



# How Linguistics can improve chat bots built with Machine Learning?

As you may know we can classify chatbots in two different types or models:

- > **Retrieval-based models:** these types of chatbots can be constructed using different complexity methods, but they are all based in containers of predefined responses. The problem of using a retrieval -based bot is obvious, they cannot cover all the possible requests users may demand.
- > **Generative models:** as opposed to the previous ones, chatbots created using this method can build responses for users from scratch, which increases the quality of the user experience. They are usually built using machine learning.

However even if these last bots are smarter at first sight, they present some issues that should be solved if we want these chatbots to be fully functional. We can highlight two of these issues:

- > A **key stage** while developing a bot is **training** them, as it happens with every tool built with machine learning. This means that there is a need for training material in colloquial language spoken or written, depending on the type of bot you want to build. However, this is a sensitive topic because of privacy issues and, as a result, training materials are very scarce.
- > On the other hand bots need to be adapted to individual **language variants**. What does this mean? Let's imagine you want to build a chat that answers in English, but which type of English? British, Americans, Indians and Australians are all English native speakers but they don't have the same language variance. If you build the bot without considering this fact, won't be able to respond all the requests. It may not seem an important issue, but OS nowadays are built adapted to language variants and if, as it seems, they will be substituted by bots soon... how can these bots not be able to understand different variants of a language. Furthermore, even predictive keyboards are adapted to language variants, just check your phone!

These two problems can be solved by using machine learning and complementing it with **linguistic knowledge**. The main view in text analysis sector is that both approaches cannot be combined, however research shows that results are significantly better when they are used at the same time.

## How can linguistics solve these two problems?

Understanding users request can be very complex only using machine learning. This model uses a "*bag of words approach*" so it doesn't focus on the structure of text. However, it is general knowledge that words don't mean the same if they are combined in different ways, and here is where linguistic becomes a key factor for a bot success. If a chatbot can understand not only the words but how are they combined it will be able to provide the answer the user is looking for.

When using exclusively machine learning a bot only learns from training materials and interactions with users, and it can be risky since customers may leave the website if the bot after two or three interactions is not able to understand them. Linguistics makes the process much easier and faster since it teaches the bot fundamental language knowledge. By providing him with grammars and understanding sentence structures thanks to parsing, the bot will be able to respond users with answers adapted to their language and requests.