



## **Allo: A Modern Digital Dictionary Platform for Ancient Languages**

*Conference presentation abstract and visual aids*


Boban Dedović,<sup>1</sup> Humanities Division, University of Chicago, Chicago, IL

OMNIKA Foundation, Las Vegas, NV

February 23, 2023

### **Author Note**

This work underwent peer review in order to be presented at the 24th Biennial Conference of the Dictionary Society of North America in Boulder, Colorado, from May 31 – June 3, 2023. Submitted February 1, 2023. Accepted February 7, 2023.

The name "ALLO" is an acronym for "Ancient Language Lexical Ossuary," and an ossuary is a container or location for the remains of the deceased. The Allo logo  is the A sign in Sumerian cuneiform, which is believed to be the world's first writing system as of this writing.

Thanks to MG from the University of Maryland for guidance related to Classical Latin; and to OH for giving me an opportunity to showcase the glory of lexicography. Partial funding for the production of this work was provided by the OMNIKA Foundation, a 501(c)(3) nonprofit entity whose mission is to organize and make freely available all the world's mythological stories. Website: <https://omnika.conscious.ai>

Correspondence concerning this article should be addressed to Boban Dedović. Email: [boban@uchicago.edu](mailto:boban@uchicago.edu)

---

<sup>1</sup> Orcid: <https://orcid.org/0000-0003-4528-7239>; Academia.edu: <https://chicago.academia.edu/BobanDedovic>

DOMINVM SAPIENTIAE SOLVM LAVDABO

### Abstract

Ancient languages matter. They connect us to our ancestors and draw attention from many fields of study. Despite overwhelming interest, the practical study of ancient languages is usually limited to persons with access to training and resources. For introductory students, the dictionary is usually located in the appendix of the assigned grammar book. For advanced study, many ancient languages have one or more physically large, expensive, inaccessible, and difficult to use dictionaries. A systematic review of both print and digital dictionaries for eight ancient languages yielded three recurring challenges: accessibility, usability, and scope. To illustrate: the Oxford Latin Dictionary contains 2,400 pages with tiny font and weighs 9.1 pounds. The Brill Dictionary of Ancient Greek is similar; and, digital access to both requires institutional affiliation. The Chicago Assyrian Dictionary, although digitized, is comprised of 17 thick volumes. In languages like Ancient Egyptian, Akkadian, and Sumerian, yet another difficulty is added. Vital dictionaries for these languages require a separate publication of sign lists to understand the script. In many cases, these resources are hand-written in French or German. While the Internet has helped with respect to distribution of some of these materials, the challenges noted above—particularly usability—remain. This is not to say that these resources are inadequate or their creators inferior; rather, there exist hitherto unexplored opportunities to leverage the Internet in order that trade-offs are mitigated. It is therefore necessary to reconsider the goals and priorities of digital dictionaries.

Enter Allo—a modern dictionary platform for ancient languages. Each dictionary contains 1,000 high-frequency words. It is designed to be accessible, user-friendly, and suitable for advanced users. To accessibility: we offer it online, charge nothing, and do not require registration. To usability: the interface is optimized for tablet and mobile devices via our design-oriented approach. Because we regarded speed and search as the most critical goals, features like autocomplete, caching, and a recommendation engine are fully integrated. These features may reduce the time it takes to find a given entry by orders of magnitude; based on a small user study, up to 50 times faster than a print book and 5 times faster than a PDF file. To content scope: all entries are aggregated such that they include both a beginner and advanced resource. The federated, or aggregated, model we chose allows us to make updates when new resources are released. Each entry contains between 30–50 individual data fields. Full page images of original source materials and cursor-zooming are built in. Advanced users can find grammatical details, tables of forms, usage frequency statistics, example sentences, and a comprehensive but compact grammar from authoritative sources. We demonstrate the benefits of this approach in our first complete language: Allo Latin, a digital Classical Latin-to-English dictionary kindly provided on <https://allo.conscious.ai/latin>.

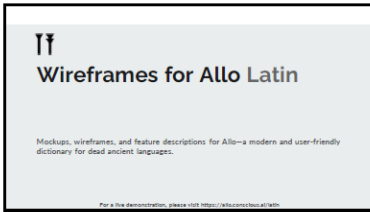
Our experience suggests that digital dictionaries must be aggregations of information about a given entry and packaged in a clean user interface. Future innovation likely requires intense cooperation among three concerned parties: a technologist, lexicographer, and language expert.

*Keywords:* lexicography, ancient languages, digital dictionaries, Latin, linguistics

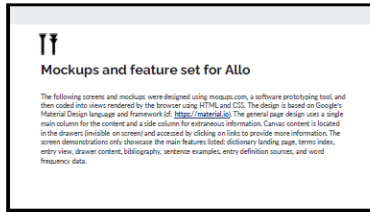
### Select References

- Allen, Joseph H. *Allen and Greenough's New Latin Grammar for Schools and Colleges: Founded on Comparative Grammar*. Edited by James B. Greenough, George L. Kittredge, Albert A. Howard, and Benjamin L. D'Ooge. Boston, MA: Ginn & Company, 1903.
- Allo Contributors. "Classical Latin to English Dictionary." Allo Latin Dictionary. Last modified September 6, 2022. Accessed February 1, 2023. <http://allo.conscious.ai/latin>.
- Crystal, David. *A Dictionary of Linguistics and Phonetics*. 6th ed. Oxford, UK: Blackwell Publishing, 2008.
- Delatte, Louis, Suzanne Govaerts, Joseph Denooz, and Etienne Evrard. *Dictionnaire fréquentiel et index inverse de la langue latine [Frequency Dictionary and Inverse Index of the Latin Language]*. Liège, Belgium: Laboratoire d'analyse statistique des langues anciennes de l'Université de Liège (L.A.S.L.A.), 1981.
- Diederich, Paul B. *The Frequency of Latin Words and Their Endings*. PhD diss., Columbia University, 1939.
- Francese, Christopher. "Latin Core Vocabulary." Dickinson College Commentaries. Last modified 2014. <http://dcc.dickinson.edu/latin-vocabulary-list>.
- Gildersleeve, Basil L., and Gonzales Lodge. *Gildersleeve's Latin Grammar: Third Edition, Revised, and Enlarged*. 3rd ed. London, England: Macmillan and Co., 1903.
- Glare, Peter G.W. *Oxford Latin Dictionary*. Vols. 1-8. Oxford, England: Clarendon Press, 1982.
- Pierson, Nick. "Sound of Text." Accessed October 26, 2019. <https://soundoftext.com>.
- Wheelock, Frederick M. *Wheelock's Latin*. 6th ed. Revised by Richard A. LaFleur. New York, NY: HarperCollins Publishers, 2005.

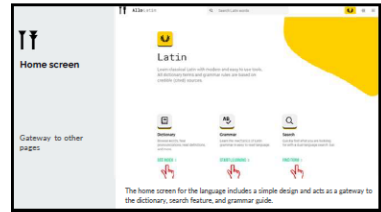
### Appendix A: Wireframes for Allo Latin (Visual Aids)



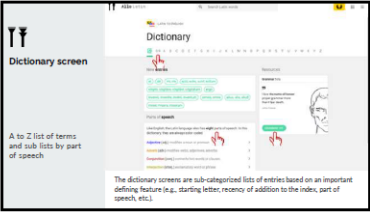
1



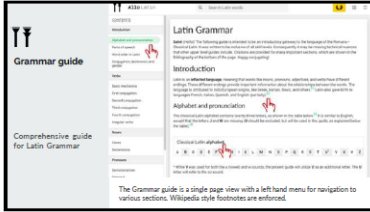
2



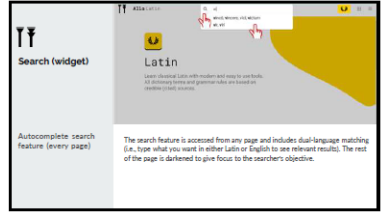
3



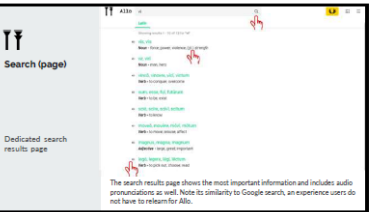
4



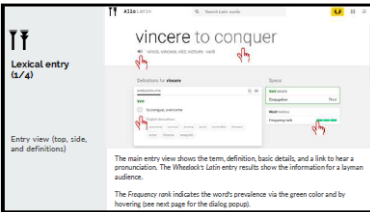
5



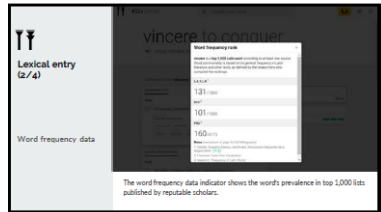
6



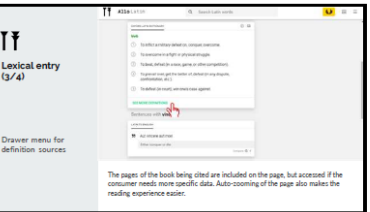
7



8



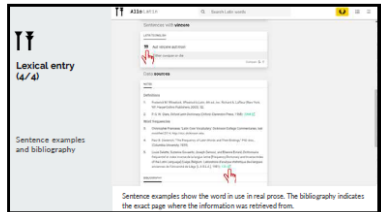
9



10



11



12



# Wireframes for Allo Latin

Mockups, wireframes, and feature descriptions for Allo—a modern and user-friendly dictionary for dead ancient languages.

For a live demonstration, please visit <https://allo.conscious.ai/latin>



## Mockups and feature set for Allo

The following screens and mockups were designed using moqups.com, a software prototyping tool, and then coded into views rendered by the browser using HTML and CSS. The design is based on Google's Material Design language and framework (cf. <https://material.io>). The general page design uses a single main column for the content and a side column for extraneous information. Canvas content is located in the drawers (invisible on screen) and accessed by clicking on links to provide more information. The screen demonstrations only showcase the main features listed: dictionary landing page, terms index, entry view, drawer content, bibliography, sentence examples, entry definition sources, and word frequency data.



## Home screen

Gateway to other pages



Allo Latin



Search Latin words



# Latin

Learn classical Latin with modern and easy to use tools. All dictionary terms and grammar rules are based on credible (cited) sources.



### Dictionary

Browse words, hear pronunciations, read definitions, and more.

[SEE INDEX >](#)



### Grammar

Learn the mechanics of Latin grammar in easy to read language.

[START LEARNING >](#)



### Search

Quickly find what you are looking for with a dual-language search bar.

[FIND TERM >](#)



The home screen for the language includes a simple design and acts as a gateway to the dictionary, search feature, and grammar guide.





## Dictionary screen

A to Z list of terms  
and sub lists by part  
of speech

Allo Latin

Search Latin words

LATIN TO ENGLISH

# Dictionary

0-9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

### New entries

et dē vīs, vīs sciō, scīre, scīvī, scītum  
cōgitō, cōgitāre, cōgitāvī, cōgitātum ergō  
inveniō, invenīre, invēnī, inventum omnis, omne alius, alia, aliud  
miser, misera, miserum

### Parts of speech

Like English, the Latin language also has **eight** parts of speech. In this dictionary, they are always color coded.

- Adjective** (adj.) modifies a noun or pronoun >
- Adverb** (adv.) modifies verbs, adjectives, adverbs >
- Conjunction** (conj.) connects two words or clauses >
- Interjection** (interj.) exclamatory word or phrase >

### Resources

#### Grammar help

”  
I love the name of honor  
proper grammar more  
than I fear death.  
Julius Caesar

GRAMMAR 101

The dictionary screens are sub-categorized lists of entries based on an important defining feature (e.g., starting letter, recency of addition to the index, part of speech, etc.).



# Grammar guide

## Comprehensive guide for Latin Grammar



### CONTENTS

Introduction

Alphabet and pronunciation

Parts of speech

Word order in Latin

Conjugation, declension, and gender

### Verbs

Basic mechanics

First conjugation

Second conjugation

Third conjugation

Fourth conjugation

Irregular verbs

### Nouns

Cases

Declensions

### Pronouns

Demonstratives

Personal



## Latin Grammar

**Salvē** (*Hello*)! The following guide is intended to be an introductory gateway to the language of the Romans—Classical Latin. It was written to be inclusive of all skill levels. Consequently, it may be missing technical nuances that other upper level guides include. Citations are provided for many important sections, which are shown in the Bibliography at the bottom of the page. Happy conjugating!

### Introduction

Latin is an **inflected language**, meaning that words like nouns, pronouns, adjectives, and verbs have different endings. These different endings provide important information about the relationships between the words. The language is attributed to Indo-European origins, like Greek, Iranian, Slavic, and others.<sup>[1]</sup> Latin also gave birth to languages French, Italian, Spanish, and English (partially).<sup>[2]</sup>

### Alphabet and pronunciation



The classical Latin alphabet contains twenty-three letters, as shown in the table below.<sup>[3]</sup> It is similar to English, except that the letters **J** and **W** are missing (**U** should be excluded, but will be used in this guide, as explained below the table).<sup>[4]</sup>

Classical Latin alphabet

A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	Q	R	S	T	U*	V	X	Y	Z
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	----	---	---	---	---



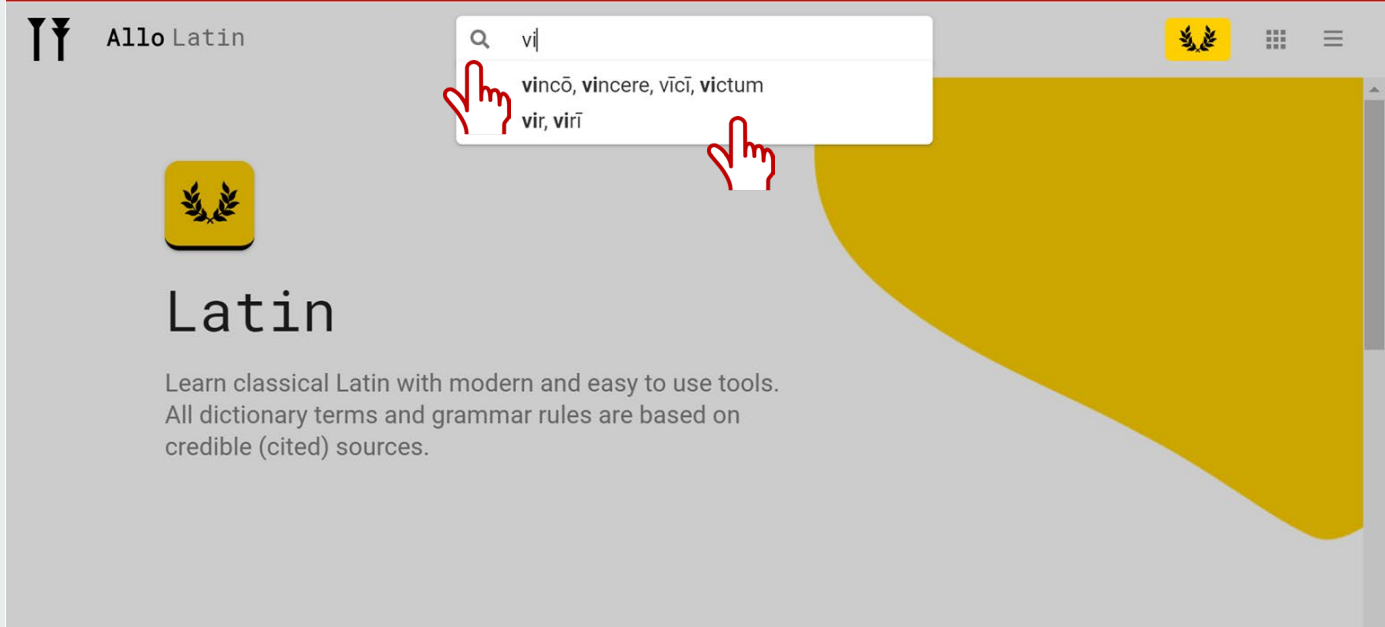
\* While **V** was used for both the *u* (vowel) and *w* sounds, the present guide will utilize **U** as an additional letter. The **U** letter will refer to the *oo* sound.

The Grammar guide is a single page view with a left hand menu for navigation to various sections. Wikipedia style footnotes are enforced.



## Search (widget)

Autocomplete search feature (every page)



The search feature is accessed from any page and includes dual-language matching (i.e., type what you want in either Latin or English to see relevant results). The rest of the page is darkened to give focus to the searcher's objective.



## Search (page)

Dedicated search results page

The screenshot shows the Allo search interface. At the top, the word "vi" is entered in the search bar. Below the search bar, the results are categorized under "Latin". A red hand icon points to the search bar. The results list includes:

- Showing results 1 - 10 of 13 for "vi"
- vīs, vīs**  
*Noun* - force, power, violence, (pl.) strength (A red hand icon points to this result.)
- vir, virī**  
*Noun* - man, hero (A red hand icon points to this result.)
- vincō, vincere, vīcī, victum**  
*Verb* - to conquer, overcome
- sum, esse, fuī, futūrum**  
*Verb* - to be, exist
- sciō, scīre, scīvī, scītum**  
*Verb* - to know
- moveō, movēre, mōvī, mōtum**  
*Verb* - to move; arouse, affect
- magnus, magna, magnum**  
*Adjective* - large, great; important
- legō, legere, lēgī, lēctum**  
*Verb* - to pick out, choose; read (A red hand icon points to this result.)

The search results page shows the most important information and includes audio pronunciations as well. Note its similarity to Google search, an experience users do not have to relearn for Allo.



## Lexical entry (1/4)

Entry view (top, side,  
and definitions)

The screenshot shows the Allo Latin website interface. At the top, there is a search bar with the text "Search Latin words" and a logo on the left. The main heading is "vincere to conquer". Below this, there is a pronunciation guide: "vincō, vincere, vīcī, victum · verb". A red hand icon points to the pronunciation text. Below the heading, there are two main sections: "Definitions for vincere" and "Specs".

The "Definitions for vincere" section is titled "WHELLOCK'S LATIN" and contains the following information:

- Verb**
- ① to conquer, overcome
- English derivatives: convince, convict, evince, evict, invincible, Vincent, victor, Victoria, vanquish

The "Specs" section contains the following information:

- Verb details**
- Conjugation: Third
- Word metrics**
- Frequency rank: (indicated by three green bars)

Red hand icons point to the pronunciation text, the "English derivatives" list, and the "Frequency rank" indicator.

The main entry view shows the term, definition, basic details, and a link to hear a pronunciation. The *Wheelock's Latin* entry results show the information for a layman audience.

The *Frequency rank* indicates the word's prevalence via the green color and by hovering (see next page for the dialog popup).



## Lexical entry (2/4)

## Word frequency data

The screenshot shows the Allo Latin website interface. At the top, the logo 'Allo Latin' and a search bar are visible. The main heading is 'vincere to conquer'. Below this, there are definitions and a section for 'Word frequency rank'. A pop-up window is overlaid on the page, providing detailed frequency data for the word 'vincere'.

**Word frequency rank**

**vincere** is a **top 1,000 Latin word** according to at least one source. Word commonality is based on its general frequency in Latin literature and other texts, as defined by the researchers who compiled the rankings.

L.A.S.L.A <sup>1</sup>
131/1000
DCC <sup>2</sup>
101/1000
PBD <sup>3</sup>
160/4173

**Notes** (see bottom of page for full bibliography)

1. Delatte, Govaerts, Denooz, and Evrard, *Dictionnaire fréquentiel de la langue latine*, 120 [↗](#).
2. Francese, "Latin Core Vocabulary."
3. Diederich, "Frequency of Latin Words."

The word frequency data indicator shows the word's prevalence in top 1,000 lists published by reputable scholars.



## Lexical entry (3/4)

Drawer menu for  
definition sources

Allo Latin

Search Latin words

OXFORD LATIN DICTIONARY

**Verb**

- ① To inflict a military defeat on, conquer, overcome.
- ② To overcome in a fight or physical struggle.
- ③ To beat, defeat (in a race, game, or other competition).
- ④ To prevail over, get the better of, defeat (in any dispute, confrontation, etc.).
- ⑤ To defeat (in court), win one's case against.

[SEE MORE DEFINITIONS](#)

Sentences with **vincere**

LATIN TO ENGLISH

” Aut vincere aut mori  
Either conquer or die

Compare G Y

The pages of the book being cited are included on the page, but accessed if the consumer needs more specific data. Auto-zooming of the page also makes the reading experience easier.

# Y

## Lexical entry (3/4)

Drawer menu for definition sources with full pages (automation on hover of cursor)

- 1. Free
- 2. NY:
- 3. P.G

uincō on page 2064



### uinciam

wine; (w. abst. noun) relating to such activities. b (neut. sg as sb.) a vessel for serving wine.

uincō on page 2064

### uinciam

1 To fasten (a person, animal) with bonds, tie up. b *clivā*, wearing borders, lettered.

### uincibilis

1 (of a case) That can be won.  
uincibilis illam causam faciliem ~nem optinamus Ter. Ph. 4.6.1  
2 (of an argument) Cogent.  
cum hinc ab illis quasi et ~la dicentur Arct. Aph. 15

### uincō

1 To fasten (a person, animal) with bonds, tie up. b *clivā*, wearing borders, lettered.

2 To defeat (in court), win one's case against.

b (absol.) to win one's case; (w. intrin. acc.) to win (a case). c (w. gen.) to convict (of an offence).

3 To bring into mental, moral, etc., subjection, subdue, overcome. b to prevail upon, persuade.

4 To overcome in a fight or physical struggle.

5 To defeat, defeat (in a race, game, or other competition). b (absol.) to win (a race, game, or other competition). c (w. intrin. acc.) to win (a competition, prize, etc.).

6 To bind, defeat (in a race, game, or other competition). b (absol.) to win (a race, game, or other competition). c (w. intrin. acc.) to win (a competition, prize, etc.).

7 To overcome in a fight or physical struggle.

8 To defeat, defeat (in a race, game, or other competition). b (absol.) to win (a race, game, or other competition). c (w. intrin. acc.) to win (a competition, prize, etc.).

9 To bring into mental, moral, etc., subjection, subdue, overcome. b to prevail upon, persuade.

10 To overcome in a fight or physical struggle.

### uincō

1 To fasten (a person, animal) with bonds, tie up. b *clivā*, wearing borders, lettered.

2 To defeat (in court), win one's case against.

b (absol.) to win one's case; (w. intrin. acc.) to win (a case). c (w. gen.) to convict (of an offence).

3 To bring into mental, moral, etc., subjection, subdue, overcome. b to prevail upon, persuade.

4 To overcome in a fight or physical struggle.

5 To defeat, defeat (in a race, game, or other competition). b (absol.) to win (a race, game, or other competition). c (w. intrin. acc.) to win (a competition, prize, etc.).

6 To bind, defeat (in a race, game, or other competition). b (absol.) to win (a race, game, or other competition). c (w. intrin. acc.) to win (a competition, prize, etc.).

7 To overcome in a fight or physical struggle.

8 To defeat, defeat (in a race, game, or other competition). b (absol.) to win (a race, game, or other competition). c (w. intrin. acc.) to win (a competition, prize, etc.).

9 To bring into mental, moral, etc., subjection, subdue, overcome. b to prevail upon, persuade.

10 To overcome in a fight or physical struggle.

11 To defeat, defeat (in a race, game, or other competition). b (absol.) to win (a race, game, or other competition). c (w. intrin. acc.) to win (a competition, prize, etc.).

12 To bind, defeat (in a race, game, or other competition). b (absol.) to win (a race, game, or other competition). c (w. intrin. acc.) to win (a competition, prize, etc.).

13 To overcome in a fight or physical struggle.

14 To defeat, defeat (in a race, game, or other competition). b (absol.) to win (a race, game, or other competition). c (w. intrin. acc.) to win (a competition, prize, etc.).

15 To bring into mental, moral, etc., subjection, subdue, overcome. b to prevail upon, persuade.

16 To overcome in a fight or physical struggle.

17 To defeat, defeat (in a race, game, or other competition). b (absol.) to win (a race, game, or other competition). c (w. intrin. acc.) to win (a competition, prize, etc.).

18 To bind, defeat (in a race, game, or other competition). b (absol.) to win (a race, game, or other competition). c (w. intrin. acc.) to win (a competition, prize, etc.).

19 To overcome in a fight or physical struggle.

ment) to prevail. (w. acc. and inf.) to carry one's point (that); (w. obj.) to get one's way (that). c (w. intrin. acc.) to be successful with regard to; to carry through successfully.

uincō on page 2064

1 To fasten (a person, animal) with bonds, tie up. b *clivā*, wearing borders, lettered.

2 To defeat (in court), win one's case against.

b (absol.) to win one's case; (w. intrin. acc.) to win (a case). c (w. gen.) to convict (of an offence).

3 To bring into mental, moral, etc., subjection, subdue, overcome. b to prevail upon, persuade.

4 To overcome in a fight or physical struggle.

5 To defeat, defeat (in a race, game, or other competition). b (absol.) to win (a race, game, or other competition). c (w. intrin. acc.) to win (a competition, prize, etc.).

6 To bind, defeat (in a race, game, or other competition). b (absol.) to win (a race, game, or other competition). c (w. intrin. acc.) to win (a competition, prize, etc.).

7 To overcome in a fight or physical struggle.

8 To defeat, defeat (in a race, game, or other competition). b (absol.) to win (a race, game, or other competition). c (w. intrin. acc.) to win (a competition, prize, etc.).

9 To bring into mental, moral, etc., subjection, subdue, overcome. b to prevail upon, persuade.

10 To overcome in a fight or physical struggle.

11 To defeat, defeat (in a race, game, or other competition). b (absol.) to win (a race, game, or other competition). c (w. intrin. acc.) to win (a competition, prize, etc.).

12 To bind, defeat (in a race, game, or other competition). b (absol.) to win (a race, game, or other competition). c (w. intrin. acc.) to win (a competition, prize, etc.).

13 To overcome in a fight or physical struggle.

14 To defeat, defeat (in a race, game, or other competition). b (absol.) to win (a race, game, or other competition). c (w. intrin. acc.) to win (a competition, prize, etc.).

FULL BOOK







## Lexical entry (4/4)

## Sentence examples and bibliography

The screenshot shows the Allo Latin website interface. At the top, there is a search bar with the text "Search Latin words" and a magnifying glass icon. The main content area is titled "Sentences with vincere". Below this title, there is a section labeled "LATIN TO ENGLISH" which contains a quote: "Aut vincere aut mori" followed by the translation "Either conquer or die". A red hand icon points to the quote. To the right of the translation, there are links for "Compare" and "G Y". Below the quote section, there is a section labeled "Data sources". Underneath, there is a "NOTES" section with a "Definitions" sub-section. It lists two references: 1. Frederick M. Wheelock, *Wheelock's Latin*, 6th ed., rev. Richard A. LaFleur (New York, NY: HarperCollins Publishers, 2005): 52. 2. P. G. W. Glare, *Oxford Latin Dictionary* (Oxford: Clarendon Press, 1968): 2064. Below the definitions, there is a "Word frequencies" sub-section with three references: 3. Christopher Francese, "Latin Core Vocabulary," Dickinson College Commentaries, last modified 2014, <http://dcc.dickinson.edu>. 4. Paul B. Diederich, "The Frequency of Latin Words and Their Endings," PhD diss., (Columbia University, 1939). 5. Louis Delatte, Suzanne Govaerts, Joseph Denooz, and Etienne Evrard, *Dictionnaire fréquentiel et index inverse de la langue latine* [Frequency Dictionary and Inverse Index of the Latin Language] (Liège, Belgium: Laboratoire d'analyse statistique des langues anciennes de l'Université de Liège [L.A.S.L.A.], 1981): 120. A red hand icon points to the number 120 in the fifth reference. At the bottom of the notes section, there is a "BIBLIOGRAPHY" section.

Sentence examples show the word in use in real prose. The bibliography indicates the exact page where the information was retrieved from.