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| **From T’es Qui to Qui Es-Tu*:* A Naïve Bayesian Approach to Assessing Literate and Oral Discourse in Non-standard French Language Data**    Schriftliche Hausarbeit  für die Bachelorprüfung der Fakultät für Philologie  an der Ruhr-Universität Bochum  (Gemeinsame Prüfungsordnung für das Bachelor/Master-Studium  im Rahmen des 2-Fach-Modells an der RUB vom 03. November 2016)  Vorgelegt von  Chandler, Christopher  Abgabedatum  31.08.2021  Prof. Dr. Stefanie Dipper  Prof. Dr. Ralf Klabunde |

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# Abstract

When expressing language, it is often referred to as being “written” or “spoken” language. However, speakers usually do not make an apparent distinction being the medial and the conceptual. Building upon the theoretical and practically foundations as presented by the likes of (Dipper, Koch and Müller), it was possible to develop a system that automatically recognizes orality i.e., “spoken” and literacy i.e., “written” in French language by weighing the criteria according to their importance. This information was then taken to train a multinominal bayes that was able to classify documents i.e., sentences automatically according to their orality and literacy.

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|  |  |
| --- | --- |
| *CMRW* | *CMR-wikiconflits* |
| CoMeRe | Corpora of Computer-Mediated Communication in French |
| EPA | *eBay petites annonces* |
| FA | français argotique |
| FCO | Français courant |
| FCU | Français cultivé |
| FRÉ | Français écrit |
| FF | Français familier |
| FPA | français parlé |
| FP | Français populaire |
| FV | Français vulgaire |
| LP | Langue parlé |
| LT | Langues techniques LT |
| NZ | Niveau zéro |
| POS-Tagging | Part of Speech Tagging |

# Introduction

Excluding other modes in which human communication can be realized such as via sign language, body language, whistling, etc., human languages are generally expressed using at least one of the two discourse types: oral or literate discourse (Bader, 2002). In the most literal sense, oral discourse can be understood as process that employs audible sounds to express meaning, whereas literate discourse is visual medium that is expressed through visible, written symbols (Bader, 2002).

Furthermore, despite the somewhat trivial natural of this discourse classification, these two domains do not represent a natural dichotomy, as one might automatically assume, but rather, they are two sectors of language that regularly overlap.

Oral and literate discourse are often realized by employing non-standard language and standard language, respectively. In the strictest sense, standard language is language which conforms to norms set forth by an official linguistic institution or work e.g., Académie Française, Real Academia *Española*, Oxford English Dictionary, Duden, etc. This contrasts with non-standard language which is not beholden to any norms whatsoever. It is therefore often characterized by the heavy usage of dialectal and vernacular speech (Bader, 2002).

With respect to the aforementioned definitions, data that stems from scientific or professional sources such as newspapers, scientific journals, political speeches, etc. tends to exhibit a style that is more akin to literate discourse. This contrasts with SMS, chat messages, online ad postings, forum discourse, etc. as they generally exhibit a style that is more representative of oral discourse. (Bader, 2002).

It is however possible to discern to the two irrespective of the domain. However, the underlying problem in identifying an oral or a literate style within a text is twofold. First, there is the issue that written speech inherently lacks several paralinguistic cues that are associated with spoken speech like intonation, prosody, speed, accent, and so on (Bader, 2002). This is further compounded by the fact that written speech can also represent language that can realized be orally but is done so artificially. This paradigm applies to documents such as presentations, speeches, sermons and news reports.

One naïve solution to solving this problem would involve native speakers sentences by hand and classify according However, this approach is cumbersome and length. It would thus only be suitable if the corpus were reasonably small i.e., a couple dozen sentences at most. Therefore, the most efficient way in solving this dilemma would have to involve a method which allows for the automatic disambiguation of oral and literate discourse.

While this method can theoretically be applied to any language, the object language of this thesis is modern French from c. 2005 – 2019. The language data has been sourced from reputable sectors that are generally considered to be representative of standard as well as non-standard language. These includes Wiki-discussions, eBay postings, and SMS chats.

A common method of disambiguation that I will employ involves the supervised usage of a naïve bayes classifier with a specific feature and classification sets (Jurafsky & Martin, 2009). First, the feature sets which are to be typical of the respective discourse styles and how they can occur in a written medium must be identified. Then the naïve bayes will be trained according to these features thereby allowing the classifier to determine to a relative degree of probability if a given text is representative of oral or literate discourse. The methodology as well as the results of this process will be presented in detail at the end of this face.

# Related Works

When examining the concept of oral and literate language within the discipline of computational linguistics, it is paramount to include not only the theoretical aspect of the dynamic, but the computational one as well.

## Theoretical Linguistics

Koch and Oesterreicher (1985) were very influential in setting up the paradigm of literate and oral discourse. They did this by providing a distinction between the medial and the conceptual facets of language. The medial aspect of the language refers to whether a given message is expressed in either a graphic or a phonetic medium. The conceptual aspect is then the either spoken or written. Koch and Oesterreicher (2007) reprised their roles in offering a more detailed explanation regarding literate and oral discourse. They also place focus on sociolinguistic aspects regarding this paradigm.

Another factor that plays a role in identifying orality and literacy in a text is that of *Distanzsprache* and *Nähesprache[[1]](#footnote-1)*. Distanzsprache represents how removed the speaker is mentally, conceptually and physically. On the other hand, Nähesprache depicts how close one is to any given situation. Situations that are more of a personal and physical nature will often be assigned to the category of Nähesprache.

As the specific object language in question is French, there are French-specific elements that should be taken into and will be instrumental in determining the necessary features. While Müller (1975) predates Koch and Oesterreicher (1985), the notion of orality and literacy was already known to Müller (1975) and refers to them as *français parlé, message oral, languée* and *français écrit, message écrit, langue écrite, langage écrit* respectively. Alongside other aspects, Müller (1975) explores this distinction and how it is realized chronologically, quantitatively, qualitatively, diatopically, diastratically with special focus placed on the French language.

## Computational Linguistics

Using a naïve bayes classifier for text classification purposes is on itself not a new process. However, what is new and has been seldom done is using it to identify oral and literate nature of a give text. Ortmann and Dipper (2019) asses the ideas as proposed by Koch and Oesterreicher(1985) to be able to automatically identify literate and oral discourse in modern German texts.

Ortmann and Dipper (2020) also applied the same methodology, also referencing Koch and Oesterreicher (1985), to assess the oral and literate nature of historical texts. This was done by using a slightly altered feature set that is more adept to historical texts as the non-standardized nature of historical documents cannot be properly analyzed using modern criteria.

To better identify literacy and orality in a text Ortmann and Dipper (2019), drew from Bader (2002) and Rehm (2001) who both provide such criteria, albeit from slightly different angels. Bader (2002) provides a rounded, general approach to properly assess orality and literacy in texts in the same vein as Müller (1975). Bader (2002) applies the analyses to digital communication e.g. e-mail, chat, newsgroups, etc., while also providing features to identify the precise nature of individual excerpts from said communication. Rehm (2001) offers a more restricted analysis by only detailing the nature, characteristics and features of written language on the internet e.g. e-mail, chat data, websites, etc.

The internet is an everchanging dimension and one could therefore rightfully question the validity of using such articles from nearly two decades ago. However, despite both articles having been published at the turn of the 21st century, where the internet and digital communication were still in their infancy, both works comment and detail phenomena that are still relevant to modern internet communication.

# General Features of Language and Discourse

## Language: Parole, Langue and Communication

As a mode of communication, it is something that humans have been capable of for around 100,000 years (Stein, 2014). Human Language, is first and foremost, the production of audible sounds i.e., speech or written symbols i.e., letters, characters, etc. (Bader, 2002).

It is tempting to analyze and define language by contrasting it with the concept of dialects. While this can be done, the goal here is to provide a general definition of what exactly is meant by language as a construct. Furthermore, to preserve the dichotomy of written versus spoken, language here will be treated as being confined to these two dimensions.

De Saussure makes the distinction of *Parole* versus *Langue*. Parole being the actual realization of language system. Langue being the virtual construct of a given language that could be realized by a speaker of said language (Stein, 2014).

The language system is simply the aggregation of conventions, norms, value and opposition. The value of a given word, be it phonetic or graphic, is that it can be distinguished from another element. If there is a distinction between these two elements, then opposition is present (Stein, 2014). Should they have the same function, then it would be necessary to refer to them as variants of one another.

A final important aspect of language is the relationship that speakers have to one another. More specifically, how communication can work between speakers. There exist at least two main models Jakob and Bühler for explaining the communication aspect of language, but they serve the same purpose, which is to present the function of language (Stein, 2014) .



Bühler Organ-Modell (Stein, 2014, p. 1)

The organ model is a communication model that models the way linguistic information is received and processed. Every communication process consists of three essential parts: *Sender*, *Empfänger* and Gegenstände und Sachverhalte. *Sender* is the speaker, with *Empfänger* being the listener. Gegenstände und Sachverhalte are the messages being transmitted. All three of these are connected through Z which represents the language i.e., *das sprachliches Zeichen* (Stein, 2014).

The sprachliches Zeichen is simply what every is transmitted via language. It has three main functions: Ausdruck, Darstellung, Appel. The Ausdruck expresses the opinions and feelings of the speaker. These are the symptoms of the sprachliches Zeichen. (Stein, 2014). The Darstellung is the symbol for the information. The Appel has the function of eliciting a desired response from the listener that is in line with the the sprachliches Zeichen. (Stein, 2014). All three of these functions are present in every message, but general one message will dominate over the others (Bader, 2002).

On a closing note, one of the most prominent features of human language, is that it is possible to transmit abstract information in a phonetic or graphical form (Stein, 2014). This is an ability that connects all humans, while at the same distancing them from other animals (Bader, 2002).

## General Features of Orality as a Medium

Oral speech in the most simplest can be understood as the phonetic expression of thought (Bader, 2002). This is in line with De Saussure, who along with other structural linguists, saw spoken language superseding and therefore being the precursor of written language (Stein, 2014). Due to the nature of orality being a primary factor chronologically speaking (Bader, 2002; Koch and Oesterreicher 1985), it is the feature that is the most prominent and the one that has been object of great discussion, especially since the 20th century (Stein, 2014)

Furthermore, speaking is a spontaneous process that is directly coupled with the transience (Bader, 2002). This real-time process prevents spoken language from becoming overly complex as it would overload the listener’s ability to ascertain the meaning from the message (Ortmann & Dipper, 2019). The working memory of the speaker is also the reason as to why the information density in spoken speech is relatively low.

The fact that speech is spontaneous and directly dependent on a speaker’s ability to be able to process the linguistic information in real time has a direct impact on syntax. That is to say that the active voice and elliptical structures are preferable in spoken speech as they are most likely easier to process (Ortmann & Dipper, 2019). This is evident in the lexical aspect too as “spoken language is characterized by frequent use of various particles, e.g., answer and modal particles in German (…) and interjections” (Ortmann & Dipper, 2019, p. 4).

## General Features of Literacy as a Medium

Seeing as how orality is the phonetic expression of thought, literacy is then to be seen as graphical depiction and recording of said thought (Bader, 2002). The basic reason as to why written speech exists at all can be summed up as it being essential to transport thoughts, messages, etc. over long distances and to preserve them for future generations. It was and is a way to escape the transience paradigm of spoken language (Ortmann & Dipper, 2019).

Written language has often been seen viewed as the true paradigm of language. In that, if language is mentioned, then it must automatically refer to the written variant. This was the prevailing assumption well into the 19th century (Koch & Oesterreicher, 1985). This is the reason why written language has often been the necessary default mode when examining an object language.

Written language is often in contrast with spoken due the dichotomous nature of the language paradigm. Where spoken language is restricted to being less complex, written language can benefit from static properties of a textual medium. (Ortmann & Dipper, 2019). This naturally carries over into the syntactical and lexical structure of any given written message. Syntactical and lexical properties can be expounded upon in a general without having to take the speaker’s ability into consideration.

An important property is that “Written language can express features of orality with specific graphical means, such as omission of characters, word contractions, or use of ellipsis dots, em dashes or apostrophes”(Ortmann & Dipper, 2019, p. 67). This feature can be exploited to identify markers that are proto-typical of spoken language((Ortmann & Dipper, 2019); (Ortmann & Dipper, 2020) (Bader, 2002)) The possibility to emulate spoken speech through text a medium cross over into the realm of the medial and conceptual distinction of language, which will be touched in more detail in the following section.

## Medium, Conception and Distance-Proximity

Koch and Oesterreicher (1985) have created an elegant, but simple paradigm of addressing the conceptual and medial nature of discourse types.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Konzeption | | |
| Medium |  | Gesprochen | Geschrieben |
| Graphischer  Kode | Faut pas le dire | Il ne faut pas le dire |
| Phonischer  Kode | [fopaldiʀ] | [ilnəfplalədiʀ] |

Fig. 1 (Koch & Oesterreicher, 1985, p. 17)

Although it would be wrong to see a dichotomy being present between orality and literacy, this is not strictly correct. The dichotomy does exist, but it only applies to the dual nature of the discourse. Excluding all other modes, either a message is communicated through spoken speech, or it written speech. Regarding the medial representation, i.e., the graphic code and the phonetic code , a dichotomy is present. The other question remains though: What is to be done with the conceptual aspect of language?

Here, it would be false to assume that spoken speech can only represent spoken speech and written speech can only represents speech. Koch and Oesterreicher(1985) see ,spoken’ and ,written’ as being a continuum with conceptual possibilities that have different levels. They exemplify this in the following diagram.



Fig. 2 (Koch & Oesterreicher, 1985, p. 17)

On the phonic portion of the diagram, a,b,c,g,h,i represent spoken speech that starts of being of a informal and personal nature and gradually becomes less informal and person. In doing so, it is more in lines with written speech. When observing the two poles, a and i, there is an obvious difference between an informal conversation and a presentation. The former most likely represents spontaneous speech, while the latter is something that prefabricated and then presented to an audience in an oral form. On the graphic portion of the diagram, d,e,f,j,k all represents possible graphic representations of speech, with a prepared interview being the most oral and an administrative regulation being the most written and least spoken realization.

Another dynamic presented by Koch and Oesterreicher(1985) is that of *Nähe* and *Distanz*. It is not enough to simply address the written or spoken nature of any given speech, but also address how close in terms of proximity and familiarity the speakers are to one another. Nähesprache is reserved for situations that physical and familiar in nature. This includes, but is not limited to, communication that is spontaneous, face-to-face and familiar. Distanzsprache represents the opposite pole in that it depicts speech that includes, but is not limited, communication that is detached, objective, unfamiliar.



Fig. 3 (Koch & Oesterreicher, 1985, p. 17)

Using all, three of these parameters: Medium, Conception and Distance-Proximity, a more detail analysis of language is possible. An informal conversation is thus representative of spoken speech, that is also conceptual representative of spoken speech. The dynamic of the speakers is one familiarity and closeness, and the speech can therefore be assigned the label of Distanzsprache. The opposite can be said of administrative regulation. There is great distance between the speakers, both in terms of familiarity and proximity. It is also not a message that can be communicated orally due to the very nature of the text. Therefore, it can be assigned as being conceptually and medially written speech, while also belonging to Distanzsprache.

# French Sociolinguistics: Diaphasic and Diastratic Registers

Sociolinguistics is the scientific study of the relationship between language and society. It deals with the linguistic phenomena that occur within society (Bieswanger & Becker, 2008; Stein, 2014). By employing sociolinguistics, it is possible to investigate the effects of extra linguistic factors on society. Furthermore, a speaker’s linguistic choices often give information about their social and geographical background (Bieswanger & Becker, 2008).

Registers are such linguistic phenomena that are general points of interest for linguistics involved in sociolinguists(Bieswanger & Becker, 2008). Registers, or styles, can be loosely defined as:

the function of language in a particular situation and the consideration of such factors as addressee, topic, location and the interactional goal rather than background of the speaker. The exact definition of style and register is difficult (…). A common distinction is that style refers to the level of formality of an utterance or a text, whereas register refers to the choice of vocabulary in an utterance or a text. (Bieswanger & Becker, 2008, p. 187)

Alongside style and register exist a host of other phenomena that are accounted for in sociolinguistics, such as: qualitive registers, quantitative registers, sociolects, diatopic view, diastratic view, gender, age, norms, etc. (Achim, 2014; Bieswanger & Becker, 2008; Müller, 1975).

All these elements can eb instrumental in determining oral and literacy provided that there are textual identifiers for them. The reasoning behind touching on French sociolinguistics is that certain sociolinguistic phenomena are directly tried to medium (oral/literate), concept (written/spoken) and nähe-distance. That is to say that certain registers, styles, etc. are usually only realized in a specific given situation. Therefore, if medium and concept do not align, it can be better identified in text. The subsequent chapters deal with the sociolinguistic aspects and how they can be identified in text and thus implemented in computational linguistic program.

## Le Français

Historically speaking, French was as having a single register. This is not in the sense that it there was no variation, but rather, that there was one and only one correct way of using the French language, often referred to as *Bon usage* (Müller, 1975). *Mauvais usage* and *Dites …ne dites pas* dictated the correct the usage of French for the majority of French history.

This was in part due to the academic body, Académie Française, who was, and still is, instrumental in setting norms for French (Müller, 1975). Nevertheless, it is not necessarily feasible to entirely dictate what speakers of any given language do or say as this is directly antithetically to a defining character of language construct, which says that languages are in a constant state of change (Müller, 1975; Stein 2008).

The world wars, the decolonization of Africa and Asian coupled with French being supplanted by English as the dominant lingua France accelerated a process that was already in motion. They led to a rapid change in what was considered as proper and non-proper French. into other registers.



(Stein, 2014, p. 185)

The adherence to these norms and the dissolving of thereof has led to a very rich tapestry of registers and styles that are vastly different from the standard language, while at the same time being internally consistent. Their usage is also consistent with respect to time and location.



(Müller, 1975, p. 184)

At the most fundamental level, French registers are usually classified as *français cultivé, niveau zéro, français courant, français familier, français Populaire, français vulgaire*. *français cultivé* being the mostformal and français vulgaire being the least formal (Müller, 1975; Stein 2014). As evident in the diagram, many of these registers have different referents, but denote the same speech patterns. For the sake of simplicity, the French registers will only be referred to terms previously mentioned.

## Français Cultivé

FC is often referred to as français soigné, français choisi, langue recherché, langue tenue, langage soutentue, style noble (Müller, 1975). This register often viewed in positive light and seen as the register that one should try to replicate. Seeing as how this register considered the highest register. It is should not be used in banal or informal situation otherwise the speaker risks be seen as being pedantic and pretentious (Müller, 1975). It is used in official situations, special ceremonies or other special occasions. This register can occur in langage parlé as well was langage écrit.

The most prominent feature of FC in speech is the phonological component. It tends to consequently conserve sounds that are no longer used in the other registers. This includes but is not limited to phonetic opposition of certain sounds, the pronunciation of the schwa at the end of phonological words and more rigid syllable structure. This has to do with the desire to retain the literary tradition, which is often dependent on such archaisms (Müller, 1975).

FC as langage écrit retains certain grammatical features that have not been used in other contemporary registers for quite some time. Certain verb tenses such passé simple, passé antérieur, subjonctif imparfait or inversion. Other atypical structures present within FC are archaisms, scientific vocabulary, literary vocabulary and the strict adherence to proper negation e.g., ne…pas, ne..point, ne guère and archaic conjunctions. (Müller, 1975). Whether spoken or written, the most important element of FC is that is a register that is artificial in the sense that is a controlled process that is heavily reliant on proper word choice, intonation. This triggers a final feature of FC as sentences in this register tend to be fairly long (Müller, 1975).

## Français Familier

FF is a qualitative register that is the half-way point while also being quite close to FC. It is often used in informal situations such as with family, job, daily routine, acquaintances and people from one’s inner social circle (Müller, 1975). The register is often consigned to français parlé and signalizes a nonchalant attitude and familiar atmosphere. It is a register that is indifferent to the social standing of the speaker.

Nevertheless, it is, however, a register that is more in use by those have profited from a higher education than those who have not (Müller, 1975). It is a register that is spontaneous in nature, and this is reflected in the fact that that there is not a lot of emphasis placed on proper enunciation. This allows for a direct comparison between FC and FF (Müller, 1975).

In FF, statements and questions are formed through falling and rising intonation, respectively. A less used approach is the formation of the question using *est-ce que*. This can be viewed as a half-step between FF and FA, as this *est-ce que* is more representative of the higher spectrum of the register (Müller, 1975).

The doubling of pronouns or referents e.g. moi je, ton père il is characteristic of FF. This can also be seen in topicalization e.g. **Cet homme**, je **l'**ai vu très souvent. This construction is a left-over of bon usage and free syntax rules (Müller, 1975).

FF employs a high level of suffixes to denote agents and actors in speech context e.g. chançard, gueulard, motard. This also includes the diminutive suffixes such as -et, ette, ot, etc. Reduplication is not only present among pronouns, but nouns e.g.. fla-fla, ronron, kif-kif, etc.

Due to the spontaneous nature of FF, speakers tend to avoid overly complex expression when communicating strong feelings. This leads to a high number of simplified expressions, metaphors using animals and using adverbs to atypically as intensifiers. FF is usually a spoken, not a written variant This spontaneity is due to FF and the following FP being directly descended from Vulgar Latin, which itself was the primary spoken register of Latin (Müller, 1975).

## Français Populaire

FP is one step about FB, but like FV, is not considered to be proper French. This means that they do not meet the requirements set by the norms or bon usage. Since FP differs quite drastically from FC, it is often considered to be a language within a language congruence (Müller, 1975).

This is because FP is not consistent with FC, but rather within itself and presents grammar and orthography that while deviant, are internally consistent. Historically speaking, this along with FF, arose as a language of the people, meaning those who belonged to neither clergy nor nobility. There speech was therefore more commonly referred to as “lanuge du peuple” (Müller, 1975).

Since communication is more important than grammatical correctness, FP displays a tendency to forgo the norms set forth by FC and adhered to by FF. Verbal phrases are often formed without their corresponding personal pronouns. The appropriate auxiliary verbs, avoir and être, are used interchangeably. Nominal congruence with respect to gender and number are ignored or forgotten all together. The subjunctif is only employed when a strong desired is expressed as would be the case with vouloir. Relative pronouns and conjunctions involving que tend to have a higher frequency for variability (Müller, 1975).

Orthographically, there is strong preference of neglecting the spelling, especially when it is morphologically clear what the intended message is. The most prominent example of this is the willingness to drop the ne of ne…pas, using only pas to express negation. This is of course more noticeably in the phonetic realization as instable sounds such as /l/ and /e/(Müller, 1975).

The lexicon of FP does not differ in form from FC, but rather in usage. That is to say that they use the same words, but differently. This leads to expressions being hyperbolic and suggestive. (Müller, 1975). A great deal of the words that occur within FP are known to most speakers; they only make up a small portion of the language. Most of the words that appear in FP are from the 19th and 20th century, which mainly stem from dialects and FV (Müller, 1975).

## Français Vulgaire

FV is lowest register both in terms of prestige and formality. It is therefore often referred to as *vulgaire, bas, grossier, trivial, obscene* (Müller, 1975). It is often grouped together with FA. The difference being that FV and its components are generally known to all speakers of French, where as FA is restricted to certain milieus. Interjections, expressions of displeasure, Expletives are present throughout FV.

FA is therefore avoided whenever possible as it is in direct opposition to social norms regarding etiquette due to how it can be used to described things in an indecent manner. It is notable for its lack of scientific jargon, Latin loanwords, euphemisms. It is also incredibly adept at coining new words that employ the method of directness.

## Argot

Argot in its original form was meant to specify the speech patterns of marginal groups and that of professional jargon. A defining feature of argot is that is the speaker is intentionally trying to distance themselves socially. At the same time, it is used as a way of identifying insiders and outsiders (Müller, 1975). This usually the reason why argot is considered to a cryptic language (Stein, 2014).

Argot employs metonym to a high degree by applying descriptions of food to refer to the body. It also displays a high willingness to import loan words from dialects as well as other languages. The high number of Synonyms and polysems are als a byproduct of argot’s instability (Müller, 1975).

Argot is for all intents and purposes a LP as the need to record speech in a written form was completely secondary. Due to the written aspect of language not being important, argot is relatively unstable (Müller, 1975). The extreme degree to which argot changes is also a defining feature. This is most likely due to the fact that it reflects the time period in which the speakers live and not the continuing of a linguistic tradition (Stein, 2014).

## Langues techniques

LT is often grouped together with argot and were historically seen as being one and the same (Müller, 1975). LT can be viewed as a microcosmos of sorts as there exist two poles within LT. LT can be used to explain theoretical concepts to those who are from the same field, or a reduction in complexity is introduced i.e., vulgarization. This makes LT more readily available to those who are not from a specific scientific field.

A defining trait of LT is the need to develop new terminology as the field of science is ever growing. This is done using complex use of morphological constructions. The high influx of new words also come from English, which is a point of contention with those working with LT. Often French words are substituted to combat this (Stein, 2014)..

The syntax and vocabulary of LT are quite rigid, more so than that of FC, since precision in scientific fields is key. The syntactical structures are not per se complex. It also displays a high level of words that express causality, which is to be expected as the goal of most LT is to explain causality in nature.

# The French Language Corpora

French, as with any natural human language, is not a monolith, but a language that is spoken across, many domains, age groups, countries, etc. (Stein, 2014; Müller 1975). Whether a native speaker of metropolitan French, second-language speaker or speaker of given French dialect, this variation is present in France and outside as well (Stein, 2014). This poses a challenge of sorts since what is of the literal or oral discourse is to some extent dependent on the local and personal understanding of the language. Due to this, some concessions and compromises must be made for the subsequent chapters to be sound.

First and foremost, the object language here in question is that of Metropolitan French. The methods and reasoning will therefore apply to this variant of French. While it might very well be possible that the methods and reasoning are applicable to other varieties such as Swiss French, Belgian French, Canadian French, etc., that is not necessarily goal, but might be an eventual byproduct.

Secondly, the data records stem from ca. 2000-2020 and can therefore only accurately encapsulate and illustrate the language at this stage. Of course, the age of each speaker would allow for an analysis that could potentially stretch further back into the past. However, no assumptions can or will be made about the language state before 2000 or projects about the language beyond 2020 as this would be purely conjecture.

Lastly, even though Metropolitan French is the object language, there is no feasible way to know if a speaker is completely in line with this standard. Seeing as how the internet is an open platform, and therefore not bound to geographical constraints, it is plausible that speakers of other varieties have partaken in the conversations.

## Data Sets

There are three primary data sets that will be the focus of the linguistic analysis: *eBay petites annonces*, *CMR-wikiconflits* and *88milsms*.

The EPA corpus was compiled by the department of Romance studies at the University of Potsdam. It is a collection of around 1256 *petites annonces*, online action listings from the online auction platform eBay. There are four subcorpora within EPA. The first three subcorpora deal with housing, vehicles, clothing, computer, telephones, children, collections and leisure, while the last corpus deals with professional activities e.g., stocks, shops, shipping, etc. (Gerstenberg & Hewett, 2019).

The first (e05p) is from 2005 and contains around 300 lists from private users. The second and third, collectively known as (e17p) are from 2017 which feature 300 listings from both private as well as professional. The final corpus is from 2018 (e18v) and only has 365 listings from private users (Gerstenberg & Hewett, 2019).

Private users were those who had less than 200 reviews as of 2005, and over 200 were considered to be professional users. This process was replicated in 2017. The final corpus was gathered using a web scraping tool called ParseHub to facilitate the automation process. An upper bound of 1000 ratings and one listing per user was set to have a representative corpus (Gerstenberg & Hewett, 2019).

The next two corpora are distinct in nature but have provided and gathered by the CoMeRe Repository. The aim of CoMeRe is “to gather different corpora that represent the forms of communication in French on different networks (Internet, phone, etc.), all structured and informed in the same way, diffused in open access formats for research purposes.” (Poudat et al., 2015)

The first of the two, *CMRW* spans from 2004 to 2014 andcontains discussions about the wikipedia article “Quotient intellectuel”. It contains around 52 participants, 170 contributions and 20 000 tokens.

The goal of using this information is to analyze how people would react knowing that their information can be viewed by others. However, as is often the case with sites like Wikipedia, the information presented may not be factually correct (Poudat et al., 2015). This does not necessarily pose a problem as the accuracy of the information is irrelevant with respect to its orality and literacy.

The second is *88milsms* which is a collection of more than 88,000 SMS messages that were collected from speakers in the Montpellier area in France. To comply with French data protection guidelines, the data has already been anonymized by Panckhurst et. Al (2014). The SMS donors were asked to participate in a questionnaire that asked them a host of questions, including , but limited to, about the languages they speak, their telephone number, their profession, how they communicate through SMS, the frequency of their communication and what their opinions of SMS communication are.

This French corpus was created as part of a greater project from sud4science, which sought to create many such corpora for various languages, such as German, English, Swiss German, etc. (Panckhurst et al., 2014).

The selection of the corpora was done in such a way as to provide three instances in which orality and literacy could appear in a data set. First and foremost, the SMS chats are generally forms of informal communication and because of this, they should contain data that is mostly of a non-literal nature. Secondly, the wiki chats contain discussions that generally relate to scientific and official matters. Therefore, it should fall more on the literal scale. Lastly, it predicted that the e-bay texts should fall somewhere in between them.

## Pre-processing

All the corpora used in this research were created with the goal of computational linguistic analysis in mind (Gerstenberg & Hewett, 2019; Panckhurst et al., 2014; Poudat et al., 2015;). Therefore, the data has been annotated as little as possible by the respective institutions. This means that processes such as sentiment analysis, POS-Tagging, tokenization, etc. are possible without interference from foreign analysis. All the data sets are available in the .xml format and have markers to identify author, date, time, title of the post, etc.

The eBay data has been tagged to with respect to typical features of ad postings such as abbreviations, misspellings, marketing language, slang, emoticons, etc. The remaining data sets have been tagged for emoticons, and personal pronouns. As previously mentioned, this data set is comprised of 4 sub-corpora. Before the individual entries could be properly processed, the corpora had due to be sub-divided into their respective components. The other two data sets were already in one homogenous corpus and sub-division was therefore not necessary. All three of the data sets were then equally divided into three parts: development, training and test data sets.

Seeing as how the files were in an .xml format, it was not possible to directly access the text directly, but rather through their respective tags. This was done by parsing them .xml tags using the module *beautifulsoup*. One function developed for accessing the tags of the eBay corpus and another function was developed for accessing the information of the other two corpora. Once the textual data was exposed, the respective entries were tokenized into their respective sentences using a custom tokenizer employing regular expressions. Subsequently, information related to parts of speech, morphological and syntactical dependencies as well as tokens were ascertained from the sentences by using *Spacy*.

# Methodology

The main objective is document classification with respect to their orality and literacy. However, due to the focus being on classifying sentences, one could appropriately view it as sentence classification. Furthermore, a sentence is to be understood as having contained less than 15 words as this has proven to be the optimal length. To classify the sentences according to their most probable feature, a naïve bayes text classification was implemented.

## Classification with Naïve Bayes

An efficient and well-known method of classifying a document is done using a group of classifiers known as naïve bayes classifiers. They work well with binary classification and are most often employing in sentiment analysis , spam detection. The naïve Bayes’ algorithm is at its core is probabilistic algorithm that is first and foremost based on the Bayes’ theorem which is as follows (Manning & Schütze, 1999):

This expressing the conditional probabilities of the process. Since Bayes’ theorem is flexible, the events can be swapped, which produces the following formula:

P(A) being the normalizing constant guarantees that the equation has a probabilistic aspect to it. P(A) is the combined probability of all events and is calculated as follows:

When converting this theorem into a classifier, it results in the following formula:

, the estimation of the correct class, represents the maximum posterior probability with d being the documents out of all classes *c ∈ C*.

However, as is often the case with NLP, natural language processing, tasks, only the maximum argument is relevant. Therefore, the following formula results:

This also applies to the naive bayes’ classifier producing a simple, but effective model.

To determine the most fitting class, the two probabilities must first be computed.

P(c) is the prior probability of a given class. The likelihood is assumed to be in line with the bag-of-words principle, which states that the position of the words is irrelevant.

Thus, the naïve bayes assumes that the features only encore word identity, but not position:

This results in the formula:

To apply this formula, it is only necessary to traverse all words in a given document:

To apply the formula, it is first necessary to train the model by calculating the probabilities of P(c) and P(|c). This is done by using the frequencies in the data to ascertain MLE, or maximum likelihood estimate.

This states that for a given number of documents, how many times does a given class occur within this document.

Finally, to compute P(|c) as P(|c), the frequency of a give word occurring within a given classes is calculated, then divided by sum of how often words within a given class occur.

The problem here comes when a given word does not occur within a certain class, this means that the effective frequency is zero. To remedy this problem, a smoothing algorithm must be applied. There are many methods to choose from such as La-Place, good turning, held-out, etc.

However, the one used in this paper is based on that of Ng(1997).

With all other parameters being the same, *N* here represents the amount of training data from a given corpus, the amount of which must be squared.

## Combining Registers and Discourse

As is the case with naive bayes’, literacy and orality represent the binary feature set. As the medium is apparent from the textual nature of the data set, it is assumed that the textual and medial discourse initially overlap as representing literacy. The other aspect is therefore orality, which can be viewed as being the opposite of literacy in this case.

The reasoning behind addressing the registers of the French language now becomes more apparent. Furthermore, it is possible to to group them in a manner akin to the diagram as presented by Koch & Oesterreicher (1985):

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | FC | TL |  |
|  |  |  |  |  | Graphic |  |  |  |
| ,Spoken’ |  |  |  |  |  |  |  | ,Written’ |
|  |  |  |  |  | Phonic |  |  |  |
|  | FA | FV | FP | FF |  |  |  |  |

By grouping the registers in this manner, it is easier to ascertain where FRP and FRÉ overlap medially and conceptually. This graph can be further refined to allow them to be mapped to the conceptual:

|  |  |  |
| --- | --- | --- |
|  |  |  |
| FA | Orality |  |
| FV | Literacy |  |
| FP |  |  |
| FP |  | FC |
|  |  | TL |

Registers by their very nature represent different discourse types and situations. In this case, registers can be assigned to FPA or FRÉ, which do line up with orality and literacy. There is a lot of variation and overlap between the respective registers. So, it would not be reasonable or feasible to train a model to recognize the individual registers. However, by extracting characteristics and criteria from each class and grouping them according to their discourse type, it was possible to fit a model with criteria that allowed it automatically recognize orality and literacy.

## Feature Sets for Identifying Discourse Types

Due to the lack of annotated i.e., training data, it was necessary to develop criteria that would allow for the automatic annotation. Various researchers (Bader, 2002; Ortmann & Dipper, 2019; Rehm, 2002; ) have provided various criteria by which one can automatically identify orality and literacy in discourse. These criteria focus on creating a system which is to be linguistically and chronologically independent. However, to be able to evaluate the naïve bayes system, a French-dependent system was developed based on criteria set forth by Müller (1975) with respect to French language registers.

Thus, by analyzing the corpora and combining them with criteria used by the researchers. Two main criteria sets were used for automatically identifying orality and literacy. One set uses syntactical and part-of-speech, syntactical dependencies and morphological information which allows the criteria to be more language-independent. The second uses French-dependent information to ascertain the assignment of the most appropriate feature.

When the system is not being evaluated, a sentence is and analyzed according to the first classification set. If a given point from the classification set can apply to a sentence, a point will be assigned either to orality or literacy respectively. After the points have been added up, the feature with the highest score will be assigned to that sentence. Evaluating the system follows a similar path, but there is a key difference. When the system is being evaluated, a sentence will be analyzed by using both classification sets. This allows for testing the reliability of the system with respect to French and the reliability of the criteria themselves.

# System Evaluation

## Developmental Overhead

As was the case with the corpora used in this project, most of the linguistic data is typically saved in an .xml format. Furthermore, the training files were saved as .csv files. Finally, the program had to be able to accept .txt files as these would be the most way of training and inputting files into the system. For these reasons, the writing of the program took around two weeks since it was necessary to write multiple functions that could accept .xml, .csv and .txt data files. Furthermore, the program is dynamic and allows for user input which required the implementation of error correction and prevention.

The optimization of the program was done in two main steps: development, training, with testing being done in the last phase. This required the data sets to be split accordingly and evenly along all three phrases. The training of the program varies depending on the amount of data being input into the system and the system resources. With that being said, the reading in of a single document and creating a training document from it typically did not take longer than a few minutes.

Creating the templates is what required a lot of time since 2 separate sets of classification rules had to be created to accommodate both French, and independent-language features. These classification rules were then of course split into 2 sub-sets for orality as well as literacy. With that being said, the program has been exclusively trained on French data as that has been the main goal of the program from the onset.

Nevertheless, since both classifications are relatively flexible, it would be theoretically possible to retrain the system to recognize any language, more specifically, any language supported by Spacy and uses the Latin script. As for applying the algorithm to a domain other than orality or literacy, this would also heavily depend on the training data being supplied to the naïve bayes. Naïve bayes is in of itself a relatively flexible algorithm and can be applies to a whole host of classification tasks. Therefore, if the program were supplied with slightly different parameters and training data, it could be restructured to recognize data with other binary classifications in mind e.g., positive vs. negative, spam vs. not spam, detection between two languages, etc.

## Classification Sets

Various researchers (Bader, 2002; Ortmann & Dipper, 2019; Rehm, 2002; ) have provided various criteria by which one can automatically identify orality and literacy in discourse. These criteria focus on creating a system which is to be linguistically and chronologically independent. However, since French data is being used, a characteristic from French developed based on criteria set forth by Müller (1975) with respect to French language registers.

The original intent of the scoring system used was meant to assign one point if a criterion met the parameters set forth. However, this proved to be ineffective, as it treated all criteria equally. This often caused the sentences to be either assigned to the wrong category or all of them to be assigned to only one category. Instead, another option was chosen which entailed weighting weighing the criteria according to the importance and prevalence of the data set

|  |  |  |
| --- | --- | --- |
| Variable | Description | Point Amount |
| SEN\_LEN | Sentence Length | The length of the sentence in character length |
| AVG\_WORD\_LEN | Average word length | The length of the average word length |
| THIRD\_PERSON\_EXPL | Dummy Subjects | The wound of dummy subjects |
| NOM\_SUBJ | Sentence Length | How often nominal subjects occur |
| PRES\_TENSE | Present tense verbs | The number of present tense verbs |
| ABBR\_NO\_VOWEL | Abbreviations without vowels | Count of abbreviations without vowels |
| NP\_VB\_RATIO | Noun to verb ration | Noun count plus verb count |
| LOW\_VERB\_HIGH\_ADJ | Low number of numbs, but high number of adjectives | Verb and adj count |
| CCONJ\_VB\_RATIO | More coordinating conjunctions than verbs | Coordinating conjuct plus verb count |
| SHORT\_SEN\_LENGTH\_PRESENCE\_OF\_NUMBERS | Short sentences that consist of only numbers | 1 |

Classification for Literacy

|  |  |
| --- | --- |
|  | Values |
| Accuracy | 94 |
| Error Rate | 28 |
| Precision | 91 |
| Recall | 69 |
| F-Score | 79 |

|  |  |  |
| --- | --- | --- |
| Variable | Description | Point Amount |
| SEN\_LEN | Sentence Length | The length of the sentence in character length |
| AVG\_WORD\_LEN | Average word length | The length of the average word length |
| VERB\_SEN\_LEN\_RATIO | Short sentences without verbs, high number of pronouns |  |
| WORD\_REDUPLICATION | Occurrence of a verb more than once |  |
| PRES\_TENSE | Present tense verbs |  |
| HIGH\_PUNCTION | High use of punctuation |  |
| MULTI\_CHAR\_REDUPLICATION | Using the same character multiple times |  |
| WORD\_WORD\_REDUPLICATION | Using the same word back-to-back |  |
| ALL\_CAPS | All caps |  |
| ISOLATED\_VERBS | Only verbs in a sentence |  |
| EMOTIOCONS | The usage of emoticons in a sentence |  |
| ABBr | Abbreviations and acronyms |  |

Classification for Orality

|  |  |
| --- | --- |
|  | Values |
| Accuracy | 91 |
| Error Rate | 29 |
| Precision | 1 |
| Recall | 68 |
| F-Score | 0,81 |

The sentence is analyzed according to both criteria and the highest score determines the feature of the document. Throughout all the corpora, word length, sentence length, reduplication of symbols played the biggest role in determining the feature of the sentence. This lines up with the sources (add sources) that also show that expressions of literacy tend to have longer sentences and longer words, whereas expressions of orality tend to show the opposite. Abbreviations, Acronyms, while important, were relatively minor. The problem in identifying these features is that users, especially in non-standard communication, often use abbreviations and acronyms that might be non-standard as well. Thus, there is no clear way to always identify acronyms properly

## Naïve Bayes

|  |  |
| --- | --- |
|  | Hand-Annotated |
| Accuracy |  |
| Error Rate |  |
| Precision |  |
| Recall |  |
| F-Score |  |
| Cross Validation |  |

## Spacy Module

## Sentence Tokenizer

Two of the most popular NLP libraries, NLTK and Spacy, both provide sentence and word tokenizers that can be used in NLP tasks. However, the overhead with respect training them to recognize non-standard data and importing them slowed down the run time of the program. Furthermore, they did not provide any additional benefit over using a custom regex expression to parse the sentences.

Since the data is often non-standard i.e., does not follow the norms of the French language, it was not always clear which sentences should be parsed and where they should be parsed. A naïve approach might involve simply splitting texts using punctuation. This initial approach proved to be extremely effective because sentence punctuation was often used correctly in sentences that were more or less standard.

Nevertheless, data from all three domains often lacked any meaningful punctuation, punctation was used incorrectly in that there was often reduplication of certain symbols to create an emphatic impression. This result in sentences that were sometimes too long or too short, which skewed the results Sentences that were generally short i.e., less than a couple of words, were generally representative of orality. The reverse of that being that the longer sentences were often representative literality.

The points did not to seem to affect the accuracy of the sentence tagger and worked well across all three domains

Long sentences could not be parsed without syntactically and semantically analyzing the sentence. Due to this, some sentence sentences were added together that should have been split by the author. The reverse, however, cannot necessarily be said. It was apparent from the data, such eBay online postings, that bullet points, rather than sentences were the intent of the author. Therefore, the decision was made to use this bullet points as sentence markers. It should be noted that the definition of sentence is being somewhat expanded to encompass such thought.

# Results

As was mentioned in chapter 5, the data was split equally into three sets: development, training and testing sets. However, the number of sentences and tokens were not distributed equally among all three of the original corpora. With the SMS chat being the biggest and the wikiconflits being the smallest corpora. Therefore, it was ensured that the development and training would only entail a small portion of each data set to ensure that there was an even distribution of quality.

## Development

Originally, a separate classification set was meant to evaluate to the first classification set. A process that was akin to a two-fold cross validation. The validity of the first classification would be weighed against the second classification set. However, this proved to be extremely ineffective since there were not enough unique words to push a sentence into one category over another. The result of this was that sentences were either wrongly classified or the number of unknown sentences was extremely high. This could be remedied by having more data to train a French-specific identifier

The second problem, however, defeats this remedy as too many features were deleted from a sentence which caused it to be unable to be recognized by the other classification. The first classification relied heavily on sentence, word length, reduplication and emoticons, which are crucially for determining orality and literacy. Therefore, the features that would have been present in the other system were generalized and incorporated into the second classification system.

The developmental phase of this project was therefore crucial since there were no French training data and criteria available by which it was possible to ascertain orality and literality in datasets. Using a combination of criteria proposed by (add sources Dipper, Koch, Muller), it was possible to develop and refine a system by which orality and literality could automatically be assigned to sentences, collection of sentences and documents.

Problems that were touched upon earlier were present throughout the eBay and SMS corpora which was that the data was non-standard, this made the classification quite difficult as there was no way to guarantee uniformity. This was compounded by the fact that French was not exclusively used in all the data sets. In the eBay set, there were traces of German and English since postings were most likely on a national, and not a local scale.

Using Wiki and SMS as training data, data was labeled either literal or oral according to the classification sets mentioned above.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Tokens | Sentences | Documents | LIT | ORAL |
| Wiki | 6766 | 345 | 53 | 110 | 234 |
| SMS | 3445 | 349 | 150 | 130 | 218 |

Training data results via the classification

It was hypothesized that Wiki documents would show the highest amount of literacy, and the lowest amount of orality. The SMS chats would be on the opposite end. To strike a balance between the two, the eBay chat corpus was choosing and being in between the two corpora and served as a control. In the development phase, the wiki document had a 30/60 split across all domains regarding the expected orality. This means that 30 percent of the documents were of oral quality, whereas 60 were of literal quality. The sentences that do not appear in the calculation above are missing since they were classified as being unknown. This means that it could not be determined if they were oral or literal

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Tokens | Sentences | Documents | LIT | ORAL |
| eBay | 580 | 380 | 100 | 361 | 8 |

Training results with the naïve bayes

Using this data, the naïve bayes was trained so that it could recognize sentences that it had not seen before. More documents were classified as literal than expected. This was due to the criteria seeing more of the data as being literal than oral and was thus transferred over to the naïve bayes. Even taking this into account, eBay chat data is more along the lines of being literal.

## Training

## Testing

# Conclusion

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# Eigenständigkeitserklärung

I hereby declare that the work submitted is my own and that all passages and ideas that are not mine have been fully and properly acknowledged. I am aware that I will fail the entire course should I include passages and ideas from other sources and present them as if they were my own.

Hiermit versichere ich, dass ich die Arbeit selbständig angefertigt, außer den im Quellen- und Literaturverzeichnis sowie in den Anmerkungen genannten Hilfsmitteln keine weiteren benutzt und alle Stellen der Arbeit, die anderen Werken dem Wortlaut oder dem Sinn nach entnommen sind, unter Angabe der Quellen als Entlehnung kenntlich gemacht habe.

|  |  |
| --- | --- |
| Ort/Place, Date/Datum | Name |
| Kamen, 14.08.2021 |  |
|  | Christopher Michael Chandler |

# Appendix

The following texts represent typical examples from each of the corpora used in the training the model.

Oral

* **eBay**
  + Je vends une caméra de surveillance et un écran de 13 cm Ce matériel se monte très facilement. Il suffit de brancher la caméra et l'écran à une prise électrique et le tour est joué[[2]](#footnote-2)
* **88SMS**
  + Ben ouais mais des fois ils trouvent jamais ou ils sont pas d'acord ou ils peuvent faire que des hypotheses. [[3]](#footnote-3)
  + Mdr ouai mais bon à se point c'est nul[[4]](#footnote-4)
* **Wiki**
  + Oh, on a beaucoup ri de ce ministère et de son ministre ![[5]](#footnote-5)

Literate

* **88SMS**
  + Bonjour. Peux-tu me confirmer ton horaire d'arrivée ? Bises et bon voyage[[6]](#footnote-6)
* **Wiki** 
  + C’est le rapport entre l'âge « mental » que donne le résultat du test sur l'âge réel, multiplié par 100. [[7]](#footnote-7)
  + S'agit-il d'un pays à une époque donnée ? [[8]](#footnote-8)
* **eBay**
  + 10 pelotes Phildar Coton Phil 51 Coloris n° 423 (noir), même bain. 51% coton, 49% acrylique. Aiguilles 2 - 3, 116 m. Échantillon 10 x 10 cm: 25 mailles, 34 rangs.[[9]](#footnote-9)

1. These are also sometimes referred to as Sprache der Distanz and Sprache der Nähe respectively without any change meaning. [↑](#footnote-ref-1)
2. <div cor="e05p" id="e05p-271" ratings="n.a." dat="n.a." pro="maison" svo="1"

   text="n.a."> [↑](#footnote-ref-2)
3. <post xml:id="cmr-88milsms-a10211" when-iso="2011-09-24T12:06:27"

   who="#cmr-88milsms-p399" type="sms"> [↑](#footnote-ref-3)
4. <post xml:id="cmr-88milsms-a10217" when-iso="2011-09-24T12:07:48"

   who="#cmr-88milsms-p504" type="sms"> [↑](#footnote-ref-4)
5. <text xml:id="cmr-wiki-c002-rev5008107" prev="#cmr-wiki-c002-rev5008019"> [↑](#footnote-ref-5)
6. <post xml:id="cmr-88milsms-a42378" when-iso="2011-10-16T23:22:58"

   who="#cmr-88milsms-p248" type="sms"> [↑](#footnote-ref-6)
7. <text xml:id="cmr-wiki-c002-rev4846889" prev="#cmr-wiki-c002-rev4845720"> [↑](#footnote-ref-7)
8. <text xml:id="cmr-wiki-c002-rev741072" prev="#cmr-wiki-c002-rev740972"> [↑](#footnote-ref-8)
9. <div cor="e17p" id="e17p-274" ratings="n.a." dat="201712" pro="loisir"

   svo="n.a." text="N"> [↑](#footnote-ref-9)