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A (Psycho-)Linguistically Motivated Scheme for Annotating and Exploring Emotions in a Genre-Diverse Corpus

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Abstract

This paper presents a scheme for emotion annotation and its manual application on a genre-diverse corpus of texts written in French. The methodology introduced here emphasizes the necessity of clarifying the main concepts implied by the analysis of emotions as they are expressed in texts, before conducting a manual annotation campaign. After explaining what entails a deeply linguistic perspective on emotion expression modeling, we present a few NLP works that share some common points with this perspective and meticulously compare our approach with them. We then highlight some interesting quantitative results observed on our annotated corpus. The most notable interactions are on the one hand between emotion expression modes and genres of texts, and on the other hand between emotion expression modes and emotional categories. These observations corroborate and clarify some of the results already mentioned in other NLP works on emotion annotation.

Keywords: emotions, annotation scheme, genre of text, expression mode, French

1. Introduction

In NLP, emotion annotation is usually considered as a difficult task, namely because of the lack of consensus on emotional categories (e.g. anger, fear, etc.), the fuzziness of boundaries between them or the great variability of emotion expressions types. By introducing here a scheme made for emotion annotation in texts, we obviously do not claim that we can answer all those difficulties. However we lay claim to an approach that appears to have been very scarcely explored in NLP as of yet. We adopt indeed a fine (psycho-)linguistic modeling perspective which aims at encompassing different concepts essential to the description of the notion of emotion as it is expressed in written texts. In other words, our approach aims at clarifying the main linguistic concepts - and their relations - which underlie the denotation of emotions in texts. The scheme introduced here fills a gap as it combines linguistic and psycho-linguistic notions which were until now used in a scattered way in NLP works.

After clarifying what entails a both psycho-linguistic and linguistic modeling perspective on emotion expression analysis (Section 2), we present a few NLP works that share some common points with this perspective (Section 3). We then introduce the annotation scheme (Section 4) and highlight some quantitative results achieved after the application of this scheme on a corpus of 1,594 texts (ca. 515K tokens) of different genres (journalistic, fictional and encyclopedic) (Section 5). In Section 6, we mention interactions between some notions of the scheme observed from the annotations and confront them with results obtained by other NLP works.

2. From the notion of emotion to its expression in texts

When NLP works tackle the notion of emotion, they almost always do it by referring to psychological studies that aim at defining what emotions are and at determining a set of basic emotions, which has yet to give rise to a true consensus. These NLP works mainly cite (Ekman, 1992) which distinguishes between six basic emotions (anger, disgust, fear, joy, sadness and surprise) or (Plutchik, 1980) which adds two more categories (trust and anticipation).

To our knowledge, apart from (Kim and Klinger, 2018) which briefly mentions the role of emotions in “literature comprehension” (p. 1346), NLP works do not rely on psycho-linguistic studies. For their part, these studies put the emphasis on how emotions are expressed in texts, and not only on emotional categories. The notion of emotion is then addressed through its relation with text comprehension, seen as a reader’s ability to build a mental representation of the situation depicted by the text (Zwaan and Radvansky, 1998). In building this representation, studies point out the importance of several semantic features, such as time, space and characters’ emotions, for adults (Dyer, 1983; Dijkstra et al., 1995) as well as children (Blanc, 2010; Blanc and Quenette, 2017). Characters’ emotions (as opposed to readers’ emotions (Dijkstra et al., 1995)) represent then a key element that must be taken into account when investigating text comprehension.

Even though there are few psycho-linguistic studies that consider the linguistic diversity of emotional expressions, they represent a crucial contribution for works that aim at a fine analysis of emotions in texts.

In that respect, (Creissen and Blanc, 2017) distinguishes between three types of emotional expressions: emotional labels (e.g. afraid, happy), descriptions of an emotional behavior (e.g. cry, laugh) and descriptions of a situation socially associated with an emotion (e.g. someone’s death associated with sadness or fear). However they do not offer a detailed linguistic characterization of these expressions.

Such characterization actually represents a “real challenge” for linguists (translated from French, (Kerbrat-Orecchioni, 2000, p. 50)) due to the tremendous diversity and heterogeneity of linguistic markers of emotions (Kerbrat-Orecchioni, 2000; Micheli et al., 2013). To our knowledge, only (Micheli, 2014) offers a detailed study of emotion denotation for French which takes into account the diversity of means employed to convey an emotion. (Micheli, 2014) organizes this vast set of heterogeneous markers into a typology of three *emotion expression modes*: emotions directly labeled by emotional words, emotions displayed by characteristics of utterances, and emotions illustrated by the description of a situation socially associated with an emotion.

From these psycho-linguistic and linguistic studies, four *expression modes* can thus be distinguished: emotional labels, linguistic characteristics of an utterance that display the speaker’s emotion, description of a situation that suggests an emotion, and description of an emotional behavior. In the following sections, these four *expression modes* will respectively be called: *labeled*, *displayed*, *suggested*, and *behavioral*.

Linguistic works such as (Micheli, 2014; Mathieu, 2005) also characterize emotion expression by studying the denotation of the *experiencer* of the emotion, i.e. the entity (human, animal, etc.) which feels the emotion.

Furthermore, emotional expressions are usually characterized by the *emotional category* they convey (JOY, FEAR, etc.). Psycho-linguistic works such as (Blanc and Quenette, 2017) also describe them by the *type of emotion* they express (basic or complex).

Finally, emotional expressions can be linked with other textual segments by semantic relations. On that note, (Blanc, 2010) suggests a strong relation between causality and characters’ emotions in building a mental representation of texts. The notions of *cause* and *consequence* of the emotion then take part in describing the expression of an emotion.

The study of emotion denotation in texts thus involves many concepts (*expression mode*, *experiencer*, *cause*, etc.). However those concepts are never taken into account all together in NLP works. These works see emotion expression analysis as a task called emotion annotation, that aims at identifying (portions of) texts conveying an emotional information (cf. Section 3). To carry out this analysis, some focus on *emotional categories*, others on the *cause* of emotions, etc.

This highlights the difficulty of grasping the notion of

emotion as it is effectively realized in texts, when one does not want to focus on emotional words only. The scheme presented in Section 4 uses all concepts introduced above. By making explicit and organizing all these concepts, it aims at modeling the notion of emotion, that is to say taking into account all concepts that underlie exploration of this notion and determining how they are linked together.

3. Emotion annotation in NLP

Emotion annotation is a difficult task. In NLP, this leads to a great diversity of emotion annotated corpora, as illustrated by several literature reviews.

For example, Bostan and Klinger (2018) compare 14 corpora and point out differences that include, but are not limited to: purpose of annotation (e.g. social media mining, intelligent agent developing), genre of texts (e.g. newspaper headlines, fairy tales), annotation schemes (types and number of emotional categories, annotation of other elements such as polarity, intensity, or cause), annotation procedures (e.g. expert annotation, crowd-sourcing), and granularity of annotations (e.g. sentences, tweets).

For her part, Öhman (2020) points out difficulties that arise in an emotion annotation task, for instance the choice of emotional categories, the kind of annotation procedure implemented, or even the subjectivity inherent to emotion annotation. She focuses on what may influence the quality of annotations, as reflected by inter-annotator agreement measures (e.g. genre and topic of texts, number and types of emotion categories, number and training of annotators).

(Bostan and Klinger, 2018) and (Öhman, 2020) thus clearly show that *emotion category* constitutes the notion most commonly employed to describe emotional expressions in NLP, with some works also using other notions such as the *cause* of emotions. However they do not offer a satisfying review of how several concepts of importance to us, namely expression modes, experiencer, and types of annotated units, are taken into account (or not) in emotion annotation schemes used in NLP.

Emotion expression modes. One of the notions essential to characterize emotion is the diversity of *emotion expression modes* (cf. Section 2). Though this diversity has already been mentioned in NLP works (see for example (Bostan and Klinger, 2018; Kim and Klinger, 2018; Demszky et al., 2020)), it has been never conceptualized. On that respect, (Alm, 2010) constitutes the most detailed work. The author lists characteristics of 460 emotional sentences on which there is a high inter-annotators agreement. Though they are not organized into a typology, the cues cited echo the markers found in the *expression modes* defined in linguistics and psycho-linguistics (see Section 2). For instance, the “affect words” (p. 120) mentioned match the *labeled* emotions, the “lexical items or phrases which describe actions, properties, behaviors” (e.g. laugh,

weep, cry) (p. 120) correspond to the *behavioral* emotions, the “words or expression of positive or negative polarity” that are interpreted given a particular “context and acquired knowledge” (e.g. splendid flower-garden, little treasure upon earth) (p. 120-121) are similar to *suggested* emotions, and finally “direct speech” including “(WH)-exclamations or (WH)-questions, short utterances, interjections” are similar to *displayed* emotions. The scheme proposed in the current paper offers a mean of naming and categorizing those different markers of emotions (see Section 4).

Experiencer of the emotion. As for the *experiencer* of the emotion, it seems to be widely discarded in NLP. Many works do not explicitly tell whose emotions are annotated (Aman and Szpakowicz, 2007; Bianchi et al., 2021; Gui et al., 2018; Russo et al., 2011; Ghazi et al., 2015; Liu et al., 2019), even when the *experiencer* is featured in the annotation scheme (Neviarouskaya and Aono, 2013). Works that do not label *experiencers* but nonetheless clearly state who feels the annotated emotions often focus on writer’s emotions (Buechel and Hahn, 2017; Demszky et al., 2020; Fraisse and Paroubek, 2015; Mohammad, 2012; Mohammad et al., 2018; Öhman et al., 2020; Paroubek et al., 2010). (Buechel and Hahn, 2017) and (Strapparava and Mihalcea, 2007) also consider reader’s emotions. On the other hand, schemes that label *experiencers* are mainly centered on characters’ emotions (Cheng et al., 2017; Kim and Klinger, 2018; Schmidt et al., 2021), though (Cheng et al., 2017) also labels writer’s and reader’s emotions.

Type of annotated units. Units labeled with emotional information usually are whole texts (Paroubek et al., 2010; Mohammad, 2012; Mohammad et al., 2018; Fraisse and Paroubek, 2015; Liu et al., 2019; Demszky et al., 2020; Bianchi et al., 2021) or sentences (Alm et al., 2005; Strapparava and Mihalcea, 2007; Aman and Szpakowicz, 2007; Neviarouskaya and Aono, 2013; Ghazi et al., 2015; Buechel and Hahn, 2017; Öhman et al., 2020). It is noteworthy that even though they annotate emotions at text-level, Fraisse and Paroubek (2015) observe how specific linguistic markers, interjections, play a part in emotion expression. It can also be noted that works which proceed to a linguistic marker-level emotion annotation (Russo et al., 2011; Neviarouskaya and Aono, 2013; Cheng et al., 2017; Kim and Klinger, 2018; Gui et al., 2018; Schmidt et al., 2021), and additionally works whose annotation scheme features *experiencers* (Cheng et al., 2017; Kim and Klinger, 2018; Schmidt et al., 2021), also identify the *cause* of emotions. In this regard, works that combine the most notions to describe emotions as they are expressed in texts are (Kim and Klinger, 2018; Schmidt et al., 2021), that identify *emotional categories*, *experiencers* and *causes* of emotional units, with a linguistic marker-level annotation.

Inter-annotators agreement of emotion annotation tasks. As (Öhman, 2020) pointed out, a strong testimony to emotion annotation’s difficulty is the overall low inter-annotators agreement measures obtained in different works: with a binary or ternary labeling task, agreement never exceeds 70-80% and it drops as more categories are added. These measures are usually limited to *emotional categories* though some works like (Kim and Klinger, 2018) present agreement measures for each part of their annotation scheme. For instance, Cohen’s Kappa between pairs of annotators range from 0.06 to 0.40 according to the *emotional category* considered, and from 0.09 and 0.63 according to the type of *experiencers*. The variability of agreement between pairs of annotators is also reflected in the measures of F1. Strict F1 and fuzzy F1 values respectively range from 6% to 40% and from 7% to 55% for *emotional categories* annotations, from 10% to 63% and from 18% to 68% for types of *experiencers* identification, and from 14% to 65% and 28% to 73% for *cause* labeling.

As a conclusion, until now, no NLP work has endeavored to consider together all notions previously mentioned to annotate emotions in texts. The scheme presented here was built to fill this need by taking into account as many concepts essential to emotion expression description as possible, as well as the relations between them. Since the first priority was to constitute an exhaustive scheme, the focus was put on testing the applicability of the scheme, rather than on straightaway calculating inter-annotators agreement. The scheme was thus applied by trained annotators on a corpus made of several genres of texts.

4. Annotation scheme

The annotation scheme is devoted to taking into account analysis perspectives pointed out in psycholinguistics as much as in linguistics on how emotions are expressed in written texts. Thus it tackles emotion expression by considering four types of linguistic units. Each unit corresponds to one or several notions used to characterize emotion expression (see Section 2) and is matched by a unit of the scheme:

- *SitEmo* units denote an emotion, specified by its *expression mode*, *type*, and *emotional category*.
- *Experiencer* units refer to the entity which feels the emotions.
- *SitCause* units describe what causes the emotion.
- *SitConsequence* units denote what results from the emotion.

Each annotation unit is specified by a set of features. In this section, the main elements of the scheme are described, as illustrated in Figure 1. The focus will be put on the left part of the scheme, which was used to manually annotate 1,594 texts (see Section 5). As for

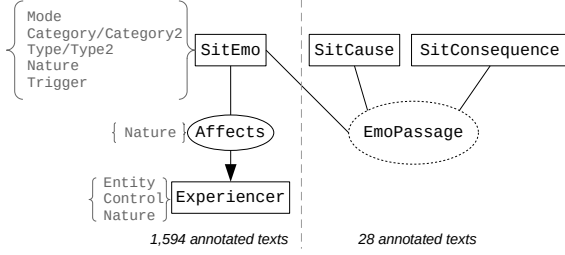


Figure 1: Main concepts of the annotation scheme

Feature	Value
<i>Mode</i>	<i>labeled, displayed, suggested, behavioural</i>
<i>Type & Type2</i>	Basic, Complex, None
<i>Category & Category2</i>	ANGER, SURPRISE, GUILT, etc., None
<i>Trigger</i>	Core of emotional expression

Table 1: SitEmo units’ features

the right part, it pertains to a more comprehensive level of emotion expression analysis: a textual structuring analysis process. The main components on which relies this process will only be briefly mentioned here, since this second part of the scheme has been so far applied on 28 texts.

4.1. SitEmo and Experiencer units

SitEmo units describe emotional situations, that is to say emotions expressed by linguistic markers and thus spatially and temporally anchored. These units are characterized by six main features, as shown in Table 1.

Feature *Mode* of a *SitEmo*. The feature *Mode* indicates how the emotion is expressed by the annotated markers.

Labeled emotions are directly designated through an emotional label, i.e. an emotional lexicon word, such as “happiness”, “afraid” or “guiltily” (Creissen and Blanc, 2017; Micheli, 2014).

Displayed emotions are conveyed by various linguistic characteristics of utterances, that occur when the speaker feels an emotion at the time of utterance. These characteristics show that the speaker was experiencing an emotion. The reader/interlocutor relies on them to infer the emotional state of the speaker. Markers that *display* an emotion take many forms, for instance words like interjections (e.g. “oh”), syntactic structures like nominal sentences (e.g. “So many presents !”), or typographic marks (e.g. “!”) (Micheli, 2014).

Suggested emotions are expressed through the description of situations associated with emotions by social conventions. Thanks to these conventions, the reader/interlocutor infers the emotion from the de-

Type	Categories
Basic	ANGER, DISGUST, FEAR, JOY, SURPRISE, SADNESS
Complex	ADMIRATION, EMBARRASSMENT, GUILT, JEALOUSY, PRIDE

Table 2: Links between emotion types and emotional categories

picted situation (Creissen and Blanc, 2017; Micheli, 2014). For instance, in our western European culture, receiving a present is usually associated with a positive emotion, like JOY. Describing of such a situation can thus convey JOY.

Finally, *behavioral* emotions are indicated by descriptions of emotional behaviors, for example “crying” or “smiling” (Creissen and Blanc, 2017). The reader relies on the depicted behavior to infer the emotion felt by the character.

Features *Category*, *Category2*, *Type* and *Type2* of a *SitEmo*. The features *Category* and *Type* respectively deal with the *emotional category* and the *type* of the emotion expressed by the annotated markers (cf. Section 2). The scheme considers eleven categories, dispatched between basic and complex emotions, as shown in Table 2. The six basic emotions are those introduced in (Ekman, 1992). Four of the complex categories were taken from (Blanc and Quenette, 2017) and (Davidson, 2006). ADMIRATION was added as a fifth complex category to better balance emotion types in the scheme. Each of the eleven categories corresponds to more specific emotions. For instance, ANGER regroups anger but also annoyance, rage, and fury. Since the scheme’s eleven categories are not sufficient to account for the diversity of emotions, a unit called *Other* was defined. It is to be used to annotate markers expressing other emotions, such as DISDAIN, LOVE or HATE.

When a *SitEmo* conveys several emotions at the same time, the features *Category2* and *Type2* tell which second emotion is expressed. When only one emotion is denoted, the default value of these features is “None”.

Feature *Trigger* of a *SitEmo*. The feature *Trigger* of a *SitEmo* specifies which element(s) within the annotated markers is(are) the most salient to express the emotion, namely the core of the emotional expression. For instance, the *Trigger* of a *labeled* emotion like “happy” is “happy”. For a *suggested* emotion like “received a lot of presents”, the *Trigger* would be “presents”. This feature allows for a finer linguistic analysis of emotion expression. It may also be useful to develop resources for emotion detection, for example lexicons.

Experiencer unit. *Experiencer* units are specified by two main features. The feature *Entity* records the entity, meaning the person, animal, etc. that feels the emotion. The feature *Control* indicates whether the entity

is a *Human, Animated - Non Human*, or *Inanimate* entity. The scheme is meant to annotate emotions felt by characters of the text, as opposed to readers' emotions (Dijkstra et al., 1995). The notion of characters' emotions includes here writer's and Doga's emotions¹.

Affects relation. *SitEmo* and their associated *Experiencer* units are linked by a relation called *Affects*. Through *Experiencer* units and *Affects* relations, the aim is to gain a finer understanding of linguistic expression of emotions in texts.

- (1) Inès se souvent des murs qui n'arrêtaient pas de faire "crac". Ça lui faisait très peur. "La maison allait tomber sur nous ..." murmure-t-elle en se blottissant sur le canapé.²
- (Inès remembers how the walls kept on cracking. It scared her a lot. "The house was about to fall on us ..." she whispers while nestling into the couch.)
- Experiencer<Inès>**{Entity: Inès, Control: Human}
- SitEmo<des murs qui n'arrêtaient pas de faire "crac">**{Mode: Suggested, Type: Basic, Cat: Fear, Type2: None, Cat2: None, Trigger: faire "crac"}
- Experiencer<lui>**{Entity: Inès, Control: Human}
- SitEmo<très peur>**{Mode: Labeled, Type: Basic, Cat: Fear Type2:None, Cat2: None, Trigger: peur}
- SitEmo<La maison allait tomber sur nous>**{Mode: Suggested, Type: Basic, Cat: Fear, Type2:None, Cat2: None, Trigger: tomber sur nous}
- SitEmo<...>**{Mode: Displayed, Type: Basic, Cat: Fear Type2:None, Cat2: None, Trigger: ...}
- SitEmo<murmure>**{Mode: Behavioral, Type: Basic, Cat: Fear Type2:None, Cat2: None, Trigger: murmure}
- Experiencer<elle>**{Entity: Inès, Control: Human}
- SitEmo<en se blottissant sur le canapé>**{Mode: Behavioral, Type: Basic, Cat: Fear Type2:None, Cat2: None, Trigger: se blottissant}
- Affects:**
- <Inès> <---> <des murs qui n'arrêtaient pas de faire "crac">; <lui> <---> <très peur>; <La maison allait tomber sur nous> <---> <elle>; <...> <---> <elle>; <murmure> <---> <elle>; <elle> <---> <en se blottissant sur le canapé>

Example 1 shows different *SitEmo* conveying the FEAR

¹"Doga" refers here to an abstract entity, that represents common belief, popular opinion.

²Example taken from "L'immeuble d'Inès et d'Adam menaçait de s'effondrer", *P'tit Libé*, n°91, 1-7 Februar 2019

of the same character ("Inès") through several *expression modes*.

4.2. SitCause and SitConsequence units

SitCause and *SitConsequence* units identify respectively markers that express a situation causing an emotion and those denoting a situation consequential to an emotion. So far, these units have been used to annotate cause and consequence expression at sentence-level.

To link together all *SitEmo* units that play a part in conveying the same *emotional category*, felt by the same *experiencer*, with the *SitCause* and *SitConsequence* that express the *causes* and *consequences* of this emotion, an additional type of structures is introduced in the scheme, namely *EmoPassage* structures.

For instance, in example 2, the EMBARRASSMENT felt by the devil is expressed through six linguistic units. Two *SitEmos* convey the *emotional category* EMBARRASSMENT (one *suggests* it while the other one *labels* it). Each *SitEmo* is associated with an *Experiencer* unit referring to the devil. Moreover the first sentence describes the *cause* of the emotion (the farmer sold beautiful turnips to the market, while the devil only had wilted leaves) and is as such captured by a *SitCause* unit. Finally, the second sentence, marked with a *SitConsequence* unit, depicts the *consequence* of the emotion (the devil left, never to be seen again). These six units are all linked by an *EmoPassage* structure, since they all participate to the expression of the devil's EMBARRASSMENT.

- (2) Au marché, le paysan les vendit facilement, tandis que le diable ne récolta que moqueries pour ses feuilles fanées. Il en fut tellement vexé qu'on ne le revit jamais plus au pays.³
- (At the market, the farmer easily sold them[turnips], whereas the devil only gained mocking for his wilted leaves. He was so offended by this that he was never seen again in the area.)
- Experiencer<le diable>**{Entity: le diable, Control: An-NonHuman}
- SitEmo<moqueries>**{Mode: Suggested, Type: Complex, Cat: Embarrassment, Type2: None, Cat2: None, Trigger: moqueries}
- Experiencer<Il>**{Entity: le diable, Control: An-NonHuman}
- SitEmo<tellement vexé qu'on ne le revit jamais plus au pays>**{Mode: Labeled, Type: Complex, Cat: Embarrassment, Type2:Basic, Cat2: Sadness, Trigger: vexé}
- SitCause<Au marché, le paysan les vendit facilement, tandis que le diable ne récolta que moqueries pour ses feuilles fanées.>**
- SitConsequence<Il en fut tellement vexé qu'on ne le revit jamais plus au pays.>**
- Affects:**
- <le diable> <---> <moqueries>; <Il> <---> <tellement vexé qu'on ne le revit jamais plus

³Example taken from *Le Diable et le paysan*, F. Rabelais

au pays>

EmoPassage:

<moqueries>; <tellement vexé qu'on ne le revit jamais plus au pays>; <Au marché, le paysan les vendit facilement, tandis que le diable ne récolta que moqueries pour ses feuilles fanées.>; <Il en fut tellement vexé qu'on ne le revit jamais plus au pays.>

4.3. Delimitation of emotional units

The scheme is intended to be used by expert linguist annotators. All choices that lead the scheme to its current form as well as many examples are detailed in the annotation guide associated to the scheme (Étienne and Battistelli, 2021). In this section, some decisions taken to solve emotional units delimitation difficulties are mentioned. These difficulties arose due to the granularity of our annotation, that takes place at a linguistic marker level (tokens, phrases, clauses, etc.).

Firstly, units must respect phrase frontiers, so that the delimitation can be compatible with syntactic parsers and chunkers, with a view of building an automatic emotion detection system from the annotated corpus. Secondly, when segments combine several ways of expressing emotions, the linguistic markers that pertain to different expression modes must be separately identified. This can lead to overlapping *SitEmos* but ensures that no linguistic information is lost. For instance, locutions such as “sauter de joie” (“jumping with joy”) are annotated with two *SitEmos*: “sauter de joie” seen as a *behavioral* emotion; “joie” seen as a *labeled* emotion.

The annotation scheme presented above takes into account all concepts that play a part in characterizing the notion of emotion as it is expressed in texts (Section 2). It also offers an organizational system to link all these notions together and then see how they interact. The next section presents the outcome of annotating text collections with the proposed scheme.

5. Application of the annotation scheme

The aim of this section is to show that (1) the scheme is applicable on real data, and (2) it can be a useful mean to discover new knowledge about the expression of emotions. To do so, the scheme was applied on a corpus of more than 1,500 texts written in French. Six expert annotators (two of the authors expert in linguistics and NLP, and four master students in NLP) took part in the annotation process. Each one manually annotated a set of texts *via* the Glozz annotation platform (Widlöcher and Mathet, 2012). Several thousands of annotated units were thus produced. The annotated corpus is described in Section 5.1 and some quantitative annotation results are presented in Section 5.2.

5.1. Corpus description

The overall corpus on which the scheme was applied comprises 1,594 texts, dispatched into 3 genres: news-

Genre	Nb texts	Nb tokens	Mean nb tokens per text
Newspaper	1,566	482K	308
Fiction	17	29K	1,707
Encyclopedia	11	4K	381
Total	1,594	515K	323

Table 3: Overall characteristics of the annotated corpus

paper, encyclopedia, and fiction, see Table 3. Most texts are dedicated to children from 6 to 14 years old. This dataset is a subset of the corpus built for the ANR TextToKids project⁴, as part of which the current work was carried out. The annotation procedure was first focused on journalistic texts provided by two French newspapers for children, *Albert* (ca. 239K tokens) and *P’tit Libé* (ca. 218K tokens), both partners in the project. The study on journalistic texts was then extended to a small corpus of articles on Covid-19, manually taken from five different newspapers (3 for children, 2 for adults) freely available online. Afterwards, the applicability of the scheme was tested on two other genres: fictional texts, that all come from novels for children, written by 12 different authors (6 full novels, ca. 25K tokens, and 11 extracts); and encyclopedic texts, taken from the French version of the online collaborative encyclopedia for children Vikidia⁵.

5.2. Annotation results observation

The annotation process lead to a total of 6,790 *SitEmos* (4,886 in journalistic texts, 1,783 in fictional and 121 in encyclopedic), 4,970 *Experiencers*, 841 *SitCauses* and 147 *SitConsequences*. After a brief overview on *Experiencer* units annotations, this section presents the results pertaining to one part of the scheme: *emotional category* annotations, which are most commonly found across NLP works, and *expression mode* annotations, which are the main contribution of the scheme.

Experiencer units. First, amongst all *Experiencer* units delimited, 72.1% refer to a character, while only 19% point towards the writer and 10.4% towards the Doxa.

Emotional categories. On the overall corpus, ANGER (25.3%), FEAR (21.8%), SURPRISE (18.1%), JOY (18%) and SADNESS (14%) are the five most frequent categories. All other emotions (ADMIRATION, PRIDE, EMBARRASSMENT, DISGUST, GUILT and JEALOUSY) represent less than 5% of annotated *SitEmos*. Those proportions combine values of the *Category* and *Category2* features (cf. Section 4), though 89.8% of *SitEmos* express only one emotion. The distribution of the five most frequent emotions

⁴<https://texttokids.irisa.fr/>

⁵<https://fr.vikidia.org/wiki/Vikidia:Accueil>

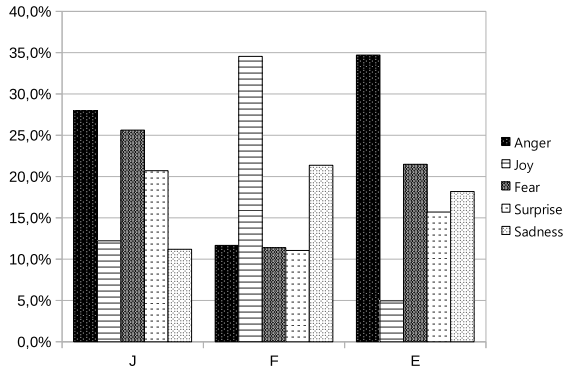


Figure 2: Distribution of the most frequent emotional categories by genre of text

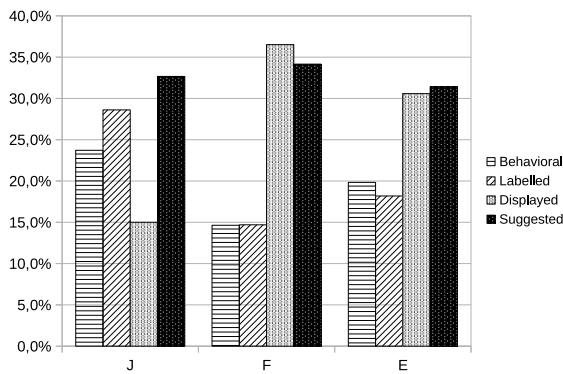


Figure 3: Distribution of expression modes by genre of text

varies according to the genre of text (Figure 2), with for example JOY reaching close to 35% of emotional units in fictional texts and as well for ANGER in encyclopedic texts.

Expression modes. *Expression modes* are rather balanced on the overall corpus with 33% *suggested* SitEmos, 24.8% of *labeled*, 21.3% of *behavioral*, and 20.9% of *displayed*. However this proportions vary according to the genre of texts (cf. Figure 3). Emotions appear to be more *displayed* (36.5%) in fictional texts than in other genres (30.6% for encyclopedic and 15% for journalistic). As for *labeled* and *behavioral* emotions, they are more frequent in journalistic texts (respectively 28.6% and 23.7%, against 14.7% and 14.6% in fictional texts, and 18.2% and 19.8% in encyclopedic). *Suggested* emotions do not appear to be specific to a genre of texts, since they always represent around a third of SitEmos.

Expression mode also varies according to the emotion conveyed, as shown in Figure 4. Thus ANGER is mostly expressed through *behavioral* emotional units (48.4%), JOY and SADNESS through *suggested* units (respectively 39.4% and 47.5%) and SURPRISE through *displayed* units (60.8%). FEAR is almost as *suggested* (39.6%) as it is *labeled* (40.4%).

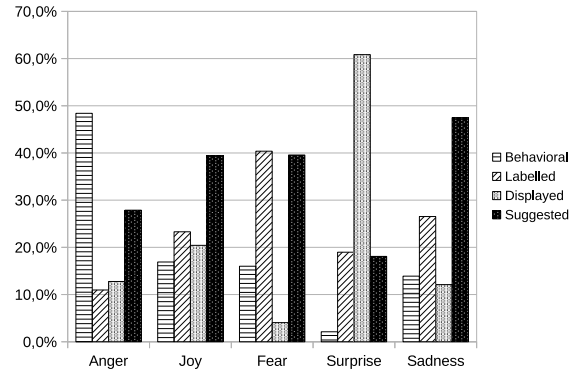


Figure 4: For the most frequent emotions, distribution of expression modes by emotion categories

6. Discussion

The annotation scheme presented in Section 4 allowed for the annotation of written texts using concepts stemming from analysis perspectives proffered in psycholinguistics as well as in linguistics on how emotions are expressed in texts (cf. Section 2). The annotations produced thus include information on *emotional categories* and *emotion expression modes*, as well as *experiencers*, *causes* and *consequences* of emotions. These annotations led to a surprising observation on *displayed* emotions in encyclopedic texts, that will be discussed here. Moreover, the analysis of the annotation results presented in Section 5.2 highlights interactions between, on the one hand, *expression modes* and genre of texts, and, on the other hand, two notions of the scheme: *expression mode* and *emotional category*. These interactions provide a feedback on some NLP works already mentioned in Section 3.

Displayed emotions in encyclopedic texts. Annotation results show that 30.6% of SitEmos found in encyclopedic texts are *displayed* emotions, usually felt by the writer (70.3% of *displayed* emotions). This came as a surprise since *displayed* emotions are usually found in direct speeches or intervene to show the writer's emotions, which is mostly the case here. Yet encyclopedic texts are supposed to describe facts with a neutral tone, devoid of writer's emotions. We hypothesize that the phenomenon we encounter in our corpus is due to the nature of the source of the texts we annotated. Indeed all our encyclopedic texts come from an online collaborative encyclopedia (cf. Section 5.1). All participants are not necessarily expert on encyclopedic writing. They often try to make texts livelier so that they appeal more to children, by resorting to exclamation marks and clearly showing how they feel about the subject of the text. This takes the shape of linguistic markers that *display* their emotions. However it can be noted that *displayed* emotions are most frequent in fictional texts (36.5%). This was to be expected since these texts contain many dialogues, conducive to the *displaying* of emotions.

Expression modes and genre. The link between *expression modes* and genre of texts is one of the key interactions highlighted by the application of our annotation scheme to the corpus. This was already sensed by Bostan and Klinger (2018), when they declared that “journalists ideally tend to be objective when writing articles,[...] and one might assume that emotion expressions in tales are more subtle and implicit” (p. 2105). In the same way, Kim and Klinger (2018) partially attributed the difficulty of annotating emotions in triplets of sentences to the nature of the texts they were dealing with. For them, “fictional texts are highly metaphoric and full of allusions and metonymies, which requires thoughtful reading (often reading between the lines) and a broader context” (p. 1354).

Unlike what (Bostan and Klinger, 2018; Kim and Klinger, 2018) proposed, *suggested* emotions do not appear to be specific of fictional texts in the annotated corpus presented here. On the contrary they represent a similar proportion of emotional units in all genres of texts (between 31.4% and 34.2% *SitEmos*). However, as previously mentioned, *displayed* emotions are most common in fictional texts. As for *labeled* and *behavioral* emotions, they appear to be mostly used in journalistic texts. The annotation results obtained on the corpus of 1,594 texts show that some *expression modes* tend to be preferably employed in specific genres of texts. To be fully confirmed, this trend would require the annotation of a corpus better balanced in genres.

Expression mode and emotional categories. The scheme we introduced also points out the relation between the concepts of *expression mode* and *emotional category*.

Alm (2010)’s study of emotional sentences’ characteristics (see Section 3) suggested “that some characteristics may show particular affinity with certain affects” (p. 121). More precisely, the category FEAR seems to be mainly conveyed by affect words or behaviours descriptions, and the category SURPRISE by markers found in direct speeches or descriptions of unexpected observations.

For their part, Demszky et al.(2020) found that “certain emotions are more verbally implicit and may require more context to be interpreted” (p. 6). For example, in their Reddit comments corpus, GRATITUDE was highly correlated with the token “thanks” and AMUSEMENT with the token “lol”, whereas GRIEF and NERVOUSNESS were not especially significantly associated with any token.

This corroborates the annotation results presented here as, on the overall corpus, SURPRISE is mainly expressed by *displayed* units and FEAR by *labeled* and *suggested* units. The results also show an association between ANGER and *behavioral* expressions, and between JOY and SADNESS and *suggested* expressions (see Section 5.2).

7. Conclusion

The annotation scheme introduced here as well as its corresponding guidelines greatly contribute to expanding resources for emotions annotation of French texts, which are scarce as for now. Rather than labeling emotions at a text or sentence level, which is currently customary in building of emotions annotated corpora, and especially in French language works (e.g. (Paroubek et al., 2010; Fraisse and Paroubek, 2015)), our scheme aims at identifying much finer textual segments (words, phrases, propositions, etc.) in order to label linguistic units that convey an emotion.

The annotation scheme is theoretically motivated as it takes into account many concepts stemming both from linguistic works (*expression mode*, *experienter*) and psycho-linguistic studies (*emotional category*, *emotion type*, *cause* and *consequence* of emotion) to characterize the linguistic realization of the notion of emotion in texts. The approach we propose here constitutes a synthesis of several other propositions, since our scheme adopts concepts used heterogeneously in other former works. Furthermore, its application to texts of different genres is systematized and discussed in the present paper. The application of the scheme on more than 1,500 texts of several genres (journalistic, encyclopedic, fictional) allowed for the highlighting of strong correlations between, on the one hand *expression mode* and *emotional category* (e.g. SURPRISE is mostly *displayed* whereas ANGER is usually conveyed through *behavioral* expressions), and on the other hand *expression mode* and genre of texts (e.g. *displayed* emotions are more frequent in fictional texts and *labeled* emotions in journalistic texts). If this type of trends had already been spotted at the margins in various NLP works, we believe that the scheme we propose offers a rigorous way to explore these types of correlations, essential in understanding how emotions are expressed in texts. We are thus confident that this scheme holds great possibilities for further exploring of correlations between the items of the scheme and other variables, for instance in the field of digital humanities or corpus linguistics. An important perspective for the generalisation of this scheme is to develop an automatic annotation system through the learning of NLP models.

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8. Bibliographical References

- Alm, C. O., Roth, D., and Sproat, R. (2005). Emotions from text: Machine learning for text-based emotion prediction. In *Proceedings of Human Language Technology Conference and Conference on Empirical Methods in Natural Language Processing*, pages 579–586, Vancouver,

- British Columbia, Canada, October. Association for Computational Linguistics.
- Alm, C. O. (2010). Characteristics of high agreement affect annotation in text. In Proceedings of the fourth linguistic annotation workshop, pages 118–122.
- Aman, S. and Szpakowicz, S. (2007). Identifying expressions of emotion in text. In International Conference on Text, Speech and Dialogue, pages 196–205. Springer.
- Bianchi, F., Nozza, D., and Hovy, D. (2021). Feel-it: Emotion and sentiment classification for the italian language. In Proceedings of the Eleventh Workshop on Computational Approaches to Subjectivity, Sentiment and Social Media Analysis, pages 76–83.
- Blanc, N. and Quenette, G. (2017). La production d’inférences émotionnelles entre 8 et 10 ans : quelle méthodologie pour quels résultats ? Enfance, 4(4):503–511.
- Blanc, N. (2010). La compréhension des contes entre 5 et 7 ans: Quelle représentation des informations émotionnelles? Canadian Journal of Experimental Psychology/Revue canadienne de psychologie expérimentale, 64(4):256.
- Bostan, L.-A.-M. and Klinger, R. (2018). An analysis of annotated corpora for emotion classification in text. In Proceedings of the 27th International Conference on Computational Linguistics, pages 2104–2119, Santa Fe, New Mexico, USA, August. Association for Computational Linguistics.
- Buechel, S. and Hahn, U. (2017). Emobank: Studying the impact of annotation perspective and representation format on dimensional emotion analysis. In Proceedings of the 15th Conference of the European Chapter of the Association for Computational Linguistics: Volume 2, Short Papers, pages 578–585.
- Cheng, X., Chen, Y., Cheng, B., Li, S., and Zhou, G. (2017). An emotion cause corpus for chinese microblogs with multiple-user structures. ACM Transactions on Asian and Low-Resource Language Information Processing (TALLIP), 17(1):1–19.
- Creissen, S. and Blanc, N. (2017). Quelle représentation des différentes facettes de la dimension émotionnelle d’une histoire entre l’âge de 6 et 10ans ? apports d’une étude multimédia. Psychologie Française, 62(3):263–277. Cognition et multimédia : les atouts du numérique en situation d’apprentissage.
- Davidson, D. (2006). The role of basic, self-conscious and self-conscious evaluative emotions in children’s memory and understanding of emotion. Motivation and Emotion, 30(3):232–242.
- Demszky, D., Movshovitz-Attias, D., Ko, J., Cowen, A. S., Nemade, G., and Ravi, S. (2020). Goemotions: A dataset of fine-grained emotions. CoRR, abs/2005.00547.
- Dijkstra, K., Zwaan, R. A., Graesser, A. C., and Magliano, J. P. (1995). Character and reader emotions in literary texts. Poetics, 23(1-2):139–157.
- Dyer, M. G. (1983). The role of affect in narratives. Cognitive science, 7(3):211–242.
- Ekman, P. (1992). An argument for basic emotions. Cognition and Emotion, 6(3-4):169–200.
- Étienne, A. and Battistelli, D. (2021). Annotation manuelle des émotions dans des textes écrits avec la plateforme Glozz. Research report, MoDyCo ; Université Paris Nanterre, June.
- Fraisse, A. and Paroubek, P. (2015). Utiliser les interjections pour détecter les émotions. In Actes de la 22e conférence sur le Traitement Automatique des Langues Naturelles. Articles longs, pages 279–290.
- Ghazi, D., Inkpen, D., and Szpakowicz, S. (2015). Detecting emotion stimuli in emotion-bearing sentences. In International Conference on Intelligent Text Processing and Computational Linguistics, pages 152–165. Springer.
- Gui, L., Xu, R., Wu, D., Lu, Q., and Zhou, Y. (2018). Event-driven emotion cause extraction with corpus construction. In Social Media Content Analysis: Natural Language Processing and Beyond, pages 145–160. World Scientific.
- Kerbrat-Orecchioni, C. (2000). Quelle place pour les émotions dans la linguistique du xxe siècle. Plantin, C., Doury, M. & Traverso, V.(éds), Les émotions dans les interactions. Lyon: Presses Universitaires de Lyon, pages 33–74.
- Kim, E. and Klinger, R. (2018). Who feels what and why? annotation of a literature corpus with semantic roles of emotions. In Proceedings of the 27th International Conference on Computational Linguistics, pages 1345–1359.
- Liu, C., Osama, M., and de Andrade, A. (2019). DENS: A dataset for multi-class emotion analysis. CoRR, abs/1910.11769.
- Mathieu, Y. Y. (2005). Annotation of emotions and feelings in texts. In Proceedings of the First International Conference on Affective Computing and Intelligent Interaction, ACII’05, page 350–357, Berlin, Heidelberg. Springer-Verlag.
- Micheli, R., Hekmat, I., and Rabatel, A. (2013). Les émotions: Des modes de sémiotisation aux fonctions argumentatives. Semen. Revue de sémio-linguistique des textes et discours, (35).
- Micheli, R. (2014). Les émotions dans les discours. Modèle d’analyse, perspectives empiriques. Champs linguistiques. De Boeck Supérieur, Louvain-la-Neuve.
- Mohammad, S., Bravo-Marquez, F., Salameh, M., and Kiritchenko, S. (2018). SemEval-2018 task 1: Affect in tweets. In Proceedings of The 12th International Workshop on Semantic Evaluation, pages 1–17, New Orleans, Louisiana, June. Association for Computational Linguistics.
- Mohammad, S. (2012). #emotional tweets. In *SEM 2012: The First Joint Conference on Lexical and

- Computational Semantics – Volume 1: Proceedings of the main conference and the shared task, and Volume 2: Proceedings of the Sixth International Workshop on Semantic Evaluation (SemEval 2012), pages 246–255, Montréal, Canada, 7-8 June. Association for Computational Linguistics.
- Neviarouskaya, A. and Aono, M. (2013). Extracting causes of emotions from text. In Proceedings of the Sixth International Joint Conference on Natural Language Processing, pages 932–936.
- Öhman, E., Pàmies, M., Kajava, K., and Tiedemann, J. (2020). XED: A multilingual dataset for sentiment analysis and emotion detection. In Proceedings of the 28th International Conference on Computational Linguistics, pages 6542–6552, Barcelona, Spain (Online), December. International Committee on Computational Linguistics.
- Öhman, E. (2020). Emotion annotation: Rethinking emotion categorization. CEUR Workshop Proceedings, 2865:134–144.
- Paroubek, P., Pak, A., and Mostefa, D. (2010). Annotations for opinion mining evaluation in the industrial context of the DOXA project. In Proceedings of the Seventh International Conference on Language Resources and Evaluation (LREC’10), Valletta, Malta, May. European Language Resources Association (ELRA).
- Plutchik, R. (1980). A general psychoevolutionary theory of emotion. In Theories of emotion, pages 3–33. Elsevier.
- Russo, I., Caselli, T., Rubino, F., Boldrini, E., and Martínez-Barco, P. (2011). EMOCause: An easy-adaptable approach to extract emotion cause contexts. In Proceedings of the 2nd Workshop on Computational Approaches to Subjectivity and Sentiment Analysis (WASSA 2.011), pages 153–160, Portland, Oregon, June. Association for Computational Linguistics.
- Schmidt, T., Dennerlein, K., and Wolff, C. (2021). Towards a corpus of historical german plays with emotion annotations. In 3rd Conference on Language, Data and Knowledge (LDK 2021). Schloss Dagstuhl-Leibniz-Zentrum für Informatik.
- Strapparava, C. and Mihalcea, R. (2007). SemEval-2007 task 14: Affective text. In Proceedings of the Fourth International Workshop on Semantic Evaluations (SemEval-2007), pages 70–74, Prague, Czech Republic, June. Association for Computational Linguistics.
- Widlöcher, A. and Mathet, Y. (2012). The glozz platform: A corpus annotation and mining tool. In Proceedings of the 2012 ACM symposium on Document engineering, pages 171–180.
- Zwaan, R. A. and Radvansky, G. A. (1998). Situation models in language comprehension and memory. Psychological bulletin, 123(2):162.