

## Online Appendix

### Brother Votes for Brother: The Effects of Pentecostal Political Influence in Brazil

Daniela Solá\*

February 2026

## A Language Distance

A language family is a group of languages which descend from a common ancestral language. Language families can be divided into smaller phylogenetic units, conventionally referred to as branches since the history of a language family is often represented as a tree diagram. Figure A-a presents one example of a linguistic tree as defined by Ethnologue. According to [Desmet, Weber, and Ortúñoz-Ortíz \(2009\)](#), the distance separating languages is defined by the number of branches or nodes separating them in the linguistic trees. One of the challenges when measuring the distance is that the number of branches/nodes varies among linguistic families and subfamilies. In order to solve for this issue, following [Desmet, Weber, and Ortúñoz-Ortíz \(2009\)](#) and [Desmet, Ortúñoz-Ortíz, and Wacziarg \(2012\)](#), all the classification strings are extended to the same length. Figure A-b provides an example of this procedure. In Figure A, language a11, b1 and C share the first node in the genealogical classification (i.e., O), but language a11 has a total of 4 nodes, language b1 a total of 3 nodes and language C a total of 2 nodes. In this example, it is considered that all three languages (a11, b1 and C) would share 1 out of 4 nodes, which means that they are all equally related.

According to [Desmet, Weber, and Ortúñoz-Ortíz \(2009\)](#), the distance between language  $i$  and language  $j$  can be calculated with the following Equation:

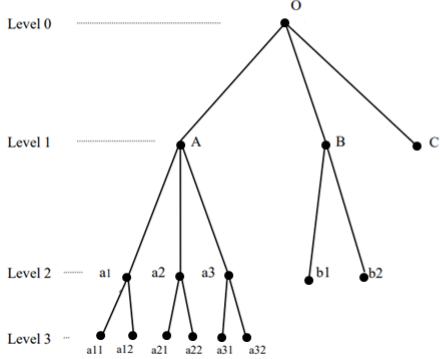
$$(1) \quad Distance_{ij} = 1 - \left( \frac{L}{M} \right)^\delta$$

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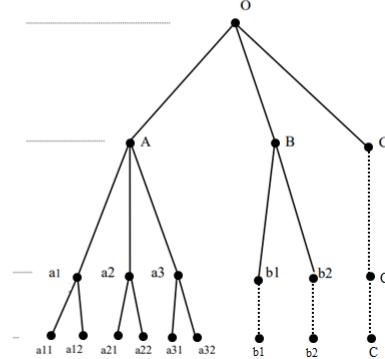
\*Daniela Solá (Universidad Carlos III de Madrid). Email: dsola@eco.uc3m.es

Figure A: Languages Genealogical classification Path

a. Language Tree from Ethnologue



b. Classification strings extended



Source: Based on [Desmet, Ortúñoz-Ortíz, and Wacziarg \(2012\)](#).

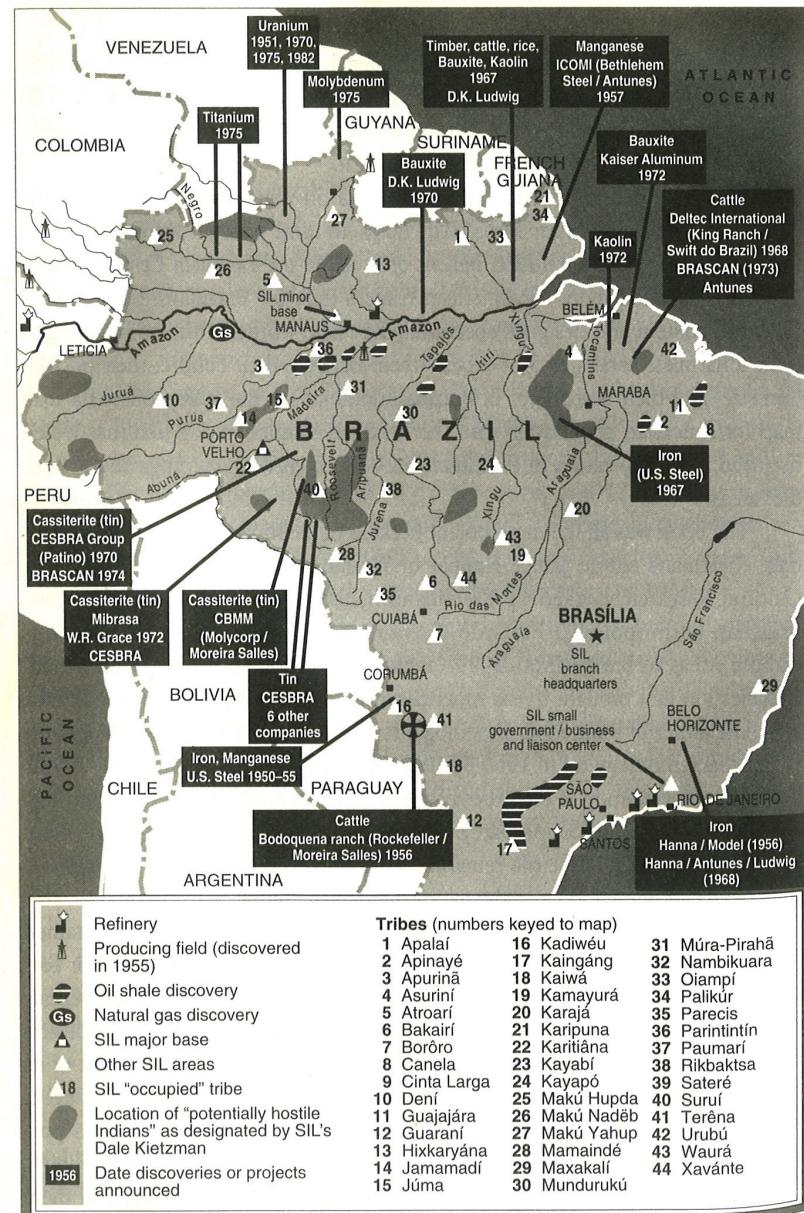
$Distance_{ij}$  depends on L which is the number of shared branches between language  $i$  and language  $j$  and on M which is the maximum number of branches between any two languages. In the example presented in Figure A, M is equal to 4.<sup>1</sup> Also,  $\delta$  is a parameter that determines how fast the distance between the languages declines as the number of shared branches increases, which following [Desmet, Weber, and Ortúñoz-Ortíz \(2009\)](#) is set equal to 0.05.

The data offered by [Giuliano and Nunn \(2018\)](#) cleanly categorizes languages into distinct linguistic families and subfamilies. I use this data to measure linguistic similarities between languages.

<sup>1</sup>For the case of the indigenous languages spoken in Brazil, M is equal to 5.

## B Tables and Figures

Figure I  
SIL “Occupied” Tribes and Major Base



Note: The figure presents a map indicating the location of the indigenous tribes reached by SIL by 1995, along with the location of the SIL base in Brazil. Source: [Colby and Dennett \(1996\)](#).

Figure II  
SIL Activity



Source: Aldridge (2018) and Wycliffe

Figure III  
Example of Joshua Project Data

### Languages ▾

[Submit update](#)

Primary Language	Desano (2,300 speakers)
Language Code	des <a href="#">Ethnologue Listing</a>
Language Written	Yes <a href="#">ScriptSource Listing</a>
Total Languages	1

### Resources ▾

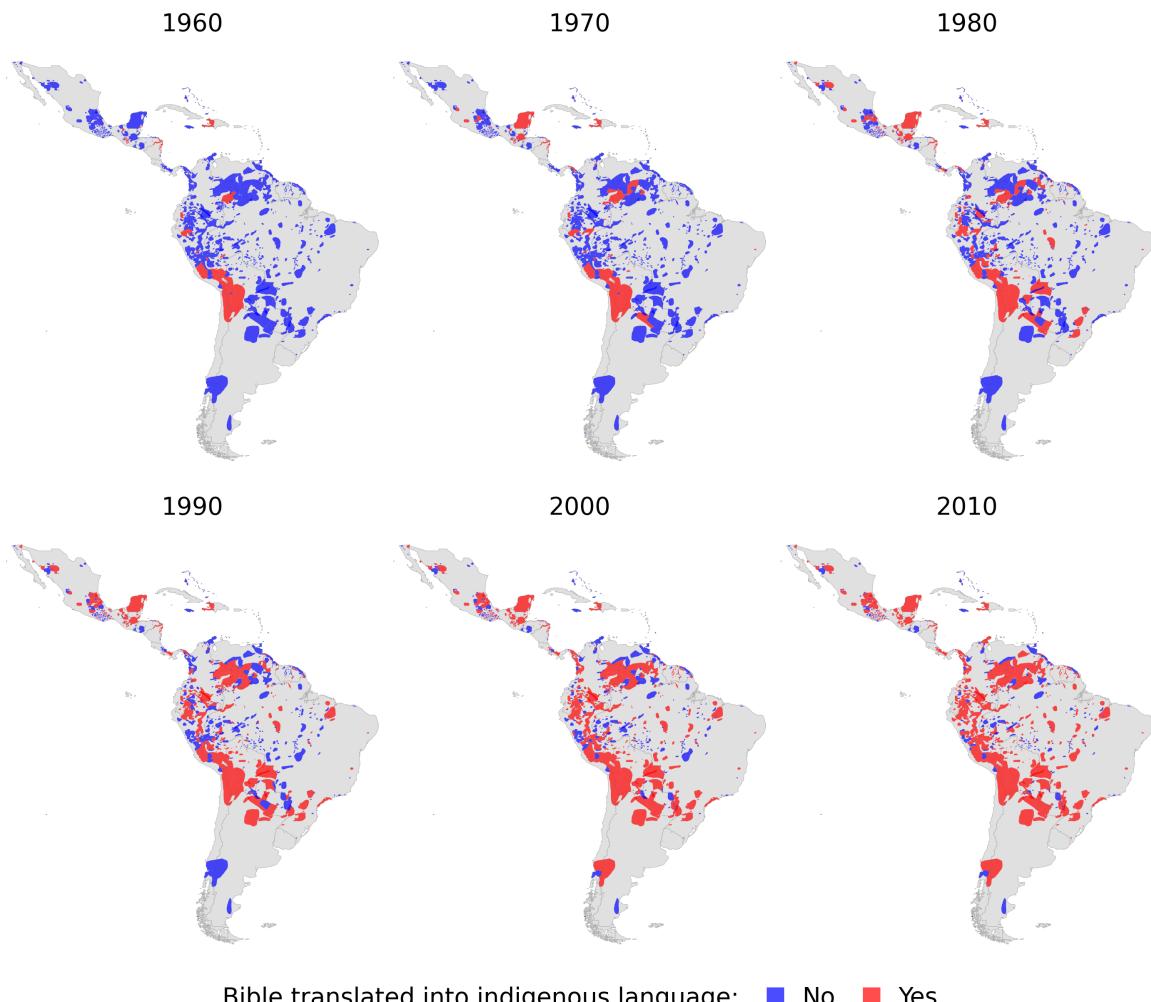
[Submit update](#)

Primary Language: Desano

Bible Translation ▲	Status (Years)
Bible-Portions	Yes (1975-1981)
Bible-New Testament	Yes (1984-2011)
Bible-Complete	No
Bible-NT Audio	<a href="#">Online</a>
Bible-NT Text	<a href="#">Online</a>

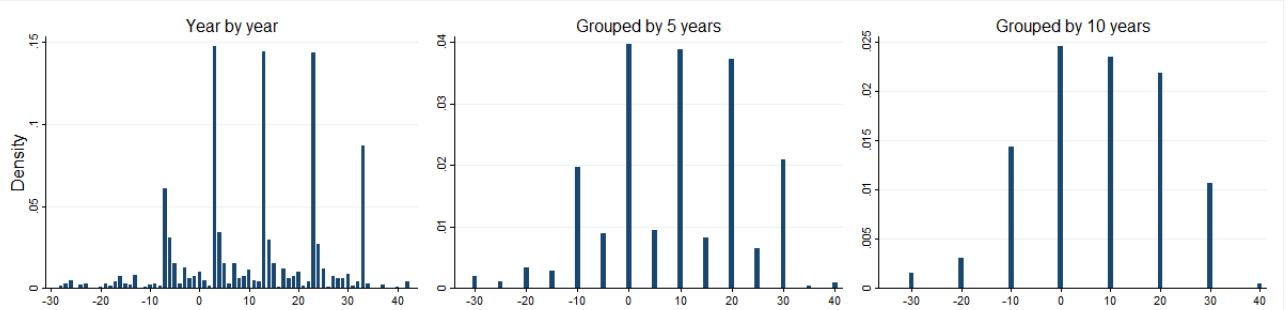
Note: The figure presents an image of the data provided by Joshua Project for a particular indigenous language. Information on the year in which the first and last editions of the Bible were published, for both the Old Testament and the New Testament, is provided. In this example, the first edition of the New Testament was published in 1984. Note that for some languages, while a complete translation of the New Testament has not been published, portions of the Bible have been translated and published. Source: <https://joshuaproject.net/>.

Figure IV  
Indigenous Language Location & Bible Translation in Latin America



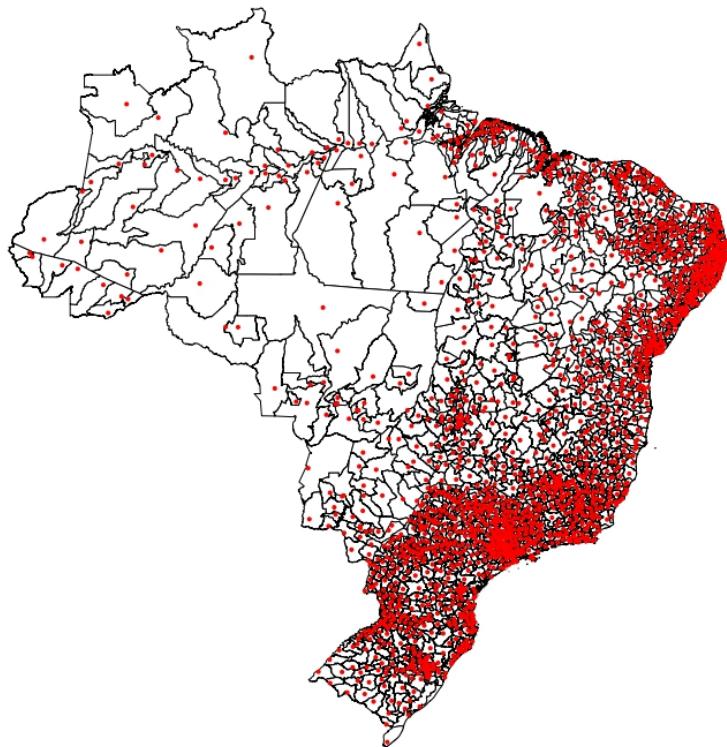
Note: This figure presents a set of maps showing the geographic location of indigenous languages in Latin America based on Ethnologue data. Red polygons denote languages with a New Testament translation, while blue polygons indicate those without one. Source: Own elaboration using data from Joshua Project & Ethnologue.

**Figure V**  
**Histogram - Years Since 1st Bible Translation in Municipalities**



The figure presents a set of histograms showing the years since the first translation, displayed in three formats: (1) year by year, (2) grouped into 5-year intervals, and (3) grouped into 10-year intervals. Source: Own elaboration using data from Joshua Project & Ethnologue.

**Figure VI**  
**Population-Weighted Centroids**



Note: The figure presents a map of the population-weighted centroids in each municipality of Brazil. This has been calculated using the population count at a 100 meter grid provided by Worldpop. These centroids are then used to compute the Euclidean distance between the population-weighted centroids of municipality  $m$  and municipality  $o$ , as referenced in Equation 6 of the paper.

## References

Aldridge, Boone. *For the Gospel's Sake: The Rise of the Wycliffe Bible Translators and the Summer Institute of Linguistics*. Wm. B. Eerdmans Publishing Co. (2018).

Colby, Gerard and Charlotte Dennett. *They Will Be Done: The Conquest of the Amazon: Nelson Rockefeller and Evangelism in the Age of Oil*. Harper Collins (1996).

Desmet, Klaus, Ignacio Ortúñoz-Ortín, and Romain Wacziarg, “The Political Economy of Linguistic Cleavages”. *Journal of Development Economics* 97 (2) (2012), 322–338.

Desmet, Klaus, Shlomo Weber, and Ignacio Ortúñoz-Ortín, “Linguistic Diversity and Redistribution”. *Journal of the European Economic Association* 7 (6) (2009), 1291–1318.

Giuliano, Paola and Nathan Nunn, “Ancestral Characteristics of Modern Populations”. *Economic History of Developing Regions* 33 (1) (2018), 1–17.