

# Sign languages: in France and across the world

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## Abstract

The linguistic heritage of France includes not only spoken French, as it is used today in various forms around the world, but also French Sign Language (LSF), whose history is more opaque, but which underwent great cultural development in the 18th and 19th centuries with the creation of schools for deaf children. Thanks to the creation of similar schools abroad, LSF became the ancestor of many sign languages around the world, including American Sign Language (ASL) and Brazilian Sign Language (Libras).

But sign languages, like spoken languages, change and evolve, giving rise to linguistic diversity at all levels of linguistic structure. In this article, we will explore this diversity at several levels, namely phonology, syntax and semantics. We will examine the linguistic systems of a variety of sign languages—some related to LSF, others not. In general, sign languages fit into typologies of linguistic variation known from spoken language, but they also sometimes exhibit properties that seem unique to the signed modality. Cross-linguistic work on sign languages can therefore give us a new perspective on linguistic variation and language families, as well as an understanding of the role of modality.

## 1 To begin...

You may already know that Deaf people in France communicate using French Sign Language—LSF.<sup>1</sup> You may even know that old LSF is the ancestor of several other sign languages around the world, including American Sign Language (ASL) and Brazilian Sign Language (Libras). But what are the consequences of these relationships? And, more generally, how do sign languages differ from one another? This is the subject of the present article.

But let's start with a much simpler question: what is a sign language? Spoken languages use the mouth, tongue and vocal cords to articulate a signal. This signal is linear, made up of acoustic waves, and is perceived by the auditory system—the ears. Sign languages, on the other hand, are languages mainly used by Deaf communities around the world. They use the hands, face and body as articulators. The signal produced is a multi-dimensional image and is perceived by the visual system—the eyes.

The image we have of sign languages is often clouded by false ideas, so let's start by deconstructing a few of these myths.

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<sup>1</sup>The word "Deaf" with a capital D indicates membership to the Deaf community or culture, beyond the physical condition of deafness.

Our first myth is the idea that sign languages are mime. This is not the case: in sign languages, as in spoken languages, it's possible to talk about non-tangible things—ideas, philosophy, mathematics, politics—and, as in spoken languages, words are arbitrary. To give an example, consider the sign in figure 1. What do you think the meaning of this sign could be?

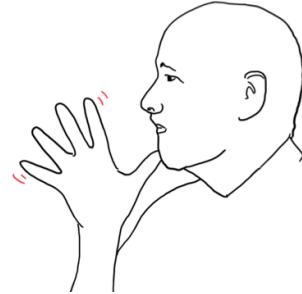


Figure 1: Guess the meaning!

Perhaps you'd guess "speak"? Or maybe "trumpet"? But no, in fact: in LSF, the meaning is "cannot". And in ASL, the meaning is "mom". The moral: we can't guess the meaning of a sign just by looking at it.

This being said, there is a certain degree of iconicity in sign languages: cases where a sign resembles its meaning (Emmorey, 2014). But even in these cases, what is represented iconically is not predictable. For example, Figure 2 shows the sign for "bird" in Israeli Sign Language (ISL) and ASL. Both signs have an iconic aspect, of course: the ISL sign visually shows the bird's wings, and the ASL sign shows the beak. But you can't switch the two signs around—if you flap your wings in ASL, it's not a word.

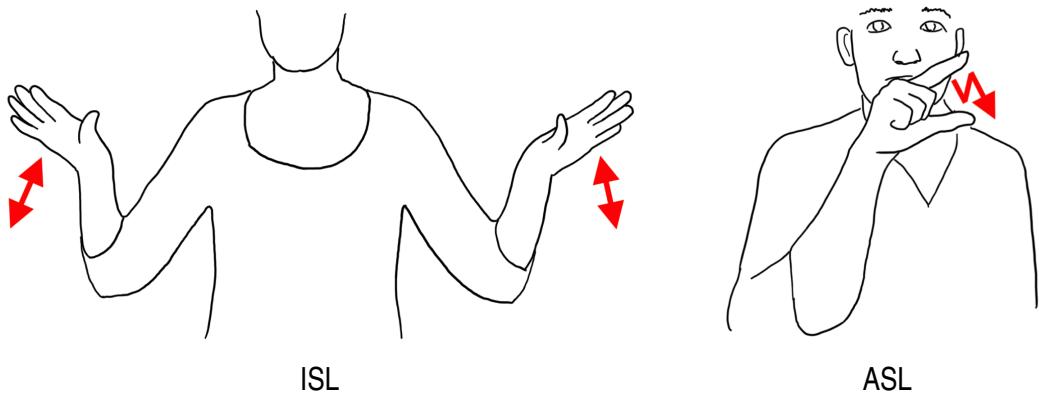


Figure 2: The sign for "bird" in two sign languages

This brings us to our second myth: that sign language is universal. Indeed, we've already seen several counterexamples: LSF, ASL, Libras and ISL. Figure 3 shows a photo taken at a conference on sign languages: on the right is Dr. Peter Hauser, presenting in ASL; on the left, an interpreter translating into British Sign Language; below, along the stage, we see a whole host of interpreters translating into other sign languages. We thus see six sign languages in a single image.

And yet, this myth is quite widespread. Figure 4 shows a screenshot of AirBnB.com. You're asked to tick the boxes for the languages you know, so I've ticked English, French and ... "sign language". You know, I wonder why they have so many boxes—they could have just had two: "spoken language" and "sign language"! (Or, more seriously, just a text entry bar.)



Figure 3: Peter Hauser presents at TISLR 11

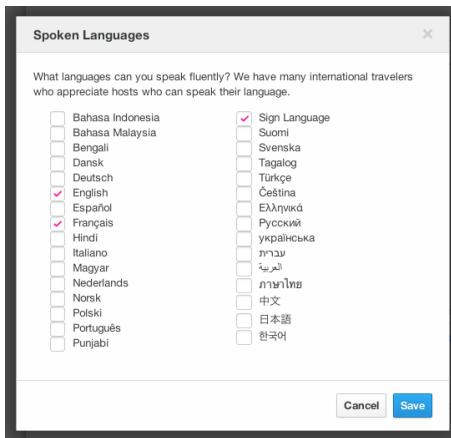


Figure 4: A simplistic view of sign languages

## 2 Some remarks on this history of sign languages

Let's move on to a question that you may be wondering about: why are there so many sign languages? To give some perspective on this question, it's useful to emphasize two points:

1. Sign languages are not invented. The emergence of a language is organic and comes from a community, not an authority.
2. Languages (spoken or signed) change and evolve.

On this second point, we can dig a little deeper and ask: what factors favor the divergence of languages? Among other things, one important factor is the existence of small communities that are isolated from each other. Italy, for example, is known for its great diversity of dialects. People living in the north of Italy wouldn't even understand certain conversations that take place in Sicily. This linguistic fragmentation is rooted in Italy's history and political fragmentation. Or consider another example: Vanuatu. This small country is the most linguistically dense place in the world by square meter. Looking at a map, we can easily guess why. Here, linguistic fragmentation stems from geographical fragmentation.

From this perspective, let's now consider sign languages and Deaf communities. Technologies like Zoom, or even video recording, have been around for a very short time. Deaf communities prior to this

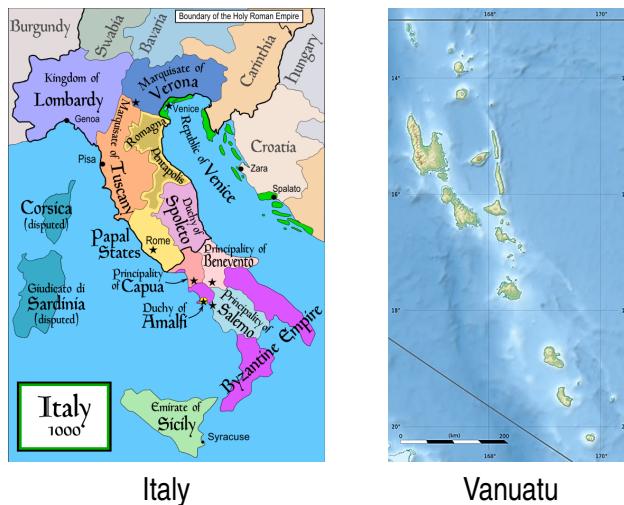


Figure 5: Sources of linguistic fragmentation

time were thus veritable linguistic "islands", isolated from one another. It's only natural, then, that we should also find linguistic diversity among sign languages.

But within this fragmentation, there is a unifying force: schools for deaf children. Now, this is not because hearing people "teach deaf children the right way to speak". Rather, it's the simple fact of bringing deaf children together that creates a community.

One notable school was the one founded by the abbot Charles-Michel de l'Epée (*l'Abbé de l'Epée*) in France around 1760—a school which you may have heard of. It wasn't perfect, of course, but l'Epée introduced a few very important innovations. First, this was the first school in the world to offer education to deaf children free of cost. Second, the school had the philosophy of offering instruction in a visibly accessible language, or, as l'Epée wrote in 1776, "we instruct our pupils in the language that is their own" ("nous instruisons nos élèves dans la langue qui leur est propre"—that is, a sign language. Finally, in time, the school employed Deaf teachers, who were even more qualified to teach in an accessible, natural sign language.

Thanks to its educational success, and because its approach was intended to be shared and not kept secret, l'Epée's method—and with it, LSF—was spread around the world. So it was that, in 1817, following the example of Abbé de l'Epée's school, the Deaf teacher Laurent Clerc taught in the first school for deaf children in the United States of America, and, in 1857, Edouard Huet likewise travelled to Brazil to establish a school for the deaf. It was in these schools that ASL and Libras were born.

We've come to the end of the historical section, but readers interested in the history of sign languages are strongly advised to consult Yann Cantin's work. In addition to his scholarly publications (e.g. Cantin, 2019), he also maintains a blog (<https://noetomalalie.hypotheses.org/>) on which he discusses all manner of issues relating to the history of Deaf people and sign languages.

Up to this point, we have seen *why* sign languages vary. The main question for the rest of this article will be: *how* do sign languages vary?

To answer this question, let's first consider how spoken languages vary. They vary in vocabulary, as we've already seen with sign languages. They vary in the way they form sentences from words, which is known as *syntax*. They vary in sound systems—the accents we use when we speak—which is called *phonology*. And finally, they vary in the meaning of words and sentences, called *semantics*. We'll see that the same dimensions of variation also exist for sign languages.

### 3 Syntax: the recipe for a sentence

Let's start with syntax, the recipe for creating a sentence. Sentences (1)-(2) show an example of syntactic variation. Imagine we've just asked: "What did Pierre do? In French, the answer might be: "Il a mangé du chocolat" ("He ate chocolate"). In this response, the subject is obligatory; you can't simply say: "A mangé du chocolat" ("Ate chocolate"). On the other hand, for an Italian, the second answer would have been perfect: "Ha mangiato cioccolato", without the subject. This is thus a parameter of variation: is the subject of a sentence obligatory or not?

- (1) a. Ce matin, il a mangé du chocolat. (French)  
b. \* Ce matin, \_\_ a mangé du chocolat.
- (2) Stamattina, \_\_ ha mangiato cioccolato. (Italian)

We can ask the same question for sign languages. What's the answer for LSF? Well, take a look at sentence (3). The subject is not obligatory: LSF apparently acts like Italian, and not like French (Jaber et al., 2022).

- (3) MATIN \_\_ MANGE CHOCOLAT. (LSF)

A second example of syntactic variation is word order. In (spoken) Italian, as in French, the direct object follows the verb. In Italian Sign Language (LIS), the opposite is true: the object precedes the verb. If we add a modal verb to the sentence, such as "can", in Italian the verb follows it; in LIS, it precedes it. And if we add negation to the sentence, in Italian, the modal follows it; in LIS, it precedes it (Cecchetto et al., 2006).<sup>2</sup>

- (4) Negation > modal > verb > object (Italian)  
a. Gianni ha ordinato il caffè.  
b. Gianni può firmare il contratto.  
c. Gianni non può firmare il contratto.
- (5) Object > verb > modal > negation (LIS)  
a. GIANNI CAFFÈ ORDINA  
b. GIANNI CONTRATTO FIRMARE PUÒ  
c. GIANNI CONTRATTO FIRMARE PUÒ-NEG

But if the LIS data seem to be exactly the opposite of the Italian data, LIS nevertheless fits into a familiar pattern of syntactic variation among the world's languages. Languages like Italian are said to be head-initial languages; languages like LIS are head-final languages. With respect to this dimension of variation, LIS joins such spoken languages as Japanese and Turkish. ASL, on the other hand, is a head-initial language, like Italian and French.

Two conclusions can be drawn from these case studies. First, the grammar of a sign language does not depend on the grammar of a spoken language. We have seen that LSF does not act like French and LIS does not act like Italian. Sign languages are independent languages. Yet, at the same time, sign languages fit into known typologies of variation. They are not alien languages; they are human languages and thus part of the same abstract cognitive system.

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<sup>2</sup>In fact, in LIS, "cannot" is expressed by a single sign, as in LSF; nevertheless, there is reason to believe that the negation follows the modal.

## 4 A "phonology" of sign languages?

Let's move on to the phonology of sign languages. You might have your doubts about this one: what could one possibly mean by "phonology"? After all, the etymology of "phonology" is "the study (logy) of sound (phono)". Is it even possible to have a phonology of a language that doesn't use sounds?

In fact, today's linguists have a more abstract way of defining phonology. By this definition, phonology is *the abstract combinatorial system that manipulates meaningless units*. The same definition applies whether these elements are sounds or body movements. In this definition, the operative phrase is "meaningless units". What does this mean? An old observation is that language is a combinatorial system on several levels (Hockett, 1960). We've already seen syntax: syntax combines words to create sentences. Of note, words are meaningful units. For example, with the same units, we can create the sentence "John loves Mary" or the sentence "Mary loves John"; in both cases, the meaning of the sentence is derived from the meanings of the words "John", "Mary" and "loves".

The phonological level is also a combinatorial system. In French, sounds are combined to create words. For example, with the sounds /r/, /o/ and /b/, one can create the words "robe", "bord", "broc" and "orbe". But in this case, the units are meaningless. The /r/ sound has no meaning in and of itself. We'll see that a phonological level exists in the same way for sign languages.



Figure 6: Combinations of meaningless units in French

For spoken languages, sounds can be broken down into three phonetic parameters: place of articulation (/b/, /d/, /g/), manner of articulation (/d/, /n/, /z/) and voicing (/z/, /s/). For sign languages, the situation is exactly parallel, with four phonetic parameters: handshape, location (on the body or in space), movement and orientation (Stokoe, 1960).

In spoken languages, we can find minimal pairs for each parameter—words that differ only by one parameter. In English, for example, the words "bay", "day" and "gay" differ only in the place of articulation of the first sound. The words "do", "new" and "zoo" all have the tongue in the same place, but have a different manner of articulation. Finally, the words "bay" and "pay" differ only in voicing.

In sign languages, we can also find minimal pairs. Figure 7 shows some examples in LSF (Mertz et al., 2022). The first example considers handshape. On the left, we see the sign for "pardon" and on the right, the sign for "email": the only difference is whether the hand is open or closed. The second example shows a minimal pair for orientation: on the left, the sign for "metro"; on the right, the sign for "fax". The only difference here is whether the palm of the hand is pointing downwards or upwards. Next comes a minimal pair for location: on the left, the sign for "intelligent"; on the right, the sign for "smell". The only difference is whether the finger is in front of the forehead or the nose. Finally, a minimal pair of movements: on the left, the sign for "train"; on the right, a sign for "expensive". Handshape, location on the cheek, and orientation are all the same; only the movement is different.

In both spoken and sign languages, phonological parameters can be broken down into more precise descriptions. For spoken languages, for example, manner of articulation is not a monolithic category; there are features such as [±sonorant], [±continuous] and [±nasal]. Likewise, for sign languages, we can break down handshape into features: for example, [±thumb] (is the thumb extended?), [±flexed]



Figure 7: Minimal pairs: a. handshape; b. orientation; c. Location; d. movement.

(are the fingers flexed?), [ $\pm$ ulnar] (does the sign use the pinky side of the hand?) and [ $\pm$ one] (how many fingers are used?).

With these features, which provide a more detailed description of a sign, we can find cases where a contrast in one language does not exist in another. For example, in ASL, the direction of rotational movement—forward or backward—is contrastive. Figure 8 illustrates this contrast in the minimal pair

"roll" versus "sign"—the former, with forward rotational movement; the latter, with backward movement.<sup>3</sup> In LIS, on the other hand, this feature is not contrastive; with the exception of certain iconic signs, all rotational movements are forward. A second example involves handshape. In ASL, there's a handshape that looks like the letter W; among other things, it's used in the sign for "world". But again, this handshape doesn't exist in LIS. There is no sign that uses the W handshape.

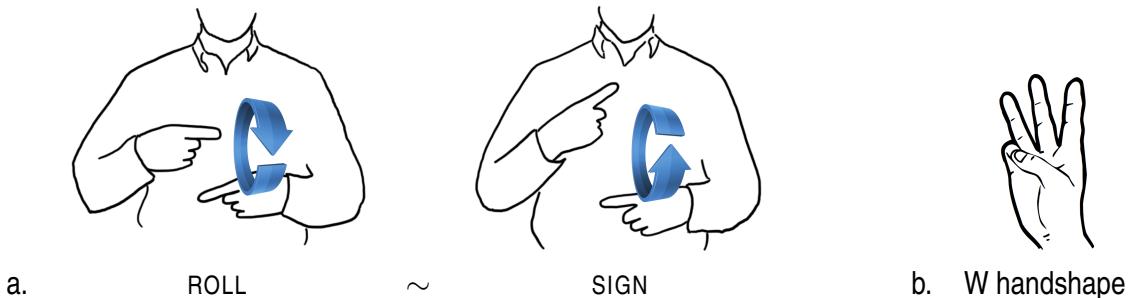


Figure 8: Features that are contrastive in ASL but not in LIS

A window into the phonological level appears in the form of borrowings—words borrowed from one language to another. This phenomenon can be seen in borrowings from English into French. In English, the expression "has-been" describes a person who has had success or fame and no longer has it. This expression has been borrowed into French with the same meaning, but the pronunciation has been adapted to French phonology. The phoneme /h/ doesn't exist in French, so it's been removed; likewise for the vowels /æ/ and /ɪ/, which have been replaced by the vowels /a/ and /i/. An underlying representation thus appears with a surface form that adapts to the rules of French phonology.

- (6) English: [hæzbɪn] → French: [azbin] "has-been"

We see exactly the same thing with sign languages. Figure 9 shows an example of a borrowing from ASL to LIS. The sign "workshop" in ASL starts with a W handshape. It so happens that the sign "workshop" has been borrowed in LIS with the same meaning. But, as we saw above, the W handshape doesn't exist in LIS. Instead of using the W handshape, the sign in LIS thus uses a handshape with all four fingers raised, a handshape that exists elsewhere in LIS (Geraci, 2017). Once again, we see an underlying representation that appears with a surface form that adapts to the phonology of the language in question.

Now let's turn to a question we've already touched on: how are the world's sign languages related to each other? And what methodologies can be used to answer this question? We've already seen one way of answering the question: historical documentation. For example, based on written sources, we know that ASL and Libras are descended from LSF. But generally speaking, there is very little documentation on the history of sign languages (and no historical record *in* sign language before the invention of video), so this methodology is subject to serious limitations.

In such a context, it is useful to switch to another strategy: the comparison of vocabulary and phonology. Under this approach, we look at the contemporary lexicon. If two languages share many signs, we conclude that they are probably related; and if two languages have similar phonology, we conclude that they are probably related. For example, Table 1 shows a selection of words in a selection of spoken languages. We see that Italian, French and Spanish share a similar vocabulary; even if the words aren't exactly the same, certain sounds are recurrent, such as the /k/ and /r/ in "heart". English, Norwegian,

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<sup>3</sup>Some signers use a forward motion for "sign" too.

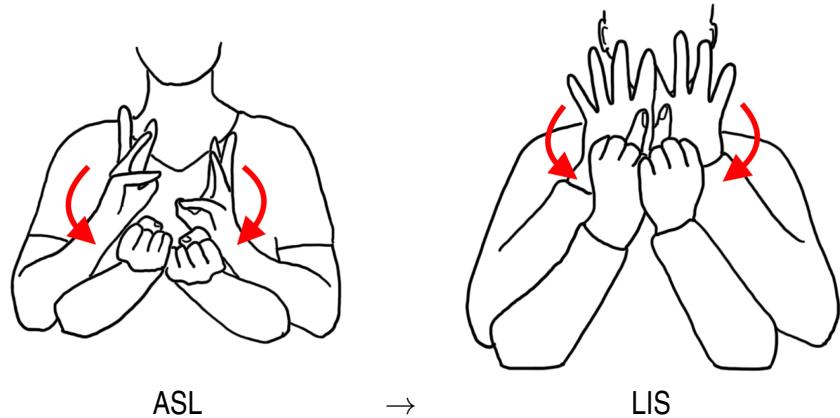


Figure 9: The sign for "workshop" in two sign languages

Dutch and German form another group. Within this group, Dutch and German seem even more closely related. From data like this, we can begin to create a phylogenetic tree of languages. Note also that only contemporary vocabulary is used—there's no need for historical data.

Italian	French	Spanish	English	Norwegian	Dutch	German
torta	tarte	pastel	pie	taart	pai	torte
albero	arbre	árbol	tree	treet	boom	baum
casa	maison	casa	house	hus	huis	haus
cuore	cœur	corazón	heart	hjerte	hart	herz

Table 1: Comparison of the lexicon of seven spoken languages

We can use exactly the same strategy for sign languages. As an example, consider the word "again", presented in eight sign languages in figure 10. On the first line, we see the sign for "again" in LSF, ASL and Spanish Sign Language. The signs are not exactly the same, but we see the same movement and sometimes the same handshape. Compare this with Chinese Sign Language and Japanese Sign Language, on the second line. These two languages use an identical sign, which looks nothing like the sign in the languages in the first group. Next, let's look at the sign languages of Lithuania, Belarus and Russia. Here again, we can discern a separate group, with a handshape that may differ from one language to another, but with the same movement and the same location. From a single sign, we can already begin to sketch out families of sign languages.

A recent project by Carlo Geraci and Natasha Abner used exactly this technique, with 100 signs from 24 sign languages. Using statistical methods, they found several language groups (Abner et al., 2020). In Europe, three language groups stand out, as shown in figure 11. First, there's a group with the sign languages of Russia, Ukraine, Lithuania, Latvia and Estonia—five countries geographically close, with a shared political history. Next, we see a group with the sign languages of Germany, Austria and the Czech Republic—another natural geographical grouping. A final group is formed by the sign languages of the United Kingdom and New Zealand—although geographically distant, they have historical links; we know that the first schools for deaf children in New Zealand were established by the British.

To sum up, we have seen that phonology, originally invented to analyze the sounds of language, has an equivalent in sign language. In addition, we have seen that the analysis of phonological variation gives us a glimpse into an otherwise hidden history—the phylogeny of sign languages.

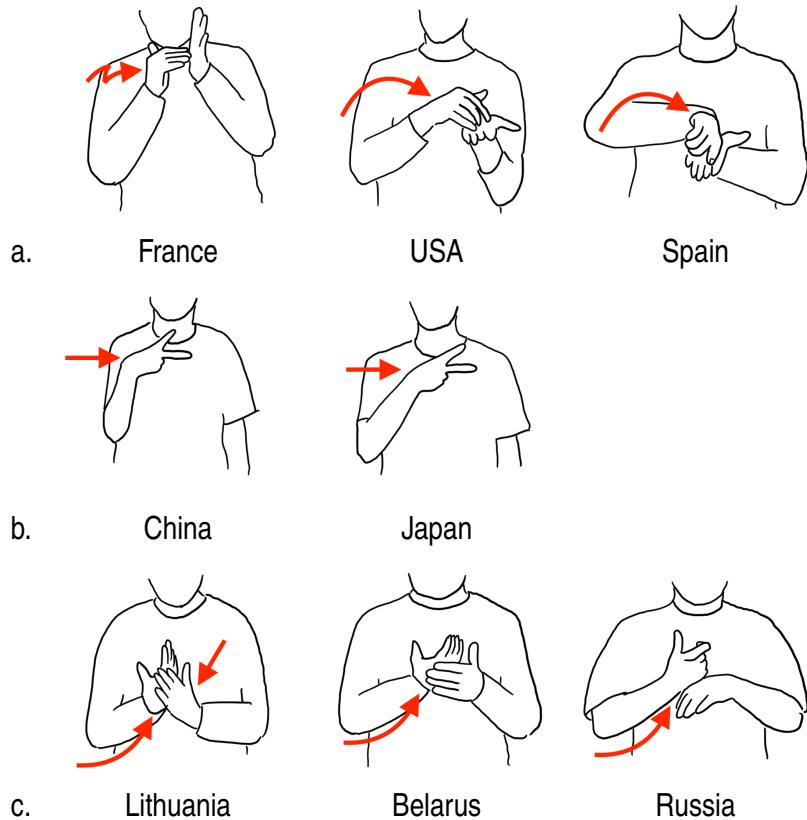


Figure 10: The sign for "again" in eight sign languages

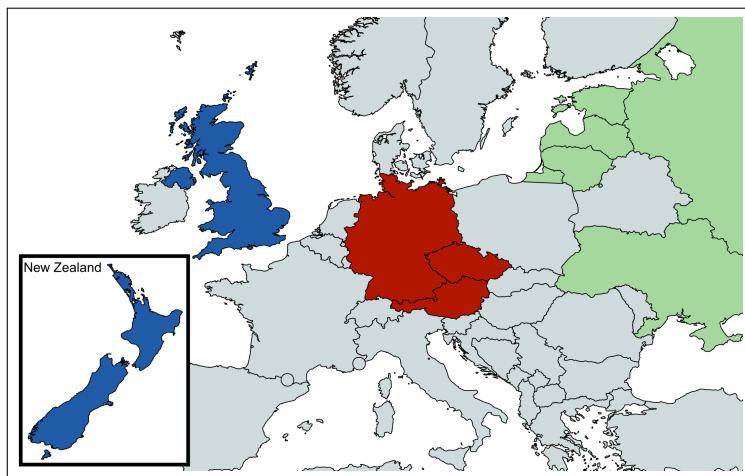


Figure 11: Sign language families based on phonological data

## 5 Semantic: a logic machine

Finally, let's move on to semantics, the meaning of words and sentences.

Let's start with a simple question: what is the meaning of the English word "nothing"? Perhaps absence? Emptiness? But it's not quite that: if "I ate nothing", I didn't eat an absence; I didn't eat emptiness. Rather, "nothing" is a word that denies the existence of something: there exists no thing that I have eaten. Let's try another question: what is the meaning of the French word "rien"? Surely "rien"

also denies the existence of something. So, do the words "nothing" and "rien" mean the same thing? In fact, the answer is no, not quite. In particular, in French, negation can be redundant, but not in English. In French, you can say "Personne n'a rien vu", but in English, the equivalent sentence, "Nobody saw nothing", implies that everyone saw something.

Rather than proposing precise definitions for "rien" and "nothing", let's instead highlight a take-home message: that cross-linguistic variation includes phonology, syntax, but also semantics.

In fact, semantic research has provided us with a typology of negation (Giannakidou and Zeijlstra, 2017). There are languages like English or German where negations are independent, as in example (7). Then there are languages like Russian or Greek where the negation is always redundant—as in example (8). Finally, there are languages like Italian or Portuguese where it depends on the syntax. In Italian, if the negative word follows the verb, another marker of negation is mandatory; if the negative word precedes the verb, no other negative marker is necessary, as in (9).

- (7) Nobody called. (English)
- (8) Nikto ne zvonil. (Russian)
- (9) a. Non ha telefonato nessuno. (Italian)  
b. Nessuno ha telefonato.

To this typology, we can add sign languages. We can thus observe that LIS is a language with independent negations (Geraci, 2005), as shown in example (10), while Russian Sign Language (RSL) is a language where it depends on the syntax (Kuhn and Pasalskaya, 2023), as shown in example (11). But even in this latter category, note that there is cross-linguistic variation. In Italian, we've seen that the negative word can appear without negation if it comes before the verb. In RSL, this happens when the word appears *after* the verb. RSL is thus the mirror image of Italian. Perhaps this reminds you of one of our earliest examples of syntactic variation!

- (10) a. NESSUNO TELEFONA (LIS)  
b. TELEFONA NESSUNO
- (11) a. NIKTO ZVONIL NEG. (RSL)  
b. ZVONIL NIKTO.

Let's consider a second example of semantic variation: the expression of plurality. In English, we can indicate a plural noun with a suffix: "horse"/"horses". It turns out that in many of the world's languages, it's possible to do the same thing with verbs, to indicate that there is a plurality of events (Newman, 2012). For example, in Hausa, a widely spoken African language, the verb "call" is "kir-aa". If reduplicated—"kir-kir-aa"—it means "call several times". More precisely, this expression, "kir-kir-aa", can be used to describe a situation in which one person has called another person several times, or a situation in which one person has called several people. In both cases, there is a plurality of events.

Note that this strategy does not exist in English or French. One cannot say "J'appelle appelle ma mère" ("I call call my mother") if one has called her several times, nor "J'appelle appelle mes frères" ("I call call my brothers") if one has several of them.

Yet this strategy does exist in LSF (Kuhn and Aristodemo, 2017). Examples (12)-(13) present two sentences in LSF. In both, the verb "forget" has been reduplicated and the resulting sentence describes a situation with a plurality of forgetting events. But, as we see in figure 12, the reduplication in the two sentences is not the same: the reduplication in (12) uses a single hand; the reduplication in (13) uses the two hands in alternation. As it happens, these two morphological strategies correspond to

different meanings. Single-handed reduplication indicates repetition in time; alternating reduplication with the two hands indicates a plurality of individuals participating in the events. These are exactly the same dimensions of pluractionality discussed above, but now they are specified by the form of the reduplication.

- (12) MIRKO OUBLIE-rep APPORTER APPAREIL-PHOTO (LSF)  
     ‘Mirko repeatedly forgot to bring a camera.’
- (13) EUX GARÇON OUBLIE-alt APPORTER APPAREIL-PHOTO  
     ‘The boys each forgot to bring a camera.’

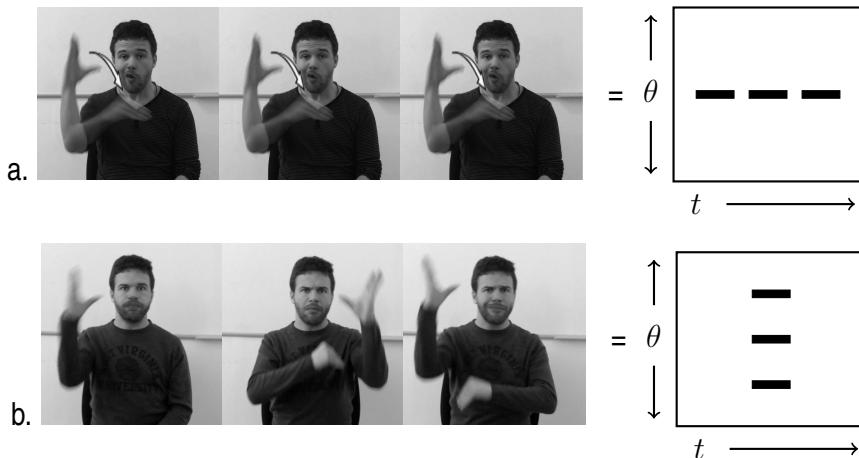


Figure 12: The verb "forget" with two strategies of reduplication: a. OUBLIE-rep and b. OUBLIE-alt. In the graphs, the x-axis represents time ( $t$ ) and the y-axis represents participants ( $\theta$ ).

Let's end with a final connection. We've observed that French has a redundant marking of negation, apparent in sentences like "Personne n'a rien fait". It turns out that pluractionality in LSF shows a similar redundancy! In sentence (14), for example, there's an adverb "every day", but also a reduplicated verb. The sentence in LSF can nevertheless be used to describe a situation in which only one thing is given per day, unlike its French equivalent in (15). Redundancy in the domain of plurality is reminiscent of redundancy in the domain of negation.

- (14) TOUS-LES-JOURS UN LIVRE JEAN DONNE-1-rep (LSF)  
*Possible interpretation:* one book per day
- (15) Tous les jours, Jean me donne un livre plusieurs fois. (French)  
*Necessary interpretation:* multiple books per day

To sum up the discussion of semantics, we once again observe that sign languages fit into known typologies of variation. We further observe that data from sign languages often bring new perspectives. For example, we saw that RSL seems to be the mirror image of spoken Italian. We also saw that negative redundancy has similarities with plural redundancy. These observations may shed new light on our linguistic theories.

## 6 Conclusion

We have seen that sign languages are natural languages. They have unique histories and grammars that are independent of spoken languages. We have further seen that sign languages fall within known

typologies of variation. Syntax, semantics and even phonology have counterparts in sign languages. We therefore conclude that sign languages are part of the same abstract cognitive system. This is the system famously referred to by Stephen Pinker as the "language instinct".

We note that sign language linguistics goes in two directions. On the one hand, theoretical linguistics can be used to study sign languages. For example, we have seen that the statistical analysis of phonological features enables us to reconstruct a hidden history of sign languages. On the other hand, sign languages can shed light on theoretical linguistics. For example, we strengthened and enriched the typology of negative concord, and demonstrated parallels between the semantics of negation and plurality.

Sign languages are therefore also part of our linguistic heritage, whether in France or elsewhere in the world. We observe that, when given a chance, language flourishes! But one pre-condition is accessibility—accessibility to education and accessibility to society. But accessibility is not a foregone conclusion; it takes time, money and hard work. And this last point really must be emphasized: if sign languages are so widespread today, it's above all thanks to Deaf people themselves, present long before the Abbé de l'Epée, who are still fighting for these rights today.

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