**ts'**ə**l**	**s'**aa**G**	**sk**uj
breast	-**b**eʔ	-**ts'**ooʔ	**b**aaʔ	-**ts'**uu	-**ɬ'**aa	**ƛ'**a**n**uwaay
burn, to	-**ƛ**a**h**	-**k'**aa**n'**	-**q'**aa**n**	-**q'**a	-**g**aa**n**	**G**u
cloud	**k'**o**s**	a**h**	**q'**o**s**	**q'**ah**s**	-**g**uu**s'**	**y**aa**n**
cold	-**k'**aa**z**	-**k'**a**ts**	-**q'**a**ts'**	-**ƛ'**e	-aa**t'**	**t**a**d**a
count, to	-**t**aʔ	-**t**a**k'**	-**t**aa**q'**	-**q**a	-**t**uu**w**[34]	**k'**^{w}aa**y**anda
die, to	-tsą (**ts-n**)	-**d**ii**n'**	-**ts**aa	-sį̨h (**sn**)	-**n**aa[35]	**k'**u**t'**ał
dog	**ɬ**ee**č**ąąʔi	**n**aa**ƛ'**ii	**ɬ**i**k'**ee	**χ**ə**w**aa	**k**ee**ɬ**	**χ**a
drink, to	-λąąʔ (**λn'**)	-**n**aa**n**	-**n**aa**n**	-**l**a	-**n**aa	**n**ii**ɬ**
dry	-tsaii (**ts-y**)	-**ts**a**y**	-**G**a**n**	-ʔeh**d**	-**x**uu**g**	**x**i**l**a
ear	-**j**aaʔ	-**j**ii**ɣ**-	-**dz**a**ɣ**-	-**j**eh**χ**	-**gu**g	**g**^{y}uu
earth	**ɬ**ee**ž**	**n**i**n'**[36]	**n**e**n'**	ʔąh (**nh**)	**ƛ'**a**d**g	**q'**^{w}ii
eat, to	-yąąʔ (**yn'**)	-**y**aa**n**	-**y**aa**n**	-**χ**a	-**χ**aa	**t**aa
egg	-yę̨ę̨ž (**yn**)	-**ɣ**ee**x**-	-**ɣ**ee**s**	-**d**əʔuh**d**g	**k'**^{w}a**t'**	**q**a**w**
eye	-**n**aaʔ	-**n**aa**g**-	-**n**ee**q**-	-**l**aa**χ**	-**w**aa**G**	**χ**a**ŋ**ii
fat	-**k'**a**h**	-**k'**a**h**	-**q'**a**x**	-**q'**ə**χ**	**t**aa**y**	**G**aa**y**
fear, to	-**dz**ii**d**	-**j**i**d**	-**g**e**d**	-**x**ah**s**	-**χ**ee**ƛ'**	**ɬG**^{w}aaga
fire	kǫʔ (**kn'**)	**k**o**ŋ'**	**q**o**n'**	-**q'**aa**g**	**χ'**aa**n**	**ts'**aa**n**uu

[33] The source contains forms from four dialects. I opt for the Western dialect which is reported to be the most conservative.
[34] Story & Naish (1973: 57).
[35] Only in secondary sources quoted by Starostin (2016), but Edwards (2009: 191) does have *nana* "death".
[36] Not directly attested. The form *nin'* is documented from closely related Hupa (Golla 1996: 30), and the existence of this root also in Mattole is suggested by a term for "earthquake", see Starostin (2016).

English	Navaho	Mattole	Ahtna	Eyak	Tlingit	Haida
fish[37]	**ł**oo**ʔ**	**ł**oo**k'**eh	**ł**u**q'**ee	**t**e**ʔ**ya**ʔ**	**χ**aa**d**	**č**ii**n**
flesh	-tsį**ʔ** (**ts-n'**)	-**x**i**n**-	-**ts**e**n'**	-**ts**e**ʔ**	**ƛ**ii**y**	**k**i**ʔ**ii
fly, to	-**t'**a**ʔ**	-**t'**a**ɣ**	-**t'**a**ɢ**	-**k'**a**ʔt'**	-**q**i**n**	**x**i**d**
foot	-**k**ee**ʔ**	-**k**e**ʔ**	-**q**e**ʔ**	-**k'**ah**š**	-**χ'**uu**s**	**st'**aay
four	dįį**ʔ** (**dn'**)	**d**i**n**t**ɛ**'eh	**d**e**n**k'ii	**qəl**ahqa**ʔ**ga**ʔ**	**d**aa**x'**uun	**st**ansa**ŋ**
full	-bįį**d** (**bn**)	-**b**ii**n**	-**b**e**n**	**dəɢ**ida**ʔ**	-**h**ii**g**	**st'**ah
go, to	-**y**a	-**y**aa**x**	-**y**aa	-a (**h**)	-**g**uu**d**	**ɢ**aa
good	-**t'**ee**h**	-**x**^{w}oo**n**	**ɣe**l**i**	-**dz**uu	**k'**ee	**l'**aa
grass	**ƛ'**o**h**	**ƛ'**o**h**	**ƛ'**o**ɣ**	**ƛ'**ih**χ**	**č**uu**k**an	**q'**an
green	-**ƛ'**ii**ž**	-**ts**o**w**[38]	-**ƛ'**e**ts'**	**d**iiya**ʔ**ga**ʔ**	**s'**uu**w**	**sɢ**inuwaa
hair[39]	-**ɣ**a	-**g**a**ʔ**	-**ɣ**a-	**l**ee**ł**	-**χ**aa**w**u	**ɢ**a**w**
hand	**l**a**ʔ**	-**l**a**ʔ**	-**l**a-	-**q'**a**ʔts'**	-**j**i**n**	**sƛ**aay
head	-**ts**ii**ʔ**	-**ts**i**ʔ**	**ts**i-	-**š**aa**w**	-**š**a	**q**a**j**
hear, to	-ts'ą**ʔ** (**ts'-n'**)	-**ts'**i**ɣ**	**ts'**aa**n**	-**č'**aa**q'**	-aa**χ**	**g**u**d**a**ŋ**
heart	-**j**e**y**	-**j**ii**y**-	-**k**i**z**ʔaani	-ʔu**ɢł**	-tee**χ'**	**k'**uu**g**
horn	-**d**ee**ʔ**	-**d**e**ʔ**	-**d**e-	-**d**ə**l**eh	-**š**ee**d**i	**k'**i**m**
hot	-doii (**dy**)	-**s**e**l**	-**k'**o**ɢ**	-**ɢ**u**ʔ**	-**t'**aa	**k'**ii**n**a
I	**š**i	**š**ii	**s**ii	**x**uu	**χ**a**d**	**d**ii
kill, to	-yį (**yn**)	-**g**ii**n**	-**ɣ**ee	-**š**e	-**j**aa**ɢ**	**t**i**y**a
knee	-**g**o**d**	-**g**^{w}o**ł'**	-**ɢ**o**t'**	-**ɢ**uh**d**	-**k**ii**y**	**q'**u**l**uu[40]
know, to	-zį**ʔ** (**zn'**)	-**ts'**i**d**	-**n**ii**g**	-**g**a	-**k**uu	u**ns**ad
laugh, to	-**ƛ**o**ʔ**	**ł**o**h**	**ƛ**o**q'**	**l**i**ʔχ**	-**š**uu**ɢ**	**k'**a**h**
leaf	-t'ą**ʔ** (**t'-n'**)	-**t'**a**ŋ'**	**t'**aa**n'**	**t'**ah**ł**	**k**a**y**aani	**x**i**l**
lie (down), to	-tį (**tn**)	-**t**ee**n**	-**t**ee	-**t**e	-**t**ii	**t**ii
live, to	-**n**aa**d**	-**n**i**x**	-**n**ii**g**	-**t**a	-**t**ii	**χ**ii**n**a**ŋ**aa

[37] Salmon is the most important kind of fish in the American Northwest. For the languages of that area, I therefore prefer terms that include this species or even refer primarily to it. The reference to salmon is emphasized in several of my sources, e.g. *łook'eh* "fish (salmon)" (Li 1930: 133) for Mattole.

[38] "Blue". Presumably also covers "green" (by a division of the color space as in other languages of the area) though the source does not state this.

[39] In the case of distinct terms for "head hair" and "body hair", Swadesh prescribed the selection of "head hair". In Athabaskan languages (including Tlingit), there is usually one single basic term for both, even if it often forms part of a compound "head-hair" in order to express specifically hair on the head. In Haida, there is a single term *qaj* for "head" and "hair on head"; I therefore resort, as for this language, to the term that exclusively stands for "body hair".

[40] "Leg", with "knee" being expressed as a compound "leg's head". Starostin (2016) reports *q'uluu* alone for "knee" from another dialect.

English	Navaho	Mattole	Ahtna	Eyak	Tlingit	Haida
liver	-**z**i**d**	-**ts**i**ł'**	-**z**e**t'**	-**s**ah**d**	-**ƛ'**uu**ɢ**u	**ƛ'a**k**'**ul
long	-**n**ee**z**	-**n**ee**s**	-**n**ee**s**	-ʔaa**w**	-**y**aa**t'**	**ja**ŋ
louse	**y**aaʔ	-**y**aʔ-	**y**aʔ	**g**u**g**sg	**w**ee**s'**	**t'a**m
man (male)	**h**a**s**tiin	**g**aʔ**t'**een	-**k**ii**ł**	**ł**i**l**aaʔ	**q**aa	ii**ł**aa**ŋ**
many	-ląąd (**ln**)	**ł**aa**n**	-**l**aa	-**t'**uʔ	-**h**aa	**q**ʷaa**n**
mountain	**dzi****ł**	-**k'**aa**n**[41]	**dɣ**ilaay	ʔi**ƛ'**	**š**aa	**ƛ**a-[42]
mouth[43]	-**z**eeʔ	-**s**a-	-**z**aa	-**s**aʔ	-**ł**a**k**a	**χa****ł**ii
nail (of finger)	-**šg**aan	-**tɕ**eʔ**s**	-**ɢa**n-	-**χ**ah**dzł**	-**χ**aa**g**ʷ	**k'**un
name[44]	-**ž**iʔ	-**x**iʔ	-**z**ii	**w**ə**š**eh	-**s**aa	**k**iʔii
navel	-**ts'**eeʔ	-**ts'**eeʔ	-**ts'**iige-	-**j**iʔ**ƛ'**g	-**k**uu**ł**	**sg**il
neck	**k'o****s**	-**k'o****s**	-**q'o****s**	-tsįʔ (**ts-n'**)	-**ł**u**d**i**χ'**	**χ**i**l**
new	**n**ii**d**	**k'**u**ŋ**[45]	**q'a**d**i**idi	**q'**aa**y**aa	**y**ii**s**	**ɢawλ**aa
night	**ƛ'**eeʔ	**g**aa**n**iŋ[46]	**tdz**	**χəƛ'**	**t**aa**d**	**ɢaa****l**
nose	čįįh (**čn**)	-**nč**ix	-**ts**ii**s**	-**n**ii**k'**	-**ł**u	**k**u**n**
not	**d**oo	**d**oo-	-**h**e	-**ɢ**	**ƛeeł**	**ga****m**
one	**ł**aaʔii	**ł**a**y**haʔ	**ts'e****ł**-	łįhɢ (**łŋ**)	**ƛeex'**	**sɢ**ʷaansaŋ
person	**di****n**e	**g**ʷ**o****n**ist'eʔ	-**de****n**ee	**d**əχụh	**łiŋ**git	**χaa****d**as
rain	-tsąąʔ (**ts-n'**)	-**di****ɣ**	**k**aa**n**	-ʔ**y**a	**s**ii**w**	**g**ʷaʔaa**w**
red	-**č**iiʔ	-**č**ii**j**	**ts**ii**g**[47]	-**č'**eeʔ	**χ'**aa**n**	**sɢ**id
sand	sei (**sy**)	**ł**ee**š**	**s**aa**s**	**č**ii**š**g	**ł'**ee**w**	**t**aa**s**
say, to	**n**ii**d**	-**n**ii	-**n**ii	-**l**e	-**q**aa	**s**uu
see, to	-ʔįįʔ (**n'**)	-ʔii**n**	-ee**n**	-ʔą (**n**)	-**t**ii**n**	**qiŋ**
sit, to	-**d**a	-**d**aa	-**d**aa	-**d**a	-aa (**h**)	**q'**a**w**a
skin	-**k**a**g**i	-**d**aa**s**-[48]	-**z**e**s**	-**t**a**h**	-**d**uu**g**	**q'**a**l**
sleep, to	-**ɣ**aa**ž**	-**l**aa**l**	**n**aa**ł**	-**ts**uʔ**d**	-**t**aa	**q'**a**d**a

[41] "Mountain ridge" (Li 1930: 130).
[42] *ƛat'aʔaaw*, I believe that the terminal part is the word for "snow" (*t'aʔaaw* in Haida).
[43] Athabaskan languages (also Tlingit) typically oppose two terms "inside of the mouth" and "outside of the mouth" (the latter also = "lips"). I opt for the former term here.
[44] In Athabaskan, this is a verb "to name, to call by name".
[45] Unattested. I could have omitted the whole item because of this gap, but I decided to reconstruct a form **k'uŋ* based on *q'uŋ* "new" documented from closely related Hupa (Golla 1996: 65). Hupa *q'* = Mattole *k'* is the regular sound correspondence.
[46] Li (1930: 126), glossed as "evening", but evidently the antonym of "day".
[47] Primarily "ochre", but can also express the idea of "red" (cf. Kari 1990: 427).
[48] Also *-tses'*. I choose here the term that Starostin (2016) puts in the first place.

English	Navaho	Mattole	Ahtna	Eyak	Tlingit	Haida
small	-**y**a**ž**i	-**k'**o**w**ʔ	-**ts**i**k'**i	-**k**u**č'**g	**g**ee**k'**[49]	**ts'**uu**j**uu
smoke	**łid**	**łih**	**łed**	łąhd (**łn**)	**s'**ee**ɢ**	**ɢ**aa**y**uu
snake[50]	**ƛ'**ii**š**	**ƛ'**i**ɣ**iš	**ƛ'**a**ɣ**es	**χ**uh**χ**	**ƛ'**u**k'χ**	**sag**
stand, to	-zį̨ʔ (**zn'**)	-**y**ii**n**	-**dz**e**n**	-łąąʔ (**łn'**)	-**h**aa**n**	**g**ʸaaʔa
star	sǫʔ (**sn'**)	**ts**i**ŋ'**	**s**o**n'**	**l**aʔ**χ**ts'ł	**qudχ**ʔayanaha	**k'**aa**y**ł**t'**aa
stone	**ts**e	**ts**ee	**ts'**e**s**	**ts**aa	**t**e	**q**ʷaa
sun	**š**a	-**x**aa	**n**aʔaa**y**	**ɢədəgəł**	**ɢagaan**	**j**uu**y**aay
swim, to	-bį̨ʔ (**bn'**)	-**b**ee	-**b**ee	-**w**e	-**h**uu[51]	**λagaŋ**
tail	-**ts**eeʔ	-**tɛ**iiʔ	-**k**e-	-**gƛ'**ah	-**ł'**ii**d**i	**sk'**ʸaaw
this	**d**ii	**d**ii	**g**aa-	ʔ**əl**	**y**a	a (**h**)
three	**t**aaʔ	**d**aa**k'**eh	**t**aa**q'**i	**t'**uh**ł**	**n**a**s'**g	**łɢ**unał
tongue	**ts**ooʔ	-**s**a**s**taan	-**ts**u**l**aʔ	-**l**aʔ**t'**	-**ł'**uu**t'**	**t'**aa**ŋ**al
tooth	**ɣ**ʷooʔ	-**ɣ**ʷoʔ	-**ɣ**u-	-**χ**uu**l**	-uu**χ**	**ts'**a**ŋ**
tree	**ts**i**n**	-**tɛ**i**ŋ**	**k**e**n**[52]	**l**i**s**	aa**s**	**q**ii**d**
two	**n**aa**k**i	**n**a**k**eh	**n**aa-	-**l**aʔ**d**	**d**ee**χ**	**sd**aŋ
vomit, to	-**k**ʷi	-**k**o**y**	-**q**o**y**	-**w**u**t'**	-**q**uu	**ƛ**agaŋ
water	**t**o	-**t**oʔ	**t**uu	**g**i**y**ah	**h**ii**n**	**ɢanλ**
way	-**t**ii**n**	**t**ee**n**iŋ	**t**e**n**e	**t**aa	**d**ee	**k'**ʸuu
we	**n**i**h**i	**n**o**h**niŋ	**n**ee**n**e	**d**aa	u**h**aa**n**	ii**ƛ'**
white	-gaii (**gy**)	-**g**a**y**	-**ɢ**a**y**	**xəƛ'**-	**λ**ee**d**	**ɢ**a**d**a
who?	**h**a**y**	**d**a**n**-	**b**e**d**e	**d**uu	aa**d**uu[53]	**g**ii**s**d
wind[54]	-**č'**i	-**č'**i[55]	**ts'**i**y**	**k'**uu**y**	uu**xj**aa	**t**a**j**aaw
winter[56]	**h**a**y**	**k**a**y**d	**x**a**y**	**χəl**aag	**t**aa**g**ʷ	**saŋ**g
woman	a**sdz**ąą	**yaŋ**keh	**ts'**a**q**ee	**q**eʔ**ł**	**š**aa**w**ad	**j**aa**d**aa
you (sg.)	**n**i	**niŋ**	**n**e**n**	ʔii (**y**)	**w**aʔe	**daŋ**

[49] Not in Edwards (2009), but cf. Starostin (2016).
[50] In some languages (Eyak, Tlingit) also "worm".
[51] Not well attested in Edwards (2009), but cf. Starostin (2016).
[52] "Stick, wood, trunk".
[53] Not well attested in Edwards (2009), but cf. Starostin (2016).
[54] In some languages such as Navaho, Ahtna, Tlingit also as a verb "(wind) to blow".
[55] Goddard (1929: 322).
[56] In several languages of the area, such as Navaho and Tlingit, "winter" serves as the standard unit for counting years ("2 winters" = "2 years").

8. RESULTS

The following table shows the resulting percentages for the six non-American test languages. They express the probability for the null-hypothesis of non-relationship to be true:

	English	German	Hindi	Swahili	Japanese	Klingon
English	–	0.00%	0.09%	32.9%	52.4%	73.3%
German		–	0.006%	32.0%	43.3%	50.6%
Hindi			–	7.0%	18.4%	21.3%
Swahili				–	6.0%	57.6%
Japanese					–	72.5%
Klingon						–

Recall that 1% was defined as the critical upper threshold for a relationship to count as proven. We can see that the values for all unrelated pairs fall somewhere within the interval from 1% to 100% (in fact, from 7% to 73.3%), where they ought to be. By contrast, the pair English–German is found to be related at a maximal level of confidence. Also German–Hindi and, slightly worse but still highly significant, English–Hindi are evidenced as related.

In addition to producing probability values like those above, the algorithm conveniently proposes recurrent sound correspondences between any two languages. In the English–Hindi pairing, the correspondence with the highest score is E. *n* = H. *n*[57], which is in fact etymologically correct. The next highest scores are E. *h* = H. *s*[58], which is correct at least for the item "horn" and reflects the centum-satem-isogloss, as well as E. *l* = H. *j*,[59] E. *s* = H. *s*,[60] E. *s* = H. *t*,[61] E. *n* = H. *r*,[62] E. *r* = H. *l*.[63] Some of them are predominantly wrong, but even they may contain a grain of truth, such as the equation E. *r* = H. *l*, which is generally invalid but correct as to the item "heart".

By contrast, the strongest equation to support the coupling English–Swahili is E. *n* =

[57] Supported by "nail", "name", "navel", "new", "nose", "not" (matching initials); "know" (matching finals). In the German–Hindi coupling, the correspondence *n* = *n* is supported by yet two more items "mouth" and "tooth". This is one of the reasons for the better score of this coupling.
[58] Supported by "head", "hear", "horn" (matching initials).
[59] Supported by "live", "liver", "louse" (matching initials).
[60] Supported by "to sleep", "snake", "sun" (matching initials).
[61] Supported by "skin", "star", "to swim" (matching initials).
[62] Supported by "night" (matching initials); "rain", "sun", "winter" (matching finals).
[63] Supported by "red" (matching initials); "to burn", "hair", "heart" (matching finals).

S. *p*,[64] for German–Japanese G. *r* = J. *m*,[65] and for Hindi–Klingon H. *m* = K. *H*.[66] All these "sound correspondences" look rather unnatural and provide additional support for the lack of relationship in addition to the totally insignificant probability figures.

Let us now move on to the results for Na-Dene, which are our actual focus of interest:

	Navaho	Mattole	Ahtna	Eyak	Tlingit	Haida
Navaho	–	0.00%	0.00%	0.01%	34.0%	94.0%
Mattole		–	0.00%	0.5%	27.9%	11.9%
Ahtna			–	0.03%	1.6%	30.1%
Eyak				–	6.7%	92.7%
Tlingit					–	40.2%
Haida						–

The figures confirm the well-established existence of the Athabaskan family (Navaho + Mattole + Ahtna) and also evidence that Eyak is related to this group, very roughly in the same order as Hindi is related to Germanic. The strongest sound correspondences between Navaho and Eyak are N. *d* = E. *d*,[67] N. *n* = E. *l*,[68] N. *ts* = E. *l*,[69] N. *ɬ* = E. *ɬ*,[70] and N. *h* = E. *χ*.[71] Most of these, as also most of the supporting equations, seem to be correct; only the correspondence N. *ts* = E. *l* is probably made up entirely of chance resemblances.

A still relatively good score, though somewhat above the 1%-threshold defined above, results for the couple Ahtna–Tlingit. It receives the strongest support by the following equations: A. *n* = T. *n*,[72] A. *d* = T. *š*,[73] A. *n* = T. *t*,[74] A. *t* = T. *t*,[75] A. *n* = T. *w*,[76] A. *γ* = T. *k'*,[77] A. *y* = T. *g*.[78] While some of these equations, such as *d* = *š*, *n* = *t* are most likely random hits, others like *n* = *n*, *t* = *t* look realistic and might have a real background.

On human inspection, a few more Tlingit items such as "cloud", "stone", "way" might seem to display some similarity to Athabaskan, while there are no – or no sufficient –

[64] Supported by "new", "nose" (matching initials); "bone", "wind", "winter" (matching finals).
[65] Supported by "ear", "rain" (matching initials); "to burn", "to drink", "hair", "mountain" (matching finals).
[66] Supported by "to die", "flesh", "to kill" (matching initials); "we" (matching finals).
[67] Supported by "blood", "horn", "person", "to sit" (matching initials); "to ask", "knee", "liver" (matching finals).
[68] Supported by "eye", "to say", "two" (matching initials); "bone" (matching finals).
[69] Supported by "big", "tongue", "tree" (matching initials).
[70] Supported by "one", "smoke" (matching initials); "blood" (matching finals).
[71] Supported by "winter" (matching initials); "fat", "grass" (matching finals).
[72] Supported by "to drink" (matching initials); "to burn", "person", "to see", "to stand", "we" (matching finals).
[73] Supported by "blood", "horn", "mountain" (matching initials).
[74] Supported by "to live", "to see", "to sleep" (matching initials).
[75] Supported by "to count", "to lie down", "night" (matching initials).
[76] Supported by "eye", "you" (matching initials); "rain" (matching finals).
[77] Supported by "egg", "good" (matching initials); "snake" (matching finals).
[78] Supported by "to go" (matching initials); "sun", "winter" (matching finals).

recurring sound correspondences to support these equations. Superficial similarities can be very deceptive. In fact, our list contains at least six items that look similar between English and Japanese: *hone* (*h* < **p*!) "bone", *ik-* "to go", *kusa* "grass", *koros-* "to kill", *namae* "name", *suna* "sand". But again, the permutation test diagnoses no relationship between English and Japanese, and correctly so.

The Tlingit-Athabaskan connection may be a borderline case, but even if we decide to accept some of the mentioned comparisons as valid, they could be cognate by borrowing rather than genetic relationship. Ahtna is a northern Athabaskan language immediately adjacent to Tlingit. It is striking that the other two Athabaskan test languages show no similarity to Tlingit at all in terms of the percentages. As a consequence, I see clearly no compelling evidence for a relationship of Tlingit to Athabaskan as a whole. There is even less reason, from the results of the present study, to assume a connection of Haida to Athabaskan. While a number of scholars have been inclined towards a more aggressive lumping, the results reached here come very close to the moderate view expressed by Campbell (1997: 110–115, 284–286) in his influential handbook on Native American linguistics.

Finally, it should be mentioned that none of the pairwise comparisons between my initial six language test set and the six American languages were reported as significant, as was to be expected. All figures are well above the 1% threshold:

	Navaho	Mattole	Ahtna	Eyak	Tlingit	Haida
English	29.4%	29.2%	6.7%	37.9%	8.1%	48.5%
German	23.9%	35.0%	52.7%	73.3%	31.1%	7.1%
Hindi	20.2%	84.6%	43.4%	54.3%	42.5%	8.7%
Swahili	34.3%	64.6%	69.0%	92.1%	60.2%	56.1%
Japanese	63.8%	79.2%	71.3%	49.2%	52.9%	29.4%
Klingon	12.8%	12.5%	15.8%	24.4%	3.1%	26.9%

The results presented here should be received with some provisos. I am no specialist in Athabaskan languages and might therefore have missed to identify some derivational affixes which would have been transparent to a more experienced professional. Furthermore, it is important to understand that the failure of proving relationship is not the same thing as proving non-relationship. It could be that the lack of success is not due to the absence of relationship, but rather due to some infelicitious decisions made here concerning either data or method. It may be that the consideration of just two consonants, or the choice of a 100-item word list (instead of a 200-item list), or the selection of just three Athabaskan languages which are perhaps not the most conservative ones, might not have left enough diagnostic features. It might be that for languages in this area, it is mistaken to focus

exclusively on lexical units, but one should rather have compared the numerous available morphological affixes, if it is true that the Na-Dene languages "are genetically related and lost their common vocabulary" by an unusually high rate of vocabulary change, as suggested by Pinnow (1964: 158). Pinnow's (1984) study arguing for Haida as being Na-Dene is largely based on morphology.

The results of the present paper will be obsolete if either another variety of a permutation test, run with different parameters, or a different scientific methodology will one day be able to prove the existence of Na-Dene. But what I do conclude is that the relationship of Tlingit or Haida to Athabaskan is not at all obvious, and if it is to be evidenced, this will have to be achieved by applying a rigid and statistically controlled method, rather than by just adducing a cherry-picked collection of look-alikes.

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AN OUTSIDER'S VIEW ON HISTORICAL LINGUISTICS

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PRELIMINARY REMARKS

I am not a professional linguist but rather a mathematical physicist with a permanent keen interest in language and philosophy.

Language ability is the main distinguishing feature of humans, which more than any other thing marks a qualitative difference between them and other animals. Studying human language provides a privileged access to the human mind.

The world in which we live and struggle for orientation and survival is never given to us directly but primarily in the form of representations appearing on our internal stage. The relationship between objects and their internal representations is a symbolic one. This holds for all animals, but by the possession of a complex developed language giving names to symbols, the human ability of symbolisation reaches a qualitatively higher level. Symbols of higher order arise as symbols for symbols, language can talk about itself, virtuality, contrafactuality and self-reference come into sight, and man is able to perceive himself as someone sitting in front of his internal stage and watching the symbolisations appearing on it. Using language, he is a virtuoso in relentlessly generating concepts, detecting patterns, similarities and symbolic relationships and finding or attributing sense and meaning.

It is this activity of the human mind which keeps fascinating me. As a mathematical professional, I must confess that I am not much impressed by the rather simple notions and formalisms of mathematical linguistics like generative grammar, which, I think, provide little insight into the real depths of language.

Historical linguistics traces back the development of languages, investigates and establishes genetic relationships between languages and deals with the task of subgrouping clusters of related languages.

The origin of human language is unclear, but it certainly dates back by more than 100,000 years. In fact, there are strong anatomical, genetic and cultural hints that the Neanderthal man was already able to speak (D'Anastasio 2013). As compared to our closest relatives, the chimpanzees, mankind exhibits striking genetic homogeneity. The cogent

conclusion from this fact is that man passed through a rather recent genetic bottleneck (Behar et al. 2008). Mankind was threatened by extinction and, at least in its main body, reduced to a small and relatively homogeneous population of perhaps a few thousand individuals. This is estimated to have occurred about 70,000 years ago. Undoubtedly, at this stage language was already fully developed. Hence, one should expect all existing languages to be either monogenetic or to descend from a small number of ancestral languages. Genetic contacts of the surviving humans with still existing Neanderthal populations are a proven fact and should have been accompanied by at least some linguistic exchange.

Just like the human mind, languages are never at rest. There is a natural tendency for change and, in the absence of harmonizing conversational exchange, splitting into different languages is inevitable.

A time depth of 70,000 years seems to be out of reach for the current methods of comparison and reconstruction for the establishment of genetic relationship of languages. There is a widespread consensus about seriously growing difficulties beyond a soft border of approximately 6000 years. (For a good general account of historical linguistics we refer to Campbell 2013 without quoting him at every instance.)

RECONSTRUCTION AND GENETIC RELATEDNESS

A natural first step for the detection and investigation of a genetic relationship between languages consists in a comparison of their basic vocabulary. Thereby usage of a standardized word list like Swadesh's inventory is recommendable. This is of course a very coarse procedure beset with many uncertainties and shortcomings: similarities by borrowing or coincidence, uncertainties about the admissible degree of variations in sound and meaning, overlooking of existent similarities and so on. The neglect of grammatical evidence should be compensated by a comparison of grammatical formants and structures. Computers can help in handling massive quantities of data, provided the user really understands and controls the functioning of the algorithms he applies. Otherwise, weird results are likely to emerge.

The analysis can be improved by augmenting the word list. The empirical basis can also be widened considerably by "mass comparison", a strategy strongly advocated and employed in particular by J. Greenberg (for example Greenberg 1987): by comparing a large number of languages one can detect cluster groups of similar languages. Such a cluster relatedness is statistically more robust and viable than simple binary similarity.

The next step is an investigation, to what extent the observed similarities are regular and law-like. Sound correspondences should be governed by sound laws. There may also be detectable rules and trends for grammatical variation. Apart from contact with other languages, the causes and dynamics of language change are largely unknown and normally not in the focus of research, which tends to content itself with a merely descriptive approach and often considers further-going investigation as unfeasible if not unscientific. There are some partial exceptions to this. The philology of Slavonic languages interprets certain

sound laws as expressions of long lasting general trends like palatalization or "rising sonority" (Aitzetmüller 1978). Some change of languages may in fact be due to erratic fashions, but I think, in many cases an investigation of causes and dynamics is possible and worthwhile and likely to yield interesting insights into the structure of the human mind. It is a remarkable fact that some languages like Icelandic or Finnish are more conservative than others, even in the same family. Writing and a developed oral literature tend to slow down language change. In addition, some languages like Turkish or Arabic seem to exhibit a tendency toward regularity and systematization, whereas others like English or Russian are more lax in this respect.

After the discovery of sound laws and other laws of language change, further investigation can be deepened and set on a firmer base. Borrowings can be traced, cognates which are invisible under superficial inspection can be detected, proto-languages of language groups can be reconstructed. Thereafter the comparative activity is applicable to the proto-languages. There are impressive examples how far back in time one can get by such a patient in-depth analysis combining comprehensive knowledge of the material and of general linguistics with thoroughness and creativity.

Pinnow's work on the Na-Dene family as described in the anchor article (Holst 2020) may serve as a model. A novel method of "positional analysis" helped to corroborate the larger Na-Dene family including Haida. The hypothesis of larger Na-Dene is not yet uncontroversial, but one has the impression that the balance starts to tip in favor of it. Another spectacular success is the demonstration of a remote genetic relationship between the Kartvelian languages and Burushaski, a so far isolated language spoken at the upper Indus. After a lot of preparatory work on earlier stages of both Kartvelian and Burushaski Holst was able to detect compelling evidence for regular correspondences in sound and grammatical formatives deeply below the easily visible surface (Holst 2017). This way he managed to bridge the wide gap between a bold conjecture and a solid proof. Pinnow's and Holst's successes are the result of thoughtful and well-advised judgement, superior to any existing computer algorithm.

There is still a long way to go until a demonstration or refutation of monogenesis of extant human languages. Much reconstruction work must be done for higher-level language groups and probably the repertory of methods needs further expansion. In the worst case the hypothesis of monogenesis, although a priori not unlikely, remains undecidable. However, one should not be surprised if at least some of the proposed global etymologies (see for instance Ruhlen 1994, Chapter 14 with J. D. Bengtson, pp. 277–336) turned out to be viable. Research on language universals may be helpful, because "unmotivated" universals, for which alternatives are absent without any compelling reason, are arguments in favor of monogenesis.

SUBGROUPING

J. H. Holst rightly pointed out (Holst 2020) that the subgrouping of a family may be more problematic than its establishment. This is evident from the cases of Indo-European and Turkic languages. Mass comparison and other clustering procedures work the better the more clearly the emergent subunits are separated. Many different cluster algorithms are implemented on computers and are employed in different fields like psychology, biological taxonomy, genome analysis, social sciences, market research and many others. For orientation see the Wikipedia article "Cluster Analysis" and, more specifically, Everitt (2011) and Estivill-Castro (2002). The problems of language classification are described in great detail in Campbell/Poser (2008).

Cluster algorithms must be handled with great care. Choosing an algorithm and applying it depends on many pre-decisions: What data are selected and admitted? What topology is used? In other words: How are the differences between data weighted in order to judge their distance? How many levels of sub-subgroupings are envisaged? Does one admit only binary or also multi-prong splitting? Much bias can enter into such choices. Lack of control and sound judgement in the application of cluster algorithms is likely to consolidate prejudices or produce absurdities.

Historical linguistics aims at the construction of family trees of related languages. Genealogy and biological taxonomy are models for this endeavor. Species formation in biology is the result of independent development of populations in genetic isolation. Likewise, language split will be the result of separate innovations after the loss of linguistic contact. The resulting daughter languages or language families will then be separated by different shared innovations, for instance as an effect of different sound laws.

There are, however, important differences between biological species formation and language splitting. In biology, genetic information is transmitted by sexuality, the loss of mutual fertility is irreversible and mutations have to pass a selective test of their use for survival fitness. On the other hand, language information is transmitted culturally, the loss of linguistic contact is reversible and there is no selective pressure, because changes of a language have little influence on its chance to survive. In biological terms, language changes are luxury mutations. If linguistic separation is incomplete or fluctuating, the very model of a family tree becomes questionable or even inappropriate. This applies, for instance, to dialectology and perhaps also to the classification of Turkic languages. Moreover, dialects often coexist with a standard language, which, in turn, may be a compromise between different dialects.

For many primitive communities, regular exogamy between different tribes establishes a deep contact between different languages, possibly with far-reaching consequences. Borrowing from the biological concept of population genetics, one should perhaps consider a dialect continuum as a gene pool with smaller or larger variants down to the level of individuals.

Sound changes or other law-like innovations must be interpreted with some care. They may be overruled by analogy formations. Shared innovations do not always signalize the emergence of a new branch in a family tree. Innovations may, of course, occur in a language without any splitting and, on the other hand, linguistic innovations may jump over language borders. The "Balkan Sprachbund" is an example for such a situation. The sound change *g* > *h* was active in Russian dialects, in Belorussian, Ukrainian, but also in West Slavonic languages like Czech, Slovak or Upper Sorbian and even in some dialects of south Slavonic Slovenian (Nahtigal 1961). A transition *g* > *j* in pronunciation can be observed in Swedish and in the German dialects of Berlin and Cologne. The universally common monophthongization *ai* > *e* occurred independently at different times in Sanskrit, Greek, French and in German dialects. If the development of languages is well known, such phenomena do not disturb anybody, but they are a possible source of confusion for the grouping of poorly known languages.

SUGGESTIONS AND WARNINGS

Research of every kind is always confronted with a double task: gaining knowledge and avoiding mistakes. In linguistics, differentiating between knowledge and error is often not as simple a matter as, for instance, in mathematics. Sometimes it may take a long time to arrive at a decision. Examples for this are Pinnow's work or Sapir's association of Ritwan with Algonquian and his long-range shot of a relationship between Na-Dene and Sino-Tibetan (Holst 2020).

Quite generally, for every kind of research there is a tension between the tasks of finding and avoidance of error. Creativity is always associated with a partial loosening of permanent rational control. Rationality and creativity are not direct opposites of one another. Rather their mutual relationship is similar to the figure of *complementarity* known from quantum physics. The standard quantum physical example for complementarity is position vs. momentum/velocity of a particle. Both notions are indispensable for a complete description of a particle, but precise knowledge of position excludes precise knowledge of momentum and vice versa. As a matter of principle, it is impossible to ascribe completely precise values for both position and momentum to a particle. There are arguments that the importance of the figure of complementarity is not constrained to physics, and that complementarity is also definable and meaningful in other fields of knowledge without assuming quantum physics to be at work there (Atmanspacher et al. 2002, Römer 2015). In this sense, rationality and creativity or error avoidance and inventiveness are examples of complementary pairs. Good control over the degree of rationality and error avoidance means weaker control over the degree of creativity and inventiveness. The need to serve such conflicting complementary tasks forces the researcher into a difficult and subtle compromise. Extremes are dangerous: uncontrolled inventiveness will soon blame itself by mistakes and exaggerated anxiety is barren. There is, however, an imbalance in the scientific

community: Evident errors will be scorned immediately, whereas anxiety is not so strongly sanctioned and often taken as a sign of care, prudence, seriousness and respectability.

This, I think, induces many linguists to exaggerate their advisable prudence. In particular, people specialized in a well-established area of research like Indo-European studies are sometimes seduced to adopt a rather negativistic or destructive stand by overburdening research in developing fields with unrealistic or premature demands like identification of many sound laws and reconstruction of proto-languages. For me, such specialists are like hermit crabs hiding their soft rear end in a snail shell while stretching out grim soldiers on the front side. They should bear in mind that their own subject started in a tentative way and that overlooking an accessible truth should also count as an error.

Prudence is necessary, but a well-placed hypothesis is a valuable and challenging contribution to research and should be encouraged. Even refutation of such a hypothesis is a real progress and need not blame its originator.

Some error is probably inevitable in creative linguistic research. Judging about the value of a person's work one should not exclusively concentrate on error searching and discard everything after the first detected flaw. A just and balanced judgement should look at the total weighted balance between achievements and failures. An even more benevolent attitude would concentrate on the most valuable contributions of a researcher.

Franz Bopp, one of the pioneers of Indo-European studies, erroneously included Georgian and Malayo-Polynesian in Indo-European (Campbell/Poser 2008: 62ff.), but this does not invalidate his great merits.

There is much controversy about the person of Joseph Greenberg. Campbell (2013, passim) points out annoying blunders in his extensive work. However, Greenberg's achievements in the classification of African languages are now generally acknowledged. Greenberg's inclusion of Andamanese and Tasmanian in his Indo-Pacific macrophylum is almost certainly unjustified, but at least he saw a large phylum comprising most of New Guinea. He misplaced the Wakashan family into his Amerind macrophylum (Holst 2005), which, in addition, is probably not as comprehensive as he claims (Holst, private communication, September 2019). But there is probably more truth in his findings than in assuming hundreds of unrelated language families in the Americas. This is very implausible, because one can safely assume that most if not all of the population of the Americas goes back to a limited number of small groups arriving rather late in the history of modern man. The final delimitation of Greenberg's Eurasiatic macrophylum (Greenberg 2000, 2002) will probably need some revision and his work contains mistakes in detail (Campbell/Poser 2008, Campbell 2013), but the very mass of Greenberg's striking observations clearly validates his overall picture. In addition, Greenberg contributed many brilliant studies, for instance on language universals (Greenberg 1990, 2005) or on the cyclic development of the definite article (Greenberg 1990: 252ff.). I think justice demands to judge the balance of Greenberg's work as clearly positive securing him a place among the great linguists of

the 20th century. He had an extremely wide view on languages, opened up new perspectives and exerted an emboldening influence against widespread linguistic defeatism.

As already mentioned, challenging hypotheses should be encouraged, but their originators should try to comment about the degree of their conviction or certainty. This is what Greenberg did in most cases.

We should like to conclude with a remark on methodology, confirming what was stated in the anchor paper (Holst 2020). Linguistic methods have a serving function in the process of gaining knowledge, the researcher should be their master and not their slave. Schematism in their employment should be avoided. Any look at the cultural productions of man provides abundant evidence that schematism is alien to the human mind. In fact, just for survival it must find a livable compromise between the complementary demands of inventiveness and rationality, flexibility and rigor. Hence, human nature is bound to abhor schematism.

A mismatch between hypertrophic terminology and methodological reflection and meagre results is typical for weak research anxious about scientific reputation. Methodology is more helpful in consolidating than in finding results, there is no systematic method for heuristics, which rather lives from intuition. Methods should support intuition but not inhibit or even replace it. The researcher should consider the methodological toolbox to be open and feel free to use it where it looks helpful. For linguistics, there is no good ideological reason to disregard information from different fields like anthropology, psychology, genetics, archaeology or ethnology.

Intuition is the strong side of man. Endowed with language, humans are unique in their ability to recognize, identify and name "gestalt" patterns, find sense and attribute meaning. This strength should be at its best, when attention is directed to the investigation of language.

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RESPONSE TO DISCUSSANTS OF THE ANCHOR PAPER

JAN HENRIK HOLST

1. INTRODUCTION

First of all, I would like to thank all discussants for taking the pain to react to my anchor article. I think we arrived at very interesting responses and valuable research. It is also a pleasant experience that all contributors agree with me that Heinz-Jürgen Pinnow was an underestimated scholar who left us a legacy that is worth exploring.

To give a brief overview of what the reactions contain (as far as this is possible at all, given their wealth), I would make an attempt as follows:

– John Bengtson has focused on the greater context of Na-Dene within the languages of Eurasia and adjacent regions, and especially on the putative Dene-Caucasian superfamily he advocates.

– Uwe Krämer has commented on various issues from the perspective of someone with a thorough knowledge of the languages involved in the Na-Dene question and of Pinnow's work.

– Carsten Peust has applied a method with a mathematical background to Na-Dene data in order to see, in an open-minded way, what this method yields.

– Hartmann Römer has commented as a physicist on historical linguistics and especially on long-range comparison.

These thought-provoking papers lead me to numerous ideas that I would like to present in my response. There are, in principle, two possible ways to arrange these ideas in a text. One would be to react to each author's paper in turn. Another way, however, would be to arrange the ideas according to topics. I chose the latter way, the reason being that what we want in linguistic research is to get ahead and advance knowledge on various topics connected with Pinnow's research.

2. EXISTENCE OF NA-DENE

As we all know, a famous and still ongoing discussion treats the question whether there is a linguistic family Na-Dene.

First of all, Bengtson and Krämer clearly agree with Pinnow and with me that Na-Dene exists. With Bengtson, of course, this is no surprise, given his previous work on the matter. It is pleasant to have also Krämer's statement in the same vein since he is, as his paper shows, a well-versed expert on Athabaskan and the other languages in question.

Römer briefly addresses the question and is confident that Na-Dene will win through. I am slightly less confident since progress in linguistics does not only depend on data and argumentations, but also on "external" issues such as in what manner influential personalities act. It remains to be seen. Probably we will still be discussing Na-Dene in ten and in twenty years' time. Everyone *should*, however, accept Na-Dene.

It is Peust's paper that I would like to focus on in this section. In an interesting investigation which must have caused much work for him, Peust applies a mathematical method, with a computer program written by himself, in order to see whether it confirms the existence of Na-Dene as a family or not. His results are negative: he lays out that the method confirms only the connection of Eyak and Athabaskan, but not the relationship of Tlingit to either, nor the relationship with Haida.

However, what exactly does this result mean? It could mean, of course, that the Na-Dene claim is invalid. But, as Peust himself points out, this is by no means the only possible interpretation. It may very well be that there are shortcomings with the method, or that it simply only has a limited power. This is in fact the conclusion I personally draw. In my opinion Na-Dene has been demonstrated already, largely even by rather traditional methods, involving research by e.g. Sapir, Hymes, Pinnow and others. If now a mathematical method does not confirm such a genealogical unit, this may be due to an insufficiency of the method. It makes sense to have a closer look at some issues involved here.

Peust lays out that English and Hindi can be demonstrated to be related by help of the method. This is fine, since Indo-European linguistics, too, teaches us that these languages are related. But would the method also work with Welsh and Kurdish? Furthermore, Peust informs us that Oswalt, carrying out research with a similar method, could find no relationship between Finnish and Hindi, "as expected". Is this really as expected? Adherents of Indo-Uralic will object to this. As is well known, the Indo-Uralic hypothesis is strong in pronouns and other core vocabulary items, consider e.g. Finnish *nimi*, stem *nime-* "name", *vesi*, stem *vete-* "water". It is exactly here where new results of a computer method would be highly welcome. As another example, consider Ceolin (2019). Applying another similar method, this author checks Turkish, Mongolian and Manchu which some counted as "Altaic". Ceolin, too, does not arrive at any clear confirmation of anything. Only possibly, Mongolian and Manchu may be related according to him. However, experts such as e.g. Janhunen had presumed this before. I do not defend the relationship of Turkic, or at least not the very close relationship, to either Mongolic or Tungusic, but there are better chances that Mongolic and Tungusic may be related to each other.

Considering all this, my suspicion is that the method can arrive at approximately the same genealogical units that the traditional comparative method provides us with. Apparently in some cases it can deliver even less. But possibly, or hopefully, in other cases it can deliver slightly more. These latter cases would be interesting.

Why is it that the method fails to deliver news on Na-Dene, and apparently also on other language families or hypotheses? I think that one reason is that the method by its very

nature ignores much information which would be readily available. It simply strips away an enormous amount of such information that a human being as a linguist would enter into his considerations (partly even subconsciously, routinely).

1. For instance, the method does not make use of the grammatical systems – neither morphology nor syntax. However, it was Hymes, among others, who demonstrated that the morpheme order of the Na-Dene languages shows significant similarities which are good evidence for their relationship. The method under study here concentrates exclusively on the lexicon. However, even here there are problems, as we will see in the remaining points.
2. The method refers solely to consonants and ignores vowels entirely.
3. The method often does not make use of information on segmentations that the analysis of each language would provide. A specialist for a language can frequently tell where a prefix, a suffix etc. is present, even if fossilized, or where we are looking at a compound.
4. The method considers the first two consonants, but no consonants further on in the word, if there are any. This entails that the method is biased as to prefixes and suffixes. Words that are cognate but have different suffixes are less likely to go undetected, whereas words that differ because of prefixes run into problems. (To a certain extent Peust remedies this for the case that one of the two words has just a single consonant, in a clever way.) In Na-Dene, prefixes play a great role.
5. The method does not deal with semantic shifts. However, they are rather important, see Pinnow (1976: 60–62) for two crucial Na-Dene etymologies employing semantic shifts concerning “finger”, “hand” and “arm”.
6. In addition, the method does not make use of information about loanwords which we linguists have. In Japanese, for instance, *shinzō* “heart”, *kanzō* “liver” and other items are loanwords from Chinese and could be set aside for a genealogical investigation, but the method does not provide any means to handle this information. The Hindi word list contains a large number of loanwords from Persian.
7. Any information from outside the word list chosen is ignored.

This list is of course incomplete. Peust is aware of these issues as well.

I would consider myself an open-minded person and not prejudiced against mathematics. However, I have not seen a mathematical method yet which brought long-range comparison ahead. And it is this what counts; the question is whether a new approach works in practice. Campbell devotes a chapter of the third edition of his textbook on historical linguistics to quantitative methods, and he finds them insufficient as well (Campbell 2013). Interestingly, Römer underlines that historical linguistics carried out by humans can be “superior to any existing computer algorithm”.

What we would like to have for long-range comparison are methods which detect, demonstrate or evaluate relationships which exist at a greater time depth. For this purpose,

it is in my opinion important to consider lexical "stability", see more on this in subsection 4.2. below, and other issues.

Peust correctly points out himself that the failure of his method to prove Na-Dene does not mean once and for all that there is no Na-Dene family. He writes: "it is important to understand that the failure of proving relationship is not the same thing as proving non-relationship." The algorithm does not permit to arrive at what I would regard as an appropriate statement on Na-Dene, and it is thus irrelevant to the question. That Na-Dene does exist is an insight we have from other approaches – by and large rather traditional ones.

However, the method may turn out to be useful with other areas. I would suggest to re-check Penutian or parts of it, as well as Hokan, or parts of it, with Peust's computer program. These two North American families have their doubters as well, but the relationship between at least some of the languages in question in each case is rather close and could be detectable by a computer with this sort of algorithm. Other areas where the method could be used are South America and New Guinea, given the quite unclear status of their classification. Moreover, it is possible that improvements of the method are going to be invented in the future, as Peust reminds me (personal communication). Improvements of the method may mean better results for a greater time depth.

I would suggest an approach with AI (artificial intelligence), i.e. to mimic with a computer what a human linguist would do with linguistic data and background knowledge. A data base with such data and background knowledge is required. This can constantly be fed with new information. Certain algorithms time and again run through all this and yield hypotheses on language relationships, etymologies, sound correspondences and the like. Human linguists check whether they find these hypotheses convincing or not. They then teach the system how to do something better, by providing it with more information.

3. SUBGROUPING OF NA-DENE

Since Peust did not arrive at a recognition of Na-Dene, he does not have news on subgrouping either. However, sometimes his data are telling in this regard. Looking at the entries for "ear" and "liver", it can be observed that Tlingit and Haida share the same etymon in each case, which can be used as evidence for grouping these two languages together, as I suggested. Tlingit *-gug* "ear" and Haida *gʸuu* "ear" were already regarded as etymologically identical by Pinnow and others, and undoubtedly correctly so. (Note that Peust's program ignores the vowels.)

Bengtson addresses subgrouping in an appendix to his paper. He entertains the possibility that Haida may be an entirely independent branch of a macro-family and not closely connected to the other Na-Dene languages. This, however, is very unlikely, given all research so far. A detail on an etymology by Bengtson. Being liberal with the semantics, he compares a Hunzib word *pirt'i* "lung" with a word in Haida meaning "guts, intestines" and with Basque *ipurdi* "buttocks" (and with further material). However, Old Georgian has *pirt'wi* "lung", and this has cognates in the rest of Kartvelian (Fähnrich / Sardshweladse

1995: 358). It is obvious that the Hunzib word *pirt'i* "lung" is a loanword from Kartvelian. I checked with the map by Klimov (1994: 403) whether Hunzib is geographically close to Georgian, and this is indeed the case.

Krämer points out the fact that, within Na-Dene, "Haida differs more from all others than they do from each other". He asks why then Haida should be anything else than the first language to branch off. It is of course true that this is a question to be answered, but I addressed this in the anchor paper. As I pointed out there, a language can suddenly, for instance due to language contact, change with accelerated speed and thereby make its original position in the family tree less recognizable. I do not deny, of course, that the question is open and needs work. Krämer suggests that investigating this could be a future research project for me. However, I may have to disappoint him, since it is at present unlikely that I familiarize myself to a sufficient extent with the Na-Dene languages in order to work on this problem – I am too busy elsewhere. Experience tells that subgrouping problems are sometimes very hard and require great expertise. I see my role as the one who has merely contributed an idea, namely that the current subgrouping of Na-Dene may have to be reinvestigated, and that was it.

Römer does not address subgrouping of Na-Dene in particular, but he devotes a whole section of his paper to subgrouping in general. There he suggests methods which have been applied outside of linguistics but which may prove fruitful in linguistics as well.

4. QUESTIONS OF NA-DENE, YENISSEIAN AND SINO-TIBETAN: LAKITIC

Pinnow and I suggested a possible relationship of Na-Dene, Yenisseian and Sino-Tibetan. The origins of this idea are older of course: already Sapir claimed the relationship of Na-Dene and Sino-Tibetan, and also Yenisseian had been brought into the debate earlier. I suggest the term *Lakitic* for the emerging unit if it indeed exists. This is a reasonable hypothesis, but of course very far from being established knowledge. Much work is still needed on this question, also keeping in mind the possibility that the hypothesis has to be given up or modified.

Peust and Römer do not make any specific statements on the Lakitic hypothesis, hence no reaction is possible here. I will react to Bengtson and to Krämer.

4.1. Bengtson on Lakitic and the issue of Burushaski

Bengtson agrees that the three families are related, but he sees these ties within the framework of his greater hypothesis of Dene-Caucasian. I will comment in more detail on the Dene-Caucasian claim below in section 5. Therefore here I will only address what Bengtson thinks about the Lakitic proposal.

According to him, only Na-Dene and Sino-Tibetan form a unit, while Yenisseian is in his opinion more closely related to Burushaski. However, Burushaski is related to Kartvelian, see subsection 5.3. Something else, namely language contact including lexical borrowing, is possible between Burushaski and "Lakitic" languages. In the case of Sino-Tibetan

this contact is even an established fact; Burushaski contains loanwords from neighbouring Tibetan (and possibly from other Tibeto-Burman languages). In Bengtson's statements on "hand", the information would be welcome why his Yenisseian reconstruction has an **r′* since Ket has *l′*. (There were other Yenisseian languages, now extinct, but to my knowledge none of them points towards a rhotic.) Recall also that the final *-ŋ* of Yenisseian seems to recur in Sino-Tibetan in the interrelated numeral "five", Tibetan *lŋa*. (Of course, a lot still remains to be clarified here.) It should be stressed, too, that **-rín* for Proto-Burushaski is not a matter of preference but more or less inevitable, see the anchor paper and references therein to work by Berger and Holst.

Bengtson writes: "I propose that investigators carefully and objectively consider the evidence for both models (Burusho-Kartvelian vs. Burusho-Yeniseian) and determine which of them is the better explanation of the facts." Yes, anyone interested in the matter can compare the two approaches and make up his mind. I personally, however, have to declare that after a decade of work on Burushaski I am biased – towards the results of my own work, see Holst (2014) and Holst (2017). This work is based on rather traditional methods and should therefore be very reliable. What makes me still more biased is that I am receiving much approval for this work. (It is also interesting that Pinnow 2006: 43, within a diagram of possible interrelationships in the world, drew a line from Burushaski to Kartvelian, cf. Holst 2017: 37.) For me personally, therefore, the Burushaski matter is settled. See 5.3. for some data and discussion.

A few words should be said now on how Burushaski is pictured in Bengtson's paper. Burushaski experts will namely object to some of the ways in which data from this language are used there – for the purpose of arguing for its membership in the putative Dene-Caucasian. Proto-Burushaski was reconstructed on the basis of the dialects with the comparative method only a few years ago, namely by Holst (2014), especially Holst (2014: 51–106). Before that, Berger's views existed already, most of all those in Berger (2008), but many of them do not have a firm methodological grounding, while others seem sound and were taken over by Holst (2014) and also, for instance, by Munshi (2015). Many of Bengtson's Proto-Burushaski reconstructions contradict Berger's works, and, what is more decisive, many do not agree with Holst (2014). In his table 5, "Some diagnostic basic roots in Dene-Caucasian", Bengtson intends to present four Burushaski words with alleged etymological parallels elsewhere in Dene-Caucasian. They are "eye", "thou", "tongue" and "star". However, there are problems.

1. "eye". There is no word *il-* "eye". All there is is a word *il* "hole"; Tiffou (2014: 150) translates it into French as "trou" ("hole"). An application of this word is "chas de l'aiguille", which is in English "eye of a needle". It must be from here where Bengtson's translation comes from. However, it is a particular trait of English to speak of an "eye" of a needle. As seen, French does not proceed in this way. To quote still another language, in German the corresponding word is *Nadelöhr*, in which *-öhr* is *Ohr* "ear". The real word for "eye" is **-l-ćin*, a reconstruction based on Yasin *-l-ći* and Hunza *-l-ćin* (Holst 2014: 92). Bengtson quotes this

word as well. He does this without the final *n* which has been lost in the Yasin dialect, but this is not the main problem. The decisive flaw is that for Bengtson the *-l-* is the stem, thus equatable with *il* "hole". Actually, *-l-* is the fossilized dual prefix which also occurs in a dozen other nouns, before vowels as *-lt-* (and all Burushaski experts agree on this: Klimov, Edelman, Berger, Tiffou, Munshi, etc.), and the stem is *-ćin*.

2. "thou". The word is indeed *un* in Burushaski. However, it should be remarked that there is no internal evidence in Burushaski for Bengtson's segmentation *u-n*. Lack of internal evidence for a segmentation does not automatically mean that the segmentation is invalid (pre)historically, but the information should be given here. Note also how short this word is.

3. "tongue". The attested forms are Yasin *-yúŋus* and Hunza *-úmus*. The reconstruction cannot be **-yú-mus*, as Bengtson maintains. Firstly, there must clearly be a velar nasal **ŋ* in the reconstruction rather than an *m*. The dialect area that has *m* has this because it shifted **ŋ > m* between the two rounded vowels, see Holst (2014: 60f.), elaborating upon Berger (2008: 39). Secondly, the initial *-y-* is an innovation of Yasin and is regarded as a former personal prefix ("his") by Holst (2014: 102–106); there are other cases of this sort. Therefore the reconstruction by Holst (2014: 97) is **-úŋus*. Finally, there is no evidence for Bengtson's segmentation. Instead, there is evidence that *-us* is a suffix, which would make **-úŋ-* the genuine root (Holst 2017: 112, 345).

4. "star". This is Yasin *asúmun*, and both Shervin Taheri-Kutanaee and I arrived independently at the idea that this must be a loanword from Persian *āsemān* "sky" (Holst 2014: 96). Note that in many varieties of spoken Persian the *ā* of the last syllable tends towards *u*. The Hunza plural *asiímuc* "stars" corresponds to this, and the Hunza singular *asií* must be a back-formation based on the plural (Holst 2014: 96).

I would maintain, and I think other Burushaski scholars would agree, that these shortcomings are severe. Elsewhere in Bengtson's paper, and in other papers, there are further problems of this kind. They cannot be discussed here. It is impossible to prove a relationship of Burushaski to something else in this way. No genealogical connection to Yenisseian or to Lakitic emerges, and the latter remains, in my opinion, a sound, though of course uncertain, working hypothesis concerning Na-Dene, Yenisseian and Sino-Tibetan. Compare also Tiffou (1995) and Holst (2017: 26–30) for other critiques of the use of Burushaski data in the Dene-Caucasian framework.

4.2. Krämer on Lakitic and "hand"

Krämer is in general a bit reserved towards greater groupings and macro-families. In fact, we also need scholars like this. To be more precise, we need both the bolder explorers and the critics and skeptics. The "lumpers" and "splitters", as they were called in classificatory debates on American Indian languages in the 20th century. We need both for the simple reason that their intellectual contributions are required in order to arrive at the facts. All the more, by the way, it is excellent news that Krämer supports Na-Dene. He has apparently

discovered for himself the conclusive evidence in the literature. He is wise enough, unlike some other scholars, to study the evidence in each case and not to do away with Na-Dene in one go together with other proposals.

What I would like to deal with in this subsection is the detailed commentary on "Lakitic" and "hand" by Krämer.

Krämer points out that in the Indo-European family there are many etymologically different words for "hand". The Romance languages have a word deriving from Latin *manus*. The Germanic branch has words such as Gothic *handus*. Balto-Slavic is characterized by Czech *ruka*, Latvian *roka*, etc.; note here Lithuanian *rankà* which reminds us of the nasal once contained in the word (and in some Slavic languages and dialects nasality is still present). As to Celtic, there is Irish *lámh* etc., etymologically connected with Latin *palma* "palm (of the hand)". Given these and other data, Krämer argues, a word for "hand" can be replaced in language history by a different word, and it can also be coincidental that the approximate form *lak* etc. occurs in Na-Dene, Yenisseian and Sino-Tibetan. This is possible, but we have to study the probabilities, and for this aim it is necessary to widen the perspective.

Looking at a wide range of language families reveals that many of them have a word for "hand" which is very ancient within that family. The Turkic languages, for instance, have the word represented by Turkish *el*, Yakut *ilii*, Chuvash *ală* "hand". Uralic has a word appearing time and again; in Finnish it is *käsi*, stem *käte*-, in Hungarian *kéz*, stem *keze*-. Austronesian has a word with considerable time depth which is *lima* "hand; five" in Indonesian and similar elsewhere in this huge family. The point is that the situation described by Krämer for Indo-European, the plurality of words for "hand", is not typical. Greenberg (1987) has pointed out that many Native American languages have a word for "hand" which is **maka* or similar, and while there are severe problems and mistakes in his overall theory, this particular fact may be meaningful (as well as the pronoun pattern *n*- / *m*-, see Nichols / Peterson 1996 for news on this).

Scholars interested in long-range comparison have a concept called *stability*, or more precisely one might speak of *average stability*. The background of this idea is the everyday experience of linguists that for each meaning the average exchange rate of words designating it is by no means the same. The differences are enormous. Words for "water" or "sun", for instance, are often kept for millennia, whereas words for "bad" or "speak" are often replaced. There are of course untypical data in particular instances, even in many instances, but it is the statistical facts that are crucial here and provide useful knowledge to have in the back of one's mind and to work with. Linguists have attempted to compile lists of such stable items. The item "hand" ranks high on several such lists. In fact there is also a relatively new fifty word list quoted by Bengtson in his paper which has "hand" on position 11.

Despite Krämer's correct data from Indo-European, in fact Indo-European does have one particular word for "hand". It is the one represented by Hittite *keššar*, Greek χείρ, Albanian *dorë*, Armenian *ǯerṙn*, possibly also present in Tocharian, and there is a derivative

Old Indian *hás-ta-* and Avestan *zas-ta-* "hand" (the root is also present in Baltic). Note that the sibilant **-s-* in the interior of the word was lost in Balkan Indo-European, the subgroup that Greek, Albanian and Armenian belong to (Holst 2009: 73–78). We can now even go one step further and compare this material with the Uralic word, Finnish *käsi* etc., which according to some adherents of Indo-Uralic is etymologically identical. This would mean that the time depth of this word for "hand" is greater in the case of Indo-European and of Uralic.

Considering all this, it is in my opinion very well possible that a word for "hand" is very old in the case of the Lakitic languages. Krämer points out that the Chinese word for hand, *shǒu*, is etymologically something different. This is true, but the statement on *lak* etc. does of course not preclude the possibility that parts of the large Sino-Tibetan family innovated a word for "hand". This has happened in parts of Na-Dene as well. Also the interrelationship with "five" is commonplace cross-linguistically and would not be surprising.

5. ON THE DENE-CAUCASIAN CLAIM

Bengtson raises the question how my statements on Na-Dene and on the possible Lakitic relate to the putative macro-family Dene-Caucasian. This is not surprising, and possibly inevitable, since for several decades he has been advocating this claim, working on assembling evidence.

As explained, like Pinnow I entertain the possibility of a relationship Na-Dene / Yenisseian / Sino-Tibetan. In contrast to this, however, and again in line with Pinnow, I do not want to go further than this at present and regard the question as entirely open which languages or families may be related more distantly to this triad. In writing the anchor paper, it was not my intention to draw attention to "Dene-Caucasian". I must confess, for the sake of clarity, that I feel myself unable to be convinced by the Dene-Caucasian construct, and, consequently, I am no adherent of it. The reasons of my criticism are as follows.

5.1. On Abkhazo-Adyghean and Nakh-Daghestanian

As to Abkhazo-Adyghean and Nakh-Daghestanian, important scholars have serious doubts that they are related to each other (except for, possibly, at a Proto-World level). Despite of this, Dene-Caucasian supporters treat them as just one alleged family, called "North Caucasian" or even just "Caucasian". There is a problem here. Let us look at this in more detail.

The Caucasus has, apart from newcomers, three indigenous language families: Kartvelian, Abkhazo-Adyghean and Nakh-Daghestanian. Almost all experts in Caucasian linguistics agree that there are exactly these three families, not more and not less. See for instance the introductions by Deeters (1963), Klimov (1994) and Hewitt (2004). Klimov was certainly not a scholar who could be accused of being narrow-minded. He had an excellent command of a wide range of languages, and he was a brilliant linguist. Klimov (1994: 201–206) lays out in detail why it is very unlikely that Abkhazo-Adyghean and Nakh-Daghestanian form a family together. I am not impressed by the existence of a "North

Caucasian etymological dictionary"; Starostin, one of its two authors, has received devastating criticism for his way to do Caucasian linguistics (see e.g. Klimov 1994: 26, 202f.). There also exists a work called "Etymological dictionary of the Altaic languages", Starostin being one of the authors, but this does not mean that "Altaic" exists.

It is true that both families have ejectives, but this applies to about 20% of the languages of the world (Fallon 2002). It is also true that both families have some sort of ergativity, but this, too, is found in lots of language families in the world (Dixon 1994). It is recommendable to study the typological profile of Abkhazo-Adyghean by Klimov (1994: 47–87) and the one of Nakh-Daghestanian by Klimov (1994: 134–174).

– Abkhazo-Adyghean languages typically have very large consonant inventories, short and often monosyllabic roots, definiteness expressed by a prefix, hardly any case systems, multiple person / number marking in the verb, and so on.

– Nakh-Daghestanian languages typically have longer roots, four classes (or a different number of classes), class prefixes, large case systems, inclusive / exclusive, no person marking in the verb, etc.

Typological differences do not necessarily preclude relationship. However, the greater the differences, the more typological change has to be assumed in at least one branch of a putative family, and plausible ways have to be found how this change is supposed to have occurred. Much evidence would be needed.

Abkhazo-Adyghean and Nakh-Daghestanian are as different from each other as Afro-Asiatic and Uralic. It is true that many Afro-Asiatic and Uralic languages have long consonants and possessive suffixes, but this is of no help, since the typological differences are otherwise so great. In the same way, ejectives and ergativity are of no help in the case of Abkhazo-Adyghean and Nakh-Daghestanian. Moreover, their core vocabularies are radically different.

I do not know whether Dene-Caucasian supporters are aware of this, but via using "North Caucasian" for their macro-family they have an implicit charge: that the Caucasianists keep the two families apart without justification. This charge is very likely to be incorrect.

I fail to understand why some promoters of Dene-Caucasian hardly do any research in its own right on some of the components which are supposed to make up their putative superfamily. In particular, there seems to be no passion for investigating Nakh-Daghestanian more closely. But this family is rather large, and any advances on subgrouping, on the reconstruction and on a better understanding of many other issues would be very welcome. Such work would be rewarding for any relationship claim that may come up in the future. And it is here where reliable progress can indeed be made, rather than on the outer connections of Nakh-Daghestanian. If I started work on the Nakh-Daghestanian languages by themselves tomorrow, I am confident that I would come up with 90% correct etymologies (among them). If, in contrast, tomorrow I started work on possible outer connections of

Nakh-Daghestanian, it is well possible that I would end up with 90% *incorrect* etymologies, and 100% is not excluded. With the will to head towards a relationship proposal, it is an advantage if one is intimately acquainted with the language families or language isolates in question, for instance by having published papers or monographs on them, or by being in contact with the relevant experts.

If Abkhazo-Adyghean and Nakh-Daghestanian cannot be shown to be related to each other, it makes of course little sense to attempt to combine them with other families, e.g. Sino-Tibetan, or language isolates, e.g. Basque. One may finally ask whether it would work to connect one of the two, either Abkhazo-Adyghean or Nakh-Daghestanian, with Sino-Tibetan or Basque, but this runs into formidable difficulties as well.

5.2. On Basque

As to Basque, according to most scholars it is rather unclear today with what it is related. At present (2020) most count it as a "language isolate". Only sometimes do I see problems in how Basque data are used nowadays in the argumentation for the putative Dene-Caucasian. The situation is better than the handling of Burushaski data which I criticized in 4.1. However, I fail to be convinced by the proposed cognate sets in Bengtson's works, which I have studied for two decades. I would expect more and better etymologies especially concerning core vocabulary, as well as convincing news on the historical grammar of Basque.

Recently a book of mine on Basque was published: Holst (2019). It does not make any decision on what Basque may be related to. I considered such a statement premature. Instead, this book is concerned with investigations concerning Basque alone, and it has various news to tell. Hopefully the book will turn out to be a help for future research on the genealogy of Basque.

In my opinion, Bengtson's greatest merit in Basque studies lies somewhere where he may not expect this. It is that he pointed out flaws in the reconstruction of Proto-Basque by Michelena and Trask. While many of the ideas Michelena and Trask put forward on the reconstruction of Proto-Basque are legitimate, there are also quite a number of ideas which are not convincing at all and in fact deeply mistaken. Nevertheless, Trask stubbornly adhered to them until his death. One of these ideas was that Basque had no **m*, an absurdity which cannot be backed up by evidence. Another such idea was that a Basque word could not begin with a voiceless plosive. It is here where Bengtson comes into play in a positive way, as well as Starostin and others, but also established Vascologists such as Hualde. What they did was to question and attack the so-called "Pre-Basque phonology" and propose alternatives which are more realistic. "A hypothesis built on sand" was the apt characterization that Bengtson (1995: 90) found for the "Pre-Basque phonology". For an elaborate discussion of these controversies concerning the reconstruction of Proto-Basque see Holst (2019: 139–149).

The possible outer connections of Basque are a difficult topic, and they remain a task. In particular, it must be emphasized that is rather unclear whether Basque has any connections to the Caucasus. It should be reported that Holst (2019) contains a long passage which argues on the basis of the facts from vocabulary and grammar that it is unlikely that Basque has any connections to the Caucasus (Holst 2019: 207–209).

5.3. On Burushaski

As to Burushaski, to the surprise of the linguistic community this problem has recently been solved. Burushaski is nothing but a relative of Kartvelian, a kind of eastern "outlier". In fact the relationship is not even so distant. It is a language that was carried eastwards and subsequently went its own way, thereby adapting to a certain extent in its profile to its new surroundings, being "indianized" and "himalayized".

This was demonstrated on 420 pages by Holst (2017) as well as in several talks at various universities, lectures and other materials. Holst (2017) was preceded by a different monograph on Burushaski alone (Holst 2014) as well as by work on Kartvelian languages (the reconstruction of Proto-Kartvelian has moved slightly in recent years due to work by Fähnrich, Holst and others, plus by acknowledging that an older scholar, Schmidt, was right on a number of decisions).

It is possible to approach the Burushaski issue from various angles. Let's take this one here. First of all, these are some cognate sets; the list is identical with the one at Holst (2019: 203), and translations apply to both proto-languages (which means that these sets are semantically impeccable):

Proto-Kartvelian	**Proto-Burushaski**	
**min*	**men*	"who"
**ƛumal-*	**-ltúmal*	"ear"
**wir-*	**gir-*	"rat"
**wal-*	**gal-*	"to go, to walk"
**war-*	**gar-*	"light" (noun)
**bar-*	**bar-*	"speech"
**bar-*	**bar*	"valley"
**gal-*	**gal-*	"to break"
**qar-*	**har*	"ox"

Note especially "ear", since the probability that such similarity exists among such long strings of segments by accident is extremely small. The data do not always exhibit complete identity. Of course this does not constitute a problem, and it is even what is to be expected since languages undergo sound laws. In this case the laws are **w-* > *g-*, **q* > *h* and **ƛ* > *lt* in Burushaski. As to the last law, in fact it had already been shown by internal reconstruction that instances of *lt* in Burushaski can be traced back to the lateral affricate **ƛ* by Holst (2014: 143–145). Even earlier, Bengtson (2008: 246) made the same point, even though coming from a rather different perspective. See the discussion by Holst (2014: 145 footnote 44) which gives full credit to Bengtson.

At this point it makes sense to ask the following question. The phonological profile of Burushaski differs from that of Kartvelian in some respects, so how does this fact relate to the relationship claim? First of all, the differences in the sound systems are not great. Then, it turns out that Burushaski has two major deviations: it has retroflexes such as *ṭ*, *ç*, *ṣ*, and it has an opposition unaspirated / aspirated with the plosives (stops) rather than ejective / non-ejective. It is immediately clear that in this respect Burushaski is typical of the languages of India and adjacent areas. As is well known, these languages form a "sprachbund" with retroflexes, an opposition unaspirated / aspirated with plosives and other features. With Holst (2017) it turned out that Burushaski has undergone a number of shifts in its phonetics. Some of these were shifts which made the "Indian" / "Himalayan" typological profile arise. In this way, roots that preserve a more conservative shape in Kartvelian acquired a new, Indian, guise, as will be explained now.

About retroflexes general experience tells us that they often arise from consonant groups with *r*. There is a Dardic language spoken in an area adjacent to Burushaski named Shina. Shina shifted a number of clusters containing *r* to retroflexes, so, for instance, *tr*, *pr*, *str* all yielded *ç* (Masica 1991: 210). The search for cognates for Burushaski roots with retroflexes reveals that this language developed similarly to its neighbour. These are four etymologies (data from Holst 2017: 221); in the first two etymologies, the translation before the slash refers to Proto-Kartvelian and the translation after the slash to Proto-Burushaski:

Proto-Kartvelian	**Proto-Burushaski**	
**totr-*	**thoṣ*	"white" / "new"
**tr-*	**ṣ-*	"drink" / "eat, drink"
**pat'r-*	**phuṣ*	"empty"
**prin-*	**çin*	"bird"

It can be seen that the sound laws which must be involved here are **tr* > *ṣ*, **t'r* > *ṣ* and **pr* > *ç*.

As to the plosive types, the following brief treatment sums up the discussion by Holst (2017: 196–203). First a look at the systems makes sense. Kartvelian has three types of plosives (stops):

p voiceless unmodified
p' ejective
b voiced

Burushaski has three types of plosives as well, but the system is a different one:

p voiceless unmodified
ph voiceless aspirated
b voiced

It turns out that Burushaski shifted the voiceless unmodified plosives to aspirates, while the ejectives became plain stops. With the velars, for instance, **k* > *kh*, **k'* > *k*. In Holst (2017) this is called *Plosivverschiebung*, i.e. *plosive shift*.

Proto-Kartvelian	**Proto-Burushaski**	
**aka*	**akhó*	"here"
**k'inčx-*	**kanjá*	"neck"

The effect of the *Plosivverschiebung* can in fact also be seen in two of the etymologies above which illustrate the rise of retroflexes: observe the first sounds *t* / *th* in "white" / "new" and *p* / *ph* in "empty". There are almost 30 examples for the *Plosivverschiebung*.

There are a number of other sound laws. Moreover, Burushaski simplified quite a number of consonant groups by dropping a consonant according to certain regularities. Examples for this include:

Proto-Kartvelian	**Proto-Burushaski**	
**c'q'al-*	**cil*	"water"
**-berc'q'-*	**barć*	"spark" / "lightning"

Also Proto-Kartvelian exhibits some innovations regarding its sound system, but only very few. An example is **ŋ* > *n*.

Holst (2017) offers 110 etymologies, as well as a historical phonology which ties them together. A legitimate question that can be asked, especially by scholars acquainted with long-range comparison, is how "basic" the items are. Investigating the 23 cross-linguistically most stable items according to Dolgopol'skij (1964), "I", "two", "thou", etc., one finds about 20 cognate sets, allowing for commonplace semantic shifts in some cases. For instance, one of Dolgopolsky's items is "sun", and Proto-Kartvelian **mže* "sun" and Proto-Burushaski **sa* "sun" are indeed etymologically identical (one has to know the sound laws behind them). For some of Dolgopolsky's meanings no cognate set at all can be found, "salt" being an example. For others, in contrast, even two cognate sets exist. This applies, for instance, to "eye": the Kartvelian word for "eye" corresponds to the Burushaski word for "eyelid", while the Burushaski word for "eye" corresponds to the Kartvelian word for "pupil of the eye". (By the way, these are the kind of connections that easily escape word list consuming computer analyses.) Given that 20 cognate sets have some connection to the Dolgopolsky list, there are thus 90 other cognate sets, considering the total of 110. Many of these 90 other cognate sets refer to rather "basic" meanings as well: body parts, animals, basic activities, etc.

What has not been discussed yet is the grammar, which provides abundant evidence for the relationship as well. These languages are usually ergative or split-ergative languages, with some "active" or "active / stative" features, and exhibit abundant prefixing and suffixing. First of all, Holst (2017: 100f., 244f., 305–307) revives Dell Hymes' positional analysis, well-known from the discussion on Na-Dene. Noun inflection can be traced to very similar templates for Kartvelian and for Burushaski (Holst 2017: 244f.); note especially the shared fossilized dual prefix **ǰ-* (Holst 2017: 266–270). Verb inflection also leads to conspicuously similar templates, and since verb forms can be longer than noun forms, even tending towards being polysynthetic, this is even more probative (Holst 2017: 305–307).

About 50 morphemes are compared by Holst (2017). If you want to say "they x you", with x a verb and "you" singular, in older English "thee", in Old Georgian you employ a prefix *g-* "thee" and a suffix *-en* "they", while in Burushaski you employ a prefix *gu-* / *go-* "thee" and a suffix *-en* "they". If the object is "us" (1st person plural), Old Georgian has *m-*, provided it is historically an exclusive form, not an inclusive form, and Burushaski has *mi-*. This may be the same *m-* / *mi-* known from many languages of Eurasia for 1st person, but also present in Niger-Congo and in Siouan.

Old Georgian has a prolative-ablative case in *-gan*, and Burushaski has a prolative-ablative case as well, with the same set of functions, also ending in *-gan* (Holst 2017: 257). The case suffixes arose from an independent word which survives in Old Georgian as *gan-i* "goal" (*-i* nominative) and in Burushaski as *gan* "way, path, road". The semantic deviation here reminds of the German saying *Der Weg ist das Ziel*, literally "The way is the goal". Only a small fraction of the evidence could be discussed here.

In my opinion, to declare all the data as coincidental is not an option for a historical linguist. It remains to be said that it may be a long way towards understanding, and possibly appreciating, some of the more complex and partly even highly demanding argumentations of Holst (2017). A practical problem is also that all evidence is interconnected. The above explanations, however, may give a sufficiently clear hint that the relationship is real.

6. THE ISSUE OF MONOGENESIS AND GLOBAL ETYMOLOGIES

Bengtson, Krämer and Römer all address the question of monogenesis of the world's languages, as well as interrelated questions of classification and of earliest mankind. In my opinion long-range comparison is still in its infancy, thus questions such as these are even more difficult to speak about.

Bengtson remarks that all human languages may be ultimately related at some point, and therefore the question on the outer connections of Na-Dene is not so much to what Na-Dene is related but: "to what other language families is Na-Dene *most closely* related?" (his emphasis). I agree that there are probably closer and less close relationships of Na-Dene – and the same applies to other language families, the principle repeating itself. With the Lakitic proposal, in my opinion we have a possible answer that can now be worked on in order to see how it fares. In fact some of this difficult work has already been done by Sapir, Pinnow, Bengtson, Vajda and others. There remains a lot to do, however, including a considerable weeding out of errors. Further relationships of Na-Dene (more distant ones) are possible, but of course even more difficult to investigate than Lakitic already is. That classification is the crucial point, and not so much the relationship itself, was in fact a point that Greenberg used to stress. Ruhlen follows him in this respect today. I feel uneasy with Peust's paper on a few occasions when he calls languages "unrelated". They are not necessarily unrelated, but we simply do not know yet. I personally prefer wordings such as "not known to be related" rather than "unrelated" in many cases.

Krämer points out that the time depth when establishing macro-families is so great that this poses enormous difficulties. He is of course correct. This is why I constantly attempt to be careful in my statements concerning long-range comparison. Krämer also points out that monogenesis is even considerably more difficult to assess. This I would confirm as well. Furthermore, Krämer reminds us that there is no necessity or automatism that the hypothesis of monogenesis is correct.

Römer is entirely correct in writing: "There is still a long way to go until a demonstration or refutation of monogenesis of extant human languages." Another observation of his is possibly even more interesting: "probably the repertory of methods needs further expansion." This is true, and we have to think about what can be done. The traditional comparative method provides us with the established language families plus the language isolates. Methods current today among scholars interested in long-range comparison carry us a bit further. Interestingly, however, they do not carry us as far back as "Proto-World", if it existed.

Römer also addresses global etymologies. He deems it possible that some of the existing global etymologies will turn out to be correct. My own experience is that most global etymologies I saw in print contain considerable flaws. However, in my opinon it is possible that global etymologies exist. There may be cases in which words survived in particular languages or families for a considerable amount of time, until today.

Two entries in Peust's Swahili Swadesh list are *sikio* "ear" and *-sikia* "hear". They are doubtlessly correct, and they are also found on a Swadesh list for Swahili I had compiled for my personal use long before. These remind strikingly of some other words for "ear":

Classical Mongolian	*čikin*	"ear"
Chaplino (Yupik)	*siγun*	"ear" (< Proto-Eskimo **čiγun*)
Yucatec (Mayan)	*šikin*	"ear"
Swahili	*sikio*	"ear"

I am at a loss to understand the cause for this. Of course you can always say that this is coincidence, but – and I ask everyone to take this seriously – in my experience such instances may be too numerous to be accidental. (I briefly checked whether the Swahili word has any great time depth within Bantu but was unable to find evidence for that.) Moreover, consider the following words, which are related to each other, as laid out in detail by Holst (2017: 143f., 211, 227):

Burushaski	*-l-ćin*	"eye" (*-l-* dual)
Proto-Kartvelian	**čkin-*	
> Georgian	*čin-i*	"pupil of the eye" (*-i* nominative)

Burushaski regularly simplified the consonant group **čk*, retaining only the affricate (Holst 2017: 210f.). Georgian changed this cluster as well; it is still present in the three other Kartvelian languages. Phonetically **čkin-* looks like the word for "ear" just treated (with no first vowel). A comparison may raise objections since "ear" and "eye" are different

body parts. However, both may derive from a root "to perceive", thus calling them "perceivers". In fact, the word for "ear" of the Georgian-Zan branch of Kartvelian, namely Georgian *q'uri* "ear", Mingrelian and Laz *q'užˇi* "ear", exemplifies exactly this. It is an innovation, and etymologically, remarkably, it belongs to Georgian *q'ur-* "to look at, to watch". (The original Kartvelian word for "ear" was **ǯumal-*.)

There may be what I would like to call a "Proto-World effect". This means that the same words crop up again somewhere in a very different place on the earth. You may sit down with an informant, take some field notes by eliciting basic vocabulary items, and suddenly the informant, out of nowhere, tells you a word that you already know from a completely different end of the globe. To my knowledge, there are weird effects in physics sometimes, e.g. in quantum mechanics and in astrophysics, and hardly any expert or layman denies them. Given this background, there may therefore a priori be some rather weird effects in linguistics as well.

Given that Bengtson, Krämer and Römer have brought up the topic, I would like to add a few thoughts of my own on the question of monogenesis. When my interest in historical linguistics started a few decades ago, concerned as a teenager with families such as Indo-European and Uralic, the question of monogenesis was very far away for me. Nowadays, after much study, I hesitate slightly to call monogenesis "probable", as Bengtson does, but I can call it "possible". This possibility somehow appeared on the horizon of my personal world-view at some point. It has its roots in certain recurring data and patterns that you come across in all those years. However, the picture is very vague. I have the impression that Römer is talking about a feeling very similar to mine.

What is of paramount importance in this situation, I think, is to remain calm and not to desire too much. No linguist is today able to argue on the basis of data for monogenesis of the world's languages. Therefore the tasks that you set yourself should be smaller. If you want to be a good historical linguist, do what you can do, more or less, and accept patiently what you cannot do. One should attempt to have some humility in view of the extremely complex material that the languages of the world provide. I personally am unfortunately not a modest person. Pinnow was one.

7. FINAL COMMENTS

Finally, I would like to apologize for the fact that this paper inevitably has some gaps. I was unable to react to more thoughts contained in the very interesting four papers. Hopefully any reader of Mother Tongue studies them again independently of my response, discovering the remaining gems in them.

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NA-DENE NUMERALS

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In the present contribution are summarized all relevant data about numerals of the first decade in the Na-Dene languages, plus Haida. On the basis of internal structure or internal reconstructions and external comparisons their etymologies are discussed.

In his manuscript dictionary of Unalaska-Aleut, Kodiak-Aleut, Tanaina of Kenai, Tlingit, Eyak and Čugačan-Eskimo languages Nikolaj Rezanov (1805) mentioned similarities between Tlingit, Eyak and Tanaina. He tried to explain them as mutual borrowings (cf. Pinnow 1975, 31). Admiral Ferdinand von Wrangell, a Baltic German explorer of Beringia, was probably the first to understood similarities between Tlingit, Eyak and some Alaskan Athapaskan languages, as a result of their common origin[1]. Later Radloff (1858, 575) connected Tlingit with Haida[2] and in his Haida glossary, compiled on the basis of several sources, also used comparisons from some Athapaskan languages. Radloff also offered the first structural analysis of the Haida numerals (pp. 589–91). Buschmann (1860, 573–78) introduced a survey of numerals in several Athapaskan languages, Eyak and Tlingit, including brief structural comments, as an appendix to his comparative glossary of these languages (pp. 546–73). In 1915 Sapir tried to demonstrate a common origin for Athapaskan, Tlingit and Haida, applying the comparative method developed by the Young Grammarians for Indo-European. Although his comparisons looked convincing, their low number, 98, and some incorrect interpretations caused doubts – see the detailed discussion by Alexis Manaster Ramer

[1] (1839, 97) '...ihre Sprache {i.e. Ugalenzen = Eyak} ist zwar von der der Koloschen {= Tlingit} verschieden, stammt aber von derselben Wurzel ab und beide Völkerschaften sind nur zwei unterschiedene Geschlechter eines und desselben Stammes.'
(1839, 99) 'Dieses Volk {i.e. Ahtena} gehört gleich den Ugalenzen zu einem und demselben Stamme mit den Koloschen und hat mit denselben grosse Aehnlichkeit in Glaubensansichten und Gebräuchen. Auch in der Sprache giebt es mehrere Wörter, die auf eine gemeinschaftliche Wurzel hindeuten.'
(1839, 101) 'Die näher wohnenden {Koltschanen = Upper Tanana} gehören zu demselben Stamme wie die Atnaer und Kenayer und können sich mit ihnen, obgleich sie einen anderen Dialekt sprechen.'
(1839, 103) Dieses Volk {i.e. Kenayer = Tanaina} gehört zu demselben Stamm wie die Galzanen oder Koltschanen {= Upper Tanana}, Atnaer {= Ahtena} und Koloschen {Tlingit}. Dieses bezeugt nich nur die noch vorhandene Ähnlichkeit einiger Wörter in den Sprachen dieser Völker.'

[2] 'Und in der That bietet auch das Thlinkit, wie es sich schon durch die engen Beziehungen, in denen diese beiden Völker zu einander stehen, leicht erklärt, die meiste Aehnlichkeit mit dem Haidah dar. Doch sollte man, in Berücksichtigung dieses Verkehrs, sich berechtigt glauben, eine augenscheinlichere Verwandtschaft auch im grammatischen Bau und Character der Sprache wahrnehmen zu können, ales dies wirklich der Fall ist, abgesehen davon, dass der ganze Lautcharacter dieser beiden Sprachen ein wesentlich verschiedener ist.'

(1996). Sapir (1915, 558) was also the author of the term Na-Dene, combining here Haida *na* "house; to dwell", Tlingit *na* "people" and a wide-spread Athapaskan suffix ***-ne***', designating "person, people" (Sapir 1915, 552, nr. 49), with Common Athapaskan ****də-ne***' "people", formed by the same suffix (Leer 1996, N-33). After a series of important studies devoted to comparative Na-Dene linguistics Pinnow (1986) concentrates on the Haida numerals, analyzed from both perspectives of internal reconstruction and external comparison. Although his reconstructions are rather artificial and his explanations do not lack creativity, his approach is inspiring and should be taken seriously.

Table 1: Survey of numerals of the first decade in the Athapaskan languages

language	1	2	3	4	5
Koyukon$_1$	*ketleket*	*unte*	*taunke*	*tinike*	*ketsmala*
Koyukon$_2$	*kaythlukéh*	*ntáykeh*	*tokah*	*tenikeh*	*ketudnála*
Koyukon$_3$	*kaythlukeh*	*n'táykneeh*	*tókhneh*	*tenikheh*	*kétsinala*
Koyukon$_4$	*kaythluket*	*n'táyuhkeh*	*tonkáh*	*tinkée*	*ketudsinala*
Inkilik	*kisleka*	*inteca*	*toca*	*tenki*	*kitschnalaa*
Ingalik	*giłaga*	*teka*	*to:g*	*de:nče*	*giłasna:l*
Up. Kuskokwim	*ts'ełk'e*	*notek'a*	*tok'e*	*dinch'e*	*ts'ihulo'*
Tanaina-Kenai	*č'ilki*	*techa*	*tugi*	*tinki*	*tskiln/tschkimo*
Tanaina-Susitna	*ilite*	*lakeji*	*takei*	*tani*	*taljtschani*
Tanaina-Kach.	*ċìλi*	*nodiɣai*	*togex*	*taŋgéh*	*čigílo*
Ahtena$_1$	*štšelkai*	*nateakcha*	*taaki*	*tijinki*, *tinnki*	*alcheni*
Ahtena$_2$	*suskai*	*naytáyky*	*tágy*	*dinky*	*ahtzunny*
Kutchin$_1$	*ihłak*	*neekaii*	*tik*	*daang*	*ihłogwinlì'* one hand
Kutchin$_2$	*ch'ihłak*	*neekwaii*	*tik*	*dǫǫ*	*ch'ihłoonlì'*
Han-Kutchin	*(tʃ')ihłej:*	*nànkxãj:*	*tʃʰaw:*	*tan:*	*ihłonlà' tʃ'ëlà' ihłeyy*
Kotcha-Kutchin$_1$	*chih'thluk*	*ne'kainⁿ*	*ti'ik*	*tang*	*chithlukanli*
Kotcha-Kutchin$_2$	*tihlagga*	*nakhei*	*thieka*	*tanna*	*illakonelei*
Tukhudh-Kutchin	*ihthlug/chithlog*	*nekthui*	*nekthui un ithlog*	*ttankthut*	*ifthlokwunlih*
Vunta-Kutchin	*inl'èg*	*nakren*	*t'iěg*	*tan*, *tankrè*	*inl'adhgwentlè*
Tanana	*chetlukeh*	*nahkehtih*	*taguh*	*tingah*	*ketudsinala*
Hare	*inl'age*	*onk'e/nak'e*	*t'age*	*dinyi*	*lla-kkè susinla*
Dogrib$_1$	*enclai*	*nàkka*	*tharga*	*thing*	*sasoola*
Dogrib$_2$	*'nthlaré*	*nakhkè*	*khtane*	*'tinge*	*zazunlarrè*
Dogrib$_3$	*thelgai*	*olkie*	*tadette*	*tinghi*	*sazelli*
Dogrib$_4$	*thlie*	*olkie*	*tie*	*tinghè*	*sazelli*
Dogrib$_5$	*ɻlè*	*nàke*	*taı*	*dɻ*	*sɻlàı*
Chipewyan$_1$	*ethliah*	*nukkur*	*torri*	*dinghe*	*sosulihe*
Chipewyan$_2$	*ittlahe*	*nankkay*	*tahe*	*dunkhe*	*sasootlahe*
Chipewyan$_3$	*inl'agé*	*nak'e*	*t'ag'é*	*ding'i*	*sésunlag'e*
Chipewyan$_4$	*ʔiłúye*	*náke*	*taɣ*	*dɻɣɻ*	*sasuláyɛ*
Beaver$_1$	*īlatc'e*	*ōñkitc'e*	*tatc'e*	*dìyetc'e*	*łatc'edī*
Beaver$_2$	*iłáádi*	*ǫ́keedyi*	*taa*	*dyę́di*	*łaats'edi*
Slave	*klie*	*oki*	*taj*	*di*	*ilagi*
Sekani	*eaclyt'ye*	*ookeet'ye*	*taht'y*	*teetutt'ye*	*clahtzoola*

language	1	2	3	4	5
Carrier$_1$	*clottay*	*nongki*	*toy*	*tingkay*	*skoonely*
Carrier$_2$	*ethla*	*nankah*	*ta/taki*	*tingi/tingkay*	*skunlai*
Carrier$_3$	*tlooki*	*nankoh*	*tagai*	*tingi*	*iskunlai*
Carrier$_4$	*iło*	*nañkhé*	*tha*	*teñgê*	*kwollai*
Babine	*łq'əj*	*neq*	*taq'əj*	*dinc'e*	*k^{w}əleʔ*
Chilcotin River	*inlhi*	*nankuh*	*tai*	*ti*	*iskunla*
Nacoontloon	*itlah*	*nanki*	*tai*	*tei*	*skwnlai*
Kaska	*ethéga*	*hleketetá*	*tadida*	*hlen´ta*	*klola*
Tahltan$_1$	*tlīgeh´*	*tlakēh*	*tāte*	*klenteh´*	*klodlac*
Tahltan$_2$	*łɣe*	*łake:*	*ta:t'e: / ta:tet'e:*	*łe:nt'e:*	*łoːlaʔe*
South Tutchone	*łə.tʃ'í*	*łə.kí*	*tə́ɪ.ké ~ tà.də́.tʃ'é*	*łə̀.ń.tʃ'é*	*k^{w}ə́.là.kʔú* fingers on one hand
Tse'tsaut	*ɛlic'*, *ɛlitsa'*, *ɛlɛ*, *ɛle·'*	*łéid'a*	*txa·adɛ*	*nt'onéi*	*ɛł'ada*
Sarsi$_1$	*à·gligah / klikkazah*	*akiye*	*tráñki*	*didni/diznah*	*kosita*
Sarsi$_2$				*ditchin*	*kulttan*
Sarsi$_3$	*tłìk'āzá*	*èkíyē*	*tá.k'ē*	*díítš'ē*	*gúùt'áá*
Kwalhioqua	*txlíe*	*ntáuke*	*táqe*	*tnútce*	*tsukwalóe*
Clatskanie	*thlie*	*nátoke*	*taqe*	*tóntçe*	*tsokwaláe*
Chasta Costa	*ła / łā^{a}ca*	*nā́xi*	*t'ā́yi*	*dÁncli*	*sxólā*
Coquille	*łaša*	*náxe*	*táxe*	*dənči*	*sxwólax*
Upper Umpqua$_1$	*aiththla*	*nakkyk*	*taak*	*sanchee*	*ishweilap*
Upper Umpqua$_2$	*áithla*	*nákhok*	*tak*	*tóntcik*	*çwolak*
Tolowa$_1$	*La*	*nax*	*tak*	*dintce*	*cwela*
Tolowa$_2$	*ła*	*naːxe*	*t^{h}aːxe*	*tʌn.t͡ʃìʔ*	*ʂ^{w}eː.laʔ*
Hupa$_1$	*La*	*nax*	*tak*	*diñk*	*tcwola*
Hupa$_2$	*ła^{ʔ}*	*nahxi*	*taːq'i*	*diŋk^{j}'i*	*tʃ^{w}ola^{ʔ}*
Bear River	*łaiha'*	*naka*	*taka*	*dintce*	*halabənła*
Sinkyone / Nongatl	*Lá'ha'*	*nak!*	*taak!*	*dīk!*	*skölá/^{N}löskö´la*
Mattole	*láiha'*	*nakxé'*	*da·k'é'*	*dint'syé'*	*kjikxó·La' / ^{D}tcugólä*
Kato	*Laxa*	*naka*	*tak*	*naka-naka*	*lasane*
Navaho$_1$	*tathlai*	*náki*	*t'ha*	*t'hi*	*estclá*
Navaho$_2$	*tláhee*	*nahkée*	*tañh*	*tee*	*est'lah*
Navaho$_3$	*akhlai*	*aki*	*ka*	*te*	*astla*
Navaho$_4$	*ła(·i) / t'áłá·i*	*na·ki*	*t^{x}á·'*	*dí·'*	*ʔàšła'*
Navaho$_5$	*t^{ʔ}á:ɬáʔí*	*naːk^{h}i*	*t^{h}á:ʔ*	*tɬ́:ʔ*	*ʔaʃt^{ɬ}aʔ*
Jicarilla	*tahchleè*	*nahkeè*	*kieè*	*tineè*	*atschleè*
West Apache	*dáła'á, dáła'é*	*nákih*	*tāāgi*	*dɻ̄'i*	*ashdla'i, ishdla'i*
Arivaipa$_1$	*dātla*	*nage*	*tage / kage*	*tie*	*estli*
Arivaipa$_2$	*takhlā*	*naki*	*rhage*	*tii^{n}*	*ashtlá*
White Mt.	*dischlai*	*na·kée*	*tágy*	*dingy*	*sellai*
San Carlos	*darcli*	*narke*	*targe*	*dinghe*	*ishkli*
Mescalero	*tashayay*	*nahkee*	*kayay*	*inyeh*	*ashtlay*
Athapaskan	**łáq'*	**nà·d(ə)*	**ta·q'əy*	**dənə'k'^{y}í*	**tšə̀qʊnə'la'i'*

language	6	7	8	9	10
Koyukon$_1$					*nekoshnala*
Koyukon$_2$	*tenankáytluka*	*tonanotáykeh*	*niltadinkeh*	*kaytlukukulyeh*	*nikognalah*

language	6	7	8	9	10
Koyukon$_3$	*tonankay-thu-ket*	*tonanotáykeh*	*tl'ka·dnkay*	*nikoználakáy-thlukehkúlla*	*nikaznarlta*
Koyukon$_4$	*tonankay-thluket*	*tonanotayukeh*	*nihkádinkeh*	*kaythluketkúlyeh*	*neekoznála*
Inkilik	*tonankelke*	*tonanteka*	*nyngantenke*	*inkojnaltolja-kykalja*	*inkojnalja*
Ingalik	*dong-agełaga*	*dong-atełaga*	*dong-ato:go*	*dong-ade:nče*	*niłk'osnal*
Up. Kuskokwim	*donants'ełk'e*	*donannotek'a*	*donantok'e*	*donandinch'e*	*hwlozrunh / hilozrunh*
Tanaina-Kenai	*kus'jini*	*kintschougoni*	*ľtakouli*	*lgitschitchou*	*klju'jun*
Tanaina-Susitna	*kisstani*	*kontschagi*	*tany*	*takoleí*	*natitlja*
Tanaina-Kach.	*čogini/košìne*	*konceɣóie*	*łtagole*	*łeče:do*	*λožon*
Ahtena$_1$	*kastaany*	*konzegai*	*ťkladenki*	*tklakolei*	*pľaja*
Ahtena$_2$	*kistán*	*konsarry*	*klahinki*	*zutlakwalo*	*lahzún*
Kutchin$_1$	*nihk'iitik* 3 repeated	*its'teech'ì' neekaii*	*nihk'iidaang* 4 repeated	*vanchòh nàk'oh zhàk dhitinh*	*ihłok gwijùutin* hands
Kutchin$_2$	*nìhk'ii tik* 3 repeated	*ch'iteeheets'ii neekwaii ...2*	*nìhk'ii dǫǫ* 4 repeated	*vanchoo zhak dhitin* thumb down	*ch'ihłoaatin* hands
Han-Kutchin	*nk'echaww*	*wënlätt'ò' nän̂kąyy ts'dhĕchann*	*nk'edänn*	*wënläch̄at ihłeyy zhèyy dhĕchann*	*ihłeyy jèchann*
Kotcha-Kutchin$_1$	*nihkiti'ik*	*e'tsede'tse*	*nihkitang'*	*menchud-hnekonkwa*	*chitluk'chotíin*
Kotcha-Kutchin$_2$	*neckhkiethei*	*nekain^n ataitsanewkhe*	*nakheietanna*	*nuntchanika*	*tikhlagga-cho-wethien*
Tukhudh-Kutchin	*nikkittyyigg*	*chitsuttetsinekthui*	*nikkithankthut*	*vunchut-nukozu-kdhityin*	*ihthlogchotyin*
Vunta-Kutchin	*ettsétèdji*	*ettsětèď ji nakren*	*ettsétèdji ťièg / nikkie tankre*	*vœntchradt zjègœdhitin*	*inľag djootin*
Tanana	*niketagah* 2x3	*taytsuntseh*	*neketungkeh*	*mintsuhtl*	*chilodeltah*
Hare	*ettsen-ťagé* +3	*ettsen-ťagé-edakkwè* 6 +	*ettsen-dinyi* +4	*ľé-ye-fwéťon inľagé ulle*	*korennon*
Dogrib$_1$	*utket tai*	*kkosing ting*	*etzenting*	*kkahooli*	*honanna*
Dogrib$_2$	*elkatharrè*	*nthlazintinge*	*alkatingè*	*'nthlaotta*	*'nthlauna*
Dogrib$_3$	*atseuti*	*thlazadie*	*etzandie*	*etthleihulai*	*kennatai*
Dogrib$_4$	*etseuti*	*handie*	*etzandie*	*ethliehoulai*	*onaiunon*
Dogrib$_5$	*ek'èta ɪ*	*łǫ̀hdɻ ɪ*	*ek'èdɻ ɪ*	*łǫǫ̀tǫ*	*hoònǫ*
Chipewyan$_1$	*elkathari*	*olusing-dinghe*	*elketdinghe*	*kutchehonerre*	*honernenuh*
Chipewyan$_2$	*ľgoothahe*	*tluzuddunkhe*	*l'gootdunghe*	*itlaudha*	*hona*
Chipewyan$_3$	*elkkèt'ag'e*	*tayeoyertan*	*elkk'eding´i*	*ínl'ayé oyertan*	*onernan*
Chipewyan$_4$	*ʔałk'étaɣɛ*	*ʔiłásɻdjɣi*	*ʔałk'édjɣɻ*	*ʔiłaɣɛyaɣaútą*	*ʔiłáunéną*
Beaver$_1$	*etc'ɻtatc'e*	*tayūdjī*	*etc'itdɻtc'e*	*k'allûkk'itc'e*	*k'initc'i*
Beaver$_2$	*ɻts'ɻtaadyi* 3+3	*taayuedzí*	*ɛts'ɻdyɻdyi* 4+4	*k'ełak'éédye*	*k'ééneidye*
Slave	*etzɛntaj*	*klatdí*	*etzɛndi*	*k'ɨuli*	*hənənə*
Sekani	*eatzetatt´ye*	*ookeidingkee*	*eatzeeteent´ye*	*kahlahkeut´ye*	*kaynent´ye*
Carrier$_1$	*alketâte*	*tekalti*	*alketinga*	*elohooly*	*lan·eezy*
Carrier$_2$	*olkitáke*	*tákalte*	*olkitingi / alketinga*	*lanízi ethlahúla*	*lanízi*
Carrier$_3$	*itlkotagai*	*ittagunłti*	*ilkuting*	*lanezlukaiunla*	*lanezi*
Carrier$_4$	*łketha*	*łthakanti*	*łketeñgê*	*ilo hulerh*	*hwonízyai*

language	6	7	8	9	10
Babine	*ɻistan*	*dəq'alt'əj*	*q'ədinc'e* 2x4	*łq'əj ts'et* 10-1	*wənize*
Chilcotin R.	*utltshuntai*	*utltshuntai-gutinlhi*	*guinilti*		*itshilawnilnan*
Nacoonthoon-Ch.	*atltshantai*	*uttshatalte*	*naketlakul*	*entlah lakul*	*atltshantai*
Kaska	*nodsliga*	*nodslika*	*nostadida*	*nosisleneta*	*tiseno go anzi tligá*
Tahltan$_1$	*nasliké*	*naslakeh´*	*nastāe*	*nastentēh*	*tsosnā´ne*
Tahltan$_2$	*na:słɪge*	*na:słake:*	*na:staʔe*	*na:słe:nt'e:*	*tθ'o:θna:n*
South Tutchone					*né.ná. tf'é* all the way across
Tse'tsaut	*ɛɬtats'é, ɛɬe·táat'atsxe*	*ɬe·id'ɛ thałcɛ́*	*txa·txaɬie·´ə*	*ɛɬiad´unɛɛ·´*	*ło·kyada´*
Sarsi$_1$	*kostranni*	*tcístcidi*	*clashdédji*	*klákuhigá*	*kúnisnañ*
Sarsi$_2$			*klashditchin*	*klakoyiran*	
Sarsi$_3$	*gùstán*	*tšìšdíítš'ē*	*tłàšdíítš'ē*	*tłìk'úyāwá*	*gūnèsnánē*
Kwalioqua	*kwustánahe*	*cōsticita*	*tcániwaha*	*txléweet*	*kwunéçin*
Clatskanie	*kwostánahe*	*costcita*	*tcaniwaha*	*thleweet*	*kwonéçin*
Chasta Costa	*k'wast´ā̆ne*	*stc!Atdé*	*nāxAndō*	*lándō*	*hwê´θe*
Coquille	*kwosta·ne*	*sčœte·*	*naxándu*	*łanti*	*hwœ·sə*
Upper Umpqua$_1$	*whastaanie*	*wheytye*	*nakatie*	*eilthantie*	*whuneya*
Upper Umpqua$_2$	*wosthane*	*hoitahi*	*nakanti*	*áiłthlanti*	*ítu*
Tolowa$_1$	*kostanne*	*tcete*	*lanisut, lanicwut*	*Laundui*	*nêsun*
Tolowa$_2$	*k'^{w}est^{h}a:ni*	*st͡ʃe:t'e*	*la:ni:ʂʌtna:t^{h}a*	*łaʔtui͡*	*ne:.san*
Hupa$_1$	*xōstan*	*xōkit*	*kenim*	*kûkkóstan*	*minLûñ*
Hupa$_2$	*xosta:ni*	*xohkʲ'idi*	*kʲe:nim*	*miq'ostawi*	*minłaŋ*
Bear River	*bdkk'at łaiha'/ kotsam / xalla bənła*	*bkk'atnake / tcuwsit*	*lebadintce*	*łasgot*	*nesiyan*
Sinkyone/ Nongatl	*köstáy / [N]bukus Lá*	*bukus nak!*	*bukus taak!*	*bukus tīk!*	*La Vágnti*
Mattole	*gwostxá·n*	*ła'sgwód*	*dji't'syéd/ [D]tcutsiět*	*[D]tcutsiět bŭklět láyaga* 8+1	*nisiyá·n*
Kato	*bûn-Laxa*	*bûn-naka*	*bûn-tak*	*bûn-naka-naka*	*laL baûñ*
Navaho$_1$	*hastár*	*tsotzi*	*tséppi*	*nasttái*	*niethné*
Navaho$_2$	*hustáh*	*soostsél*	*tsaipée*	*nastái*	*neznah*
Navaho$_3$	*ustā*	*sustsit*	*sepi*	*nastai*	*nestna*
Navaho$_4$	*xast^{x}á*	*cisčid*	*ce·bí·ʔ*	*ná·xást'ái*	*ne·zná*
Navaho$_5$	*xast^{h}ą́:*	*ts^{h}ots^{ʔ}it*	*ts^{h}e:pí:*	*náhást^{ʔ}éí*	*ne:zná:*
Jicarilla	*coscon*	*cossetpeè*	*tsapee*	*nusteè*	*coneznàn*
West Apache	*gostán*	*gosts'idi, gosts'igi*	*tsebīī, sebīī, sabīī*	*góst'áí, ńgóst'áí*	*goneznán, goni-inán, gonenán*
Arivaipa$_1$	*goston*	*gastede*	*sēpi*	*'ngosta*	*konezna*
Arivaipa$_2$	*ustrhan*	*ustsiki*	*tsepi*	*ngostai*	*gutesnon*
White Mt.	*goostán*	*gooselty*	*saybée*	*goostai*	
San Carlos	*gustún*	*gussede*	*sapé*	*gūsti*	*gunisnar*
Mescalero	*hostkonnay*	*hosteeday*	*hahpee*	*'nghostay*	*gonayhannay*
Athapaskan	**qu̯·sdəta·nI*	**k^{y}o̯s-k'^{y}ədi'*	*k^{y}ẹ̀·-wəni· / *k^{y}ẹ̀-n̲ə{w/y}i·*	**{na·/we-q'əd}qʊ'·-st'^{a}á·(ɣ)əy*	**qʊ-nẹ̀z-yaŋ^{y}i·/-ŋ^{y}a·ŋ^{y}i·*

D = Duncan by Li Fang Kuei

Table 2: Survey of cardinal numerals of the first decade in Eyak, Tlingit, and Haida

language	1	2	3	4	5
Eyak$_1$	*ł̨ihG / LinhG*	*laʔd-ih / la'd-ih*	*t'uhł-g$^{(w)}$aʔ / t'uhLga'*	*qəlah-qaʔ-g$^{(w)}$aʔ / qAlahqa'gwa'*	*č'q̨·ʔ-ih ch'a:nih*
Eyak$_2$	*tlxinke*	*loate*	*totlkoa*	*kalakakua*	*coan-e*
Eyak$_3$	*likhi*	*lhati*	*tulkva*	*khuliakhakva*	*tchai*
Tlingit$_1$	*tłʰé:x'*	*té:χ*	*nʌ́s'k*	*ta:x'ú:n*	*kʰe:tʃín : tʃín* hand
Tlingit$_2$	*tléix'*	*déix̣, déex̣*	*nás'k*	*daax'oon*	*keijín* = hand up
Tlingit$_3$	*tlyex*	*Tyex*	*nyusk*	*takun*	*ki̯čin*
Haida$_1$	*sɢwaansəŋ*	*sdiŋ*	*łɢunʔuł*	*sdansəŋ*	*tleełə*
Haida$_2$	*s-xánsöŋ*	*ś́töŋ*	*hlönhl, tlönxl*	*ś/stan söŋ*	*tlēhl, tlēlh*
Haida$_3$	*squansung*	*stung*	*klughunnil*	*stunsang*	*koheil*
Haida$_4$-Skid.	*sγwáansıŋ*	*sdıŋ*	*łγún'uł*	*sdánsıŋ*	*tlé·ł̨*
Haida$_5$-Alaska	*sγwá·nsaŋ*	*sdáŋ*	*łγúnał*	*stánsaŋ*	*tléeł*

language	6	7	8	9	10
Eyak$_1$	*c'i̯· / ts'i:n*	*laʔdic'i̯· / la'dits'i:n*	*q'ədic'i̯· / q'Adits'i:n*	*guc'-de· / guts'de:*	*dəGa·q ~ °x̣- / dAGa:q';*
Eyak$_2$	*ci̯ń*	*laateci̯ń*	*kateci̯ń*	*kutke*	*takakx*
Eyak$_3$	*tzi*	*khatatzi*	*lhtatzi*	*kvatzte*	*takhakh*
Tlingit$_1$	*tłʰe:tu:ʃʊ́* 1+	*tʌχʔʌtu:ʃʊ́* 2+	*nʌs'kʔʌtu:ʃʊ́* 3+	*ku:ʃʊ́q*	*tʃinka:t*
Tlingit$_2$	*tleidooshú*	*dax̣adooshú*	*nas'gadooshú*	*gooshúk*	*jinkaat*
Tlingit$_3$	*kletuuyeyu*	*taxatavyeyu*	*neskatauyeyu*	*kuusıok*	*činikat*
Haida$_1$	*tłəɢunʔuł*	*d͡ʒiguɢa*	*sdaansəŋχa*	*tlaaʔał ʔwaa sda sɢwaansəŋ gəw*	*tlaaʔał*
Haida$_2$	*tlūnxl, tle ūnhl*	*dzíggoa*	*stan saŋa / ś́tan zaŋa*	*tlāl sxansaŋ-a / tlāls-han senk-o*	*tlāl, tlalh, tlūth*
Haida$_3$	*kloonil*	*tsunqua*	*stansungha*	*klaso kensinoh*	*klauhl*
Haida$_4$-Skid.	*tł̨γún'uł*	*djí·go·γa*	*sdá·nsaŋx̣a*	*tlá·'ałŋ- sγwá·nsıŋgəu*	*tláa'ał*
Haida$_5$-Alaska	*tla'únł*	*dsagwaa*	*stáansaaŋaa*	*tláał- sγwaansaŋguu*	*tlá·'ał*

Skid. = Skidegate

Table 4: Comparison of the Proto-Athapaskan, Eyak, Tlingit, and Common Haida cardinal numerals of the first decade

	Proto-Athapaskan (Leer)	Eyak (Krauss)	Tlingit (Twitchell)	Proto-Haida (Pinnow)
1	**łʌ̀q'*	*ł̨ihG*	*tléix'*	*sk̲uǎ̆n(-saŋ)*
2	**nʌ̀·d(ə)*	*laʔd-ih*	*déix̣, déex̣*	**sdǎ̆ŋ*
3	**ta·q'-əy*	*t'uhł-g$^{(w)}$aʔ*	*nás'k*	**ł+k̲uǎ̆n-'wa-(h)aidl*
4	**dənə'k'ʸí*	*qəlah-qaʔ-g$^{(w)}$aʔ*	*daax'oon*	**sdǎ̆ŋ-sdaŋ*
5	**tšʊ̀-qʊ-nə-'laʔ-i'*	*č'q̨·ʔ-ih*	*keijín*	**tlǎ̆-(h)aidl*
6	**qʊ̀·sdəta·nI*	*c'i̯·*	*tleidooshú*	**tlǎ̆-(sɨ)k̲uǎ̆n-'wa-(h)aidl*
7	**kʸʊ̀s-k'ʸədi'*	*q'ədic'i̯·* 8/*7	*dax̣adooshú*	**dsɨ̆n-gua-{g+ā/-(h)aidl}*
8	*kʸə̀·-wəni· / *kʸə̀-n̲ə{w/y}i·*	*laʔdic'i̯·* 7/*8	*nas'gadooshú*	**sdǎ̆ŋ-sdǎ̆ŋ-x̣a*
9	**{na·/we-q'əd}qʊ'·-st'ǻ·(ỷ)əy*	*guc'-de·*	*gooshúk*	**tlǎ̆+xa-(h)aidl-aŋ-gi-skuǎ̆n-saŋ-gau*
10	**qʊ-nə̀z-yaŋʸi·/-ŋʸa·ŋʸi·*	*dəGa·q ~ °x̣-*	*jinkaat*	**tlǎ̆-x̣a-(h)aidl*

Note: The Eyak numerals *laʔdic'į·* and *q'ədic'į·* should originally designate "8" and "7" respectively. It is confirmed by the records *lhtatatzi* "8" and *khatatzi* "7" of Johan Hampus Furuhjelm, the governor of Russian Alaska in 1859–1864, and by the internal etymology of the form *laʔdic'į·* < *laʔd-ih* "2" + *c'į·* "6" = "8" (Krauss 2012, 48).

Sources

Ahtena$_1$ – see Hymes 1955, 35, after Wrangell (1839).
Ahtena$_2$ – see Hymes 1955, 35, after Allen (1886).
Arivaipa$_1$ – see Hymes 1955, 44, after Gilbert (1879).
Arivaipa$_2$ – see Hymes 1955, 44, after Loew (1879).
Babine-Witsuwit'en – see Sharon Hargun 1990 <https://mpi-lingweb.shh.mpg.de/numeral/Babine.htm>
Bear River – see Hymes 1955, 42, after Goddard (1929).
Beaver$_1$ – see Hymes 1955, 38, after Goddard (1917).
Beaver$_2$ – see Dagmar Jung 2009 <https://mpi-lingweb.shh.mpg.de/numeral/Beaver.htm>
Carrier$_1$ – see Hymes 1955, 40, after Harmon (1820).
Carrier$_2$ – see Hymes 1955, 40, after Anderson (1846).
Carrier$_3$ – see Hymes 1955, 40, after Dawson (1890).
Carrier$_4$ – see Hymes 1955, 40, after Morice (1932).
Chasta Costa – see Hymes 1955, 41, after Sapir (1914).
Chilcotin River – see Hymes 1955, 39–40, after Dawson (1844).
Chipewyan$_1$ – see Hymes 1955, 37–38, collected by MacKenzie (c. 1800), published by James (1830).
Chipewyan$_2$ – see Hymes 1955, 37–38, after McLean (1849).
Chipewyan$_3$ – see Hymes 1955, 37–38, after Petitot (1876).
Chipewyan$_4$ – see Hymes 1955, 37–38, after Li (1946).
Clatskanie – see Hymes 1955, 41, after Hale (1846).
Coquille – see Hymes 1955, 42, after Johnson (1954).
Dogrib$_1$ – see Hymes 1955, 37, after Le Froy (1844).
Dogrib$_2$ – see Hymes 1955, 37, after Richardson (1851).
Dogrib$_3$ – see Hymes 1955, 37, from the River of the Mountain after O'Brian (1851).
Dogrib$_4$ – see Hymes 1955, 37, from Fort Simpson after O'Brian (1851).
Dogrib$_5$ = Wıìlıìdeh Yatıì – see Alessandro Jaker 2014 <https://mpi-lingweb.shh.mpg.de/numeral/Dogrib.htm>
Eyak$_1$ – see Krauss 1970/2012.
Eyak$_2$ – see Wrangell 1839.
Eyak$_3$ – see Furuhjelm by Krauss 1970/2012.
Haida$_1$ – see Hirofumi Hori 2011 <https://mpi-lingweb.shh.mpg.de/numeral/Haida-Southern.htm>
Haida$_2$ – see Middendorff by Radloff (1858, 589).
Haida$_3$ – see Tolmie by Radloff (1858, 589).
Haida$_4$ – see Sapir (1923).
Haida$_5$ – see Lawrence & Leer (1977) by Pinnow (1986, 4).
Han-Kutchin – Ruth Ridley 1983 <https://mpi-lingweb.shh.mpg.de/numeral/Han-Athascan.htm>
Hare – see Hymes 1955, 36, after Petitot (1876).
Hupa$_1$ – see Hymes 1955, 42, after Goddard (1905); Dixon & Kroeber (1907).
Hupa$_2$ – see Kayla Carpenter 2012 <https://mpi-lingweb.shh.mpg.de/numeral/Hupa.htm>
Ingalik – see Hymes 1955, 34, after Osgood (1940).
Inkilik – see Hymes 1955, 34, after Zagoskin (1847).
Jicarilla – see Hymes 1955, 45, after Yarrow (1874).
Kaska – see Hymes 1955, 39, after Honigmann (1949).
Kato – see Hymes 1955, 43–44, after Dixon & Kroeber (1907).
Koyukon$_1$ – see Hymes 1955, 33, from Koyukuk River after Whymper (1868).
Koyukon$_2$ – see Hymes 1955, 33, from Ululuk River after Dall (1870).
Koyukon$_3$ – see Hymes 1955, 33, from Kaiyuh River after Dall (1870).
Koyukon$_4$ – see Hymes 1955, 33, from Tanana River after Dall (1870).
Kutchin$_1$ = Gwich'in – William G. Firth, Dinjii Zhuh K'yuu Eenjit Gwichit Nilii 2011

<https://mpi-lingweb.shh.mpg.de/numeral/Gwichin.htm>
Kutchin$_2$ = Gwich'in – Pierre DeMers 2008 <https://mpi-lingweb.shh.mpg.de/numeral/Gwichin.htm>
Kutchin-Kotcha$_1$ – see Hymes 1955, 36, after Kennicott (1869).
Kutchin-Kotcha$_2$ – see Hymes 1955, 36, after Murray (1848/1910).
Kutchin-Tukhudh – see Hymes 1955, 36, after MacDonald (1911).
Kutchin-Vunta – see Hymes 1955, 36, after Petitot (1876).
Kwalhioqua – see Hymes 1955, 41, after Hale (1846).
Mattole – see Hymes 1955, 43, after Li (1930); Driver (1939).
Mescalero – see Hymes 1955, 45, after Cremony (1868).
Nacoontloon – see Hymes 1955, 39–40, after Dawson (1844).
Navaho$_1$ – see Hymes 1955, 44, after Whipple (1855).
Navaho$_2$ – see Hymes 1955, 44, after Eaton (1851–57).
Navaho$_3$ – see Hymes 1955, 44, after Loew (1876).
Navaho$_4$ – see Hymes 1955, 44, after Haile (1941–45).
Navaho$_5$ – see Daniel W. Hieber 2014 <https://mpi-lingweb.shh.mpg.de/numeral/Navajo.htm>
Nongatl – see Hymes 1955, 43, after Driver (1939).
San Carlos – see Hymes 1955, 44, after White (1876).
Sarsi$_1$ – see Hymes 1955, 40, after Petitot (1885).
Sarsi$_2$ – see Hymes 1955, 40, after Wilson (1889).
Sarsi$_3$ – see Eung-Do Cook 1990 <https://mpi-lingweb.shh.mpg.de/numeral/Sarsi.htm>
Sekani – see Hymes 1955, 38, after Howse (1850).
Sinkyone – see Hymes 1955, 43, after Driver (1939).
Slave – see Hymes 1955, 38, after Honigmann (1946).
South Tutchone – see Daniel Tlen 2010 <https://mpi-lingweb.shh.mpg.de/numeral/Southern-Tutchone.htm>
Tahltan$_1$ – see Hymes 1955, 39, after Dawson (1889).
Tahltan$_2$ – see John Alderete 2009 <https://mpi-lingweb.shh.mpg.de/numeral/Tahltan.htm>
Tanana = Tenan_Kutchin – see Hymes 1955, 36, after Dall (1870).
Tanaina-Kachemak Bay – see Hymes 1955, 35, after Osgood (1937).
Tanaina-Kenai peninsula – see Hymes 1955, 35, after Wrangell (1839).
Tanaina-Susitna River – see Hymes 1955, 35, after Osgood (1937).
Tlingit$_1$ – see James A. Crippen 2007 <https://mpi-lingweb.shh.mpg.de/numeral/Tlingit.htm>.
Tlingit$_2$ – see Twitchell 2016.
Tlingit$_3$ – see Wrangell 1839.
Tolowa$_1$ – see Hymes 1955, 42, after Dixon & Kroeber (1907); Driver (1939).
Tolowa$_2$ – see Christopher Doty 2008 <https://mpi-lingweb.shh.mpg.de/numeral/Tolowa.htm>
Tse'tsaut – see Hymes 1955, 39, after Boas (1924).
Upper Kuskokwim – see Raymond Collins & Betty Petruska 1979
<https://mpi-lingweb.shh.mpg.de/numeral/Upper-Kuskokwim.htm>
Upper Umpqua$_1$ – see Hymes 1955, 41, after Tolmie (1841).
Upper Umpqua$_2$ – see Hymes 1955, 41, after Hale (1846).
West Apache – see Willem J. de Reuse 2008 <https://mpi-lingweb.shh.mpg.de/numeral/Apache-Western.htm>
White Mountain – see Hymes 1955, 44, after Wheeler (1879).

COMPARATIVE-STRUCTURAL ANALYSIS

1.1. Athapaskan **łàq*' "1" < **lə-q*'-; **la·* "whole" // Eyak *łịhG* "1" < **łən-q*'- // Tlingit *tléix*' "1" < **łə-*'*yi-q*'*i*, all from AET **łi* (Leer 1996, Ł-29a). Sapir (1915, 552, nr. 40) compared Athapaskan & Tlingit with Haida *tla·*- "the first". Enrico (2004, 285, nr. L97) included the Haida form *tlaa-gaŋ* "first" among borrowings from Tlingit.
External relations:

Sino-Tibetan **ƛăŋ* “all, together” > Kachin *nlaŋ*[1] “all”; Lushai *hlaŋ* “all together” (CVST III, 59, nr. 219).
Yeniseian **biɬ́-* “all” > Ket *biɬdə*[5], Yug *biɬ́ĺa*[5] with fossilized inanimate prefix *b-* (Starostin 1995, 211).
Avar-Andi **hiƛ̣u-* /**-ƛ̣ː-* “all” > Avar *ṭol-go*, Andi *hilu-b*, Akhvakh *aƛ̣o*, Tindi *hĩƛ̣ːu-b*.
Proto-Basque **b-il* “to assemble, amass, unite, gather, collect” > Gipuzkoan *bil-du*, High Navarrese *bil-du*, Low Navarrese *bil*, Lapurdian *bil*, Zuberoan *bil*, Roncalese *bil-tu* (Bengtson 2017, 158, 439–40: Basque+Avar-Andi+Yeniseian).

1.2. Eyak *ɬịhG* “1” – see §1.1.

1.3. Tlingit *tléix*’ “1” – see §1.1.

1.4. Haida **s+k̲uă̠n(-sa-ŋ)* “1” is analyzed as “Gegendteil von viel” by Pinnow (1986, 3, 11). The root proper corresponds with Haida *k̲wáan* “to have plenty, be many” // Tlingit *k‘uun* “many”, besides *cu-k̲‘wáanax̣* “first” (Swanton) < **cu-k̲‘wáan-náx̣ ~ shóogu* adj. “first, initial”, *shóogu-nax̣* & *shux̣’(w)a-náx̣* adv. “at first, in the beginning, originally” (Twitchell). Pinnow ascribed to the Haida prefix *s-* in the numeral “1” (and others) the negative function. But with regard to the parallel structure of the Tlingit ordinal “first” it should be more probably a determining function
External relations to Haida **k̲uă̠n*:
Sino-Tibetan **khʷăn* (~ *ghʷ-*, *qhʷ-*) > Old Chinese (Late Zhou) **khʷans* > Chinese 券 *quàn* “bond, deed, consisting of two halves (wooden parts)”; Tibetan *rgjan* “a stake or pledge at play”; Burmese *khwan* “taxes”; Kachin *khan* “taxes, tribute” (CVST V, 105, nr. 385).
West Caucasian: **kʷa(nə)də* “many, much” > Adyghean *kʰʷandə*, Kabardinian *kʷad*.
Common Basque **haundi* “big, great” > Bizkaian *aundi*, *andi*, Gipuzkoan *andi*, *aundi*, High Navarrese *andi*, Low Navarrese *handi*, Aldude *haundi*, Lapurdian *handi*, *haundi*, Zuberoan *hă̠ndi*, Roncalese *ándi*.
Lit.: Blažek & Bengtson 1995, 39, nr. 203: Basque+West Caucasian+Tlingit+Haida.

2.1. Athapaskan **nå·d(ə)* “2” (Leer 1996, N-10) // Eyak *laʔd-ih* “2”.
External relations:
Sino-Tibetan **nĭj* (*k-*, *-s*, *-ks*) > Old Chinese 二 **nijs* (~ *-ts*) “two”; Tibetan *gńis* “two”; Lolo-Burmese **ni(k)x* > Burmese *hnać* “two”; Kachin *ńi*[1] “two”; Kuki-Chin **k-hnis* > Lushai *hniʔ* “two”, Lepcha *njí* two; *njăt* “two” etc. (Shafer 1974, 37, 135, 411, 429; Benedict 1972, 16; CVST II, 35, nr. 126).
Yenisseian **xɨna* “two” > Ket attr. *īn//ɨn*, Yug attr. *ɨn*, Kottish *īna*, Arin *kína*, *kinä*, Pumpokol *híneaŋ* (Starostin 1995, 296).

2.2. Eyak *laʔd-ih* “2” – see §2.1.

2.3. Tlingit *déiẋ*, *déeẋ* “2”, *dáẋ-gaa* “two by two”, *daax’oon* “4” are compared with Haida **s+dă̆+ŋ* “2”, which is analyzed as “nicht einmal einigen (eben)” by Pinnow (1986, 17–18). The same root **da* may be grammaticalized in Haida *-da-gu* ‘plural suffix’ // Tlingit *da-ga-*, *da-ẋ-* ‘plural-distributive prefix’ “each one” // Athapaskan: Navaho *da(a)-*, San Carlos, Chiricahua, Mescallero, Jicarilla, Lipan, Kiowa Apache *daa-* ‘distributive prefix’ (Pinnow 1986, 18). It is tempting to add the first syllable of Athapaskan **dənəʔkʼʸí* “4”, while the root proper **nəʔ* could be related to Athapaskan **nå·d(ə)* “2” (Leer 1996, N-10) // Eyak *laʔd-ih* “2”.
External relations:
Sino-Tibetan **Tŭr* > Old Chinese (Late Zhou) **d(h)ur* > Chinese 淳 *chún* “each consisting of..., each of a pair”; Tibetan *dor* “a pair of draught cattle” (CVST II, 182, nr. 670).

2.4. Common Haida **s+dă̆+ŋ* “2” – see §2.3.

3.1. Athapaskan **ta·qʼ-əy* “3” is probably derived from the verb **-ɬ-ta·qʼ-* “to count” (Leer 1996, T-43).

3.2. Eyak *tʼuhɬ-g$^{(w)}$aʔ* “3”, where N-*g$^{(w)}$aʔ* means “like N, appropriate amount of N” and the stem proper may be segmented in **tʼuh-ɬ*, cf. *dą·ʔ-ɬ-g^{w}aʔ* “slowly” (Krauss 1970, 364; 97). The root is perhaps etymologizable with help of Eyak *tʼuʔ* “many, much” (Krauss 1970, 354).

3.3. Tlingit *nástʼk* “3” can perhaps be connected with the Athapaskan-Eyak **naʔ-* “two”. The difference in meaning may be explained from the way of counting the fingers: the second finger is the index-finger, if the first one is the thumb, but the middle-finger, if the thumb is excluded and the index-finger is the first one. If the latter strategy was replaced by the former way of counting, the middle-finger already could remain as “second”.

3.4. Common Haida **ɬ+k̲uă̆n-ʼwa-(h)aidl* “3” was interpreted as “nicht viel(e)” by Pinnow (1986, 12), where the final component is reconstructed on the basis of Haida *eehl* “with”, *G̲ahl* “with it” (Lachler 2010, 726).

4.1.1. Athapaskan **dənəʔkʼʸí* “4” looks as the compound of **də-*, comparable with Tlingit *déiẋ*, *déeẋ* “2”, *dáẋ-gaa* “two by two”, *daax’oon* “4”, while the root proper **nəʔ* could be related to Athapaskan **nå·d(ə)* “2” (Leer 1996, N-10) – see above.
External comparisons:
It is tempting to compare **dənəʔkʼʸí* “4” with Yeniseian **doʼŋa* “3”. The Yeniseian numeral “3” can consist of the same components, but in the sense “the second {after} two”.

4.1.2. Kato *naka-naka* “4” represents a transparent reduplication of *naka* “2” (cf. §4.4.).

4.2. Eyak *qəlah-qaʔ-g$^{(w)}$aʔ* “4” with two suffixes *-qaʔ* “amongst” and *-g$^{(w)}$aʔ* “like, approximately”, cf. *gahχ̇ədəqaʔgaʔ* “every single day” (Krauss 2012, 180). The root proper looks as a compound of *qaʔ / qa:n-* “up” (Krauss 2012, 171) & *laʔ(-d-)* “2”, together “up two”.

4.3. Tlingit *daax’oon* “4” is analyzable as *daa-* “2” (in compounds) & *x’uun* “numerous” (Pinnow 1986, 13), cf. *x’oon sá* “how many, how much”, where *sá* is the interrogative particle, e.g. in *daa(t) sá* “what”, *wáa sá* “how”, *goo sá* “where” (Twitchell 2016, 219; 171).

4.4. Common Haida **sdă̆ŋ-sdaŋ* “4” was understood as the reduplication “2+2” from the first records, cf. (Radloff 1858, 591; Sapir 1915, 154; Pinnow 1986, 17).

5.1. Athapaskan **tšǒ-qʊ-nə-'laʔ-i'* “5” is formed on the basis of **nə-laʔ* “hand” (Leer 1996, Ł-9–10). There is a parallel formation in Haida **tlă̆-(h)aidl* “5”, lit. “with the hand” (Pinnow 1986, 8–10; Sapir 1923, 156) vs. *s-tláay* “one´s hand”, *tláay* “one´s hands”, ref. *tláang* “one´s own hands”, *tlahla* “to put one´s hands in X”, *tlawula* “for one´s hand to be closed, in a fist; to grasp, grip O in one´s hand or fist” (Lachler 2010, 351, 386–87, 391, 396). Enrico (2004, 252, nr. 43) added Eyak *leʔg-* “to use hands”.
External comparisons:
Sino-Tibetan **lə̌k* “hand, arm” > Old Chinese 翼 **lək* > Chinese *yì* “wing”; Tibetan *lag* “hand, arm”; Lolo-Burmese **lakx* > Burmese *lak* “hand”; Kuki-Chin **lak* id., Lepcha *ljók* “the palm”; Kiranti **lak* etc. (Shafer 1974, 138, 409, 435; Benedict 1972, 32; CVST III, 8–9, nr. 29).
?North Caucasian **r[i]χ̣ə̄* “hand” > Avaro-Andian **riχ̣a*, Tsezian **rɨχ̣a*.
Lit.: Sapir 1920 (ms.), followed e.g by Shafer 1952, 15, §10.1 – see Bengtson 1994, 217, nr. 18: Athapaskan+Sino-Tibetan.

5.2. Eyak *č’ą·ʔ-ih* (Krauss 1970) = *ch’a:nih* (Krauss 2012) “5” is explainable with help of *č’ą·-d-* “arm, forearm” (Krauss 1970, 901). According to Krauss (1970, 886), related may be Tlingit *k^{h}e:tʃ́ín* ”5” vs. *tʃ́ín* “hand” (Crippen) ~ *keijín* “5”, consisting of *kei* “up” & *jín* “hand, arm”, i.e. “hand up” (Twitchell 2016, 129–30). Pinnow (1986, 20) added Haida *djîn'gî* “alongside” (Swanton 1911, 263) = *jíinga* “to be distant, far away; a long time” (Lachler 2010, 172), interpreting it as *”to the hand”, where *-gi* meant “to”.

5.3. Tlingit *k^{h}e:tʃ́ín* (Crippen) ~ *keijín* (Twitchell) “5” – see §5.2.

5.4. Common Haida **tlă̆-(h)aidl* “5” – see §5.1.

6.1.1. Athapaskan **qu̯ˑsdətaˑnI* “6” was interpreted by Leer (1996, T-18) as “that which sits in a group” or “which is attained” – from the verbal root √*taˑn* (i) “to be with, stay among, sit”; “to attain, reach” (Leer 1996, T-15-16).
6.1.2. In some Athapaskan languages there was applied pairing to form the numeral “6”, e.g. Kutchin *nihk’iitik* “6” = “3 repeated”, cf. *tik* “3”; Tanana *niketagah* “6” vs. *taguh* “3”.
6.1.3. Koyukon *tonan-kaythuket* “6” represents the additive formation based on *kaythlukeh/kaythluket* “1”. Similarly Upper Kuskokwim *donan-ts’ełk’e* “6” vs. *ts’ełk’e* “1”, Ingalik *dong-agełaga* “6” vs. *giłaga* “1”, or Kato *bûn-Laxa* “6” vs. *Laxa* “1” etc.

6.2. Eyak *c’ɨˑ* (Krauss 1970, 634) ~ *ts’iːn* (Krauss 2012, 48) “6” is perhaps etymologizable on the basis of Eyak *-y-(ɬ-)c’ɨhG(-ɬ) ~ -y-(L-)ts’inhG(-L)* “finger” (Krauss 1970, 686 / 2012, 58). Cf. also Athapaskan **ts’əG* “finger” (Leer 1996, TS-29/39b)

6.3. Tlingit *tleidooshú* “6” is explainable as “someone extends {hand} to the first one”, cf. *tlei-x̱* “1”, *du* “someone” and *shú* “to extend” (Twitchell 2016, 201).

6.4. Common Haida **tlă̱-(s+)k̲uă̱n-’wa-(h)aidl* “6” was analyzed as “with the hand and one” by Pinnow (1986, 13). Let us mention that Radloff (1858, 591) saw in “6” the sum “3+3”, parallel to “4” = “2+2”.

7.1.1. Athapaskan **kʸò̯s-kʼʸədi’* / **qò̯s-kʼʸədi’* “7” is interpreted as “next to thumb” by Leer (1996, Kʸ-96c; Kʼʸ-26). The Athapaskan word “thumb” (cf. Ahtena *kots’* id.) has been compared with Eyak *-y-kų̇ːtsh’* “thumb, big toe” // Tlingit *gush* “thumb, big toe” // Haida *k’us* “butt end”, including “thumb, big toe” (Enrico 2004, 253, nr. 55; Nikolaev 2014, 114, fn. 31).
7.1.2. In some languages the numeral “7” is based on the quinary system operating with the numeral “2”, e.g. Upper Kuskokwim *donan-notek’a* “7” vs. *notek’a* “2”, Inkilik *tonan-teka* “7” vs. *inteca* “2”, or Kato *bûn-naka* “7” vs. *naka* “2” etc.
7.1.3. Hare *ettsen-ťagé-edakkwè* “7” should be interpreted as “6+{1}”, cf. *ettsen-ťagé* “6” = “+3”, besides *ettsen-dinyi* “8” = “+4”.

7.2. Eyak *laʔdic’ɨˑ* (Krauss 1970, 634) ~ *laʔdits’iːn* (Krauss 2012, 48) “7” apparently represents the compound of *laʔd-* “2” and *c’ɨˑ* (Krauss 1970, 634) ~ *ts’iːn* (Krauss 2012, 48) “6”, although the sum is “8”. In reality, the primary value of this numeral was “8”, how it was recored in the form *lhtatzi* “8” by Furuhjelm. It seems that in most Eyak dialects the values of “7” and “8” were exchanged one for another.

7.3. Tlingit *daxadooshú* “7” is formed from Tlingit *déix̱*, *déex̱* “2”, *dáx̱-gaa* “two by two”, and is interpreted as “someone extends {their hands} to the second one” (Twitchell 2016, 48).

7.4. Common Haida **dsǐ(n)-gua-{g+ā / -(h)aidl}* "7" is interpreted as "die andere Hand – es fehlt ihr (etwas noch)" by Pinnow (1986, 20). The hypothetical component **dsǐ(n)-* "(other) hand" was reconstructed on the basis of Haida *djîn'gî* "alongside" (Swanton 1911, 263) = *jíinga* "to be distant, far away; a long time" (Lachler 2010, 172), which was interpreted by Pinnow as *"to the hand", where *-gi* meant "to". Related have to be Tlingit *keijín* "5", consisting of *kei* "up" & *jín* "hand, arm", i.e. "hand up" (Twitchell 2016, 129–30) and Eyak *č'ą·ʔ-ih* (Krauss 1970) = *ch'a:nih* (Krauss 2012) "5". See §5.2.

8.1.1. Athapaskan **kʸẻ·-wən-i· / *kʸẻ-n̲ə{w/y}-i·* "8" is perhaps derived from **wən* "in front of" (Leer 1996, W-43).
8.1.2. In some Athapaskan languages pairing is applied to form the numeral "8" (similarly as "6"), e.g. Kutchin *nihk'iidang* "8" = "4 repeated", cf. *daang* "4"; Tanana *neketungkeh* "8" vs. *tingah* "3".
8.1.3. In other Athapaskan languages the quinary system is applied, forming the numeral "8" on the basis of "3", e.g. Upper Kuskokwim *donantok'e* "8" vs. *tok'e* "3", Ingalik *dong-ato:go* "8" vs. *to:g* "3" or Kato *bûn-tak* "8" vs. *tak* "3" etc.
8.1.4. There are also forms based on the subtractive principle: Nacoonthoon *naketlakul* "8", *entlah lakul* "9" vs. *nanki* "2", *itlah* "1" respectively. Similarly Chasta Costa *nāxAndō* "8", *lándō* "9" vs. *nā́xi* "2", *ła* "1" or Coquille *naxándu* "8", *łanti* "9" vs. *náxe* "2", *łaša* "1", and **(-ən)-du·* "lacking", from **-də-we·* "no" (Leer 1996, D-65-65a).

8.2. Eyak *q'ədic'į·* (Krauss 1970, 634) ~ *q'Adits'i:n* (Krauss 2012, 48) "8" originally meant "7", cf. the record *khatatzi* by Furuhjelm with the meaning "7" and the comments in §7.2. The shift could be caused by influence of Babine *q'ədinc'e* "8", etymologizable as multiplication of *neq* "2" and *dinc'e* "4" > **[ne]qVdinc'e* > **q'ədinc'e*.

8.3. Tlingit *nas'gadooshú* "8" is formed from *nás'k* "3" and means "someone extends {their hands} to the third one" (Twitchell 2016, 165).

8.4. Haida **sdă̆ŋ-sdă̆ŋ-x̣a* "8" represents a transparent plural/dual in **-x̣a* from the numeral "4" (Pinnow 1986, 17–18).

9.1.1. Athapaskan **{na·/we-q'əd}qʊ'·-st'ą̈·(ɣ̌)əy* "9" is maybe etymologizable with help of *t'a·* behind" (Leer 1996, T'-6; 3).
9.1.2. Upper Kuskokwim *donan-dinch'e* "9" is formed from *dinch'e* "4"; similarly Ingalik *dong-ade:nče* "9" from *de:nče* "4" or Kato *bûn-naka-naka* "9" vs. *naka-naka* "4" ("2+2"), in agreement with the quinary system.

9.1.3. Koyukon *nikoznála-káythlukeh-kúlla* “9” represents the subtraction of *kaythlukeh* “1” from *nikaznarlta* “10”.
9.1.4. Mattole *tcutsiět bŭklět láyaga* “9” represents the rare pattern “8+1”, cf. *tcutsiět* “8” and *láiha*’ “1”.

9.2. Eyak *guc’de·* (Krauss 1970, 1051) ~ *guts’de:* (Krauss 2012, 82) “9”, with the variant **gwəc’de·*, reconstructible on the basis of the form *kvatzte* “9” recorded by Furuhjelm, where the final *-de·* is perhaps derivable from **-də-* “self” & *ʔeʔ* “into place” (Krauss 1970, 31, 2668). The root proper, **guc*’-, resembles a contamination of Eyak *kų·č*’ “thumb” and Tlingit *-goosh* id.

9.3. Tlingit *gooshúk* “9” = *goosh-wu-√shook̲* “thumb is smiling” (Twitchell 2016, 76).

9.4. Common Haida **tlă̭+x̣a-(h)aidl-aŋ-gi-s+k̲uă̭n-sa+ŋ-ga+u* “9” is interpreted by Pinnow (1986, 9, 22) as “mit beiden Händen (= “10”) eben bei/an – Gegenteil von vielen (= “1”) fehlt”, i.e. “10” – “1”.

10.1. Athapaskan **qʊ-n-ė̀·-z-yaŋʸi·/-ŋʸa·ŋʸi·* “the one (= last finger) that has been used up”, i.e. “the last finger to be folded down”, cf. **yaŋʸ* “to become depleted, used up” (Leer 1996, Y-16, 14).

10.2. Eyak *dəGa·q*’ ~ ᵒx̣- (Krauss 1970, 1359) ~ *dAGa:q*’ (Krauss 2012, 142) “10”. The final may be identified with the postposition *-q*’ “on” or *-x̣* “in contact with” (Leer, l.c.). The first syllable *də-* probably corresponds to the particle *də-* “ipse” (Krauss 1970, 25). The root **Ga·* is perhaps related to Eyak *Ga·* “arm”, *Gəlaʔ* / *GAlaʔ* “shoulder” (Krauss 1970, 1370 / 2012, 144) // Athapaskan **Gả-nɨ* “arm” (Enrico 2004, 254, nr. 66).
External comparisons:
?Sino-Tibetan: Mewahang *hukhu* “10” (**huk-huk*?) : *ihuk* “5” vs. *huk* “hand” (Matisoff 1997, 77; Gvozdanović 1999, 102),
Yenisseian **χɔGa* “10” > Ket *qō* (attr.), Yug *xo* (attr.); Kottish *hāga*; Assan *hágiaŋ*, Arin *hioga*, Pumpokol *xajáŋ* id. (Starostin 1995, 303).
East Caucasian **Gə̆* “20”, but Nakh **ṭqə̆*“20” indicates the original compound of North Caucasian **tqHwā̆* “2” & **Gə̆*, implying the primary meaning “10” for the latter component (cf. NCED 456, 924).
Basque**hogei* “20” > Bizkaian, Gipuzkoan, High Navarrese *ogei*, Low Navarrese, Lapurdian *hogoi*, Zuberoan *hógei*, Roncalese *ógei*, *ogéi* (Bengtson 2017, 347–48; he adds The final *-i* can perhaps be identified with the pronominal plural in *-i-*, cf. *(h)ar-* “that (one)” vs. *(h)ai(e)-* “those” (Trask 2008, 99). In this case it is possible to conclude the original meaning of **hoge* would be *”10”.

Lit.: Blažek 2010[2011], §10: Eyak+Yeniseian+Sino-Tibetan+North Caucasian+Basque.

10.3. Tlingit *jinkaat* "10" represents the compound *jín-kaat* "hand(s) facing" (Twitchell 2016, 117).

10.4. Common Haida **tlă̋-x̣a-(h)aidl* "10" is analyzable as "with both hands" (Pinnow 1986, 9).

CONCLUSIONS

Results of the present study can be summarized as follows:

There is no inherited system of cardinal numerals in the Na-Dene languages. Only some common traces may be identified, whose validity is verified by external comparisons:

**łȧ / *łi* "1" – Athapaskan + Eyak + Tlingit. The external cognates lead to a non-numerical function.

**na* "2" – Athapaskan + Eyak + ?Tlingit *nás'k* "3". The external cognates in Sino-Tibetan and Yeniseian indicate the primary numerical function.

Rather doubtful is the root **da* "2" or perhaps originally *"other, second, both" *vel sim*., appearing in Tlingit + ?Haida as "2" and in "4", plus Athapaskan **d(ə)* in **nȧ˙-d(ə)* "2" (*"both two?") and **də-nə'k'ʸí* "4", if is analyzable as multiplication "2x2". Eyak *-d-* in *laʔd-* "2" is probably of the same origin.

The numerals "3" and "4" are formed independently, at least some from lower components.

For the numeral "5" there are two pairs of parallel formations, Athapaskan+Haida, and Eyak+Tlingit, which were more probably independently formed from appellatives with the primary meaning "hand, arm" than inherited.

The numerals "6"-"9" are formed very unsystematically. Among the Athapaskan languages the most frequent forms are analyzable as whole sentences without any primary numerical sense. Parallelly, there are several other patterns:

Quinary, e.g. in Upper Kuskokwim, Ingalik, Kato, and also Tlingit (without "9" which is based on "thumb").

Additive, based on "6", e.g. Hare "7" = "6+1" or Eyak *"8" = "6+2"; based on "8", e.g. Mattole "9" = "8+1".

Subtractive, e.g. Koyukon "9" = "10-1".

Pairing, e.g. Kato "4" = "2+2", similarly Haida, where also "8" = "$(2+2)^{\text{plural}}$"; Kutchin, Tanana or Dogrib "6" and "8" are formed from "3" and "4" respectively.

The numeral "10" is formed in Athapaskan customarily as a sentence, expressing in this case that "all fingers are down", while in Eyak, Tlingit and Haida the numeral "10" is based on various designations of "hand, arm".

The etymological analysis of numerals does not confirm the inclusion of Haida in Na-Dene.

APPENDIX

Table 5: Comparison of numerals of the first decade in the Dene-Sino-Caucasian languages

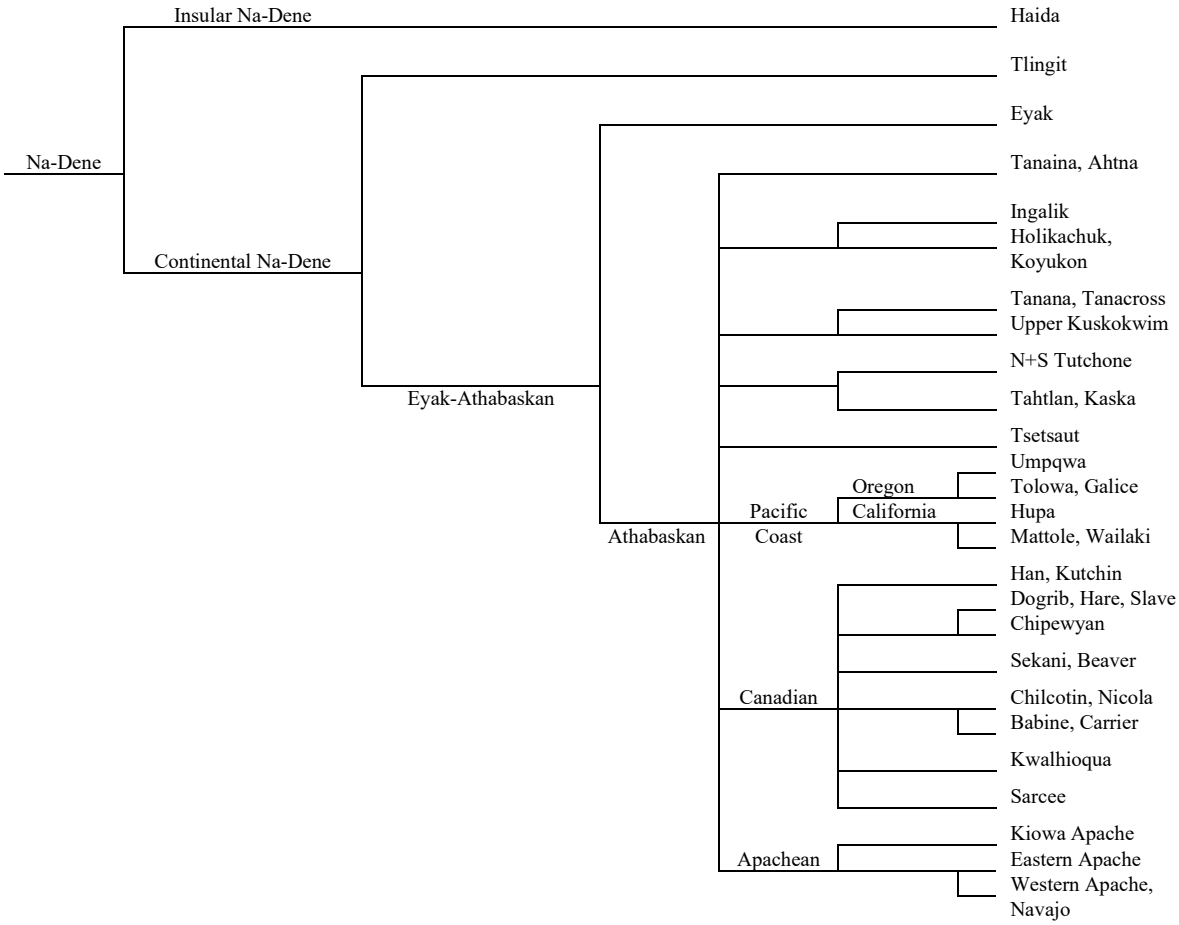
	Ibero-Vasconic	Etruscan	Hurrian	NCaucasian	Burushaski	Yeniseian	Sino-Tibetan CVST/Co-blin	T = Tlingit A = Athapaskan
1	**ba-*	*θun-*	*šu-*	**cHə̆*	*han/hin/hi(k)*	**χu-sa* **χo'-k(V)* Kott *xan-čixit* 1 man	**ʔĭt / *ʔjit* **g(h)at* **tjăik/*gtyik*	T *tɬʰé:x'* A **łaq'*
2	**bi-*	*zal*	*šin(a)*	**ṭq̇Hwā̆* Nakh **šiʔ* obl. **šina-*	*alt-á(n)/-ó/-í*	**xɨna*	**nĭj / *gnyis*	T *té:χ* A **nả·d(ə)*
3	I *(k)ilu(n)*, B *hiru*	*ci*	*kig(a)*	Nakh **qoʔ* **ƛHĕ* **ś̱wimHV*	*uskó/iskí*	**do'ŋa*	**sūm/*gsum*	T *nʌ́s'k* A **ta·q'-əy*
4	**lau(r)*	*huθ*	*tumni*	WC **p(:)əλ̣̂ə* **hĕmq̇i*	*wált-o/-i* cf. *alt-* 2; *we-ałtan* both	**si-ka/-jV*	**lĭj / *błyid*	T *ta:x'ú:n* A **dənə'k'ʸí*
5	**bortz*	*maχ*	*nariy(a)*	**f̱ẖä*	*ċhundó / ċhindí*	**qä-ka/-jV*	**ŋāH/*lngaγ*	T *kʰe:tʃín* : *tʃín* hand A **tšʊ̉-qʊ-nə-'la'-i'* : **nə-la'* hand
6	**sei*	*śa*	*šeže*	**ʔrā̆nλ̱E*	*mišínd-o/-i* Y *biśíndu*	**'aχV* **qäj-l-χusa* 5+1	**rŭk/*dljəkw*	T *tɬʰe:tu:ʃʊ́* 1+ cf. *ʔʌt ʃʊwʊ́* its tip A **qủ·sdəta·nI* sits in a group
7	I *sisbi*, B *zazpi* < **bortz-az-bi* 5+2	*semφ* < Italic	*šindi* < **šinri* < **šina-nari*	**ʔĕrḺɨ̱*	*thal-ó/-é*	**'o'n-* **qäj-l-xɨna* 5+2	**nĭt /*shnjis* cf. 2	T *tʌχʔʌtu:ʃʊ́* 2+ A **kʸʊ̉s-k'ʸədi'* next to thumb
8	I *sorse*, B *zortzi*	*cezp* < **ci-zep/pez* 3+5*	*kira/i* < **ki-nari* 3+5	**bū̆nḺe* cf. WC **p(:)əλ̣̂ə* 4	*altámb-o/-i* cf. *alt-* 2	**qäj-l-* *-do'ŋa* 5+3 **xɨna-* *-wənsV* *-χɔGa* 10-2	**(p-)rjiat /* **priat*	T *nʌs'kʔʌtu:ʃʊ́* 3+ A **kʸẻ·-wəni·/* **kʸẻ-ṉə{w/y}i·* cf. **wən* in front of
9	B *bederatzi* 10* – 1	*nurφ* < ?Italic	*tamri/a* < **tum-nari* 4+5	**ʔĭlćwɨ*	*hun-ćó/-tí* Y *hu-çó̧/-tí* < **hun-trº* 10-1	**qäjam-* *-sijam* 5+4 **χusa-* *-wən(sV)* *-χɔGa* 10-1	**kʷə̆H /* **dkwjəγw*	T *ku:ʃʊ́q* A **{na·/we-q'əd}qʊ'·-st'ᵃ̊·(ẏ)əy* cf. *t'a·* behind
10	I *abaŕ*, B *hamar*	*halχ* *śar/zar* = 12 (Jacemir.)	*eman*	**ʔĕnçĔ*	*tóorumo / tóorimi*	**χɔGa*	**k(h)ĭp/*gɨip* **[ʒ́h]Vj*	T *tʃinka:t* in palm of hands A **qʊ-nẻz-yaŋʸi·/-ŋʸa·ŋʸi·* one (= last finger) has been used up
20	I *oŕkei*, B *hogei*	*zaθrum* < **zal-θrum* 2x10*		**G̱ə̆*	*áltar* < **alta-torº* < 2x10	**'e'k* **xɨn-tu'kŋ* 2x10	**kuł* cf. AuA **kol* 10	T *tɬʰe:qʰá:* one person A: 2 x 10 UpKuskokwim *ts'ełk'inh dina* Dogrib *naàną̀* Navajo *naaltso:s* West Apache *nadin* one person

Abbreviations: A Athapaskan, AuA Austro-Asiatic, B Basque, I Iberian, Ph Phoenician, T Tlingit, Up Upper, WC West Caucasian, Y Yasin.

Sources

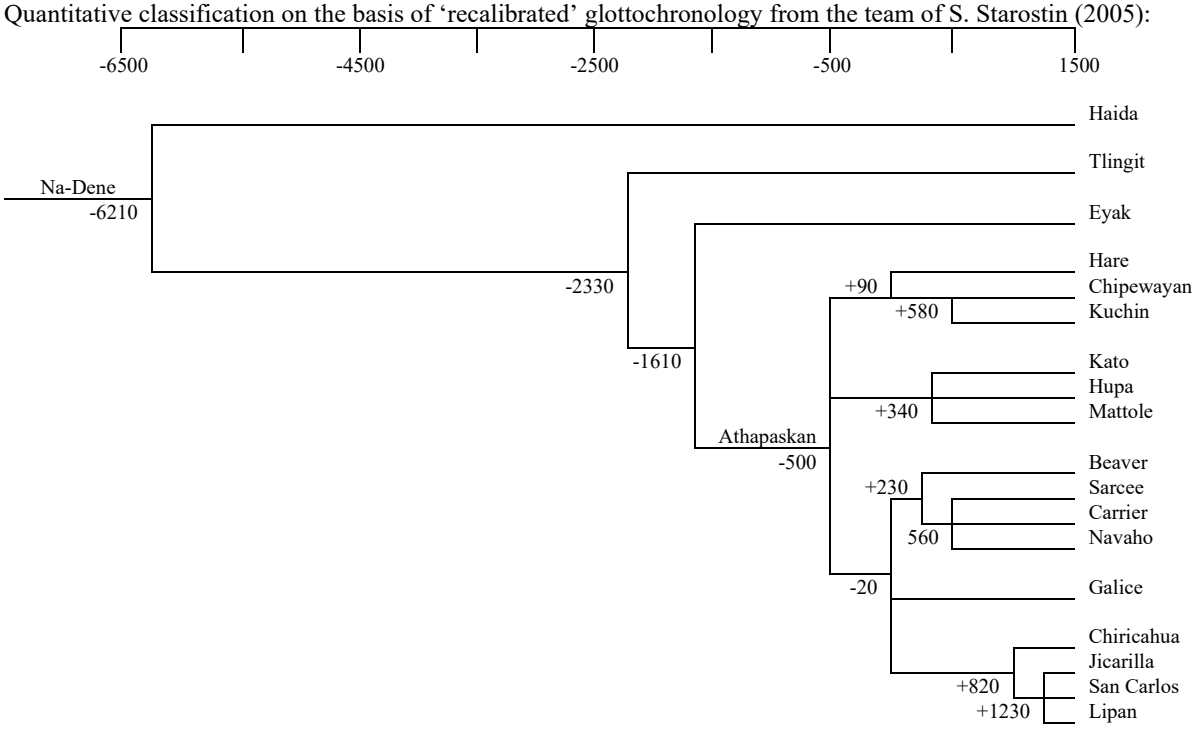
Basque & Iberian: Orduña Aznar 2005, 2011; Etruscan: Steinbauer 1999 & Jacemirskij 2007; Hurrian: Blažek 2010; North Caucasian: NCED; Burušaski: Berger 1998, 1998a, 2008; Yeniseian: Starostin 1995 & Blažek 2010[2011]; Sino-Tibetan: CVST / Coblin 1986; Athapaskan: Leer 1996; Tlingit: James A. Crippen 2007 <https://mpi-lingweb.shh.mpg.de/numeral/Tlingit.htm>.

Traditional classification summarized by Merritt Ruhlen (1987, 365)

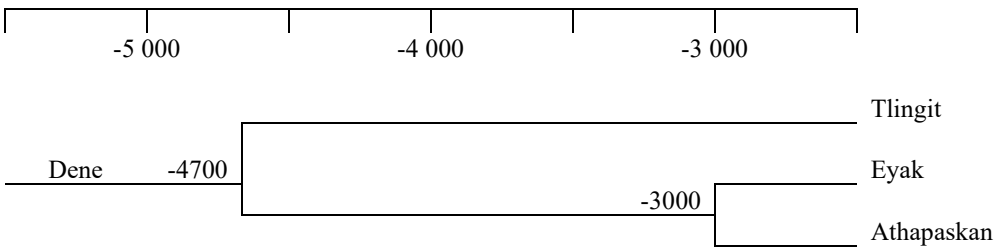


Source: Ruhlen, Merritt. 1987. *A Guide to the World's Languages*, I: *Classification*. Stanford: University Press.

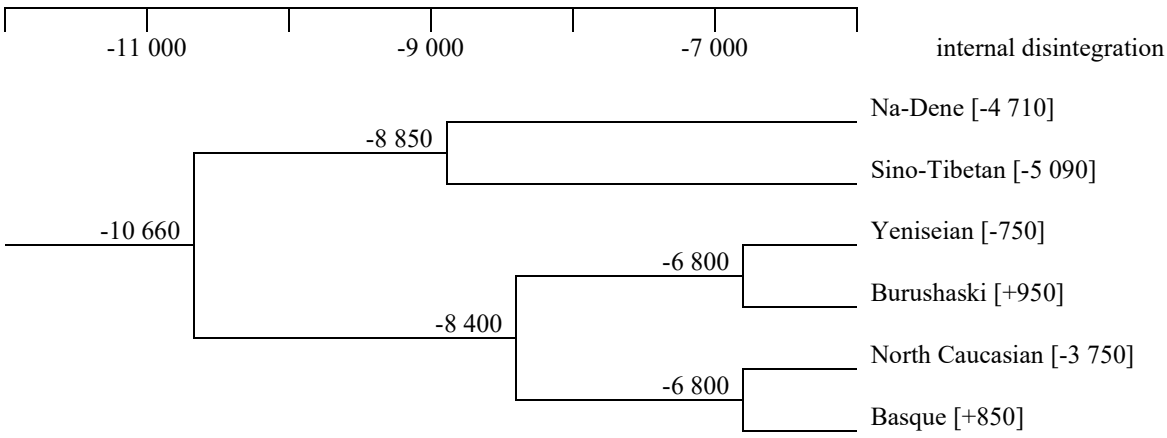
Quantitative classification on the basis of 'recalibrated' glottochronology from the team of S. Starostin (2005):



Na-Dene classification based on recalibrated glottochronology modified by George Starostin (2010):



Dene-Sino-Caucasian classification based on recalibrated glottochronology modified by George Starostin (2010):



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Geographic distribution of the Athabaskan languages
https://native-americans.com/category/native-american-tribes-by-language/nadene-language-family/

SOME NOTES ABOUT DENE-CAUCASIAN[1]

JOHN D. BENGTSON

Sergei L. Nikolaev of Moscow caused a bit of a stir when he arrived at the First International Symposium on Language and Prehistory (Ann Arbor, 1988) and presented a report on "Sino-Caucasian Languages in America," later published as Nikolaev (1991).[2] Scholars in the audience remarked that the North Caucasian and Na-Dene forms in his handout were amazingly similar. Indeed, it is obvious to any linguist that the North Caucasian and Na-Dene phonological systems are very similar in some ways, such as the trinary oppositions of glottal/fortis/lenis consonants and the abundant lateral fricatives and affricates. In the current Dene-Caucasian (DC) analysis, these typological similarities are not interpreted as common innovations pointing to a special relationship between Na-Dene and North Caucasian, but rather as archaic retentions of some features of the original DC phonological system in widely separated areas.[3]

As far as we know, Nikolaev was the first and only scholar to make an extensive direct comparison of North Caucasian and Na-Dene, though his effort was no doubt inspired by combining the earlier "Sino-Dene" hypothesis of Sapir and Shafer with the "Sino-Caucasian" hypothesis of his Moscow colleague S.A. Starostin. In an appendix of his 1991 article (pp. 61–64) Nikolaev added in the proposed cognates with Sino-Tibetan and Yeniseian already proposed by Starostin (1984, 1991), thus going full circle with the first multilateral Dene-Caucasian comparisons that included the four families Na-Dene, North Caucasian, Sino-Tibetan, and Yeniseian.

How did the term "Dene-Caucasian" originate? In a recent email (April 2019) Nikolaev stated that:

> I don't remember. The term "Dene-Caucasian" arose between me and Starostin at the turn of 1979/80 somehow automatically, by analogy with his "Sino-Caucasian," as soon as I collected a large list of comparisons (which almost 10 years later was published by [Vitaly] Shevoroshkin in Ann Arbor). I had no connection with Shevoroshkin in the 80s. Perhaps "Dene-Caucasian" was in use long before me and Starostin, and the terms coincided occasionally.

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[1] This is an updated version of part of a paper delivered at the 2009 Athabascan (Dene) Languages Conference, University of California - Berkeley, 10-12 July 2009. [JDB]

[2] The surname appears in print variously as Nikolaev or Nikolayev. Here the former is generalized.

[3] The archaic residue explanation seems more parsimonious than the alternative, that North Caucasian and Na-Dene independently innovated a complex set of features (glottal/fortis/lenis oppositions, lateral fricatives and affricates).

At any rate, it seems clear that the popularization, such as it is, of the term is a result of Shevoroshkin's edited volume titled *Dene-Sino-Caucasian Languages* (1991), which included Nikolaev's article. The use of the term by Merritt Ruhlen (*e.g.*, 1996, 1998, 2001), in three languages, must also have played a role in propagation of the term.

DENE-CAUCASIAN ETYMOLOGIES

After three decades of study of Nikolaev's etymologies I now think that a fair number (perhaps about half of them) still seem plausible and are borne out by my research. Perhaps about another quarter of them could be valid or promising, but I have not yet been able to verify the Na-Dene and/or North Caucasian data. Some others (perhaps about one fourth), because of clear errors in the data, or implausible phonetic or semantic changes, seem to me to be improbable or simply erroneous. To help with this evaluation process we could use the help of Na-Dene specialists in providing relevant data. **Table 1** displays a representative sample of Nikolaev's (1991) lexical comparisons that seem valid or at least promising.

Table 1: A selection of Nikolaev's (1991) Dene-Caucasian lexical comparisons.

general gloss	etym. number	**Athabaskan**	**Eyak**	**Tlingit**	**Haida**	**North Caucasian**	**Other DC**
arm, shoulder	1.45	*ɢa·nʔ [4]	ɢəlaʔ s.			PNC *ǥHwĭnĀ ~ *nHĭwǥĀ [5]	OC *kēn [6] PY *ke(ʔ)n- [7]
bark, hide	1.15		łãh [8]	łu'n-i' [9]		PEC *łĕʔwnɨ [10]	PST *lwV(y) [11]
bottom	7.17	*ƛ'a· ~ *ƛ'aʔ [12]	ƛ'ah-g [13]	ł'i'd [14]	s=ƛ'aŋ [15]	PNC *Hƛ'ŏnŭ [16]	PST *t-lăŋ [17]

[4] Hupa =*gan*-tag- 'shoulders', Mattole =*ga·n*-e' 'arm', Navajo =*gààn* 'arm, foreleg', etc.
[5] 'arm, shoulder; armpit' > Lezgi *q:ün*, Archi *qˤun* 'shoulder', Ubykh *nəqˤ* 'armpit', etc.
[6] OC (Old Chinese) 'shoulder'.
[7] PY **ke(ʔ)n-* 'shoulder joint'; Kott *hēnar, hinar* 'shoulder', etc. (*-ar* as in Kott *hačar* 'foot sole').
[8] 'bark' (of tree).
[9] 'outer bark' (Leer 1993).
[10] 'skin (of an animal)', *e.g.* Lak *lu* 'skin, sheepskin; book', Agul *leʔ* 'skin (of animal)'.
[11] Tibetan *lwa*-ba 'skin of wild animal'; Chepang *hlyu* 'to skin'.
[12] 'bottom, buttocks, rear' > Hupa *-ƛ'aʔ* 'buttocks (of person); bottom (of object)', Navajo *ƛ'ààʔ* 'buttocks', etc. (G 117; Leer 1993).
[13] 'tail (of animal, fish, not bird)' (Leer 1993).
[14] 'tail'.
[15] (M) *s-ƛ'aŋ*, (A) *s-ƛ'áŋ*, (S) *s-ƛ'əŋ* 'bottom, interior/exterior surface farthest from opening' (Enrico 2004: 251, no. 41).
[16] 'bottom', *e.g.* Bezhta *õƛ'o*, Archi *k'an* (< **ƛ'an*).
[17] 'floor' > Old Chinese **Łaŋ* 'field, arena', Burmese *tə-laŋ* 'floor'.

general gloss	etym. num-ber	**Athabaskan**	**Eyak**	**Tlingit**	**Haida**	**North Caucasian**	**Other DC**
bough, branch	4.1	*ʔəɬ [18]	ʔa·ɬ [19]			PEC *ʔăɬV [20]	PST *yəl / *yər [21]
breast-bone	1.5	=γìd [22]		χèt [23]	s=q'ut [24]	PEC *qVdV ~ *χ:VdV [25]	PY *qot- [26] Bur *=́qat [27] Tib. s-ked-pa [28]
burn	10.11	*=q'a·n [29]	=q'a [30]	χ'a'n [31]		PEC *=īk'wV(n) [32]	
child	2.7	*-ya·ž(ʷ)- [33]	yahš [34]			PNC *=ɨ̄šwĔ [35]	PST *śū [36] Bsq *śe-/*śa-/*-śo [37] Bur *=́s [38]
dish, bowl (see also **Table 7**)	6.8	*c'aʔk'	c'a·g-ɬ [39]	s'ix'	c'əs [40]	PNC *ć̲ă̄q'wă ~ *ć̲'ă̄qwă [41]	PY *siʔk [42] Bsq *aśka [43]

[18] 'bough (evergreen)'.
[19] 'bough (of conifer)' (Leer 1993).
[20] 'branch', *e.g.* Tindi *hala*, Bezhta *äle*.
[21] 'sprout, branch' > Old Chinese **lhāy* 'sprout, shoot'; Tibetan *yal*-ga 'branch, bough', Lushai *zār* id.
[22] Navajo 'chest'.
[23] 'chest, breast' (Boas) = ? *xe't-ka* 'breastbone' (Leer 1993); /x/ or /χ/?
[24] (A) 'armpit', (S) *s-qōt* (Swanton); cf. (S) *sqōt-* 'with the arms'; cf. Burushaski *=́*qat* 'armpit'.
[25] 'brisket' > Avar me-*héd*, Bezhta *ʁade;* 'brisket' is the breast or lower chest of a quadruped.
[26] 'in front, before'.
[27] 'armpit' (cf. Haida meaning).
[28] 'waist'.
[29] 'to burn, catch fire'.
[30] 'to burn'.
[31] 'fire'; *χ'an* 'smolder' (Leer 1993).
[32] 'to burn, set on fire', *e.g.* Akhwakh *k'on-* 'to set on fire', Lezgi k-*ük'-ün* 'set fire, burn'.
[33] 'small, woman's child'; cf. PPA *(ʔə-)*šy*-qe· 'boy, children' (Nav. *ʔaškii*) (Leer 1993 'child, son2, child, son 3').
[34] 'child (of a female)'; cf. *sə*-qe·-ɢ 'son, child'.
[35] 'son / daughter' (with changing class prefixes), *e.g.* Avar *w=as* 'son' / *y=as* 'daughter'; Kabardian *śā-wa* 'son', etc.
[36] 'grandchild' > Old Chinese **sū-n* 'grandson, granddaughter'; Jingpho *šu*[4] 'grandchild''; Mikir *su*,
[37] Morph in several Bsq kin terms, *e.g.*: ***se-me*** 'son', *o-**sa**-ba* 'uncle', *gura-**so*** 'parent', *a-**sa**-ba* 'ancestor', etc.
[38] 'child; young (of animals)'.
[39] ɬ-*c'a·g* 'to bail (a boat)'; *c'a·g*-ɬ 'bailer, ladle'.
[40] 'box or pot object' (classifier).
[41] 'scoop, spoon, vessel', *e.g.* Tabasaran *č'aq'a* 'wooden jar', Ubykh *čaq'ʷə́* 'basin, tureen'.
[42] 'trough (for dough)'.
[43] 'trough, manger, crib'; (Low Navarre, Roncal) *aska* 'trough, kneading tray' (cf. PY 'trough for dough').

general gloss	etym. number	**Athabaskan**	**Eyak**	**Tlingit**	**Haida**	**North Caucasian**	**Other DC**
dog$_1$	3.22		χəwa·		χa [44]	PNC *χHwĕye [45]	Bsq *ho-r
dog$_2$, wolf	3.4		ɢu·ʒ-ih [46]	ɢu‘ǯ [47]	[ɢu·ʒə] [48]	PNC *gwăǯē [49]	
eyebrow	1.3	*č’əχ-g [50]	c’ã·χ	s’e‘ ~ s’i‘		PEC *c’ɦwĕme [51]	PST *chām [52] Bur *śe[m] [53] PY *cəŋe [54]
face, front	1.6	*da· [55]	da·ʔ [56]			PEC *dānʔɪ̄ ~ *dānʔū [57]	PST *tăŋ(H) [58]
feather, wing	1.25	*t’a· [59]	t’ah-ɬ [60]	t’a‘w [61]	t’a·-ɢun [62]	PNC *t’ʕa̋mV [63]	
flint (knife)	6.16	*we·š [64]	we·gš [65]			PNC *mHōK(V)ć’V [66]	
foot	1.19	*t’ a·χ [67]			s=t’a- [68]	PEC *t’wīɦV̄ ~ *ɦīt’wV̄ [69]	PST *tɪ̆H [70]

[44] (A) *χa* ‘dog’, definite form *χa·y,* (S) *χa* ‘dog’.
[45] ‘dog’, *e.g.* Andi *χʷoy*, Kabardian *ħa.*
[46] ‘wolf’.
[47] ‘wolf’.
[48] (S) ‘wolf’, (M) *ɢu·ʒ*, (A) *gú·ʒ* id. “Loan from Tlingit ... wolves do not occur on the Queen Charlotte Islands” (Enrico 2004: 283, no. L81).
[49] ‘bitch, dog’, *e.g.* Andi *geži* ‘bitch’, Lak *k:ač:i* ‘dog’, Abkhaz a-*kʷə́ǯ́*-ma ‘wolf’.
[50] ‘eyebrow’ (Leer 1993), *e.g.* Ahtna -*c’ehɣ*-aʔ.
[51] ‘eyebrow’, *e.g.* Chechen *c’oc’q’am* ‘eyebrow’, Tabasaran *c’ilc’im* ‘eyelash’.
[52] Lushai *sam* ‘hair (of head)’, Garo mik-*sam* ‘eyebrow’, Limbu mik-*sāŋ* ‘eyelashes’, Kinnauri *tsam* ‘wool’, etc.
[53] ‘wool’.
[54] ‘hair’.
[55] ‘edge, lip, beak; front, entrance’.
[56] ‘face, front; door (going in), in (container)’.
[57] ‘cheek, gum’, *e.g.* Ingush *do*-l ‘gum’ (in mouth)’ , Tsakhur *dan* ‘cheek’.
[58] ‘flat part of body (palm, buttock, cheek)’; Yamphu nam-*daŋ* ‘cheek’.
[59] ‘feather’.
[60] ‘feather; leaf’: “appar. coalescence of 2 etyma” (Leer 1993).
[61] ‘feather’.
[62] (S) ‘long feather’; cf. (M) *t’aw.a·n*, (A) *t’áw.a·n* id. Enrico (2004: 287) lists these under “Haida and Tlingit resemblances with no evidence for a source language.”
[63] ‘wing, feather’, *e.g.* Lak *t’imu* ‘feather’, Adyge *tāma* ‘wing, shoulder’.
[64] ‘(semilunar) knife’.
[65] ‘(semilunar) knife’.
[66] ‘flint’, *e.g.* Chechen *mōqaz*, Lak *nuwč’a*.
[67] Navajo *nī̀-t’á̋h* ‘foot; base (*e.g.*, of a mountain)’.
[68] (A) *st’áy* ‘foot’, (M, S) *st’a* id.
[69] ‘foot, forefoot’, *e.g.* Chechen *t’a* ‘front leg (of animal)’, Avar *ħet’, ħet’é* ‘foot’.
[70] ‘heel, ankle’ > Old Chinese **təʔ* ‘foot, heel’; Tibetan *s-ta* ‘hip bone’; Jingpho lə-*tho*^{3} ‘the leg just above the ankles’.

general gloss	etym. number	**Athabaskan**	**Eyak**	**Tlingit**	**Haida**	**North Caucasian**	**Other DC**
							Bur *=húṭ-
grass	4.11	*ƛ'uχ	ƛ'ihχ	ƛ'eχ [71]		PEC *ʔwēƛ'V [72]	PST *l[ɨ]wH [73]
gum, resin	7.10		sĩhχ [74]	seq'^{w} [75]		PNC *śwänq̱'ī [76]	PST *s-māk / *s-māŋ [77] PY *su(ʔ)K [78] Bur *śu-kor / *ṣuqor [79]
guts, intestines	1.9	*c'i·k' ~ *č'i·k'	c'ehχk' [80]	c'i·k' [81]	c'i· [82]	PNC *c̲'ĭk'wĔ ~ *k̲'wĭc'Ĕ [83]	Bsq *bi=hoc [84]
hare, rabbit	3.7	*ɢaχ	ɢəχ	ɢaχ		PNC *g̲wōrʔɬe [85]	PST *ɢ^{w}ār [86]
ice, snow	5.10	*ɬu· [87]	*ɬa· [88]			PEC *ɬĭwV ~ *yĭwɬV [89]	Bsq *e=ɬhu-ṙ [90]

[71] 'Usnea' (brown fungus).
[72] 'a kind of grass', *e.g*. Chechen *yol* 'hay', Tsakhur *ok'* 'grass' (/k'/ < *ƛ').
[73] 'weed'; Lushai *hlô* 'a weed, drug, medicine'.
[74] 'hardened resin, tar' (Leer 1993 'resin').
[75] 'become stained, dyed, colored' (Leer 1993 'red3'), if there was a semantic development as in North Caucasian ('ink') and Yeniseian (Ket *śuk* 'dye, paint').
[76] 'gum, ink', *e.g*. Avar *s:anq':* 'gum (added to ink for lustre)', Lezgi *šq'aq'* 'gum', etc.
[77] Old Chinese **māk* 'ink'; Tibetan *snag* 'ink, India ink'; Burmese *hmaŋ* 'ink'; Jingpho *mak* 'dye, colouring, used in tattooing'.
[78] 'dye, paint' > Ket *śuk*.
[79] 'a kind of homemade soap'.
[80] 'inside of a pelt'.
[81] 'adductor muscle of a bivalve'.
[82] (M, S) *c'i·*, (A) *c'í·* 'insides (especially of shellfish), filling, guts, etc.' (Enrico 2004: 250, no. 29).
[83] 'intestines, spleen', *e.g*. Tindi *c:ik:^{w}a* 'small intestine', Dargwa *k'ac'* 'spleen'.
[84] 'heart' < **=koc*' (with class prefix); cf. Dargwa *k'ac*' 'spleen', Circassian *k'^{w}ac*' 'entrails, intestines', with a similar metathesis.
[85] 'hare', *e.g*. Hunzib *qi*, Budukh *q:ur*.
[86] Old Chinese **w̲ār, *swar, *swār* 'badger'; Jingpho mə-*gan* 'a species of ground-rat'.
[87] 'ice, icicle, glacier'.
[88] 'glacier'.
[89] 'snow', *e.g*. Chechen *lō,* Batsbi *law*, Tabasaran *yif* (< **yiwɬ*).
[90] 'snow'; Northern Bsq dialect *elhauso* 'avalanche' < **e=ɬhu-* + **Haúśo* 'snowfall' (BCR G.11, G.17).

general gloss	etym. num-ber	**Athabaskan**	**Eyak**	**Tlingit**	**Haida**	**North Caucasian**	**Other DC**
jaw, mouth	1.36		q'aʔc' [91]	χ'as' [92]		PEC *q'ăc'ɨ̆ ~ *q'ăc'ŭ [93]	Bsq *o=ko[ć] [94]
kidney, roe	1.12	*q'u·nʔ [95]	q'əma· [96]	χ'u'n [97]		PEC *k̲'unHV [98]	
knee	1.14	*ɢʷət' < *ɢunt'	ɢuhd	-ɢʷat'- [99]		PEC *q'HwəntV [100]	PY *g[i](ʔ)d [101]
ladder	6.15		gaʔc' [102]	ga·s' [103]	[ga·c'ə] [104]	PEC *gōnʒi [105]	Bur ganc [106]
limb, bone	1.17	*c'ən	c'əl / c'əlih [107]	s'a'n [108]	c'əŋ [109]	PEC *Hc̲'wēynə [110]	Bur *=śáŋ [111] Bsq *śoin [112]
navel	1.27, 1.28	*c'e·q'-əʔ	c'a·ʔ [113]			PEC *ʒ̲ŏnʔŭ [114] PNakh *c'an-k'u	Bur *=sú[m] [115]

[91] 'jaw'; cf. *q'əs* 'gland, tonsil' (Leer 1993 'jaw').
[92] 'jaw'.
[93] 'piece; bite, incision', cf. Lak *q'ac'* 'bite, mouth', Rutul, Tsakhur *q'ac'* 'chin'.
[94] 'chin': Bizkaian *okotz* 'chin, snout', standard Bsq *kokots* 'chin' (contaminated with **kokot* 'nape, neck') (BCR A.15).
[95] 'roe'.
[96] 'kidney; salmon-roe'.
[97] 'punk [used for tanning hides], sphagnum moss' (Leer 1993); ('roe' of a tree).
[98] 'kidney, liver', *e.g.* Hunzib *koma* 'kidney', Chamalal *k'ũ̃* 'liver'.
[99] in D-*ɢʷat'*l 'crawl' (Leer 1993).
[100] 'knee, elbow', *e.g.* Hinukh *q'ontu* 'knee', Lezgi *q'ünt* 'elbow'.
[101] 'elbow, joint; to bend' > Ket uĺ-*git*^{5} 'elbow', etc.
[102] 'ladder, stairway'. "Traditional ladders were notched posts" (Leer 1993).
[103] 'post'.
[104] (S) 'housepost', etc. "Borrowed by Haida from Tlingit ... Also found in Tsimshian ..." (Enrico 2004: 282, no. L74).
[105] 'threshold, ladder', *e.g.* Tabasaran *gurzil* 'threshold', Dargwa *ganzi* 'ladder'.
[106] 'spindle; neck of sitar' (the neck of a sitar resembles a ladder, with its frets corresponding to steps on a ladder).
[107] 'bone'; cf. *-c'əlih* 'bone, (large) fruitstone', *c'ã̃* 'be strong, tough'.
[108] 'limb (of body'; cf. *s'àq, s'àɢ* 'bone'
[109] Skidegate 'tooth'; cf. (M) *c'aŋ*, (A) *c'áŋ* 'tooth' (Enrico 2004: 249, no. 25); 'bone of mouth' ?.
[110] 'leg bone', *e.g.* Lezgi *c'um* 'shin-bone', Tindi *hinc:i* 'groin (of an animal)'.
[111] 'limbs, body parts'.
[112] 'shoulder, (upper) body'.
[113] 'umbilical cord'; the PA form may represent a diminutive of this, like Proto-Nakh **c'an-k'u*.
[114] *e.g.*, Chechen *c'onga*, Akhwakh *c':un*, Dargwa *zu* 'navel'.
[115] 'umbilical cord'.

general gloss	etym. num-ber	**Athabaskan**	**Eyak**	**Tlingit**	**Haida**	**North Caucasian**	**Other DC**
old, year	11.10	xa·n [116]	xa·nih [117]	šan / ša‘n [118]		PNC *śwänɨ̌ [119]	PY *siń, [120] *s[ɨ]-ɢa [121]
plant, tree	4.8	*č’əɬ [122]				PEC *č’ħwɨ́ɬū [123]	
pus, mucus	7.4	*χəz [124]	χəs [125]	χi·š [126]		PNC *ɦ[a]mʒ̲ū [127]	Bsq *[H]uśu [128]
sand	5.14	*sa·x ~ *sa·y			sī, síi [129]	PEC *swüre[130]	PST *srāy [131]
sleep	7.22	*wəɬ[132]				PEC *mhewƛ̲’ŭ[133]	PST *mīɬ
stick	4.7	*ɢəǯ [134]	ɢəǯ [135]	ɢiǯ [136]		PEC *q’wĕrč’V̄ [137]	PY *qēǯ- [138]
warm	11.13	*-χe·n [139]	-χã [140]	χa‘ÿ [141]		PEC *=Hēwχ̌V(n) [142]	PST *kăŋ [143]

[116] ‘old age, old person’, *e.g*. Navajo *sání* ‘old, aged’, *sá́* ‘old age’, Beaver *šo:n* ‘old age’, etc.
[117] ‘very old salmon’.
[118] *šan* ‘become old, gray-haired’ / *ša‘n* ‘old person, old age’.
[119] ‘year’, *e.g*. Avar *šon*, Lak *šin*, Archi *s:an*, Ubykh *šʷa* ‘year’.
[120] ‘old, withered’.
[121] ‘year’.
[122] ‘plant, tree’, *e.g*. Navajo *č’il* ‘plant, weed’, San Carlos *č’il* ‘tree’.
[123] ‘beam, girder, [log, stick]’, *e.g*. Avar *č’álu* ‘log, beam’, Dargwa *č’ala* ‘stick (stake, fork, etc.)’.
[124] ‘pus’; cf. *-*ɣe·z* ‘itch’ (KL 95), **χẽ·ʔs* ‘itch’ (Leer 1993 ‘itch’).
[125] ‘pus’; cf. *-*χe·s* ‘infected’ (KL 95).
[126] ‘rash’ (Leer 1993 ‘itch’).
[127] ‘saliva, mucus, herpes’, *e.g*. Lak *ụncu* ‘snot, Avar *ħác’:u* ‘saliva’, Chechen *ħätt* ‘herpes, eczema’.
[128] ‘pus, matter, serum’.
[129] ‘large collection of small identical objects’ (classifier in various movement verbs).
[130] ‘dirt, soot, sand’, *e.g*. Andi *sur* ‘sand’, Tsakhur *sera* ‘ashes’.
[131] ‘sand’; Old Chinese **srāy* ‘sand’, Tibetan *sa* ‘earth, Burmese *sayh* ‘sand’.
[132] ‘sleep’ > Hupa *miɬ*, Carrier *beɬ,* Chipewyan *bèɬ,* Navajo *bìɬ,* etc
[133] ‘sleep, dream’, *e.g*. Avar *móƛ’:u,* Lak *mak*’; especially in eastern Daghestanian languages, PNC lateral affricates have shifted to velars.
[134] *E.g*., Navajo *gìš* ‘cane, staff’, Chipewyan *gɣès* ‘poker (of wood)’ (LDC no. 66).
[135] ‘s acts on o with end of stick’ (Leer 1993).
[136] ‘stick (out) [sticklike]’ (Leer 1993).
[137] ‘stick’, *e.g*. Chechen *ʁaž* ‘stick’, Hunzib *q’ač’a* ‘beam’.
[138] ‘pole’.
[139] ‘melt, thaw’.
[140] ‘melt, thaw’.
[141] ‘sweatbath; beaver lodge’ (Leer 1993).
[142] ‘to become warm, hot; catch fire’, *e.g*. Chechen *=owχa* ‘hot’,
[143] ‘to fry, roast’.

general gloss	etym. num-ber	**Athabaskan**	**Eyak**	**Tlingit**	**Haida**	**North Caucasian**	**Other DC**
							PY *ʔəqan [144]
water	5.15	*χanʔ [145]		hi·n [146]	ɢən-l̨ [147]	PNC *x̲ăńɦɨ̆ [148]	Bur *han- [149] PY *xäń [150] Bsq *u-hain [151]
wood, fire-wood	4.3	*łəd [152]	łid, łəd [153]			PEC *łwɨndV [154]	Bsq *i=łhinti [155]
yellow	11.3	*-cʊχʷ		s'u·w [156]		PEC *ć̲akwV [157]	PY *taʔk- [158] Bur *ṣikark [159]

Historical linguists are quite correctly interested in whether recurrent sound correspondences can be found in any set of proposed etymologies.[160] **Table 1** displays only 36 etymologies, not enough for a full-blown comparative phonology. (Bear in mind that this selection makes up only 17% of Nikolaev's 207 comparisons, and there are no doubt more Na-Dene-North-Caucasian etymologies beyond what Nikolaev discovered and published in 1991.) Nevertheless, even in this small sample

[144] 'to boil'.
[145] 'river' > Hupa *han?*, Tututni *xan?e*, Kutchin *hán*, etc. (G 109); PPA **hən* 'river' (Leer 1993).
[146] 'water, river' (Leer 1993).
[147] Skidegate 'water', (A) *ɢán-ƛ*.
[148] 'water', *e.g.* Chechen *χi*, Tsakhur *x́an*, Dargwa *hin, šin*, etc.
[149] In Hunza *án-cil*, Nager *hán-chil* 'water from a wound; watery (tea, soup)' (comp. with **chel* 'water') (SCG 221).
[150] 'wave (in water)'.
[151] 'wave, current'. **u-* is a truncated form of **hur* 'water', as in other compounds.
[152] *E.g.*, Chipewyan *-łìr, -łər, łìr, łìy* 'to dry (leaves, bark, grass, etc., in the sun or by the fire' (LDC no. 72); cf. also PA **łəd* 'smoke' < PAET **łənd* (Leer 2008).
[153] 'dead wood, dry wood'; cf. also *łãhd* 'smoke' < PAET **łənd* (Leer 2008).
[154] 'wood, firewood', *e.g.* Andi *łudi*, Khwarshi *lida*, etc.
[155] 'firebrand, ember'.
[156] 'green'.
[157] 'yellow, white'.
[158] 'white'.
[159] 'yellow'.
[160] Bearing in mind that sound correspondences are not, in themselves, proof of genetic connection (since large sets of loanwords, as in English < French, or Turkish < Arabic, also exhibit regular correspondences), but 'sound laws' are a property of shared genetic vocabulary. In this case, Na-Dene and North Caucasian, loanwords are out of the question because of (a) the vast geographical distance and (b) the thoroughly basic nature of the vocabulary compared.

a fair number of recurrent phonetic matches (mainly between Proto-Athabaskan and PNC or PEC) are attested in two or more sets, denoted here according to the main semantic gloss:

Table 2: Recurrent sound correspondences from Table 1.

Na-Dene	**North Caucasian**	lexical set	notes
c' (= ts')	**c'** (= ts')	eyebrow, guts, limb	Tlingit /**s'**/
χ	**ɦ**	eyebrow, foot, pus	
χ	**χ**	dog, warm	
ɢ	**ɢ**	arm, hare	
d	**d**	face, wood	
ɬ	**ɬ**	ice, wood	Basque ***ɬh**
ɬ	**ɬ**	bark, bough, plant	
ƛ'	**ƛ'**	bottom, grass	
t'	**t'**	feather, foot	
w	**m**	flint, sleep	
q'	**k'w, k'u**	burn, kidney	
ɢ	**gw**	dog_2	see **Table 3**

Apparent "split reflexes," as when PND *χ (voiceless uvular fricative) matches PNC *χ in some cases but PNC *ɦ (voiced laryngeal fricative) in others, may reflect either phonemic splits or mergers; which cannot be determined from this dataset alone, but only from a thorough exploration of DC comparative phonology. In the words for 'knee / elbow': PEC *q'HwəntV ~ PAET *ɢunt', the glottalization has traded places. In North Caucasian the initial uvular is glottalized, in AET the final coronal is glottalized. This kind of metathesis, and also dissimilation or assimilation, has apparently taken place in other etymologies. In the words for 'stick' North Caucasian *q'wĕrč'V̄ has both consonants glottalized, in Na-Dene *ɢəʒ both are lenis. A protoform such as PDC *ɢwerč'V or *q'werʒV could account for both, with progressive or regressive assimilation – without more external evidence it is difficult to know which was original. The Basque (Bizkaian) word *gartxu* /garču/, and/or Burushaski *gaśí*, if related, could support *ɢwerč'V or *ɢerč'wV, or the like.[161]

In several cases where North Caucasian has a velar (*k', *g) followed by a labial vowel (*u) or glide (*w) the corresponding words in Na-Dene have a uvular /q/, /q'/, or /ɢ/:

Table 3: Na-Dene–North-Caucasian velar-uvular correspondences.

[161] Bsq *gartxu* denotes 'a species of evergreen plant (*Phillyrea media*)' (Spanish *labiérnago*); Bur *gaśí* is 'Tanne, Fichte, Föhre' (or possibly Bur *káçul* 'Föhre'); there is also Bur *gaçhé* 'branch' (see the discussion in SCG, p. 237). All of the other languages (Na-Dene, NC, Yeniseian) have only words relating to the products of trees (stick, log, pole), not live trees. For semantics, cf. English *beam* < Old English *bēam* 'tree, pillar, beam, post', German *Baum*, Gothic *bagms*, etc.; German *Tanne* 'fir', Old High German *tanna*, Sanskrit *dhanvan-* 'bow', etc. (Buck 8.64-65; 9.51).

	PNC/PEC	Tsezian	Eyak	Athabaskan
cheek[162]	***ħk'wĕɬV̄**	**-**	**=quhɬ**	**-**
kidney, liver, roe	***k'unHV**	***kõbɔ**	**q'əma·, =q'uʔ**	***q'u·nʔ**
burn	***=īk'wV(n)**	***=ek'^{w}-**	**=q'a**	***=q'a·n**
fog, cloud	***k̲'wĭmhV**	***qima**	**q'ənih**[163]	**-**
smoke, fire	***k̲'wĭnħV**	***q^{w}i ~ *qo**	**=qu- / qũ·-**	***q^{w}unʔ**
leg, foot	***k'wĭrV**	**-**	**qi-**	***qe·ʔ**
dog, wolf	***gwăǯē**	**-**	**ɢu·ǯih**	**-**

Note the partially convergent developments in the Tsezian branch of East Caucasian. The variation in Na-Dene between /q/ and /q'/ is a mystery, so far, one of the problems for future study.

DENE-CAUCASIAN MORPHOLOGY: INSTRUMENTAL SUFFIX

Morphology is a vital part of historical linguistic research, but as far as Dene-Caucasian is concerned the work has been rather scanty. Most of the pioneering articles in the 1990s concentrated mainly on lexicon and phonetics. In 2008 I attempted to assemble what I called "materials for a comparative grammar of the Dene-Caucasian languages,"[164] and soon after George Starostin (2010) analyzed the Dene-Caucasian pronouns. G. Starostin and I published online about the "state of the art and perspectives" of Dene-Caucasian (2015), which includes a sketch of comparative morphology.

Edward Vajda (2009), in his paper submitted to the 2009 Athabaskan conference, discusses an instrumental suffix with a shape *-l* or *-ɬ* and some proposed examples from Yeniseian and AET. To be clear, this "instrumental suffix" is a noun-forming suffix, or nominalizer, not an affix marking an instrumental case form. As mentioned by Vajda, Fang-Kuei Li (1956) wrote the classic treatment of the instrumental suffix common to Athabaskan and Eyak. Among the examples he gave:

Table 4: Athabaskan instrumental *-l* / *-ɬ*.

	verb stem	derivative in **-l / -ɬ**
Chipewyan (Dënesųłiné)	**=γį, =γé, =γɛɬ** 'to carry on the back'[165]	**xɛ̀ɬ** 'something to be carried on the back (pack, burden)'

[162] Mostly 'mouth, palate' in NC, *e.g*. Avar *k'al* 'mouth'; cf. PY **χol* 'cheek'.

[163] Eyak *q'ənih* 'fog', apparently an archaic variant of the word also recorded as *q'əyįh* and *q'əyį·y* (Krauss 1970, p. 372). Thanks to Michael Krauss (p.c.) for pointing out that the form *q'əmaʔ* 'fog' cited by Nikolaev (1991: 52, no. 5.4), and in my conference handout, was an error in the index of Krauss (1970).

[164] This title was modeled after Illič-Svityč's (1967) "Materials for a comparative dictionary of Nostratic languages," implying that the actual dictionary did not exist yet, but here are some materials for it.

[165] The verb forms ending in a voiceless lateral *-ɬ* are progressive. Li suggested that the progressive *-ɬ* suffix could ultimately be related to the noun-forming *-ɬ* suffix.

Navajo	**=γ̀h, =γ́, =γ́ɬ** 'to transport, handle a burden'	**xɛ́ɬ, =γ́ɛl** 'pack, burden'[166]

Cf. the East Caucasian comparisons made by Nikolaev & Starostin of the protoforms *=*ǐχ̲V* 'to carry' and **χ̲[ä]ʔlV* 'burden, pack':

Table 5: East Caucasian 'carry' vs. 'burden, pack'.

	verb stem	derivative in **-l / -ɬ**
Dargwa	**=iχ̲-** 'to carry, bear'	**χ̲ala** (dial. **χ̲:ala**) 'bundle'
Tabasaran	**χ̲-** (dial. **χ̲:-**), 'to carry, bear'	[Kryz, Budukh **χ̲el** 'pack, burden']
Agul	**χ̲(i)-** 'to carry, bear'	
Rutul	**=iχ̲-** 'to carry, bear'	**χ̲äl** 'pack, burden'
Archi	**χ̲:e-** 'to carry, bear'	**χ̲:al** 'burden, load'
Udi	**aχ̲a**-yesun 'to drag, carry'	**χ̲el / qel** 'burden, load'

In the NCED entry for PEC **χ̲[ä]ʔlV* 'burden, pack' Nikolaev & Starostin recognize that it is "possibly one of the derivates of PEC *=*ǐχ̲V* 'to carry' (with Anlaut reduction)." The relationship of the verb stem *=*ǐχ̲V* to the derivative noun **χ̲[ä]ʔlV* < **χ̲[ä]ʔ-lV* is entirely parallel to the Athabaskan example above. Elsewhere in Na-Dene we have the suffixless Eyak *χe* 'burden' and Tlingit *=ʔaχ* 'to pack up', *χìy* 'pack, burden' (Pinnow 1966: No. 118). Leer (1993) cites the forms Eyak o-√*χe** 's[ubject] carries o[bject] on back', o-*ɬ*-√*χeɬ* 'tie with rope, into bundle; (*k'u*-) 'rope', Tlingit *χi'ÿ* 'pack', *ka-ɬ*-√*χeɬ* 'coil [rope]'.

The agreement between the Athabaskan and East Caucasian forms above seems quite striking, but we need more examples to be convinced that these morphological parallels are not just fortuitous, but can be traced back to a Proto-Dene-Caucasian stage.

Another common Athabaskan example involves the verbs 'to tie, to bind, to weave, to knit' and nouns meaning 'rope, string, cord'. Li gives examples including: Chip. *=ƛ'ų, =ƛ'ų, =ƛ'ų* 'to tie a rope, to bind' / *ƛ'uɬ* 'string', *ƛ'ulɛ* 'rope'; Nav. *=ƛ'ó, =ƛ'ǫ́, =ƛ'ǿɬ, =ƛ'ǿɬ* 'to tie a rope'/ *ƛ'ǿɬ, =ƛ'ǿl* 'rope, cord'. This root is found in all major branches of Na-Dene: Haida (Alaskan) *ƛ'íi* 'to sew', *ƛ'áayu* 'thread', (Skidegate) *ƛ'o* 'to sew'; Tlingit *ƛ'iin* 'to tie up in a bunch'; Eyak *ƛ'i* 'to bind, tie'.

The East Caucasian root **Ł̲ŭʰV* 'seam, sewing pattern'[167] seems to be related to these Na-Dene words, but it is attested in only three languages, Chechen *lol* 'basting, tacking', Ingush *lo* '(sewing) pattern', and Avar *ƛ':ĕʕ* 'seam' (NCED 790-791). Of these Chechen *lol* 'basting, tacking' is very close, phonetically and semantically, to Athabaskan words like Navajo *ƛ'ǿɬ, =ƛ'ǿl* 'rope, cord'. Nikolaev & Starostin remark that "-l in [Chechen] *lol* is historically a suffix, as seen from the Ingush form." East Caucasian has another similar root that may be related to **Ł̲ŭʰV*: PEC **HŁünV*

[166] Alternation between voiceless and voiced fricatives (*x/γ, s/z, š/ž*, etc.) is very common in Athabaskan, both initially and finally.
[167] The PNC proto-phoneme **Ł* (here in the tense form **Ł̲*) represents a voiced lateral affricate.

'hem (of a garment)' > Tsez *ału*, Inkhokvari *ạnna* id.;[168] Lak. *lan-t:u* 'hem of a kerchief (used by women for wrapping)'; Lezgi *gin* 'front hem of a garment'. Starostin (SCG 75) adds Burushaski **lám-at* 'hem'.[169] In formation these resemble Tlingit *ƛ'iin,* cited above.

The parallelism of the Na-Dene and North Caucasian forms can be seen clearly in **Table 6**:

Table 6: Na-Dene and North Caucasian 'tie ~ sew'.

	simple verb or noun stem	derivative in **-l / -ɬ**
Na-Dene	Chip. **=ƛ'ų, =ƛ'ų, =ƛ'ų** 'to tie a rope, to bind' Nav. **=ƛ'ó, =ƛ'ǫ́, =ƛ'ǿɬ,** **=ƛ'ǿɬ** 'to tie a rope'	Chip. **ƛ'u-ɬ** 'string', **ƛ'u-lɛ** 'rope' Nav. **ƛ'ǿ-ɬ, =ƛ'ǿ-l** 'rope, cord'
North Caucasian	Avar **ƛ':ĕʕ** 'seam' Ingush **lo** '(sewing) pattern'	Chechen **lo-l** 'basting, tacking'

There is an important Na-Dene etymology involving names for various containers, reconstructed by Pinnow as **c'aigʔ*: Haida **c'a-, *c'ə-* in (Skidegate) *c'əs* 'box or pot object' (classifier), (Alaskan) *c'ā́n ƛ'at'ās* 'carrying basket', etc.; Tlingit *s'íx'* 'dish'; Eyak *c'ik'* 'plate or wooden dish' (borrowed from Tlingit), Eyak *c'āk-ɬ* 'dipper; basket'; Athabaskan **c'aɢʔ* 'basket, cup, dish' (Pinnow 1966: 111, no. 224; Enrico 2004: 249–250, no. 27).

There is a North Caucasian root that is very similar, phonetically and semantically, to Na-Dene **c'aigʔ*: PNC **ć̆ă̆q'wă / *ć̆'ă̆qwă* 'scoop, spoon, wooden vessel', which is based on words such as Bezhta *čuχ-rö* 'wooden gutter'; Lezgi (dial.) *č'uχar* 'gutter'; Agul *č'aq'* 'wooden spoon', Archi *č'aqʷ* 'spoon, wooden shovel'; Abkhaz *a-ć̆aq'ʷá* 'wooden spoon', etc. (with metathesis also: Lak *k'ič'u* 'slop-basin, basin'), etc. (NCED 332–333; see 'dish, bowl' in **Table 1**). Here again we can juxtapose several forms, both Na-Dene and North Caucasian, which exhibit this root with and without the lateral suffix:

Table 7: Na-Dene and North Caucasian 'dish ~ basin ~ spoon'.

	stem without suffix	derivative in **-l / -ɬ**
Na-Dene	[Eyak **c'ik'** 'plate or wooden dish']¹⁷⁰ Navajo **c'āʔ** 'shallow basket, plate' Ingalik **tθ'og** 'bowl' Chipewyan **tθ'áí** 'cup, dish', etc.	Eyak **c'āk-ɬ** 'dipper; basket' Navajo ʔawé-**c'á-l** 'baby cradle' Sarsi **c'ą-l** 'baby's moss bag' Wailaki **c'a-lʔ** 'baby basket'
North Caucasian (with metathesis)	Archi **č'aq'ʷ** 'spoon, wooden shovel' Lak **k'ič'u** 'slop-basin, basin'	Avar (dial.) **č':ik'á-ro** 'spoon' (**-ro** < ***-lV**) Lak **k'ič'a-la** 'scoop', Dargwa **k'uc'u-l** 'spoon'

[168] /ạ/ representing the pharyngealized vowel, otherwise written as *aInna* (NCED).
[169] A plausible comparison, in my opinion. The rounding feature of the vowel has transferred to the following nasal. This is the only known match between PNC initial **HŁ-* and Bur. **l-*.
[170] Eyak *c'ik*' is now thought to be a loanword from Tlingit *s'ix*' 'dish' (Leer 1993).

Enrico (2004: 250) cites the verb stem that may underlie all of the Na-Dene forms, as represented by (Northern Athabaskan) Ahtna *c'aɣ* (= *c'aʁ*) / *c'aχ* / *c'ēχ* 'to be concave, folded'. A corresponding verb in North Caucasian, perhaps now lost, may have given rise to the nouns with and without the **-lV* suffix, originally 'a concave instrument' (scoop, spoon, basin, etc.). The Ahtna forms also bear witness to an original final uvular that changed to velar in some languages (e.g., *k'* = *ḳ* in Eyak, Lak, etc.).

In his 1956 paper Li gives 12 examples from Eyak and about 40 examples from Athabascan languages of these formations with a lateral suffix. The following examples from North Caucasian languages support and add to the above evidence, and provide more probability to the hypothesis that this type of formation can be traced back to Proto-Dene-Caucasian:

- PNC **=ič'wĔn* 'to cleave, cut, incise': Tsakhur *č'ika* 'knife' / Lezgi *čuk'u-l*, Kryz *č'uk'u-l* 'knife' (NCED 394); for formation cf. Eyak *cā* 'rock' / *caʔ-ɬ* 'knife, dagger' (Li 1956: 48).
- Dargwa *q'ʿart'* 'pod' / Karata *q':ot'u-lu* 'skein, hank, clew', Lezgi *qʷet'e-l* 'lace', etc. (NCED 923–924); cf. Eyak *k'ot', k'ot'-ɬ* 'thread, sinew', Navajo *=č'id* 'sinew'.
- Lezgi *kant*, Agul *kant'* 'big knife' / Akhwakh *k'at-la* 'big knife' (NCED 718).
- Dargwa *pada* 'trousers' / Archi *pạt:ə-la*[171] 'trousers' (NCED 600); cf. Burushaski **baṭ* 'skin, leather'. For formation cf. Eyak *kohs-ɬ* 'apron' / Navajo *=cōs, =cōz, -cos* 'to handle fabric', Chipewyan *=čuθ, =čúđ, =čuθ, =čiθ, =čɛθ* id. (Li 1956: 48).
- Tsakhur *os* 'wood, timber', Lak. *his* 'a prick (by some sharp object)' / Lak (dial.) *his:i-lu* 'fork' (< **ħwāĺsə̆*: NCED 505). cf. Basque **hols* 'plank, tile, wall' (BCR Q.63).
- Akhwakh *k'eru* 'big knife, hatchet', etc. / Avar (dial.) *k'ere-lo* id. (NCED 725).
- Andi, Tindi, etc. *huma* 'stalk, stem; post, prop' / Dargwa *ʕumu-l* 'bar, bolt' (NCED 502)
- Godoberi *k'anɬ':a* 'pitchfork' / Akhwakh *k'ăɬ':e-la* 'scissors' (NCED 734); cf. Navajo *=k'àl* 'fork (in a road); V=shaped fork; crotch; nock of arrow' (comparison by Nikolaev 1991: 7.21).
- Hinukh *ʁuč'* 'small stick', Bezhta *q'äč'ä* 'beam' / Lak *ụrči-lu*[172] 'rolling-pin; corn-cob' (NCED 935–936); cf. Athabaskan **ɢəǯ* 'cane, staff, stick', etc. in **Table 1**.
- Dargwa *k'ič'* 'hook, buckle', Agul *k'uč'* 'button' / Chechen *kŏ̄žalg*, Ingush *kožolg* 'stick with a hook; hook, gaff' < **kō̆č'e-l-ik'* (NCED 694).
- Chechen *yuħ (y=uħ)* 'face; end', Avar *beʕ (b=eʕ)* 'face' / Avar *raʕ-al* 'edge', Andi *le-l,* Karata *reʕ-il* id. < **r=aʔ-il* (NCED 258; a noun with changing class prefixes). Cf. Navajo *=dā́ʔ* 'edge' < **d=ā́ʔ* = Dargwa Chirag *dạ (daI)* 'face' < PEC **r=ăħwV* (Nikolaev 1991: 7.23).

The comparative morphology of Dene-Caucasian languages is, so far, a relatively unknown territory. Much more needs to be done.

> 'Dene-Sino-Caucasian' is not an amorphous, indescribable entity where 'anything goes' whenever the need arises; it is understood as a proto-language with its individual phonetic, morphological, and lexical characteristics, enough of which should be identifiable as 'genetic residue' in any

[171] /ạ/ representing the pharyngealized vowel, otherwise written as *paIt:əla* (NCED).
[172] /ụ/ denotes a pharyngeal vowel, otherwise written *uIrči-lu* (NCED).

> of its hypothetical descendants so that one could unequivocally include them in the macrofamily. . . . It is simply the idea of offering the most logical, simple, and systemic explanation to a set of stunning similarities that manifest themselves as *exclusive* links between a number of linguistic taxa (Bengtson & Starostin 2015: 32).

CONCLUSIONS

If we remove Nikolayev's more improbable lexical comparisons, what remains is a rather impressive collection of potential etymologies. We have seen above that the similarity of the Caucasian and Na-Dene phonological systems (on several points) makes the matches more transparent, e.g.:

> PNC **c̲'ĭk'wĔ ~ *k'wĭc'Ĕ* 'intestines, spleen' (Chamalal *s'iq':ʷa* 'small intestine', Tindi *c:ik:ʷa* id.; [with metathesis] Dargwa *k'ac*' 'spleen'; Circassian *k'ʷac*' 'entrails, intestines', etc.) ~ Proto-Athabascan **c'i·k' ~ *č'i·k'* 'intestines' (Ahtna *c'i·g* 'intestine(s)', Hare *c'i*, Hupa *=č'eek*'-e', Navajo *=č'íí*' id.); Eyak *c'ehχk'* 'inside of a pelt'; Tlingit *c'i·k'* 'adductor muscle of a bivalve'; Haida *c'i·* 'insides, filling, guts, etc.'[173]

Furthermore there are recurrent phonetic correspondences, both trivial and non-trivial, a sample of which is given above. The weakest part of Nikolayev's study is morphology: only ten "pronouns and particles" are listed (9.1–9.10), of which some appear improbable, and there is no attempt to demonstrate complete or partial paradigms. If this side of Dene-Caucasian can be elaborated by future study (as I tried to do with the instrumental suffix), it will do much to increase the plausibility of the hypothesis.

"Dene-Caucasian"[174] has been repeatedly "discovered" by several scholars from several starting points, each seeing only a part of the whole, as in the fable of the blind men discovering the elephant. Recent advances in historical linguistics allow us to view the complete "elephant." We can easily designate Dene-Caucasian as a PT ("probable truth") hypothesis, in Lamb's (1959) parlance, to distinguish it from ER ("established relationship").

Another taxonomic principle from Lamb is instructive here:

> Uniformity III. Two languages, A and B, should not be combined in a group which excludes another language, C, unless A and B are (probably) more closely related to each other than either is to C. That is, the discovery of a relationship, even if it can be well established, is not sufficient

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[173] In North Caucasian the picture is complicated by a phonetically (and semantically) similar root, **q̲'wič'V / *č̲'iq'wV* 'spleen, small intestine' (Khinalug *č'ik'ild* 'intestine', Tindi *č'iq':i* 'spleen', etc.), which reminds one of the variation of initial affricates in Athabascan **c'i·k' ~ *č'i·k'* 'intestines'; perhaps these variations originated in old expressive changes; cf. Basque *sagu* 'mouse' ~ (dialectal) *xagu* /šagu/ 'mousie' (diminutive).

[174] The term "Dene-Sino-Caucasian" has sometimes been used, equivalent to the more inclusive version of Dene-Caucasian. "For the past 20 years Sino-Caucasian has been used exclusively for Sino-Tibetan, Caucasian and Yeniseian, while Dene-Caucasian has been used exclusively for a family that includes these three families plus Basque, Burushaski and Na-Dene. These are two different taxa and should not be mixed up. Also there are no families . . . consisting of three names, so the term Dene-(Sino-)Caucasian is both taxonomically and typographically inappropriate" (M. Ruhlen, p.c.).

> grounds for classifying groups together. One must also have evidence that, at the level in question, the two groups are unrelated to others being excluded from the larger grouping. One must not assume that other relationships do not exist merely because no one has discovered them (Lamb 1959: 38).

In other words, it is a taxonomic error if we do not consider the evidence relating "A" (Na-Dene) and "B" (Yeniseian), not only to each other, but also to "C" (Sino-Tibetan), "D" (Caucasian), "E" (Burushaski), "F" (Basque), and possibly others.

As anthropologists our task is to find the best explanation for linguistic diversification and taxonomy in Eurasia and the Americas (and the rest of the world). A major part of this "best explanation" is the Dene-Sino-Caucasian hypothesis, a model that comprehensively explains and accounts for the incomplete glimpses of linguistic classification made by various scholars throughout the past century. The goal is not to assemble a series of discrete (often binary) relationships, but to put forth a model that integrates "relationships" in the most comprehensive classification possible.[175] As a "PT" classification Dene-Caucasian is understood to be not an ending point, but "a basis from which closer and closer approximations to the true picture could be made."[176]

Abbreviations used in tables:

Bsq	Basque
Bur	Burushaski
OC	Old Chinese
PEC	Proto-East-Caucasian
PNC	Proto-West- Caucasian
PST	Proto-Sino-Tibetan
PY	Proto-Yeniseian

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[175] In this argumentation I have been helped by Merritt Ruhlen, *e.g.* (2001b, 2005).
[176] Lamb (1959: 38), making an analogy with biological classification.

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RESONANT VARIATION IN PROTO-INDO-EUROPEAN

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Upon close inspection, many roots in the reconstructed vocabulary of Proto-Indo-European show similarities, both phonetic and semantic, that suggest ancient genetic affiliations. In particular, cases of resonant variation within the context of a fixed consonant structure often show striking semantic uniformity. The examples provided suggest that, at a very early pre-Proto-Indo-European stage of the language, these resonant-variations were morphological variants of earlier primitive roots. Additionally, when evaluating the likelihood of distant language affiliations, these generalized primitive roots, not their derived variants, are the principal forms that can be meaningfully compared to the lexica of other proto-languages.

DEDICATION

This work is dedicated to E. J. Michael Witzel, Wales Professor of Sanskrit at Harvard University, without whose contributions, both in encouragement and in helpful suggestions, this project would never have been realized.

INTRODUCTION

The following table compares three PIE roots that share a semantic field and that are identical phonetically except for the variation seen in the resonants. The question arises: Is this resemblance accidental, or does it reflect some ancient morphological system? I will argue that this pattern of resonant variation parallels other familiar non-etymologically-significant root-variations such as changes in vowel gradation, s-mobile, and nasal infix, that are universally recognized in PIE comparative linguistics.

***g^h(R)eb^h- 'Grab, take, seize, hold'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
*$g^h eb^h$-	g^h	ø		b^h	1	Grasp, seize, cause another to grasp (give)
*$g^h reb^h$-	g^h	*r*		b^h	2	Grab, seize, snatch up, devour, take
*$g^h rei̯b^h$-	g^h	*r*	*i̯*	b^h	3	Grip, grasp, seize

1 ***$g^h eb^h$- 'Grasp, seize, cause another to grasp, i.e. give'**

Lat *habeō* 'grasp, possess, have,' Umb *habe* 'have,' OIr *gaibid* 'take, take hold of, seize, catch, grasp,' Goth *gabei* 'riches, wealth,' *giban* 'give,' Lith *gebù* 'to be capable' (*capable* is literally

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the ability to catch, take, sieze), Pol *gabać* 'lay hands on, seize, hold,' WRus *habáć* 'take, grab.' —LIV 193; IEW 407–09; EIEC 563; Mallory and Adams (2006) 271; Bomhard 349, 376.

Words for *give* and *take* often interchange in PIE (Watkins 2011: xxvii).

2 ***$g^{h}reb^{h}$-* 'Grab, seize, snatch up, devour, take'**

Skt *gṛbhnáti* 'grabs,' MHG *grabben* 'seize,' Latv *grebju* 'seize,' OCS *grabiti* 'snatch up,' Hit *k(a)rap-* 'devour,' Av *gərəwnāiti* 'takes,' NE *grab* (from MDutch). —Mallory and Adams (2006) 271; Watkins (2011) 32; IEW 455–56; EIEC 563; LIV ***$g^{h}rebh_2$-* 201.

3 ***$g^{h}reu̯b^{h}$-* 'Grip, grasp, seize'**

Goth *greipan* 'grasp, seize, catch,' Lith *griebiù* 'take hold of, seize,' ON *greipa* 'commit, perpetrate,' *greip* 'grip, hand,' OE *grāp* 'fist, grip,' NE *grip, gripe, grope*, OHG *grīfan* 'touch, take hold of,' *greifōn* 'grope, touch,' Latv *greībi* 'seize.' —LIV 203; IEW 457–58; EIEC 564; Mallory and Adams (2006) 272.

* * *

The semantic values of these three roots are closely aligned. Phonetically, they are identical except for the fluidity of the resonants. As will be seen in the following examples, this is no isolated instance, rather it is a common pattern seen in what appears to be the oldest strata of the language.

SOME INITIAL METHODOLOGICAL OBSERVATIONS

1. Resonant Variants *(R)* may include any resonant: r, l, n, m, u̯, i̯, ø (null-grade), or a laryngeal: h_1, h_2, or h_3. Inside the root, laryngeals function as do the other resonants. This has been noted by Todd B. Krause and Jonathan Slocum, who write, "Given the ability of the laryngeals to vocalize between consonants, it is occasionally convenient to think of the laryngeals likewise as resonants."[2]

2. A root may contain zero, one, or two resonants. In rare cases, roots are found with two resonants and a laryngeal.

3. The structure of the primitive root can be generalized as: *(s)-C [+/- R (R)] -C [+/-C].

4. The glosses indicating the semantic value of PIE roots included in this analysis may sometimes differ from those given in the etymological dictionaries of Rix, Pokorny, Watkins, Mallory and Adams, Wodtko, or others. For example, in the *Lexikon der Indogermanischen Verben*, the root, ***streu̯-*, is glossed *streuen* 'strew.'[3] In modern English, *strew* means "to spread here and there, scatter, disperse, spread over a wide area."[4]

One of the attestations given in LIV for ***streu̯-* is Latin *struō*. The primary definitions for that word, as given in the *Oxford Latin Dictionary*, are: "To set in position, arrange (so as to construct something), stand fast, ...construct, put together, build, ... build up, establish."[5]

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[2] https://lrc.la.utexas.edu/eieol/tokol/20.
[3] Rix, Helmut, et al., *Lexicon der Indogermanischen Verben* (LIV), 2nd edition (Wiesbaden: Dr. Ludwig Reichert Verlag, 2001) 605.
[4] *The American Heritage Dictionary of the English Language* (AHD), 4th edition (Boston and New York: Houghton Mifflin Company, 2000) s.v. "strew," 1715.
[5] *Oxford Latin Dictionary* (OLD), P. G. W. Glare, ed., (Oxford: The Clarendon Press, 1982) s.v. "struō," 1829-30.

It would appear then that the meaning of *struō* in Latin is roughly the opposite of "strew." Rather than scattering randomly or dispersing, it indicates the placing of something very precisely for the purpose of building. The form of the perfect tense of this Latin word is *structum*, the source of the English words *structure*, and *construction*, two very non-random concepts.

Because of its phonetic alignment (allowing for resonant variations) with other PIE roots that signify "to set in place, to stand, to build, to establish," it appears that Latin preserves the original meaning of the root more faithfully, and therefore **streu̯-,* is here glossed accordingly, even though this is at variance with the general gloss given in LIV.[6]

5. The sources for the semantic values assigned to roots are always cited following the lists of attestations. Where it has been necessary to rely on glosses given in etymological dictionaries of PIE, these have often required translation from German to English. Since that translation-process could be an opportunity for personal bias to enter in, readers may wish to verify the accuracy of those translations by consulting the sources cited and reading the German or the original languages directly.

6. The grammatical significance of resonant variations within PIE roots is unclear. They appear too systematic to have been the result of a fusion of related dialects. If they represent some archaic morphological pattern of verb aspect or of noun declension, that function is no longer obvious. The question is left for future investigators.

7. The attestations cited for each root are primarily for identification purposes and are in no way exhaustive. Semantic outliers are generally excluded. The selection presented probably reflects, to some degree, the semantics of the resonant series as a whole.

8. In roots that deal with taboo subjects, one must deal with obliquities and circumlocutions at every level, both in the original documentary evidence, and at each stage of lexicography.

9. In one or two occasions, new roots have been proposed for the PIE lexicon. This occurs primarily when a word with no known etymology fits semantically and phonetically very tightly within a strong resonant series. If the reader has doubts about that inclusion, he or she is advised to disregard the proposed root, as it will rarely affect the viability or credibility of the series as a whole.

10. The s-mobile presents special challenges. When roots in a resonant-series contain forms both with and without initial **s-*, those with the initial sibilant are here typically considered to be the result of the s-mobile. Where the s-mobile has been added to a root beginning with **g-*, that voiced stop must have eventually become de-voiced to **sk-*. In one or two cases, this assumption has been made where the semantics and phonetics are otherwise especially compelling. In like manner, where the s-mobile has been added to a root beginning with **d^h-*, that voiced stop must have eventually become de-voiced to **st-*.

11. Occasionally one encounters a root that matches the semantics of a resonant-series so closely that there is no reasonable doubt that it belongs there, but that phonetically it differs in

[6] See **(s)d^{h}e(R)-* infra.

some minor quality. For formal reasons, such roots have generally been omitted from inclusion here, although future reconsideration is not out of the question.

12. The resonants function like an archaic ablaut system, acting anciently as non-etymologically-significant vowel modifiers. In the later stages of PIE, these morphological variants took on the status of independent roots as their earlier genetic affiliations were gradually forgotten.

13. It is unclear which (if any) of the resonant variants was the fundamental form of the primitive root. It is tempting to posit the zero (resonant) grade as the fundamental, since it is the simplest, but that variant is often unattested.

14. The resonant **m-* functions either independently or as a variation of **n-* when that nasal precedes a labial consonant.

15. The following proposed root-families are based on resonant variations that have been determined solely through internal analysis of PIE, uninfluenced by considerations of possible connections to non-Indo-European languages.

But, in order to estimate the approximate time-depth of the process that created the resonant variations, it is useful to look for comparanda among external language-families that may have possible genetic connections to PIE.

Proponents of the so-called Nostratic Hypothesis have assembled large sets of data relating to such outside language families. While remaining agnostic regarding the validity of that general hypothesis, I have made use of the data that such proponents have presented, in particular, the work of Allan Bomhard. Because his documentation of sources is explicit and well organized, his work lends itself well for comparative purposes.

Roots that appear in Bomhard's list of 676 PIE roots for which he claims to have found a Nostratic etymology have been cited when they occur in the following resonant-families. The etymologies suggested by Bomhard vary significantly in quality, some being quite convincing and others rather doubtful. For this reason an assessment has been provided that indicates their strength and applicability for the present purposes.

If two or more PIE roots within a proposed resonant series can be shown to have strong phonetic and semantic parallels to Afrasian, Uralic, Altaic, Kartvelian, Dravidian, etc., then this would suggest that the separation of these PIE resonant-variants from an earlier primitive root occurred before the separation of PIE from the other language families. This may provide an approximation of the time-depth involved, assuming, of course, that the hypothesis of an ancient super-family is valid.

The results of this comparison are as follows:

The number of PIE resonant-families identified in this investigation:	85
The number of resonant-families in which:	
One PIE root in the family has credible outside connections:	17
Two PIE roots in the family have credible outside connections:	12

Three PIE roots in the family have credible outside connections:	6
Four PIE roots in the family have credible outside connections:	2

This tally indicates that 20 of the 85 resonant families identified here show two or more roots with credible connections to the outside language groups compared by Bomhard. This would indicate that at least some of the resonant-variants within those families had differentiated during the period when PIE was still in contact with the linguistic community that would later separate into Afrasian, Dravidian, Altaic, Uralic, etc. The dates assigned to this community are approximately 12,000 to 15,000 BC (Bomhard 2014:257). The remainder of the resonant-variants would have completed the differentiation process between that time and the point at which PIE broke up into the attested daughter languages.

It should be strongly emphasized that this preliminary attempt to assign approximate dates to the differentiation of PIE resonants is secondary to the main thesis presented here, which is the system of resonant variation within a fixed consonantal root structure.

16. Abbreviations employed include the following:

Adams: *A Dictionary of Tocharian B*, Douglas Q. Adams, 1999
AHD: *American Heritage Dictionary of the English Language*, 4th edition, 2000
ALEW: *Altlitauisches etymologisches Wörterbuch*, Wolfgang Hock, et al., Berlin, 2019
Autenrieth: *A Homeric Dictionary*, Georg Autenrieth, 1982, Univ. of Oklahoma Press
Balg: *Comparative Glossary of the Gothic Language*, G. H. Balg, 1887–89
Benveniste: *Dictionary of Indo-European Concepts and Society*, Émile Benveniste, 1969
Bomhard: *A Comprehensive Introduction to Nostratic*, Allan R. Bomhard, 1st ed., 2014
Bosworth and Toller: *Anglo-Saxon Dictionary*, Oxford University Press, 1921
Buck: *A Grammar of Oscan and Umbrian*, 2nd edition, Carl Darling Buck, 1928
CLL: *Cuneiform Luvian Lexicon*, H. Craig Melchert, Chapel Hill, N.C., 1993
DELG: *Dictionnaire Étymologique de la Langue Grecque*, Pierre Chantraine, 2009
de Vries: *Altnordisches Etymologisches Wörterbuch*, 2nd edition, Jan de Vries, 1977
EIEC: *Encyclopedia of Indo-European Culture*, Mallory and Adams, 1996
Fitzgerald: Homer, *Iliad*, Robert Fitzgerald, trans., 1974
Fortson: *Indo-European Language and Culture*, 2nd edition, Benjamin W. Fortson, 2010
IEW: *Indogermanisches Etymologisches Wörterbuch*, Julius Pokorny, 1959
Kluge: *Etymologisches Wörterbuch der Deutschen Sprache*, 19th edition, Friedrich Kluge, 1963
LIV: *Lexicon der Indogermanischen Verben*, Rix, et al., 2nd ed., 2001
L&S: *A Greek–English Lexicon*, Liddell, Scott, and Jones, 1968
Mallory and Adams (2006): *The Oxford Intro. to Proto-Indo-European and the PIE World*
Mayrhofer: *Etymologisches Wörterbuch des Altindoarischen,* Manfred Mayrhofer, 1992
Monier-Williams: *A Sanskrit – English Dictionary*, Sir Monier Monier-Williams, 1899
Nesselmann: *Thesaurus Linguae Prussicae*, ed. G. H. F. Nesselmann, Berlin, 1873
NIL: *Nomina im Indogermanischen Lexikon*, Wodtko, Irslinger and Schneider, 2008
OLD: *Oxford Latin Dictionary*, P. G. W. Glare, ed., 1982
Ovid: Ovid, *Metamorphoses*, Allen Mandelbaum, trans., 1993
Ozoliņš: *Revisiting PIE Schwebeablaut*, Kaspars Ozoliņš, PhD thesis UCLA 2015
Ringe: *From Proto-Indo-European to Proto-Germanic*, Don Ringe, Oxford U. Press, 2006

TLG: *Thesaurus Linguae Graecae*, University of California at Irvine, Maria Pantelia, Director
Vigfusson: *Icelandic – English Dictionary*, Cleasby-Vigfusson, 1874
Watkins (2000): *App. I to the American Heritage Dictionary of The English Language, 4th ed.*
Watkins (2011): *American Heritage Dictionary of Indo-European Roots*, 3rd edition, 2011
Whitney: Roots, Verb-forms, & Primary Derivatives of Sanskrit, William D. Whitney, 1885

FAMILIES OF PROTO-INDO-EUROPEAN RESONANT-VARIANTS

Additional representative examples of resonant-variants are shown below. This listing is not intended to be exhaustive as these are merely some of the more obvious cases. Roots are grouped by initial consonant only; the order within these groups is random.

**bʰ-*

***Table 1: *bʰ(R)eg-* 'Break'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**bʰeg-*	*bʰ*	*ø*		*g*	1	Break
**bʰreg̑-*	*bʰ*	*r*		*g̑*	2	Break

1. ****bʰeg-* 'Break'**

Arm *bekanem* 'break,' Ved *bhanákti* 'break,' OIr *boingid* 'break,' Lith *bengiù* 'to end' (literally to break off). —LIV 66; IEW 113–14; Mallory and Adams (2006) 371; Watkins (2011) 8; EIEC 81; Bomhard 17.

2. ****bʰreg̑-* 'Break'**

Lat *frangō* 'break,' *frāctum* 'break,' *fragilis* 'breakable,' Goth *brak* 'broken,' OE *brecan* 'break,' OHG *brocco* 'broken,' NE *break*. —LIV 91; IEW 165; Mallory and Adams (2006) 376; Watkins (2011) 13; EIEC 81.

Notes on possible outside root connections:
1. Bomhard 17 cites Proto-Afrasian **bak'-*, etc. 'cleave, split, break open, scratch, tear, scrape, rake, sharpen, rip open, bore, excavate, break,' Dravidian *paku*, etc. 'split, divide, separate, apportion distribute, break, crack, go to pieces, burst, rend,' Kartvelian **bek'-*, etc. 'trample down, press close,' Uralic **pakka-* 'burst, rend, split, break, open, blossom,' Proto-Altaic **baka-* 'divide, separate, break, divide bread,' Eskimo **pakak-,* etc. 'knock into, knock against and break, jostle, parry a thrust, slap,' and Chukchi-Kamchatkan **pako-* 'strike, knock, flick, touch or knock against, cut into.'
Conclusions: The close phonetic and semantic parallels seen in the outside language families suggest a genetic connection to this PIE root.

***Table 2: *bʰe(R)d-* 'Beat, break, strike, crush'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**bʰeld-*	*bʰ*		*l*	*d*	1	Beat, break, batter
**bʰeu̯d-*	*bʰ*		*u̯*	*d*	2	Beat, strike, push, pound
**bʰei̯d-*	*bʰ*		*i̯*	*d*	3	Break, split, crush, shatter, destroy

1. ***b^{h}eld-* 'Beat, break, batter'**

Lith *béldžiu (bélsti)* 'beat, break, crush, pound, batter,' Germanic **bulta(n)* 'bolt, rivet, pin, peg,' Swed *bulta* 'beat, break, batter,' Latv *beĴzt* 'give a blow,' *beĴziês* 'a blow, a blow with the fist.' —LIV 73; IEW 124.

2. ***b^{h}eu̯d-* 'Beat, strike, pound'**

OE *bēatan* 'beat, strike, push,' OIr *bibdu* 'guilty, culpable, enemy,' MIr *búalaim* 'beat, strike,' OE *beafton* 'lament, bewail,' ON *bauta* 'beat, pound, strike, push,' OE *býtel* 'hammer,' MHG *bœzel* 'mallet, club.' —LIV 82; IEW 112; Bomhard 15.

3. ***b^{h}ei̯d-* 'Break, split, crush, strike, shatter, destroy'**

Ved *bhid* 'split, break, destroy,' *bhidāpana* 'split, break, shatter, crush, destroy,' *bhedá* 'breaking, splitting, cleaving, rending,' *a-bhedya* 'not to be divided, broken or pierced,' KeltIber *biðetuð* 'chip or strike,' Ved *bhinná* 'broken, shattered, pierced, destroyed,' Lat *findō* 'split apart, cleave,' Khot *bitte* 'bore through,' Goth *beitan* 'bite.' —LIV 70; IEW 116–17; Monier-Williams 75,756–57,766; OLD 702.

Notes on possible outside root connections:
2. Bomhard 15 cites Proto-Afrasian **baħ-*, etc. 'cut, strike, wound, drive off, kill, trap, tear,' and Dravidian *pāy*, etc. 'butt, gore, knock against, strike, beat, shoot, kill.'
Conclusions: Although the semantics are fairly close, neither of these proposed outside connections shows a final dental consonant, so that genetic affiliation is uncertain.

***Table 3: *b^h(R)ed-* 'Active water, water in movement'**

PIE Root	Initial	R1	R2	Final	Ref.	Semantic Value
**b^{h}led-*	*b^h*	*l*		*d*	1	Splash, boil, splutter, seethe, bubble, gush, spout, effervesce, sparkle
**b^{h}lei̯d-*	*b^h*	*l*	*i̯*	*d*	2	Bubble, boil up, gush, spout, simmer, seethe, overflow, bloat
**b^{h}leu̯d-h$_2$-*	*b^h*	*l*	*u̯*	*d*	3	Have an excess of moisture, become soft or flabby; blisters, sores
**b^{h}red-*	*b^h*	*r*		*d*	4	Wade in water, jump, gush, spout, burst, leap, spring
**b^{h}rend-*	*b^h*	*r*	*n*	*d*	5	Gush forth, flow, spring from, swell, steep, soak, bubble up

1. ***b^{h}led-* 'splash, boil, splutter, seethe, bubble, gush, spout'**

Grk *παφλάζειν* 'splash, boil, splutter, seethe,' OHG *uz-ar-pulzit* 'bubble, effervesce, boil up, gush, spout, brim over, sparkle,' OIr *ind:láidi* 'boast, brag,' Latv *blāžu* 'chatter, gossip.' —LIV 86; IEW 155; L&S 1350.

2. ***b^{h}lei̯d-* 'Bubble, boil, gush, seethe, overflow, bloat'**

Grk *φλοιδούμενος* 'bubble, boil up, gush, spout, simmer, seethe,' *φλιδάνει* 'overflow with moisture, be ready to burst, NE *bloat*. —LIV 88; IEW 156; L&S 1944.

3. ***b^hleu̯d-h_2* ‘Have an excess of moisture, become soft or flabby, blisters, sores’**

Grk *φλυδᾰ́* ‘have an excess of moisture, become soft or flabby,’ *ἐκ-φλυνδάνει* ‘break out’ (in sores). —LIV 90; IEW 159; L&S 1946.

4. ***b^hred-* ‘Wade in water, jump, gush, spout’**

Lith *bredù*, *bredžióti* ‘wade, walk in water,’ OCS *bredǫ* ‘wade,’ OCzech *brdu* ‘wade,’ Alb *bredh* ‘leap, spring, jump, hop, gush, spout, burst.’ —LIV 91 *b^hred^h- or *b^hred- (see note #1); IEW 164; ALEW 146.

5. ***b^hrend-* ‘Gush forth, flow, spring from, swell, steep, soak, bubble up’**

OIr *do:e-prinn* ‘gush forth, flow or arise from, spring from, swell,’ MIr *bruinnid* ‘make to gush forth, make to swell up,’ Lith *brį̃’stu* ‘steep, soak, bubble or well up, swell.’ —LIV 95; IEW 167–68.

***Table 4: *b^he(R)g-* ‘Food: desire it, get a portion, prepare, eat, and enjoy it’**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
*b^hag-, *b^heg-	b^h		ø	g	1	Get a portion, share with, partake, enjoy, wish, desire, long for
*b^heh_3g-	b^h		h_3	g	2	Wish for, desire, long for, want, crave, roast, toast, bake
*b^heu̯g-	b^h		u̯	g	3	Eat, feed, drink, enjoy, nourish, support, maintain, use, possess
*b^hreu̯Hg-	b^h	r	u̯H	g	4	Need, want, require, use, enjoy, be blessed with, delight in

1. ***b^hag-* ‘Get a portion, share with, partake, enjoy, wish, desire, long for’**

Grk *ἔφαγον, φαγεῖν* ‘eat, devour, Ved *bhájati* ‘divide, distribute, allot, share with, receive a portion, obtain as one’s share, partake of, enjoy, possess, have, prefer, choose,’ YAv *baxšaiti* ‘divide out,’ *baxšaite* ‘get a share,’ Ved *abhakṣayam* ‘enjoyed, drank,’ *bhíkṣate* ‘wish, desire, long for.’ —LIV 65; IEW 107; L&S 1911; Monier-Williams 743.

2. ***b^heh_3g-* ‘Wish for, desire, long for, want, crave, roast, toast, bake’**

Rus *bažú* ‘wish, desire, long for, want, hanker after, crave,’ Grk *φώγω* ‘roast, toast, parch,’ OE *bacan* ‘bake,’ Czech *bažiti* ‘to long for something.’ —LIV 70; IEW 113; L&S 1967; Bosworth and Toller 65.

3. ***b^heu̯g-* ‘Eat, feed, drink, enjoy, nourish, support, maintain, use, possess’**

Ved *bhójate* ‘have eaten, have enjoyed,’ Arm *bowci* ‘nourish, feed,’ Ved *bhunákti* ‘enjoy, use, possess, enjoy a meal, eat, eat and drink, consume, take possession of,’ *bhuñjáte* ‘enjoy,’ Arm *bowcanem* ‘nourish, feed, support, maintain.’ —LIV 84; IEW 153; Monier-Williams 759.

4. ***b^hreu̯Hg-* ‘Need, want, require, use, enjoy, be blessed with, delight in’**

Goth *brūkjan* ‘need, want, require, use,’ OE *brūcan* ‘need, want, require, use,’ Lat *fruor* ‘avail oneself of, enjoy, to have as one’s lot something good, to be blessed with, to derive pleasure from, delight in.’ —LIV 96; IEW 173; OLD 739–40; Bomhard 52.

Notes on possible outside root connections:
4. Bomhard 52 cites Afrasian *barḳūḳ*, etc. ‘plum, apricot,’ Dravidian *piṛika*, etc. ‘green mango, unripe mango,’ and Proto-Kartvelian **berq’en-*, etc. ‘wild pear, wild plum.’
Conclusions: Semantics are dubious as they indicate specific fruits only.

***Table 5: *b^he(R)$\hat{g}^h$-* ‘Prepare, protect, or posture oneself for conflict; intimidate, confront’**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
*$b^h eh_1 \hat{g}^h$-	b^h		h_1	$\hat{g}^h$	1	Vex, irritate, reproach, threaten, menace, quarrel, struggle, fight
*$b^h el\hat{g}^h$-	b^h		l	$\hat{g}^h$	2	Puff or swell up with anger, be enraged, be inflamed with passion
*$b^h er\hat{g}^h$-	b^h		r	$\hat{g}^h$	3	Raise oneself up, prepare, store away, strengthen, entrench, fortify
*$b^h en\hat{g}^h$-	b^h		n	$\hat{g}^h$	4	Increase, strengthen, establish, secure, thick, tight, impervious

1. ***$b^h eh_1\hat{g}h$-* ‘Vex, irritate, reproach, threaten, menace, quarrel, struggle, fight’**

OHG *bāgan* ‘reprimand, reproach, scold, quarrel, struggle, fight,’ Latv *buôžuôs* ‘bristle up of the hair, annoy, vex, irritate, put out of temper,’ OIr *págaid* ‘boast, brag, swagger, threaten, menace, fight,’ *bág* ‘fight, battle, conflict.’ —LIV 68; IEW 115.

2. ***$b^h el\hat{g}h$-* ‘Puff or swell up with anger, be enraged, be inflamed with passion’**

OE *belgan* ‘to cause oneself to swell with anger, irritate oneself, enrage oneself, swell with anger, be angry, be enraged,’ ON *belgja* ‘puff up, swell up,’ OHG *belgan* glossed in Bosworth and Toller as ‘tumere, irasci’ —*tumere*: ‘to swell up, to be inflamed with passion or unrest, (in undesirable situations) to be in process of coming to a head,’ to be puffed up with conceit or presumption, be proud, exultant,’ —*irasci*: ‘to feel resentment, to be angry, to fly into a rage.’ —LIV 73; IEW 125–26; Bosworth and Toller 82; de Vries 31–32; OLD 966, 1987.

3. ***$b^h er\hat{g}h$-* ‘Raise oneself up, prepare, store away, strengthen, entrench, fortify’**

Hit *parktaru* ‘raise oneself up, Arm *ebarj* ‘raise up, seize, capture, store away, provide for,’ TochB *parka*, TochA *pärk* ‘raise oneself up,’ Grk *φράσσω* ‘entrench, fortify, make fast,’ Ved *barhayā sám* ‘strengthen,’ *ni-barháyas* ‘cast down,’ OIr dí-bairg ‘throw, cast,’ Ved *babṛhāṇá* ‘firm, strong.’ —LIV 78; IEW 140-41; Bomhard 49; EIEC 269.

4. ***$b^h en\hat{g}h$-* ‘Increase, strengthen, establish, secure, thick, tight, impervious’**

Ved *baṁhayate* ‘grow, increase,’ *báṁhishṭha* ‘strongest,’ OAv *də-bązaitī* ‘establish, secure, strengthen,’ Grk παχύς ‘thick, tight, impervious, stout.’ —LIV 76; IEW 127–28; Monier-Williams 719; Bomhard 69.

Notes on possible outside root connections:
3. Bomhard 49 cites Proto-Afrasian **birVg-*, etc. 'be high, rise, high, tall, height,' Dravidian *per*, etc. 'great, grow thick, large, stout, become numerous, multiply, become full, swell, increase, augment, enlarge, prosper, expand, extend' (without final consonant), and Proto-Kartvelian **bṛg-*, etc. 'strong, high, large, firm, bold, hill.'
4. Bomhard 69 cites Proto-Afrasian *b[u]n-*, etc. 'puff up, inflate, expand, swell, grow, abound, face, features, figure, beautiful, bead, pellet, have plenty, abound in food' (without final consonant), Proto-Dravidian **poṅk-*, etc. 'increase, swell, expand, boil up, shoot up, rise, grow high, abound, flourish, spread, burst open,' Uralic **puŋka*, etc. 'rounded protuberance, lump, bud, knob, bump, hump, swollen or expanded object, ball, gnarl, clod,' Altaic *boŋgo*, etc. 'point, apex, first, fellow, chap, lad, thick, big,' and Eskimo *pəŋuʀ*, etc. 'mound or hillock, hill, swell, rise in a lump, dune, pimple, wart, blister.'
Conclusions: The (for the most part) credible outside parallel forms for roots 3 and 4 suggest that a division into these resonant groups occurred prior to the separation of PIE from the other language families. Forms without final consonant are doubtful.

***Table 6: *b^he(R)H-* 'strike, beat, break out'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
*b^herH-	b^h		*r*	*H*	1	Beat, strike, break open, pound, threaten, abuse, affront, fight
*b^he̯iH-	b^h		*i̯*	*H*	2	Beat, strike, batter, destroy, beat unmercifully, wipe out, strike root
*b^hreu̯H-	b^h	*r*	*u̯*	*H*	3	Break, destroy, demolish, bud, sprout, germinate, strike root
*b^hleu̯H-	b^h	*l*	*u̯*	*H*	4	Beat, strike, scourge, murder, beat severely, strike a blow

1. ****b^herH-* 'Beat, strike, break open, pound, threaten, abuse, affront, fight'**

ON *berja* 'beat, strike,' Lat *feriō* ' to strike with the hand, deal a blow, strike with a weapon, flog, strike down, kill, break, destroy, cut open, pierce, wound,' Alb *bie* 'beat, pound, strike,' *bren* 'gnaw, eat into, erode,' Skt *bhṛṇāti* 'threaten, menace, insult, abuse, affront,' OCS *borjǫ* 'to fight, to battle,' Lith *barù* 'reproach, chide, upbraid.' —LIV 80; IEW 133–35; OLD 686; Bomhard 35.

2. ****b^he̯iH-* 'Beat, strike, batter, destroy, beat unmercifully, germinate, strike root'**

OLat *perfīnes* 'batter, beat unmercifully, destroy, wipe out,' OIr *benat* 'beat, strike,' OCS *biti* 'beat, strike, deal a blow,' *bišę* 'beat, strike,' Alb *(m-)bin* 'germinate, sprout' (i.e., the seed "breaks open, strikes root"). —LIV 72; IEW 117–18.

3. ****b^hreu̯H-* 'Break, destroy, demolish, bud, sprout, germinate, strike root'**

ON *brjóta* 'break, destroy, annihilate, demolish, exterminate,' OE *breotan* 'break,' MHG *briezen* 'bud, sprout, germinate' ("break open, strike root"), Lith *briáujuos* 'break in,' Ved *bhrūṇá* 'embryo.' —LIV 96; IEW 169; de Vries 58; Monier-Williams 771.

4. ****b^hleu̯H-* 'Beat, strike, scourge, murder, beat severely, strike a blow'**

Goth *bliggwan* 'beat, strike, scourge, murder, beat severely' (*ggw* < *ww*), ME *blēwe* 'to beat, strike,' OHG *bliuwan* 'strike, beat.' —LIV 90; IEW 125; Balg 56–57; Kluge 84.

Notes on possible outside root connections:
1. Bomhard 35 cites Proto-Afrasian **bar-*, etc. 'cut, cut down, carve, scrape, trim, shape, sharpen, scratch off,' Proto-Kartvelian **berg-*, etc. 'to hoe,' Proto-Uralic **parз-*, etc. 'scrape, cut, carve, whittle, hew, trim, chip, to plane, rub, dress hides, cut leather,' and Chuk-Kamch **pare-*, etc. 'shave, plane, remove hair from.'
Conclusions: Semantic parallels are only fair. Except for Kartvelian, proposed outside roots all lack the final consonant of the PIE forms, rendering any genetic connection doubtful.

***Table 7: *(s)b^h(R)e-* 'Bright, shining'**

PIE Root	Initial	R1	R2	Final	Ref.	Semantic Value
**b^{h}eh$_2$-*	*b^h*	*ø*	*h$_2$*		1	Bright, shining
**b^{h}er-*	*b^h*	*ø*	*r*		2	Shining, light brown
**b^{h}el-h$_1$-*	*b^h*	*ø*	*l*		3	White, shining
**b^{h}e̯i-g^u-*	*b^h*	*ø*	*i̯*		4	Pure, shining
**(s)b^{h}en-g-*	*(s)b^h*	*ø*	*n*		5	Light up, shine, shimmer, flicker, glisten, ring, resound
**b^{h}reh$_1$-ĝ-*	*b^h*	*r*	*h$_1$*		6	Shine, sparkle, gleam, bright, birch, ash tree
**b^{h}ro-d^{h}nós-*	*b^h*	*r*			7	White, pale
**b^{h}le-g-*	*b^h*	*l*			8	Light up, blaze, flame, shine, lightning
**b^{h}le̯i-g-*	*b^h*	*l*	*i̯*		9	Gleam, glisten, light up, shine, lightning
**b^{h}le̯i-q-*	*b^h*	*l*	*i̯*		10	Shining fish, to bleach, fire
**b^{h}le-s-*	*b^h*	*l*			11	Blaze
**b^{h}le̯i-*	*b^h*	*l*	*i̯*		12	Clear, bright, light, color, agreeable
**b^{h}leh$_1$-u̯*	*b^h*	*l*	*h$_1$*		13	White flecks, lightning, ivy, scar
**b^{h}leu̯-(k)*	*b^h*	*l*	*u̯*		14	Burn, flame, torch, blush, light up, gleam, shine

1. ****b^{h}eh$_2$-* 'Bright, shining'**

Ved *bhā́ti* 'shine, be bright or luminous, to be splendid or beautiful,' YAv *fra-uuāiti* 'shine forth,' Grk *φάντα* 'shine, bring to light, appear,' *φάσις* 'appearance of stars above the horizon,' Arm *banam* 'open, reveal, allow to be seen.' —Mallory and Adams (2006) 330; LIV 1.**b^{h}eh$_2$-* 68; IEW 1.**bhā-* 104–105; Monier-Williams 750; L&S 1912, 1918; NIL 7; Bomhard 13; EIEC 513.

2. ****b^{h}er-* 'shining, light brown'**

Skt *bhalla-ḥ* 'bear' (animal), OHG *bero* 'bear,' OE *bera* 'bear,' OHG *brūn* 'shining, brown,' Rus-ChSlav *bronь* 'white, colored,' Lat *fiber* 'beaver,' TochA *parno*, TochB *perne* 'shining.' —Mallory and Adams (2006) 333–34; IEW 5.**bher-* 136; Bomhard 55.

3. ****b^{h}el-h$_1$-* 'White, shining'**

Wels *bal* 'white-faced,' NE *ball* 'horse with white blaze,' Goth *bala* 'shining, gray of body' (of horses), Lith *bālas* 'white,' Latv *bāls* 'pale,' Grk *φαλός* 'white,' Arm *bal* 'pallor,' OE *bǣl* 'fire,' Mir *Beltane* 'May Day festival,' OCS *bělŭ* 'white,' Skt *bhālam* 'gleam, forehead,' Lat *flāvus* 'blond.' —Mallory and Adams (2006) 332; EIEC 641; IEW 1.**bhel-* 118; Bomhard 21.

4. ****b^{h}ei-g^u-* 'Pure, shining'**

OPers **bigna-* 'shine? (in personal names: *Bagā-bigna, Ἀρια-βιγνης*), Grk *φοῖβος* 'pure, shining,' *φοιβάω* 'purify.' —IEW 118.

5. ****(s)b^{h}en-g-* 'Light up, shine, shimmer, flicker, glisten, ring, resound'**

Grk *φέγγω* ‘make bright, shine, gleam,’ *φέγγ*ος ‘light, splendor, luster, the gleam of the sun, moonlight or of the Milky Way,’ Lith *spengiù* ‘ring, resound,’ Lith *spingiu* ‘shimmer, flicker, sparkle, glitter, glisten.’ —LIV 512; IEW *sp(h)eng-* 989–90.

6. ***bʰreh₁-ĝ-* ‘shine, sparkle, gleam, bright, birch, ash tree’**

Ved *bhrā́jate* ‘shine, beam, sparkle, glitter,’ *bhūrjá* ‘birch tree,’ YAv *brāzaiti* ‘shine, gleam,’ Lith *brė’kšta* ‘the break of day,’ Pol *o-brzasknąć* ‘to be bright,’ NWels *berth* ‘shiny,’ Goth *baírhts* ‘bright, shining, clear,’ OE *beorht* ‘shining, gleaming,’ NE *bright*, ON *biartr* ‘light, bright,’ *bjǫrk* ‘birch tree,’ Alb. *bardhë* ‘white,’ Lat *frāxinus* ‘ash tree.’ —Mallory and Adams (2006) 329; LIV 92; IEW **bherəĝ-, *bhrēĝ-* 139. Monier-Williams 770, 764; OLD 732; Bomhard 33; EIEC 513.

7. ***bʰro-dʰnós- ‘White, pale’***

OCS *bronŭ* ‘white, variegated’ (of horses), Skt *bradhná-* ‘pale, red, yellowish, bay’ (of horses), Kashmiri *bodurᵘ* ‘tawny bull.’ —Mallory and Adams (2006) 332.

8. ***bʰle-g-* ‘Light up, blaze, flame, shine, lightning’**

Grk *φλέγω* ‘kindle, burn up, light up, blaze, flash,’ TochA *pälkäs* TochB *palkäm* ‘light up,’ Lat *fulgō* ‘flash, shimmer, shine,’ *flamma* ‘flame,’ *fulmen* ‘lightning,’ OHG *blecchen* ‘shine, flicker,’ Skt. *Bhṛgavaḥ* ‘mythical priest of lightning fire.’ —LIV 86; IEW *bheleg-* 124–25; L&S 1944; Bomhard 21; EIEC 513.

9. ***bʰleu̯-g-* ‘Gleam, glisten, light up, shine, lightning’**

OE *blīcan* ‘light up, gleam, shimmer,’ Lith *blýškiu* ‘spark, gleam, glisten,’ OCS *blъštǫ* ‘shine,’ OFris *blēsza* ‘make visible,’ OHG *blic* ‘Blitz, lightning.’ —LIV **bʰleig-* 89, IEW *bhlěiĝ-* 156–157.

10. ***bʰleu̯-q-* ‘shining fish, bleach, fire’**

OE *bœlge* ‘gudgeon’ (a small shiny fish), NHG *Blecke* ‘whitefish,’ Rus *blëknutь* ‘bleached by the sun, fire.’ —IEW 157.

11. ***bʰle-s-* ‘Blaze’**

MHG *blas* ‘bald, pale, white,’ OE *blæse* ‘torch, fire,’ NE *blaze*, OHG *blas-ros* ‘a horse with a white patch on its forehead.’ —IEW 158; Bomhard 21.

12. ***bʰleu̯-* ‘Clear, bright, light, color, agreeable’**

Germanic **blīþia* ‘light, clear, bright,’ ON *blīðr* ‘mild, friendly, agreeable,’ OHG *blīdi* ‘clear, bright, happy, friendly,’ OSax *blī* ‘color,’ OE *blēo* ‘color, appearance, form.’ —IEW**bhlei-* 155; Bomhard 21.

13. ***bʰleh₁-u̯-* ‘White flecks, lightning, ivy, scar’**

Russ *blju-šč* ‘ivy,’ Pol *błysk* ‘lightning,’ Sorb *b’lu-zná* ‘scar,’ Lith *blù-zganos* ‘scurf, dandruff.’ —IEW 159.

14. ***bʰleu̯-(k)-* ‘Burn, flame, torch, blush, light up, gleam, shine’**

Grk *περιφλύω* 'to singe all around,' ON *blys* 'flame,' OE *blȳsa* 'flame, torch,' NE *blush*, MHG *bliehen* 'burning, lighting up,' Czech *blýštěti* 'gleam, shimmer,' *blýskati* 'shine.' —IEW **bhleu-(k)-* 159; Bomhard 21.

Notes on possible outside root connections:
1. Bomhard 13 cites Proto-Afrasian **bah-*, etc. 'shine, bright, brilliant, glitter, be beautiful, splendid, radiant, rejoice, glad, happy, white, leprosy.'
2. Bomhard 55 cites Proto-Afrasian **bor-*, etc. 'color, red, yellow, brown, gray, dull, black,' and Proto-Altaic **bo-ryV*, etc. 'dark-colored, gray, brown, swarthy, brown stag.'
3., 8., 11., 12., 16. Bomhard 21 cites Proto-Afrasian **bal-*, etc. 'shine, be bright, gleam, smile, dawn, be glad, clear, gay, beautiful, nice, sparkle, glitter, flash, scintillate, flash of lightning, blaze, flame, flicker,' Dravidian *paḷapaḷa*, etc. 'glitter, shine, gleam, brightness, flash, pureness, to light,' and Altaic (Turkish) *balki* 'shimmer, glitter.'
7. Bomhard 33 cites Proto-Afrasian **bar-*, etc. 'shine, be bright, sparkle, flash, lightning, scintillate, purify, clean, make white, light up, dawn,' Dravidian *par*, etc. 'become a little light before dawn, to dawn, to shine, be seen clearly,' and Proto-Kartvelian **bar-*, etc. 'glow, burn, blaze, flame, shine, brightness, to light, illuminate, white.'
Conclusions: These roots are well represented in language families outside PIE and they are semantically close or very close. This suggests that the creation of these resonant variants occurred before the separation of the related language families.

***Table 8: *b^{h}e(R)d^h-* 'Cause or experience an inner state of mind'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
*b^{h}end^h-	b^h		n	d^h	1	To bind, feel obligated, feel bound, constrained, or compelled
*b^{h}e̯u̯d^h-	b^h		u̯	d^h	2	To feel awake, observant, experienced, dominant, knowledgeable, flattered
*b^{h}e̯id^h-	b^h		i̯	d^h	3	To feel trust, confidence, obligation, obedience, coercion, patience
*b^{h}eh$_1$d^h-	b^h		h$_1$	d^h	4	To feel threatened, beset, pressed; to feel disgust or loathing
*b^{h}lend^h-	b^h	l	n	d^h	5	To feel mixed up, deceived, ashamed, mistaken, dazzled, blind
*b^{h}ed^h-	b^h		ø	d^h	6	To feel need, to pray, to ask, to request, to hunger, to convince, to bend oneself as a suppliant, honor

1. ***b^{h}end^h-* 'To bind, feel obligated, bound, constrained'**

Goth *bindan* 'bind, constrain, oblige, to bind oneself, feel bound or compelled,' Ved *badhnā́ti* 'bind, tie, fasten, join, unite,' OE *bendan* 'bend, bind, fetter,' NE *bind*, Lith *beñdras* 'companion,' Grk *πενθερός* 'father-in-law,' Skt *bándhu* 'kinsman, connection, kinship.' —LIV 75; IEW 127; Monier-Williams 720; Mallory and Adams 380; EIEC 64, 196; Bomhard 25.

2. ***b^{h}e̯u̯d^h-* 'To feel awake, observant, experienced, dominant, knowledgeable, flattered'**

Grk *πυνθάνομαι* 'to hear or learn something,' *πεύθομαι* 'examine, experience,' OIr *ad:boind* 'announce, make known, foretell,' Ved *bódhati* 'wake up, observe, learn, understand, recognize,' Goth *ana-biudan* 'order, command, direct, put in order, arrange,'

ON *bjóða* ‘ask, offer, invite, prescribe, forbid,’ NE *bid*, Rus *bljudú* ‘ observe, pay attention to,’ TochB *pautoy* ‘coax,’ TochA *poto* ‘flattery.’ —LIV 82; IEW 150-52; Fortson 410; L&S 1554; Monier-Williams 733; Mallory and Adams (2006) 326; Bomhard 39; EIEC 516.

3. ***bʰeu̯dʰ-* ‘To feel trust, confidence, obligation, obedience, coercion, patience’**

Alb *bind* ‘convince, persuade,’ *be* ‘oath,’ Grk *πείθομαι* ‘be persuaded, yield, obey, trust, feel confidence,’ Lat *fīdō* ‘trust in, have confidence in,’ Goth *baidjan* ‘force, oblige,’ OE *bædan* ‘urge,’ OCS *běždǫ* ‘force, oblige,’ —LIV 71; IEW 117; L&S 1353–54; OLD 698–99; Mallory and Adams (2006) 355; EIEC 418; Benveniste 75, 85, 88.

4. ***bʰeh₁dʰ-* ‘To feel threatened, beset, pressed; to feel disgust or loathing’**

Ved *bā́dhate* ‘press, force, drive away, harass, pain, trouble, grieve, vex, suffer, feel an aversion for, loathe,’ *bādhá* ‘annoyance, molestation, affliction, distress, pain, trouble,’ Lith *bėdà* ‘need, grief, sorrow, worry, care.’ —LIV 68; IEW 114; Monier-Williams 727–28; Bomhard 7.

5. ***bʰlendʰ-* ‘To feel mixed up, deceived, ashamed, mistaken, dazzled, blind’**

Lith *blandýti* ‘to be gloomy, dreary, cheerless, sad, melancholy, overcast, dull, dim, dead, flat, clouded, lost, wandering about trying to find the way,’ Latv *bluôdîtiês* ‘dawdle, loiter about, prowl around, rove about, be ashamed, be ashamed of oneself,’ OCS *blędǫ* ‘go astray, sin, fornicate, be mistaken,’ Rus *blud* ‘unchastity, lewdness,’ ON *blanda* ‘mix up,’ OE *blenden* ‘dazzle, deceive, blind,’ NE *blind, blunder*.’ —LIV 89; IEW 157–58; Mallory and Adams (2006) 330; ALEW 131; EIEC 147; Bomhard 66.

6. ***bʰedʰ-* ‘To feel need, to pray, to ask, to request, to hunger, to convince, to bend oneself as a suppliant, to honor’**

ON *biðja* ‘ask, pray,’ OE *biddan* ‘ask,’ NE *bid*, OHG *bitten* ‘ask, request,’ Goth *bidjan* ‘ask, pray,’ Lith *bādas* ‘hunger,’ Alb *bind* ‘convince,’ Skt *bā́dhate* ‘presses,’ TochA *poto* ‘honor,’ TochB *pauto* ‘honor.’ —EIEC 62; IEW 114; Bomhard 8.

Notes on possible outside root connections:
1. Bomhard 25 cites Afrasian (Egyptian) *bnd* ‘wrap, put on clothing,’ Proto-Kartvelian **band-*, etc. ‘plait, interweave, braid, patch up, twist or tie together, spider’s web,’ and Proto-Chukchi-Kamchatkan **(lə)pənit*, etc. ‘tie, tie laces, binding, tying, bundle.’
2. Bomhard 39 cites Afrasian (Proto-Semitic) **baw-aħ* ‘become known, be revealed, disclose, be seen, revealed, clear, be visible, understand, stare, remember’ (without final dental consonant).
4. Bomhard 7 cites Afrasian (Proto-Semitic) **bad-al-*, etc. ‘be afflicted with pain, suffer, inflict pain, cause harm, damage, injury, disease, do wrong, commit injustice, mistreat, offend,’ and Dravidian *paṭu*, etc. ‘occur, happen, come into being, rise, strike against, touch, suffer, endure, affliction, experience emotion, seem good, feel, trouble, suffer, experience, enjoy.’
5. Bomhard 66 cites Proto-Afrasian **bul-*, etc. ‘mix, mix up, confuse, idle, useless, spoil, ruin, disquiet, make uneasy or restless, stir up, rouse, disturb, trouble, messed up, scattered,’ and Proto-Altaic **buli-*, etc. ‘stir, shake, stir up, smear, soil, mix, become turbid,’ (neither with final consonant).
6. Bomhard 8 cites Dravidian *paṭṭiṉi*, etc. ‘fasting, abstinence, starvation, privation of food, hunger.’
Conclusions: Three of these six roots (1, 4, 6) show credible phonetic and semantic parallels, suggesting that the creation of those resonant variants occurred before the separation of PIE from the other language groups.

***Table 9: b^h(R)eu̯-s-* 'swell, overflow'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
*b^hleu̯-	b^h	*l*		*u̯*	1	Spew, gush, overflow, boil over
b^hreu̯-s	b^h	*r*		*u̯*	2	Swell, breast, belly, bud

1. ***b^hleu̯-* 'swell, spew, gush, overflow, boil over'**

Lith *bliaúju* 'roar, bleat, low,' OCS *bljujǫ* 'spew, vomit,' Grk *φλέω* 'gush, teem, overflow,' *φλοίω* 'overflow with words, talk idly.' From *b^hleu̯-d:* Grk *φλυδάω* 'have an excess of moisture,' TochAB *plätk* 'arise, develop, swell, overflow,' TochA *plutk-* 'arise, develop, swell, overflow.' From *b^hleu̯-g:* Lat *fluō* 'flow,' *flūmen* 'river,' *fluvius* 'river,' Grk *φλύζω* 'boil up, boil over.' —EIEC 561; IEW 158–59; Bomhard 19.

2. ***b^hreu̯-s* 'swell, breast, belly, bud'**

OIr *brū* (< *bhrusō(n)*) 'belly, breast,' *bruinne* (**bhrusnio-*) 'breast,' Wels *bru* (**bhreuso-*) 'belly,' *bron* (< *b^hrusneh₂*) 'breast,' ON *brjōst* 'breast,' OE *brēost* 'breast,' NE *breast*, OHG brust 'breast,' Goth *brusts* 'breast,' Rus *brostī* 'bud,' *brjukh* (< *b^hreuso-*) 'belly, paunch.' —EIEC 561; IEW 170-71; Bomhard 26.

Notes on possible outside root connections:
1. Bomhard 19 cites Afrasian **bal-* 'flow, overflow, pour over', Kartvelian *li-bēl-e* 'swell up,' Altaic *balbai-* 'to swell, to bulge,' and Chuk-Kamch **pəlʁə*, etc. 'flow.'
2. Bomhard 26 cites Afrasian **bar-* 'swell, puff up, expand,' Dravidian *paru*, etc. 'become large, bulky, plump, to swell,' Uralic **parɜ* 'swarm, flock, shoal, troop.' The Afrasian and Dravidian semantics are close, Uralic more distant.
Conclusions: Both these roots show credible parallels with the PIE forms, suggesting that the formation of those resonant variants occurred before the separation of PIE from the other language groups.

***d-**

***Table 10: *dre(R)-* 'sleep'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
*dreh₁-	*d*	*r*	*h₁*		1	Sleep
*drem-	*d*	*r*	*m*		2	Sleep

1. ***dreh₁-* 'sleep'**

Ved *ni-drāyáṭ* 'sleep,' Av *drāṇá* 'sleeping.' —LIV 126; IEW 226; Mallory and Adams (2006) 324; EIEC 526.

2. ***drem-* 'sleep'**

Lat *dormiō* 'sleep,' OCS *drěmljǫ* 'slumber.' —LIV 128; IEW 226; Mallory and Adams (2006) 324; EIEC 526.

***Table 11: *dre(R)-* 'Run'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**drem-*	*d*	*r*	*m*		1	Run, cause to run away, run around
**dreh₂-*	*d*	*r*	*h₂*		2	Run, run away, run loose
**dreu̯-*	*d*	*r*	*u̯*		3	Run

1. ****drem-* 'Run, cause to run away, run around'**

Grk *ἔδραμον* 'ran,' *δρόμος* 'horse race, foot race, race course,' *δρομεύς* 'a runner,' Khot *dremäte* 'drive away,' Ved *dandramyamāṇa* 'run around.' —LIV 128; IEW 204–5; L&S 450; Bomhard 272; EIEC 491.

2. ****dreh₂-* 'Run, run away, run loose'**

Ved *drā́tu* 'shall run,' Grk *ἀπ-έδρᾱν* 'ran away,' *ἀπο-διδράσκω* 'run away,' Ved *dadrur* 'they are running loose.' —LIV 127; IEW 204; EIEC 491.

3. ****dreu̯-* 'Run'**

Ved *drávati* 'runs,' *drāváyati* 'let run,' *ádudrot* 'has run,' *dudrāva* 'ran.' —LIV 129; IEW 205–6.

Notes on possible outside root connections:
1. Bomhard 272 cites Afrasian *ẓarā*, etc. 'flow, run, have diarrhea,' Proto-Dravidian **coṛ-* (< **cory-*) 'run, flee, run away, go away,' Proto-Uralic **tʸorɜ-*, etc. 'run, flow, falling drops, drip, trickle,' and Proto-Altaic **či̯or-ka*, etc. 'swift stream, current, rapid, rapids of a river, torrent, shoal in a river, roar, run quickly, flow rapidly, roaring (as water).' **Conclusions:** All of these show reflex of initial dental plus –r, with semantics mostly pertaining to run, flow. Likely root connection to PIE.

***Table 12: *de(R)k̂-* 'Take in, see, observe, understand, point out'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**dek̂-*	*d*		*ø*	*k̂*	1	Take in, receive, see, understand, watch, appear, resemble, keep an eye on
**derk̂-*	*d*		*r*	*k̂*	2	Look, see, keep the eyes open, have seen, come to know
**dei̯k̂-*	*d*		*i̯*	*k̂*	3	Cause someone to see or understand, show, point out, indicate'

1. ****dek̂-* 'Take in, see, understand, watch, appear, resemble, honor'**

Arm *etes* 'see,' Grk *δέκτο* 'receive, understand,' *δοκεύω* 'keep an eye on, watch narrowly,' *δοκεῖ* 'appear,' Lat *didicī* 'to have learned, hence to know,' Hit *takkanzi* 'to resemble, be like.' —LIV 109; IEW 189–90; L&S 377, 441; EIEC 564.

2. ****derk̂-* 'Look, see, keep the eyes open, come to know'**

Ved *dárśam* ‘see,’ OAv *darəsəm* ‘see,’ Grk *δρακέντ-* ‘have looked,’ *δέρκομαι* ‘look, keep the eyes open,’ OIr *ad:con-dairc* ‘have seen,’ Goth *ga-tarhjan* ‘come to know.’ —LIV 122; IEW 213; EIEC 505.

3. ***deḭk̂-* ‘Cause someone to see or understand, show, point out, indicate’**

Grk *δείκνυμι* ‘show,’ Ved *ádiṣṭa* ‘have shown,’ Lat *dicō* ‘say,’ Goth *ga-teihan* ‘announce, inform, point out, make known, proclaim,’ OHG *zīhan* ‘make known, accuse,’ YAv *daēsaiieiṇti* ‘show, indicate, point out.’ —LIV 108; IEW 188–89; Benveniste 392–93; Mallory and Adams (2006) 353–54.

**dʰ-*

***Table 13: *dʰe(R)bʰ-* ‘strike, break, injure’**

PIE Root	Initial	R1	R2	Final	Ref.	Semantic Value
**dʰebʰ-*	*dʰ*		*ø*	*bʰ*	1	Strike, injure, kill
**dʰreu̯bʰ-*	*dʰ*	*r*	*u̯*	*bʰ*	2	Break up, crumble
**dʰembʰ-*	*dʰ*		*m*	*bʰ*	3	Break to pieces, annihilate
**dʰeu̯bʰ-*	*dʰ*		*u̯*	*bʰ*	4	Strike, tap, dub
**dʰeHbʰ-*	*dʰ*		*H*	*bʰ*	5	Strike, one who strikes metal or wood, i.e. smith, carpenter

1. ****dʰebʰ-* ‘strike, injure, destroy’**

Ved *dabhāti* ‘hurt, injure, destroy, deceive,’ *dabhī’ti* ‘injurer, enemy,’ YAv *dauuaiṇtī* ‘bring injury,’ Hit *tepnuzzi* ‘to reduce, to humble, humiliate,’ OAv *dābaiieitī* ‘deceive, betray,’ Lith *dóbiu* ‘overcome, overpower,’ Lett *dâbju* ‘beat, strike.’ —IEW 240; LIV 132–33; NIL 85; Monier-Williams 469; Bomhard 245.

Note: See **(s)dʰe(R)bʰ-* (below) for Baltic forms that connote “hole, grave.”

2. ****dʰreu̯bʰ-* ‘Break up, crumble’**

Grk *θρύπτω* ‘break in pieces, enfeeble, corrupt, crush, weaken,’ *διατρυφὲν* ‘shatter.’ —LIV 156; IEW **dhreubh-* 275; L&S 395, 807; Iliad 3,363 Fitzgerald 80.

3. ****dʰembʰ-* ‘Break to pieces, annihilate’**

Ved *dambháyati* ‘smash, crush, break to pieces, annihilate,’ Chwar *δnby* ‘beat, strike,’ Ved *dambhá-ḥ* ‘betray.’ —LIV 3.**dʰembʰ-* 144; IEW **dhebh-* 240.

4. ****dʰeu̯bʰ-* ‘strike, beat, tap, dub’**

OHG *tubila* ‘dowel-pin, peg, stake,’ EFris *dufen, duven* ‘push,’ Neth *dof* ‘push,’ ON *dubba* and OE *dubbian* ‘dub a knight,’ ProtoGerm **đaƀ* ‘beat, strike, hit.’ —IEW **dheubh-* 268.

5. ****dʰeHbʰ-* ‘Beat, strike; a craftsman who strikes metal or wood (to make it fit)’**

Norw dial *dabba* ‘stamp,’ ON *an(d)døfa* ‘(naut.) to beat against the wind,’ NE *dab* ‘tap lightly,’ EFris *dafen* ‘beat, clap, push,’ MHG *beteben* ‘press,’ Germanic *tappen* ‘slap, smack,’ Lat *faber* ‘craftsman,’ Goth *ga-dob* ‘to fit, to be suitable, appropriate.’ —IEW 1.**dabh-* and 2.**dabh-* 233; LIV 135–36; Mallory and Adams (2006) 283; Bomhard 144; EIEC 139.

The fundamental meaning of this root is to beat or strike. Secondarily, it carries the semantic value of *to fit, be suitable*. Typically, with fabrication of any sort, in order to make a given material fit, it needs to be trimmed, cut, or hammered to the right size. All of these activities were anciently performed with pounding and cutting stones, then later with metal hammers and axes. These activities always involved *beating*, and were carried out by craftsmen.

Notes on possible outside root connections:

1. Bomhard 245 cites Proto-Afrasian **dʸab-*, etc. 'beat, hit, strike, harm, injure, kill, slaughter, sacrifice, offering, murder, skin an animal,' Dravidian *cavaṭṭu*, etc. 'destroy, ruin, kill, beat, tread upon, trample, kick, step on,' Uralic (Proto-Finno-Ugrian) **tʸappɜ-*, etc. 'hit, cut, notch, strike, timbered superstructure on a tomb,' and Proto-Chuk-Kamch **ðəpœ(ŋœ)*, etc. 'hammer, pestle for crushing, stone hammer.'

5. Bomhard 144 cites Proto-Afrasian **dab-*, etc. 'stick together, join together, adhere, cling, unite, bring together, gather, plait, put together, include, add, hand, arm.'

Conclusions: These two reasonably strong parallels to outside language families suggest a likely differentiation of resonants prior to separation.

***Table 14: *(s)d^{h}e(R)b^h-* 'Bury the dead'**

PIE Root	Initial	R1	R2	Final	Ref.	Semantic Value
**d^{h}eb^h-*	*d^h*		*ø*	*b^h*	1	Pit, hole, grave
**d^{h}elb^h-*	*d^h*		*l*	*b^h*	2	Dig, hollow out
**d^{h}emb^h-*	*d^h*		*m*	*b^h*	3	Grave, tomb, funeral; to be buried, be interred
**(s)d^{h}erb^h-*	*(s)d^h*		*r*	*b^h*	4	To be in peril, spoil, rot, perish, die

1. ****d^{h}eb^h-* 'Pit, hole, grave'**

Latv *dùobs* 'pit, hole, grave, excavation, hollow,' Lith *dúoba*, *duobà* 'hollow in tree-trunk,' Lith *duobė* 'pit, hole, grave,' Latv *dùobė* 'hole, grave.' —Wodtko, et al., *Nomina im Indogermanischen Lexikon* (NIL), s.v. "**d^{h}eb^h-* ", (Heidelberg: Universitätsverlag Winter, 2008) 85, 86n11, 122; ALEW 278; LIV **d^{h}eb^h-* 132–33; IEW **dhebh-* 240; see also IEW 267–68 and ALEW 205–06.

Other researchers (see the LIV and NIL citations above) have attempted to place these Baltic words with roots connoting 'hurt, injure, deceive,' but usually with notations to the effect that the root affiliation remains "unclear" or "very doubtful." Although there is certainly some semantic correspondence between the concepts "injure" and "the grave," postulating a set of homophonous roots in **d^{h}eb^h-* and separating the two senses may be the best solution (see **d^{h}e(R)b^h-* 'strike, break, injure' above). Glosses for these Balt. words were taken from NIL and ALEW.

2. ****d^{h}elb^h-* 'Dig, hollow out'**

NE *delve*, OE *delfan* 'dig,' OHG *telpan* 'dig,' Lith *dálba* 'crowbar ("digging tool"), SCr *dúbēm* 'hollow out,' *dùbok* 'deep,' Czech *dlubu* 'hollow out, poke.' —Mallory and Adams (2006) 376; LIV **d^{h}elb^h-* 143; IEW **dhelbh-* 246; Bomhard 147; EIEC 159.

3. ****d^{h}emb^h-* 'Grave, tomb, funeral; to be buried, be interred'**

Arm *damban* 'grave, tomb,' *dambaran* 'grave, vault, tomb,' Grk *θάπτω* 'to be buried, interred,' *τάφος* 'burial, funeral, grave, tomb, grave mound,' *τάφρος* 'ditch, trench.' —LIV 2.**d^{h}emb^h-* 143; IEW **dhembh-* 248–49; L&S 784, 1761; Bomhard 165.

4. ****(s)d^{h}erb^h-* 'To be in peril, spoil, rot, perish, die'**

OE *deorfan* 'be in peril, perish,' OHG *sterban* 'to die,' Russ *stérbnut* 'gradually die, wither away, CSlav *u-strьbe* 'be old, mature.' Modern Ger *verderben* 'spoil, rot, perish.' —LIV **(s)d^{h}erb^h-* 512; IEW **(s)terbh-* 1024–25; Bosworth and Toller 202; Kluge 813.

Notes on possible outside root connections:
2. Bomhard 147 cites Afrasian **dalaaʕ-,* etc. 'gash, notch, shoot with arrow,' Dravidian *tallu*, etc. 'beat, crush, blow, stroke, hit the mark,' Proto-Altaic **delpʰi-*, etc. 'split, burst, crack open, break, crack, explode, cleft, crevice, fissure, hole,' and Proto-Chuk-Kamch **tala-*, etc. 'beat, pulverize, hit, pound, hammer, strike, crush.' PIE is the only language-family cited that refers specifically to digging.
3. Bomhard 165 cites Proto-Afrasian **dim-*, etc. 'raised, elevated place, tower, fortified area, district, town, vicinity, village,' and Dravidian *dimmi*, etc. 'elevated spot, rising ground, hillock, bank of river, mound.' Neither shows final consonant nor associations to burial sites or funeral rites.
Conclusions: Semantically and phonetically divergent with low probability of outside genetic connections.

***Table 15: *dʰe(R)-* 'Valley, depression in the earth, animal den'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**dʰel-*	*dʰ*		*l*		1	Valley, hole, pit, depression, animal den, bedroom
**dʰen-*	*dʰ*		*n*		2	Hollow place in the earth, animal den, valley, hole, bed
**dʰeu̯-*	*dʰ*		*u̯*		3	Deep, depression, pit, valley, dip, dimple

1. ****dʰel-* 'Valley, pit, depression, animal den'**
Grk *θαλάμη* 'hole, animal den,' *θάλαμος* 'bedroom within a house,' Cymr *dol* 'valley,' Bret *Dol* 'valley' (in place names), ON dalr 'arch, vault,' Goth *dals, dal* 'valley, pit, hole, cavity, depression,' OE *dæl* 'valley,' ON *dalr* 'valley,' OE *dell* 'ravine, gully,' MHG *tüele* 'small valley, depression,' OCS *dolъ* 'hole, pit, cavity, excavation.' —IEW 245–46; Mallory and Adams (2006) 122.
2. ****dʰen-* 'Hollow place in the earth, animal den, valley, hole, bed'**
Skt *dhánuṣ* 'dry land,' Grk *θέναρ* 'palm of the hand, hollow at top of altar, hollow bed of the sea,' OHG *tenni* 'house floor, ground,' *denn* 'animal den,' MNG *denne* 'depression, woodland valley,' MNether *denne* 'den of wild animal,' OE *denn* 'hole, animal den,' EFris *dann(e)* 'bed, garden bed.' —IEW 249; L&S 780.
3. ****dʰeu- (with extensions -b, -p)* 'Deep, depression, pit, valley, dip, dimple'**
Grk *βυθός* 'deep,' OIr *domain*, Cymr *dwfn*, Corn *down*, Bret *doun* 'deep,' Goth *diups*, ON *diūpr,* OE *dēop* 'deep,' Norw *dobbe* 'swampy land,' *dump* 'depression in the earth,' Danish *dump* 'excavation, pit, depression,' NE *dimple*, OHG *tobal* 'narrow valley,' ON *dūfa* 'dip down,' *deyfa* 'dip,' NE *dive*. —IEW 267–68; Mallory and Adams (2006) 292.

Some commentators have analyzed this root as **dʰeub-*, but this assumes the use of the rare PIE **b-* as an integral part of the root. Others have suggested that it may be a substrate term borrowed from a non-Indo-European language.[7] But, given the strong parallels to other members of this resonant series, the solution accepted by Pokorny (seeing the **b-* and **p-* as root extensions) may be the most reasonable conclusion.

***Table 16: *dʰe(R)ĝʰ-* 'Earth, earth works, and earth workers'**

This group of roots denotes the earth; working the earth by kneading, shaping and building; the products of earth-works such as walls, enclosures, walled gardens and yards; and men who are employed in working the earth. These men would be "workers of earth" or "earth men." Farmers

[7] Mallory, J. P., and D. Q. Adams, *The Oxford Introduction to Proto-Indo-European and the Proto-Indo-European World*, (New York: Oxford University Press, 2006) 292–93.

were similarly regarded, as paralleled in Greek *γεωργέω* 'to be a husbandman, farmer' (modern name *George*, literally 'earth worker').

PIE Root	Initial	R1	R2	Final	Ref.	Semantic Value
**dʰégʰ-om-*	*dʰ*		*ø*	*ĝʰ*	1	Earth, ground, land, man (as earth worker), human being, dragon
**dʰeu̯ĝʰ, *dʰíĝʰs*	*dʰ*		*u̯*	*ĝʰ*	2	Work clay, fashion, stroke, knead (clay, mud, dough), build, build wall; wall, earthen wall
**dherĝʰ-*	*dʰ*		*r*	*ĝʰ*	3	Make firm, strong, tough, tenacious, enclosure, garden, yard
**dʰeu̯ĝʰ-*	*dʰ*		*u̯*	*ĝʰ*	4	Make, build, prepare, produce something useful, touch, knead, fit into place, strong big; common or vulgar men

1. ****dʰégʰ-om-* 'Earth, ground, man'**

Hit *tēkan* 'earth, ground,' Ved *kṣám-* 'earth, ground,' Grk *Χθών* 'earth, ground, land,' Lat *humus, homo* 'earth, human being,' OE *guma* 'man, (bride)groom,' TochA *tkaṃ* 'earth, ground,' OCS *zmii* 'dragon, snake.' —IEW 414–16; EIEC 174; NIL 86; Mallory & Adams (2006) 120; Watkins (2011) 20; DELG 143; Ringe 19; Bomhard 145; EIEC 247–48.

References to 'man' in this root probably reflect, not man in general, but rather man as 'earth worker, commoner, vassal, slave.' Even modern English retains this characterization. The definition of *dirt*, given by AHD, is: "**1.** Earth or soil. **2a.** A filthy or soiling substance, such as mud or dust. **b.** Excrement. **3.** A squalid or filthy condition. **4.** *One that is mean, contemptible, or vile...*" (emphasis added). In some cultures, later semantic development elevated the "dirt man" to a more respectable social status. See also #4 below.

2. ****dʰeu̯ĝʰ-, *dʰíĝʰs-* 'Form, build, mold mud or clay, knead, smear, plaster; bank, wall of mud or mud bricks'**

Skt *dḗhmi* 'spread, fill,' *dḗhī* 'wall, rampart, dam,' Goth *digan* 'form, fashion, knead, make pottery,' ON *deig* 'dough', *digr* 'thick,' NE *dough*, Lith *žiedžiù* 'form from mud,' TochB *tsikale* 'to form,' Lat *fingō, finxī* 'form, shape,' *figūra* 'form, shape, figure,' *fictilis* 'fashion out of clay, made of earth or clay,' *figulus* 'potter,' Av *pairi-daēza-* 'enclosure' (> NE *paradise*); Grk *τεῖχος, τοῖχος* 'wall, embankment,' possibly Grk *θιγγάνω* 'touch with the hand,' OIr *digen* 'build, firm, solid, hard, strong, fixed.' —LIV 140; IEW 244; NIL 118; de Vries 194; Mallory & Adams (2006) 223, 224, 228; Watkins (2011) 18; EIEC 649; Bomhard 166.

Mallory and Adams write, "The underlying semantics of **dheu̯ĝh* indicate that it was specifically associated with the working of clay (e.g. Lat *fingō* 'fashion,' Skt *dḗhmi* 'smear, anoint,' Toch AB *tsik-* 'fashion [pots, etc.],' hence the English cognate *dough*; in Greek and Indo-Iranian it is also associated with building walls, e.g. Av *pairi-daēza* 'build a wall around' ... but there are also cognates of more general meaning, e.g. OIr *con-utainc* 'builds,' Lith *diežti* 'whip, beat,' Arm *dizanem* 'heap up'" (2006:223–4, 371). And: "The substance from which the walls were made, [earth] came to be applied both to the finished product, e.g., Grk *τοῖχος* 'wall', Av *uz-daēza-* 'wall', and clay-like substances, e.g. Germanic *dough*" (EIEC 629).

3. ****dherĝʰ-, *dʰeregʰ-* 'Become hard, strong, firm; garden, yard, enclosure'**

Skt *dr̥hyati* 'make firm,' Lith *dir̃žmas* 'strong,' OPrus *dīrstlan* 'powerful,' *dir̃žti* 'tough, tenacious, become hard,' Lith *dar̃žas* 'garden,' Latv *dārz* 'garden, yard, enclosure.' —IEW 254; Mallory & Adams (2006) 381.

4. ***d^{h}eu̯ĝ^h- 'Make, build, make ready, prepare, produce something useful, suitable, fit, touch, knead, big, strong; common or vulgar men'**

Grk *τεύχω* 'make, prepare, build, produce by work or art, form, create, well made, of fields: tilled,' Grk *τυγχάνω, ἔτυχον* 'gain one's end or purpose, succeed, attain, obtain a thing, of men: common, everyday, vulgar' (compare *d^{h}éĝ^h-om above), Goth *daug* 'be useful,' OIr *dúal* 'suitable, fit,' NIr *dual* (< *d^{h}ug^h-lo-*) 'right, proper, natural,' ON *duga* 'to suit,' NHG *taugen* 'to be useful or fit,' Slav **dugъ* 'strength,' Pol *duży* 'strong, big,' Ved *duhé* 'give milk.' —LIV 148; IEW 271; Mallory & Adams (2006) 370; L&S 1783, 1882.

The process of building with earth requires the addition of water, then a vigorous kneading of the clay or mud. The men employed in the construction process are considered common and vulgar, predominantly slaves. The kneading, squeezing movement of the hands as it prepares the mud for building gives rise to the secondary meaning of milking an animal because it involves a similar kneading motion to coax the milk from the animal's udder.

Notes on possible outside root connections:

1. Bomhard 145 cites Proto-Afrasian **d[a]g-* 'put in place, be stable, be firmly established, remain, abide, become tame, plant, build, join, attach,' Proto-Dravidian **taṅk-*, etc. 'be put in place, be stable, be firmly established, stay abide, remain, stop, rest, delay, stability, be permanent,' Proto-Kartvelian **deg-*, etc. 'to stand, put, place, set,' and Uralic **taɣз-*, etc. 'place, site, region country, land.'

2. Bomhard 166 cites Proto-Afrasian **dik-*, etc. 'beat, crush, pound, tamp earth, mold or knead clay, mix, flatten, smooth, level, ruin, tread, clay or loam, dust,' Dravidian *tig-* 'press down hard, push,' and Proto-Kartvelian **diq-*, etc. 'earth, clay, mud, soil, ground.'

Conclusions: Both PIE roots appear to have phonetic and semantic parallels with outside language groups, suggesting that they differentiated into the separate resonant-variants while still in linguistic contact with those groups.

***Table 17: *d^{h}e(R)h$_2$-* 'Run, move rapidly, shake, run away/vanish (euph. for death)'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
*d^{h}enh$_2$-	d^h		n	h$_2$	1	Run, flow, move quickly, run away or vanish (as euphemism for death)
*d^{h}eu̯H-	d^h		u̯	H	2	Run, run away, flow, flee, shake, move violently, rage, vex

1. ***d^{h}enh$_2$- 'Run, flow, move, run away or vanish (as euphemism for death)'**

Ved *dhánvati* 'run, flow,' *dadhanvā́ṁs* 'cause to run or move quickly,' *dhanáyan* 'cause to run,' *pra-dhanvati* 'vanish, disappear, perish, die,' NPers *dan* 'hurry, run,' Grk *θνῄσκω* 'to die, be dead' (run away, vanish — as euphemism for death). —LIV 144; IEW 249; Monier-Williams 508–09; L&S 802; DELG 406; Bomhard 178.

2. ***d^{h}eu̯H- 'Run, run away, flow, flee, shake, move violently, rage, vex'**

Ved *dhā́vati* 'run, flow, stream, move, run after, run away, flee, cause to run,' Ved *dhūnóti* 'shake, agitate, cause to tremble, shake or move violently,' *ni-dhuvati* 'throw down, shake to and fro, agitate, sexual intercourse,' Grk *θύω* [ῡ] 'rage, seethe,' Goth *af-dojan* 'tire out, vex, harass,' OCS *davljǫ* 'urge, press forward.' —LIV 149; IEW 261–63; Monier-Williams 516–17 (1. *dhāv*), 549; L&S 813; Balg 72; Bomhard 249.

Notes on possible outside root connections:

1. Bomhard 178 cites Afrasian **dun-*, etc. 'leak water, pour,' Dravidian *tundnā*, etc. 'be poured out, spill, shed, throw out, be split, be shed,' and Proto-Kartvelian **dn-*, etc. 'run, flow, melt, disappear, get lost, thaw.'
2. Bomhard 249 cites Proto-Kartvelian **ǯgw-*, etc. 'defecate.'
Conclusions: The semantic divergence between the PIE and the other language families does not strongly support the notion of genetic connections.

***Table 18: *d^h(R)eh_2-* 'Exhalations, vapors, breath, blow on a fire, steam, smoke'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
*d^hmeH-	d^h	*m*		*H*	1	Blow, blow away, breathe, exhale, kindle a fire by blowing
*d^hu̯eh_2-	d^h	u̯		h_2	2	Blow, exhale fragrance, burn an aromatic substance or sacrifice
*d^hu̯enH-	d^h	u̯	*n*	*H*	3	To steam, to smoke, fly up, cause to steam or smoke, cloud

1. ***d^hmeH-* 'Blow, blow away, breathe, exhale'**
Ved *dhámati* 'blow, breathe out, exhale, kindle a fire by blowing,' Khot *damäte* 'blow,' Lith *dumiù* 'breathe, blow, blow away,' OCS *dьmǫ* 'blow.' —LIV 153; IEW 247–48; Monier-Williams 509.
2. ***d^hu̯eh_2-* 'Blow, exhale fragrance, burn an aromatic substance or sacrifice'**
CSlav *dujǫ* 'blow,' Slov *díjem* 'exhale fragrance, be fragrant, smell sweet,' Lat *suf-fiō* 'subject to aromatic fumes, fumigate, burn an aromatic substance as a fumigant,' Grk *θύω* 'offer sacrifice by burning.' —LIV 158; IEW 262–63; OLD 1861.
3. ***d^hu̯enH-* 'To steam, to smoke, fly up, cause to steam or smoke, cloud'**
Ved *ádhvanīt* 'to steam, to smoke,' YAv *duuąsaiti* 'fly, rush, dash,' *ádhvānayat (caus.)* 'cause to smoke, to steam,' Av *dvąnman-* 'cloud.' —LIV 159; IEW 266.

***Table 19: *(s)d^he(R)-* 'Put, place, set, stand, fix in place, be firm, be immobile'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
*$d^h eh_1$-	d^h		h_1		1	Put, place, set, do, build, found, establish, lay, set up
*$d^h eh_1$-k-	d^h		h_1		2	Place, set up, establish, raise, produce, make
*$steh_2$- < *(s)$d^h eh_2$-	(s)d^h		h_2		3	Put, place, set, stand, set in, fix, set up, set firmly
*$sth_2ei̯$- < *(s)$d^h h_2ei̯$-	(s)d^h	h_2	i̯		4	Not easily moved, stiff, fixed, hard, heavy, coagulated, frozen
*sth_2-b^h- < *(s)$d^h h_2$-b^h-	(s)d^h		h_2		5	Fixed in place, standing firmly, post, staff, stone, pillar, column
*$stéh_2$-u̯r < *(s)$d^h eh_2$-u̯r	(s)d^h		h_2		6	Fixed, immovable, permanent, pillar, post, column, cross
*$stéh_2$-tis < *(s)$d^h éh_2$-tis	(s)d^h		h_2		7	Place, position, station, site, land, standing, setting, stature
*$stéh_2$-mōn < *(s)$d^h éh_2mōn$	(s)d^h		h_2		8	Set down, stand, position, stature, stem, tree, warp (the stationary part of the weaving)
*st(h_2)eu̯-g- < *(s)d^h(h_2)eu̯-g-	(s)d^h	(h_2)	u̯		9	To stand, be stiff
*stieH- < *(s)d^hieH-	(s)d^h	i̯	*H*		10	Stiff, hard, become stiff, stone

*stel- < *(s)d^hel-	(s)d^h		*l*		11	Put, place, standing position, stall, set up, establish, stand
*st̥l-neh$_2$- < *(s)d^hel-neh$_2$-	(s)d^h		*l*		12	Firm support, pillar, stand
*stemb^h- < *(s)d^hem-b^h-	(s)d^h		*m*		13	To stand, be firm, be imperturbable, set, produce a stalk, support, post
*d^her-	d^h		*r*		14	To be solid, firm, immobile, motionless, seated, quiet, stopped, hold fast
*ster-h$_3$- < *(s)d^her-h$_3$-	(s)d^h		*r*		15	Lay down, place loose material for making a bed or paving a road, strew, spread out, place a saddle on a horse
*ster(h$_3$)mn̥ < *(s)d^her(h$_3$)mn̥	(s)d^h		*r*		16	Material placed on the ground or floor for sleeping, straw, bed, couch
*(s)ter-h$_1$- < *(s)d^her-h$_1$-	(s)d^h		*r*		17	Stiff, firm, hard, tight, stare (a fixed, unmoving look)
*streu̯- < *(s)d^hreu̯-	(s)d^h	*r*	u̯		18	Set in position, construct, stand fast, put together, build, establish, stack up, heap, strew

1. ***d^heh$_1$-* 'Put, place, set, do, build, found, establish, lay, set up'**
Grk *τίθημι* 'sets,' Av *daδāiti* 'puts, brings,' Skt *dádhāti* 'puts, places, lays,' TochB *tattam* 'will put, place,' Lat *facere* 'do,' *condere* 'build, found, establish,' OE *dōn* 'do,' NE *do*, OHG *tuon* 'do,' Lith *déti* 'lay,' OCS *dēti* 'lay,' Arm *dnem* 'put, place,' Hit *dāi* 'puts, lays,' *tittiya-* 'establish,' *tittanu-* 'set up,' Lycian *tadi* 'puts, places.' —LIV 136; EIEC 472, 506; IEW 235–39; Mallory and Adams (2006) 472; Bomhard 158; Benveniste 387.
2. ***d^heh$_1$-k-* 'Place, set up, establish, raise, produce, make'**
OUmb *face* 'place, set up, establish, raise, produce, make,' Lat *faciō* 'make,' Ven *faksto* 'set up, place, establish,' Osc fefacid 'make.' —LIV 139; IEW 236; Bomhard 158.
3. ***(s)teh$_2$-* 'Put, place, set, stand, set in, fix, set up, set firmly'**
Ved *tíṣṭhati* 'put, place, set down,' Grk *ἵστημι* 'put, place, set oneself, stand,' Lat *sistō* 'put, place, set,' Umb *sestu* 'put, place,' OIr *air-sissedar* 'remain standing,' Grk Cret *στανύω* 'put or set in, fix, fit, place, set up,' Lat *dē-stinō* 'set firmly,' ON *standa* 'stand,' OE *standan* 'stand,' NE *stand*.' —LIV 590; IEW 1004–8; EIEC 542; Mallory and Adams (2006) 296.
4. ***sth$_2$e-i-* 'Not easily moved, stiff, fixed, hard, heavy, coagulated, frozen'**
Lat *stīria* 'icicle,' Fris *stīr* 'stiff,' Lith *stóras* 'stiff,' Skt *styā́yate* 'becomes fixed, coagulated, hardens,' *stíyā* 'stagnant water,' *stīmá* 'heavy,' *stimita* 'unmoving, fixed, silent,' TochB *stināsk-* 'be silent.' An extension of *steh$_2$-. —EIEC 547; IEW 1010-11; Mallory and Adams (2006) 347.
5. ***st̥h$_2$-b^h-* 'Fixed in place, standing firmly, post, staff, stone, pillar, column'**
MIr *sab* (< *st̥h$_2$b^{h}eh$_2$-) 'post,' ON *stafr* 'staff,' OE *stæf* 'staff,' NE *staff*, OHG *stap* 'staff,' OPrus *stabis* 'stone,' Lith *stābas* 'post,' Latv *stabs* 'pillar,' OCS *stoborū* 'column.' "A nominalization of *steh$_2$-. (EIEC:442)" —IEW 1012–13; Mallory and Adams (2006) 226; EIEC 442.
6. ***stéh$_2$-u̯r* 'Fixed, immovable, permanent, pillar, post, column, cross'**
ON *staurr* 'post,' Grk *σταυρός* 'post, cross,' Shughni *sitan* 'pillar, post,' Skt *sthū́ṇā-* 'pillar, post, column,' *sthāvará* 'fixed, immovable, permanent,' *sthūrá* 'thick, strong, big.' From *steh$_2$- 'stand.' —EIEC 442; IEW 1009; Mallory and Adams (2006) 225.
7. ***stéh$_2$-ti̯s* 'Place, position, station, site, land, standing, setting, stature'**

Lat *statiō* 'position, station,' ON *staðr* 'place,' OE *stede* 'place,' NE *stead*, OHG *stat* 'place, site,' (>NHG *stadt* 'city'), Goth *staþs* 'place, land,' Lith *stāčias* 'standing,' Grk *στάσις* 'place, setting, standing, stature,' Skt *sthíti* 'position,' ON *stœðr* 'firm,' Lat *status* 'standing.' "Widespread and ancient derivatives of **steh₂-* 'stand (up)' (EIEC 431)." — Mallory and Adams (2006) 287, 288; EIEC 430-31; IEW 1006.

8. ****stéh₂-mōn* 'set down, stand, position, stature, stem, tree, warp (the stationary part of the weaving)'**

MIr *samaigid* 'sets down,' Wels *sefyll* 'a stand,' Lat *stāmen* 'warp,' OE *stemn* 'stem,' OHG *stam* 'stem,' Lith *stomuō* 'stature,' Latv *stāmen* 'body, torso,' Grk *στήμον* 'warp,' Skt *sthā́man* 'position,' TochA *ṣtām* 'tree.' —EIEC 431; IEW 1007–08; Mallory and Adams (2006) 287.

9. ****st(h₂)eu̯-g-* 'To stand, be stiff'**

Lith *stúkti* 'stand tall,' Rus *stúgnutĭ* 'to freeze' (< 'become stiff'), Toch B *staukk-* 'swell, bloat.' An extension of **steh₂-*. —EIEC 547; IEW 1033–34; Mallory and Adams (2006) 347.

10. ****stu̯eH-* 'stiff, hard, become stiff, stone'**

Ved *ní-ṣṭyāyatām* 'to become stiff,' Grk *σῶμα* '(stiff, dead) body,' Germ **staina-* 'stone.' —LIV 603; IEW 1010-11.

11. ****stel-* 'Put, place, standing position, stall, set up, establish, stand'**

ON *stjǫlr* 'stem, stalk,' *stallr* 'stall,' OE *stela* 'stalk, support,' *steall* 'standing place, position, stall, stable,' *stellan* 'put, place,' OHG *stal* 'standing place position, stall,' *stellen* 'set up, establish,' NE *stall*, OPrus *stallit* 'stand,' Alb *shtjell* 'fling, toss, hurl,' Grk *στέλλω* 'make ready, fit out with, send, dispatch,' Skt *sthālam* 'eminence, tableland, ground, earth, dry land,' OLat *stlocus* 'place.' —EIEC 442, 506; IEW 1019–20; LIV 594.

12. ****stl̥-neh₂-* 'Firm support, pillar, stand'**

OHG *stollo* support,' Grk *στήλη* 'pillar,' ON *stallr* 'stand.' —EIEC 442; IEW 1050.

13. ****stembʰ-* 'To stand, be firm, be imperturbable, set, produce a stalk, support, post'**

Lith *stembti* 'produce a stalk' (of plants), Grk *ἀστεμφής* 'imperturbable, firm,' Av *stəmbana* 'support,' Skt *stabhnā́ti* 'prop, support, hinder, restrain,' *stámbha* 'post,' TochAB *stäm* 'stand,' TochB *śanmäṣṣäṃ* 'to set firmly.' —EIEC 543; IEW 1012–13; LIV 595; Mallory and Adams (2006) 296.

14. ****dʰer-* 'To be solid, firm, immobile, motionless, seated, quiet, stopped, hold fast'**

Lat *firmus* (< **dʰer-mo-*) 'solid, firm,' OE *darian* 'lie motionless, lurk,' Lith *deréti* 'be useful, serviceable,' Grk *θρήσασθαι* 'seat oneself,' Arm *dadarem* 'become quiet, stop, be immobile,' Av *dārayat* 'holds fast, hold firm,' Skt *dhāráyati* 'holds, preserves.' —LIV 145; IEW 252–53; EIEC 270; Mallory and Adams (2006) 271; Bomhard 248.

15. ****ster-h₃-* 'Lay down, place loose material for making a bed or paving a road, strew, spread out, place a saddle on a horse'**

Lat Alb *shtie* 'lay down, throw, miscarry,' ON *strā* 'strew,' NE *strew*, SC *strōvo* 'heap,' Grk *στόρνῡμι* 'to place loose materials such as straw for a bed or stones for paving a road, spread out, strew, place a saddle on a horse.' —LIV 599; IEW 1029–30; Mallory and Adams (2006) 226; EIEC 539; Bomhard 194; L&S 1650, 1656; DELG 1023–24.

16. ****ster(h₃)mn̥* 'Material placed on the ground or floor for sleeping, straw, bed, couch, something strewn'**

Lat *strāmen* 'straw,' Grk *στρῶμα* 'straw, bed,' Skt *stárīman* 'act of spreading out, bed, couch.' —EIEC 57; Mallory and Adams (2006) 226; IEW 1029–30.

17. ***(s)ter-h$_1$-* 'stiff, firm, hard, tight, stare (a fixed look)'**

ON *starr* 'stiff,' OE *starian* 'look at, stare,' NE *stare*, OHG *starēn* 'stare,' OPrus *stūrnawiskan* 'sternness,' Lith *starinù* 'tighten, stretch, make stiff,' OCS *stradá* 'hard work,' Grk *στερεός* 'stiff, firm.' —EIEC 547; IEW 1022; Mallory and Adams (2006) 347.

18. ***streu̯-* 'set in position, construct, stand fast, put together, build, establish, stack up, heap, strew'**

Lat *struō* 'set in position, arrange so as to construct something, stand fast, put in position, put together, build, establish, set, set out in place,' *struēs* 'heap,' OIr *asroither* 'strew,' Goth *straujan* 'strew.' —LIV 605; IEW 1030-31; EIEC 539; Mallory and Adams (2006); OLD 1829–30.

Notes on possible outside root connections:

1. & 2. Bomhard 158 cites Proto-Afrasian **day-* 'throw, cast, put, place,' Elamo-Dravidian *da-* 'put, place, deposit,' Etruscan *te-* 'put, place,' Chuk-Kamch *tæjkə-*, etc. 'make, do, build.'

14. Bomhard 248 cites Proto-Afrasian **dʾar-*, etc. 'hold firmly, hand, arm,' Proto-Kartvelian **ǯger-* 'to make firm, strong, unshakable.'

15. Bomhard 194 cites Proto-Afrasian **tar-* 'to spread, spread out, expand, extend, stretch, stretch out,' Dravidian *tāṟṟu,* etc. 'sift, winnow, sow seed, scatter, sprinkle,' Uralic **tara-*, etc. 'spread or stretch out, separate, open, scatter, wide, roomy,' Proto-Altaic **tʰarV-*, etc. 'spread, scatter, disperse,' Proto-Eskimo **taʀpaʀ-* 'open out, flare out, enlarge, open wide.'

Conclusions: All four of these PIE roots show strong parallelism, both phonetically and semantically to the non-PIE forms. This suggests that the laryngeal and the -r resonant variants diverged from the primitive root while PIE was still in linguistic contact with the outside language groups.

**ĝ*

***Table 20: *ĝe(R)b^h-* 'Bite, chew, eat'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**ĝeb^h-*	*ĝ*		*ø*	*b^h*	1	Eat, chew, masticate, consume, feed, forage, nourishment
**ĝemb^h-*	*ĝ*		*m*	*b^h*	2	Open the jaws wide, snap at, swallow, bite, tear to pieces

1. ***ĝeb^h-* 'Eat, chew, masticate, consume, feed'**

OLith *žėbmi* 'eat slowly, chew, masticate,' OCS *zobljǫ* 'consume, eat up,' ORus *zobъ* 'food, fodder, feed, forage, nourishment, nutriment,' *zob* 'beak, snout.' —LIV 161; IEW 382; Bomhard 570.

2. ***ĝemb^h-* 'Open the jaws wide, snap at, swallow, bite, tear to pieces'**

Ved *jambháyati* 'crush, destroy,' *jabhat* 'open the jaws wide, snap at,' *jámbha* 'tooth, set of teeth, mouth, jaws, swallowing, one who crushes or swallows,' YAv *zəmbaiiaδβəm* 'let one bite hard,' Oss *zæmb* 'yawn, gape,' OCS *zębǫ* 'rip or tear to pieces,' Alb *dhemb* 'pain, hurt, distress, grieve.' —LIV 162; IEW 369; Monier-Williams 412; Bomhard 573.

Notes on possible outside root connections:

1. Bomhard 570 cites Dravidian *kavuḷ*, etc. 'cheek, jaw, jawbone,' and Proto-Kartvelian **qʾab-*, etc. 'jaw, chin.'

2. Bomhard 573 cites Proto-Afrasian **k'am-*, etc. 'crush, grind, chew, bite, eat, flour, wheat, meal, grain, graze, devour, swallow, bread, molar tooth, tooth in general,' and Chuk-Kamch **qametva-*, etc. 'eat, feed, give food to a guest, treat,' both with either missing or variant (non-labial) final consonant.
Conclusions: Both roots show semantic parallels to the outside language groups, but lack of final labial consonant in those groups leaves the connection doubtful.

***Table 21: *ĝe(R)h₁-* 'Engender, impel, set in motion, sprout, germinate, be born'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**ĝeu̯H-*	*ĝ*		*u̯*	*H*	1	Set in motion, rouse, impel, be quick, animate, inspire
**ĝei̯H-*	*ĝ*		*i̯*	*H*	2	Germinate, spring up, grow, sprout, develop
**ĝenh₁-*	*ĝ*		*n*	*h₁*	3	Beget, conceive, create, bring forth, cause the growth of, be born

1. ****ĝeu̯H-* 'set in motion, rouse, impel, be quick, animate, inspire'**
Ved *junā́ti, jávati* 'press forwards, hurry on, be quick, impel, urge, rouse, drive, incite, excite, promote, animate, inspire,' *apī-jū́* 'impelling,' *dhī-jū́* 'inspiring the mind, rousing devotion,' *yatú-jū́* 'incited or possessed by a yatú,' *vayo-jū́* 'exciting or increasing strength,' *viśva-jū́* 'all-impelling,' *sánā-jū́* 'nimble or active from of old.' —LIV 166; IEW 399; Monier-Williams 424.

The basic sense of this root is to set something into brisk motion, impel, animate. In the following roots of this resonant series, this notion is applied specifically to living beings, setting the development of plants or animals into motion. For the relationship between "quick" and "life," consider the range of meanings contained within the English word, *quick*: "**1.** Moving or functioning rapidly and energetically; speedy. ...**6.** *Archaic* **a.** Alive. **b.** Pregnant."[8]

2. ****ĝei̯H-* 'Germinate, spring up, grow, sprout, develop'**
Goth *keinan* 'germinate, spring up, grow,' Latv ziêdu 'blossom,' NArm cil 'bud, sprout, shoot, scion,' OHG, OSax *kīnan* 'germinate, sprout, arise, spring up, develop.' —LIV 161; IEW 355–56; Balg 217; ALEW 1507.

3. ****ĝenh₁-* 'Beget, conceive, create, bring forth, cause the growth of, be born'**
Lat *gignō* 'bring into being, create living creatures, cause the birth of or growth of, give rise to, produce.' *gignentia* 'growing things, vegetation, things coming into being,' OE *cennan* 'beget, conceive, create, bring forth,' Ved *jánati* 'generate, beget, produce, create, cause, be born or produced,' Grk *γίγνομαι* 'to become.' —LIV 163; IEW 373–75; OLD 764; Bosworth and Toller 150; Monier-Williams 410; Bomhard 465; EIEC 56.

In PIE, the semantic field "child" can overlap with the semantic field "seed, sprout." Mallory and Adams (EIEC 107) write: "One originally neuter term, derived from the root **tek-* 'beget' (Grk *τικτω* < *τι-τκ-ω*), is preserved as 'child' in Greek and matches Germanic terms for 'servant' which is semantically upgraded in many areas to mean 'servant of the king' > 'nobleman' (cf. thane in *Macbeth*). Indo-Iranian cognates suggest an original meaning 'seed, sprout,' a meaning also recorded in Greek."

Notes on possible outside root connections:
3. Bomhard 465 cites Proto-Afrasian **k'an-*, etc. 'get acquire, possess, create, produce, buy, dominate, tame, have power over, to originate,' and Dravidian *kaṉru*, etc. 'calf, colt, sapling, young tree, young child, bear or bring forth children, beget, young animal or plant.'

[8] AHD, s.v. "quick," 1436.

Conclusions: Phonetically and semantically root #3 appears to parallel the Afrasian and Dravidian attested forms.

**ĝʰ-*

***Table 22: *ĝʰe(R)d-* 'Defecate, evacuate, pour out, emit, rump, hole, opening'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**ĝʰed-*	*ĝʰ*		*ø*	*d*	1	Defecate, be covered in excrement, rump, anus, hole, excretion
**ĝʰeu̯d-*	*ĝʰ*		*u̯*	*d*	2	Pour, spill, to empty, to emit from the body, large intestine, hole, vulgar

1. ****ĝʰed-* 'Defecate, be covered in excrement, rump, anus, hole, excretion'**
Grk *χέζω* 'Defecate, ease oneself, drop dung,' Alb *dhjes* 'I defecate,' Alb *n-dot* 'dirty oneself, be covered in excrement,' Skt *hadati* 'defecate, *hadana* 'excretion,' Av *zadah* 'arse,' Arm *jet* 'the tail, the end,' ON *gat* 'hole, opening.' —LIV 172; IEW 423; L&S 1982; EIEC 187.

2. ****ĝʰeu̯d-* 'Pour, spill, empty, emit from the body, large intestine, vulgar'**
ON *gjōta* 'throw' (young), NIsl *gjóta* 'hole,' Lat *fundō* 'pour, spill, empty (a vessel or container), drench with, emit freely from the body, pour out, shed (blood, tears, etc.), (of a woman) to give birth,' *fundulum* 'the blind gut' (part of the large intestine), Umb *hondu* 'shall pour/spill out,' Goth *giutan* 'pour out, shed, spill,' Grk *χύδην* 'poured out in floods or heaps, promiscuously, indiscriminately,' *χυδαῖος* 'poured out in streams, common, vulgar, coarse,' *χυδαιόω* 'make vulgar, debase.' —LIV 179; IEW 448; OLD 746–47; L&S 2012–13; EIEC 448.

***Table 23: *ĝʰeh₁(R)-os* 'Gaping hole, gap, empty space'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**ĝʰeHu̯-os*	*ĝʰ*	*H*	*u̯*		1	Gaping abyss, jaws, chasm, chaos
**ĝʰoh₁r-os*	*ĝʰ*	*h₁*	*r*		2	Gap, empty space, hollow in the mouth

1. ****ĝʰeHu̯-os* 'Gaping abyss, jaws, chasm, chaos'**
Grk *χάος* 'chaos, the nether abyss, any vast gulf or chasm, the gaping jaws of the crocodile,' TochA *ko* 'mouth,' MHG *giel* 'jaws, throat, mouth, yawning abyss, gullet,' NHG *Gosche, Gusche* 'enormous jaws.' —Mallory and Adams (2006) 222; L&S 1976; IEW 449.

2. ****ĝʰoh₁r-os* 'Gap, empty space, hollow in the mouth'**
Grk *χῶρος* 'vast open space,' *χήρη* 'widow,' *χηραμός* 'hole, cleft, hollow, hollow on the sides of the tongue,' TochB *kāre* 'pit, hole.' —Mallory and Adams (2006) 287; DELG 1224; L&S 1990; IEW 449.

**gʷ-*

***Table 24: *gʷe(R)-* 'Devour, swallow, gulp'**

PIE Root	Initial	R1	R2	Final	Ref.	Semantic Value
**gʷer-h₃-*	*gʷ*		*r*		1	Devour, swallow, gulp, throat
**gu̯el-*	*g*	*u̯*	*l*		2	Devour, swallow, gulp down

1. ***g^{u}er-h_3-* 'Devour, swallow, gulp, throat'**
OInd *giráti* 'eat voraciously,' Lat *carni-vorus* 'devouring meat,' Avest *jaraiti* 'swallow, gulp,' Lith *gìrtas* 'intoxicated, drunk,' Arm *eker* 'ate,' Ved *garan* 'gulp,' OCS *po-žrětъ* 'devoured.' —Mallory and Adams (2006) 256, 625; IEW 474; LIV 211; Bomhard 589.
2. ***gu̯el-* 'Devour, swallow, gulp down'**
Arm *ekowl* 'swallowed, gulped,' OIr *gelid* 'consume, devour,' OE *ceole* 'gorge.' —LIV 192; IEW 365; Bomhard 577.

Notes on possible outside root connections:
1. Bomhard 589 cites Afrasian *ḳard*, etc. 'throat, voice,' Dravidian *kural*, etc. 'throat, windpipe, neck, gullet, eat greedily, drink, eat, guzzle,' Proto-Kartvelian **q'orq'-*, etc. 'throat, gullet, larynx,' and Uralic **k[ü]rkɜ*, etc. 'neck, throat.'
2. Bomhard 577 cites Kartvelian **q'el-*, etc. 'neck, throat, collar.'
Conclusions: Both of these roots show credible parallels with non-PIE forms, suggesting that the separation of the two resonant-variants probably occurred while PIE was still in contact with the other language families.

***Table 25: *(s)g(R)eb^h-* 'To cut, scratch, engrave, cutting tool'**

PIE Root	Initial	R1	R2	Final	Ref.	Semantic Value
**(s)greb^h-, *gerb^h-*	*g*	*r*		*b^h*	1	Scratch in, cut in, engrave
**gleu̯b^h-*	*g*	*l*	*u̯*	*b^h*	2	Hollow out, cut off
**gneiḭb^h-*	*g*	*n*	*iḭ*	*b^h*	3	Knife
**skeb^h- (< *(s)geb^h-)*	*(s)g*	*ø*		*b^h*	4	Scratch, shave, scrape
**s(ˆ)reiḭb^h- (< *(s)greiḭb^h-)*	*(s)g*	*r*	*iḭ*	*b^h*	5	Scratch, cut, write, mark

1. ***(s)greb^h-, *gerb^h-* 'scratch in, cut in, engrave'**
Grk *γράφω* 'scratch,' NE *carve*, OE *ceorfan* 'cut off, engrave,' OPrus *gīrbin* 'number', OCS *žrěbŭ* 'lot,' Lith *gerbiù* 'honor, respect.' —Mallory and Adams (2006) 377; LIV **gerb^h-* 187; IEW *gerbh-, grebh-* 392; Bomhard 487; EIEC 143.
2. ***gleu̯b^h-* 'Cut out, cut off'**
Grk *γλύφω* 'carve out, glyph,' Lat *glūbō* 'peel,' OHG *klioban* 'split,' NE *cleave*. —Mallory and Adams (2006) 377; IEW 401; LIV 190; Bomhard 463; EIEC 143.
3. ***gneiḭb^h-* 'Knife'**
ON *kneif* 'a type of knife-tongs,' *knīfr* 'knife,' OE *cnīf* 'knife,' NG dial. *kneif* 'cobbler's knife,' Lith *gnýbiu* 'pinch.' —IEW 370.

AHD provides no PIE etymology for the English word "knife." Watkins (2011) places it with an assortment of words ("a pseudo root" EIEC 451) denoting lumps or clumps such as knob, knoll, knot, knuckle, etc., which is not likely. Mallory and Adams write, "By the earliest historical attestations of the various IE stocks knives were made of bronze or iron; however, across Eurasia there were stone equivalents at least since the Neolithic. At that time long blades fashioned of flint or some other suitable stone were fixed within a wooden haft. Despite the weak lexical evidence it is impossible to imagine that the earliest IE speakers did not possess 'knives' of some sort, either stone or copper (EIEC 336)."

The following two roots show initial **sk-* for expected original **sg-*. But unvoiced **s-* would be expected to de-voice the following **g-*, so these roots should belong with the above forms in **g-* or **(s)g-*.

4. ****skeb^h-* 'scratch, shave, scrape'**
Lat *scabō* 'shave, scratch, scrape,' ON *skafa* 'shave,' OE *scafan* 'shave' (> NE shave), OHG *schaben* 'shave,' Goth *skaban* 'shear,' Lith *skambùs* 'pluck,' *skabùs* 'sharp, *skōbti* 'pull, pluck, gather,' Latv *skabît* 'hew off,' *skabrs* 'sharp,' OCS *skoblĭ* 'scraping knife.' —EIEC 503; IEW 931–33; LIV 549; NIL 621.

5. ****s (k̂) reu̯b^h-* 'scratch, cut, write, mark'**
Lat *scrībō* 'write, mark, draw, sketch.' —LIV 562; IEW 946–47.

Notes on possible outside root connections:
1. Bomhard 487 cites Proto-Afrasian **k'e(e)r-*, etc. 'cut, cut into, engrave, notch, sever, clip, split, pinch, nip, bite, wound,' Proto-Kartvelian **k'r-eč-*, etc. 'cut, cut off,' and Proto-Altaic **kiro-*, etc. 'cut, mince, break off, gnaw, scrape, shave, tear out, kill, destroy.' All lack final labial.
2. Bomhard 463 cites Proto-Afrasian **k'al-*, etc. 'separate, remove, strip off, pluck, tear, pull off, uproot, cut off, open, peel,' Dravidian *kaḷ*, etc. 'weed, pluck, pull up, remove, exterminate, strip off, dig, gather,' and Proto-Kartvelian **k'al-,* etc. 'threshing place, threshing floor,' all without final consonant.
Conclusions: Although there are many semantic parallels, the lack of final consonants in the outside languages makes any further conclusions doubtful concerning possible connections with the PIE roots.

**g^h-*

***Table 26: *g^{h}e(R)d^h-* 'Desire, seek and choose a bride, pay the bride-price'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**g^{h}ed^h-*	*g^h*		*ø*	*d^h*	1	Be pleasing, await, expect, form a union
**g^{h}eu̯d^h-*	*g^h*		*u̯*	*d^h*	2	Desire, wish for, wait for, expect
**g^{h}lend^h-*	*g^h*	*l*	*n*	*d^h*	3	Desire, seek out, glance at, choose, select, fix on
**g^{h}reu̯d^h-*	*g^h*	*r*	*u̯*	*d^h*	4	Pursue, follow, come
**g^{h}eld^h-*	*g^h*		*l*	*d^h*	5	Requite, repay, recompense, pay for, atone for

1. ****g^{h}ed^h-* 'Be pleasing, await, expect, form a union'**
MycGrk *k^{h}ek^h(e)t^{h}wohes* 'form a union, or alliance,' Latv *gadu* 'meet, encounter, expect, await, find,' Fris *gadra* 'unite,' OHG *bigatōn* 'come together,' OE *togædere* 'together,' OCS *u-goždǫ* 'be pleasing,' *godū* 'appointed time,' Ved *gádhya-ḥ* 'clutch, embrace, sexual union.' —LIV 195; IEW 423–24; Whitney 34 ('attach'); Monier-Williams 344; Bomhard 377; EIEC 64.

2. ****g^{h}eu̯d^h-* 'Desire, wish for, wait for, expect'**
OPrus *gieidi* 'waits for,' *sengijdi* 'desires,' Lith *geidžiù* 'wish for, desire,' OCS *židǫ* 'expect, wait for,' Latv *gàidu* 'wait for, expect.' —LIV 196; IEW 426–27.

3. ****g^{h}lend^h-* 'Desire, seek out, glance at, choose, select, fix on'**
OIr *gleinn* 'inquire, investigate, explore, learn, choose, select, single out, fix on,' Bret *gou-lenn* 'desire,' *di-lenn* 'select, choose,' Latv *glendi* 'seek out,' Rus *gljažú* 'see, look at, glance at.' —LIV 200; IEW 431; Bomhard 356.

4. ****g^{h}reu̯d^h-* 'Pursue, follow, come'**
OIr *in:greinn, in:grennat* 'pursue, follow,' OCS grędǫ 'come,' OIr *in:gríastais* 'follow,' Rus *grjadú* 'go, stride.' —LIV 203; IEW 456–57; Bomhard 384; EIEC 546.

5. ***$g^h eld^h$-* ‘Requite, repay, recompense, pay for, atone for’**
Goth *-gildan* ‘requite, repay, recompense,’ OCS *žlědǫ* ‘pay for, atone for,’ ORus *želedu* ‘pay for, atone for,’ ON *galt* ‘repaid, recompensed, requited,’ OHG *in-gelten* ‘punish.’ —LIV 197; IEW 436.

In PIE society, after seeking and choosing a marriage partner, it was necessary to pay the bride-price. Also, when social alliances are ruptured, the only way to re-enter the good graces of the other person is to atone for the wrong done by providing recompense to the injured party. In traditional tribal societies, brides are sometimes stolen from their parents, (most often with the consent of the woman). It is typically the custom, after a cooling-off period, to provide recompense to her father so as to avoid long-term family feuds.

Notes on possible outside root connections:
1. Bomhard 377 cites Proto-Afrasian **gid-*, etc. ‘press together, join, unite, gather, force, compel,’ Dravidian *kiṭṭu*, etc. ‘draw near, be on friendly terms with, approach, meet, touch, reach,’ and Altaic *gida-*, etc. ‘press, crush, stamp, roll flat, compel , quell, defeat, raid, plunder.’
3. Bomhard 356 cites Proto-Afrasian *gal-, etc. ‘be visible, clear, obvious, evident, to look at, be shining, clarify, disclose’ (without final consonant), Dravidian *gāḷaka*, etc. ‘a good, proper, clever, ingenious man’ (without final dental consonant), Proto-Kartvelian **gal-*, etc. ‘to know, be acquainted with, understand’ (without final consonant), and Proto-Altaic **galV*, etc. ‘clear sky, sky, shine, glitter, good weather’ (also without final consonant).
4. Bomhard 384 cites Proto-Afrasian **gir-*, etc. ‘move, hasten, run, flow, rush, happen, follow’ (without final consonant), Proto-Altaic **g̱iar^{y}a-*, etc. ‘walk, step, rush, go or come out, walk through’ (without final consonant).
Conclusions: Root #1 shows credible phonetic and semantic parallels to the outside roots and is therefore probably distantly cognate. Roots #3 and #4 lack final consonants, leaving possible root connections uncertain.

***Table 27: *g^h(R)eb^h-* ‘Grab, take, seize, hold’**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**$g^h eb^h$-*	*g^h*	*ø*		*b^h*	1	Grasp, seize, cause another to grasp (give)
**$g^h reb^h$-*	*g^h*	*r*		*b^h*	2	Grab, seize, snatch up, devour, take
**$g^h re\underline{i}b^h$-*	*g^h*	*r*	*i̯*	*b^h*	3	Grip, grasp, seize

1. ***$g^h eb^h$-* ‘Grasp, seize, cause another to grasp, i.e. give’**
Lat *habeō* ‘grasp, possess, have,’ Umb *habe* ‘have,’ OIr *gaibid* ‘take, take hold of, seize, catch, grasp,’ Goth *gabei* ‘riches, wealth,’ *giban* ‘give,’ Lith *gebù* ‘to be capable’ (*capable* is literally the ability to catch, take, seize), Pol *gabać* ‘lay hands on, seize, hold,’ WRus *habáć* ‘take, grab.’ —LIV 193; IEW 407–09; EIEC 563; Mallory and Adams (2006) 271; Bomhard 349.

Words for *give* and *take* often interchange in PIE (Watkins 2011:xxvii).

2. ***$g^h reb^h$-* ‘Grab, seize, snatch up, devour, take’**
Skt *gr̥bhnáti* ‘grabs,’ MHG *grabben* ‘seize,’ Latv *grebju* ‘seize,’ OCS *grabiti* ‘snatch up,’ Hit *k(a)rap-* ‘devour,’ Av *gərəwnāiti* ‘takes,’ NE *grab* (from MDutch). —Mallory and Adams (2006) 271; Watkins (2011) 32; IEW 455–56; EIEC 563; LIV **$g^h rebh_2$-* 201.

3. ***$g^h re\underline{i}b^h$-* ‘Grip, grasp, seize’**
Goth *greipan* ‘grasp, seize, catch,’ Lith *griebiù* ‘take hold of, seize,’ ON *greipa* ‘commit, perpetrate,’ *greip* ‘grip, hand,’ OE *grāp* ‘fist, grip,’ NE *grip, gripe, grope*, OHG *grīfan* ‘touch, take hold of,’ *greifōn* ‘grope, touch,’ Latv *greībi* ‘seize.’ —LIV 203; IEW 457–58; EIEC 564; Mallory and Adams (2006) 272.

Notes on possible outside root connections:
1. Bomhard 349 cites Afrasian *gaba-*, etc. ‘hand, arm,’ Dravidian *kavar,* etc. ‘grasp, catch, steal, receive, desire, seize, plunder.’

Conclusions: Root #1 appears to have valid genetic connections with the other outside language families.

*$g^{\underline{u}}$-

Table 28: *$g^{\underline{u}}e(R)b^h$- 'Womb, vulva, act of conception, embryo, young off-spring'

PIE Root	Initial	R1	R2	Final	Ref.	Semantic Value
*$g^{\underline{u}}reb^h$-, *$g^{\underline{u}}erb^h$-	$g^{\underline{u}}$		*r*	b^h	1	Fetus, embryo, child, new born babe, cub, nestling, foal
*$g^{\underline{u}}elb^h$-	$g^{\underline{u}}$		*l*	b^h	2	Womb, uterus, menstruation, young child or animal, new born
*$g^{(\underline{u})}emb^h$-	$g^{\underline{u}}$		*m*	b^h	3	Womb, vulva, slit, deeply excited, sexual intercourse, depth, to know carnally
*$g^{\underline{u}}e\underline{i}b^h$-	$g^{\underline{u}}$		$\underline{i}$	b^h	4	Dive, covet, seek, female pudenda, vibrate (Proposed root)
$g^{\underline{u}}eh_1b^h$- ($g^{\underline{u}}\bar{e}b^h$)	$g^{\underline{u}}$		h_1	b^h	5	Something slimy, young animal, woman, wetness, vibrate, emit fluid or liquid
$g^{\underline{u}}eh_2b^h$- ($g^{\underline{u}}\bar{a}b^h$)	$g^{\underline{u}}$		h_2	b^h	6	Dive, plunge, dip, deep, become hard, dye with blood or other colorants

1. ***$g^{\underline{u}}reb^h$-, *$g^{\underline{u}}erb^h$-* 'Fetus, embryo, child, foal'**

Grk *βρέφος* 'babe in the womb, fetus, new born babe, foal, whelp, cub, nestling,' *βρεφόω* 'form into a fetus, engender,' OCS *žrēbę* (< *$g^{\underline{u}}erb^h$*en*-) 'foal,' MIr *brommach* 'foal.' —EIEC 615; IEW 485; L&S 329; Monier-Williams 349–50; DELG 186; Bomhard 539.

2. ***$g^{\underline{u}}elb^h$-* 'Womb, uterus, young animal'**

OE *cilfor-lamb* 'ewe lamb,' OHG *kilbur* 'ewe lamb,' Grk *δελφύς* 'uterus,' Av *gərəbuš-* 'new-born animal,' *δέλφαξ* 'young pig,' *δελφάκειος* 'female pudenda,' *δελφίς* 'dolphin (fish with womb, i.e. mammal),' and from *$g^{\underline{u}}olbho$- 'womb, fruit of womb,' ON *kalfr* 'calf,' OE *cealf* 'calf,' NE *calf*, OHG *chalb, chalp* 'calf,' Goth *kalbō* 'calf,' Grk (Hesychius) *δολφός* 'womb,' Av *garəwa-* 'uterus,' Skt *gárbha-* 'to conceive, womb, uterus, fetus, embryo, child, brood offspring, a woman's courses.' —EIEC 615; IEW 473; Watkins (2011) 34; L&S 377–78; DELG 250; de Vries 298; Mallory and Adams (2006) 184; Bomhard 462.

Mallory and Adams write, "The Germanic words suggest an initial *g-, the Grk *g^w-. Indo-Iranian is indecisive. The pre-Greek *g^w- (attested Grk d-) may owe its labialization to assimilation to the following *bhu-. Conversely the non-labialized initial in Germanic may be dissimilatory. In either case, *$g^w elbhus$ would appear to have been at least the late PIE term for 'womb'."

3. ***$g^{(\underline{u})}emb^h$-* 'Womb, vulva, slit, deep down, sexual intercourse'**

Skt *gabhīrá-, gambhīrá-* 'deep,' *gambha-, gámbhan-, gambhára-* 'depth, slit, vulva,' *gambh-vepas* 'moved deeply or inwardly, deeply excited,' *gabhi-shák* 'deeply down, down or within,' *jambh* (also *jabh*) 'to know carnally,' *Jambhana* 'sexual intercourse.' —IEW 466; Monier-Williams 346, 348, 412, Mayrhofer *gabhá* 463.

Jan de Vries (674) places ON *vǫmb* 'womb,' with this root.

4. ***$g^{\underline{u}}e\underline{i}b^h$-* 'Dive, covet, female pudenda, vibrate' (Proposed root)**

TochA *kip* 'female pudenda,' TochB *kwīpe* 'female pudenda,' Lat *uibrō* 'vibrate,' Grk *δῖφ-άω* 'dive, covet, seek.' —Watkins (2000) 2030; OLD 2054; Fortson 282–83, 402–3;

AHD 1915; LIV 671; IEW 1132; DELG 275; Autenrieth 78; Fitzgerald 400; L&S 438; Adams, s.vv. "kwīpe, kwipe, onkipṣe."

For the semantics of Grk *δῑφάω* 'dive,' compare *$*g^{u}eh_2b^{h}$*- below. AHD defines *vibrate* as: "1. To move back and forth or to and fro, especially rhythmically and rapidly. 2. To feel a quiver of emotion." OLD defines *uibrō* as "1b. To cause parts of one's body to move to and fro." It then quotes examples of this word's usage by classical authors in the context of explicit sexual movement.

Watkins (2000) postulated a root, **ghwībh*, that included the Tocharian attestations listed here along with Germanic **wībam* 'woman, wife.' That suggestion is not accepted here (see discussion of the idea in Adams s.v. "*kwipassorñe*"), and in fact, it does not reappear later in Watkins (2011). PIE *$*g^{u}$*- typically became *k*- in TochA, and *kw*- in TochB. PIE *$*b^{h}$*- became *p*- in both TochA and TochB. The root that I propose here satisfies both of those equations, along with the attested resonant, *i*-.

Watkins is probably correct, however, in his interpretation of TochA *kip* 'shame' and TochB *kwipe* 'shame' as denoting the female pudenda. The sexual organs are referred to as "shame" both in Latin *pudenda*, which derives from *pudor* 'a feeling of shame,' *pudendus* 'shameful, disgraceful, scandalous, the genitals,' and in German *Scham* 'shame, modesty, chastity, genitals.' Tocharian B makes this connection explicit in *kwipe-ike* 'penis' (literally 'shame-place'). It would not be unreasonable to assume that this designation applied equally (or originally?) to the female genitals, since that is the case in both the Latin and German examples already mentioned. It would, however, probably be a mistake to understand the original use of the word *shame* in this connection with the general use of that word in modern English where it suggests a feeling of self-recrimination or guilt for some evil committed. In ancient or more tribal societies, a better translation would be something like *taboo*. I follow Watkins in his gloss for Toch *kip* and *kwīpe* as 'female pudenda.'

Watkins (2000, 2011) derives Eng *vibrate* (Lat *uibrō*) from the PIE root **u̯eip*. LIV does not include Lat *uibrō* in its listing of verbs derived from **u̯eip*, probably because of semantic differences and because PIE *p*- would normally remain *p*- in Latin, and not become *b*- as in *uibrō*. The expected outcome of PIE *b^{h}*- is Latin *b*-, and PIE *$*g^{u}$*- became simply *u̯*-, precisely as attested in Lat *uibrō*.

Grk *δῑφάω* 'dive' is a word with unknown etymology (see DELG 275). Autenrieth, *A Homeric Dictionary*, translates it as '*dive after*.' Fitzgerald, in his translation of Homer's *Iliad* (16.747) gives '*diving*.' Liddell and Scott define *δῑφάω* as 's*earch after'*, but then cite the above passage from Homer, where the meaning is clearly to dive into the sea in order to collect oysters. Hesiod uses the same word to mean something like "covet." Evelyn-White translates this line from Hesiod with the phrase "to be after." The passage runs, "Do not let a flaunting woman coax and cozen and deceive you: she is after your barn."

Phonetically, the form of *δῑφ-άω* is parallel to Grk *δελφ-ύς* 'uterus,' with substitution of the resonant /i/ for the resonant /l/.

It should be unnecessary to spell out the common semantic link between the three attestations of this proposed root (dive, female pudenda, vibrate). Nevertheless, stated very bluntly, the action required for a man to engender a child is to dive into the female pudendum and move in a vibrating motion.

It should be noted that this proposed root, along with the following two roots, constitute a trio of parallel forms *(*$g^{u}ei̯b^{h}$, *$g^{u}ēb^{h}$, *$g^{u}āb^{h}$*), all with identical consonantal structure. They also

appear to share a common semantic value (sex organs and sex act), that, significantly, are referenced obliquely in all three cases. This is, no doubt, due to the emotional charge associated with this semantic field, and can be explained as the result of taboo deformation.

5. ***$g^{u}eh_1b^h$-** (***$g^{u}ēb^h$-**) **'something slimy, young animal, woman, wetness, vibrate, emit fluid'**

OSax *quappa* 'eel pout,' MHG *quappe* 'tadpole, belly,' ON *kvap* 'something slimy or gelatinous' (IEW 466), Swed-dial *(s)kvebba* 'fat woman,' NE *quab* 'bog, mire,' NE *quaver* 'shake, vibrate,' Norw-dial *kvapa* 'emit a fluid or liquid,' Old Prussian *gabawo* 'toad' (but see below), OCS *žaba* 'toad.' —Watkins (2011) 34; IEW 466; A. Christenson, *K'iche' – English Dictionary*, sv. *t'ot'*; Kluge s.v. "*Quappe,*" 572; New Cassell's German Dictionary, s.v. "*Kröte*," 280; Nesselmann, s.v. "*gabawo*," 41.

6. ***$g^{u}eh_2b^h$- (*$g^{u}āb^h$-) 'Dive, plunge, deep, become hard, dye with blood or other colorants'**

ON *kafa* 'dive, plunge,' *kvefja* 'dip, submerge, OSwed *kvaf* 'depth,' Grk *βάπτω* 'dip, plunge, dip a sword into a liquid in order to temper the steel, become hard, to dye, to dye someone with their own blood (cutting by sword), draw water by dipping.' —Watkins (2011) 34; IEW 465–66; LIV 205; EIEC 160; DELG 156; L&S 305–306; Mallory and Adams (2006) 403.

The Greek tragedies use the word, *βάπτω*, to describe a "sword tempered in blood" (DELG 156). At an early date this term was applied to the dyeing process, i.e., dipping yarn into dyeing vats. Much later, in Christian times, it was used to signify religious baptism.

Both of these last two roots have uncertain but plausible semantic relationships to "womb, vulva, embryo, sexual intercourse" as seen in the other roots of this resonant series. The root, *$g^{u}āb^h$, shares the concept *deep* with *$g(^{u})emb^h$, and the notion of "dive" with *$g^{u}ei̯b^h$. The root, *$g^{u}ēb^h$, shares the notion of "young animal" (in this case, tadpole), with *$g^{u}reb^h$ and *$g^{u}elb^h$. The variations in vowel length and vowel color can again be accounted for by taboo deformation given the obvious sexual references in this resonant series as a whole.

Vulgar slang for the female vulva in the unrelated K'iche' Maya language is *t'ot'* 'snail'. This refers to the sticky, slimy, mucus-covered smooth tissue of both vulva and snail. It may be that the reference here to "slimy" and to "eel pouts and tadpoles" (the young of frogs and toads) fulfills a similar function in PIE.

The semantic value "toad" for the root, *$g^{u}ēb^h$, is based on Old Prussian *gabawo*, and Slavic *žaba*, both glossed 'Kröte' in Nesselmann's *Thesaurus Linguae Prussicae*, which was the source for the citation in Pokorny and others. While the primary meaning of German *Kröte* is 'toad,' a secondary meaning is 'woman.' The *New Cassell's German Dictionary* defines *Kröte* as: "toad, malicious person; bitch; jade, wench... (vulg.) *niedliche kleine Kröte*, pretty wench."

Obviously German is not Old Prussian, and in any case it is difficult to know how far back in time the association can be traced, but nevertheless this instance constitutes an additional case parallel to the vulgar slang of K'iche' *t'ot'* where the vulva is represented by a slimy animal.

"Plunge" and "deep" may also share semantic value with the concepts of "womb" and "vulva," as the reproductive process of conception requires that the man plunge deeply. The first primitive human experience with dye and dyeing (staining) undoubtedly involved the female menses, and these are also referenced in *$g^{u}elb^h$ ("a woman's courses"). In that connection, the concept "dye with blood" is explicit in the historic use of Grk *βάπτω* where it can also mean "cut

with sword" (L&S 306). The root, *$g^{u}\bar{e}b^{h}$, carries notions of "woman," "moist place," "shake, vibrate," and emitting a fluid." These can all reasonably be taken for oblique references to the reproductive organs in the act of conceiving a child. Vibrating movement is a concept that is also shared with ***$g^{u}e\underset{\wedge}{i}b^{h}$-**.

It is evident that *$g^{u}\bar{a}b^{h}$ and *$g^{u}\bar{e}b^{h}$ share many of the semantic values that are exhibited by this resonant series as a whole, and which are concerned with "womb, uterus, young animal, engendering, conception, and menstruation." Certainly the other four roots *(*$g^{u}erb^{h}$, *$g^{u}elb^{h}$, *$g^{(u)}emb^{h}$*, and *$g^{u}e\underset{\wedge}{i}b^{h}$) function in this way.

Notes on possible outside root connections:
1. Bomhard 539 cites Afrasian *k'^{w}arb*, etc. 'midst, inward part, female genitalia, intestines, interior of the body,' Dravidian *karu*, etc. (without final consonant) 'fetus, embryo, egg, germ, young of animal, womb, yolk, pregnant.'
2. Bomhard 462 cites Afrasian *k'al-*, etc. (without final consonant) 'to give birth, beget, son, male child, young of animals, to be pregnant.'
Conclusions: In root #1 the phonetic and semantic parallels to the Afrasian forms are strong, suggesting an ancient genetic connection. In root #2 the phonetic divergence (lack of final consonant) leaves the possibility of root connections inconclusive.

***Table 29: *$g^{u}e(R)$-* 'Go, come'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
*$g^{u}eh_{2}$-	g^{u}		h_{2}		1	Stride, go
*$g^{u}em$-	g^{u}		m		2	Go, move, go away, set out, hurry, come

1. ***$g^{u}eh_{2}$-* 'stride, go'**
Ved *jígāti* 'strides, go quickly,' Arm *eki* 'I went,' Grk *βίβαϛ* 'stride, cause to go,' Av *gāṯ* 'goes,' Latv *gāju* 'went.' —LIV 205; IEW 463–64; Monier-Williams 420; L&S 315; EIEC 115.
2. ***$g^{u}em$-* 'Go, move, go away, set out, hurry, come'**
Ved *gácchati* 'go, move, go away, set out, come,' Alb *n-gah* 'go free, hurry,' Grk *βαίνω* 'go,' Lat *ueniō* 'come,' TochB *kekamu* 'has come,' Ved *gámaya* 'bring,' Goth *qiman* 'come,' OHG *queman* 'come.' —LIV 209; IEW 464–65; Monier-Williams 346–47; EIEC 115.

EIEC calls these two roots "ancient variants."

***$g^{u}\underset{\wedge}{h}$-**

***Table 30: *$g^{(u)h}e(R)s$-* 'To be delighted, glad, charmed, pleased, happy, laughing'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
*$g^{(u)h}ers$-	$g^{(u)h}$		r	s	1	Rapture, delight, pleasure, happiness, joyfulness, cheerfulness
*$g^{(u)h}es$-	$g^{(u)h}$		ø	s	2	Laugh, smile, laugh at, mirth, laughter, jest, joke, fun

1. ***$g^{(u)h}ers$-* 'Rapture, delight, pleasure, happiness, joyfulness, cheerfulness'**
Ved *hárṣate* 'bristling of the hair in a thrill of rapture or delight, pleasure, happiness,' *harṣin* 'joyful, rejoicing, delighting,' *harṣula* 'disposed to be cheerful or happy, delighted.' —LIV 198; IEW 445–46; Monier-Williams 1292–93.
2. ***$g^{(u)h}es$-* 'Laugh, smile, mirth, laughter, fun'**

Ved *jákṣat* ‘laughing,’ Late Ved *hasati* ‘laugh, smile, laugh at,’ *hása* ‘mirth, laughter,’ *hāsa* ‘laughing, laughter, mirth, jest, joke, fun.’ —LIV 199; Monier-Williams 407, 1294.

***h*$_1$-**

***Table 31: *h$_1$(R)es-* ‘Moisture, mist, wetness, dew, rain, urine, ’**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**h$_1$u̯es-*	*h$_1$*	*u̯*		*s*	1	Fine mist, moist ground, tree sap, libation
**h$_1$u̯ers-*	*h$_1$*	*u̯*	*r*	*s*	2	Rain, dew, urine
**h$_1$res, *h$_1$ers-*	*h$_1$*	*r*		*s*	3	Liquid, moisture, dew, rain

1. ****h$_1$u̯es-* ‘Fine mist, moist ground, tree sap, juice, libation’**
Umb *vestikatu* ‘offer a libation,’ OE *wōs* ‘juice, broth, NDutch *waas* ‘layer of mist or fine drops,’ OHG *wasal* ‘moist ground,’ Latv *vasa* ‘forest with wet ground,’ *ievasa* ‘moisture, tree sap.’ —Mallory and Adams (2006) 347; EIEC 639; IEW 1171–72.
2. ****h$_1$u̯ers-* ‘Rain, dew, urine’**
Grk *ἐέρση* ‘dew,’ *οὐρέω* ‘urinate,’ Hit *warsa* ‘rainfall,’ Skt *várṣati* ‘rains,’ Av *aibi-varšta* ‘rained upon.’ —Mallory and Adams (2006) 126; LIV 291 (**h$_2$u̯ers-*); IEW 80-81; EIEC 477; Bomhard 721.
3. ****h$_1$ers-, *h$_1$res-* ‘Liquid, moisture, dew, rain’**
Lat *rōs* ‘dew,’ Lith *rasà* dewy, dew covered,’ OCS *rosa* ‘dew,’ Alb *resh* ‘it rains,’ Av *Raŋha* (river name) ‘Volga,’ Skt *rása-* ‘liquid, moisture.’ —Mallory and Adams (2006) 346; IEW 336; EIEC 638.

Notes on possible outside root connections:
2. Bomhard 721 cites Afrasian *ḥwi*, etc. (without final sibilant) ‘surge up, overflow, rain, flood, moisture;’ Dravidian *varṟu*, etc. (without final sibilant) ‘inundation, flood, torrent, deluge, torrential rain.’
Conclusions: Lack of final sibilants in Bomhard’s proposed outside connections leave the possibility of genetic afiliations uncertain.

***Table 32: *h$_1$e(R)-* ‘To go’**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**h$_1$ei-*	*h$_1$*		*i*		1	Go
**h$_1$el-*	*h$_1$*		*l*		2	Go, drive, go out, go up
**h$_1$er-*	*h$_1$*		*r*		3	Go, come, set in motion, move, go toward, arrive
**h$_1$er-s-*	*h$_1$*		*r*		4	Go, move, go astray, wander about, flow

1. ****h$_1$ei-* ‘Go’**
Lat *eō* ‘go,’ Goth *iddja* ‘went,’ Lith *eimi* ‘go,’ OCS *iti* ‘go,’ Grk *εἶμι* ‘will go,’ Hit *yanzi* ‘they go,’ Av *aēiti* ‘goes,’ Skt *éti* ‘goes,’ TochB *yaṃ* ‘go,’ TochA *yiñc* ‘to go.’ —Mallory and Adams (2006) 395–96; LIV 232; IEW 293–96; Bomhard 666.
2. ****h$_1$el-* ‘Go, drive, go out, go up’**
MWels *el* ‘may go,’ Grk *ελαύνω* ‘drive,’ Arm *eli* ‘I went out, went up,’ —Mallory and Adams (2006) 397; LIV **h$_1$elh$_2$- 235; IEW 306–07; EIEC 228.
3. ****h$_1$er-* ‘Go, come, set in motion, move, go toward, arrive’**
Grk *ἔρχομαι* ‘go, come,’ *ὁρμάω* ‘to set in motion, start, go for, go after,’ Ved *ṛicchati, ṛiṇoti* ‘to go, move, rise, go toward,’ Hit *āraskizzi* ‘reach, arrive, get to.’ —Mallory and

Adams (2006) 391, 394; LIV 238; IEW 326–29; Monier-Williams 223; L&S 1252–53; EIEC 506.

4. ***h₁er-s-* 'Go, move, go astray, wander about, flow'**

Lat *errō* 'go astray, wander about, roam, ramble, to move in an uncertain direction, wander from the course,' OHG *irran* 'lead astray,' Hit *āraszi* 'flow,' Ved *árṣati* 'go, move, rush, push, flow, move with a quick motion.' —Mallory and Adams (2006) 394; OLD 618; LIV 241; IEW 336–37; Monier-Williams 226; EIEC 206–7.

Notes on possible outside root connections:

1. Bomhard 666 cites Afrasian *ii, ei, yi?, ya,* etc. 'come, go, arrive at, went;' Dravidian *iyaṅku*, etc. 'move, stir, go, proceed, walk about, break in, marching, go on foot, lead, proceed, way, path, drive cattle, approach reach;' Chuk-Kamch. *jet,* etc. 'come, arrive, appear.'

Conclusions: Connections of root #1 with outside language families is probable.

***Table 33: *h₁(R)ed^h-* 'Come, grow, spring forth, originate'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**h₁leu̯d^h-*	*h₁*	*l*	*u̯*	*d^h*	1	Grow, sprout, ascend, come, grow up
**h₁ned^h-*	*h₁*	*n*		*d^h*	2	Come, arise, grow, spring forth
**Hu̯eRd^h-*	*H*	*u̯*	*R*	*d^h*	3	Grow, strengthen, increase, thrive

1. ***h₁leu̯d^h-* 'Grow, sprout, ascend, come, grow up'**

Ved *ródhati* 'sprout, shoot, grow,' *rodha* 'sprouting, growing, ascending, moving upwards,' Goth *liudan* 'grow, grow up,' OSax lōd 'has grown,' TochB *lac* 'surpass, exceed, go beyond,' YAv *raoδəṇti* 'grow,' Grk *ἤλυθον* 'came.' —LIV 248; IEW 306–07, 684–85; Monier-Williams 884; EIEC 248; Benveniste 261–64.

2. ***h₁ned^h-* 'Come, arise, grow, spring forth'**

Grk *ἐνθεῖν* 'come,' *ἐνήνοθε* 'grow, arise from, originate, spring forth,' —LIV 249; IEW 40-41; L&S 617.

3. ***Hu̯eRd^h-* 'Grow, strengthen, increase, thrive'**

Ved *vṛdhánt* 'increase, augment, strengthen, thrive, grow, grow up,' OAv *varədaitī* 'become stronger,' Ved *várdhate* 'grow, strengthen,' YAv *varəδaiiete* 'strengthen.' —LIV 228; IEW 1167; Monier-Williams 1010; Bomhard 804.

Notes on possible outside root connections:

3. Bomhard 804 cites Afrasian **war-am*, etc. 'raise, elevate, grow, increase, swell,' Dravidian *varai,* etc. 'mountain, peak, slope of hill,' Uralic *vaar,* etc. 'hill or mountain, forest, provide, fortify.'

Conclusions: Except for Afrasian, the semantic parallels to PIE are tenuous at best. The lack of final consonants in the roots cited further weakens possible connections with the PIE root.

***Table 34: *h₁e(R)s-* 'To be, to be at rest, to sit'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**h₁eh₁s-*	*h₁*		*h₁*	*s*	1	Sit, stay, remain
**h₁es-*	*h₁*		*ø*	*s*	2	Am, is, are, was, were

1. ***h₁eh₁s-* 'sit, stay, remain'**

Hit *ēsa* 'sit,' *āszi* 'stays, remains, is left,' Ved *ā́ste* 'sit,' YAv *å̊ŋhāire* 'sit,' Grk *ἧσται* 'sit.' —LIV 232; IEW 342–43; EIEC 522; Mallory and Adams (2006) 368; Bomhard 640.

Mallory and Adams (2006:296) write, "[This root] appears to be an intensive of *h_1es- 'be' (one might note that Spanish employs both the original verbs 'be' and 'sit' in its paradigm for 'be')."

2. ***h_1es-* 'Am, is, are, was, were'**
Hit *ēszi* 'is, are,' CLuv *āsta* 'was, were,' Ved *ásti* 'is, are,' Arm *em* 'am,' Grk *ἐστί* 'is, are,' Lat *est* 'is,' OIr *is* 'is,' Goth *ist, sind* 'is, are,' OLith *esmì, ēsti* 'am, is.' —LIV 241; IEW 340-41; Mallory and Adams (2006) 296.

Notes on possible outside root connections:
1. Bomhard 640 cites Proto-Afrasian *$ʔas^y$-, etc. 'put, place, set, sit, be seated, strengthen, fortify, found, establish,' Proto-Uralic *as^ye-, etc. 'place, put, set, reside, live, dwell, position, place, station, found, establish.'
Conclusions: Root connections to the Afrasian and Uralic forms are plausible.

***Table 35: *h_1(R)ed-* 'Wish, long for, desire, love, cherish'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
*h_1u̯eld-	h_1	u̯	l	d	1	Wish, long for, desire
*Hleh$_2$d-	H	l	h_2	d	2	Love, cherish, wish, desire

1. ***h_1u̯eld-* 'Wish, long for, desire'**
Grk *ἐέλδομαι* 'wish, long for, eager to reach, desire, be welcome,' *ἔλδωρ* 'wish, longing, desire.' —LIV 254; IEW 1137; L&S 530.

2. ***Hleh$_2$d-* 'Love, cherish, wish, desire'**
Rus *ládyj* 'dear,' *láda* 'wife,' TochB *lāre* 'dear,' Arm *alalem* 'love, caress,' Skt *lādayate* 'cherish, foster, wish, desire,' Lyc *lada* 'wife.' —Mallory and Adams (2006) (*$h_x leh_a d$-) 343; Monier-Williams 895.

***Table 36: *h_1e(R)k-* 'suffer, feel terrible, be hungry, die'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
*$h_1 e(\hat{k})$-	h_1			$(\hat{k})$	1	To die
*$h_1$elk	h_1		l	k	2	To hunger, to be bad, to be evil, empty stomach

1. ***$h_1 e(\hat{k})$-* 'To die'**
Hit *āki* 'die,' *ākkis* 'has died.' —LIV 234.

2. ***$h_1$elk* 'To hunger, to be bad, to be evil, to be on an empty stomach'**
Lith *álkstu (álkti)* 'to hunger,' OCS *lačǫ (lakati)* 'to hunger,' OIr *olc* 'bad,' ON *illr* 'evil, bad,' OPrus *alkīns* 'on an empty stomach.' —LIV 235; IEW 307.

*h_2-

***Table 37: *h_2(R)eĝ-* 'Take care of (animals?), tend, to milk, gather, clean'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
*$h_2 le(\hat{g})$-	h_2	l		$(\hat{g})$	1	Look after, care for, give careful attention to
*$h_2$melĝ-	h_2	m	l	ĝ	2	Squeeze out, press out, milk animals
*$h_2$merĝ-	h_2	m	r	ĝ	3	Squeeze out, gather up, wipe clean, graze animals
*$h_2 reh_1(\hat{g})$-	h_2	r	h_1	$(\hat{g})$	4	Help, aid, support, be concerned about, care for

1. ***$h_2 le(\hat{g})$-* 'Look after, care for, give careful attention to, gather up'**
Grk *αλέγω* 'to mind, look after, care for,' Lat *-legō, legere* 'look after, care for,' *dīligens*

'fond of, careful, attentive, diligent,' *dīligentia* 'carefulness, attentiveness, give careful attention to,' *legō* 'gather up, count up, follow the track of.' —LIV 276; IEW 658; L&S 61; OLD 543–44, 1014.

2. ***h₂melĝ-* 'squeeze out, press out, milk animals'**
Grk *ἀμέλγω* 'squeeze out, press out, to milk,' MIr *bligim* 'to milk' (< *mligim*), OE *melcan*, OHG *melchan* 'to milk,' Lith *mélžu* 'to milk,' Alb *mjel* 'to milk,' Lat *mulgeō* 'to milk,' TochA *mālk* 'milk.' —LIV 279; IEW 722–23; Mallory and Adams (2006) 261–62; L&S 80; Bomhard 850.

3. ***h₂merĝ-* 'To squeeze out, gather up, harvest, touch, wipe clean, graze animals'**
Grk *ἀμέργω* 'squeeze out, pluck, gather, harvest,' *ὀμόργνυμι* 'wipe off,' *ἀμοργός* 'press out,' *ἀμόργη* 'the liquid that runs out when olives are pressed' (also Lat *amurga, amurka*), Ved *mā́rṣṭi* 'wipe off, clean,' YAv *marəzaiti* 'touch, strip off, take off,' Arm *meržem* 'expel, drive cattle out to graze.' —LIV 280; IEW 738; Mallory and Adams (2006) 169; L&S 81, 1227; OLD 125; EIEC 258.

4. ***h₂reh₁(ĝ)-* 'Help, aid, support, be concerned about, pay attention to, care for'**
Grk *ἀρήγω* 'help, aid, succor, be good for, ward off,' ON *røkja* 'to be concerned,' pay attention to, take care of,' OHG *ruoh, ruohha* 'pay attention to, take trouble for, care, attention, conscientiousness,' NE *reck-* (opposite of *reckless* 'carelessness'). —LIV 284; IEW 857; L&S 238; de Vries 457.

Notes on possible outside root connections:
2. Bomhard 850 cites Proto-Afrasian **mal-*, etc. 'draw out, squeeze out, suck out, suckle, nurse,' Uralic **mälke-* etc. 'breast, chest,' Eskimo **malak*, etc. 'upper part of breast, chest, suck (breasts), nipple, milk.'
Conclusions: Despite the lack of final consonant in the Afrasian terms, credible parallels are found in the Uralic and Eskimo words compared by Bomhard, suggesting the probability of ancient root connections.

***Table 38: *h₂e(R)g-* 'To set oneself in motion, grow'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**Heiǵ-*	*H*		*i̯*	*ǵ*	1	Go, move, agitate, shake
**h₂u̯erg-*	*h₂*	*u̯*	*r*	*ǵ*	2	Turn, move downward, throw oneself
**h₂eu̯ǵ-*	*h₂*		*u̯*	*ǵ*	3	Grow, enlarge, increase

1. ***Heiǵ-* 'Go, move, agitate, shake'**
Ved *iṅgáyati* 'to go toward, move, agitate, shake,' *éjati* 'stir, move, tremble, shake,' —LIV 222; IEW 13–14; Monier-Williams 164, 231.

2. ***h₂u̯erg-* 'Turn around, move downward, throw oneself'**
Ved *várk* 'to turn around,' Lat *vergō* 'to move as on a downward slope,' Dutch *werkan* 'to throw oneself,' OCS *vrěšti* 'throw.' —LIV 290; IEW 1154; OLD 2036.

3. ***h₂eu̯ǵ-* 'Grow, enlarge, increase'**
Goth *aukan* 'increase, enlarge,' Lith *áugu* 'grow,' Lat *auxi* 'increased, enlarged,' *augeō* 'increase in quantity or size, enlarge, extend, swell, to grow,' Av *uxšyeiti* 'grows,' Skt *úkṣati* 'strengthens,' TochB *auk-* 'grow, increase,' NE *wax*. —LIV 274; IEW 84–85; OLD 212; Balg 36; EIEC 452; Mallory and Adams (2006) 190; NIL 328; Bomhard 722.

Notes on possible outside root connections:
3. Bomhard 722 cites Proto-Kartvelian **xwaw-*, etc. 'heap, pile, flock, much, many, multitude.'
Conclusions: Possible but uncertain connection to PIE.

***Table 39: *h₂e(R)k-* 'Have, defend, protect'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**h₂erk-*	*h₂*		*r*	*k*	1	Have, hold, retain, control, ward off, defend
**h₂elk-*	*h₂*		*l*	*k*	2	Ward off, protect, defend, help, avenge wrongs

1. ****h₂erk-* 'Have hold, retain, control, ward off, defend'**
Hit *harzi, harkanzi* 'have, hold, keep, retain,' Lat *arceō* 'keep close, contain, hold in, control, prevent from approaching, keep away, repulse, protect,' *arca* 'box, chest,' Grk *ἀρκέω* 'ward off, defend, keep off, assist,' Arm *argehum* 'hinder, restrain, hold back.' —LIV 273; IEW 65–66; OLD 162; Mallory and Adams (2006) 271; DELG 105; L&S 242; EIEC 270.

2. ****h₂elk-* 'Ward off, protect, defend, help, avenge wrongs'**
Grk *ἄλαλκε* 'ward off, keep off,' *Ἀλαλκ-ομενηῑ́ς* 'Protectress' (epithet of Athena), *ἄλκαρ* 'safeguard, defense,' *ἀλκή* 'strength, strength to avert danger, defense, help,' *ἀλκ-τήρ* 'one who wards off, protector, helping, healing,' Lat *ulcīscor* 'inflict retribution, take revenge, avenge wrongs,' Goth *alhs* 'temple,' Lith *aĨkas* 'sacred grove.' —LIV 264; IEW 32; Mallory and Adams (2006) 281; Balg 19; L&S 67; DELG 55–56; OLD 2083.

***Table 40: *h₂e(R)k̂-* 'Take as one's own, receive an allotment or share'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**Hei̯k̂*	*H*		*i̯*	*k̂*	1	Take, seize, lay hold of, receive, accept, possess, own
**h₂enk̂*	*h₂*		*n*	*k̂*	2	Hand over, allocate, present, portion, part, share, allotment

1. ****Hei̯k̂* 'Take, seize, lay hold of, receive, accept, possess, own'**
Oss *īs* 'take, seize, appropriate, capture, lay hold of, receive, accept,' TochB *aiśtär* 'recognize, perceive, apprehend, know,' Ved *ī'śe* 'have at one's disposal,' Goth *aih, aigun* 'possess, own, hold, occupy.' —LIV 223; IEW 298–99; Mallory and Adams (2006) (**h$_a$ei̯k̂*) 271.

2. ****h₂enk̂* 'Hand over, allocate, present, portion, part, share, allotment'**
Hit *hikzi* 'assign, allot, allocate, distribute, apportion to, hand over, present,' Ved *áṁśa* 'portion, part, share, allotment,' Grk *ἀνάγκη* 'necessity.' —LIV 268; IEW 45, 318; Mallory and Adams (2006) (**h$_{2/3}$enk̂*) 270.

***Table 41: *h₂e(R)-s-* 'Fire, heat, dry out, burn, altar, blaze'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**h₂eu̯-s-*	*h₂*		*u̯*	*-s*	1	Kindle a fire, give fire to a neighbor, apply fire to smoke out bees
**h₂eh₁-s-*	*h₂*		*h₁*	*-s*	2	Hearth, altar, dry up, suffer from thirst, wither, be parched
**h₂eh₁-*	*h₂*		*h₁*		3	Fire, burn, be hot, kiln, with derivatives meaning ash, fire, heat of day
**h₂el-*	*h₂*		*l*		4	Burn a sacrifice, altar, blaze, flare up, firebrand, coal

1. ****h₂eu̯s-* 'Kindle a fire, give fire to a neighbor, apply fire to smoke out bees'**

Grk *αὕω* 'get a light, light a fire, take fire,' Grk Att *-αῦσαι* 'light a fire,' *ἐναύω* 'kindle a fire, light a fire, give a light (as was the duty of a neighbor), apply fire (to smoke out bees).' —LIV 275; IEW 90; L&S 285, 557.

2. ***h₂eh₁s-* 'Hearth, altar, dry up, suffer from thirst, wither, be parched'**
TochB *asāre* 'dry up, wither, desiccate,' Lat *āreō* 'to be dry or parched, to be withered from lack of moisture, to suffer from thirst, be dry,' TochA *asatär*, TochB *osotär* 'dry up, wither, desiccate,' Lat *āra* 'altar,' Hit *hāssa* 'hearth.' —LIV 257; IEW 68; OLD 166; Bomhard 717.

LIV suggests that this root is an extension of the following (see **h₂eh₁s-*, note 1; and **h₂eh₁-*, note 1).

3. ***h₂eh₁-* 'Fire, burn, be hot, kiln, with derivatives meaning ash, fire, heat of day'**
Palaic *hāri, hānta* 'to burn, to be hot,' Av *āt(ə)r-* 'fire,' OIr *āith* 'kiln.' —LIV 257; Mallory and Adams (2006) 67, 124.

4. ***h₂el-* 'Burn a sacrifice, altar, blaze, flare up, firebrand, coal'**
Lat *altar* 'altar,' *adoleō* 'burn a sacrifice,' Swed *ala* 'blaze, flare up,' Skt *alātam* 'firebrand, coal.' —Mallory and Adams (2006) 124; IEW 28; Bomhard 739.

Notes on possible outside root connections:
2. Bomhard 717 cites Afrasian *ḥasḥasa*, etc. 'place meat on the coals, roast,' Uralic **äs₃-* 'to heat, to ignite,' Proto-Altaic **ase-* 'catch fire, hot, burn, ignite, warm, heat, hot wind.'
4. Bomhard 739 cites Afrasian **ʕal-aw/y-* 'burn, burnt offering, make a fire, ignite, kindle, catch fire.'
Conclusions: Both semantically and phonetically these outside roots parallel the PIE forms, suggesting that the two resonant variants here were formed while still in contact with the Afrasian, Uralic, and Altaic families.

**h₃-*

***Table 42: *h₃(R)ed-* 'Hate, be angry at, blame, abhor, detest, despise'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**h₃ed-*	*h₃*			*d*	1	Hate, be angry at, be terrible
**h₃neḭd-*	*h₃*	*n*	*i̯*	*d*	2	Mock, blame, abhor, detest, hate, despise

1. ***h₃ed-* 'Hate, be angry at, be terrible'**
Lat *ōdī* 'to hate,' *odium* 'hate, hatred,' OE *atol* 'atrocious,' Grk *ὀδύσσασθαι* 'be angry at, hate,' Arm *ateam* 'hate,' Hit *hatukzi* 'is terrible.' —LIV 296; IEW 773; Mallory and Adams (2006) 344; Bomhard 719.

2. ***h₃neḭd-* 'Mock, blame, abhor, detest, hate, despise'**
Ved *nidānā́* 'blame, criticize, reprimand,' *nid* 'mocking, ridiculing, contempt, mocker, blamer, scoffer, enemy,' Lith *níedu* 'abhor, abominate, detest,' Latv *nîdu* 'hate,' Arm *anēc* 'curse, damn, execrate,' Goth *naitjan* 'abuse, revile, despise.' —LIV 303; IEW 760-61; Mallory and Adams (2006) 344; Monier-Williams 547–48; EIEC 313.

Notes on possible outside root connections:
1. Bomhard 719 cites Afrasian *ḥaṭā* 'to shake,' Dravidian *atir*, etc. 'shake, quake, tremble, be startled, alarmed, roar of beasts, fear, shiver.'
Conclusions: The semantics are distant and genetic connections doubtful unless one can accept the semantic development from "fear" to "hate."

**k̂-*

***Table 43: *k̂e(R)k-* 'shell, pebble, limestone pebble'**

PIE Root	Init	R1	R2	Final	Ref	Semantic Value
**k̂ork-ā-*	*k̂*		*r*	*k*	1	Gravel, grit, pebble on the sea-shore
**k̂onk-$h_a$os*	*k̂*		*n*	*k*	2	Mussel shell, conch shell (commonly used as pendants)
**k̂elk-*	*k̂*		*l*	*k*	3	Hypothetical root to account for Latin *calx*
**k̂e̯uk-*	*k̂*		*u̯*	*k*	4	Shine, glow, mussel, pearl oyster, mother of pearl, cockle

1. ****k̂ork-ā-* 'Gravel, grit, pebble on the sea-shore'**
Skt *śárkarā* 'gravel, grit, pebbles,' Grk *κροκάλη* 'pebble on the sea-shore.' —IEW 615; Monier-Williams 1058; L&S 997; EIEC 547–48.

2. ****k̂onk-* 'Mussel shell, conch shell'**
ON *hengja* 'hang,' Hitt *kānki* 'hang, suspend.' Extended form **k̂onk-$h_a$os* 'mussel and any related shellfish' (presumably from conch or cowrie shells used as pendants), Grk *κόγχος* 'mussel shell, conch shell,' Skt *śaṅká* '(conch) shell.' —Mallory and Adams (2006) 150, 388, 439 (indicating that **k̂onk$h_a$os* is derived from **k̂onk-*); LIV 325; Watkins (2011) 45; IEW 566, 614; L&S 966; AHD 382; de Vries 222; Bomhard 601 (hang).

3. ****k̂elk-* 'Proposed hypothetical root to account for Lat *calx, calk-is*'**
Lat *calx, calkis* 'lime, limestone, pebble (> NE "calculate," from the small stone, probably limestone, used in reckoning; also "calcium"), *calculōsus* 'full of pebbles, pebbly,' *calculus* 'a small stone or pebble, stone or gravel in the bladder or kidney, a pebble used in making calculations or on a counting board,' Poss. Grk *χάλιξ, χάλικος* 'small stone, pebble, rubble and mortar used to make concrete.' —L&S 1972; OLD 261–62; AHD 262, 267; DELG 1198–99; EIEC 287.

Note that Limestone is derived from the shells of crustaceans like mussels, snails, and conches that are frequently referred to in the other roots in this resonant-series.

4. ****k̂e̯uk-* 'shine, glimmer, mussel, pearl oyster, mother of pearl, cockle shell'**
Skt *śócati* 'glow, shine, glimmer,' *śukti* 'mussel, pearl oyster, mother of pearl, a small shell or cockle.' —LIV 331; IEW 597; Monier-Williams 1080; EIEC 514.

Notes on possible outside root connections:
2. Bomhard 601 cites Afrasian *šankala* 'to hook up, peg, hook,' Dravidian *cuṅku, etc.* 'end of cloth left hanging out in dressing, pleat, or fold of garment, the end of a garment, cloth, dangling tatter.'
Conclusions: Semanticly and phonetically this PIE root shows credible parallels to the Afrasian and Dravidian forms, suggesting ancient genetic connections.

***Table 44: *k̂e(R)-* 'Cover, conceal, coat'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**k̂el-*	*k̂*		*l*		1	Cover, conceal, cloth garment
**k̂em-*	*k̂*		*m*		2	Cover, shirt, wool coat
**k̂er-*	*k̂*		*r*		3	Cover of hair, coat of hair

1. ****k̂el-* 'Cover, conceal, cloth garment'**
OIr *ceilid* 'conceals, dissembles,' Lat *cēlō* 'conceal,' *occulō* (<**ob-kelō*) 'cover, hide,' ON *hylja* 'to cover,' OE *helan* 'to conceal,' OHG *helan* 'to conceal,' Goth *huljan* 'to cover,' OSax *bi-hellian* 'cover, veil, wrap up,' Ved *śárman* 'shelter, cover, protection,'

śarmara ‘garment, cloth.’ —IEW 553–54; EIEC 134; Mallory and Adams (2006) 380; LIV 322; Monier-Williams 1058; L&S 871.

2. ***k̂em-* ‘Cover, coat’**

Late Lat *camīsia* ‘linen shirt, nightgown,’ ON *hamr* ‘skin, slough,’ *hams* ‘snake’s slough, husk,’ OE *hama* ‘dress, covering,’ *ham* ‘undergarment, *hemeð* ‘shirt,’ Skt *śāmūla* ‘thick woolen shirt,’ *śamī-* ‘pod, legume,’ Bret *kamps* ‘a ceremonial coat warn at the mass.’ —IEW 556–57; EIEC 134; Mallory and Adams (2006) 379; Bomhard 567.

3. ***k̂er-* ‘Cover of hair, coat of hair’**

Eng *hair*, Lith *šr̃ys* ‘bristle, animal hair,’ Rus *šerstî* ‘wool, animal hair,’ Latv *sari* ‘bristle,’ Rus-CSlav *sʙrstʙ* ‘wool,’ Slov *sŕst* ‘animal hair.’ —IEW 583; Mallory and Adams (2006) 178; Bomhard 598.

Notes on possible outside root connections:

2. Bomhard 567 cites Proto-Afrasian **kam* ‘to cover, hide, conceal, cloak,’ Proto-Kartvelian *qaml̥, etc*. ‘skin of sheep or goat, shoe,’ Proto-Uralic **kama*, etc. ‘peel, skin, surface, crust, scalp, rind, fish scale,’ Eskimo **qəmtəq*, etc. ‘roof, ceiling, be filled to the brim, become high tide, attic, upper floor.’

3. Bomhard 598 cites Afrasian (Hebrew) *śēʕār*, etc. ‘hair, fur, pelt, wool, bristle, straw, grass, comb,’ Dravidian *īrppi,* etc. ‘nit, to comb out nits, lice, comb for removing nits.’

Conclusions: The phonetics and semantics are close, suggesting that these two resonant variants were created while PIE was still in contact with the outside language families.

***Table 45: *k̂e(R)s* ‘Praise, predict, tell, teach, announce’**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**k̂eNs-*	*k̂*		*N*	*s*	1	Praise, predict, tell, teach, show, announce
**k̂eHs-*	*k̂*		*H*	*s*	2	Praise, predict, tell, teach, announce, proclaim

1. ***k̂eNs-* ‘Praise, predict, tell, teach, show, announce’**

Ved *śáṁsati* ‘recite, repeat an invocation, praise, extol, relate, say, tell, report, announce, predict,’ OAv *səŋhaitī* ‘announce, proclaim, preach, prophesy,’ MCymr *dan-gos-* ‘show, demonstrate,’ Lat *cēnseō* ‘give an opinion, recommend, decide, decree, assess.’ —LIV 326; IEW 566; Monier-Williams 1043–44; OLD 297; Benveniste 424–27.

2. ***k̂eHs-* ‘Praise, predict, tell, teach, announce, proclaim’**

Ved *śā́ssi* ‘chastise, correct, censure, control, rule, direct, bid, order, teach, instruct, inform, announce, proclaim, predict, foretell, praise, commend,’ OAv *sāstī* ‘instruct, teach,’ Alb *thom* ‘say,’ *rrëfen* ‘tell, confess, admit, tell the truth.’ —LIV 318; IEW 533; Monier-Williams 1068.

Whitney (1885:172) states that these two roots are “apparently related.”

**k-*

***Table 46: *k(R)ep-, *ke(R)p-* ‘Womb, vulva, uterus, vibrate, sexual excitement’**

PIE Root	Init	R1	R2	Final	Ref	Semantic Value
**keu̯p-*	*k*		*u̯*	*p*	1	Desire, covet, shake, tremble, vibrate, be in a passion, vulva
**ku̯elp-*	*k*	*u̯*	*l*	*p*	2	Womb, vagina, gulf, arched or vaulted ceiling
**k^{u}lep-*	*k*	*u̯*	*l*	*p*	3	Desire
**krep-*	*k*	*r*		*p*	4	Body, belly, womb, uterus, midriff
**k$^{(u)}$emp-*	*k*	*(u̯)*	*m*	*p*	5	Tremble, shake, quiver, vibrate

1. ***keu̯p-* 'Desire, covet, vibrate, be in a passion'**
ON *hjúfa* 'moan,' Skt *kupyati* 'shake, tremble, thrill, vibrate, to be moved, be excited, be agitated, be in a passion,' Lat *cupiō* 'wish, want, desire,' *cupiditās* 'passionate desire, longing, yearning, lust, passion, the object of one's desire,' *cupidus* 'eager for carnal pleasure, wanton, lecherous, passionately longing,' *cupītus* 'that which one desires, beloved,' Ved *kopáyati* 'shake, quake, vibrate, be in a passion,' Slav **kъpъ*, Czech *kep* 'vulva.' —LIV 359; IEW 591, 596; Monier-Williams 291; de Vries 233; OLD 472–73; Watkins (2011) 47.

2. ***kṷelp-* 'Womb, vagina, gulf, arched or vaulted ceiling'**
Grk *κόλπος* 'bosom, lap, vagina, womb, bay, gulf, fold of garment,' ON *holf* 'the domed, arched, curved, or vaulted ceiling of a room,' OHG *be-welben* 'surround, encircle, curve or arch over.' —LIV 375; IEW 630; L&S 974; de Vries 247; Kluge 869; Mallory and Adams (2006) 384; EIEC 62.

Use of this root to denote an arched, domed, or vaulted ceiling probably originally developed from the notion of a curved, concave, womb-like room. It is highly unlikely that the name of the womb or vagina (as in Grk *κόλπος*) would be derived from geographical or architectural features (bay, gulf, arched ceiling). Typically, derivatives develop from the more familiar term to the more abstract term. It is far more likely that the word for *womb* inspired the notion of a bay with a narrow opening, or of a room with a curved ceiling than the other way around.

There are three additional attested words that are not usually placed with this root, but that share strong semantic connections and close (or exact) phonetic form. They are included below for consideration:

- OHG *(h)wëlf*, OSax, OE *hwëlp*, MHG *wëlf*, ON *hwëlpr*, Eng *whelp* 'young offspring of a mammal, such as dog or wolf, to give birth to, to whelp,' all from Germanic **hwelpa*. —AHD 1958; Kluge 852; EIEC 615.

Germanic **hwelpa* probably dissimulated from earlier **hwelfa* to distinguish this word from the very similar sounding word, *wolf*, which had altogether different origins and an independent history. As can be seen in **gʷelbʰ* ('Womb, uterus, young animal'), the PIE word for womb was also commonly applied to the fruit of the womb, i.e. the embryo or young offspring of human or animal. The word *whelp* has no known PIE origin.

- Lat *culpa* 'guilt, blame, an offense (often of sexual misconduct), a moral defect,' *culpābilis* 'deserving of censure, reprehensible.' —OLD 465–66.
- Osc *kulupu* 'culpa(?)' with normal anaptyxis. —Buck 50, 51, 252, 314.

In the ancient world, rape, adultery, and fornication were considered some of the most culpable and reprehensible offenses. These all involve unauthorized entry into a woman's vagina, and the concept of such guilt was apparently derived from that organ. Neither Latin *culpa* nor Oscan *kulupu* has any known PIE origin.

3. ***kʷlep-* 'Desire'**
Av *xrap-* 'desire,' TochAB *kulyp-* 'desire.' —Mallory and Adams (2006) 342; EIEC 158.

The semantics of this root parallel that seen in #1 above. The instinct for procreation, and the focus on the organs of procreation, constitute some of the strongest sources of desire in the human being.

4. ***krep-* 'Body, belly, womb, uterus, midriff'**
OHG *(h)rëf* 'belly, womb, uterus,' OFris *href* 'belly,' OE *hrif* 'womb, uterus, belly,' *mid(h)rif* 'midriff,' Grk *πραπίς* 'diaphragm,' Lat *corpus* 'the body, the generative powers, to live by prostitution (*corpore quaestum facere*), the center of certain physiological needs and desires, especially as representing the grosser elements in human nature,' Skt *kr̥pá* 'form, beauty,' Av *kəhrpəm* 'form, body,' MIr *crī* 'body' (< *kr̥pes*). —Mallory and Adams (2006) 178; IEW 620; OLD 448; Bomhard 526.

5. ***k$^{(w)}$emp-* 'Tremble, shake, quiver, vibrate'**
Ved *sam-pra-kampante* 'tremble, shake, quiver, vibrate, to be in excited motion,' YAv *kafsąn* 'shake, tremble, quiver, vibrate,' Ved *kampáyāmi* 'let shake, tremble, vibrate.' Possibly Lat *con-cumbō* 'to lie together (for sexual intercourse).' —LIV 351; [IEW 525; Mallory and Adams (2006) 384]; OLD 392, 464.

On semantic grounds, LIV excludes attested words with distant meanings, such as *field, maimed, corner, edge, etc.*, (cited in IEW and Mallory and Adams) as these are probably from a different root. I follow LIV here. Latin *con-cumbō* 'to lie together (for sexual intercourse)' belongs here only if one can accept that the /p/ becomes voiced to /b/ through assimilation with the preceding voiced /m/. Otherwise, Lat *(con-)cumbō* has no known PIE origin. Perhaps it is a collateral form of Lat *cubō*, 'to lie down, recline,' *cubīle* 'a bed regarded as the scene of sexual relations, a marriage bed,' as suggested by OLD 392, but Lat *cubō, cubīle* likewise has no known PIE origin.

Notes on possible outside root connections:
4. Bomhard 526 cites Afrasian (Akkadian) *karšu*, etc. 'body, belly, womb, stomach,' Proto-Uralic **kurɜ* 'body, form, figure.'
Conclusions: While semantic parallels seem to be present, the lack of final consonant in the Afrasian and Uralic makes outside root connections doubtful.

***Table 47: *k(R)ep-* 'steal, hide'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**klep-*	*k*	*l*		*p*	1	Steal, conceal, cover, hide
**kreu̯p-*	*k*	*r*	*u̯*	*p*	2	Hide, conceal, bury, keep secret, steal, betray

1. ***klep-* 'steal, conceal, cover, hide'**
Grk *κλέπτω* 'steal, carry off, spirit away,' *κλέπτης* 'a thief, robber, cheat, knave,' Lat *clepō* 'take away secretly, steal, hide oneself away, steal away,' Goth *hilfan* 'steal,' TochB *kälypi* 'steal,' OPrus *anklipts* 'concealed.' Probably Grk *καλύπτω* 'cover, hide, conceal' (semantically an exact fit, but with unexplained epenthetic vowel and with altered second vowel probably by analogy with the following root). —LIV 363; IEW 553, 604; L&S 958; OLD 336; Mallory and Adams (2006) 335; EIEC 595; Bomhard 408.

2. ***kreu̯p-* 'Hide, conceal, bury, keep secret, steal, betray'**
Grk *κρύπτω* 'hide, conceal, cover in the earth, bury, keep secret, lie hidden, keep covered,' TochB *kraup-* 'gather,' Latv *krâpju* 'steal, betray,' Lith *krópti* 'steal.' —Mallory and Adams (2006) 267; IEW 616; L&S 1000; EIEC 217.

Mallory and Adams (2006) and IEW analyze this root with final in *-b^h* as a root extension.

Notes on possible outside root connections:

1. Bomhard 408 cites Dravidian *qale*, etc. 'rob, steal, thief, theft, deceitful.'
Conclusions: While semantic parallels exist, lack of final consonant in the Dravidian makes root connections doubtful.

***Table 48: *(s)k(R)et-* 'shake, shudder, quake, vibrate'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**kret-*	*k*	*r*	*ø*	*t*	1	Shake, agitate, rattle, strike
**kreu̯t-*	*k*	*r*	*u̯*	*t*	2	Move, quick, shake, agitate, flutter
**(s)ku̯eh₁t-*	*(s)k*	*u̯*	*h₁*	*t*	3	Hurry, strew, sprinkle, shake, agitate, strike, jolt
**(s)ku̯(n)t-*	*(s)k*	*u̯*	*(n)*	*t*	4	Shake, jolt, quake, convulse

1. ****kret-* 'shake, agitate, rattle, strike'**
OHG *redan* 'sift,' OE *hraðe* 'quick,' Lith *krečiù* 'shake, agitate, vibrate, strew by shaking,' Grk *κροτέω* 'rattle, strike, clap,' MIr *crothaid* 'shakes.' —LIV 370; Mallory and Adams (2006) 380; IEW 620; L&S 999; EIEC 509.
2. ****kreu̯t-* 'Move, quick, shake, agitate, flutter'**
ON *hraustr* 'quick,' Lith *krutù* 'move, stir,' MHG *rütten* (**hrudjan*) 'shake, agitate,' OE *hrēaðe-mūs* 'bat' (literally "fluttering mouse"). —Mallory and Adams (2006) 380; IEW 623; EIEC 509.
3. ****(s)ku̯eh₁t-* 'Hurry, strew, sprinkle, shake, agitate, vibrate, strike, jolt'**
ON *skynda* 'hasten, go quickly, anything hurried,' OE *scyndan* 'hurry, hasten, urge, incite,' Grk *πάσσω* 'strew, sprinkle,' Lat *quatiō* 'shake, rock, agitate, tremble, vibrate, hurry, strike,' OHG *scutten* 'shake, agitate, vibrate, jolt, joggle.' —LIV 563; Mallory and Adams (2006) 380; IEW 632, 957–58; EIEC 509; Vigfusson 563; Bosworth and Toller 847; L&S 1346; OLD 1544–45; Bomhard 520.
4. ****(s)ku(n)t-* 'shake, jolt, quake, convulse'**
OHG *scutten* 'shake violently, convulse, quake, vibrate,' NE *shake, shudder*, Lith *kuntù* 'recover, get better,' OCS *skytati sę* 'wander,' Lith *kutù* 'shake up, arouse.' —Mallory and Adams (2006) 380; IEW 957–58; EIEC 509.

Notes on possible outside root connections:
3. Bomhard 520 cites Afrasian (Egyptian) *ktkt,* etc. 'shake, quiver, make with the hands, touch, build,' Dravidian *kuti*, etc. 'jump, leap, bound, frolic, splash, boil, bubble, stamp, trot, agitation, shake violently,' Proto-Kartvelian **kwet-* 'move, shake, swing, sway, move something.'
Conclusions: Root 3 appears to correspond semantically and phonetically with the outside non-PIE roots.

***Table 49: *ke(R)h₁-* 'sing, call, praise, extol, proclaim, chant incantations'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**kan-*	*k*		*n*		1	Sing, celebrate, extol, proclaim, sound a call, chant incantations, the cry of birds, the cock
**kerH*	*k*		*r*	*H*	2	Praise, celebrate, extol, announce, report, fame
** ʿk̂ʾelh₁, *kleh₁*	*ʿk̂ʾ*		*l*	*h₁*	3	Proclaim, praise, extol, call, charm by incantation and music, the cock

1. ****kan-* 'sing, celebrate, extol, proclaim, sound a call, chant incantations, the cock'**
OIr *canaid* 'sings,' *cechain* 'sang,' Wels *canu* 'sing, play an instrument,' Lat *canō* 'sing, chant incantations, celebrate (in verse), relate, tell, extol, proclaim, tell rumors, sound a

call, (of birds) to cry,' prophesy, foretell' *carmen* 'song, prophecy, form of incantation,' Grk *ηι-κανός* 'cock' (literally 'dawn-singer), probably TochB *kene* 'song, tune,' Umb *kanetu* 'let sing,' Goth *Hahn* 'cock.' —Mallory and Adams (2006) 358; LIV 342; IEW 525–26; EIEC 519; OLD 266; Bomhard 414.

2. ***kerH* 'Praise, extol, fame'**

Ved *akāriṣam* 'have praised, have extolled,' *carkarmi* 'to praise, celebrate, extol,' YAv *carəkərəmahī* 'we praise,' OE *hrēþ* 'fame,' ON *herma* 'announce, report,' OHG *hruom* 'fame.' —Mallory and Adams (2006) (**kar*-) 337; LIV 353; IEW 530-31; deVries 224; EIEC 449.

3. ***$^{(}\hat{k}^{)}$*elh*$_1$, **kleh*$_1$ 'Proclaim, praise, extol, call, charm by incantation, the cock'**

OIr *cailech* 'cock,' Wels *ceiliog* 'cock,' Lat *calō* 'announce, proclaim, summon,' ON *hjala* 'chatter, talk,' Grk *καλέω* 'call,' *καλήτωρ* 'herald,' *κηλέω* 'charm, bewitch, beguile ("especially by music"), charm by incantation,' Hit *kalless* 'call,' Skt *uṣā-kala* 'cock' (literally "dawn caller"), ON *høla* 'praise, extol, celebrate.' —LIV 349, 361; IEW 548–551; EIEC 90; OLD 260; L&S 947; deVries 278; Bomhard 404.

Notes on possible outside root connections:

1. Bomhard 414 cites Afrasian (Egyptian) *kny* 'to call,' Dravidian *kaṇakaṇa*, etc. 'to sound, rattle, jingle, ring, tinkling,' Proto-Uralic **kaŋз*, etc. 'to call, to invite, ask, request, beg,' Chuk-Kamch *kəŋ(lœ)*, etc. 'growl, snarl.'

3. Bomhard 404 cites Proto-Afrasian **kal*, etc. 'make a noise, to sound, to call out, to shout, cry out, howl, argue, quarrel, resound,' Dravidian *kalakala*, etc. rustle, tinkle, rattle, sound, clamor, roar, chatter, gurgle, noise, sound, clamor, tumult chattering of birds, shout,' Eskimo **qaləʀ* 'yell, ring, whistle, growl, cry, shriek, whine, twitter, bark, make a characteristic animal sound.'

Conclusions: These two roots appear to have differentiated as resonant-variants while still in contact with the outside language groups.

Table 50: *(s)ke(R)p- **'Cut, scratch, carve, take, gather, catch, seize, reap, pluck, harvest'**

PIE Root	Initial	R1	R2	Final	Ref.	Semantic Value
**(s)kep-*	*(s)k*		*ø*	*p*	1	Cut, hack, hew, dig, strike
**(s)kerp-*	*(s)k*		*r*	*p*	2	Cut off, shear, shape, pluck, harvest, reap, seize
**(s)kelp-*	*(s)k*		*l*	*p*	3	Scratch, carve, engrave, split or hew smoothly
**keh₂p-*	*k*		h_2	*p*	4	Take, gather, reap, seize, catch, have, hold

1. ****(s)kep-* 'Hack, hew, cut'**

Grk *κόπτω* 'smite, cut off, chop off, fell trees,' Lith *kapù* 'hew, hack,' OCS *skopljǫ* 'cut away, cut off, cut down,' Alb *kep* 'hewn, hacked,' NPers *kāf* 'split,' Grk *σκέπαρνος* 'hatchet for hewing wood.' —LIV **(s)kep-* 555; IEW **(s)kep-* 931–32; L&S 979.

2. ****(s)kerp-* 'Cut off, shear, shape, pluck, pull, pick, harvest, reap, seize'**

Lith *kerpù* 'cut, shear,' OCS *po-čгьpǫ* 'to shape,' Lat *carpō* 'pluck, pull, pick, harvest, crop, seize, pull off, take away,' Grk *καρπόω* 'take as fruit or produce, reap crops from, exploit, bear fruit,' *καρπάλιμος* 'eager, ravenous,' *κάρπασος* 'cotton,' *καρπός* 'fruit, fruits of the earth, corn, harvest, crops, wool, produce,' NE *harvest*, Skt *karpāsa* 'cotton.' —LIV **(s)kerp-* 559; OLD 279; IEW **(s)kerp-* 944–45; Monier-Williams 258; L&S 879–80; EIEC 258.

3. ****(s)kelp-* 'scratch, carve, engrave, hew wood'**

Lat *scalpō* 'scratch, carve, engrave,' *sculpō* 'carve or engrave,' OHG *scelifa*, MHG dial. *schelfe* 'skinned bark,' MNG *schelver* 'piece (of wood) with leaves removed,' ON *skjǫlf*

'bench,' OE *scielfe* 'story, floor, tier,' MNG *schelf* 'book-shelf, wooden framework,' (without s-): Got *halbs*, ON *halfr*, OE *healf,* OSax *half*, OHG *halb* (literally 'divided') 'grip, handle, shaft,' NE *helve*, Lith *kálpa* 'cross-beam on a sledge,' OPrus *kalpus* 'upright pole,' Lith *sklempiù* 'smoothly hew or dress timber, to polish.' —IEW ***(s)kelp-** 926; OLD 1698, 1713.

4. ***keh₂p-* 'Take, gather, reap, seize, catch, have, hold'**

Lat *capiō* 'take into the hand, take hold of, take food or drink, catch, gather, reap, capture, seize, take booty,' Grk *κάπτω* 'greedy, gulp down,' Goth *hafjan* 'lift, heave,' OHG *habēn* 'have, hold,' Latv *kàmpju* 'seize,' Alb *kap* 'catch, grab, seize,' Skt *kapaṭī* (dual) 'two handfuls.' —Watkins (2011) 38; IEW 527; LIV 344; EIEC 563; L&S 876; OLD 269–71; Balg 148; Mallory and Adams (2006) 270-71; Bomhard 415.

Notes on possible outside root connections:

4. Bomhard 415 cites Proto-Afrasian **kap-*, etc. 'take, seize, hand, palm, paw, claw, flat of the hand, cut off the hands,' Elamo-Dravidian *kap-pi*, etc. 'catch, latch, clasp, brooch, cover or press gently with the hand, throw the hand or claws upon in order to catch, feel with the hand, touch,' Uralic (Proto-Finno-Ugrian) **kappɜ-*, etc. 'take seize, grasp, captive, hand, paw,' Proto-Altaic **kʰapʰV-*, etc. 'press, grasp, strangle, pinch, squeeze, hold, join, press together, snatch, take, bite, carry off, acquire, loot,' Proto-Eskimo **kapət-*, etc. 'be narrow, constricted, tight-fitting, pull outer garment over inner one.'

Conclusions: This root is well-represented in the outside language families and therefore appears to be a distant cognate.

***Table 51: *ke(R)-* 'To love, desire, be pleased, copulate with; friend, pleasure, whore'**

PIE Root	Initial	R1	R2	Final	Ref.	Semantic Value
**keh₂-*	*k*		*h₂*		1	Love, desire, gladness, friend, adulterer, whore, greedy
**kem-*	*k*		*m*		2	Love, desire, hunger, lasciviousness, charming, beautiful, copulates with
**ken-*	*k*		*n*		3	Love, be pleased, demand, request, tendency, pleasure

1. ***keh₂-* 'Love, desire, gladness, friend, whore'**

Ved *kā́yamāna* 'desire,' OAv *kaiiā* 'to be glad,' Lat *cārus* 'love,' Goth *hors* 'adulterer,' Ved *kam*^{i} 'desire, love,' OIr *caraid* 'loves,' *cara* 'friend,' Wels *caraf* 'love,' NE *whore*, Latv *kārs* 'greedy.' —IEW 515; EIEC 357; LIV 343.

2. ***kem-* 'Love, desire, hunger, lasciviousness, charming, beautiful, copulates with'**

Lith *kamaros* 'lasciviousness,' Latv *kāmêt* 'hunger,' Skt *kāmáyati* 'desires, longs for, is in love with, copulates with,' *kamra-* 'charming, beautiful,' *kamana-* 'greedy,' TochB *kāñm* 'play.' —EIEC 357; IEW 515.

3. ***ken-* 'Love, be pleased, demand, request, tendency, pleasure'**

MIr *cin* (< **kenu-*) 'love, tendency,' Av *čakana* 'be pleased,' *čanah-* 'demand, request,' Skt *cākana* 'is pleased,' *cánas-* 'pleasure.' —EIEC 358; IEW 515.

K^{u}-

***Table 52: *k$^{(u)}$se(R)b^{h}-* 'shake, vibrate, whirl around, swing, toss'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**k$^{(u)}$seu̯b^{h}-*	*k$^{(u)}$*s		*u̯*	*b^{h}*	1	Shake, tremble, vibrate, swing, toss
**k$^{(u)}$su̯eib^{h}-*	*k$^{(u)}$s*	*u̯*	*i̯*	*b^{h}*	2	Throw, toss, move hastily, turn, swing

1. ***k$^{(u)}$seu̯b^{h}-*** **'shake, tremble, vibrate, swing, toss'**
Ved *kṣobhate* 'shake, tremble, be agitated or disturbed, be unsteady, stumble, stir up, excite,' *kṣubhita* 'agitated, shaken, tossed, set in motion,' YAv *xšufsąn* 'shake, tremble, vibrate,' Pol *chybać* 'swing, rock, pitch, move back and forth.' —LIV 372; IEW 625; Monier-Williams 331.
2. ***k$^{(u)}$su̯eib^{h}-*** **'Throw, toss, move hastily, turn, swing'**
Ved *kṣipáti* 'throw, cast, toss, move hastily,' YAv *xšuuaēβaiiaṯ.aštra* 'swing the whip,' OCS *o-šibati* 'turn oneself around,' Rus *šibát* 'throw.' —LIV 373; IEW 625, 1041; Monier-Williams 328.

Table 53: *k^{u}e(R)- **'Make, do, gather, fabricate, spin, build'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
*k^{u}er-	k^{u}		r		1	Make, do, manufacture, cultivate, execute, build, create
*k^{u}ei̯-	k^{u}		i̯		2	Make, do, manufacture, create, construct, gather up, arrange in order
*k^{u}el-	k^{u}		l		3	Turn, turn the earth (i.e. plow, cultivate), spin (i.e. manufacture yarn), wheel, spindle
*k^{u}er-pH-	k^{u}		r		4	Turn, wrist, whirlpool

1. ***k^{u}er-*** **'Make, do, manufacture, cultivate, build'**
Ved *kr̥ṇóti* 'make, do, manufacture, cultivate, execute, build' OIr *cruth* 'form,' Lith *kuriù* 'make, build, create,' OCS *kručĭjĭ* 'smith,' Av *kərənaoiti* 'does, makes,' Lith *kẽras* 'magician,' Rus *čáry* 'sorcery.' —LIV 391; IEW 641–42; Watkins (2011) 47; Mallory and Adams (2006) 370; Monier-Williams 300-303; Mayrhofer I.307; Bomhard 525; EIEC 362.
2. ***k^{u}ei̯-*** **'Make, do, manufacture, create, gather up, construct'**
Grk *ποιέω* 'make, do, manufacture, create, produce, bring about, cause,' OCS *činĭ* 'order,' Skt *cinṓti* 'arrange in order, heap up, pile up, construct, gather together.' —LIV 378; IEW 637–38; Watkins (2011) 46; Mallory and Adams (2006) 219–20; L&S 1427; Monier-Williams 394; Bomhard 523.

Probably the first manufacturing activity that human beings engaged in was the production of textiles, which was based on the spinning of yarn from raw fleece and fibers. As the early Indo-Europeans transitioned from an economy built around hunting, gathering, and herding animals to one of settled agriculture, the next most important activity would have been the cultivation of the soil, which involved turning the earth through plowing. ****k^{u}el-*** includes both of these concepts, and these link it to the roots cited above. Since the notions "*make, do, manufacture*" that the above roots express, are more general than the the specific concepts expressed by ****k^{u}el-*** , it may very well be that ****k^{u}el-*** retains the earliest and most fundamental sense of this resonant series, as semantic development usually proceeds from the specific to the more general.

3. ***k^{u}el-*** **'Turn, turn the earth (i.e. plow, cultivate), spin (i.e. manufacture yarn), wheel, spindle, lead to pasture'**
Grk *περι-τέλλομαι* 'move in a circle,' OE *hwēol* 'wheel,' NE *wheel*, Grk *κύκλος* 'circle, wheel,' *πολέω* 'turn or rotate,' *πόλος* 'the pole or axis of the celestial sphere, the center of a circular threshing floor, the vault of heaven' (from the circular movement of the stars),

αἰπόλος ‘goat herd,’ Skt *cárati* ‘move oneself, wander, lead or drive to pasture,’ *cakrá* ‘wagon wheel, disk, pulley, potters wheel,’ *karṣū́* ‘furrow’ (where the earth has been turned), *kárṣati* ‘turn, turn over, plow,’ Av *čarāna* ‘field,’ TochB *kokale* ‘wagon’ (from the turning/spinning wheels), Lat *colus* ‘distaff, spindle, spinning,’ *collum* ‘neck’ (that which turns the head). —LIV 386; IEW 639–40; Watkins (2011) 46; Mallory and Adams (2006) 377; OLD 358; L&S 1436; Watkins 46; DELG 846; EIEC 606–7; Bomhard 510, 511, 516.

4. ***k^{u}er-pH-* ‘Turn, wrist, whirlpool’**

OE *hweorfan* ‘turn, change,’ Grk *καρπός* ‘wrist,’ OHG *(h)werban* ‘turn,’ *wirbel* ‘swirl, whirlpool.’ —LIV 392–93; EIEC 607; IEW 631; Mallory and Adams (2006) 379.

Notes on possible outside root connections:

1. Bomhard 525 cites Afrasian *k^{w}ir-,* etc. ‘twist or twine together, tie, fasten, twist a rope, woven basket, encircle, wrap, surround, turn,’ Uralic *kure-*, etc. ‘twist, turn, plait, tie together, twine, braid, plait, stitch together.’

2. Bomhard 523 cites Afrasian *kayyafa*, etc. ‘form, shape, fashion, mold, fit,’ Dravidian *key-*, etc. ‘do, make, create, act, work, perform,’ Altaic *khi-*, etc. ‘do, make, act perform.’

3. Bomhard 510 cites Afrasian *k^{w}al-* ‘revolve, go around, roll, surround, encompass, encircle, circuit, turn, circle,’ Dravidian *kulavu,* etc. ‘bend, curve,’ Altaic *k^{h}ulo-*, etc. ‘roll, turn, dance, walk around, turn around, bend in river, go round and round.’

Conclusions: Strong phonetic and semantic parallels to all three of these PIE forms are seen in the outside language families. A very credible example that suggests a differentiation into the attested resonant variants while still part of an ancient linguistic community that included at least PIE, Afrasian, Dravidian Uralic, and Altaic.

**l-*

***Table 54: *le(R)p-* ‘Remove outer peel or bark, strip off, pare’**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**lep-*	*l*		*ø*	*p*	1	Peel, pare, strip off skin or bark
**leu̯p-*	*l*		*u̯*	*p*	2	Peel the skin off, strip off outer covering

1. ****lep-* ‘Peel, pare, strip off bark’**

Grk *λέπω* ‘pare, peel, remove bark, strip,’ *λέψαι* ‘strip, peel, pare,’ Lat *lapit* ‘to cause pain or grief to someone.’ —LIV 413; OLD 1001; L&S 1040; IEW 678; EIEC 568.

2. ****leu̯p-* ‘strip off skin or bark, peel, pare’**

Lith *lupù* ‘peel, pare, strip off skin or bark,’ Lith *laupýti* ‘peel, pare, strip,’ Rus *lupljú* ‘remove skin or bark, peel.’ —LIV 420; IEW 690-91; EIEC 567–68.

***Table 55: *le(R)d-* ‘Leave, let loose, set free, set in motion’**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**leh$_1$d-*	*l*		*h$_1$*	*d*	1	Leave, let be, set free, release, make weary, tired
**lei̯d-*	*l*		*i̯*	*d*	2	Let loose, set free, set in motion, play

1. ****leh$_1$d-* ‘Leave, let be, set free, release, make weary, tired’**

Goth *letan* ‘leave, let, let be, let alone, set free, release,’ Alb *lodh* ‘make weary, tired, exhausted, worn out,’ Goth *lailot* ‘left,’ Lat *lassus* ‘weary, tired.’ —LIV 400; IEW 666; Balg 247; OLD 1004.

2. ****lei̯d-* ‘Let loose, set free, set in motion, play’**

OLith *léidmi* ‘let loose, set free, set in motion,’ Lat *lūdō* ‘to play,’ Grk *λίνδεσθαι* ‘vie with, contend with,’ Alb *lindet* ‘was born,’ Lith *láidyti* ‘let loose, set in motion,’ Alb *len* ‘leave behind.’ —LIV 402; IEW 666.

**m-*

***Table 56: *(s)me(R)k-* ‘Moisture, wetness, milk’**

PIE Root	Initial	R1	R2	Final	Ref.	Semantic Value
**mak-*	*m*		*ø*	*k*	1	Wet, moist, skin that forms on liquid
**māk-*	*m*		*ø*	*k*	2	Knead, soak, steep
**merk-*	*m*		*r*	*k*	3	Wet, moist, languid
**melk-*	*m*		*l*	*k*	4	Milk, wet, damp, moisture
**(s)meu̯k-*	*(s)m*		*u̯*	*k*	5	Slippery, slime, swamp, mucus, rain, moist

1. ****mak-* ‘Wet, moist, puddle, pool’**
Lith *makonė* ‘puddle, pool,’ OBulg *mokrъ* ‘moisture,’ Russ *móknutь* ‘make wet,’ Alb *makë* ‘skin that forms on liquid.’ —IEW 698.
2. ****māk-* ‘To make wet, soak, steep, squeeze’**
Lat *mācerō* ‘make wet, soak, steep, bathe,’ Latv *màkt* ‘press,’ Czech *mačkati* press, squeeze.’ —EIEC 450; OLD 1057; IEW 698.
3. ****merk-* ‘Bog, swamp, soak, limp’**
Lat *marceō* ‘faded, languid, limp, flaccid, slack, loose, lazy, to languish,’ Gallorom **bracu* (< **mraku*) ‘bog, morass,’ Slav **morky* ‘bog, morass,’ Cymr *brag-wellt* ‘swamp grass,’ Gall *mercasius* ‘swamp,’ MHG *murc* ‘faded, limp,’ MNG *meren* ‘bread dunked in wine or water,’ Lith *mirkstù* ‘to lay in water,’ *merkiù* ‘soak.’ —IEW 739; OLD 1078.
4. ****melk-* ‘Wet, damp, moisture, milk’**
Grk *μέλκιον* ‘well, spring, fountain,’ Goth *milhma* ‘cloud,’ Russ *molokó* ‘milk,’ ORuss *molokita* ‘swamp, waters, flood,’ Serb mlâkva ‘puddle,’ Czech mlklý ‘moisture.’ —IEW 724; L&S 1098, 994.
5. ****(s)meu̯k-* ‘slick, slippery from wetness’**
OIr *mocht* (< *muk-to*) ‘soft, tender,’ Lat *mungō* ‘blow nose, mucus,’ ON *mugga* ‘drizzle,’ Grk *μύσσομαι* (< **muk-ie/o*) ‘I blow my nose,’ Cymr *mign* ‘swamp, bog,’ ON *mugga* ‘drizzle,’ Latv *mukls* ‘pools of water.’ “These forms have been connected, farther from the sense central to this etymology, to forms meaning ‘to run away, slip away, flee’: Lith *mùkti* ‘slip away from,’ OInd *muñcáti* ‘looses, frees,’ [etc.] (EIEC 528).” —EIEC 527; IEW 744; LIV 443; Mallory and Adams (2006) 400; OLD 1287.

***Table 57: *(s)me(R)d-* ‘Melt, smear, daub, anoint, remedy, bad-smelling fat’**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**(s)meld-*	*(s)m*		*l*	*d*	1	Allow to melt, become soft, become liquid, dissolve, become digested
**(s)mei̯d-*	*(s)m*		*i̯*	*d*	2	Smear, daub, anoint, filth, foul pollution, smudge, be dirty
**med-*	*m*		*ø*	*d*	3	Salves, ointments, unguents, and potions; a person who prepares and administers these
**(s)merd*	*(s)m*		*r*	*d*	4	Spreading stink, foul odor, make an evil smell, bad-smelling fat

1. ***(s)meld-* 'Melt, become soft'**
Ved *ví mradā* 'soften,' Grk *μέλδω* 'allow to melt,' *ἀμέλδειν* 'τήκειν' (Hsch.): "melt, bring clouds down in rain, dissolve, cause to waste or pine away, of putrefying flesh, fall away, of a corpse, of food in the digestive organs, come to naught," OE *meltan* 'melt,' OHG *smelzan* 'melt,' ON *melta* 'melt, digest,' OHG *smelzen* 'melt, dissolve,' NE *melt, smelt*. —LIV 431; IEW 718; Mallory and Adams (2006) 125; L&S 1096, 1786–87; de Vries 383; Watkins (2011) 55; Bosworth and Toller 677, 889; EIEC 378; NIL 482.

2. ***(s)meu̯d-* 'smear, daub, anoint, filth, foul pollution'**
OE *smītan* 'daub, smear, anoint, smudge, defile, pollute,' *smīte* 'a foul, miry place,' OHG *be-smeizen* 'be dirty,' MHG smitze 'spot, filth,' Goth *smait* 'smears,' OCS *smědь* 'dark brown,' Arm *mic* 'filth,' OBul *smīta* 'smear thinly.' —LIV 569; IEW 966; Mallory and Adams (2006) 382; EIEC 528.

Of OE *smītan*, Bosworth and Toller write, "Later English takes the word in the sense of *strike*." The modern English spelling of this word is "smite." The probable semantic development would be something like the following: The OE word *smirels* signifies unguent, ointment, unction, salve. Anciently, such unguents were prepared by melting, rendering, and clarifying solid animal products (butter, fatty tissue, fat, beeswax, etc.) until they reached a clean liquid state. Then medicinal herbs were added and thoroughly mixed. The whole concoction was then allowed to cool and re-solidify, and finally daubed, smeared, or anointed onto the skin or wound where needed. Later, when the smelting of metals came into use in PIE society, the process involved the same steps: First, dirty metal chunks and ore were melted in a cauldron in order to separate the pure metal from the dross, which was typically skimmed off the surface (a process called *smelting*). Then the clarified metal was poured into molds for further elaboration. The work of the metal-smith paralleled the earlier work of the unguent-maker/apothecary. Later, when the work of the metal-smith assumed greater importance in social life, the sense of the OE word, *smītan,* changed from that of applying unguents, to that of striking metal, for that is how gold, silver, copper, bronze and iron were worked into their final form. The smith smites the metal that he has melted and smelted.

The references here to filth, foul, miry pollution, defile, be dirty, etc., are because the process of rendering animal fat creates an unbearably foul stench. In addition, if these unguents were applied to open wounds, say after a battle, the infected, gangrenous, putrid, rotting flesh would create an absolutely horrible smell.

3. ***med-* 'salves, ointments, unguents, and potions; a person who prepares them'**
Lat *medeor* 'heal, cure, remedy, bring to health,' *medicus* 'doctor,' *medica* 'a female physician,' *medicābulum* 'a healing agent, restorative,' *medicāmentum* 'a substance administered to produce spec. effects upon the body, a remedy; a cosmetic, a dye,' Grk *Μηδος* 'god of medicine,' Av *vi-madaya* 'act as healer.' —LIV 423; IEW 705–06; Watkins (2011) 53; Mallory and Adams (2006) 195, 201,317–18; OLD 1087–88; EIEC 261–62; Benveniste 406–11.

Most authorities place these attestations with a root that signifies "to measure." This fails to satisfy on semantic grounds, since medicine in the ancient world was not the quantitative science that it is today. Typically it involved magic rituals, prayers, and herbal remedies that were prepared and administered by a shaman or other tribal healer.

Mallory and Adams write, "There are two words of Proto-Indo-European status that refer to 'healing.' *$h_{1/4}$eis- [...] finds cognates in Anatolian indicating 'salving' or 'anointing' (Hit *iski(ya)*-) while **med*- (which gives Lat *medicus* 'doctor', Av *vi-mad*- 'healer') is probably a specialized development of PIE **med*- 'measure'."

Mallory and Adams are very likely correct in their reasoning about the concept 'healing' arising from concepts for 'salving' or 'anointing,' but I would suggest that the source for **med* is more likely to be found in a root connected directly with the process for producing such remedies, rather than in the abstract concepts of weighing and measuring.

4. ***(s)merd*- 'stink, foul odor, evil smell, bad-smelling fat'**
Lith *smardyti* 'makes an evil smell,' OCS *o-smražd̨o* 'a spreading stink,' Lith *smìrdžiu* 'to stink,' OCS *smrьžd̨o* 'a putrid smell, stink,' Lat *merda* 'ordure, excrement, dirt, dung.' OLith *smarstas* 'stink, bad-smelling fat.' —LIV 570; IEW 970; OLD 1102.

For an explanation of the relation of this root to the overall resonant series, see the commentary to #2 above.

***Table 58: *me(R)h_2-* 'strike, crush, grind, diminish, pulverize, destroy'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
*melh$_2$-	*m*		*l*	*h$_2$*	1	Pound, crush, pulverize, rub, grind, mill
*melh$_2$-u̯-	*m*		*l*	*h$_2$*	2	Crush, grind, press
*merh$_2$-	*m*		*r*	*h$_2$*	3	Crush, pulverize, beat, strike
*menH-	*m*		*n*	*H*	4	Tread, stamp, press together, break, crush
*meiH-	*m*		*i*	*H*	5	Diminish, harm, injure, damage, hurt, lessen

1. ***melh$_2$*- 'Pound, crush, pulverize, rub, grind, mill'**
Arm *malem* 'beat to pieces, pound, crush, pulverize,' Lat *molō* 'grind in a mill,' Umb *maletu* 'ground, milled,' OIr *melid* 'ground, crushed, milled,' ON *mylja* 'rub away, crush, pulverize,' NE *meal*, OCS *meljǫ* 'crush, grind, mill,' CLuv *malw, mālḫu*- 'crush, break,' Goth *malan* 'ground, crushed, milled,' Grk *μύλη* 'mill,' Lith *malù* 'grind, crush, pulverize.' —LIV 432; IEW 716; CLL 132; OLD 1129; Buck 338; L&S 1152; Bomhard 887; EIEC 247.

2. ***melh$_2$-u̯*- 'Crush, grind, press'**
Goth *ga-malwjan* 'press,' ON *mølva* 'crush, grind,' TochA *malywät* 'press.' —LIV 433; IEW 717; Bomhard 878.

3. ***merh$_2$*- 'Crush, pulverize, beat, strike'**
Ved *mṛṇāti* 'crush, grind, mill, destroy,' Grk *μαραίνω* 'fight, pulverize, destroy,' Alb *merr* 'take, grab,' Hit *marritta* 'break up, reduce to small pieces, crush, grind, pulverize,' ON *merja* 'beat, batter, pound, strike.' —LIV 440; IEW 735–36; Mayrhofer 2.319; L&S 1081; Bomhard 893.

4. ***menH*- 'Tread, stamp, press together, break, crush'**
Lith *minù* 'tread, stamp, break,' ChSlav *mьnǫ* 'tread, knead, press, squeeze,' Skt *carmamnās* 'refine, polish, thrash,' Cymr *mathru* 'stamp with the feet,' Bret *mantra* 'stamp,' MIr *men* 'meal, dust,' Rus *mnu, mjatь* 'break, knead, stamp, crush, crumble.' —LIV 438; IEW 726; ALEW 755.

5. ***meiH*- 'Diminish, harm, injure, damage, hurt, lessen, make smaller'**

Ved *minā́ti* ‘diminish, harm, injure, damage,’ Grk *μινύθω* ‘lessen, diminish, curtail, become smaller,’ Lat *minuere* ‘lessen, diminish, reduce,’ *minus* ‘smaller,’ Osc *menvum* ‘diminish,’ Corn *minow* ‘make smaller, diminish,’ TochAB *mi-* ‘hurt, harm.’ —LIV 427; IEW 711; Mallory and Adams (2006) 319; EIEC 351.

Notes on possible outside root connections:
1. Bomhard 887 cites Afrasian *móōldó*, etc. ‘grinding stone,’ Uralic **molɜ-*, etc. ‘grind, crush, break, smash, crumb, little bit, piece, morsel, crumble away,’ Proto-Altaic **mole-*, etc. ‘rub, crush, grind, wear out, weak, weary, tired, destroy, ruin,’ Eskimo **mulŋa-* ‘be careful, gentle.’
2. Bomhard 878 cites Afrasian (Proto-Semitic) **mal-al-*, etc. ‘be or become worn out, weak, tired, weary,’ (Ethiopic) *malala*, etc. ‘plane a board, smooth with a plane, rub smear,’ anoint, grease, smear,’ Dravidian (Tamil) *mel,* etc. ‘soft, tender, slowly, gently, woman, weak, poor, cause much suffering,’ Proto-Chuk-Kamch. **məl*, etc. small, fine, supple, soften.’
3. Bomhard 893 cites Dravidian *muṟi,* etc. ‘break, be defeated, perish, cease to exist, cut, discontinue, wound, destroy, crushing destruction, break in pieces, crack,’ Proto-Uralic **mura-*, etc. ‘break, shatter, crumb, fragment, crumble, burst, beat to pieces, split apart,’ Eskimo **muʀiiq-*, etc. ‘sharpen, grind, whet.’
Conclusion: PIE forms with resonants in *–r* and *–l* show probable cognates in outside language families, suggesting that these variants were formed while still in linguistic contact with them.

***Table 59: *(s)me(R)-* ‘Remember, think, worry, say’**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**(s)mer-*	*(s)m*		*r*		1	Thought, remember, worry about, mourn, care
**men-*	*m*		*n*		2	Think, feel, remember, believe, speak
**mn-eh₂-*	*m*		*n*		3	Think about, remember, experience
**mein-o-*	*m*	*i*	*n*		4	Opinion, desire, bemoan, remorse, think, say
**ml-euh₂*	*m*		*l*		5	Know, say, speak, bemoan, express
**mel-*	*m*		*l*		6	Think, suppose, worry about, thought, idea, speech, quarrel

1. ****(s)mer-* ‘Thought, remember, worry about, mourn, care’**
NE *mourn*, Lith *merėti* ‘worry about,’ Grk *μέριμνα* ‘thought, care, anxiety,’ Av *maraiti* ‘observes,’ Skt *smárati* ‘remembers, longs for,’ Lat *memoria* ‘remembrance,’ OE *mimorian* ‘remember,’ Arm *mormok’* ‘care,’ OHG *mornēn* ‘worry about, mourn.’ —LIV 569; IEW 969; EIEC 483; Mallory and Adams (2006) 323.
2. ****men-* ‘Think, feel, remember, believe, speak’**
OAv *maṇtā* ‘think about,’ Ved *manuté* ‘think, feel, remember,’ Grk *μαίνομαι* ‘rage, rave, be consumed with madness,’ *μέμονα* ‘yearn,’ Lat *re-miniscor* ‘remember,’ *comminīscī* ‘sense, think through,’ *moneō* ‘remind, warn, admonish,’ OIr *-mainethar* ‘to mean, to believe,’ Hit *mēmai* ‘speak,’ Goth *man* ‘to mean, to remember,’ Lith *miniù* ‘think, remember,’ OCS *mьnjǫ* ‘to believe, to mean.’ —LIV 435; IEW 726–28; EIEC 575; Mallory and Adams (2006) 322; Bomhard 856.
3. ****mn-eh₂-* ‘Think about, remember, experience’**
Grk *μνάομαι* ‘think about, remember, woo for a bride,’ *μνήσκεται* ‘thought, chosen, remembered,’ Late Ved *ā-manati* ‘chosen,’ poss. CLuv *manāti* ‘see, experience,’ —LIV 447; IEW 726–27; CLL 135; L&S 1138.
4. ****mein-o-* ‘Opinion, desire, bemoan, remorse, think, say’**
OIr *mīan* ‘wish, desire,’ NE *mean, bemoan*, OCS *měnjǫ* ‘mention,’ TochB *onmiṃ* ‘remorse’ OHG *meinen* ‘to mean, to say,’ OE *mœnan* ‘think, say.’ —Mallory and Adams (2006) 323; IEW 714.
5. ****ml-euh₂-* ‘Know, say, speak, bemoan, express’**

Ved *brávīti* 'say, speak,' *bruve* 'is known,' OAv *mraomī* 'say, speak,' YAv *mruiiē* 'is said,' TochB *palwaṃ* 'bemoan,' Rus *mólvitĭ* 'say, express,' Czech *mluviti* 'utter.' —LIV 446; EIEC 535–36.

The semantic pairing of "think/say" is very common throughout PIE.

6. ***mel-* 'Think, suppose, worry about, thought, idea, speech, quarrel'**

CLuv *mali-/malai-* , 'think, suppose,' *māli* 'thought, idea,' Grk *μέλω* 'to be an object of care or thought, to weigh on one's soul, to worry about, to take an interest in, to be in one's thoughts,' ON *māl* 'speech, legal dispute,' OE *mǣl* 'speech, quarrel.' —CLL *mali* 132; L&S 1100; DELG 658–59; IEW 720; EIEC 125; Bomhard 848.

Notes on possible outside root connections:

2. Bomhard 856 cites Proto-Afrasian **man-,* etc. 'count, reckon, consider, think, portion, share, number, allot, fortune, mind, to know, word, speech, intention.' Dravidian *maṇi,* etc. 'speak, scold, abuse, utter, petition, request, prayer, word,' Proto-Uralic **manɜ-*, etc. 'consider, recount, say, speak, warn, admonish, curse, bewitch, wish evil to, ruin, slander, appoint, order, legend, saga, myth, repeat,' Proto-Altaic **mana-*, etc. 'learn, try, strive.'

6. Bomhard 848 cites Proto-Afrasian **mal-,* etc. 'do good, be pleasant, be efficient, beneficent, excellent, potent, trusty, well-disposed, devoted, splendid, costly, lavish, famous,' Dravidian *mālimi* 'youthful friendship, familiarity, love, affection,' Etruscan *mlac* 'beautiful,' Proto-Chuk-Kamch **mœl-*, etc. 'good, good weather, dear, easy, well, strongly, cure, treat, get better.'

Conclusion: Root 2 shares strong phonetic and semantic parallels with the outside language families. Root 6 differs slightly semantically, but still within range of the semantic field. These two resonant variants were likely formed while in contact with the outside language families.

***Table 60: *me(R)d-* 'To be happy, satisfied, drunk, joyful'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**med-*	*m*		*ø*	*d*	1	Rejoice, be glad, be drunk, be satisfied
**meu̯d-*	*m*		*u̯*	*d*	2	Merry, glad, rejoice, cheerful

1. ***med-* 'Rejoice, be glad, be drunk, be satisfied'**

Ved *mándati* 'rejoice, be glad, be delighted, be drunk, be intoxicated,' *mádati* 'gladden, delight, satisfy, exhilarate, intoxicate, inflame, inspire,' YAv *maδaite* 'be drunk, be intoxicated,' ON *mettr* 'satisfied,' Lat *madeō* 'be wet or sodden, be satisfied, be drunk,' Grk *μεστός* 'full,' OE *mettian* 'to satiate.' —LIV 423; IEW 694–95, 706; NIL 463; Monier-Williams 777, 787; Bomhard 876.

2. ***meu̯d-* 'Merry, glad, rejoice, cheerful'**

Ved *mudīmahi* 'be merry, glad, happy, rejoice, delight,' *módate* 'rejoice,' Lith *mudrùs*, Latv *mudrs* 'lively, cheerful, blithe, merry.' —LIV 443; IEW 741–42; Monier-Williams 822.

Notes on possible outside root connections:

1. Bomhard 876 cites Proto-Afrasian **mat'-*, etc. 'be or become wet, moist, rain, be soaked by rain, be rotten, dew.'

Conclusion: Latin *madeō* 'be wet or sodden, satisfied, drunk' parallels the Afrasian terms, at least with respect to the 'wet and sodden' elements, suggesting that these may be distant cognates.

***Table 61: *me(R)g-* 'To deceive, charm, cheat; guile, trickery, thief, dice cheat'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**meng-*	*m*		*n*	*g*	1	Deceit, guile, spell, magic charm, trickery, illusion
**meu̯g-*	*m*		*u̯*	*g*	2	Concealed, smothered, dice cheat, thief, highwayman

1. ***meng-* 'Deceit, guile, spell, magic charm, trickery, illusion'**

MIr *meng* 'deceit, guile, illusion,' Grk *μάγγανον* 'spell, magic charm, philter,' *μαγγανεία* 'trickery,' Oss *mæng* 'deceit.' —EIEC 154; IEW 731.

2. ***meu̯g-* 'Concealed, smothered, dice cheat, thief, highwayman'**

OIr *formūchtha, for-mūigthe* 'smothered, concealed,' Lat *muger* 'dice cheat,' ME *micher* 'thief,' OHG *mūhhari* 'highwayman.' —EIEC 154; IEW 743–44.

*n-

***Table 62: *ne(R)-* 'Bow, bend, incline, nod, beckon'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**nem-*	*n*		*m*		1	Bow, bend, bow down
**neu̯-*	*n*		*u̯*		2	Bend, bow the head, incline, nod, beckon

1. ***nem-* 'Bow, bend, bow down'**

Ved *námate* 'bend, bow,' YAv *nəmaite* 'bow down,' TochB *nmetär* 'bow oneself,' Ved *nānāma* 'bend over, bow.' —LIV 453; IEW 764; Monier-Williams 528.

2. ***neu̯-* 'Bend, bow the head, incline, nod, beckon'**

Lith *niausiù* 'bend, bow, bow the head,' Grk *νεύω* 'incline, nod, beckon, bow, bend forward,' Lat *ad-nuō* 'beckon, nod, bow,' Ved *áti nāvayet* 'shall bow.' —LIV 455; IEW 767; L&S 1171; OLD 51; EIEC 394.

*p-

***Table 63: *(s)pe(R)-* 'spin, twist, weave, wind, coil'**

This group of roots shows variations on the concept: spun thread and its resulting woven cloth, winding thread, moving in a revolving motion, and winding up cloth in flat segments (folding).

PIE Root	Initial	R1	R2	Final	Ref.	Semantic Value
**(s)pen-*	*(s)p*		*n*		1	Spin, thread, weave, toil
**sper-*	*(s)p*		*r*		2	Spin, spiral
**pan-*	*p*		*n*		3	Weave, wind up thread, cloth
**per-i-*	*p*		*r*		4	Round, round about, all around
**pel-*	*p*		*l*		5	Woven cloth, garments, folded cloth (double/triple folded)

1. ***(s)pen-* 'spin, weave, thread'**

NE *spin*, OE *spinnan* 'spin,' ON *spinna* 'spin,' OE *spinel* 'spindle,' OHG *spinala* 'spindle,' *spannan* 'stretch,' OE *spithra* 'spider' ("spinner and weaver of webs"), Lith *pinù* 'weave,' OCS *pĭnǫ* 'tighten, strain,' Alb *pe* 'thread,' Grk *πένομαι* 'toil (at household tasks),' Arm *hanum, henum* 'weave,' TochB *pänn* 'draw out, stretch.' —Mallory and Adams (2006) 234, 237; IEW 988; LIV 578; EIEC 571; Watkins (2011) 85.

Stretching the combed raw fleece is part of the process of spinning (see photo of spinner stretching and spinning raw fiber).

2. ***sper-, (s)per-* 'Turn, twist, wrap around, band, ribbon, coil, surround'**

Lith *spartas* 'band ribbon,' Grk *σπεῖρα* 'winding, spiral, whirl, coil, twist,' *σπεῖρον* 'linen cloth, sail cloth, wrapper, garment,' *σπάρτον* 'rope, cable,' Arm *p'arem* 'enclose, surround.' —Mallory and Adams (2006) 380; Watkins (2011) 85; IEW 991; DELG 999; AHD 1676; EIEC 644.

Traditionally, the initial **s*- in this root is not seen as the s-mobile, but I would argue that **peri* (see below #4) is a related form.

3. ***păn*- 'Weave, garments, wind up thread, cloth, flag'**

Grk *πῆνος* 'woven fabric,' *πήνη* 'thread on the bobbin in the shuttle,' *πηνίον* 'wound-up thread, bobbin, spool,' *πηνίζομαι* 'wind thread off a reel for the woof,' Lat *pannus* 'piece of cloth, rag,' Goth *fano* 'cloth,' OE *fana* 'flag, cloth.' —IEW 788; de Vries 111; OLD 1290; L&S 1401; DELG 865; EIEC 569.

4. ***peri*- 'Around, all around, round about'**

Skt *pári* 'round, around, about, round about,' *pari-karoti* 'to surround,' *pari-kṛit* 'to wind round,' *pari-kṛishati* 'to draw a circle,' *pari-kramya* 'walk around, circumambulate,' *pari-krānti* 'revolution,' *pari-kshit* 'dwelling or spreading around,' *pari-kshipya* 'to wind round, to surround, encircle, embrace,' *pari-khā* 'a moat, ditch, trench around a town,' *pari-dhi* 'an enclosure, fence, wall, any circumference or circle' *pari-bhramya* 'turn or whirl around, move in a circle, round, revolve, rotate,' Grk *περί* 'round about, all round, extension in all directions as from a center, all round,' περιάγω 'completion of an orbit and return to the same point, rotate, cause to revolve, turn round, turn about,' *περιάγωγός* 'a circular canal,' *περιδρομάς* 'running around, encircling,' *περικάθημαι* 'to be seated all around, to surround and besiege a town, to blockade with ships all around,' Lith *pér-jousti* 'to gird around.' —Mallory and Adams (2006) 289; IEW 810; Monier-Williams 591–598; L&S 1366–94; Bomhard 119.

Traditionally this preposition is grouped with *for*, *pro, per*, etc. as in *forward, progeny*, *permit*, but its connotations are significantly different. To go forward is quite distinct from going around something, and so this is better seen as a variation of **(s)per*- 'turn, twist, wrap around.'

5. ***pel*- Woven cloth, gown, folded cloth (double/triple folded, etc.)**

Grk *πέ-πλος* 'any woven cloth used for a covering; sheet, carpet, curtain, veil; a cloth laid over the face of the dead; upper garment or mantle in one piece worn by women,' *πέπλῠφος* 'weaver of πέπλοι,' *πέπλωμα* 'robe, garment,' ("The word *πέπλος* would be a reduplicated form with zero grade, cf. *κύκλος*." DELG 852), Alb *palë* 'fold,' ON *fel* 'fold,' *faldr* 'a woman's head covering, fold,' *feldr* 'coat,' MHG *valte* 'fold, winding, corner,' Skt *puṭati* 'to fold, to envelope,' *puṭa* 'a cloth worn to cover the private parts, fold, pocket,' OCS *pelena*, Russ *pelená* 'diaper, cloth, cover,' Lat. *-plex* (duplex, triplex) 'two-fold, three-fold, etc.' Lat *palla* 'a rectangular mantle, worn esp. as an outdoor garment by women or used as a curtain or covering.' —Mallory and Adams (2006) 384; IEW 802; Kluge 182; OLD 1284; EIEC 63; Bomhard 93.

This root is traditionally glossed as *fold*, but that would seem to be a secondary meaning. The primary sense is 'spun and woven cloth,' which is then folded for storage or transport.

Notes on possible outside root connections:

4. Bomhard 119 cites Dravidian *piri*, etc. 'twist, strand, wisp, curl, turn, cord, twine, rope, spiral, string,' Proto-Uralic **pire*, etc. 'round, any round object, around, round about, circumference, periphery, extent, compass, circle, district, ring, wheel,' Proto-Altaic **p^{h}erkV*-, etc. 'tie round, surround, bind, wrap, envelop, girdle, go round, turn, move around, revolve, rotate, spin a spindle,' Proto-Eskimo **piʀðaʀ*-, etc. 'braid, weave, twisted sinew thread.'

5. Bomhard 93 cites Proto-Kartvelian **pal*-, etc. 'hide, bury, grave,'

Conclusion: Root 4 shares strong phonetic and semantic parallels with the outside language families—a very likely cognate. The Kartvelian form cited by Bomhard with respect to Root 5 would be cognate only if ON *fela* 'to hide' and other related Germanic forms belong here, which is not certain.

***Table 64: *p(R)eu̯-* 'Breathe, breathe heavily, pant, lungs, wind, spirit'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**preu̯-th₂-*	*p*	*r*		*u̯*	1	Pant, blow, breathe heavily, snort, foam, froth
**pneu̯-*	*p*	*n*		*u̯*	2	Blow, breathe heavily, pant, snort, sneeze, spirit
**pleu̯-mon-*	*p*	*l*		*u̯*	3	Lungs, float, swim
**peu̯-*	*p*	*ø*		*u̯*	4	Pant, lungs, breath, wind, spirit

1. ****preu̯-th₂-* 'Pant, blow, breathe heavily, snort, foam, froth'**
Ved *próthati* 'pant, blow, breathe heavily, gasp, snort,' *pra-prōthati* 'pant, blow up, inflate,' YAv *fraoθaṯ.aspa-* 'with snorting horse,' OE *ā-frēoðan* 'foam, froth,' ON *frauð* 'foam.' —LIV 494; IEW 810; Monier-Williams 711; Bosworth and Toller 27; de Vries 140.

2. ****pneu̯-* 'Blow, breathe heavily, pant, snort, sneeze, puff, spirit'**
Grk *πνέω* 'blow, breathe, draw breath, fragrance,' *πνεῦμα* 'blast, wind, breath, spirit, soul,' ON *fnýsa* 'pant, blow, breathe heavily, snort,' OE *fnēosan* 'sneeze,' *fnæst* 'puff, blast, breath.' —LIV 489; IEW 838–39; L&S 1424–25; de Vries 136; Bosworth and Toller 296.

3. ****pleu̯-mon-* 'Lungs,' **pleu̯-* 'Float, swim'**
Skt *klóman-* 'right lung,' Grk *πλεύμων* 'lung,' Lat *pulmō* 'pl. lungs,' Lith *plaũčiai* 'lungs,' ORus *pljuča* 'lungs;' Ved *plávate* 'swim, float,' Grk *πλέω* 'to sail, to swim,' TochB *plyewsa* 'float.' —Mallory and Adams (2006) 187; IEW 837; OLD 1518; EIEC 359, 561; LIV 487.

PIE **pleu̯-* 'swim, float,' has been seen as the source for Latin *pulmō* 'lungs' etc., but this is unlikely. Names for parts of the body generally do not derive from abstract concepts, rather the contrary is much more common. We say, for example, "the mouth of the river," "the foot of the mountain," "the head of the department, "the heart of the artichoke." For this reason, the concept "floating" is much more probably derived from the notion: *breathe air into the lungs*.

4. ****peu̯-* 'Pant, lungs, breath, wind, spirit'**
Skt *phupphukāraka* 'pant, gasp, puff, wheeze,' *phuphusa* 'lungs,' Arm *(h)ogi* 'breath, spirit, soul,' MIr *ūan* 'foam,' Grk *φῦσα* 'breath, wind, blast, bellows,' Latv *pũga* 'squall of wind.' —IEW 847; Mallory and Adams (2006) 386; L&S 1963; EIEC 72; Bomhard 137.

Notes on possible outside root connections:
4. Bomhard 137 cites Proto-Afrasian **fuw-*, etc. 'puff, blow, exhale, inflate, breath, wind, diffuse an aroma, fragrant emanation, catch one's breath, smell,' Dravidian *pūcci*, etc. 'fart,' Proto-Kartvelian **pu-*, etc. 'swell up, inflate, rise (dough), boil, seethe, blow at somebody, whiff (puff),' Proto-Uralic **puwɜ-*, etc. 'blow,' Proto-Eskimo *puvə-,* etc. 'swell, inflate, lung, bubble, gas, air, be fat, ball or balloon-like thing, swim bladder, become swollen with air.'
Conclusion: If not onomatopoeic, then this root would have clear parallels to the outside language families cited.

***Table 65: *pe(R)-* 'Buy, sell'**

PIE Root	Initial	R1	R2	Final	Ref.	Semantic Value
**per-*	*p*		*r*		1	Sell, barter, exchange
**pel-*	*p*		*l*		2	Sell, profit, booty, bargains

1. ***per-* 'sell, barter, exchange'**
OIr *renaid* 'sells, barters, exchanges,' Lat *inter-pres* 'go-between,' *pretium* 'price,' Grk *πέρνημι* 'sell,' *πόρνη* 'prostitute,' Av *pairyante* 'they compared,' NE *price*. —Mallory and Adams (2006) 273; L&S 1394–95; DELG 856; LIV 474; IEW 817; Bomhard 98; Benveniste 98–101.
2. ***pel-* 'sell, profit, booty, bargains'**
ON *falr* 'to be sold,' Lith *pelna*s 'profit,' Russ *polón* 'booty,' Grk *πωλέω* 'sell,' Skt *páṇate* 'bargains, haggles.' —Mallory and Adams (2006) 273–74; DELG 925–26; IEW 804; EIEC 185; Benveniste 98–101.

Notes on possible outside root connections:
4. Bomhard 98 cites Proto-Afrasian **par-*, etc. 'separate, divide, break, scatter, judge, deliver, set free, sever, distribute, rend, burst, break out or open (blister or boil), crush, crumble, cut, tear, smash,' Dravidian *pari*, etc. 'separate, sunder, break off, destroy, cut, tear, rend, piece, portion, split, cleave,' Uralic **päre*, etc. small piece, fragment, splinter, chip, crumb, bit,' Altaic *farsi*, etc. 'piece, strip, cut or make in pieces,' Chuk-Kamch **pər-*, etc. 'pull tear, pluck, rip out, pull out by root, harvest, peel, take off.'
Conclusion: These outside forms are somewhat distant semantically.

***Table 66: *(s)pe(R)s-* 'Breathe, blow, blast, fragrance, spirit'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**(s)peis-*	*(s)p*		*i̯*	*s*	1	Breathe, blow, soul, spirit, whistle
**pes-*	*p*		*ø*	*s*	2	Blast, breathe, blow, fragrance

1. ****(s)pei-s-* 'Breathe, blow, soul, spirit, whistle'**
Lat *spīrō* 'breathe, blow, respire,' *spīritus* 'breath, air, spirit, soul, divine inspiration,' OCS *piskati* 'whistle,' Skt *picchorā* 'flute,' OE *fisting* 'play pan pipes, fart,' TochA *pis-* 'blow an instrument.' —IEW 796; Mallory and Adams 385–86; OLD 708, 1805–06; Bosworth and Toller 289; EIEC 72.
2. ****pe-s-* 'Blast, breathe, blow, fragrance'**
ON *fǫnn* 'blast of snow,' OCS *pěchyrъ* 'breathe,' *pachati* 'ventilate, fan, blow,' Rus *pachnútь* 'blowing snow,' *zápachъ* 'fragrance, scent, smell,' Pol *pęchnąć* 'blow upon, drift against.' —IEW 823–24; Mallory and Adams (2006) 184.

***Table 67: *p(R)eth₂-* 'spread out, stretch out, be wide, be open'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**peth₂-*	*p*	*ø*		*th₂*	1	Spread out, stretch out the arms, be open, extend in space
**pleth₂-*	*p*	*l*		*th₂*	2	Spread, extend, become larger or wider, broaden, spread itself out

1. ****peth₂-* 'spread out, stretch out the arms, be open, extend in space'**
Grk *πίτνημι* 'spread out, stretching out the arms, open,' Lat *pandō* 'to spread out, splay, extend the hands, open, open out,' Osc *patensíns* 'open,' Lat *pateō* 'to be open, to extend in space, cover a wide field.' —LIV 478; IEW 824–25; L&S 1409; OLD 1289; Buck 227, 321; EIEC 539; OLD 145, 1307; Bomhard 121.
2. ****pleth₂-* 'spread, extend, become larger or wider, broaden, spread itself out'**

Ved *práthate* 'spread, extend, become larger or wider,' YAv *fraθa.sauuah-* 'the spreading power,' Lith *plečiù* 'to broaden, spread itself out,' Grk *πλατύς* 'broad, wide.' —LIV 486; IEW 833; Monier-Williams 678; Bomhard 88; EIEC 133, 539.

Notes on possible outside root connections:
1. Bomhard 121 cites Proto-Afrasian **pit-*, etc. 'open, untie, loosen, release, free, forgive, be wide, spacious, open, broad, widen,' Dravidian *pituṅku*, etc. 'protrude, bulge, gush out, press out, squeeze out, blow up as a bladder, milk (a cow), open up, burst open, cause to burst, pinch,' Proto-Eskimo **pitə-*, etc. 'come up, rise (sun), come into view or existence, sprout, flower, go out, grow, become, make.'
2. Bomhard 88 cites Proto-Afrasian **pal-*, etc. 'flat, level, broad, even, wide, spacious,' Dravidian *həlu*, etc. 'thinned, rare, not dense, sparse, slight, contemptible, thinness, transparent,' Proto-Altaic **phāla,* etc. 'field, level ground, meadow, floor, threshing floor, clearing, open space, plain,' Proto-Chuk-Kamch **pəɣər(ra)-*, etc. 'flat, flatten, bend down close to the ground, smooth out, huddle up in a ball.'
Conclusion: Root 1 shows parallels between the PIE and outside forms which suggest that they may be distant cognates. Semantically, root 2 shares concepts of "open, wide, spacious" with the PIE forms, but phonetically lack of final consonant leaves too much uncertainty to draw definite conclusions.

***Table 68: *(s)pe(R)-* 'Nourish, take food or drink, suck, care for, feed, be full, thrive'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**peh₂(i)-*	*p*		*h₂*		1	Protect, preserve, feed, pasture animals, maintain, grow rich or fat
**pen-*	*p*		*n*		2	Feed, fatten, fodder, food, provisions, stock of a household
**peh₃(i)-*	*p*		*h₃*		3	Drink, suck, sip, swallow, enjoy, feast upon, partake of a meal
**(s)peh₁(i)-*	*(s)p*		*h₁*		4	Be satisfied, thrive, prosper, have success, be filled, get full
**(s)peh₂-*	*(s)p*		*h₂*		5	Suck, absorb, draw in, (of a female) to be sucked, derive, enjoy
**pleh₁-*	*p*	*l*	*h₁*		6	Have the belly full, fill, satisfy, glut, be filled, have enough

1. ****peh₂(i)-* 'Protect, preserve, feed, pasture animals, maintain, grow rich or fat'**
Ved *pā́ti* 'to watch, keep, preserve, protect, defend,' Lat *pāscō* 'to feed, to pasture, keep, rear animals, feeding the young, provide food for, maintain, support, grow rich or fat on, nurture, gratify hunger,' TochB *paskenträ* 'protect, safeguard, care for,' Hit *pahhasmi* 'I care for, I protect,' OCS *pasǫ* 'graze, guard.' —LIV 460; IEW 787, 839; Monier-Williams 613; OLD 1304–05; Bomhard 83.

2. ****pen-* 'Feed, fatten, fodder, food, provisions, stock of a household'**
Lith *penù, (penė'ti)* 'feed, fatten,' *pẽnas* 'feed, fodder,' Lat *penus* 'food, provisions, the stock of a household.' —LIV 471; IEW 807; OLD 1326; Bomhard 116; EIEC 199.

3. ****peh₃(i)-* 'Drink, suck, sip, swallow, enjoy, feast upon, partake of a meal'**
Ved *píbati* 'drink, suck, sip, swallow, enjoy, feast upon, draw in,' *pā́triya* 'worthy to partake of a meal,' *pā́ka* 'drinking, sucking,' Grk *πῶθι* 'drink,' Arm *əmpem* 'drink,' Lat *bibō* 'to drink.' —LIV 462; IEW 839–40; Monier-Williams 612–13.

4. ****(s)peh₁(i)-* 'Be satisfied, thrive, prosper, have success, be filled, get full'**
Ved *sphāyātai* 'become fat,' Khot *spaiye* 'be satisfied,' OE *spōwenlice* 'thriving, prosperously, abundantly,' OCS *spějǫ* 'have success,' Hit *ispā(i)* 'get full, be filled, be satiated,' TochB spāw 'spread out.' —Mallory and Adams (2006) 275, 342; LIV 584.

5. ***(s)peh₂-* 'suck, absorb, draw in, (of a female) to be sucked, derive, enjoy'**
Grk *σπάω* 'draw in, suck in, suck, (of a female) to be sucked, draw breath, absorb, derive, enjoy,' Arm *hanem* 'draw, pull.' —LIV 575; IEW 982; L&S 1625.

6. ***pleh₁-* 'Have the belly full, fill, satisfy, glut, be filled, have enough'**
Ved *ápiprata* 'have the belly full,' Grk *πίμπλημι* 'fill, full, satisfy, glut, to be filled, satisfied, have enough of a thing,' Arm *lnowm* 'full,' Alb *m-blon* 'fill.' —LIV 482; IEW 798–800; Mallory and Adams (2006) 319; L&S 1405; Bomhard 90.

Notes on possible outside root connections:
1. Bomhard 83 cites Proto-Afrasian **paħ-*, etc. 'take into the mouth, eat, bite, serve up portions of food.'
2. Bomhard 116 cites Dravidian *pēṇu*, etc. 'treat tenderly, cherish, foster, protect, regard, esteem, honor, care for, nurture, protecting with loving care, nourish, support, rear, fatten, increase,' Proto-Uralic **punʸa-*, etc. 'watch over, protect, preserve, keep, hold, value, herdsman, to pasture, to herd.'
6. Bomhard 90 cites Dravidian *pala*, etc. 'many, several, assembly, be multiplied, to breed, to rear,' Proto-Uralic **palyɜ-*, etc. 'much, dense, tight, thicken, swell up, fester, many,' Proto-Altaic *pʰŭle*, etc. 'to be left over, surplus, excess, remain, be enough, sufficient,' Proto-Chuk-Kamch derivational affix **pəl-* 'completely, intensely, well, to swell, to increase, big.'
Conclusion: All three of these roots show quite plausible connections to outside language families, suggesting that the differentiation of the resonants occurred before the separation of the ancient language stocks.

***Table 69: *pe(R)k̂-* 'Pick, pluck, shear, tear off'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**pek̂-*	*p*		*ø*	*k̂*	1	Pick, pluck, pull, shear, comb, card, and plait wool
**perk̂-*	*p*		*r*	*k̂*	2	Pain, ache, suffering, to be painful
**pleh₁k̂-*	*p*	*l*	*h₁*	*k̂*	3	To skin, to flay, peel off the skin, tear off, strip off

1. ***pek̂-* 'Pick, pluck, pull, shear, comb or card wool; plait, braid or twist it'**
Grk *πέκω* 'shear, comb, or card wool,' Lith *pešù* 'pluck, pull, pick,' Lat *pectō* 'to comb, to card wool,' OHG *fehtan* 'fight, fence,' Arm *hiwsem* 'plait, braid, twist, wreathe.' —LIV 467; IEW 797; L&S 1356; OLD 1315; EIEC 570.

2. ***perk̂-* 'Pain, ache, suffering, to be painful'**
Lith *peršti* 'pain, ache, suffering, to be painful.' —LIV 475; IEW 821; ALEW 875; Mallory and Adams (2006) 139.

Attempts to link this root with "furrows" or "pigs" (porcus) are dubious due to the semantic distance involved. Probably those stem from a separate root. On the other hand, pain and suffering are closely linked to plucking wool, which, long before the availability of metal shears, would have been a painful experience for the fleece-bearing animals.

3. ***pleh₁k̂-* 'To skin, to flay, peel off the skin, tear off, strip off'**
ON *flá* 'to skin, to flay,' OE *flēan* 'pull off the skin, flay,' Lith *plė'šiu* 'tear off, peel off, strip off.' —LIV 483; IEW 835; Bomhard 132.

Notes on possible outside root connections:
3. Bomhard 132 cites Proto-Afrasian **fil-*, etc. 'cleave, split, divide, canal, stream, hew, hollowed, ravine, cut open, break to pieces,' Dravidian *piḻ-*, etc. 'burst open, be rent or cut, break to pieces, divide, crush, tear apart, split, crack,' Proto-Kartvelian **plet-*, etc. 'tear apart, rip apart, be worn out, tear to pieces, pluck,' Proto-Uralic **pilʸɜ-*, etc. 'split, cleave, cut asunder, divide, crack off, splinter, small piece of wood, little bit, fragment,' Proto-Eskimo **pilaɣ-*, etc. 'to butcher, slit, cut into, cut or saw up, knife for butchering.'
Conclusion: This root shows close semantic parallels to the outside language families, but their lack of final consonant makes the connection uncertain.

***Table 70: *pre(R)s-* 'spray, sprinkle'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**pres-*	*p*	*r*	*ø*	*s*	1	Sprinkle, spray, squirt, splash, spit, splatter, rain
**preu̯s*	*p*	*r*	*u̯*	*s*	2	Spray, spit, sprinkle, wash, dewdrop, frost

1. ****pres-* 'sprinkle, spray, squirt, splash, spit, splatter, rain'**

Ved *pŕ̥ṣant* 'sprinkle,' TochB *pärsāte* 'squirt, spray, sprinkle,' Hit *papparaszi* 'spatter, splash, spurt,' Lith *purškiù* 'spray, sprinkle, spit,' OCS *ras-prašǫ* 'burst, blast,' Czech *prší́m* 'spit, splatter, sprinkle, rain.' —LIV 492; IEW 823; Monier-Williams 647.

2. ****preu̯s* 'spray, spit, sprinkle, wash, dewdrop, frost'**

Ved *pruṣā* 'spray, spit, sparkle,' ON *friósa* 'to freeze,' Lith *prausiù* 'wash,' Skr *pŕskati* 'spray, sprinkle,' Ved *pruṣvā́* 'dewdrop,' Lat *pruīna* 'frost, hoar-frost,' Germanic **frusta-* 'frost.' —LIV 493; IEW 809–10, 846; Bomhard 99.

Notes on possible outside root connections:

2. Bomhard 99 cites Proto-Afrasian **par-*, etc. 'spread, scatter, expand, stretch, extend, pull apart, piece, disperse,' Dravidian *para*, etc. 'spread, be diffused, be flattened, be broad, extend, large,' Altaic *fara-* 'to spread freshly harvested grain out to dry.'

Conclusion: Semantic and phonetic differences (lack of final *–s*) make this connection uncertain.

***Table 71: *pe(R)k̂-* 'Adorn (oneself), to ornament, to clean, paint, draw, make ready'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**pek̂-*	*p*		*ø*	*k̂*	1	To adorn, to ornament, to clean, to dress, satisfy, delight
**pei̯k̂-*	*p*		*i̯*	*k̂*	2	Adorn (oneself), ornament, paint, write, draw, decorate, make ready

1. ****pek̂-* 'To adorn, to ornament, to clean, to dress, satisfy, delight'**

Lith *púošiu* 'to adorn, to ornament,' Latv *puôšu* 'to clean, to adorn,' ON *føgja* 'clean, dress, adorn,' Goth *fulla-fahjan* 'be satisfied,' OE *ge-fēon* 'make glad, delight.' —LIV 467; IEW 796–97.

2. ****pei̯k̂-* 'Adorn (oneself), ornament, paint, write, draw, decorate, make ready'**

Ved *piśānā́* 'make ready, adorn oneself, form, fashion,' *píś* 'ornament, decoration,' OPers *api$_n$θa* 'adorn, ornament,' TochB *piṅkeṃ* 'paint, write,' YAv *aṇku'paēsəmna* 'adorn oneself,' Lith *piešiù* 'draw, paint, write,' Ved *pipéśa* 'has adorned.' —LIV 465; IEW 794–95; Monier-Williams 628; EIEC 414.

****s-***

***Table 72: *su̯e(R)-* 'stake, beam, plank, column, sacrificial post'**

PIE Root	Initial	R1	R2	Final	Ref.	Semantic Value
**su̯el-, *sel-*	*s*	*u̯*	*l*		1	Plank, board, shaped wood, doorsill, pillar
**su̯er-*	*s*	*u̯*	*r*		2	Post, support, stake, sacrificial post

1. ****su̯el-, *sel-* 'Plank, board, shaped wood, pillar, post, stake'**

NE *sill* 'sill, window sill, door sill,' Grk *σέλις*, *σέλμα*, *ἕλματα* 'plank, beam, decking,' ON *syll, svill* 'doorsill, threshold,' *svalar* 'arcade,' OE *syll* 'doorsill, threshold,' OHG *swelli, swella* 'doorsill, threshold,' OHG *sūl* 'pillar,' Lith *súolas* 'bench.' —Mallory & Adams

(2006) 227, IEW 898, L&S 1191–92, Watkins (2011) 91, EIEC 431, de Vries s.v. "súl" 560, Vigfusson, "súla, syll," 605, 614.

2. ***su̯er-* 'Post, stake, support, sacrificial post'**

Lat *surus* 'post, stake,' Grk *ἔρμα* 'prop, support,' Skt *sváru* 'sacrificial post, stake.' —Mallory & Adams (2006) 224–225; IEW 1050; OLD 1888; Monier-Williams 1282.

***Table 73: *sne(R)h₁-* 'spin, weave, sew'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**sneh₁-*	*s*	*n*	*ø*	*h₁*	1	Spin, sew
**sneu̯H-*	*s*	*n*	*u̯*	*H*	2	Spin, wind, warp, knot
**si̯eu̯H-*	*s*	*i̯*	*u̯*	*H*	3	Sew, stitch
**seu̯h₁-*	*s*	*ø*	*u̯*	*h₁*	4	Set in motion, twist, turn, spin

1. ****sneh₁-* 'spin, sew'**

Grk *νῆ* 'spins,' Lat *nēre* 'spin,' OIr *sní* 'bind,' Cymr *nyddu* 'spin,' OHG *nāen* 'sew, stitch.' —LIV 571; IEW 973; Mallory and Adams (2006) 234; EIEC 571.

2. ****sneu̯H-* 'spin, wind, warp, knot'**

ON *snúa* 'wind, spin,' ChSlav *snovǫ* 'warp' (in weaving), Goth *sniwan* 'make haste,' ON *snúðr* 'spinning, knot, loop.' —LIV 575; IEW 977; EIEC 571; Bomhard 320.

3. ****si̯eu̯H-* 'sew, stitch'**

Lat *suō* 'sew, stitch together, suture a wound,' Lith *siuvù* 'sew, stitch,' Ved *sīvyati* 'sew, stitch,' NE *sew*, Oss *xwyj* 'sew,' Goth *siujan* 'sew, stitch,' ChSlav *šijǫ* 'sew.' —LIV 545; IEW 915–16; Mallory and Adams (2006) 234; OLD 1872; EIEC 573.

4. ****seu̯h₁-* 'set in motion, twist, turn, spin'**

Hit *suwezzi* 'push,' Ved *suváti* 'drive on, set in motion,' OIr *im:soí* 'twist, turn, spin about,' OAv *hunāitī* 'carry across,' Ved *asāviṣur* 'set in motion,' OIr *soa* 'shall rotate.' —LIV 538; IEW 914; Mallory and Adams (2006) 392 (**seu̯h₃-*).

Notes on possible outside root connections:

2. Bomhard 320 cites Proto-Uralic **sene*, etc. 'sinew, tendon, vein.'

Conclusion: This may be a PIE-Uralic isogloss as the roots are both phonetically and semantically congruent.

***Table 74: *se(R)h₂-* 'To bear a child, be blest, obtain one's desire, be satisfied'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**seu̯H-*	*s*		*u̯*	*H*	1	Beget, bear, bring forth a child, give birth, son, child
**selh₂-*	*s*		*l*	*h₂*	2	Well-disposed, merciful, kind, favorable, gracious, propitious
**senh₂-*	*s*		*n*	*h₂*	3	Obtain, gain, be fulfilled, have, hold, seek, accomplish
**seh₂-*	*s*		*ø*	*h₂*	4	Satiate, take one's fill, be satisfied, to have enough

1. ****seu̯H-* 'Beget, bear, bring forth a child, give birth, son, child'**

Ved *sū́te* 'to beget, bring forth, bear,' *sū* 'child bearing, begetting, procreating,' *sūtā* 'a woman who has given birth to a child,' *sūnú* 'son, child, offspring,' YAv *hunahi* 'you give birth,' Ved *sasū́va* 'has given birth,' Lith *sūnùs* 'son.' —LIV 538; IEW 913–14; Monier-Williams 1239–40; ALEW 1141; Bomhard 275.

2. ****selh₂-* 'Well-disposed, merciful, kind, favorable, gracious'**

Grk *ἵλαμαι* ‘disposed or inclined to be merciful, kind, favorable, gracious, propitious,’ Arm *ałač‘em* ‘request, entreat,’ Grk *ἵληθι* (impv.) ‘Be merciful!, Be favorable!,’ —LIV 530; IEW 900; L&S 927–28.

3. ***senh₂-* ‘Obtain, gain, be fulfilled, have, hold, seek, accomplish’**

Ved *saniṣat* ‘have obtained,’ *sánati* ‘gain, acquire, obtain, possess, enjoy, be successful, be granted, be fulfilled,’ Arm *ownim* ‘have, hold, come into possession,’ OHG *sann* ‘strive after,’ OIr *sennid* ‘pursue, follow,’ Hit *sanahzi* ‘seek,’ Grk *ἄνυμι* ‘achieve, accomplish, bring about, fulfill, complete,’ *ἤνεσα* ‘have accomplished, have fulfilled, have completed.’ —LIV 532; IEW 906; Monier-Williams 1140.

4. ***seh₂-* ‘Be satisfied, have enough’**

Grk *ἄμεναι* ‘satiate, take one’s fill, be satisfied,’ *ἔωμεν* ‘to have enough,’ Ved *á-sinvant* ‘insatiable,’ TochB *sinəsk* ‘satisfied, be satisfied,’ *soyeṃ* ‘will be satisfied.’ —LIV 520; IEW 876; L&S 299; Monier-Williams 121.

Notes on possible outside root connections:

1. Bomhard 275 cites Dravidian *cēy*, etc. ‘son, child, youth, child at the breast, baby, female child, boy, servant,’ Proto-Kartvelian **škew-* ‘to give birth, beget,’ *šv-a*, etc. ‘child, son, first-born.’

Conclusion: Although few potential cognates can be shown, still the phonetics and semantics are close enough to suggest possible external connections.

***Table 75: *s(R)eĝ-* ‘salve, apply an unguent, smear on an ointment’**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**seĝ-*	*s*			*ĝ*	1	Apply ointment, salve, unguent, oil
**sleiĝ-*	*s*	*l*	*i̯*	*ĝ*	2	Smear, dab, apply ointment

1. ***seĝ-* ‘Apply ointment, salve, unguent, oil’**

Hit *iskiyanzi* ‘apply ointment, anoint,’ *sakan* ‘oil.’ —LIV 517; Mallory and Adams (2006) 195.

2. ***sleiĝ-* ‘smear, dab, apply ointment’**

OIr *-slig, -slegar* ‘to smear, to dab, smear on a substance,’ Grk *λίγδην* ‘touch the surface of,’ OCS *slьzъkъ* ‘slippery.’ —LIV 566; IEW 663–64; OLD 1033.

***Table 76: *(s)te(R)-* ‘steal, conceal, bring secretly, deprive, rob, thief’**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**(s)teh₂-*	*(s)t*		*h₂*		1	Steal, hide, rob, thief
**ster-*	*st*		*r*		2	Deprive, rob, thief
**stel-*	*st*		*l*		3	Steal

1. ***(s)teh₂-* ‘steal, hide, rob, thief’**

OCS *tajǫ* ‘hide,’ *taj* ‘secret,’ Hit *tāyezzi* ‘steals,’ Av *tāyu-* ‘thief,’ Skt *(s)tāyu* ‘thief,’ TochB *ene-stai* ‘in secret,’ OIr *tāid* ‘thief,’ Grk *τητάομαι* ‘deprive, rob.’ —EIEC 543; IEW 1010.

2. ***ster-* ‘Deprive, rob, thief’**

MIr *serb (<* **sterm̥os)* ‘thief,’ Grk *στερέω* ‘deprive, rob.’ —EIEC 543; IEW 1028; LIV **sterh₁-* 599; Mallory and Adams (2006) 275–76.

3. ***stel-* ‘steal’**

ON *stela* ‘steal,’ OE *stelan* ‘steal,’ NE *steal*, Goth *stilan* ‘steal.’ —EIEC 543; Mallory and Adams (2006) 275–76.

*t-

***Table 77: *(s)te(R)k-* ‘Rotate: spin, twist, churn, bore, weave, thresh’**

This group of roots shows variations on the concept *spin, twist, rotate*. *Spinning* yarn is fundamental; *weaving* reflects the fact that spinning was a major part of the overall weaving process; *tormenting* results from the twisting of limbs; *churning* milk is accomplished by turning or spinning the churning stick; *boring* was done with a friction-stick rotated by a bow with a string under tension like the ancient fire-drill; *threshing* was performed by leading oxen in a circle to stamp the grain out of the husk, or to drag a threshing sledge around the threshing floor. All these activities involve circular rotation, probably originally based on the notion of spinning wool.

PIE Root	Initial	R1	R2	Final	Ref.	Semantic Value
**tek-*	*t*		*ø*	*k*	1	Twist, spin, plait, weave, spindle
**terk$^{(u)}$-*	*t*		*r*	*k$^{(u)}$*	2	Spin, twist, spindle, torment (twisting the limbs)
**tenk-*	*t*		*n*	*k*	3	Twisting a churning stick, coagulate by churning, churned milk
**teu̯k-*	*t*		*u̯*	*k*	4	Bore, thresh, weave
**telk-*	*t*		*l*	*k*	5	Thresh
**(s)trenk-*	*(s)t*	*r*	*n*	*k*	6	String, spun yarn, be twisted, strong, strangle

1. ****tek-* 'Weave, plait, twist, spin’**

Arm *t’ek’em* ‘turn, twist, roll, plait,’ *hiwsem* ‘plait, weave,’ Lat *texō* weave, plait, spin, put together,’ MHG *dehsen* ‘break flax,’ OHG *dehse, dehsa* ‘spindle.’ —LIV 619; IEW 44, 1058–59; Bomhard 185.

2. ****terk$^{(u)}$-* ‘Twist, spin, spindle, yarn (and other products of spinning)’**

Lat *torqueō* ‘twist, turn, wind up, spin, torment,’ OE *Þrǣstan* ‘turn, twist, writhe,’ OHG *drāhsil* ‘roller, wood turner, wood spinner,’ OPrus *tarkue* ‘reins,’ OCS *trakŭ* ‘band, belt,’ Rus *tórok* ‘reins,’ Alb *tjerr* (<**terkne/o*) ‘spin,’ (also *tjerr* ‘flax yarn spun with a spindle’), Grk *ἄτρακτος* ‘spindle,’ Hit *tarku(wa)-* ‘turn oneself, dance,’ Skt. *tarkú* ‘spindle,’ TochB *tärk-* ‘twist around, work wood.’ —Monier-Williams 440; L&S 101, 272; EIEC 572; OLD 1951; Mallory and Adams (2006) **terk$^{(w)}$-* 234; LIV **terk$^{u̯}$-* 635; IEW **terk-* 1077.

3. ****tenk-, temk-* (By turning a butter-churn): ‘Make thick, coagulate, buttermilk, curdle, churning-stick, (twisted) seaweed’**

Hit *tamekzi* ‘attach, cling,’ Ved *tanakti* ‘churned buttermilk,’ OIr *téici* ‘coagulated,’ ON *Þēl* (< *tenklo*) ‘buttermilk,’ Lith *tánkus* ‘thick, copious,’ Pashto *tat (*< **tahta-* < **tn̥kto-*) ‘thick,’ NPers *talxina* ‘sour milk,’ Skt *a-tanákti* ‘makes curdle,’ *takram* (< *tn̥klóm*) ‘buttermilk,’ *takrâṭa* (< *tañc*) ‘churning stick,’ TochB *tanki* ‘very full, blocked,’ ON *Þang* ‘seaweed’ (from the tendency of seaweed to twist itself around other seaweed strands and make a thick, strong, ropelike tangle). —LIV 625; Mallory & Adams (2006) 320; IEW 1068; EIEC 516; Monier-Williams 431; de Vries 608.

This root is typically understood to represent thickened or coagulated milk products, rather than the rotating, churning process employed to reach such coagulation. Understood in this way, however, makes sense out of the attested forms signifying 'churning stick' and '(twisted) seaweed,' as well as all of the terms related to coagulated milk. A parallel example is the English word, *grain*. This term signifies a diverse range of cereal crops, but it is derived originally from a word meaning, *rub, crush, grind*, denoting the process involved in preparing the items for consumption.

4. ***teu̯k-* 'Thresh, bore, drill, hole made by boring, tool for boring, weave'**
Grk *τυκίζω* 'to work stone,' *τύκος* 'tool for working stone,' *τυκάνη* 'a kind of drag used as a threshing instrument, a threshing sledge (This implement was drawn in a circular motion by a draft animal.), OIr *toll* 'hollow, hole, aperture' (< *tukslo*), Cymr *twill* 'an aperture, hole or cavity ("originally one produced by boring"), perforated,' OCS *тьkati* 'weave, prick.' —L&S 1833, 1807; OLD 1958, 1971, 1927; IEW 1032; LIV 640.

The attested OCS word *тьkati* '*weave'* presumably refers to the spinning component of the weaving process. See also L&S s.v. "*πόλος*," 1436, for a reference to the circular threshing floor.

5. ***telk-* 'Thresh, stamp upon, grist, husks of grain**
OCS *sъ-tlъče* 'break up, smash,' *tlъkǫ* 'beat, pound, break,' Cymr *talch* 'fragment, grist,' OCorn *talch* 'husks of grain,' Slav *tolkъ* 'stamp, crush,' Russ *toloknó* 'pounded oat meal.' —Mallory & Adams (2006) 406; LIV 623; IEW 1062; Bomhard 189.

This root denotes the process of threshing grains. Since, in the ancient world, this activity typically involved leading oxen in a circle around a central post, it implies rotational motion.

6. ***(s)trenk-* 'string, spun yarn, be twisted, strong, strangle'**
OE *streng* 'cord' (> NE *string*), *strang* 'strong,' ON *strangr* 'stark, strong,' Grk *στραγγαλή* 'halter,' *στραγγαλιζω* 'strangle,' *στραγγαλόομαι* 'to be twisted or knotted up,' *στραγγός* 'twisted,' MIr *sreng* 'string, cord,' ON *strengr* 'rope, cord,' OHG *stranc* 'cord,' Lat *stringō* 'bind fast, string a bow, tighten,' *strangulō* 'strangle, throttle, suffocate, choke' (presumably with a cord). —Watkins (2011) 90; EIEC 574; IEW 1036–37; OLD 1828; LIV 604; Mallory and Adams (2006) 236.

Notes on possible outside root connections:
1. Bomhard 185 cites Afrasian **tak-al-*, etc. 'fix, fasten, drive in, plant, set up, establish, peg, stake, nail, post, build,' Dravidian *takai*, etc. 'stop, resist, deter, obstruct, forbid, subdue, enclose, bind, fasten, yoke, surrounding wall, fortress, palatial building, section of house, apartment,' Proto-Uralic **takka-*, etc. 'fasten together, stick together, adhesive state of the snow, sticky thick mass, cling, get stuck, hang,' Eskimo **taquq*, etc. 'braid, cheek, braid hair.'
5. Bomhard 189 cites Dravidian *taḷḷu,* etc. 'push, shove, expel, reject, remove, lose, fall, thrust, press through,' Proto-Kartvelian **tel-,* etc. 'press, tread down, crush, touch, trample,' Uralic **talʲa-,* etc. 'trample, tread on, press, stamp, crush.'
Conclusion: Although the semantics are close enough, lack of final consonant in both of these proposed cognate sets make the connection to PIE roots uncertain.

***Table 78: *te(R)k̂-* 'Colonize: build, cultivate, and control the earth'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**tek̂-s, *te-tk̂-*	*t*	*ø*		*k̂*	1	Establish, produce, hew, cut, fabricate, fashion, axe
**tk̂-ei̯-*	*t*	*ø*		*k̂*	2	Cultivate soil, settle, dwell
**tk̂-eh₁-*	*t*	*ø*		*k̂*	3	Gain control of, gain power over, rule, kingdom
**tu̯erk̂-*	*t*	*u̯*	*r*	*k̂*	4	Carve, cut, form, fashion, mold, shape

1. ***tek̂-s, *te-tk̂-* **'Establish, produce, hew, cut, fabricate, fashion, axe'**
Lith *tašýti* 'hew, trim,' OCS *tesati* 'hew,' Skt *tákṣati* 'fashions, creates, carpenters, cuts,' Grk *τέκτων* 'architect,' *τέχνη* 'art, craft, skill, technique,' Skt *tákṣan* 'carpenter,' Hit *taksanzi* 'undertake, prepare, cause, joint,' OHG *dehsa* 'axe.' —LIV **tetk̂-* 638; IEW **tekp̂-* 1058–59; Watkins (2011) 92; Mallory and Adams (2006) 220, 243, 283; Bomhard 205; EIEC 139.

2. ***tk̂-eu̯-* '**Cultivate soil, settle a land, dwell in a place**'
Ved *kṣéti* 'dwells, lingers,' GrkMyc *ki-ti-je-si = /ktiʲensi/* 'to build on, cultivate, or work land,' Lat *pōnō* 'put, place, sit down,' Grk *κτίσις* 'settlement,' *κτίζω* 'people a country and build houses and cities in it,' Av *šiti* 'settlement,' Arm *šēn* 'dwell, build on, farm, town.' —LIV **tk̂ei-* 643; IEW 626; Watkins (2011) 95; Mallory and Adams (2006) 223.

3. ***tk̂-eh₁-* Gain control of, gain power over, rule, kingdom**
Skt *kṣáyati* 'possess, rule over, govern, control,' Av, OPers *kšaθra* 'dominion, control, command,' Grk *κτάομαι* 'gain, acquire, earn, win.' —IEW **kp̂ē(i)-* 626; Watkins (2011) 95; Mallory and Adams (2006) 269; EIEC 490.

4. ***tu̯erk̂-* '**Carve, cut, form, fashion, mold, shape**'
YAv *θβərəsaiti* 'carve, cut, form, fashion, shape,' OAv *θβarōždūm* 'have formed, have shaped,' Skt *tváṣṭar* 'maker or creator god,' Grk σάρξ 'flesh, piece of flesh.' —LIV 656; IEW 1102.

Notes on possible outside root connections:
1. Bomhard 205 cites Proto-Kartvelian **tik-*, etc. 'small tool or implement, a stick, a pick, toothpick, tooth,' Uralic *teke-*, etc. 'do, make, deed, act.'
Conclusion: The semantic parallels here are not particularly strong.

Table 79: *t(R)ep-* 'strike, beat, stamp'

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**tep-*	t	*ø*		*p*	1	Stroke, smear, beat, strike, whip, hammer
**trep-*	*t*	*r*		*p*	2	Trespass, tread (crush) grapes, tramp

1. ***tep-* 'stroke, smear, beat, strike, whip, hammer'**
Lith *tepù* 'stroke, smear,' OCS *tepǫ* 'beat, strike, pound,' ORus *tepu* 'beat, strike, scourge, lash, whip,' OCzech *tepati* 'beat, strike, hammer,' ON *þōfi* 'to felt wool.' —LIV 630; IEW 1056; ALEW 1260-61; Bomhard 192.

2. **trep- 'Trespass, tread (crush) grapes, tramp'**
OPrus *er-treppa* 'run over, trespass,' Grk *τραπέω* 'tread grapes,' Lith *trepénti* 'tramp.' —LIV 650; IEW 1094; L&S 1811.

Notes on possible outside root connections:
1. Bomhard 192 cites Dravidian *tappu*, etc. 'strike, kill, a blow, stroke, slap, attack, hit,' Proto-Uralic **tappa-,* etc. 'hit, beat, strike, slay, kill, put to death, stamp, tread on, trample on, clap hands, kick.'
Conclusion: Strong semantic and phonetic parallels suggest that this root is cognate to the outside language forms cited.

***Table 80: *te(R)-* 'Rotation: spin, bore, churn, throw pots, whisk, whirl'**

PIE Root	Initial	R1	R2	Final	Ref.	Semantic Value
**ter-h_1-*	*t*		*r*		1	Rub, turn, twist, bore, drill, pierce, thresh, grind, whirling motion
**tu̯er-*	*t*	*u̯*	*r*		2	Circular motion: rotate, whirl, stir, agitate, churn, vortex, whirlwind
**ten-*	*t*		*n*		3	Stretch, spin, weave, twist, string (as spun fiber), musical tone from string under tension
**tel-h_2-*	*t*		*l*		4	Raise, lift, cause to rise into the air, uphold, turn, spin, endure, rise (of the stars)

1. ****ter-h_1-* 'Rub, turn, twist, bore, drill, pierce, thresh, grind'**
Grk *τείρω* 'pierce by rubbing,' *τορεύς* 'a boring tool,' *τορνεύμα* 'whirling motion as of a lathe,' *τορνεύω* 'to turn round as a carpenter turns an auger,' *τρύπανον* 'a carpenter's tool, a borer rotated by a thong,' *τρῦπα* 'a hole,' OIr *tarathar* 'instrument for drilling,' Lat *terō* 'wear down, rub, thresh, grind,' *trībulum* 'a threshing sledge,' *terebrā* 'borer,' Lith *trinù* 'rub,' OCS *тьrjǫ* 'rub,' Alb *tjerr* 'spin,' Skt *tārá* 'piercing,' OE *therscan* 'thresh,' *thráwan* 'turn, twist, throw pots on a potter's wheel,' *thrǣd* 'thread' (from Germanic **thrēdu* 'twisted yarn'), MidDutch *drillen* 'to drill.' —IEW 1071; Mallory and Adams (2006) 375–76; LIV 632; OLD 1927; Watkins (2011) 93; L&S 1830; Bomhard 196.

See Ozolins (2015:29) for an argument by Anttila (1969:154) that this root is **ter-h_1* rather **terh$_1$*. I follow Anttila here.

2. ****tu̯er-* 'Move in circular motion: whirl, stir, churn, vortex, whirlwind'**
OE *þweran* 'stir, churn, agitate,' OHG *dweran* 'turn about quickly,' ON *þvara* 'whisk,' *þyrla* 'turn, whirl or swirl around,' OE *dwēre* 'olive press,' MNG *dwarl* 'whirlpool, vortex, NHG *dorlen* 'rotate.' (With -b extension): Lat *turbō* 'whirlwind, vortex, spinning motion, top (toy).' —Mallory and Adams (2006) 379; IEW 1100; LIV 655; EIEC 607.

3. ****ten-* 'stretch, spin, weave, twist, thread, string, cord, rope, musical tone'**
Skt *tanyate* 'stretch a cord, bend a bow, spread, spin out, weave,' NPers *tanīðan* 'rotate, spin,' Skt *tánti* 'cord, musical string,' *tantu-* 'thread, cord, string, the warp in weaving,' *tántra* 'the warp on a loom,' *tāna* 'sound, musical note, thread,' Grk *τένος* 'bow string,' *τόνος* 'tension, sound, musical tone,' Goth *uf-þanjan* 'stretch out,' ON *þinull* 'rope,' Latv *tinu* 'plait, twist,' *tanis* 'spider, spider web.' —LIV 626; IEW 1064–66; Mallory and Adams (2006) 299; OLD 1922; DELG 1053; Monier-Williams 435; NIL 690-91; Bomhard 190.

4. ****tel-h_2-* 'Raising, lifting, turning'**
Lat *tollō* 'lift, cause to rise into the air,' TochAB *täl* 'uphold, raise,' Grk *τέλλω* 'come into being, accomplish, turn, to rise (of stars).' —LIV 622; IEW 1060; Mallory and Adams (2006) 406; L&S 271, 1754, 1772; Bomhard 212; EIEC 352.

Liddell and Scott write of Greek *τέλλω*, "The sense *rise* is perhaps derived from that of *revolve* as used of stars." That this is correct can be seen from the name, *Anatolia*, signifying Asia (or more particularly, Asia Minor), as the place (the East) where the stars "up-turn" (ανα=up, *τέλλω*=turn), or as we commonly say in English, "where the stars come up," but the ancients were well-aware that the stars move in a circular motion, i.e. that they turn. Other attestations of this root have drifted into the metaphorical realm: Grk *ταλάσσαι* 'bear, suffer,' Goth *þulan* 'bear, suffer, endure,' etc., but evidence that the original sense of this root was, as suggested by Liddell

and Scott, *turning up, revolving, spinning*, can be seen from the fact that a group of related Greek words indicate just that: *ταλασήϊος* 'of wool spinning,' *ταλασίουργέω* 'spin wool,' *ταλασίουργός* 'wool spinner.' Another Greek word, *Ἄτλας* 'the titan, Atlas,' who is said (by Hesychius) to be the "axis of the earth," is often ascribed to this root (*ἀ-* euphonic, and *τλάς* from **τλάω*). Since "axis of the earth" is, by definition, "axis of rotation," this supports the notion that this root ultimately shares the fundamental semantic value of *revolve, rotate*, as do the other roots in this resonant series.

Notes on possible outside root connections:

1. Bomhard 196 cites Dravidian *taṛayuka,* etc. 'be worn out, rubbed, ground (as a knife), habituated, practiced, try, abrade, wear away, become thin, become wasted, become abraded by moving over a rough surface or by having something rubbed over it, be chafed, grazed.'

3. Bomhard 190 cites Proto-Afrasian **tan-*, etc. 'extend, spread, stretch out, endure, be long-lasting, be continuous, perpetual, steadfast, great and strong, solidly built,' Dravidian *taṇi*, etc. 'abound, be profuse, increase in size, grow fat, full, strong, developed, matured, rich, rise, shine, be well, progress, advance, thrive,' Proto-Altaic **t^{h}āno-*, etc. 'stretch, pull, bent backwards, arched, become straight, stretch oneself, be stretched.'

4. Bomhard 212 cites Proto-Afrasian **tul-*, etc. 'lift, raise, pile up, stack in a heap, hill, mound, hang, mound, be exalted, lofty, elevation, rise, spread, long, outstretched, extended, high, tall,'

Conclusion: All three of these roots show credible connections to the outside language families, suggesting a separation into the resonant variants seen in PIE while still in mutual contact.

***Table 81: *(s)te(R)g-* 'Touch, stroke, touch gently, show affection for, be fond of'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**teh$_2$ĝ-*	*t*		*h$_2$*	*ĝ*	1	To touch, lay hands on, reach out and touch
**terĝ-*	*t*		*r*	*ĝ*	2	To rub against, to rub a person down after a bath
**streiĝ-*	*(s)t*	*r*	*i̯*	*g*	3	Touch, stroke, rub, touch gently
**streu̯g-*	*(s)t*	*r*	*u̯*	*g*	4	Stroke, caress, fondle, hug, rub, rub down, wipe
**stelĝ-*	*(s)t*		*l*	*ĝ*	5	Stroke, rub smooth
**sterg-*	*(s)t*		*r*	*g*	6	Show affection for, be fond of, love, watch over

1. ****teh$_2$ĝ-* 'To touch, lay hands on, reach out and touch'**
Lat *tangō* 'to touch, to touch in a sexual or erotic sense, lay hands on, reach out and touch,' Grk *τεταγών* 'hold on to, lay hold of,' Goth *tekan* 'to touch,' OE *þaccian* 'touch lightly, stroke,' TochB *ceśäṃ* 'to touch.' —LIV 616; IEW 1054; EIEC 595; OLD 1904–05; L&S 1779; Autenrieth 267; Balg 435; Bomhard 186; Mallory and Adams (2006) 336.

2. ****terĝ-* 'To rub against, to rub a person down after a bath, to wipe dry'**
Lat *tergō* 'rub, wipe dry, to rub a person down after a bath, to rub oneself down, to rub against, press.' —LIV 632; IEW 1073; OLD 1924–25.

3. ****streiĝ* 'Touch, stroke, rub, touch gently'**
Lat *stringō* 'to touch,' OHG *strīhhan* 'stroke, touch gently, rub,' OCS *strigǫ* 'shear, clip.' —LIV 603; IEW 1028; OLD 1828.

LIV suggests that two separate roots have fallen together in Latin *stringō*. Besides the sense described here, the other signifies "twist together," and forms part of the resonant series above (**te(R)k-* 'rotate'). See LIV 604, note 1 to 1.**streiĝ-*.

4. ****streu̯g-* 'stroke, caress, fondle, hug, rub, rub down, wipe off'**
ON *strjúka* 'stroke, wipe off, smooth, hurry,' OCS *o-stružǫ* 'scrape off,' NDutch *stroken* 'stroke, caress, fondle, hug,' Grk *στρεύγομαι* 'exhausted, worn out, rub, rub down,' OE

stroccian 'rub, rub down,' Latv *strūgains* 'rub.' —LIV 605; IEW 1029; de Vries 554; DELG 1026.

5. ***stelǵ*** **'stroke, rub smooth'**

Hit *istalakzi* 'stroke, rub smooth,' *istalkiyattari* 'is smoothed.' —LIV 595.

6. ***sterg-*** **'show affection for, be fond of, love, watch over'**

Grk *στέργω* 'love, feel affection (between parents and children), be fond of, show affection for,' OCS *strěgǫ* 'guard, watch over.' —LIV 598; IEW 1032; L&S 1639.

Notes on possible outside root connections:

1. Bomhard 186 cites Afrasian **-tak'*, etc. 'touch, push, strike, break,' Dravidian *tagalu*, etc. 'come into contact with, touch, hit, have sexual intercourse with, draw near, strike against, follow, pursue, be entangled, be caught, hurt, rub or graze in passing, give a very slight knock.'

Conclusion: These are quite plausible outside connections to the PIE root.

**u̯-*

Table 82: *(s)u̯e(R)- **'Turn, spin'**

PIE Root	Initial	R1	R2	Final	Ref.	Semantic Value
**(s)u̯er-*	*(s)u̯*		*r*		1	Spin, turn, spindle, whirlwind, spindle whorl
**u̯el-*	*u̯*		*l*		2	Turn, roll, wind up, round, rotate
**u̯ei, *u̯eis-*	*u̯*		*i*		3	Weave, twist, roll, plait, whirlwind
**u̯en-*	*u̯*		*n*		4	Reel, winch, ring, circle, turn, twist, wind, spindle whorl

1. ****(s)u̯er-*** **' Spin, turn, spindle, whirlwind, spindle whirl'**

(From **u̯er-b^h*): Rus dial. *voróba* 'circular string, cord, or board,' *voróby* 'coil of yarn,' ON *verpa* 'warp, to warp a loom for weaving,' *varp* 'the warp of a weaving, yarn used for warp in weaving, beating the loom,' NE *warp*. With s-mobile **(**su̯er-b^h*):** Cymr *chwerfu* 'whirl, whirlpool, vortex, rotate, revolve,' *chwerfan* 'whorl for a spindle,' OHG *sworbo* 'eddy, whirlpool, vortex,' OSwed *svarva* 'turn on a lathe,' Latv *svar̃pst* 'borer.' (From **u̯er-p*): Lith *verpiù* (Latv *vērpt*) 'to spin,' *varpstė* 'spool, spindle,' Latv *verpeli* 'whirlwind.' (From **u̯er-t*): Skt *vartati* 'turn, rotate, roll,' Av *varət* 'rotate,' *vartáyati* 'to set in a turning motion,' Lith *vartana* 'the turning,' *vartula* 'round,' *vartulā* 'spindle whorl,' OCS *varti* 'rolling,' Grk *ἄ-ρρατος* 'not turnable,' Lat *vertō* 'revolve, turn, spin, churn,' *vortex* 'whirl, whirlpool, whirlwind,' MIr *fertas* 'spindle,' Cymr *gwerthyd* 'spindle,' OCorn *gurhthit* 'hand spindle with spindle whorl,' OHG *wurt* 'destiny' (from the fates who are spinners), Russ-CSlav *vrěteno* 'spindle.' —LIV 691; IEW 1050, 1153–57; OLD 2042; EIEC 607; Mallory and Adams (2006) 378, 380 (**su̯erb^h*-).

2. ****u̯el-*** **'Turn, roll, wind up, round, rotate'**

Skt *válati* 'turn, turn around,' *valaya* 'circle, round enclosure,' Arm *gelowm* 'turn,' Lat *uoluō* 'roll, turn,' *uolūtō* 'to impel forward by rolling, roll, form by rolling,' Grk *ειλύω* 'to turn, to wind,' ON *valr* 'round,' MNG *walen* 'turn, rotate, roll.' —LIV 675; IEW 1140-42; EIEC 607; Monier-Williams 927; OLD 2101–02; Bomhard 792.

3. ****u̯ei-, *u̯ei-s-*** **'Weave, twist, roll, plait, whirlwind'**

Skt *váyati* 'weave, plait, twist, braid,' *vāya* 'weaver, the weaving,' *vāyaka* 'weaver, one who sews,' *vyáyati* 'roll, roll up, wind, twist,' Lat *vieō* 'bend or twist into basketwork, plait, weave,' Skt *vḗṣṭatē* 'wind, twist around,' Neth *wier*, OFris *wīr*, OE *wār* 'algae, seaweed' (from its tendency to twist itself around other seaweed strands to make a strong

rope-like tangle), OCS *vichrъ* 'whirlwind.' —Mallory and Adams (2006) 233; IEW 1120-21, 1133; OLD 2060; Monier-Williams 1019; EIEC 571.

4. ***û̯en-* 'Reel, winch, ring, circle, turn, twist, wind, spindle whorl'**

û̯en-g: OE *wince* 'reel, windlass, winch,' NE *winch*. ***û̯en-dh***: Arm *gind* 'ring, circle,' Grk *ἄθραϛ* 'wagon,' Umbr *pre-uendu* 'turn,' Goth, OE, OSax *windan*, OHG *wintan*, ON *vandr* 'wind, twine, reel, twist, coil,' OHG *wanda* 'turbo' = "an object that spins or revolves, a spinning top, the whorl or fly-wheel of a spindle, whirlwind, whirlpool." —Mallory and Adams (2006) 378–79; IEW 1148; LIV 681–82; OLD 1992; EIEC 607; Buck 98, 343; Bomhard 798.

Notes on possible outside root connections:

2. Bomhard 792 cites Proto-Afrasian **wal-*, etc. 'revolve, turn, turn around, turn back, wheel around, flee, turn towards,' Dravidian vaḷai, etc. 'surround, hover around, walk around, move about, circle, circumference, ring, bracelet, enclosing, wander about, be surrounded, encompassing,' Chuk-Kamch **wæltə-* 'to twist face.'

4. Bomhard 798 cites Proto-Afrasian **wan-*, etc. 'bend, twist, be crooked, be twisted, press, oppress, deceive, trick, tread down, trample, cheat, delude, mistreat, vex, be faint, be weak, do wrong, commit a fault,' Dravidian *vaṅki,* etc. 'kind of armlet, hook, gold armlet of a curved shape, bend, yield, submissive, curl, vault, bow, reverence, curve, inclination, curve, crookedness,' Uralic **waŋka*, etc. 'bent or curved, hook, lever for rolling logs, handle,' Chuk-Kamch **wən-* 'bend.'

Conclusion: Both of these PIE roots show credible parallels in outside language families, suggesting that separation into the resonant variants occurred while still in contact with them.

***Table 83: *(s)û̯e(R)-* 'Wound, injure, sore, hurt'**

PIE Root	Initial	R1	R2	Final	Ref.	Semantic Value
**(s)u̯er-*	*(s)u̯*		*r*		1	Wound, pain, sore
**u̯el(h₂-₃)*	*u̯*		*l*		2	Wound, pain, scar, tear, strike
**u̯en-*	*u̯*		*n*		3	Wound, injure, hurt'
**u̯eh₂-, (*u̯ā-)*	*u̯*		*h₂*		4	Wound, damage, sore

1. ****(s)û̯er-* 'Wound, pain, sore'**

OHG *sweran* 'abscess, ulcer, pain, fester,' Av *xᵛara* 'wound, hurt, damage, injury,' Alb *varrë* 'wound, injury, sore,' Skt *vraṇa* 'wound, sore, ulcer, abscess,' OCS *rana* 'wound,' Russ *rana* 'wound.' —LIV 613; IEW 1050; EIEC 650; Mallory and Adams (2006)198; Monier-Williams 1042.

2. ****û̯el(h₂-₃)-* 'Wound, pain, scar, tear, strike'**

Grk *ἐάλων* 'painful, distressing, causing sorrow, causing pain,' *οὐλή* 'scar, wound,' TochA *wlatär* 'will die,' Lat *uolnus* wound, injury, blow,' *vellō* 'pluck, tear,' ON *valr* 'corpse on the battlefield,' OE *wæl* 'battlefield,' Hit *walahzi* 'strike,' OIr *fuil* 'blood,' *fuili* 'bloody wounds,' Welsh *gweli* 'wound, blood.' —LIV 679; IEW 1144–45; Watkins (2011) 101; L&S 465, 1066; Mallory and Adams (2006) 198; EIEC 150, 567, 650; Bomhard 786, 816.

3. ****û̯en-* 'Wound, injure, hurt'**

OE *wund* (< Germanic **wundaz*) 'wound,' *wen(n)* 'wen, cyst on scalp or face, a swelling,' Goth *wunds* 'wound, injure, hurt,' ON *und* 'wound.' —Watkins (2011) 101; IEW 1108; de Vries 634; Mallory and Adams (2006) 280; Bomhard 799; EIEC 548–49.

4. ****û̯eh₂- (*û̯ā-)* 'Wound, damage, sore'**

Grk *ἀάω* 'hurt, wound, damage,' *ἄτη* 'damage, blame, offense, guilt,' *οὐτάω* 'wound,' Latv *vâts* 'wound,' Lith *votìs* 'open sore.' —IEW 1108; de Vries 634; L&S 1; Bomhard 783.

Notes on possible outside root connections:
2. Bomhard 816 cites Dravidian *vel*, etc. 'conquer, overcome, destroy, victory, kill,' Uralic *welɜ-,* etc. 'strike, kill, slay, slaughter, put to death, butcher, massacre, catch.'
3. Bomhard 799 cites Dravidian *vaṅki*, etc. 'dagger, knife, sword,' Proto-Kartvelian **wn-*, etc. 'injure, harm, torment, suffer,' Uralic **waŋɜ-*, etc. 'strike, cut, cut off, stab, hew, hammer, chop, slaughter, slash, gash, killing, blow, wound made by cutting.'
4. Bomhard 783 cites Proto-Afrasian **waḥ-*, etc. 'strike, wound, hew, cut stone, reap, pluck, kill, quell, stab, sting, blade, knife, sword,' Altaic **wā-*, etc. 'kill, slay.'
Conclusion: The parallels in the outside language families suggest that the resonant variants of PIE were created while still in contact with them.

***Table 84: *u̯e(R)-* 'see, look'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**u̯el-*	*u̯*		*l*		1	See, appearance, seer, investigate
**u̯er-*	*u̯*		*r*		2	Beware, notice, see, guard, put one's attention

1. ****u̯el-* 'see, appearance, seer, investigate'**
OIr *fil, feil* 'exists, seen,' Cymr *gwel* 'see,' Lat *uoltus* 'appearance,' Goth *wulþus* 'glory,' Air *fili, filed* 'seer,' possibly OE *wlītan* 'see,' TochB *yel* 'examine, investigate.' —LIV 675; IEW 1136–37; EIEC 505; Mallory and Adams (2006) 326; Bomhard 821.
2. ****u̯er-* 'Beware, notice, see, guard, put one's attention'**
Lat *vereor* 'honor, fear,' NE *ware and wary*, Latv *vērt* 'look, gaze, notice,' Grk *οὖρος* 'guard,' *οράω* 'see,' Hit *werite* 'put one's attention,' TochAB *wär* 'smell.' —LIV 685; IEW 1164; EIEC 417; Mallory and Adams (2006) 327; Bomhard 801.

Notes on possible outside root connections:
1. Bomhard 821 cites Proto-Afrasian **wil-*, etc. 'become bright, appear, come into view, appear suddenly, emerge into view, come out of hiding,' Dravidian *veḷ*, etc. 'white, pure, shining, bright, clear, whiten, dawn, be manifest, know, show itself clearly, kindle, scour.'
2. Bomhard 801 cites Afrasian *wrš,* etc. 'spend the day, spend one's time, be awake, guard, sentry, watch, vigil, watch-tower,' Uralic **warɜ-*, etc. 'watch over, look after, tend, attend to, keep, guard, wait for, wait on.'
Conclusion: These two PIE roots both show credible parallels in the outside language families. This suggests that they differentiated into the resonant variants while still in contact with them.

***Table 85: *u̯e(R)h₁-* 'Want, choose, desire'**

PIE Root	Initial	R1	R2	Final	Ref	Semantic Value
**u̯elh₁-*	*u̯*		*l*	*h₁*	1	Choose, wish, want
**u̯enH-*	*u̯*		*n*	*H*	2	Wish, yearn, desire, love, lust
**u̯ei̯(h₁)-*	*u̯*		*i̯*	*h₁*	3	Want, strive for, eager for, desirous of, liked, loved

1. ****u̯elh₁-* 'Choose, wish, want'**
Ved *vṛṇīté* 'choose,' Goth *wili* 'want,' Lat *uult* 'wish, want,' OLith *velmi* 'wish, want,' OCS *veljǫ* 'be willing, wish, want, desire,' Umb *veltu* 'shall choose,' Grk *λέω* 'want, wish,' NE *will*, Av *var* 'choose, wish.' —LIV 677; IEW 1140-43; Mallory and Adams (2006) 341.
2. ****u̯enH-* 'Wish, yearn, desire, love, lust'**
ON *vinr* 'friend,' Av *vantā* 'wife,' Lat *venus* 'lust,' Skt *vánas* 'longing, desire,' *vanī* 'wish, desire,' *venā́* 'yearning, longing, anxious, loving,' TochA *wañi*, TochB *wīna* 'pleasure,' and in a further derived form, OE *wȳscan* 'wish,' OHG *wunsc* 'wish,' NE

wish. —LIV 682; IEW 1146–47; Mallory and Adams (2006) 341; Monier-Williams 917, 1018; EIEC 158; Bomhard 822.

3. ***u̯ei̯(h₁)* 'Want, chase, strive for, enjoy, eager for, desirous of, liked, loved'**
Lat *uīs* 'thou wantest,' Lith *vejù* 'chase, drive, pursue,' Grk *(ϝ)ίεμαι* 'strive,' Skt *véti* 'follow, strive, seek or take eagerly, enjoy, arouse, excite,' *vī* 'eager for, desirous of, fond of,' *vītá* 'desired, liked, loved, pleasant.' —LIV 668; IEW 1123–24; Mallory and Adams (2006) 402; OLD 2068–69; Monier-Williams 1004; Bomhard 826.

Notes on possible outside root connections:
1. Bomhard 822 cites Proto-Afrasian **win-*, etc. 'be pleasant, joyful, rejoice, nice, comfortable, soft, gentle, good, clean,' Dravidian *vēṇṭu*, etc. 'want, desire, beg, entreat, request, be required, necessary, indispensable, petition, longings, sexual passion, amorous pleasure.'
5. Bomhard 826 cites Uralic **woye-*, etc. 'be able, have power or capability, strength, force, power, win, gain, conquer, beat, overcome, victory, triumph,' Altaic **u(y)-*, etc. 'be able, have power or capability, endure.'
Conclusion: Outside language parallels to the two PIE roots here indicate probable genetic connections, suggesting contact with those language families during the time that the resonant variants were developed.

* * *

CONCLUSION

It is evident from these examples that pre-Proto-Indo-European used resonant variation as a kind of grammatical ablaut, as a morphological process to express nuance to ancient roots in the same way that modern languages use vowel modifications, as in the English series: sing, sang, sung, song. The resonants changed, but the fundamental semantic value of the primitive root remained relatively constant.

A further and more comprehensive evaluation of the PIE lexicon to determine the precise extent of this linguistic feature, and to classify roots according to their ancient affiliations, would accomplish two valuable objectives: First, it would push back in time the limits of our knowledge of IE word histories. And second, it would reveal the form of the language at a stage where meaningful comparisons with other language families could be more productive.

THE PROTO-SAPIENS PROHIBITIVE/NEGATIVE PARTICLE **MA*

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We report here on a lexical root, very widespread in diverse languages worldwide, including more than 50 ancient languages, long-isolated languages, and proto-languages. Most of these rely on uncontroversial reconstructions, while others, from Proto-Nilo-Saharan to Proto-Trans-New Guinea through Proto-Austric and Proto-Amerind, go back to far more than 10,000 years ago and cover all continents. We argue that this lexical root may only have been part of the ancestral language common to all modern humans.

1. INTRODUCTION

We will document here an ancestral word root, which is found in such a huge number of language families across all continents that it can only be a common inheritance from the original lexicon of our remote Sapiens ancestors. Following the common linguistic custom of naming the ancestral language of a family by the name of this family with the prefix *Proto-* (Proto-Germanic, Proto-Algonquian, Proto-Bantu, etc.), we call the ancestral language of our species Proto-Sapiens.

Proto-Sapiens is not a newcomer in historical linguistics: building upon the pioneering work of Trombetti (1905), about three dozen Proto-Sapiens words have recently been identified (Bengtson & Ruhlen 1994), making use of the massive linguistic materials and comparative works that have accumulated during the 20th century.

However, many historical linguists deny the validity of Proto-Sapiens etymologies, a subject which deserves a brief preliminary discussion. Their rejection basically results from an orthodoxy which has held for more than a century that languages evolve so fast that, after 5,000 to 8,000 years of evolution, nothing significant remains of an ancestor language in its descendants.

This orthodoxy is easily demonstrated to be false. We can illustrate this point with an example taken from the Indo-European family, to which most modern European languages belong and which is, for this (unscientific) reason, by far the best studied of all language families. Its ancestor language, Proto-Indo-European, is estimated to have been spoken some 5,000 to 8,000 years ago. This is close to the limit beyond which any trace of it should have vanished in modern languages;

nevertheless, thanks to comparison of its descendant languages, Indo-Europeanists have reconstructed a wealth of knowledge about it, including nearly 3,000 words and major parts of its conjugation and declension systems.

Moreover, in an unpublished study bearing on 494 Indo-European languages, we have found (Bancel & Matthey de l'Etang, ms.) that only two of them (0.4%) had lost the Proto-Indo-European 1st person singular pronominal root **m-* (found in English *me*, *my*, *mine*) and only seven (1.4%) the 2nd person singular **t-* (English, in which *thou, thee, thy, thine* subsist only in religious and other specialized uses, is counted as one of these seven cases of loss). This amounts to minuscule loss rates of 0.05% per millennium for **m-* and 0.18% for **t-*. Extrapolating these loss rates allows us to endow these roots with theoretical half-lives (Pagel 2000) of 1.39 million years and 385 000 years, respectively. These timespans are about 50 to 200 times the 5,000 – 8,000 year threshold beyond which every significant trace of an ancestor language is supposed to be lost forever, again showing the inanity of this alleged limit.

Some linguists also have attempted to demonstrate through probabilistic calculations that global or other remote etymologies could be due to chance resemblances (Ringe 2002, Boë et al. 2006). We have shown in detail elsewhere (Bancel & Matthey de l'Etang 2013) that such demonstrations were flawed by glaring mistakes. For instance, Ringe (2002), ignoring that a probability is a ratio, *i.e.* a number of chances for a given event to occur *out of* a total number of possibilities, multiplies chances as he adds parameters that obviously shrink this ratio – as if there were four times more chances to get four aces of hearts when picking a card from each of four decks than to get one when picking a card from a single deck.[1] As a consequence, the results and conclusions of these supposed demonstrations are deprived of any validity. Our study has also shown that, while several crucial parameters contributing to the validity of an etymology could not be reduced to figures, thus preventing a final probabilistic assessment, their huge distribution made some individual etymologies so obvious – like **m-* '1st person' or **t-* '2nd person' in the Indo-European family – that no calculation was needed.

Finally, we have studied the kinship appellative terms *papa*, *mama* and *kaka*, gathering kinship terminologies in over 3,000 languages covering the whole Earth. These words are so widespread that linguists never even envisioned that their convergence might be due to chance. Instead, since the mid-19th century they had elaborated an ad hoc hypothesis (Buschmann 1852, Lubbock 1889, Westermarck 1891), holding that the similarity of these words at the global level resulted from convergent innovations stemming from the phonetic limitations of babies learning to speak.

This hypothesis, refined by Murdock (1959) and Jakobson (1960), was widely accepted without any historical study having documented a single case of such innovation. However, prompted by recent publications claiming a Proto-Sapiens antiquity for *papa*, *mama* and *kaka* words (Ruhlen 1994a, 2000; Bengtson & Ruhlen 1994; Bancel & Matthey de l'Etang 2002; Matthey de l'Etang

[1] Actually, one has 1 chance out of 52 to get an ace of hearts (or any other card) when picking at random a card from a deck, and $(1/52)^4$ = 1 chance out of 7,311,616 to get four aces of hearts when picking a card from each of four decks.

& Bancel 2002), Trask (2004) claimed to have found such convergent innovations in a range of language families. We have shown that all of Trask's alleged innovations were inherited from the earliest stages of their respective language families (Matthey de l'Etang & Bancel 2008, Bancel & Matthey de l'Etang 2013). For instance, the allegedly "new" French words *maman* and *papa* have been inherited from Latin *mamma* and *pappa*, Welsh *tat* and *mam* have been inherited from Proto-Celtic **tata* and **mama*, all words found in classical and comparative dictionaries and apparently ignored by Trask.

The massive preservation of *papa*, *mama* and *kaka* words in an overwhelming majority of language families over the last several millennia leaves us with two theoretically possible explanations of their global distribution: (i) blatantly implausible, massive convergent innovations having originated in the Paleolithic and having inexplicably ceased in the Neolithic, a period in which these words would have started to be faithfully transmitted from one generation to another; (ii) inheritance from a common Proto-Sapiens ancestor.

As we will see, the lexical root presented here also is already known to be ancestral in a great number of language families worldwide. As a consequence, just like for *papa*, *mama* and *kaka*, any suggestion that their convergence might be due to chance would be preposterous. Let us now present the data establishing its existence.

2. THE PROTO-SAPIENS LEXICAL ROOT *MA- 'PROHIBITIVE/NEGATIVE'

This etymology is ***ma**, a prohibitive or negative particle. It was originally discovered by the Italian linguist Alfredo Trombetti (1905) and rediscovered by the first author in Trombetti's work in the late 1980s. We have entirely redesigned its empirical support, gathering reconstructions from many language families and directly adding data from language descriptions. It is found in a huge series of languages families and phyla (Table 1).

Table 1. Proto-Sapiens *ma- 'prohibitive/negative'[2]

[?? **KHOISAN**

SANDAWE: Sandawe ***mě:** 'not (prohibitive)';

SOUTHERN KHOISAN: Central Khoisan: Proto-Khoe ***tama-** 'not'; Proto-Khoekhoe ***tama-** 'negative morpheme'; Nama **tàmà**'negative morpheme'; !Ora **tama** negative morpheme'; Proto-West Khoe ***-ta[ma]** 'negative morpheme'; Naron **-tá**, **- tàmà**'negative morpheme'; //Gana **tàmà** 'negative morpheme';

(Güldemann & Elderkin 2010; G. Starostin 2007)]

NIGER-KORDOFANIAN

[2] Data between brackets preceded by a double question mark ([?? Khoisan …], [?? Chadic …] and [?? Hmong-Mien …]) are uncertain reflexes; data between brackets preceded by a simple question mark are dubious members of the etymological series ([? Mongolic…], [? Ainu …], [? Austronesian …] and [? Proto-Mountain Ok …]); they do not count as fully legitimate members of the etymology and are mentioned for the record. Sources are listed at the end of each phylum.

MANDE: Proto-Mande ***maa-**, ***mee-** ‘prefixes of the negative perfective of qualificative verbs’; Western: *Northwestern*: Soninke **ma** ‘negative verb marker’; Bobo **má ~ mā** ‘negative marker’; *Central Southwestern*: Susu **mu** ‘not’; Yalunka **ami** ‘not’; Kuranko **ma** ‘not’; Vai **má** ‘not’; Konyanka **ma** ‘not’; Mandinka **maŋ** ‘negative verb marker’; Malinke **ma** ‘negative verb marker’; Bambara **ma** ‘negative verb marker (past tenses); Dyula **ma** ‘negative perfective marker of qualificative verbs’; Mende **mā** ‘not’;

WEST ATLANTIC: Mel: Krim **ma** ‘negative verb marker’;

SOUTH-CENTRAL NIGER-CONGO: Gur: Senufo **mɛ** ‘negative verbal marker’; **m’a** ‘negative imperative marker’; Kwa: Baule **man** ‘negative verb marker’; Fon **ma** ‘negative verb marker’, **ma … nó** ‘prohibitive verb marker’; Abidji **mɷ̀~ mu** (sg.) ‘negative verb marker’; Abron **mã ~ mĩ** ‘negative verb marker’; Adioukrou **-m** ‘negative verb suffix’; Attié **ma** ‘negative verb marker’; Ewe **mé** ‘negative verb marker’; Yoruba **máà** ‘negative verb marker’; Gechode **mɛ̄** ‘negative past marker’; Krachi **mɛ̄** ‘negative verb marker’; Nchumuru **mi**, **mā** ‘negative verb markers’; Gonja **múN-** ‘negative verb marker’; Likpe **ma-** ‘negative verb marker’; Edoid: Edo **má** ‘negative verb marker’; Ijoid: Proto-Ijo ***ma** ‘negative verb marker’; Okrika **mà** ‘negative verb marker’; Plateau: Eloyi **mô** ‘negative verb marker’; Oko: Oko **ma**, **mi** ‘negative verb markers’; Adamawa-Ubangian: Sango **maa**; Gbaya Kaka **ma**;

KORDOFANIAN: Talodi-Heiban: Masakin **maa**;

(Bailleul 1977; Camara 1999; Dramé 2003; Duthie 1996; Fadaïro 2001; Fofana & Traoré 2003; Girier 1996; Gregersen 1972; Hérault 1982; Kouadio N’Guessan & Kouame 2004; Kropp Dakubu 1980; Kutsch-Lojenga & Hood 1982; Long 1971; Long & Diomandé 1968; Migeod 1908; Mohammed 2001; Prost 1983; Rongier 2002; Tresbarats 1992; Williamson 2004)

NILO-SAHARAN: Proto-Nilo-Saharan ***má-** ‘negative prefix of verbs’;

KUNAMA: Kunama **-mma** ‘neg. conditional’, **-mai** ‘neg. subjunctive & imperative’, **-mme** ‘neg. aorist, optative’;

SONGHAY: **-ma-** ‘neg. with perfect’; Nara **ma-** ‘neg. of perf., imper.’; Nubian ***m-** ‘verb neg. prefix’;

EASTERN SUDANIC: Kuliak: Ik **máá** ‘verb neg. marker of perf. & imper.’; Western: Merarit **m(V)-** ‘verb. neg. pref.’; Surmic: Didinga **ma-** ‘neg. of imper.’;

NILOTIC: Eastern: Lango **ma:m** ‘preposed verb neg. particle’; Teso **mam** ‘no’; Karamojong **man** ‘no’; Proto-Maa ***m(i)-** ‘verb neg. pref.’; Maasai **m-** ‘negative verb prefix’; Southern: Kalenjin ***-ma-** ‘id.’;

(Ehret 2001; Sicard & Malherbe 2005; Kitching 1915)

AFROASIATIC: Proto-Afroasiatic ***mV** ‘prohibitive particle’;

SEMITIC: Proto-Semitic ***mā** ‘not’; Central: Arabic **mā** ‘not’; South: Harari **mē?** ‘not’; Amharic **al- … -m** ‘past verbal negative suffix’;

CUSHITIC: Saho-Afar: Afar **mā-**; Somali: Somali **má-** ... **in**; Rendille-Boni: Rendille **ma-** ‘negative prefix’; Western Omo-Tana: Dasenech **ma**; Arbore **máala**; South: Iraqw **má**;

OMOTIC: South: Hamer-Banna **-ma**;

ONGOTAN: Ongota **mi-**;

EGYPTIAN: Ancient Egyptian **m** ‘do not! (prohibitive particle)’; survives in Coptic as the initial element of the negative Sahidic Coptic particle ***m**pōr* and Bohairic Coptic ***m**p^{h}ōr* ‘do not!’ and some negative verbal prefixes: Sahidic ***m**pr-*, Bohairic ***m**per-* ‘do not...!’, the prefix ***m**pe-* of the negative perfect I, the prefix ***m**pu-* ‘you [f. sg.] did not’, the Sahidic prefix ***m**pate-* (and Bohairic ***m**pante-* ‘not yet’), Sahidic ***ma**re- ~ **me**re- ~ **ma-** ~ **me-***, Bohairic ***m**pare- ~ **m**pa-* (prefix of the negative aorist);

[?? CHADIC: West Chadic Kofyar **má** ‘negative verbal marker’; Miya **má** ‘negative verbal marker’; Bade **-m** ‘negative verbal marker’;]

(Bomhard 2008; Cohen 1936; Dolgopolsky 2008; Kropp Dakubu 1980; Militarev & Stolbova 2007; Schuh 1998, 2003)

DENÉ-CAUCASIAN: Proto-Sino-Caucasian ***ma** ‘prohibitive particle’;

NORTH CAUCASIAN: Proto-North Caucasian ***ma ~ *mə** ‘prohibitive particle’; Nakh: Proto-Nakh ***ma** ‘prohib. particle, do not’; Chechen **ma**; Ingush **ma**; Batsbi **ma**; Tsezian: Proto-Tsezian ***-m** ‘negative particle’; Tsezi **-n-č**; Ginukh **-go-m**; Khvarshi **-b-ç̌**; Inkhokvari **-b-**; Lak: Lak **ma**; Lezghian: Proto-Lezghian ***mV** ‘prohibitive particle’; Lezghian **-mir**; Tabasaran **m-**; Agul **m-**; Rutul **m-**; Tsakhur **m-**; Kryz **m-**; Budukh **m-**; Udi **ma**;

West Caucasian: Proto-West Caucasian ***mə** 'not' (neg. particle); Abkhaz **m-**; Abaza **-m-**; Adyghe **mə-**; Kabardian **mə-**; Ubykh **-m(a)-**;

SINO-TIBETAN: Proto-Sino-Tibetan ***mă(H)** 'not'; Sinitic: Chinese **無** 'not have, not'; Preclassic Old Chinese **ma**; Classic Old Chinese **ma**; Western Han Chinese **ma**; Eastern Han Chinese **mwa**; Early Postclassic Chinese **mwo**; Middle Postclassic Chinese **mwo**; Late Postclassic Chinese **mwo**; Middle Chinese **mü**; Beijing **u^{12}**; Jinan **u^{12}**; Xi'an **vu^{12}**; Taiyuan **vu^{1}**; Hankou **u^{12}**; Chengdu **vu^{12}**; Yangzhou **u^{12}**; Suzhou **vu^{32}**; Wenzhou **vu^{12}**; Changsha **u^{12}**; Shuangfeng **əu^{12}**; Nanchang **u^{31}**; Meixian **vu^{12}**; Guangzhou **mou^{12}**; Xiamen **bu^{12}** (lit.), **bɔ^{12}**; Chaozhou **bo^{12}**; Fuzhou **u^{12}**; Shanghai **ɦu^{32}**; Zhongyuan yinyun **u^{12}**; Jianchuan Bai **-mo^{1}**; Dali Bai **mu^{1}**; Bijiang Bai **-mu^{1}** (cf. also Old Chinese **勿 mət** 'don't', **未 məts** 'not yet', **亡 maŋ** 'have not'); Tibeto-Burmese: Tibetan **ma** 'not'; Burmese **maʔ** 'verbal negative', **majʔ** 'have not'; Kachin **maʔ^{3}** 'be exhausted, ended', **šəmat^{2}** 'be lost', (H) **ma** 'nothing' (cf. also **mje** 'be lost, gone'); Lushai ***maʔ ~ māk'** (cf. **ma ~ māk** 'to give up, to divorce (one's wife)'); Lepcha **ma ~ mat** negative, **ma ~ mă** 'negative particle' (cf. also Tibetan **min** (< **ma-gin**) 'is not'; Moshang **mu**; Namsangia **ma**; Kanauri **ma**; Kham **ma** 'negative affix'; Akha **mah-xv** 'no, not'; Proto-Garo ***ma'^{L}** 'be lost'; Bodo-Garo: Bodo **ga-ma** 'disappear', **ka-ma** 'to lose'; Dimasa **gama, kama** 'lose, disappear, perish', **khama** 'destroy'; Garo **mat** 'be spent', **gimat** 'destroy'; Kham **ma^{L}** 'become lost'; Magari **hma, hmat** 'be lost');

YENISEIAN: Proto-Yeniseian ***wə-** 'not, there is not'; Ket **bɜ̄ń~bъń** 'not, there is not', **bъńśeŋ^{1}**, **bъtśeŋ^{1}**, **bъńčəŋ^{1}** 'there is not'; Yug **bъń** 'not, there is not', **bъšɛ** 'there is not'; Kottish **bō** 'prohibitive particle', **mon** 'not'; Assan **mon** 'not'; Arin **bon** 'there is not, not'; Pumpokol **a-mút**, **amut** 'not';

(S. Starostin 2007; Wang 2004; McDaniel 2002)

DRAVIDIAN: Proto-Dravidian ***mal-** 'negative morpheme';

NORTH: Proto-North Dravidian ***mal** 'no, not'; Kurukh **mal** 'not'; Malto **mala**, **malā** 'not, no', **malnā** 'not to be (so)', **maʔā** 'not (when the negation falls on one single word which is being opposed to another word), no', **malkā** 'deprived of, lacking', **mal-** (past **mall-**) 'to be not';

SOUTH: Proto-South Dravidian ***mal-** 'negative morpheme', Tamil **-mal** in negative adv. suffix ***-āmal***;

(Burrow & Emeneau 1984, etym. 3883)

KARTVELIAN: Proto-Kartvelian ***ma-** 'not (prohibitive)'; Svan **mā-d(e)**, **mō-de**; Laz **mo-t**;

(S. Starostin 2005b)

EURASIATIC: Proto-Eurasiatic ***ma** 'prohibitive particle';

INDO-EUROPEAN:

1. Proto-Indo-European ***mē** 'prohibitive particle'; Tocharian: Agnean **mā** 'not, no'; Kuchean **mā** 'not, no'; Indo-Iranian: Proto-Indo-Iranian **mā** 'not, no'; *Indic*: Sanskrit (Ṛgveda) **mā**; Pali **mā**; Aśokan **ma ~ mā**; Apabhraṁśa **mẵ**; Gypsy (Europe & Armenia dials.) **ma**; Waigali **ma ~ mi**; Dameli **ma**; Pashai **ma**; Wotapuri **ma**; Kashmiri **mã̃**; Sindhi **ma**; Gujarati **mã̃**; Kalasha (Rumbur dial.) **moh**; Khowar **mo**; with various adverbial affixes: Prakrit **māia**, **māi**, **maïa**, **maṁta**; Kashmiri **matã̃**; Sindhi **matã**, **mataṇa**, **matuṇi**; Lahnda **mattaṇ**, **mattã**, **matã**, **mat**; Old Awali **matu**, **mati**; Hindi **mat**; Old Marwari **mati**; Old Gujarati **matu**, **mana**]; *Nuristani*: Ashkun **m'â** 'don't!'; Kalasha-ala (Nishei-ala dial.) **ma·a** 'don't!'; *Iranian*: Avestan **mā**; Old Persian **mā**; Ossetic **mā**; Armenian: Classical Armenian **mi**; Hellenic: Proto-Greek ***mā́**; Elean **mā́**; Homeric **mḗ**; Attic **mḗ**; Modern Greek **mí**; Albanian: Albanian **mos**;

2. Proto-Indo-European ***(s)mal-** 'mean, malicious, small'; Tocharian: Agnean **smale** 'lie', **smālok** 'liar'; Iranian: Avestan **mairya-** 'fraudulent'; Armenian: Classical Armenian **meł** 'sin'; Hellenic: Classical Greek **méleo-** 'vain, unhappy'; Slavic: Proto-Slavic ***māl'** 'small'; Old Slavic **mal'** 'small'; Russian **mal** 'small'; Ukrainian **malij** 'small'; Bielorussian **mály** 'small'; Bulgarian **mál'k** 'small'; Serbian, Croatian **máli** 'small'; Slovenian **mâli** 'small'; Czech, Slovak **malý** 'small'; Polish **mały** 'small'; Upper Sorbian **małki** 'small'; Lower Sorbian **małki** 'small'; Baltic: Proto-Baltic ***mel-a-** 'lies'; Lithuanian **mẽla-s** 'lie'; Lettish **mę̣li** 'lies', **melis** 'liar'; Germanic: Proto-Germanic ***smal-a-** 'small'; Gothic ***smal-s** 'small, little'; Old Norse **smali** 'small cattle'; Norwegian **smale** 'narrow'; Swedish **smal** 'narrow'; Old English **smäl** 'small'; English **small**; Old Frisian **smel** 'small, minor'; Old Saxon **smal** 'small, minor, narrow'; Middle Dutch **smal** 'small, minor, narrow';

Dutch **smal** ‘small’; Middle Low German **smal** ‘small’; Old High German **smal** ‘small, minor, narrow’; Middle High German **smal** ‘small, minor, narrow’; German **schmal** ‘narrow’; Italic: Latin **malus** ‘bad, mean'; Osk **mallom** ‘bad, mean'; French **mal** ‘badly, poorly; trouble, illness, pain, harm'; Portuguese **mal** ‘bad; badly, poorly; trouble, illness’; Spanish **mal** ‘bad; badly, poorly; trouble, illness’; Occitan **mal** ~ **mau** ‘bad; badly; trouble, illness’; Italian **mal** ‘bad; badly; trouble, pain, illness’; Celtic: Proto-Celtic ***mell** ‘sin’; Middle Irish **mell** ‘sin, fault';

ALTAIC: Proto-Altaic ***ma** ‘negative particle’; Turkic: Proto-Turkic ***-ma-** ‘not’; Old Turkish **-ma-**; Karakhanid **-ma-**; Turkish **-ma-**; Tatar **-ma-**; Middle Turkish **-ma-**; Uzbek **-ma-**; Uighur **-ma-**; Sary-Yughur **-ma-**; Azerbaijan **-ma-**; Turkmen **-ma-**; Khakassian **-ma-**; Shor **-ma-**; Oyrat **-ma-**; Halaj **-ma-**; Chuvash **-ma-**; Yakut **-ma-**; Tuva **-ma-**; Tofalar **-ma-**; Kirghiz **-ma-**; Kazakh **-ma-**; Noghai **-ma-**; Bashkir **-ma-**; Balkar **-ma-**; Gagauz **-ma-**; Karaim **-ma-**; Karakalpak **-ma-**; Salar **-mi-**; Kumyk **-ma-**; [?Mongolic: Proto-Mongolic ***büi**, ***bu** ‘prohibitive particle’ may be originally the same morpheme, but functioning as a separate word and thus subject to the rule ***mV** > **bV* in monosyllabic words: Written Mongolian **bü** ‘do not’; Middle Mongolian **bu**; Monguor **bī**; Dagur **bū**; Mogol **bi**; Ordos **bū**; Khalkha **bū**; Buriat **bɯ**; Oyrat **bö**;] Tungusic: Proto-Tungusic ***-me** ‘prohibitive particle’; Spoken Manchu **emə** 'don't'; Literary Manchu **ume**; Jürchen **ume**; Nanai **em**; Oroch **em**;

NIPPO-KOREAN: Korean: Proto-Korean ***mō-t** ‘impossible (adv.), bad, wicked’; Middle Korean **mōt**, **mōtír-**; Modern Korean **mōt** [mōs] ‘prohibitive particle’, **mōžil-**; Japonic: Proto-Japonic ***-ma-** ‘dubitative suffix’; Old Japanese **-ma-**; Middle Japanese **-ma-**; Tokyo **-ma-i**;

(Nikolayev 2007; Abaev 1970; Turner 1962–1966 [etym. 9981]; Chantraine 1968; Poppe 1955; S. Starostin 2005a; S. Starostin 2006; Strand 1997–2012)

[**? AINU:**[3] Ainu is**am** ‘not to be’ (to be compared to *isu* ‘to be’);

(Greenberg 2000: 213)]

AMERIND: Proto-Amerind ***mã** ‘negative’;

PENUTIAN: Maiduan: Proto-Maiduan ***-men** ‘negative’; Maidu **-men**; Konkow **-men-te** ‘without, but not’; Nisenan **-men** ‘not’; Wintuan: Wintun **-mina**; Yokutian: Yokuts **ʔoho-m**; Yo-Yaudanchi **ʔa-m**, **kʾamu** ‘not’; Zuñi: Zuñi **-(ʔ)amme**, **-na-ʔ-ma** ‘not’; Mayan: Proto-Mayan ***(ma)-n ... ta(x)** ‘negative’; Quiche **man ... tax**; Achi **n ... tax**; Pocomchi **ma ... ta**; Cakchiquel **man ... ta**; Tzeltal **maʔ** ‘not, without’; Ch’ol **maʔ** ~ **mač** ‘not’; Chontal **maʔ** ~ **mač** ‘not’; Chorti **ma-** ‘negative prefix’, **ma ači** ‘no, not’, **maan** ‘lack, failure’;

HOKAN: Seri-Yuman: Seri **m-** ‘negative’;

CENTRAL AMERIND: Uto-Aztecan: Proto-[?Uto-Aztecan][4] ***ma** ‘negative verb marker’; Tetelcingo Nahuatl **a ... mo** ‘negative verb marker’; North Puebla Nahuatl **a’mo** ‘negative verb marker’; Huasteca Nahuatl **amo** ‘negative verb marker’; Michoacán Nahual **amo** ‘negative verb marker’; Northern Tepehuan **mai** ‘negative verb marker’; Monachi **minoʔ** ‘prohibitive’;

CHIBCHAN-PAEZAN: Chibchan: Yanomam **ma** ‘no, negative’; Paezan: Paez **-mee**;

ANDEAN: Quechuan: Quechua **mana** ‘negative’;

EQUATORIAL-TUCANOAN: Tucanoan: Tucano **mãrĩ** ‘negative sg.’; Macro-Arawakan: Yavitero **yama** ‘negative’; Proto-Arawakan ***ma** ‘privative’; Parecís **maha** ‘negative sg.’; Taino **mar** ‘negative’; Proto-Tupi-Guarani ***maʔe-tei** ‘negative’; Siriono **emoa** ~ **mae eã** ‘nothing’;

GE-PANO-CARIB: Ge: Apinayé **mã** ‘negative’; Macro-Panoan: Lengua **ma** ‘no, negative’; Sanapana **ama** ‘no, negative’, **ma** ‘nothing’; *Pano-Tacanan*: Proto-Panoan ***[-ya]ma** ‘negative’; Cashibo-Cacataibo **-ma** ‘no, negative’; Catuquina **-yama** ‘nothing, no, negative’; Chacobo **-ma** ~ **-yama** ‘no, negative’; Shipibo-Conibo **-ma** ~ **-yama** ‘no, negative’, **yamaki** ‘nothing’; Yaminahua **ma** ‘no, negative’, **aβa-ya-ma** ~ **aβa-ma** ‘nothing’; Proto-Tacanan ***-ma** ‘no, not’; Tacana **moe** ~ **mawe** ~ **aimoe ... mawe** ‘no, negative’; Araona **ma** ‘no’, **maesa** ‘no, nothing’; Cavineña **-ma** ~ **ama** ‘no, negative’, **aihama** ‘nothing’; Ese’ejja **-ama** ‘no, negative’;

[3] The classificatory status of Ainu is unsure, and therefore is listed here separately, though the authors each have an opinion regarding the phylum it may belong to.

[4] According to Langacker (1977: 34), **ma* ‘negative’ “might be reconstructed at some level” of Uto-Aztecan.

Carib: Proto-Carib ***-myra** 'negative'; Eastern and Western Surinamese, Venezuelan and Guyanese Carib **-`ma**, **-myn** 'negative'; Wayana **-mna** 'negative'; Trio **-nna**;

(Matteson 1972; Ultan 1964; Langacker 1977; Tuggy 1979; Brockway 1979; Marlett 2002; Beller & Beller 1979; Sischo 1979; Wisdom 1950; Lamb 1957; Swadesh 1967; Rowan & Burgess 2008; Key 2007a; Shell & Olive 1987; Loriot et al. 1993; Buckley & Ottaviano 1989; Kennell 2000; Prost & Prost no date; Pitman 1981; Key 2007b; Wyma & Wyma 1962; Courtz 2008)

AUSTRIC: Proto-Austric ***mV** 'negative particle';

AUSTROASIATIC: Proto-Austroasiatic ***ʔVm ~ *mVn** 'not, negative'; Munda: Proto-Southern Munda ***əm** 'negative verb particle'; Juang **ama- ~ am- ~ ma-** 'negative verb particle'; Kharia **um** 'negative verb particle', ? **umbo** 'negative verb particle'; Mon-Khmer: Proto-Mon-Khmer ***ʔam** 'not'; *Aslian*: Semai **ʔama** 'don't (mild negative)', **ʔamama** 'no matter! never mind!'; *Bahnaric*: Mnong (Rölöm dial.) **məʔ** 'not (preverbal)', **maːn ~ məː** 'do not'; Laven (Jru' dial.) **ʔmiŋ** 'not possible'; Nyaheun **mmiŋ** 'negative'; Kasseng **ʔəhɔɔm** 'not'; Yaeh **hɔɔm** 'not'; Tariang **hɔɔm** 'not'; Brao **tə- … ʔiim** 'not'; Ta'oih **ʔən** 'not'; Halang **maʔ** 'do not'; *Katuic*: Katu (An Diem dial.) **məʔ ʔawɛ**: 'not'; Ngeq **hɔɔm** 'not yet'; *Khasic*: Proto-Khasic ***ham** 'not'; Khasi **ʔeːm** 'not'; War **mə ... laʔ** 'negation of future'; Pnar (Jowai dial.) **wom ~ wum** 'negative'; **ʔim** 'negative marker', **ham** 'negator'; Pnar (Rymbai dial.) **ʔim** 'negative marker'; *Khmeric*: Khmer **min** 'not'; Surin Khmer **man** 'not to, not to want to'; *Khmuic*: Khmu **ʔam** 'not'; Khmu (Cuang dial.) **ʔam** 'not'; T'in (Mal dial.) **məː** 'not yet'; Mlabri **met** 'not'; *Monic*: Mon **mah mah** 'nothing of importance, for nothing, gratis'; Nyah Kur (Huai Khrai, Nam Lao & Northern dials.) **ʔɤ́ɤm** 'emphatic particle used with negative statements' (Central, Klang, Southern & Tha Pong dials.), **mée ~** (Huai Khrai, Nam Lao & Northern dials.) **mɛ́ɛ** 'emphatic particle used with negative, contradicting or correcting statements'; *Palaungic*: Proto-Palaungic ***ʔaŋ** 'not, no', Proto-Palaung-Wa ***mV** 'not', ***ʔaŋ** 'not, no'; Plang **maŋ**^{31} 'not'; Rumai **u**^{55} **moh**^{51} 'not'; Lamet **maʔ**^{53} 'not'; Khme **mak**^{31} **kəʔ**^{53} 'not'; Proto-Waic ***ʔaŋ** 'not'; Paraok **ʔaŋ** 'not'; Wa **ʔaŋ** 'not'; Wa (Kentung dial.) **āng** 'not'; Wa (Southern dial.) **ang** 'not'; U **àng** 'not'; *Pearic*: Pear (Kompong Thom dial.) **miej** 'to stop, cease; not do, be wary of'; Chong **mùuj mùuj** 'not'; Chong (Samray dial.) **min** 'no, not', **maj** 'to stop, cease; not do, be wary of'; *Vietic*: Vietnamese **hɔɔm** (orthogr. *không*) 'not', Thavung **maʔ** 'do not (prohibitive particle)'; Tum **nɔ**^{212} **mɛːn**^{212} 'not';

TAI-KADAI: Hlai: Proto-Hlai ***ʔeːmɦ** 'not'; Bouhin **ʔeːm**^{2} 'not'; Ha Em **ʔeːm**^{2} 'not'; Central Hlai (Qi) **ʔɛ́m** 'not'; Kradai: Gelao (Judu dial.) **ma**^{42} 'no, not'; Gelao (Niopo dial.) **ma**^{55} 'no, not'; Be: Ong Be (Lincheng dial.) **mən**^{2} 'no, not'; Tai: Proto-Tai ***miːᴬ** 'no, not'; Ningming **mi**^{5} 'no, not'; Daxin **mi**^{2} 'no, not'; Shangsi **mi**$^{3'}$ 'no, not'; Longzhou **mi**^{5} 'no, not'; Debao **mei**^{2} 'no, not'; Jingxi **mi**^{2} 'no, not'; Chongzuo **məi**^{2} 'no, not'; Fusui (Central dial.) **mi**$^{1'}$ 'no, not'; Bouyei (Po-ai) **mei**^{2}; Bouyei (Wangmo dial.) **mi**^{31} 'no, not'; Lianshan **mi**^{2} 'no, not'; Qinzhou **mai**^{3} 'no, not'; Yongnan **mei**^{1} 'no, not'; Long'an **muɯi**^{2} 'no, not'; Proto-Zhuang-Tai ***mai**^{T}; Longzhou Zhuang **mi**^{5}; Archaic Siamese **mi**^{4} 'no, not'; Siamese **maj**^{3} 'no, not'; Shan **maw**^{2} 'no, not'; Dehong **maau**^{3} 'no, not'; Kam-Sui: Southern Dong **mi**^{31} 'no, not'; Ai-Cham (Diwo dial.) **məi**^{6} 'not yet'; Mak (Yangfeng dial.) **me**^{2} 'no, not'; Then **me**^{2} 'no, not'; Biao **m**^{6} 'no, not'; Mak (Laliu dial.) **me**^{2} 'no, not'; Ai-Cham (Taiyang dial.) **me**^{2} 'no, not';

[?? HMONG-MIEN: (likely Chinese borrowing) Hmongic: Dongnu Bunu (Nongjing dial.) **ma**^{2} 'no, not'; Younuo (Xiaozhai dial.) **mɔ**^{22} 'no, not'; Mienic: Kim Mun **maa**^{13} **~ ma**^{33} 'no, not';]

[? AUSTRONESIAN: East Formosan: Basai **maju** 'not'; Basay **mia** 'not'; Puyuman: Puyuma (Katipul dial.) **məli** 'not'; Puyuma (Lower Pinlang dial.) **amli** 'not'; Puyuma (Pilam dial.) **amli** 'not'; Western Plains: Favorlang **maini** 'no'; Malayo-Polynesian: Muna (Katobu-Tongkuno dial.) **miina** 'no, not'; Wuna **mīna** 'no, not'; Anakalang **da'ama** 'no, not'; Baliledo **da'ama** 'no, not'; Buru **mo** 'no, not'; Paulohi **tama** 'no, not'; Alune **mo** 'no, not'; Selaru **léma** 'no, not'; Levei **mole** 'no, not'; 18th cent. Tahitian **'aima** 'no, not' (compare modern Tahitian *'aita*); Nanumea **mooe** 'no, not'; Kusaie **mo[h]** 'no, not'; Apma (Suru Kavian dial.) **ma … nga** 'negative sentence marker ('not')'; Nggela **mua** 'no, not'; Kwaio **ʔamoe** 'no, not'; Kwai **amoe** 'no'; Dori'o **āmɔne** 'no'; Oroha **mao** 'no'; Sa'a (Sa'a village) **mao** 'no'; 'Are'are (Ma'asupa village) **mao** 'no'; 'Are'are (Waiahaa village) **mao** 'no'; Santa Ana **marefa** 'no'; Kahua (Mami dial.) **marefa** 'no'; Kahua **mareha** 'no'; Tawaroga **mareha** 'no'; Santa Catalina **marefa** 'no'; Haku **moa** 'no, not'; Halia (Selau dial.) **moia** 'no, not'; Numbami (Simboma dial.) **mou** 'none'; Kove **mao** 'not'; Kayupulau **moxa** 'no, not'; Windesi Wandamen

moyar ‘no, not’; Marau **mao** ‘no’; Inabaknon **ma’in** ‘no, not’; Kadori **eam** ‘no, not’; Proto-Lampungic ***ma(kʔ)** ‘no, not’; Lampung **maʔwat** ‘no, not’; Komering **maʔwat’** ‘no, not’; Lampung Api (Belalau dial.) **mawat** ‘no, not’; Lampung Api (Jabung dial.) **mawat** ‘no, not’; Komering (Kayu Agung Asli dial.) **homaʔ** ‘no, not’; Komering (Kayu Agung Pendatang dial.) **homaʔ** ‘no, not’; Lampung Api (Kalianda dial.) **mawat** ‘no, not’; Komering (Ulu dial., Adumanis village) **maʔwat’** ‘no, not’; Komering (Ulu dial., Darmapura village) **maʔwat’** ‘no, not’; Komering (Ulu dial., Perjaya village) **maʔwat’** ‘no, not’; Komering (Ulu dial., Perjaya village) **mawat’** ‘no, not’; Komering (Ilir dial., Palau Gemantug village) **maʔwət’** ‘no, not’; Lampung Api (Kota Agung dial.) **mawat** ‘no, not’; Lampung Nyo (Abung/Kotabumi dial.) **maʔ** ‘no, not’; Lampung Nyo (Menggala/Tulang Bawang dial.) **maʔwaʔ** ‘no, not’; Lampung Nyo (Abung/Sukadana dial.) **maʔ** ‘no, not’; Lampung Api (Sukau dial.) **maweʔ** ‘no, not’; Lampung Api (Talang Padang dial.) **muwat** ‘no, not’; Lampung Api (Way Kanan dial.) **maʔwat** ‘no, not’; Lampung Api (Way Lima dial.) **maʔ** ‘no, not’; Lampung Api (Ranau dial.) **maweʔ** ‘no, not’; Lampung Api (Krui dial.) **maweʔ** ‘no, not’; Lampung Api (Pubian dial.) **mawat** ‘no, not’; Lampung Api (Sungkai dial.) **maʔwat** ‘no, not’; Modang **am** ‘no, not’; Bundu Dusun (Dentral Dusun) **amuʔ** ‘no, not’;]

(Anderson 2007; Blust et al. no date; Norquest 2007; Peiros & Starostin 2006; Shorto et al. 2006)

INDO-PACIFIC

TRANS-NEW GUINEA: Proto-Trans-New Guinea ***ma-** + verb ‘not’; South-East: Yareba **me**; Angan: Ankave **ma-**; Agaataha **maa-**; Finisterre-Huon: Dedua **mi**; Kâte **mi**; Ono **mi**; Komba **mâ**; Madang: Proto-Madang ***ma-**; Kalam **ma- (-C), m- (-V)**; Waskia **me-**; Pila **me-**; Saki **me-**; Tani **me-**; Ulingan **me-**; Bepour **me-**; Wanuma **me-**; Yaben **me-**; Ukuriguma **me-**; Amaimon **me-**; Hinihon **ma-**; Abasakur **ma-**; Bilakura **ma-**; Sileibi **ma-**; Katiati **ma-**; Wadaginam **ma**; Eastern Highlands: Siane **am-**; Mid-Wahgi **ma** ‘no’ (interj.); Wiru **mo-**; Central: Samo **moi**; Kubo **moi**; Bibo **moi**; [? Proto-Mountain Ok ***ba**; Bimin **ba**; Faiwol **ba**; Telefol **bA**].

(Pawley 2000)

3. DISTRIBUTIONAL, PHONETIC AND SEMANTIC COMMENTS

A first remark is that **ma* ‘negative/prohibitive’ is among the most widely and firmly supported of all Proto-Sapiens etymologies published so far. Beyond the massive list of data from individual languages presented above, this is true both in terms of phyla (only Australian is not represented, perhaps because it was not investigated in any depth) and of reconstructed proto-languages, ancient languages and long-isolated languages represented (Table 2).

Table 2. Reconstructed, ancient and long-isolated languages with **ma-* ‘prohibitive/negative’

Sandawe ***mĕ:**, Pr.-Mande ***maa-**, Pr.-Ijo ***ma,** Pr.-Nilo-Saharan ***má-**, Pr.-Maa ***m(i)-**, Pr.-Afroasiatic ***mV**, Pr.-Semitic ***mā-**, Ancient Egyptian **m**, Pr.-Sino-Caucasian ***ma**, Pr.-North Caucasian ***ma**, Pr.-Nakh ***ma**, Pr.-Tsezian ***-m**, Pr.-Lezghian ***mV**, Pr.-West Caucasian ***mə**, Pr.-Sino-Tibetan ***mă(H)**, Preclassic Old Chinese **ma**, Pr.-Yeniseian ***wə-**, Pr.-Dravidian ***mal-**, Pr.-North Dravidian ***mal**, Pr.-Kartvelian ***ma-**, Pr.-Eurasiatic ***ma**, Pr.-Indo-European ***mē**, Pr.-Indo-Iranian **mā**, Vedic Sanskrit **mā**, Avestan **mā**, Agnean **mā**, Classical Armenian **mi**, Pr.-Greek ***mā́**, Doric **mā́**, Homeric **mḗ**, Pr.-Altaic ***ma**, Pr.-Turkic ***-ma-**, Old Turkish **-ma-**, Pr.-Tungusic ***-me**, Middle Korean **mōt**, Pr.-Japonic ***-ma-**, Pr.-Amerind ***-mã**, Pr.-Maiduan ***-men**, Pr.-Mayan ***(ma)-n ... ta(x)**, Pr.-Uto-Aztecan ***ma**, Pr.-Arawakan ***ma**, Pr.-Tupi-Guarani ***maʔe-tei**, Pr.-Panoan ***[-ya]ma**, Pr.-Tacanan ***-ma**, Pr.-Carib ***-myra**, Pr.-Austric ***mV**, Pr.-Austroasiatic ***ʔVm** ~ ***mVn**, Pr.-Southern Munda ***əm**, Pr.-Mon-Khmer ***ʔam**, Pr.-Khasic ***ham**, Pr.-Palaung-Wa ***mV**, Pr.-Palaungic ***ʔVm**, Pr.-Waic ***ʔaŋ**, Pr.-Hlai ***ʔe:mɦ**, Pr.-Tai ***mi:^{A}**, Pr.-Trans-New Guinea ***ma-**, Pr.-Madang ***ma-**.

All the reconstructions in this list, based on data from their respective families, have been made by linguists operating independently from the Proto-Sapiens hypothesis (which many of them would presumably have opposed). Most or, possibly, none of them had ever heard of the particular hypothesis of a Proto-Sapiens word **ma* 'prohibitive/negative,' which has remained buried until today in Trombetti's (1905) largely forgotten work. This entirely precludes the possibility that the convergence of these reconstructed words might be due to any kind of wishful thinking, much less any conspiracy, on the part of those who have postulated them.

It is to be noted that this list of ancient forms, and, for that matter, the general list of some 600 *ma*-forms, are far from exhaustive. African and Amerind languages, and still more languages of New Guinea – which represent together close to 4,000 languages – have been only superficially investigated. Most probably, both lists could be expanded to double or triple their present sizes.

An important phonetic detail is that, while the selection of putative cognates in the list was essentially made on the basis of the consonant *m*-, a strong majority of the words are also built with the vowel *-a*. This is particularly conspicuous in the more ancient putative cognates (Table 3).

Table 3. Reconstructed, ancient and long-isolated languages with an **m*-initial 'prohibitive/negative' + vowel *a*.

Pr.-Mande ***maa-**, Pr.-Nilo-Saharan ***má-**, Pr.-Semitic ***mā-**, Pr.-Sino-Caucasian ***ma**, Pr.-North Caucasian ***ma**, Pr.-Nakh ***ma**, Pr.-Tsezian ***ma**, Pr.-Sino-Tibetan ***mă(H)**, Preclassic Old Chinese **ma**, Pr.-Dravidian ***mal-**, Pr.-North Dravidian ***mal**, Pr.-Kartvelian ***ma-**, Pr.-Eurasiatic ***ma**, Pr.-Indo-Iranian **mā**, Vedic Sanskrit **mā**, Avestan **mā**, Agnean **mā**, Pr.-Greek ***mā́**, Elean **mā́**, Pr.-Altaic ***-ma-**, Pr.-Turkic ***-ma-**, Old Turkish **-ma-**, Pr.-Japonic ***-ma-**, Pr.-Amerind ***mã-**, Pr.-Mayan ***(ma)-n ... ta(x)**, Pr.-Arawakan ***ma**, Pr.-Tupi-Guarani ***maʔe-tei**, Pr.-Panoan ***[-ya]ma**, Pr.-Tacanan ***-ma**, Pr.-Mon-Khmer ***ʔam**, Pr.-Khasic ***ham**, Pr.-Waic ***ʔaŋ**, Pr.-Trans-New Guinea ***ma-**.

Most of these ancient forms are either words attested in writing or reconstructions supported by regular sound correspondences. Only a few of the highest-level cognates (e.g. Proto-Eurasiatic **ma*, Proto-Sino-Caucasian **ma*, Proto-Amerind **mã-* or Proto-Trans-New Guinea **ma-*) essentially rely on a majority of their own supporting reflexes rather than an analysis of regular sound changes. Multilateral etyma they are, and their exceptionless convergence on vowel *-a* with most regular reconstructions and attested ancient words is nonetheless striking.

Another important remark bears on the semantic side. A particular form of negation, consisting in a prohibition to act or a negation of an action, also enjoys a wide distribution in our series. It is represented by 'prohibitive' or 'verbal negative' particles or suffixes (Table 4).

Table 4. Reconstructed, ancient and long-isolated languages with **ma* 'prohibitive'.

Proto-Mande ***maa-** ~ ***mee-** 'prefixes of the negative perfective of qualificative verbs', Proto-Nilo-Saharan ***má-** 'negative prefix of verbs', Ancient Egyptian **m** 'do not! (prohibitive particle)', Proto-Nakh ***ma** 'prohibitive particle, do not', Proto-Tsezian ***-m** 'negative particle', Proto-Lezghian ***mV** 'prohibitive particle', Old Chinese ***mət**

'don't', Proto-Kartvelian ***ma-** 'not (prohibitive)', Proto-Indo-European ***mē** 'prohibitive particle', Proto-Indo-Iranian **mā** 'prohibitive particle', Sanskrit **mā** 'prohibitive particle', Avestan **mā** 'prohibitive particle', Proto-Greek ***mā́** 'prohibitive particle', Proto-Turkic ***-ma-** 'not', Proto-Tungusic ***-me** 'prohibitive particle', Modern Korean **mōt** 'prohibitive particle', Proto-Uto-Aztecan ***ma-** 'negative verb marker', Proto-Southern Munda ***əm** 'negative verb particle', Proto-Trans-New Guinea ***ma-** + verb 'not'.

Thus, beyond their sheer number, these ancient words and reconstructions strikingly coincide on several independent levels: (i) the root consonant *m-*; (ii) the root vowel *-a*; (iii) a negative, and, more specifically, prohibitive meaning. Taken together, these three repeatedly matching elements make random convergence an unlikely explanation.

Or do they? After all, both consonant *m* and vowel *a* are among the commonest sounds in the world's languages (otherwise, we would not have found so many words made of them), while negation and prohibition are seemingly universal in human languages, and, like most other common shifters, are nearly always conveyed by short, typically monosyllabic words. From a sheer probabilistic viewpoint, there might be good chances that at least a good part of the *ma* words in the series presented here had arisen by random convergence.

But how do probabilities apply in this particular case? Most of the words in the list are known to descend from one or the other of the 50-odd ancestor languages mentioned in Table 2. Thus, they have been preserved over the last few millennia, at least, and cannot be said to have *recently* arisen from random convergence. Moreover, ancestral words themselves often have close parallels in related groups, e.g. Sanskrit *mā*, the ancestor language of the Indic group, matches Avestan *mā*, the ancestor language of the Iranian group, and words in various Nuristani languages, with all of which Indic constitutes the Indo-Iranian family. In turn, the Proto-Indo-Iranian form **mā* has parallels in the Tocharian, Armenian, Hellenic and Albanian families, that converge onto a still older form, namely Proto-Indo-European (PIE) **mē* 'prohibitive particle'.

4. CHANCES FOR INDO-EUROPEAN *M-* NEGATIVES TO BE RECENT

How likely is it that PIE **mē* had resulted from a sudden innovation in this language, while its survival for 6 to 8 millennia in many of its daughter languages testifies to its resistance? Wait a minute, there also is a good number of daughter languages that lost it! Would not those languages having lost PIE **mē* reveal that negation is a fruitful soil for linguistic innovation, so that PIE could after all plausibly have created a new negation **mē*?

This is not the case, however. Most Indo-European languages that lost PIE **mē* did not replace it by a new word, but generalized, instead, the other PIE negative particle **nē*.[5] Consequently,

[5] PIE **nē* 'neg. particle'; Anatolian: Hittite *natta* 'not', *nawi* 'not yet'; Lydian *ni* 'not'; Tocharian: Agnean *a(n)-* 'neg. pref.'; Kuchean *e(n)-* 'idem'; Indo-Aryan: Sanskrit *na, nā* 'not', *ned* 'not, not indeed', *a-* 'un-'; Avestan *na* 'not', *nōit* 'not at all', *a-* 'un'; Armenian: Classical Armenian *an-* 'neg. pref.'; Hellenic: Old Greek *ne-* 'neg. pref.', *a-* ~ *an-* 'un-

many new negative words in Indo-European languages, like Latin *non* 'no, not' (< *noenum* < Archaic Latin *ne oinom* 'no one') or English *not* (< *naught* < Old English *na wiht* 'no thing') are compounds of an ancestral PIE negation with a reinforcing word.

Nevertheless, negatives not bearing a clear trace of an inherited PIE negative are found in the Indo-European family. Classical examples are Greek *ouk* 'no, not', Armenian *oč'* 'no, not', Old Norse *eigi* 'not', *enngi* 'no one', *hvergi* 'never', and French *pas* 'not'. All are explained by Indo-Europeanists as former complex expressions made of a descendant of **nē* with a reinforcing word, in which the negative meaning was transferred to the latter, whereafter the descendant of **nē* disappeared more or less completely, on the model of French[6] *ne ... pas* (Cowgill 1960).

The most frequent emergence of new negatives from a pre-existing one certainly are the reasons why the Albanian negative *mos* is considered by Indo-Europeanists to be a legitimate descendant of PIE **mē*. Albanian *mos*, however, like any other Albanian word, is attested no earlier than five centuries ago and is thus separated from PIE by a factual night of 5,500 to 7,500 years – apparently, more than enough time for Pre-Albanian to lose PIE **mē* and recreate a new negative *mos*. Moreover, its ending *-os* is impossible to explain without postulating still another compounding of **mē* with a reinforcing word – for which there is no evidence except by analogy with compounds on **nē*. According to Joseph (2002), Albanian *mos* would derive from PIE **mē-kʷid* 'not anything' or **mē-kʷe* 'not anyone.'

However, it does not seem likely to Indo-Europeanists that the lineage of Albanian might have lost PIE **mē* and recreated *mos* during the 5 to 7 millennia before Albanian was first put in writing. Indeed, the idea that **mē* was preserved in Albanian, like in many other Indo-European languages, and underwent at some point a compounding by a process known in several other languages, is simpler than the idea that it was lost and then re-created, which did *not* happen in a single language of the IE branches whose respective ancient written languages had lost **mē*, like Italic, Celtic, Germanic or Slavic.[7]

Thus, preservation certainly is the most likely hypothesis for Albanian *mos*, but this goes with an important consequence. There being a slim chance that Albanian independently recreated an *m*-initial negative particle in 5,500 to 7,500 years (as well as for Tocharian, Indo-Iranian, Greek and

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'; Slavic: Proto-Slavic **ne* 'not', Baltic: Proto-Baltic **nē* 'neg. particle'; Germanic: Proto-Germanic **nē* 'neg. particle', **un-* 'neg. pref.'; Italic: Latin *ne-* 'neg. pref.', *nē* 'not, that not', *in-* 'neg. pref.'; Osk *ne* 'no, that not', *an-* 'un-'; Celtic: Old Irish *ne-* 'neg. pref.', *nō* ~ *no* ~ *nū* 'no', *ni* 'not'; Cornish *ny* 'not'; Breton *ne* 'not'. By the way, **nē* is itself another widespread root, with correspondences at least in Uralic, Altaic, Japonic, Eskimo-Aleut, Kartvelian, Afroasiatic and Austric, showing again that it was not a new word in PIE, either.

[6] Or, rather, Gallo-Romance, as *pas* 'not' is also general in Occitan and Franco-Provençal, both of which have, even more completely than French, eliminated the original *ne* from which *pas* 'step' originally drew its negative meaning (*je ne marche pas* 'I do not walk a step').

[7] Actually, prohibitive *mi* does occur in Southeast Macedonian and Eastern Bulgarian, two South Slavic dialects in close contact with Greek, which still maintains PIE **mē* under a form *mí*, a regular evolution of Proto-Greek **mā́* > Attic *mḗ*. Joseph (2002) rightly states that Southeast Macedonian and Eastern Bulgarian *mi* words have "clearly [been] borrowed from Greek [...], given [their] form and [their] absence from Slavic languages not in intimate contact with Greek."

Armenian, in the shorter but by no means negligible timespans separating their first written attestations from their Indo-European origin) logically entails that chances for **mē* 'prohibitive' to have been recent in PIE itself are small as well.

At first sight, this improbability that **mē* had been recent in Proto-Indo-European may seem not to lead anywhere: it may or may not have *actually* been recent – from the Indo-European viewpoint, there simply is no way to tell.

5. CHANCES FOR ANCIENT **MA* NEGATIVES TO HAVE BEEN RECENT

But the PIE case is not unique. The same reasoning applies to each of the 40-odd other written or reconstructed ancestor languages, whose respective descendants have preserved an ancestral negative **ma* over the last millennia – for many of them, for 3,000 to 6,000 years or more.[8] Just as with Albanian or Proto-Indo-European, it is also not very likely that their respective **ma* negatives were recent. And, just like for PIE, we cannot tell *for each* of these ancestor languages, seen from inside their respective families, whether its own **ma* word was or was not recent.

However, their number now allows us to make a general inference: as all had a tiny chance to have emerged randomly in a recent past, we may be sure that, *taken together*, most (and possibly all) of them were not recent. A few of them may have been, but the chances for more than a few to have appeared independently quickly drop to infinitesimality.[9] As a consequence, while any of

[8] Such estimated ages hold for low-level, easily reconstructible families. Ages of remote phyla like Khoisan, Nilo-Saharan, Dené-Caucasian or Eurasiatic may not be assessed, except sometimes through non-linguistic means, e.g. Proto-Amerind must be more or less isochronic with the genetic clock data for Amerind and the first human remains found by archeologists in North America, pointing to a period comprised between some 12,000 and 20,000 years ago, and consistent with the existence of an ice-free corridor in Beringia during this period.

[9] It is possible to give a rough idea of the probability of the 40-odd reconstructed *m*-initial ancestral negatives (leaving aside those found in isolates or posited in remote macrofamilies and phyla) to be the result of convergent innovations. Each of the five Indo-European language groups with an *m*-initial negative is believed to have preserved PIE **mē* over the 3 to 7 millennia separating their first respective attestations from PIE times. Their *m*-initial negatives must thus be considered as having less than 1 chance out of 5 to have been a recent innovation in the group they are found in, a maximal probability which may indeed be much lower.

Even if roughly estimated, this individual probability of innovation of less than 1/5 in, say, 5 millennia makes possible, thanks to Bernoulli's Binomial Law, to calculate the probability for any number of 40 ancestral *m*-initial negatives to have been recent in the proto-languages they belong to.

We have used the Microsoft Excel function BINOMDIST (*w*; *x*; *y*; *z*), which calculates the probability to get *w* winning trials out of *x* trials with an individual probability *y* for each trial to be a winning one;

these ancestral **ma* words, considered individually, may or may not be recent, we can safely assume that an overwhelming majority has been inherited from a remoter ancestor over several millennia before the time they were spoken.

Being mostly inherited from remoter ancestral languages, these 40 low-level ancestral *ma* words draw us a good bit farther back in time – say, some 10,000 to 15,000 years ago. What may have happened in the millennia having preceded them? Just like in the interval between PIE times and today, there must have occurred many language splits. Since the **ma* words of some 30 to 40 of our recent ancestor languages have to be several millennia older than the ancestors in which they are reconstructed, it would be a kind of miracle if none of them had resulted from the splits of ancestor languages spoken some millennia earlier, and did not descend from the same ancestral word, exactly like Albanian *mos*, Sanskrit *mā*, Avestan *mā* and Classical Greek *mḗ* descend from PIE **mē*. With so many ancestor languages having inherited the same word worldwide, the conclusion seems inescapable that at least some – and probably not a few – of them ought to have descended from common ancestors. This seems to be a strong argument in support of negative **ma* words posited by various authors (mostly independently of each other) in such ancient phyla as Nilo-Saharan, Afroasiatic, Eurasiatic, Dené-Caucasian, Amerind and Trans-New Guinea.

Transitively, this near universal presence in high-level linguistic phyla strongly supports an inheritance from a common origin, namely, in the language of the ancestral population of all modern humans, namely those who, some 100,000 years ago, left their African cradle and conquered the whole world.

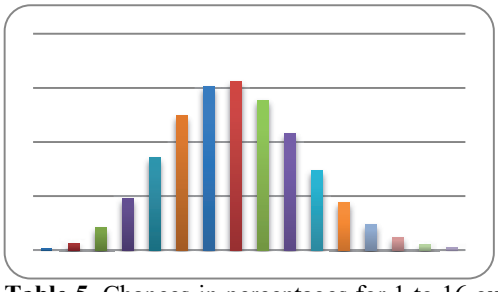

Table 5. Chances in percentages for 1 to 16 out of 40 ancestral *m*-initial negatives to be recent, calculated with the Microsoft Excel BINOMDIST function, based on an individual probability of 1/5. The total chances for 17 to 40 of them to be recent are of 0.1%, or 1/1,000.

argument *z* is a Boolean one; if set to "False," the function returns the probability to get the exact given number *w* of winning trials; if set to "True," it returns the total probability to get from 0 to *w* winning trials.

Using this BINOMDIST function, we have calculated the probability for each number of ancestral *m*-initial negatives to have resulted from recent innovations, based on a individual probability of 1/5 for each of them to be recent (Table 5).

The most likely numbers of innovations range between 6 (BINOMDIST (6; 40; 1/5; False) = 12.5%) and 10 (BINOMDIST (10; 40; 1/5; False) = 10.7%), while the total probability of any number over 16 drops close to zero (1 – BINOMDIST (16; 40; 1/5; True) = 0.01%).

As a consequence, even calculated based on the grossly overrated probability that each 1 out of 5 of them might be recent, 23 ancestral *ma* negatives at least have to have been inherited from an earlier ancestral language several millennia older.

Recall that the individual probability of 1/5 is an absolute limit, and that the actual one may only be lower, perhaps much lower, which would entail that much less ancestral *ma* words might be innovations. If it is set to 1/20 (instead of 1/5), there would be 1 out of some 1,400 chances that 8 or more of them be recent (1 – BINOMDIST (7; 40; 1/20; True) = 0.07%); if set to 1/100, there would be 1 out of some 1,400 chances that 4 or more be recent (1 – BINOMDIST (3; 40; 1/100; True) = 0.07%).

Whether their language was relatively unified or highly diversified, and what its degree of evolution may have been remain questions that have hardly been posed, much less answered. But we believe that the most reasonable hope of shedding some light into this darkness is to continue the job interrupted for nearly a century and unearth more Proto-Sapiens words – only they and the problems they will pose will tell us something about the evolution of language ability in humans.

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BOOK REVIEW
BENGTSON ON BASQUE:
A RADICAL SIMPLIFICATION OF THE LINGUISTIC MAP OF PREHISTORIC EUROPE

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A review article on *Basque and Its Closest Relatives: A New Paradigm. An Updated Study of the Euskaro-Caucasian (Vasco-Caucasian) Hypothesis* (Cambridge, Massachusetts: Mother Tongue Press, 2017), by John D. Bengtson. xx + 515 pages.

John Bengtson, the longtime editor of *Mother Tongue*, has produced an unprecedentedly thorough defense of the thesis that Basque and its close relatives, collectively known as Euskaran, are akin to the North Caucasian languages. Those looking for a short and accessible introduction to this subject will find one in a slightly earlier work by Bengtson, "The anthropological context of Euskaro-Caucasian" (see bibliography). The work I am discussing here, in contrast, represents a much more intricate and demanding treatment of its subject and seems certain to remain the single most necessary reference on the Euskaro-Caucasian question for at least the next few years.

Here it is not my intent to discuss the evidence and arguments Bengtson presents in detail but instead to pose the question: if Bengtson is correct, what then?

If Bengtson is correct, then massive segments of prehistory fall into place in the most elegant way and our knowledge of Eurasian prehistory suddenly takes a giant bound forward, bringing linguistics back to its former status as an equal of physical anthropology (now vastly augmented by genetics) and archeology in the investigation of the human past.

Before we can evaluate the potential importance of this new work, however, we must first backtrack to previous work by two other scholars in seemingly unrelated fields: the Indo-Europeanist, archeologist, and mythographer Marija Gimbutas and the prominent and in some ways controversial Celticist John T. Koch.

Gimbutas was the first to identify, not only the archeological traces of the Indo-Europeans in their area of origin to the immediate south of the Urals and their successive expansions from it, but also the antagonistic civilization to the southwest which they largely destroyed and, in

the process, fused with, thereby giving rise to the western branches of Indo-European. In contrast to the pastoral and warlike Indo-Europeans, these cultures of the Balkan Neolithic practiced the mixed agriculture that remained almost universal in Europe into the 20th century and were at least relatively peaceful. European civilization, prior to the introduction of Christianity, was the result of the synthesis or syncresis of these two unlike civilizations, one contributing horse warfare, nobility, kingship, and a male priestly caste, the other contributing agriculture, metallurgy, sailing ships, and a religion in which women played a major and perhaps predominant role.

The Balkan Neolithic is constituted by a set of closely related cultures descended from a single culture that spread from Anatolia into Thessaly around 6700 BC (David Anthony 2010). The Anatolian Neolithic can provisionally be regarded as an extension of the Near Eastern Neolithic, whose elements gradually appear in an area stretching from western Iran to southern Turkey from ca. 11,000 BC on, reaching a first known high point with the ceremonial center at Göbekli Tepe, dated not later than 9500 BC. From this Near Eastern source also arose the seaborne cultures of the Neolithic in Italy, Sardinia, Malta, Spain, Portugal, and the British Isles.

Gimbutas tentatively posited that the ancestral language of these cultures belonged to the Afroasiatic family, a not unreasonable surmise given the geography involved, but she presented no actual linguistic evidence to this effect. Her mythographic studies, though (e.g. Gimbutas 1982, 2001), strongly suggest that some of the gods and goddesses of ancient Greece go back to divinities of the Balkan Neolithic, including Athena, whose name is recorded in Linear B as A-TA-NA. By following out such clues we might be able to reconstruct a portion of the Balkan Neolithic vocabulary.

The Afroasiatic conjecture, however, has been rendered obsolete, or at least doubtful, by Bengtson's work. If indeed, as Bengtson argues, Basque descends from the language of the Neolithic colonists of Iberia — at the time depth of ca. 7,500 years, or 5,500 years from Proto-Euskaran to the sparsely but securely attested Aquitanian of Roman times — and if, on the other hand, it is relatable, via a chain of substratal relicts in Sardinia and elsewhere, to the North Caucasian languages, then it is almost a foregone conclusion that we have to do with a single Neolithic language family from Ireland to the Caucasus.

The inscriptions of the Balkan Neolithic, which bear at least a strong apparent resemblance to an alphabetical writing system, could then begin to be tackled with a chance of knowing what sorts of words and phonology to expect.

To the southeast of the Basque region, separated only by a gap in the east central Pyrenees through which successive invaders (e.g. the Visigoths) have passed, are found the remnants of the Iberian language, which is either akin to Basque (in my view the more plausible hypothesis) or heavily influenced by it (as some scholars suppose). If Basque indeed reflects the language of the Neolithic colonizers, if Iberian is akin to it, and if the gap between them is to be accounted for by expropriation of the territory by successive invaders, then all of eastern Spain and southwest France was once home to a single language. Furthermore, we may posit that all

the Neolithic settlements in what is now Spain and Portugal spoke this language or (what amounts to the same thing from a diachronic standpoint) closely related dialects thereof.

At the time of the Roman conquest of Iberia, however, much of the peninsula was Celtic-speaking. Well-known now to linguists is the Celtiberian language, an archaic Celtic language spoken in central Spain. To its northwest was Galician, a less archaic Celtic language that was very probably akin to Gaulish, reflecting a more recent migration across the Pyrenees.

We must now consider the work of John T. Koch. In the southwest of the Iberian peninsula, in an area overlapping southwestern Spain and southern Portugal, there are numerous short inscriptions in a language dubbed Tartessian. In a series of studies, Koch has argued that Tartessian, too, can be identified as a Celtic language, advancing such evidence as what appear to be Indo-European verb endings and a verbal prefix *ro* which would be the regular outcome in most forms of archaic Celtic of the extremely common Indo-European preposition *pro*.

Koch has also argued that Lusitanian, another language of ancient Iberia, attested in what is now east central Portugal and west central Spain, reflects a very archaic form of Celtic, one in which *p* had not yet passed to *0*.

If both Bengtson's and Koch's theories are correct, the entire area of Spain and Portugal in the Bronze Age would have been occupied by representatives of just two language families, Euskaro-Caucasian and Celtic. Likewise, we would have the language family of the Balkan Neolithic and its Mideast forebear. Furthermore, we would have the language family of the substrate of some or all of the western branches of Indo-European, wherever Indo-European invaders overwhelmed Balkan Neolithic farmers and fused their genomes and cultures with those — predominantly female, according to one recent study (Goldberg et al. 2017) — they did not kill through violence or, it can be presumed, starvation following the devastation of agricultural land and its repurposing into pastureland.

The linguistic map of the Bronze Age cultures of Europe, then, would be reduced to only two underlying languages: Euskaro-Caucasian, in the process of being reduced to a substrate except in a few mountainous or otherwise marginal regions, and Indo-European, dynamic and expanding. Within Europe, Basque speakers would be holding the last line of defense against an expansion that is, in fact, not yet completed at the present day.

The multifarious appearance of the ancient languages of the regions involved would be reduced to a dichotomy between two successive waves of cultural diffusion, each carrying with it a language lineage and, it is likely, a good deal of genetic material from the parent society.

It can be seen, therefore, that the seemingly arcane debate about the origins of Basque is of major and indeed crucial importance to the study of prehistoric Europe for all of the disciplines concerned. It can be expected that John Bengtson's new book will help place this debate front and center in the coming years.

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BOOK NOTICE
VÁCLAV BLAŽEK (IN COLLABORATION WITH MICHAL SCHWARZ AND ONDŘEJ SRBA). *ALTAIC LANGUAGES: HISTORY OF RESEARCH, SURVEY, CLASSIFICATION AND A SKETCH OF COMPARATIVE GRAMMAR*. BRNO: MASARYK UNIVERSITY PRESS. 2019. 358 PP.

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"The present monograph ... concentrates on development of linguistic research in the Turkic, Mongolic, Tungusic, Koreanic and Japonic branches, first descriptive, later comparative. Special attention is paid to history of both the partial and general models of classification, overview of etymologies of the main ethno– and choronyms and the process of establishing the phonetic correspondences within and among the individual branches. For illustration of the common heritage the nominal and pronominal case systems were chosen as examples of the stable subsystems. A history of etymological analysis of the Altaic numerals is mapped in detail, including new solutions. ... Although the monograph is intended as a synthesis comparing different ideas, hypotheses, etymologies of various scholars or even schools, there are passages or whole chapters, where besides summarized data and existing solutions new ideas or etymologies are proposed, namely in the chapters about the ethnonyms, nominal & pronominal case systems and numerals. On the other hand, the historical surveys of development of individual Altaistic disciplines are also new. And the same ambition was applied to bibliographic data – besides the mapping of the early beginnings of all studied disciplines the most recent titles known to us are included. Most of the titles are written in European languages, including Slavic or Hungarian languages, but we have also included the important titles in Turkish, Khalkha Mongol, Korean, Japanese and Chinese."

The extensive history of the dispute between the 'Altaicists' and 'Anti-Altaicists' begins with the early period (17–19th century), when the Chagatai scholar Abu 'l-Ġazi Bahadur Khan (1603–1663) wrote that Turkic and Mongolic 'sprang from some common source', but in the next century Peter Simon Pallas formulated the first areal conception (1776), surmising that many of the words that the Tatar language has in common with Mongolian can partly be attributed to an ancient neighborhood and common ground of both nations. Thus began the intellectual battle that has been waged ever since between 'Altaicists' believing that at least some

of the similarities can be attributed to common genetic origin, *versus* the 'anti-Altaicists' who favor the explanation of extensive diffusion among unrelated languages. This historical analysis continues to the 'First classic generations – optimists' (*e.g.*, notably, Ramstedt, Poppe, Menges, Miller, and many others), 'First classic generation – skeptics' (notably, Clauson & Doerfer), 'second optimistic generation' (mostly the Moscow School, Illič-Svityč, Starostin, Anna Dybo, Mudrak, Alpatov), then the 'second skeptic generation' (Unger, Janhunen, Vovin, Georg, and others), the 'First realistic generation' (the Hungarians Ligeti, Róna-Tas, Károly, Kempf), the 'second realistic generation' (Lewicki, Kałużyński, Tulisow, Jankowski, Stachowski, Knüppel, Rozycki), and finally the 'Third generation – realistic optimists', notably Martine Robbeets, who has proposed a 'Transeurasian' language family (traditional Altaic + Korean & Japanese) with a body of lexical and grammatical evidence pared down to about 75% 'verified' from the 2800 lemmas in the EDAL of the 'second optimistic generation'.[1] This new approach by Robbeets has influenced some 'skeptics' as well as 'optimists' toward a more positive view of the Altaic hypothesis, and attracted cooperation from some younger scholars, including the authors of this book.

The book includes numerous tables and figures (linguistic trees, phonetic correspondences, numerals, pronouns, etc.) and a comprehensive bibliography (72 pp.).

Besides the printed version, available from Masaryk University Press, the book is available online, for example on Ilya Gruntov's *Monumenta Altaica* site: http://altaica.ru/e_index.php

[1] EDAL = *Etymological Dictionary of the Altaic Languages*, Part One [*A-K*], Part Two [*L-Z*], Part Three [*Indices*], by Sergei Starostin, Anna Dybo, Oleg Mudrak, with assistance of Ilya Gruntov and Vladimir Glumov. Leiden-Boston: Brill 2003.