Automated Deduction in Phonology:
A Case Study of Spanish Historical Phonology

陳朝陽
Chen Zhaoyang
zc23@illinois.edu

November 10, 2022

Abstract

1   *Introduccíon:*
Fonología automatizada

```
type soundChange = PhWord → PhWord
```

2 Representation of Segments, Syllables, and Phonological Words

3 Representation of Sound Changes

3.1 Feature and Segmental Level Changes

3.2 Syllabic and Phonological Word Level Changes

4 *Los elementos de Fonología histórica española*

4.1 Vowel Shifts from Latin to Romance

4.2 Palatalization

4.3 Loss of Hiatus

4.4 Lenition

4.5 Palatalization

4.6 Sibilant Reorganization

5 Conclusion

6 Bibliography

Phonology

Chomsky, Noam and Morris Halle (1968). *The Sound Pattern of English*. Harper & Row.

Kaplan, Ronald M. and Martin Kay (1994). "Regular Models of Phonological Rule Systems". In: *Computational Linguistics* 20.3, pp. 331–378.

Kondrak, Grzegorz (2002). *Algorithms for Language Reconstruction*. URL: https://webdocs.cs.ualberta.ca/~kondrak/papers/thesisnew.pdf (visited on 10/17/2022).

Hartman, Steven Lee (2003a). *Modeling Phonological Change*. URL: https://langev.com/pdf/harman03phonologicalChange.pdf (visited on 10/17/2022).

— (2003b). *Phono (Version 4.0): Software for Modeling Regular Historical Sound Change*. URL: https://langnhist.weebly.com/files/theme/ver40.pdf (visited on 10/18/2022).

Prince, Alan and Paul Smolensky (2004). *Optimality Theory: Constraint Interaction in Generative Grammar*. Blackwell Publishing.

Bouchar-Côté, Alexandre et al. (2007). *A Probabilistic Approach to Diachronic Phonology*.

Sims-Williams, Patrick (2018). "Mechanising Historical Phonology". In: *Transactions of the Philological Society* 116.3, pp. 555–573.

Romance Historical Linguistics

Spiegel, Irving (1952). *Old Judaeo-Spanish Evidence of Old Spanish Pronunciation*.

Hartman, Steven Lee (1974). "An outline of Spanish historical phonology". In: *Research on Language & Social Interaction* 7.1-2, pp. 123–191. DOI: 10.1080/08351817409370365.

Lloyd, Paul M. (1987). *From Latin to Spanish*. American Philosophical Society.

Kohen, Elli and Dahlia Kohen-Gordon (2000). *Ladino-English English-Ladino Concise Encyclopedic Dictionary (Judeo-Spanish)*. Hippocrene Books.

Penny, Ralph (2002). *A History of the Spanish Language*. Cambridge University Press.

Hualde, José Ignacio (2004). "Quasi-Phonemic Contrasts in Spanish". In: *WCCFL 23 Proceedings*. Ed. by Benjamin Schmeiser et al.

— (2005). *The Sounds of Spanish*. Cambridge University Press.

Quirk, Ronald J. (2005). "The "Appendix Probi" as a Compendium of Popular Latin: Description and Bibliography". In: *The Classical World* 98.4, pp. 397–409.

Chitoran, Ioana and José Ignacio Hualde (2007). "From hiatus to diphthong: the evolution of vowel sequences in Romance". In: *Phonology* 24, pp. 37–75. DOI: https://doi.org/10.1017/S095267570700111X.

Varol, Marie-Christine and Ralph Tarica (2008). *Manual of Judeo-Spanish: Language and Culture*. University Press of Maryland.

Alkire, Ti and Carol Rosen (2010). *Romance Languages: A Historical Introduction*. Cambridge University Press.

Hualde, José Ignacio (2010). *Ibero-Romance II: Astur-Leonese, Spanish, Navarro-Aragonese*. Oxford Research Encyclopedia of Linguistics. DOI: https://doi.org/10.1093/acrefore/9780199384655.013.718.

Clackson, James, ed. (2011). *A Companion to the Latin Language*. Blackwell Companions to the Ancient World. Wiley-Blackwell.

Hualde, José Ignacio and Mahir Şaul (2011). "Istanbul Judeo-Spanish". In: *Journal of the International Phonetic Association* 41.1, pp. 89–110.

Maiden, Martin, John Charles Smith, and Adam Ledgeway, eds. (2011). *The Cambridge History of The Romance Languages: Structures*. Vol. 1. Cambridge University Press.

Bermúdez-Otero, Ricardo (2013). *The Spanish lexicon stores stems with theme vowels, not roots with inflectional class features*.

Baddeley, Susan and Anja Voeste, eds. (2017). *Orthographies in Early Modern Europe*. De Gruyter Mouton.

Marr, Clayton (2017). *Towards a computational model of long-term diachronic change: simulating the development of Classical Latin to Modern French*.

Quirk, Ronald J. (2017). "Hypercorrection in the *Appdendix Probi*". In: *Philologus* 161.2, pp. 350–353. DOI: https://doi.org/10.1515/phil-2016-0119.

Dworkin, Steven N. (2018). *A Guide to Old Spanish*. Oxford University Press.

Coulson, Frank T. and Robert G. Babcock, eds. (2020). *The Oxford Handbook of Latin Palaeography*. Oxford University Press.

Recasens, Daniel (2020). *Palatalizations in the Romance Languages*. Oxford Research Encyclopedia of Linguistics. DOI: https://doi.org/10.1093/acrefore/9780199384655.013.435.

Manterola, Julen and José Ignacio Hualde (2021). "Old Basque had */χ/, not /h/". In: *Journal of Historical Linguistics* 11.3, pp. 421–456.

Barbato, Marcello (2022). *The Early History of Romance Palatalizations*. Oxford Research Encyclopedia of Linguistics. DOI: https://doi.org/10.1093/acrefore/9780199384655.013.750.

Mackenzie, Ian (2022). "The Genesis of Spanish /θ/: A Revised Model". In: *Languages* 7.191.

Jover, Francisco Gago, Andrés Enrique Arias, and Javier Pueyo Mena, eds. (2022a). *Biblia romanceada E8*. Spanish Biblical Texts. Digital Library of Old Spanish Texts. URL: http://www.hispanicseminary.org/t&c/bib/e8/framconc.htm (visited on 10/23/2022).

Jover, Francisco Gago, Andrés Enrique Arias, and Javier Pueyo Mena, eds. (2022b). *Evangelios y Epístolas paulinas*. Spanish Biblical Texts. Digital Library of Old Spanish Texts. URL: http://www.hispanicseminary.org/t&c/bib/lucena/framconc.htm (visited on 10/17/2022).

Computation

Backus, J. W. et al. (1960). "Report on the Algorithmic Language ALGOL 60". In: *Communications of the ACM* 3.5.

Geurts, Leto and Lambert Meertens (1978). "Remarks on Abstracto". In: *ALGOL Bull.* 42, pp. 56–63. DOI: https://dl.acm.org/doi/10.5555/1061701.1061714.

Bird, Richard S. and Lambert Meertens (June 1987). "Two Exercises Found in a Book on Algorithmics". In: *The IFIP TC2/WG 2.1 Working Conference on Program specification and transformation*, pp. 451–457. DOI: https://dl.acm.org/doi/10.5555/28195.28216.

Friedman, Daniel P. and Matthias Felleisen (1989). *The Little LISPer*. 3rd ed. The MIT Press.

Bird, Richard S. and Oege de Moor (1997). *Algebra of Programming*. Ed. by C. A. R. Hoare. Prentice Hall International Series in Computer Science. Prentice Hall Europe.

Milner, Robin et al. (1997). *The Definition of Standard ML*. Revised. The MIT Press. DOI: https://doi.org/10.7551/mitpress/2319.001.0001.

Pierce, Benjamin C. (2002). *Types and Programming Languages*. The MIT Press.

Marlow, Simon, ed. (2010). *Haskell 2010 Language Report*.

Harper, Robert (2016). *Practical Foundations for Programming Languages*. 2nd ed. Cambridge University Press.

Gibbons, Jeremy (2020). *The School of Squiggol*. URL: https://www.cs.ox.ac.uk/people/jeremy.gibbons/publications/squiggol-history.pdf (visited on 10/28/2022).

Gorman, Kyle and Richard Sproat (2021). *Finite-State Text Processing*. Ed. by Graeme Hirst. Synthesis Lectures on Human Language Technologies. Springer. DOI: 10.1007/978-3-031-02179-4.