RELATIVE CHRONOLOGY IN HISTORICAL LINGUISTICS

University of Copenhagen
29–30 June 2023

PROGRAMME AND ABSTRACTS

University of Zurich[UZH]

DANMARKS FRIE FORSKNINGSFOND
INDEPENDENT RESEARCH FUND DENMARK

PROGRAMME

Wed.		*arrival in Copenhagen*
	afternoon	*informal gathering on own initiative (venue?)*
Thursday 29 June 2023	09.30–10.00	*coffee*
	10.00–10.30	Florian Wandl & Thomas Olander: Introduction
	10.35–11.15	Tijmen Pronk: Riding the waves: relative chronology in the early stages of the formation of dialect continua
	11.20–12.00	Martin Kümmel: Parallel or inherited: on the chronology of some widespread phonological rules in IE
	12.00–13.00	*lunch*
	13.00–13.40	Dariusz Piwowarczyk: Towards a relative chronology of changes from Proto-Indo-European to Latin
	13.45–14.25	Agnes Korn: Bridging the Dark Ages: Persian historical grammar and how to fill the gaps
	14.30–15.10	Sampsa Holopainen: From Proto-Uralic to Hungarian: problems with the relative chronology of some sound changes
	15.10–15.30	*coffee*
	15.30–16.10	Don Ringe: On the relative chronology of some Greek sound changes (online)
	16.15–16.55	Matthew Scarborough: Relative chronology and loanword stratigraphy: towards a framework for classifying prehistoric loanwords in Ancient Greek
	afternoon	*for speakers: reception (see p. 4)*

09.30–10.00	*coffee*	Friday 30 June 2023
10.00–10.40	Johann-Mattis List: Neglecting relative chronology in phonological reconstruction: Towards a revised workflow for the induction of sound laws (online)	
10.45–11.25	Chundra Cathcart: Modeling the co-evolution of sound patterns and the lexicon	
11.30–12.10	Florian Wandl & Thilo Thelitz: From book to graph: digitizing models of relative chronology	
12.10–13.00	*lunch*	
13.00–13.40	Magnus Pharao Hansen: What happened when? What was pre-Nahuatl like in the classic period?	
13.45–14.25	Anders Richardt Jørgensen: The Brittonic complex	
14.30–15.10	Marc Canby, Anders Richardt Jørgensen, Simon Poulsen, Matthew Scarborough & Thomas Olander: Inferring relative chronologies from phylogenetic data	
15.10–15.30	*coffee*	
15.30–16.30	concluding discussion	
19.00–	*for speakers: conference dinner (see p. 4)*	
	departure	Sa.

VENUES

The SEMINAR Thursday and Friday takes place in room 27.0.09 at the University of Copenhagen, South Campus, Emil Holms Kanal 2, 2300 Copenhagen S.
The nearest metro station is Islands Brygge.

Online participation: https://ucph-ku.zoom.us/j/61430308529?pwd=OExxYmQxRjhwZGJzbmRRbzNTMUlNdz09

For speakers and organisers:
The RECEPTION Thursday afternoon takes place at Thomas' place, H.C. Ørsteds Vej 35, 1st floor, left side, 1879 Frederiksberg C. It's a ten-minute walk from Forum metro station.
The CONFERENCE DINNER Friday evening takes place at Restaurant Famo Saxo, Saxogade 3, 1662 Copenhagen V.

SEMINAR

Relative chronology has always played an essential role in historical linguistics. Despite its importance and ubiquity in discussions of linguistic change, however, relative chronology is usually treated as a means to achieve other objectives, rather than being an object of study in itself. With the seminar we wish to put relative chronology in the spotlight – not as a secondary tool for the examination of other topics, but as a primary object of investigation.

The talks discuss topics focusing on relative chronology, including but not limited to:

- methodological issues related to relative chronology
- relative dating of changes across different domains (phonology, morphology, syntax)
- systematic models of relative chronology (e.g. the relative chronology of sound changes from PIE to Ancient Greek)
- the role of relative chronology in phylogenetic modelling
- computational approaches to relative chronology
- theoretical and methodological issues related to relative chronology and language contact

Since the seminar is not concerned with specific problems but focuses on more general and methodological problems, the language families or branches used for illustration are of minor significance.

We plan to make online attendance possible for a broader audience. A link will be posted here.

The seminar is organised within the framework of the research project "Connecting the Dots: Reconfiguring the Indo-European family tree", funded by the Independent Research Fund Denmark.

Florian Wandl & Thomas Olander
University of Zurich University of Copenhagen

Inferring relative chronologies from phylogenetic data

Marc Canby, Anders Richardt Jørgensen, Simon Poulsen, Matthew Scarborough & Thomas Olander
University of Illinois, University of Uppsala & University of Copenhagen

In this talk we present software for automatically inferring relative chronologies of phonological and morphological data using phylogenetic analysis. First, we use maximum parsimony to find the underlying phylogeny (tree) that minimizes the total amount of evolution in the data (alternatively, one could upload a tree of interest). Then, for a particular language (or clade), we list all the changes that occurred from the root of the tree to that language in the order that they occur. This analysis stands out for two reasons. For one, it automatically uses data from other languages to infer the relative chronology of a particular language rather than using language-internal data alone. Further, this work orders phonological and morphological changes that are seemingly unrelated on the basis of the phylogeny, providing a new direction for research in relative chronology.

Modeling the co-evolution of sound patterns and the lexicon

Chundra Cathcart
University of Zurich

The world's languages vary dramatically in terms of the phonotactic patterns they allow, as well as the frequencies of different patterns they display. At the same time, a number of recurrent trends have been identified in large numbers of genetically diverse languages with respect to the sound patterns they display. For instance, robust sound-meaning correspondences, partly rooted in perceptuomotor analogies, have been detected cross-linguistically (Blasi et al. 2016, Johansson et al. 2020). Additionally, recent work shows that voiced velar plosives are highly infrequent relative to other sounds, measured according to type frequencies in word lists (Everett 2018). Finally, a large body of research speaks to the statistical underrepresentation of consonants sharing a place of articulation within lexical items, documented in a diverse sample of languages, a phenomenon known as similar place avoidance (Greenberg 1950, Buckley 1997, Berkley 2000, Frisch et al. 2004, Pozdniakov and Segerer 2007, Coetzee and Pater 2008, Rácz et al. 2016, Grotberg 2022, a.o.).

While these phenomena are robustly attested and are conceivably rooted in constraints on processing and production (van de Weijer 2005, Lancheros et al. 2020), little is known regarding the specific diachronic mechanisms involved in their emergence and maintenance. A commonly held but ultimately untested view is that lexical usage serves to mediate such patterns: if some diachronic development (e.g., regular sound change, analogical change, etc.) results in a phonotactically dispreferred pattern in a word, the word will be phased out of usage (Martin 2007). A family of tools capable of testing predictions such as these can be found in phylogenetic comparative methods, a set of methodologies from computational biology that are frequently applied to questions in diachronic lin-

guistics and well suited to addressing questions regarding chronological precedence in evolutionary changes involving pairs of features (Pagel 1994). At the same time, modeling change in sound patterns requires a degree of granularity not always needed when analyzing changes in other structural features (e.g., word order).

With an eye to investigating such phenomena, I review a range of different models of lexical evolution as well as phylogenetic models of sound change. Although several methods have been developed to model sound change and carry out automated reconstruction of word forms, models of this sort are highly restrictive and do not capture the full range of documented sound changes; in general, extant models are limited to modeling only unconditioned sound changes (Hruschka et al. 2015, Jäger 2019) and changes with adjacent conditioning environments, e.g., /mp/ > /mb/ (Bouchard-Côté et al. 2013), and work best on languages that share a relatively simple syllabic template (Clarté 2021). I contrast these approaches with the use of a continuous-time Markov process to model transitions between states of the type FIRST SEGMENT OF REFLEX OF PROTO-INDO-EUROPEAN *wokw- =/w/ vs. FIRST SEGMENT OF REFLEX OF PROTO-INDO-EUROPEAN *wokw- =/ʊ/, etc. (Blasi et al. 2019); this approach limits sound changes to individual segments in a word, but can take into account a more flexible range of conditioning environments by taking individual words as proxies for conditioning environments. Finally, I introduce a novel method that treats the sound patterns displayed by a word as dependent on a evolving latent variable, changes in which can coincide with a word falling out of use. I apply this model to the issue of similar place avoidance in Austronesian languages, and discuss some issues concerning difficulty in interpreting this model's results as well as future directions for such models.

References

Berkley, D. M. 2000. Gradient obligatory contour principle effects. Ph. D. thesis, Northwestern University.

Blasi, D. E., S. Moran, S. R. Moisik, P. Widmer, D. Dediu & B. Bickel. 2019. Human sound systems are shaped by post-Neolithic changes in bite configuration. *Science* 363(6432).

Blasi, D. E., S. Wichmann, H. Hammarström, P. F. Stadler & M. H. Christiansen. 2016. Sound–meaning association biases evidenced across thousands of languages. *Proceedings of the National Academy of Sciences* 113(39). 10818–10823.

Bouchard-Côté, A., D. Hall, T. L. Griffiths & D. Klein. 2013. Automated reconstruction of ancient languages using probabilistic models of sound change. *Proceedings of the National Academy of Sciences* 110. 4224–4229.

Buckley, E. 1997. Tigrinya root consonants and the ocp. *University of Pennsylvania Working Papers in Linguistics* 4(3). 19–51.

Clarté, G. 2021. *Some contributions to computational Bayesian methods with application to phylolinguistics*. PhD thesis, Université Paris sciences et lettres.

Coetzee, A. W., & J. Pater. 2008. Weighted constraints and gradient restrictions on place co-occurrence in Muna and Arabic. *Natural Language & Linguistic Theory* 26(2). 289–337.

Everett, C. 2018. The global dispreference for posterior voiced obstruents: A quantitative assessment of word-list data. *Language* 94(4). e311–e323.

Frisch, S. A., J. B. Pierrehumbert & M. B. Broe. 2004. Similarity avoidance and the OCP. *Natural Language & Linguistic Theory* 22(1). 179–228.

Greenberg, J. H. 1950. The patterning of root morphemes in semitic. *Word* 6(2). 162–181.

Grotberg, A. L. (2022). Quantifying phonological feature co-occurrence. PhD thesis, Purdue University Graduate School.

Hruschka, D. J., S. Branford, E. D. Smith, J. F. Wilkins, A. Meade, M. Pagel & T. Bhattacharya. 2015. Detecting regular sound changes in linguistics as events of concerted evolution. *Current Biology* 25. 1–9.

Jäger, G. 2019. Computational historical linguistics. *Theoretical Linguistics* 45(3–4). 151–182.

Johansson, N. E., A. Anikin, G. Carling & A. Holmer. 2020. The typology of sound symbolism: Defining macro-concepts via their semantic and phonetic features. *Linguistic Typology* 24(2). 253–310.

Lancheros, M., A. Jouen, & M. Laganaro. 2020. Neural dynamics of speech and non-speech motor planning. *Brain and Language* 203. 104742.

Martin, A. T. (2007). The evolving lexicon. Ph. D. thesis, University of California, Los Angeles.

Pagel, M. 1994. Detecting correlated evolution on phylogenies: A general method for the comparative analysis of discrete characters. *Proceedings of the Royal Society of London B* 255. 37–45.

Pozdniakov, K., & G. Segerer. 2007. Similar place avoidance: A statistical universal. *Linguistic Typology* 11(2). 307–348.

Rácz, P., J. Hay, J. Needle, J. King & J. B. Pierrehumbert. 2016. Gradient māori phonotactics. *Te Reo* 59.

van de Weijer, J. (2005). Listeners' sensitivity to consonant variation within words. *Lund University Working Papers in Linguistics* 51. 225–238.

From Proto-Uralic to Hungarian: problems with the relative chronology of some sound changes

Sampsa Holopainen
University of Vienna

In this presentation I will discuss problems of relative chronology in the historical phonology of Hungarian, concentrating on the development of Proto-Uralic front vowels (**ä*, **e*, **i*, **ü*). Even though the main outlines of the phonological developments leading from Proto-Uralic to Hungarian have been established decades ago (see e.g. Gombocz 1940), many details of Hungarian historical phonology remain poorly understood and debated, including the relative chronology of many sound changes. The history of Hungarian vowels is rather complicated, making it difficult to establish relative chronology, and it is debated whether some changes of Hungarian are shared by Khanty and Mansi that in the traditional taxonomic framework of Uralic constitute the Ugric branch of the family together with Hungarian.

Loanword evidence, especially the early Turkic loanwords but also the less numerous Iranian loans in Hungarian have been used in attempts to establish relative chronology of sound changes (Ligeti 1986: 181–188; Róna-Tas & Berta 2011: 1071–1124) but the results remain inconclusive. I will reassess also the loanword evidence and discuss the methodological problems involved.

References

Gombocz, Zoltán. 1940. *Magyar történeti nyelvtan II.1. Hangtan*. Budapest: Magyar Tudományos Akadémia.

Ligeti, Lajos. 1986. *A magyar nyelv török kapcsolatai a honfoglalás előtt és az Árpád-korban*. Budapest: Akadémiai Kiadó.

Róna-Tas, András, & Árpád Berta. 2011. *West Old Turkic. Turkic loanwords in Hungarian*. Wiesbaden: Harrassowitz.

The Brittonic complex

Anders Richardt Jørgensen
Uppsala University

The formation of the Brittonic branch of Celtic came about through a series of profound changes in a relatively short span of time in the early Middle Ages. In the course of a few hundred years, Brittonic changed from being more or less indistinguishable from Gaulish, with e.g. preserved final syllables and a case system similar to the Classical languages, to a language with a fundamentally restructured number system, initial mutations generated by lost final syllables and almost no trace of the inherited case system.

The talk will focus on various aspects of the formation of the Neo-Brittonic branch. Special attention will be paid to the relative ordering of the major developments in the period, such as *i*-affection, apocope, syncope, spirantization of voiceless stops and the loss of the inherited case system. These changes will furthermore be related to the date of the split of Brittonic into Welsh on the one hand and Cornish and Breton on the other.

The talk will also discuss the effects of *i*-affection and apocope on the morphology, specifically the origin of the typologically unusual order of inflectional and derivational morphemes in Breton diminutives.

Bridging the Dark Ages: Persian historical grammar and how to fill the gaps

Agnes Korn
CNRS, Paris

Research on the historical grammar of Iranian languages can indulge in data spanning over 3000 years and over a vast region. The field has also been fortunate that a good share of these data were available early enough to be studied by pioneers by eminent scholars such as Christian Bartholomae, Heinrich Hübschmann, Wilhelm Geiger and Paul Horn. While their works are now more than 100 years old, most of them have not been replaced by a more recent works.

One reason for this surely is the fact that these pioneers applied the rigorous method of comparative linguistics, by which, for instance, Hübschmann was able to establish that there were two languages, not one, in the material that until then was considered summarily as Pahlavi – viz. Middle Persian and Parthian, as became clear with the discovery of the Manichean manuscripts in Eastern Turkestan – much in the same way as he also established that Armenian is a separate branch of Indo-European rather than a sub-branch of Iranian as had been thought until then.

For reasons of lack of data, much of the work by the early scholars had to apply what can be called the "black box method" (a terminology that I borrow from Eichner 1992). Essentially, one thus finds in the pioneering works statements of the type "Old Iranian (or: Proto-Iranian, or: Proto-Indo-European) X yields Middle Persian / New Persian / Balochi / Pashto Y". This approach, useful as it is for practical purposes, does not take into account the relative chronology of the changes concerned. (To be sure, the pioneering works do occasionally note that change A needs to have happened before change B.)

Today, entire corpora of Middle and New Iranian languages have become available, but some traditional methods that the pioneers had no

choice but to apply have lingered on; handbooks and articles still perpetuating the "black box" method.

In this talk, I will present examples for the "glass box method", which tries to determine the relative chronology of changes leading from one stage of a language to another. This approach is obviously more precise, but, as I intend to show, also highlights problems with the changes hitherto assumed which are not quite visible in a black box perspective.

This state of affairs becomes particularly clear when dealing with a period during which an important number of changes must have happened. One such period is the time between the latest Old Persian inscriptions and the earliest Middle Persian texts. It is perhaps not by accident that the period during which the essential changes between Old and Middle Persian happened is not attested directly.

Armenian data combined with the glass box method help to achieve, I think, a coherent chronology of changes, or at least one that accounts for the data, which is not the case when applying the black box method.

References

Bartholomae, Christian. 1920. *Zur Kenntnis der mitteliranischen Mundarten III*. Sitzungsberichte der Heidelberger Akademie der Wissenschaften, phil.-hist. Klasse. Heidelberg: Akademie der Wissenschaften. https://digi.hadw-bw.de/view/sbhadwphkl_1920_2.

Bartholomae, Christian. 1925. *Zur Kenntnis der mitteliranischen Mundarten VI*. Sitzungsberichte der Heidelberger Akademie der Wissenschaften, phil.-hist. Klasse. Heidelberg: Winter. https://digi.hadw-bw.de/view/sbhadwphkl_1924_1925_6.

Eichner, Heiner. 1992. Indogermanisches Phonemsystem und lateinische Lautgeschichte. In Thomas Krisch and Oswald Panagl (eds.), *Latein und Indogermanisch: Akten des Kolloquiums der Indogermanischen Gesellschaft, Salzburg, 23.–26. September 1986*, 55–79. Innsbruck: Institut für Sprachwissenschaft.

Geiger, Wilhelm. 1890. Etymologie des Balūčī. *Abhandlungen der I. Classe der Königlich Bayerischen Akademie der Wissenschaften* 19(1). 105–153.
Geiger, Wilhelm. 1891. Lautlehre des Balūčī. *Abhandlungen der I. Classe der Königlich Bayerischen Akademie der Wissenschaften* 19(2). 397–464.
Gippert, Jost. 1993. *Iranica Armeno-Iberica*. Vol. 26. 2 vols. Studien zu den iranischen Lehnwörtern im Armenischen und Georgischen SER - Veröffentlichungen der Kommission für Iranistik. Österreichische Akademie der Wissenschaften.
Horn, Paul. 1901. Neupersische Schriftsprache. In In Wilhelm Geiger and Ernst Kuhn (eds.), *Grundriss der iranischen Philologie I: Sprachgeschichte* 2, 1–200. Strassburg: Trübner. https://archive.org/details/bub_gb_sbxfAAAAMAAJ/.
Hübschmann, Heinrich. 1895. *Persische Studien*. Strassburg: Trübner. https://archive.org/details/persischestudieoohbgoog/.
Hübschmann, Heinrich. 1897. *Armenische Grammatik. I. Theil: Armenische Etymologie*. Leipzig: Breitkopf & Härtel. https://archive.org/details/ArmenischeGrammatik/.
Korn, Agnes. 2010. Parthian *ž*. *Bulletin of the School of Oriental and African Studies* 73. 415–436. doi:10.1017/S0041977X1000039X.
Korn, Agnes. 2013. Final troubles: Armenian stem classes and the word-end in Late Old Persian. In Pavel Lurje & Sergei Tokhtas'jev (eds.), *Commentationes Iranicae, Vladimiro f. Aaron Livschits nonagenario donum natalicium. Sbornik statej k 90-letiju Vladimira Aronoviča Livšica*, 74–91. St Petersburg: Nestor-Istorija.
Korn, Agnes. 2021. Contributions to a relative chronology of Persian: The non-change of postconsonantal *y* and *w* in Middle Persian in context. *Indo-European Linguistics* 9. 85–127. doi:10.1163/22125892-bja10009.
Schmitt, Rüdiger. 1989. *Compendium linguarum Iranicarum*. Wiesbaden: Reichert.

Parallel or inherited: on the chronology of some widespread phonological rules in IE

Martin Kümmel
Friedrich-Schiller-Universität Jena

There are some phonological rules or processes which are often ascribed to the level of a protolanguage (be it Proto-Indo-European, or Proto-Nuclear IE or Proto-Indo-Iranic), because they are found or reflected in many or even the majority of subbranches. The agreement between related and non-adjacent languages, interpreted as non-trivial, is most easily understood as common inheritance from the last common node.

E.g., Sievers' Law, according to which a postconsonantal glide (*j/w*) became syllabic (*i/u*) after a (virtual) heavy syllable, is most often described as a PIE rule, based on largely identical rules attested in Vedic Sanskrit and Germanic, compared with some data from other branches (cf. Schindler 1977; Byrd 2010). So, since we have such an agreement between two branches, this could be explained very well by the presence of such a rule already in the last common stage shared by both branches which would here be at least Proto-Indo-Germanic, following Olander's (2019) tentative subgrouping model and terminology. However, before we can draw such a conclusion, we first have to make sure that the rule is not a parallel innovation, and one way to do this is by checking its relative chronology: Are the sound changes implied by the rule preceded by some branch-specific changes and must therefore be ordered in the particular history of the branch in question? And can we be sure that the rule was present in all prestages of the respective branch? In our case, the first task would be to check whether Sanskrit (or Indo-Aryan) agrees with its sister subbranch, Iranic. This has not really been done in a comprehensive fashion, but there is some evidence that the rule did not work as in Sanskrit, cf. Avestan *jąθβa-* 'to be killed' < **janθwa-* < (disyllabic) **ǵʰán-twa-* vs. Vedic trisyllabic *hántuva-*. The aim of my talk is to investigate the chrono-

logy of Sievers' Law and some other rules, with special focus on the chronology of Indo-Iranic sound changes showing that a strict consideration of the relative chronology may challenge traditional assumptions based on simple comparison.

References

Byrd, Andrew Miles. 2010. Motivating Siever's Law. In Stephanie W. Jamison, H. Craig Melchert & Brent Vine (eds.), *Proceedings of the 21st Annual UCLA Indo-European Conference, October 30th and 31st, 2009*, 45–67. Bremen: Hempen.

Olander, Thomas. 2019. Indo-European cladistic nomenclature. *Indogermanische Forschungen* 124. 231–244.

Schindler, Jochem. 1977. Notizen zum Sieversschen Gesetz (Rez.-Aufsatz zu Seebold 1972). *Die Sprache* 23. 56–65.

Neglecting relative chronology in phonological reconstruction: Towards a revised workflow for the induction of sound laws

Johann-Mattis List
University of Passau

In historical linguistics, it is taken as some kind of a ground truth that relative chronology is at the core of phonological reconstruction. In order to reconstruct a proto-language from previously attested cognate sets, scholars infer sound laws and proto-sounds at the same time, with sound laws being thought as an ordered cascade of replacement rules applied to the initial proto-forms of the proto-language (Marr and Mortensen 2022). Sound laws, in this notion, represent an ordered set of rules whose relative order is of crucial importance to predict how words from the proto-language evolve into words in the descendant languages.

While it is true that a relative ordering of sound laws comes closest to the mechanism of regular, Neogrammarian sound change (and it is true that it can be successfully applied, even with computational tools, see Gong et al. 2023), I will try to argue in the talk that the establishment of the relative ordering of sound laws does not necessarily need to be done at the same time when inferring sound laws and establishing proto-forms. Instead, I will present a new framework that models the transformation of proto-forms into descendant forms with the help of an unordered set of transformation rules. The system is implemented as a proto-type in the form of a web-based application programmed in JavaScript, with a Python implementation planned for the future (see http://lingpy.org/misol/, List 2022). Having inferred sound laws for a previously established proto-language with this system, an ordering of sound laws can be applied as a *secondary step* of the workflow, which might even take phylogenetic arguments into account.

In the talk, I will present the major ideas behind the system. I will explain the major ideas behind the new workflow, and I will also outline how the new approach could be fruitful for phylogenetic reconstruction when combining the secondary inference of the ordering of sound laws with the postulation of subgroupings.

References

Gong, Xun, Nathan W. Hill, Seth Knights & Johann-Mattis List. 2023. Computer-assisted approaches to rule-based phonological reconstruction. *Humanities Commons*. https://doi.org/10.17613/2cbe-2j11

List, Johann-Mattis. 2022. MISoL: Modeling and inducing sound laws with an interactive web-application [Version 0.1]. https://lingpy.org/misol/.

Marr, Clayton, & David Mortensen. 2022. Large-scale computerized forward reconstruction yields new perspectives in French diachronic phonology. *Diachronica*. https://doi.org/10.1075/dia.20027.mar.

What happened when? What was pre-Nahuatl like in the classic period?

Magnus Pharao Hansen
University of Copenhagen

Traditionally, Nahuatl has been seen as a language with a shallow chronology and proposed dates for proto-Nahuatl tend to locate it in the early Mesoamerican post-classic period (ca. 800–900 CE). At the same time, the Uto-Aztecan language family has been described as having a rake like structure, with little internal branching. As such, though the development from proto-Uto-Aztecan (ca. 3500 BCE) to proto-Nahuatl is relatively well understood, no intermediate stages have been reconstructed so far.

Dakin (1982) proposes a highly useful chronology of phonological changes in the development from proto-Uto-Aztecan to proto-Nahuatl. Nevertheless, some recent findings suggest a need to revise her chronology somewhat, especially because her proposal does not operate with an intermediate proto-Corachol-Nahuan stage which seems to be necessary (Pharao Hansen 2020, Greenhill et al. 2023).

At the same time a major question in the study of Mesoamerican history, is the question of whether Nahuas (or rather pre-Nahuas) were present in Central Mexico, during the classic period, perhaps with a significant population at the classic period megalopolis of Teotihuacan. Some efforts to read the Teotihuacan writing system has proposed phoneti readings anachronistically using colonial Nahuatl, this however begs the question of what the pre-Nahuan language would have sounded like in the classic period, during the heyday of Teotihuacan.

This paper presents an analysis of the relative chronology of some phonological changes in the development of Proto-Nahuatl from pre-Nahuatl, and their relevance for understanding what pre-Nahuatl might have been like in the classical period (ca. 200–600 CE) during which the

language's assimilation to the Mesoamerican Language Area must have taken place.

References

Dakin, K., 1982. *La evolución fonológica del protonáhuatl* (No. 2). Universidad Nacional Autónoma de México, Instituto de Investigaciones Filológicas.

Greenhill, Simon J., Hannah J. Haynie, Robert M. Ross, Angela M. Chira, Johann-Mattis List, Lyle Campbell, Carlos A. Botero & Russell Gray. 2023. A recent Northern origin for the Uto-Aztecan family. *Language* 99(1). 81–107.

Pharao Hansen, Magnus. 2020. Capítulo 3 ¿Familia o vecinos? Investigando la relación entre el proto-náhuatl y el proto-corachol. In Rosales & Rosa H. Yáñez (eds.), *Lenguas yutoaztecas: historia, estructuras y contacto lingüístico: homenaje a Karen Dakin*, 73–107. Universidad de Guadalajara, Centro Universitario de Ciencias Sociales y Humanidades, Unidad de Apoyo Editorial.

Towards a relative chronology of changes from Proto-Indo-European to Latin

Dariusz R. Piwowarczyk
Jagiellonian University

In the introduction to his *Etymological dictionary of Latin and the other Italic languages* Michiel de Vaan observed that "a reliable etymological discussion must refer to the relative chronology of sound changes between Proto-Indo-European and Latin (...). While this principle is equally uncontroversial, the number of studies elaborating on the relative chronology of more than a few Latin sound changes is small" (de Vaan 2008: 4).

Despite the fact that the research on the relative chronology of changes has been one of the main issues of Indo-European linguistics, a comprehensive account of the complete relative chronology has never been fully established for Latin or the other oldest Indo-European languages (cf. an outline by de Vaan 2008: 4–10 on Latin). Additionally, various studies on the subject usually concentrate only on sound changes leaving the interaction with morphological changes aside (cf. Maniet 1985, Parker 1986, Schrijver 2006, Kümmel 2007: 376–378, Weiss 2020: 207–209) while it is known that no language undergoes only sound changes in its history. Moreover, various competing hypotheses exist alongside each other as far as their starting point, i.e. the reconstruction of the proto-language, is concerned and the exact order of changes which occurred in the development of the respective Indo-European languages (e.g. Melchert 1984, 1994, Kimball 1999 and Kloekhorst 2007 with different assumptions concerning both the reconstruction of Proto-Indo-European and the relative chronology of changes which occurred in the development of Hittite).

The purpose of the present paper is presentation and discussion of the relative chronology of both phonological and morphological changes which are assumed to have occurred from the reconstructed Proto-Indo-

European language in its development into Proto-Italo-Celtic, Proto- Italic, Proto-Latino-Faliscan and Archaic Latin. As such it is part of a larger project which traces the relative chronology of changes from Proto-Indo-European to the oldest representative Indo-European languages: Hittite, Vedic, Latin and Ancient Greek.

Although the approach is traditional it is also comprehensive in the sense that it includes a large number of lexemes on which the relative chronology of changes is based rather than just *Paradebeispielen* which are mostly used in works dedicated to Latin historical phonology and morphology (cf. the criticism of Eichner 1992 on the "handbook approach"). It also includes various approaches to the reconstruction of Proto-Indo-European and the concurrent development of Latin from such starting points since such possibilities are not infinite and can be quite easily tested and compared. Finally, the assumed relative chronology is confirmed on a large number of examples with the use of the computational replication of changes (Sims- Williams 2018).

In the paper I will discuss the problems concerning the establishment of the chronology of the changes, the interaction of the phonological and morphological changes, the competing views towards the reconstruction of the proto-language and its development to Latin as well as problems with the computational replication of changes (especially replication of analogical changes).

References

Eichner, Heiner. 1992. Indogermanisches Phonemsystem und lateinische Lautgeschichte. In Oswald Panagl & Thomas Krisch (eds.), *Latein und Indogermanisch*, 55–79. Innsbruck: Innsbrucker Beiträge zur Sprachwissenschaft.

Kimball, Sara. 1999. *Hittite historical phonology*. Innsbruck: Institut für Sprachwissenschaft der Universität Innsbruck.

Kloekhorst, Alwin. 2007. *Etymological dictionary of the Hittite inherited lexicon*. Leiden: Brill.

Kümmel, Martin. 2007. *Konsonantenwandel*. Wiesbaden: Ludwig Reichert.

Maniet, Albert. 1985. Un programme de phonologie diachronique: de l'"indoeuropéen" au latin par ordinateur – version définitive. *Cahiers de l'Institut de Linguistique de Louvain* 11(2). 203–243.

Meiser, Gerhard. 2003. *Veni Vidi Vici. Die Vorgeschichte der lateinischen Perfektsystems*. München: Beck.

Melchert, Craig. 1984. *Studies in Hittite historical phonology*. Göttingen: Vandenhoeck & Ruprecht.

Melchert, Craig. 1994. *Anatolian historical phonology*. Amsterdam & Atlanta: Rodopi.

Parker, Holt. 1986. *The relative chronology of some major Latin sound changes*. Unpublished PhD dissertation, Yale University.

Schrijver, Peter. 2006. Review of Meiser 2003. *Kratylos* 51. 46–64.

Sims-Williams, P. 2018. Mechanising historical phonology. *Transactions of the Philological Society* 116(3). 555–573.

de Vaan, Michiel. 2008. *Etymological dictionary of Latin and the other Italic languages*. Leiden: Brill.

Weiss, Michael. 2020. *Outline of the historical and comparative grammar of Latin*. 2nd ed. Beech Stave.

Riding the waves: relative chronology in the early stages of the formation of dialect continua

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Relative chronology can be used very effectively to establish linguistic affinity (see, e.g., Matasović 2005 on Balto-Slavic). This method works well for cases in which there was a speech community with relatively little internal linguistic variation where these changes took place. These are cases in which the tree-model provides an appropriate representation. In linguistically diversified speech communities, like dialect continua, the role of relative chronology is more complicated. It will be argued in this paper that relative chronology plays an important role in the early stages of the formation of dialect continua.

In an area in the initial stages of dialectal diversification, a high degree of mutual intelligibility will make the spread of language-internally motivated as well as contact-induced sound change and analogy across larger areas relatively easy. As a result, identical linguistic innovations may affect two different areas in a different order, potentially leading to different outcomes of what are essentially the same innovation. There are two potential causes for such mismatches:

1 two innovations originating in the same centre spread across a dialect area at different speeds
2 two innovations originating in different centres reach the same target area at different moments

Related to the second type are cases in which the specific outcome of an innovation that affects several target areas is affected differently by earlier local innovations in these areas.

In this paper, the role of relative chronology in shaping dialect areas will be illustrated with the help of phonological and morphological innovations in the western South Slavic dialect continuum. The significant dialectal diversity in this area has its roots in the Middle Ages and centres of innovation have shifted over time. The canonical division of the area into four main dialects - Slovene, Kajkavian, Čakavian and Štokavian –, which is based on a few salient features, obscures the fact that none of the early isoglosses in the dialect area coincide with the boundaries of the traditional dialect groups (Pronk 2021). Among these early isoglosses, there are relatively many cases in which the relative order of the changes is different in different areas. The innovations that will be discussed in the paper include the following:

- Analogical spread of long vowels in nominal and verbal endings (Pronk 2013)
- Contraction of vowels in hiatus (Kortlandt 1975: 39)
- The development of **ä* (Vermeer 1983: 450–451, Pronk 2021: 12)

References

Kortlandt, Frederik. 1975. *Slavic accentuation: A study in relative chronology*. Lisse: Peter de Ridder.

Matasović, Ranko. 2005. Toward a relative chronology of the earliest Baltic and Slavic sound changes. *Baltistica* 40(2). 147–157.

Pronk, Tijmen. 2013. On the accentuation of *l*-participles of the type *neslъ* in Western South Slavic. *Rasprave Instituta za hrvatski jezik i jezikoslovlje* 39(1). 105–131.

Pronk, Tijmen. 2021. The early history of Western South Slavic. *Zeitschrift für Slavische Philologie* 77(1). 1–32.

Vermeer, Willem. 1983. The rise and fall of the Kajkavian vowel system. In André G. F. van Holk (ed.). *Dutch contributions to the Ninth International Congress of Slavists. Linguistics*, 439–477. Amsterdam: Rodopi.

On the relative chronology of some Greek sound changes

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I will begin by emphasizing that, in historical phonology, *only* the phonological interaction of two sound changes is evidence for relative chronology; the supposed relevance of "phonological space" is ultimately based on Martinet's "functional load" hypothesis, which has been exploded (King 1967, Surendran and Niyogi 2006). In other words, I will deal only with the relative chronology of sound changes in the strictest sense.

It has proved possible to recover the relative chronologies of long sequences of sound changes in the prehistory of Germanic (cf. e.g. Ringe 2017: 176). Recovering the same information for Greek is proving to be both easier and harder. I will argue that that is the result of contingent events – in effect, an accident – but that the results are still worth the effort.

One contingent difference is that Mycenaean Greek provides us with a fairly well attested stage of the language some centuries before the fuller attestation of alphabetic Greek; that gives us a fixed point in time within at least half a dozen relative chronologies which must otherwise be inferred, and of course that makes dealing with Greek easier. On the other hand, the surviving evidence points to an almost "clean" split between East Germanic and the rest of the subfamily, and to a fairly clean split between North and West Germanic; it is only within West Germanic that ongoing contact between diverging dialects leads to serious complications (cf. the extended discussion of Ringe and Taylor 2014), and even there the best-attested WGmc. dialects are far enough apart (linguistically) to permit a partial reconstruction of what happened. The prehistory of Greek, by contrast, was clearly a history of dialects in constant contact even be-

fore the Mycenaean period, and that makes dealing with Greek much harder.

However, it is still possible to recover useful information about the prehistory of Greek from the reconstruction of relative chronologies of changes, as the following examples (and others, as time allows) will show.

It's clear that the unrounding of labiovelars in contact with **u* was already in place in Mycenaean (cf. *qo-u-ko-ro*), and that it was fed by "Cowgill's Law", to the extent that that was a sound change (Vine 1999; cf. *νυκτ-* 'night' < **nuk*^{w}*t-* < **nok*^{w}*t-*). But Cowgill's Law was fed by the merger of labiovelars with velar-plus-**w* sequences (cf. *ὀνυχ-* 'nail, claw' < **onuk*^{wh}*-* < **onok*^{wh}*-* < **h*$_3$*nog*^{h}*-w-*; not **g*^{wh}, cf. PGmc. **naglaz*), and that in turn must have been fed by the merger of palatals and velars (cf. *θήρ* 'wild animal' < < **ǵ*^{h}*wēr*, cf. Lith. *žvėrìs*). It follows that that merger, the first change in the sequence, occurred well before the Mycenaean period – which means there can be no phonological objection to the interpretation of *qe-ra-si-ja* as 'Huntress' (pace Aura Jorro s.v.).

The other "Cowgill's Law" – the loss of **τ* and **θ* between a short nonnigh nonnasalized unaccented vowel and word-final **-ι* (Cowgill 2006: 536–545 with references) – also receives an endorsement from a consideration of relative chronology. The "law of limitation" of accent treats most examples of word-final *-αι* and *-οι* as "light", but not the optative 3sg. forms, nor *οἴκοι* 'at home'. For the optative forms there is an obvious explanation: the law of limitation was fixed before the loss of the 3sg. ending **-δ* (or **-τ*), at which time the diphthongs were not word-final. But if *οἴκοι* is the sound-change outcome of **οἴκοθι*, whereas actually occurring *οἴκοθι* reflects reintroduction of *θ* on the model of adverbs in (accented) *-όθι*, the accent can be explained by a similar relative chronology. (If the ending is post-PIE **-oy* we have no good explanation.) Moreover, the fact that virtually the only relevant forms in *-ει* are present 3sg. explains why that ending is "heavy" too; we do not need to distinguish between mid vowels in stating regular sound changes that manipulate accent.

References

Aura Jorro, Francisco. 1985–93. *Diccionario micénico.* Madrid: Instituto de Filología.

Cowgill, Warren. 2006. The personal endings of thematic verbs in Indo-European. In Jared Klein (ed.), *The collected writings of Warren Cowgill*, 535–567. Ann Arbor: Beech Stave.

King, Robert D. 1967. Functional load and sound change. *Language* 43. 831–852.

Ringe, Don. 2017. *From Proto-Indo-European to Proto-Germanic.* 2nd ed. Oxford: OUP.

Ringe, Don, & Ann Taylor. 2014. *The development of Old English.* Oxford: OUP.

Surendran, Dinoj, & Partha Niyogi. 2006. Quantifying the functional load of phonemic oppositions, distinctive features, and suprasegmentals. In Ole Nedergaard Thomsen (ed.), *Competing models of linguistic change: evolution and beyond*, 43–48. Amsterdam: Benjamins.

Vine, Brent. 1999. On "Cowgill's Law" in Greek. In Heiner Eichner et al. (eds.), *Compositiones indogermanicae: in memoriam Jochem Schindler*, 555–600. Prague: Enigma.

Relative chronology and loanword stratigraphy: towards a framework for classifying prehistoric loanwords in Ancient Greek

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Since the late nineteenth century it has been widely acknowledged that there is a significant proportion of vocabulary of uncertain origin that is not from the Indo-European inherited lexical stock, but apparently borrowed from the languages already spoken in the Aegean before the introduction of the linguistic ancestor of Greek into the region. Some potential sources of these loanwords are known (e.g., the language of Linear A, Eteocretan, and other non-Greek languages concretely attested in the epigraphic record) but remain undeciphered. Still others may have been completely lost. Many theories have been proposed to account for these loanwords and none has met with scholarly consensus. In this paper I will review the arguments that suggest a plurality of linguistic sources for these loanwords (contrary to recent views, e.g., Beekes 2010, 2014) and propose a preliminary framework as an initial step towards identifying and delimiting layers of prehistoric lexical borrowings in Greek.

References

Beekes, Robert S. P. 2010. *Etymological dictionary of Greek*. Leiden: Brill.
Beekes, Robert S. P. 2014. *Pre-Greek: Phonology, morphology, lexicon*. Edited by Stefan Norbruis. Leiden: Brill.

From book to graph: digitizing models of relative chronology

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Models of the relative chronology of the changes of a language resemble the structure of a graph. They consist of a set of "objects" – the changes – which in many cases are related to each other. It follows that they can be visualized in a single diagram, which opens up new possibilities for publishing historical linguistics data.

Based on detailed models of the relative chronology of sound changes in two languages (Holzer 2007 on Croatian and Wandl 2011 on Russian), we show how digital graph representations can help visualizing linguistic changes and the chronological relationships between them. One of the advantages of this digital representation is that the underlying models can be represented in their entirety, in contrast to traditional formats such as articles or books, where the model is presented as text across the publication. A digital graph representation allows the reader to immediately grasp the established chronological relationships between individual changes, and compare competing models more easily because their differences and shortcomings are more explicit. By making the model interactive, it is furthermore possible to make relevant data readily accessible. Therefore, the model can serve as a platform for linking data that provide information of the history of the included languages. These data can then be extracted and processed for further research.

Apart from providing a new resource for research, we also believe that our model presents a useful tool for teaching historical linguistics. In particular, the presentation of language history according to a clear timeline gives the student an impression of its complexity and temporal depth. To make the tool available to all potentially interested persons we will publish the project's source code and data on GitHub. Using the documentation,

it is easy to adapt the data files with custom datasets. Thus, the web app can be used to visualize any suitable data.

References

Holzer, Georg. 2007. *Historische Grammatik des Kroatischen. Einleitung und Lautgeschichte der Standardsprache* (Schriften über Sprachen und Texte; 9). Frankfurt am Main et al.: Peter Lang.

Wandl, Florian. 2011. *Diachrone Lautlehre des Russischen. Ein Modell des Lautwandels und seiner relativen Chronologie*. MA thesis. University of Vienna.