

# **The Problem of the Language of Science in a Global World: Linguistic Inter-Understanding is a Possibility**

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## **Introduction**

We have an important challenge today. We need science to reach as many people as possible, and knowledge to be disseminated in every country around the world. To achieve those aims, obviously, it is only necessary to increase and improve science teaching in the entire planet. However, a problem arises when we think about this issue: language.

Indeed, as it is known, in general, science is published and shared in English. In fact, it is sometimes taught in that language even in countries with a mother tongue other than English. And this is so because most of the scientific books, papers, and texts that can be got (both in hard copies and in digital versions) are written in the mentioned idiom. Of course, this would not be a problem if the largest part of general population in all the countries spoke or, at least, were able to read English. Nevertheless, this is not really the case. The truth is that the places in the world in which most people do not have basic notions of English are many, which means that more than a few individuals cannot access to science in practice.

A first possible solution is clear: we can accept the fact that English is today the international language, or, if preferred, the new lingua franca, and try to improve its teaching in the entire globe. Evidently, one might argue against this that the universal language does not need to be English. For example, several constructed or artificial languages have been created, simply some of them being Esperanto (e.g., Zamenhof, 1906), Latino Sine Flexione (e.g., Peano, 1903), or, with some links to this last language, Interlingua (e.g., Gode, 1951). Nonetheless, these languages do not appear to have had much success, at least, if compared to English. Thus, this last circumstance, along with the current reality of English, which is de facto the language used in most international meetings, events, and activities, makes it very difficult to consider another alternative. Furthermore, this seems to

apply, in the same way, not only to planned languages such as those indicated, but also to the possibility to adopt another natural language, regardless of which it can be, as universal idiom, the reason of that being that, as said, English is very present everywhere and in many different academic and non-academic situations nowadays.

But, even if the universal language were a language different from English, this first solution has an obvious problem that would not be removed: all the population around the world would have to learn it, and that does not appear to be a goal easy to achieve. However, it is also possible to think about another option, since a different solution can be linguistic inter-understanding. Inter-understanding is a linguistic phenomenon that has been much studied, just some works on it related to romance languages, which are cited by López-Astorga (2017), being, for example, Bonvino, Caddéo, Vilaginés Serra, and Pippa (2015); Chávez Solís and Erazo Muñoz (2014); Erazo Muñoz (2016); Tassara and Villalón (2014); and Wilke and Lauría de Gentile (2016). This phenomenon refers to the fact that the effort levels necessary to receive information in a language other than the mother tongue are much lower than those required to express messages in that other language, and this applies both in the case in which the information and the message are oral and in the case in which they are written. Clearly, the effort needed is even lower if the languages are closely related to each other. Nevertheless, the main idea supported by the proponents of linguistic inter-understanding seems to be that, instead of developing the four traditional abilities in languages learning (i.e., listening, speaking, reading, and writing), we only develop the abilities to listen or read in languages different from ours. By doing so, with the same cognitive effort that is necessary to learn just one language, we could understand a number of them. Likewise, an additional advantage would be that, if other people speaking other languages did the same with our language, we could also keep speaking and writing our mother tongue.

It is absolutely true that, although the effort is lower, we will be never able to understand all of the languages that exist in the planet. Nonetheless, it is evident too that the needs for translation would significantly decrease, as, for example, if everybody studied only linguistic inter-understanding, and not the four abilities mentioned, when trying to learn foreign languages, it could be supposed that, in general, people tend to understand languages akin or close to each other, and hence it could also be thought that it is only necessary to translate documents into just one language of the same family.

Furthermore, López-Astorga (2017) has given theoretical support to this idea as well. In that study he based on a relevant cognitive theory at present: the mental

models theory (e.g., Johnson-Laird, Khemlani, & Goodwin, 2015). In particular, his argument there was that the mental models theory can describe the mental processes that happen when an individual speaking a mother tongue intends to understand a message in a close language, and that, therefore, the mentioned theory can predict which the difficulties that that very individual can find in doing that are too. Thus, he also proposed that the mental models theory allows identifying the exact directions that should be followed in the teaching to interpret what is said in a language without necessary speaking that same language, that is, in the teaching of linguistic inter-understanding.

But, likewise, I have tried to give further evidence in this regard by means of a research focused on a case study. It is the case of a Spanish-speaking undergraduate student, who has faced a text written in a version of the language *Latino Sine Flexione* by Giuseppe Peano (e.g., Peano, 1903), that is, in an artificial language coming from Latin and hence close to Spanish (but different enough to check López-Astorga's predictions from the mental models theory). I describe this research, and, from its results, I try to draw some conclusions relevant to the dissemination of science and the aim that it arrives to as many individuals as possible below. However, before that, I comment on López-Astorga's (2017) theoretical framework following the mental models theory, which is adopted by me here as well, in the next section.

### **The mental models theory and the inter-understanding between Spanish and Portuguese**

As said, the general approach in López-Astorga (2017) is based on the mental models theory. Nevertheless, what is actually important for linguistic inter-understanding is how this theory deals with the induction processes. Certainly, the theory tries to account for all the intellectual activities involved in human reasoning, but, as far as inter-understanding is concerned, it appears that induction is the most relevant of those activities.

Let us think about an induction such as the following: given the datum that

[I] Peter goes to university

We conclude that

[II] He is a student

There is no doubt that, although this is not a correct inference if assessed from classical logic (which, as it is well known, does not enable to make inductions), it is a clear example of certain type of reasoning that we often make every day. And, if we pay attention to works supporting the mental models theory such as Johnson-Laird (2012), the explanation of that type that the theory offers is obvious (see also, e.g., the account in López-Astorga, 2017). The first point to be taken into account is that the idea of possibility is very important in the mental models theory (see also, e.g., Quelhas, Rasga, & Johnson-Laird, 2017, a paper in which the theory is named ‘the unified theory of mental models’). In fact, what the theory provides is that people always think by deeming all the possibilities related to inferences, which, in the previous inference, are evidently:

- [III] (University) & (Student)
- [IV] (University) & (Not-student)
- [V] (Not-university) & (Student)
- [VI] (Not-university) & (Not-student)

Indeed, [III], [IV], [V], and [VI] are four possible situations with regard to Peter that combine the information contained in [I] and [II]. In this way, [III] represents a world in which Peter both goes to university and is a student. [IV], on the other hand, denotes a scenario in which he goes to university, but he is not a student. Nevertheless, in [V], Peter does not go to university, but he does be a student. Finally, in [VI] he neither goes to university nor is a student.

Thus, the process of the inference begins with the elimination of the possibilities [V] and [VI]. This occurs by virtue of the information transmitted by the premise [I], which indicates that Peter does go to university, that is, information clearly incompatible with [V] and [VI], in which, as commented on, Peter does not go to university. Nonetheless, maybe the most interesting step can be the one in which [IV] is also removed. In principle, [IV] is an absolutely possible scenario, since not all people going to university are students. In a university, there are also, for example, professors and an administration staff. However, the individual that makes the induction and concludes [II] from [I] is an individual that, based on the fact that most people going to university are, in general, students, infers that what is most likely is that Peter is a student. In this way, by basically considering the probabilities of [III] and [IV], [IV] is ignored because, as said, it is less likely.

So, from a similar explanation, López-Astorga (2017) applied the theses of the mental models theory on induction to the linguistic phenomenon of inter-understanding. He took as an example the case in which a Spanish-speaking person tries to understand a text written in Portuguese (of course, without knowledge of

this last language). In particular, he used a fragment taken from Bompastor Borges Dias and Rozzi (2003), and, paying attention to the mental models theory, he attempted to show, theoretically, which the words of that Portuguese passage hard to understand for a Spanish-speaking individual not speaking Portuguese could be. In this way, he argued, for example, that a Portuguese word such as *processos* (processes) should be very easy to understand, as it corresponds to a Spanish word very akin to it: *procesos* (i.e., a word with just one less letter), and that a word such as *são* (they are) should be more difficult to interpret, since it corresponds to a Spanish word to which it is not easy to relate it: *son* (i.e., a word that is not obviously equivalent to *são*).

The reason of this, which can be found in López-Astorga (2017), is clear. In principle, the possibilities that can be linked to the relationship between *processos* and *procesos* lead to an evident result. Such possibilities are:

[VII] (*Processos = Procesos*)

[VIII] (*Processos ≠ Procesos*)

And given the similarity between the two words, [VII] seems to be the most likely alternative. However, that is not, *prima facie*, the case of the relationship between *são* and *son* because there is not clarity enough to make a decision with regard to these two scenarios:

[IX] (*São = Son*)

[X] (*São ≠ Son*)

Indeed, the words are so short that it is difficult to decide, and, while they share two letters ('s' and 'o'), one of them ('o') is not in the same position (in *são* is the third letter and in *son* is the second one).

Nevertheless, as explained in López-Astorga (2017), there are situations in which [IX] is undoubtedly more likely and one might note the equivalence. What has been said about the mental models theory implies that meanings and, in general, the semantic context in which a word is included are important to detect the most suitable possibility. However, his idea is that perhaps this is not very different from the importance that meanings and, in general, the semantic context can have in inter-understanding too. Certainly, that idea seems to be in accordance with the main principles of inter-understanding, since

“El léxico es el principal factor del que depende la comprensión de un texto. Si es transparente de una lengua a otra, permite la comprensión incluso en caso de estructuras sintácticas complejas” [Lexicon is the main factor on which the

understanding of a text depends. If it is transparent from language to language, it allows understanding even in the case of complex syntactic structures] (Bonvino et al., 2015).

And, thus, it can be said, in a way coherent with López-Astorga's (2017) theses, that, if, in a particular sentence, all the words around an unknown word are understood, that unknown word can be inferred, regardless of the syntactic structure of the sentence. This can be seen in an easy way by means of one of the examples provided by López-Astorga (2017). That example is related to a sentence such as this one:

“Processos inferenciais são necessários...” (Bompastor Borges Dias & Roazzi, 2003).

In English, this Portuguese sentence would be:

“Inferential processes are necessary...” (translation by López-Astorga, 2017:p.15).

But what is interesting here is that in Spanish this very sentence would be:

“Los procesos inferenciales son necesarios...” (translation by López-Astorga, 2017, p.15).

In this way, given that, from what has been indicated above, it can be expected that a Spanish-speaking person understands *processos* (processes) because is akin to *procesos, inferenciais* (inferential) because is akin to *inferenciales*, and *necessários* (necessary) because is akin to *necesarios*, what would be understood would be:

procesos inferenciales \_\_\_\_\_ necesarios [inferential processes \_\_\_\_\_ necessary]  
(see: López-Astorga, 2017, p.16).

And, clearly, the semantic context suggests that the blank space should refer to the verb ‘to be’, and, in particular, to ‘are’ (*son*), as that would be the most logical and most immediate way to link *procesos inferenciales* (inferential processes) to *necesarios* (necessary). So, semantics would help us note that [IX] is the best option in this case.

Nevertheless, as mentioned, this was a purely theoretical argumentation given by López-Astorga (2017). Assuming it, I have carried out a research based on a case study that, clearly, confirms his ideas. I describe that research below.

## Method

### *Participant*

The participant in the case study was a Spanish-speaking Psychology undergraduate student, in her fifth semester, female, and 23 years old. She was chosen because she fulfilled the inclusion criteria, which were essentially not to have studied Latin not to speak other romance languages different from Spanish. She was Chilean and studied at a Chilean university.

### *Design*

The instrument selected was case study because it appeared to be the most suitable instrument for my study. Certainly, I intended to analyze in detail as many elements interacting in a specific phenomenon (linguistic inter-understanding) as possible, and, after taking descriptions of case study such as the one of Efrat Efron and Ravid (2013:pp.41-42) into account, that seemed to be the best instrument to do that.

Thus, a paragraph written in Latino Sine Flexione, which, as it is known, is essentially Latin with almost no inflexions, was given to her and she was asked to translate it into Spanish. Actually, the experimenter explained to her what Latino Sine Flexione was, but he also told her that the text she had to translate could be in real Latin or in Latino Sine Flexione, and that she would not know that after the end of the experiment.

The language selected was Latino Sine Flexione because, indeed, it is easier to understand for a romance language-speaking individual than Latin, but, as indicated above, the differences between it and Spanish are sufficient to check the previous theses of the mental models theory. And this is so to the extent that it is possible to think about words in Latino Sine Flexione difficult to translate for a Spanish-speaking individual. In particular, it can be thought that the words in Latino Sine Flexione being so are those that fulfill these two criteria:

[A]: They are clearly different from the corresponding words in Spanish.

[B]: They are not, in a particular oral message or text, in a semantic context that, as in the case of *são* with *processos inferenciais* and *necessários* in the previous Portuguese example, enables to interpret them.

In this way, [A] and [B] can be considered to be predetermined categories that, coming from the review of previous works, can lead the analyses of results (see, e.g., Efrat Efron & Ravid, 2013:pp.169-170, whose description about such categories is based in turn on Boyatzis, 1998, and on Hatch, 2002). In fact, they were deemed so in my study, which tried to check the prediction that, when a word in Latino Sine Flexione fulfills criteria [A] and [B], its meaning in Spanish cannot be inferred.

Furthermore, I can add that she did not have time limit and could spend as time as she needed to do the translation. Likewise, a document with an informed consent was used and all the ethical requirements necessary in researches of this type were taken into account.

### *Materials and procedure*

A text in Latin coming from Ørberg (2003) was selected and translated into Latino Sine Flexione. The original text in Latin was as follows:

“Quis est Marcus? Marcus puer Romanus est. Quis pater Marci est? Iulius pater Marci est. Quae est mater Marci? Mater Marci est Aemilia. Quae est Iulia? Iulia est puella Romana. Quae mater Iuliae est? Aemilia mater Iuliae est. Pater Iuliae est Iulius. Iulia filia Iulii est. Qui sunt filii Iulii? Filii Iulii sunt Marcus et Quintus. Marcus, Quintus Iuliaque sunt tres liberi. Liberi sunt filii filiaeque. Marcus et Quintus et Iulia sunt liberi Iulii et Aemiliae. In familia Iulii sunt tres liberi: duo filii et una filia” (Ørberg, 2003:pp.13-14).

A translation of this simple paragraph into English can be this one:

‘Who is Marcus? Marcus is a Roman boy. Who is Marcus’ father? Iulius is Marcus’ father. Who is Marcus’ mother? Marcus’ mother is Aemilia. Who is Iulia? Iulia is a Roman girl. Who is Iulia’s mother? Aemilia is Iulia’s mother. Iulia’s father is Iulius. Iulia is Iulius’ daughter. Who are Iulius’ sons? Iulius’ sons are Marcus and Quintus. Marcus, Quintus, and Iulia are three children. Children are sons and daughters. Marcus, Quintus, and Iulia are three Iulius and Aemilia’s children. In Iulius’ family, there are three children: two sons and one daughter’.

However, as indicated, the text that actually was presented to the participant was a translation of this one into Latino Sine Flexione. The translation that she received was exactly the following:



‘Quo es Marco? Marco es puero Romano. Quo es patre de Marco? Iulio es patre de Marco. Quo es matre de Marco? Matre de Marco es Aemilia. Quo es Iulia? Iulia es puella Romano. Quo es matre de Iulia? Aemilia es matre de Iulia. Patre de Iulia es Iulio. Iulia es filia de Iulio. Quo es filios de Iulio? Filios de Iulio es Marco et Quinto. Marco, Quinto et Iulia es tres liberos. Liberos es filios et filias. Marco, Quinto et Iulia es liberos de Iulio et Aemilia. In familia de Iulio es tres liberos: duobus filios et uno filia’.

Really, it cannot be said that this last fragment is written following Peano’s exact original Latino Sine Flexione. It is actually written in a version of this last language with small changes. The reason of that is that, as it is known, Peano sometimes hesitated whether to select for his new language Latin words in their ablative case or in their nominative case, and, as it can be noted, I have decided to consider only the forms in the ablative case. Nevertheless, maybe what is more important is that this version of Latino Sine Flexione keeps a number of characteristics that, at least theoretically, cause it to be close to the current romance languages in general and Spanish in particular, including the use of *de* to denote genitive, the use of ‘s’ to indicate plural (it is also unclear whether or not ‘s’ must always be used in Latino Sine Flexione to indicate plural, but I have assumed that it must in my version), and the elimination of the inflexions of the verb *sum* (to be), always using the form *es* in the present tense.

In any case, that last text was the one that, as indicated, was given to the participant. It was written in a sheet of paper and she had to write her translation in that very sheet. As also said, she did not have time limit, and, as the next section shows, this material allowed confirming the prediction.

## Results

This is the reproduction of the response given by the participant, that is, her translation of the text into Spanish:

‘¿Quién es Marco? Marco es puero Romano. ¿Quién es el padre de Marco? Iulio es el padre de Marco. ¿Quién es la madre de Marco? La madre de Marco es Aemilia. ¿Quién es Iulia? Iulia es puella Romano. ¿Quién es la madre de Iulia? Aemilia es la madre de Iulia. El padre de Iulia es Iulio. Iulia es hija de Iulio. ¿Quiénes son los hijos de Iulio? Los hijos de Iulio son Marco y Quinto. Marco, Quinto y Iulia son los tres hermanos. Hermanos son hijos e hijas. Marco, Quinto y Iulia son hermanos de Iulio y Aemilia. En la familia de Iulio son tres hermanos: todos los hijos en una hija’.

As it can be seen, this paragraph is not absolutely in correct Spanish. There are some spelling and grammar problems, for example, the fact that the first letter of some adjectives is capitalized (which is not allowed in Spanish). This is so because, obviously, I have respected the way the participant wrote the text and I have reproduced it exactly as it was finally given in the sheet of paper. Nonetheless, what is interesting now is to review the mistakes made in the translation, which can be clearly detected if we pay attention to a translation into English of the translation made by the participant:

‘Who is Marco? Marco is Roman puero. Who is Marco’s father? Iulio is Marco’s father. Who is Marco’s mother? Aemilia is Marco’s mother. Who is Iulia? Iulia is Roman puella. Who is Iulia’s mother? Aemilia is Iulia’s mother. Iulia’s father is Iulio. Iulia is Iulio’s daughter. Who are Iulio’s sons? Iulio’s sons are Marco and Quinto. Marco, Quinto, and Iulia are the three brothers. Brothers are sons and daughters. Marco, Quinto, and Iulia are Iulio and Aemilia’s brothers. In Iulio’s family there are three brothers: all the sons in a daughter’.

As it can be checked, it can be stated that, in general, the text has been understood. It is a fragment of 100 words and the participant could not adequately interpret only eight of them, which means that she understood 92% of the text. In fact, from another perspective, it can be claimed even that she understood 95% of it too, since, if it is taken into account that one of the words that were not correctly interpreted is repeated four times, it can also be thought that the actual errors were only five (the words *puero*, *puella*, *liberos*, *duobus*, and *et*). However, what is most relevant here is that, as explained below, most of them correspond to words fulfilling [A] and [B], and that, as it can be noted, the 92 words whose meaning was properly identified are words that are very similar to the equivalent words in Spanish.

In this way, the first error is *puero* (‘boy’), which is not translated by the participant and is written again as it is in Latino Sine Flexione. This word can be related to [A] because its translation into Spanish is *niño*, and, therefore, only the last letter (‘o’) is shared by the words in the two languages. Likewise, it can be linked to [B] too, as the sentence ‘Marco es puero Romano’, or, if preferred, ‘Marco is Roman puero’ does not unequivocally leads to the inference that *puero* means ‘boy’. And this is so because other possibilities can be thought, for example, ‘citizen’ (the sentence being ‘Marco is Roman citizen’), ‘man’ (the sentence being ‘Marco is Roman man’), or ‘slave’ (the sentence being ‘Marco is Roman slave’).

Something similar happens with *puella* (‘girl’), which is not translated either. [A] is fulfilled because the Spanish word is *niña* and, again, only the last letter (in this

case, ‘a’) is a common letter. On the other hand, it can be sorted under category [B] too, since the sentence ‘Iulia es puella Romano’, or, if preferred, ‘Iulia is Roman puella’ does not enable to deduce that *puella* means ‘girl’ either. In fact, interpretations such as ‘Iulia is Roman citizen’, ‘Iulia is Roman woman’, and ‘Iulia is Roman slave’ are possible in this case as well.

And what occurs with *liberos* (‘children’) is not, at least in principle, very different. Criterion [A] is suitable because its Spanish translation can be *niños*, or, to also explicitly mention girls and remove gendered biases in language, *niños y niñas*. So, the similarities are, once again, almost non-existent. As far as [B] is concerned, it is evident that it is equally a characteristic that can be attributed to *liberos*, and in this case this is clearly shown by the fact that the participant gave an alternative translation. Indeed, in the two previous cases, *puero* and *puella*, as indicated, the participant opted for put the word as it was in the original text without translating it. However, she did offer a translation for *liberos*: *hermanos* (‘brothers’, but probably meaning ‘brothers and sisters’).

Nevertheless, this last point is important for more reasons. It evidently supports the idea (held by both the mental models theory and inter-understanding) that the general semantic context is absolutely relevant. *Liberos* is not a word akin to *hermanos* either, and, if these two words are linked, that can be so only because the paragraph has provided, in the previous lines, that Marco, Quinto, and Iulia have the same parents. Thus, when it is read that ‘Marco, Quinto et Iulia es tres *liberos*’ (‘Marco, Quinto, and Iulia are three *liberos*’), it can be understood, for example, that the sentence means ‘Marco, Quinto, and Iulia are three brothers and sisters’.

Undoubtedly, this is a semantic process that leads to infer a conclusion (that *liberos* means ‘brothers and sisters’) from the meanings of the previous words, that is, from the semantic context built by the previous sentences. It is true that that conclusion is mistaken, since the correct translation would be, as said, ‘children’, but it confirms the prediction and the idea that the inter-understanding mental processes occur in the same way as the mental models theory accounts for induction.

Furthermore, a curious fact is that, while the sentence in which *liberos* appears for the second time, ‘*Liberos* es filios et filias’ (‘*Liberos* are sons and daughters’) enable to confirm the idea that it means ‘brothers and sisters’, the third time is problematic, as it reveals that that is not the best interpretation. Certainly, the third time that the word is used is in the sentence ‘Marco, Quinto et Iulia es *liberos* de Iulio et Aemilia’ (‘Marco, Quinto, and Iulia are Iulio and Aemilia’s *liberos*’), and there is no doubt that this does not allow translating *liberos* as ‘brothers and

sisters'. It has already been said in the text that Iulio and Aemilia are Marco, Quinto, and Iulia's parents, so the relationship cannot be the one that exists between brothers and sisters. In this way, one might have expected that the participant, after assuming that *liberos* means 'brothers and sisters', had continued to critically review her interpretations during all her task, and that, with some reflection, she had realized the inconsistency and revised her previous translations. However, as indicated, this has no influence on the general thesis of this paper. 'Brothers and sisters' refers to a concept that is not very far from the one of 'children', especially because the paragraph suggests that Marco, Quinto, and Iulia are children in the same family. Thus, this shows mental semantic processes such as those described by the mental models theory and in accordance with the general principles of inter-understanding. And that is so because, clearly, the words identified by the participant, who, as also mentioned, knew in detail neither the syntax of Latino Sine Flexione nor the exact meaning of all the words in this last language, led her.

Indeed, given these two possibilities:

[XI] (*Liberos* = Brothers and sisters)

[XII] (*Liberos* ≠ Brothers and sisters)

Although the sentence 'Marco, Quinto et Iulia es liberos de Iulio et Aemilia' seems to indicate that the best choice is [XII], the general information of the text and the semantic possibilities linked to other sentences in it, by contrast, appear to support [XI]. These last possibilities are absolutely consistent with the idea that Marco and Quinto are brothers, and that Iulia is their sister. So, it is not hard to explain why that meaning was attributed to the word *liberos*, which is difficult to translate for a Spanish-speaking participant without some knowledge of Latin or Latino Sine Flexione.

But, based on all that said so far, it is very easy to understand the following mistake. The participant translated *duobus* ('two') as *todos* (in plural, 'everything', 'all'). However, the real meaning of *duobus* in Spanish is *dos* (obviously, 'two'). It is clear that the first and the last letter match, but they are different words. *Duobus* is longer and has more letters. So, it can be said that it corresponds to [A]. On the other hand, the semantic context was not clear enough to help in the interpretation, which means that [B] is fulfilled too and the error was practically inevitable.

Finally, the last mistake was the one of the last *et* (and) in the text, and I am saying 'the last *et*' because that very word appears several times in the fragment. The problem is that the correct word corresponding to it in Spanish is *y*, and, in its last appearance, it is translated as *en* (in). In my view, this is not an interpretation error,

but a writing error. As said, *et* is used several times in the text and, in all of them except in the last one, the right translation (y, or, in English, ‘and’) is given. Maybe the reason of this mistake is related to the inconsistency that is revealed by the sentence ‘Marco, Quinto et Iulia es liberos de Iulio et Aemilia’, which, as explained, seems to be incoherent with the rest of the paragraph if *liberos* is interpreted as ‘brothers and sisters’. That incoherence could discourage the participant and, after noting that the sentence made no sense, she, being confused, could want to finish quickly. In this way, it is possible that she did not think enough, which could have an influence on this error (and perhaps on the one of *duobus* as well). In any case, if this was not exactly so, that is not a problem for the arguments based on the mental models theory above, since, regardless of what really happened in the case of the last *et*, the causes of the other mistakes can be understood under the account of this last theory without difficulties.

## Conclusion

Evidently, this study has clear limitations. Undoubtedly, better conclusions could have been derived if the work had been carried out with more participants and with quantitative analyses to check whether or not statistical significance is obtained. Therefore, it seems advisable to continue to research in this line.

However, the participant in my case study showed important points, the main of them being that the prediction with regard to inter-understanding that can be drawn from the mental models theory appears to be correct. Certainly, it seems that, when a word can be linked to [A] and [B], that word is not adequately interpreted. Hence, apparently, the mental models theory well describes the mental activities that human beings do when trying to understand an information in a close language of which they have no knowledge. At a minimum, this is what the study reported reveals for the case of the interpretation of Latino Sine Flexione by a Spanish-speaking person. Not only the participant knew nothing about Latino Sine Flexione, but she did not have even knowledge of Latin. Nevertheless, without any preliminary preparation, she understood an important percentage of a text with 100 words. It is true that the paragraph was very simple, but it is also so that only eight mistakes were made. Furthermore, as indicated, four errors corresponded to the same word (*liberos*) and other word was properly interpreted in other appearances of it in the text (*et*). So, it can be said that the words that were not actually understood were four: *puero*, *puella*, *liberos*, and *duobus*, and, in the case of *liberos*, a very similar meaning was proposed.

Accordingly, it can be thought that it is not necessary a great deal of study to infer what is transmitted in a language close to another language that is known, which can be considered to be an easy task. Likewise, as far as more distinct idioms are concerned, it also seems that, with a little more effort, an acceptable inter-understanding level can be achieved. And, thus, this can be a clear alternative to the idea of a universal common tongue, whether English or any other language. Of course, this last idea is a good, possible, and interesting option (which, as commented on, is already working in different areas). Nonetheless, as it can be deduced from the literature cited, inter-understanding has two advantages: one the one hand, everybody continues to use his/her mother tongue; on the other hand, the other person continues to use his/hers as well.

Obviously, in this last case, it would be always necessary to resort to translations. However, as pointed out above, translations into all the languages around the world would not be required. If each of us understood, although he/she did not speak, a group of languages, translations into just a certain number of languages would suffice to ensure that all the people correctly interpret the information that we wish to transmit. But, undoubtedly, as also said, to promote a lingua franca is a reasonable possibility too. So, it seems that it is the moment to make a political decision in this way: either we favors the knowledge of a common language (which is being English nowadays) to a larger extent all over the planet or we train people to understand (and just understand) several languages. The main goal of this paper has been to show that the first one is not the only acceptable possibility. The second is so too. In fact, maybe there can be even a third possibility, since the two mentioned options can be compatible, and they can be implemented at the same time. If this last decision were the agreed one, the cultural advantages to the preservation of the heritage of people would be evident. Nevertheless, there is no doubt that the way a lingua franca such as English and linguistic inter-understanding could be taught at once would have to be previously thought in detail so that it were properly done.

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## Summary

### **The Problem of the Language of Science in a Global World: Linguistic Inter-Understanding is a Possibility**

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This paper is about a problem with the dissemination of scientific information. As it is well known, most of science is written in English nowadays. However, large portions of population in the planet do not understand that language, and, accordingly, it is hard for many people to access to relevant scientific results at present. Given this situation, there are two alternatives. On the one hand, we can try to make people improve their English levels. On the other hand, we can foster linguistic inter-understanding techniques amongst general population around the world. I basically explore here this last possibility, and I do that based on a case study that seems to confirm previous ideas about inter-understanding.

**Keywords:** inter-understanding; knowledge dissemination; language; mental models' theory; science teaching