

## Techniques of Designing Modern Linguistics Mapping

### تقنيات تصميم الخرائط اللسانية الحديثة

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#### ملخص

ركزت هذه الدراسة على الأساليب الأساسية الحديثة لتصميم الخرائط اللغوية ومن ثم إنجازها. في هذا السياق، تقدم الخرائط اللغوية مجموعة متنوعة من الرسوم التوضيحية للتنوع اللغوي والثقافي. ورغم ذلك، فإن تخطيط خرائط اللغة ليس مسعى جديد. إلا أن التكنولوجيا غيرت جوهر عملية إنشاء هذه الخرائط مع تطور التقنيات. ووفقاً لذلك، فقد وفرت التكنولوجيا لمصممي الخرائط طرقاً جديدة لتصوير المعلومات اللغوية. ولهذا استخدمت هذه الورقة المنهج النوعي لوصف مبادئ بناء الخرائط اللغوية الحديثة باستخدام نظام المعلومات الجغرافية.

الكلمات المفتاحية: نظام المعلومات الجغرافية؛ رسم الخرائط؛ الخرائط اللغوية؛ خرائط اللغة؛ التكنولوجيا.

#### Abstract

This study focused on the modern fundamental techniques for designing and then achieving linguistics maps. In this vein, language maps provide a variety of illustrations of linguistic and cultural diversity. However, language mapping is not a new endeavor. The fundamental nature of cartography has changed with the evolving technologies. Accordingly, technology has provided cartographers with new methods for visualizing linguistic information. Thus, this paper used the qualitative approach to describe principles for constructing modern linguistics maps using Geographic Information System (GIS).

**Keywords:** GIS; cartography; language maps; linguistic maps; technology.

## Introduction:

While geographical maps represent the geographical environment; language maps are consistently used as illustrations for lessons on linguistic and cultural diversity. (Luebbering, 2011, p. 37). Interestingly the author distinguished between the concepts of “linguistic maps” and “language maps.” The former type describes “the spatial variation of internal features of a language or languages” (Luebbering, 2011, p. 12). For instance, word usage patterns of particular pronunciation of a language are examples of linguistic maps. On the other hand, the notion “language maps” relates to a specific aspect of a language. To illustrate more, the percentage of a language’s speakers or distribution of language families represent examples of language maps (Luebbering, 2011, p. 12).

### 1. The World Atlas of Language Structures as a Linguistic Map:

From a historical viewpoint, the earliest atlas was the *Sprachatlas des Deutschen Reiches* of Georg Wenker and Ferdinand Wrede, published in 1888. Then, followed by the *Atlas Linguistique de la France*, of Jules Gilliéron between 1902 and 1910, and the *AIS - Sprach- und Sachatlas Italiens und der Südschweiz* of Karl Jaberg and Jakob Jud, published 1928–1940 (Crystal, 1997). Later, the first linguistic atlas of the US was published by Hans Kurath (Chambers & Trudgill, 1998).

Bossong, Matras, Everaert, Musgrave, and Dimitriadis (2009) regard that The *World Atlas of Language Structures* (often abbreviated as *WALS*) is primarily a book with 142 world maps showing the global distribution of structural features of the world languages. Martin Haspelmath put it together, Matthew S. Dryer, David Gil, and Bernard Comrie at the Max Planck Institute for Evolutionary Anthropology between 1999 and 2004. Then, Oxford University Press published it in July 2005 (Haspelmath, 2009. As cited in Bossong, Comrie, Matras, Everaert, Musgrave & Dimitriadis (2009). A sample map is shown in Figure 1.

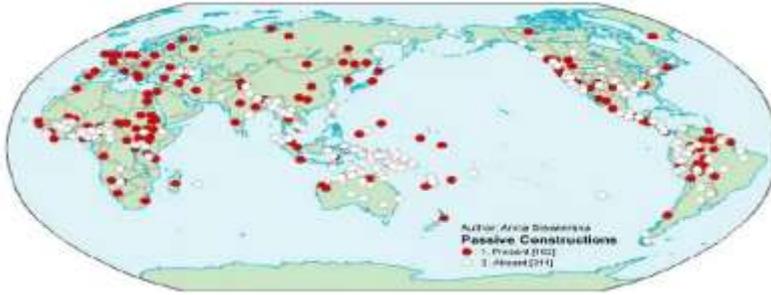


Figure 1. The WALS map “Passive Constructions”, by Anna Siewierska, 2005 (as cited in Haspelmath, 2009, p. 1).

On this map, each language is shown by a dot (most often a circle), and different colours stand for other structural types (or feature values). Thus, in the map in Figure 1, the white dots are languages lacking a passive constructions, and the red dots are passive constructions (Haspelmath, 2009).

## 2. Linguistics Cartography as a Tool of Power

According to Woodward (2007), cartography represents the study and practice of making maps. This process requires using “both scientific and artistic elements, combining graphic talents and specialized knowledge of compilation and design principles with available techniques for product generation.”

Since its emergence in the 19<sup>th</sup> century, the science of linguistic cartography (linguistic map) has focused on using maps as instruments for territorial, imperial and expansionist claims to stabilize the nation-state (Buisseret, 2010, p. 223). This view was due to the awareness “that cartography as a primary human activity may be found in virtually every human society” (Buisseret, 2010, p. 223).

In the book edited by Akerman James (2009) “*The Imperial Map: Cartography and the Mastery of Empire*”, the author considered that in the context of imperialism, maps are not only produced as aids to navigation and orientation, but also as a means of gaining power over the spaces staked out on the map.

Luebbering (2013) extended this notion by inferring that “language maps can both convey power and be used for power.” (p. 49). Whoever controls

depictions of a given geographical, political, or linguistic territory has the means of shaping a society's thoughts regarding that territory, insofar as the maps are accepted as "top-down" representations of the group's claims to sovereignty (Ormeling, 2010, p. 28). In colonial contexts, maps were and are used as tools of ownership, in which European groups assigned names and borders to newly-created territories, hence "claiming" them (Aporta et al., 2014; Ormeling, 2010)

### 2.1. Categories of Linguistic maps:

According to König and Paul (2001), there are several categories which include but are not limited to:

- a) Ethnolinguistic Mapping
- b) Language Area Mapping
- c) Language Family Mapping
- d) Anthropological Feature Mapping
- e) Historical Mapping
- f) Grammatical Feature Mapping
- g) Lexical Variation Mapping
- h) Phonological Features Mapping
- i) Religion and language maps (König & Paul, 2001).

## 3. Geographic Information System and Linguistic Mapping

In the era of the "information technology" revolution, modern cartography has undergone rapid changes in the last decade. Memecke and Crossland (1995) defined the term "geographic information system (GIS)" as:

"a computer-based information system that provides tools to collect integrate, manage, analyze, model, and display data that is referenced to an accurate cartographic representation of objects in space." (as cited in Mennecke, & Crossland, (1996, p. 538).

In simple terms, GIS is a spatial database management tool to collect and manage spatially-defined data. Stoeckle (2014) regarded that the purpose of GIS is to create, share, and apply useful map-based information products that support the work of organizations as well as to develop and manage the supporting geographic information.

In a study, Briscoe (2009) stated that there are two main GIS principles. The first principle combines different data types by listing populated places and areas in language descriptions. On the other hand, the second principle links these data to the earth's surface. In this principle, geo-linguistic researchers use abstract areas to represent data on language location.

### 3.1. Techniques for Constructing linguistic map using GIS

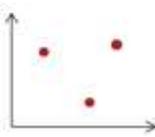
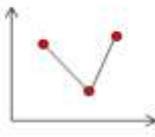
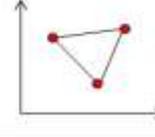
GIS possesses several linguistic mapping techniques according to these maps' categories or nature. Accordingly, these strategies include, but are not limited to, the following points:

#### a) *Vectors Format:*

As evidenced by Ormeling's (1992) and Ambrose and Williams' (1991) discussions of typical language map types, most language maps are in vector format, composed of points, lines, and polygons.

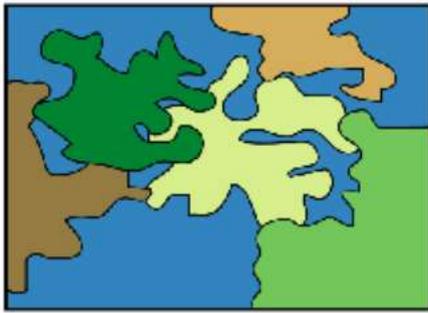
Table 1:

*Vector formats of linguistic maps using GIS (Stoeckle, 2014).*

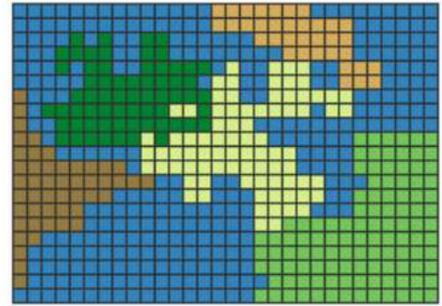
"Real world"	GIS
<b>Locations</b> <ul style="list-style-type: none"> <li>• Villages, cities, fire departments, police stations, ...</li> <li>• In dialectology: places of investigation</li> </ul>	<b>Point features</b> 
<b>Borders, connections</b> <ul style="list-style-type: none"> <li>• Political/administrative borders, streets, rivers, ...</li> <li>• In dialectology: isoglosses</li> </ul>	<b>Line features</b> 
<b>Areas</b> <ul style="list-style-type: none"> <li>• Countries, land use, districts, ...</li> <li>• In dialectology: dialect areas, Thiessen polygons, mental maps</li> </ul>	<b>Polygon features</b> 

#### b) *Rasters Format*

According to Environmental Systems Research Institute (ESRI, 2009), in its simplest form, a raster consists of a matrix of cells (or pixels) organized into rows and columns (or a grid) where each cell contains a value representing information, such as temperature (ESRI, 2009).



Polygon features



Raster polygon features

Figure 2: Vector formats of linguistic maps using GIS (Stoeckle, 2014).

### 3.2. Lexical Variation Mapping using GIS:

As cited in Luebbing (2011), Cambell (2010) provided an example of a lexical variation map of the generic names of soft drinks across the American states using the GIS (figure 3).

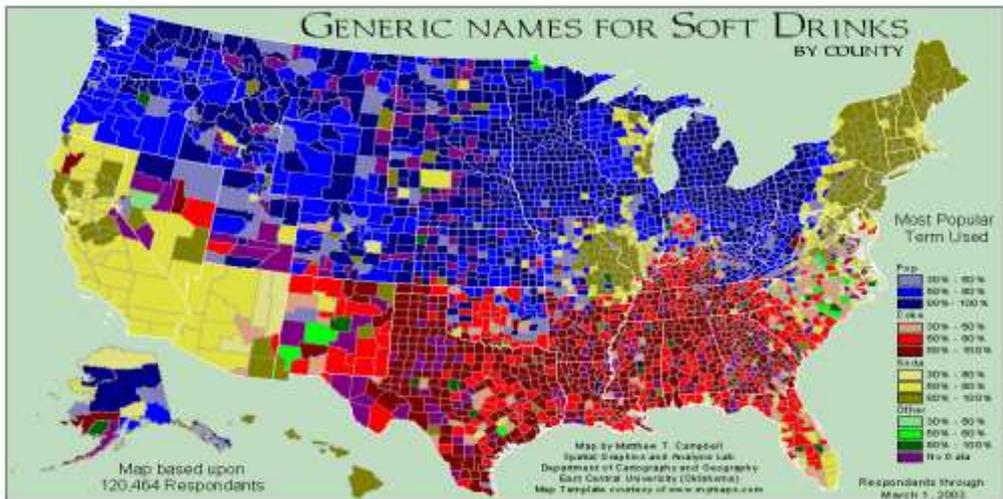


Figure 3: Example of a GIS generated map from VGI data on the different terms used for soft drinks in the US (Campbell, 2010. As cited in Luebbing, 2011, p. 35)

Moreover, Abadi (2018) illustrates the difference in the lexical variation of “soda,” “pop” and “coke” as follows:

- 1) *Soda*: is the preferred term in the Northeast, most of Florida, California, and pockets in the Midwest around Milwaukee and St. Louis.
- 2) *Pop*: is what people say in most of the Midwest and West.
- 3) *Coke*: even if it’s not a Coca-Cola brand, it is what people call it in the South (Abadi, 2018).

### Conclusion:

In sum, thanks to technology, cartographic quality in linguistics have improved in recent years. However, linguists often independently designed their

atlases at the beginning of the twenty-first century. Recently, the computational basis and collaborations within and across technology fields would become more relevant and used via web mapping than ever. In this context, using GIS is essential for constructing a language map. This tool could assist research in enhancing the accuracy of achieving linguistic maps.

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