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## Predicting verbal mood in complement clauses: the role of the *distributive patterns*, the *tense* and the *grammatical aspect* of the matrix verb

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This study deals with the issue of mood choice in complement clauses in French, in which speakers may choose between the indicative or the subjunctive. We report on the results of two experiments using an elicitation task, in which we investigated how the matrix verb, via its distributive patterns (i.e. verbs selecting only the subjunctive vs. only the indicative vs. verbs accepting either mood), tense and grammatical aspect influences mood choice in the complement clause. While the role of the semantics of the matrix verb has been extensively studied in semantic studies, considering its tense and its grammatical aspect is a novel approach to explaining mood choice. Our experiments confirm that mood choice depends on the distributive patterns of the matrix verb: there are verbs selecting only the indicative (e.g. *constater* ‘notice’), verbs selecting only the subjunctive (e.g. *apprécier* ‘appreciate’) and verbs which allow both the indicative and the subjunctive, called alternance verbs (e.g. *rêver* ‘dream’). Crucially, our results reveal important interactions between the matrix verbs’ distributive patterns and their tense, as well as with their grammatical aspect. Specifically, both alternance verbs and subjunctive verbs undergo the influence of tense but the direction of the effect is different for each of these categories. In contrast to alternance and subjunctive verbs, verbs selecting the indicative are not influenced by tense and aspect. At a general level, our experimental study opens a new path towards enriching our knowledge about what factors play a significant role for mood choice in complement clauses and reveals that the polysemy of certain verbs strongly affects their selection of the subjunctive or of the indicative.

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## 1 Introduction

In many languages, such as French and other Romance languages, the main distinction of verbal mood in complement clauses is that between the indicative and the subjunctive. These verbal moods are usually interpreted as expressing the distinctions between *realis* vs. *irrealis* (with respect to the *mood typological category*) (Lalaire 1998; but see Giorgi & Pianesi 1997 who refute it), between *veridical* vs. *non-veridical* (with respect to *truth*) and *emotive* vs. *cognitive* (with respect to *emotion*) (Giannakidou 1998; Baunaz 2017; Giannakidou & Mari 2021; Baunaz & Puskás 2022) (see Portner 2018 for a comprehensive discussion of these notions). These oppositions are visible through the distributive patterns of mood selection by semantically defined classes of predicates. The main distinction would be a binary one: evaluative/emotive predicates (e.g. *want*, *prefer*) are subjunctive governors while intellectual/cognitive predicates (e.g. *say*, *believe*) are indicative governors. For example, when a complement clause expresses a desire, as in (1), the subjunctive is used, whereas when the complement clause expresses a belief, as in (2), the indicative is used. In the case of French, both prescriptive grammars and semantic studies have focused on providing exhaustive lists of verbs whose distributive pattern is that of a subjunctive governor or that of an indicative governor (cf. section 2.1 for a detailed discussion).

- (1) Pierre veut que Marie vienne.SUBJ à la fête. (French)  
‘Peter wants Mary to come to the party.’
- (2) Pierre croit que Marie vient.IND à la fête. (French)  
‘Peter believes that Mary will come to the party.’

At the same time, other linguistic studies suggested that there are verbs which also express cognitive states and mental events but which accept to be followed by either the indicative or the subjunctive, as for example *s’assurer* ‘make sure’ in examples (3) and (4) (Soutet 2000; Gosselin 2010; Baunaz & Puskás 2014; 2022; Baunaz 2017; Petkovic 2020; cf. section 2.1). As such, the influence of the matrix verb would not be binary but three-way: in addition to verbs that select the indicative and to verbs that select the subjunctive, a third type exists: verbs which accept the alternance of the indicative or the subjunctive. In other words, the proponents of these approaches claim that these distributive patterns of the matrix verb (i.e. verbs selecting only the subjunctive vs. only the indicative vs. verbs accepting either mood) influence mood choice in complement clauses.

- (3) Pierre s’assure que Marie vienne.SUBJ à la fête. (French)  
‘Peter makes sure Mary comes to the party.’
- (4) Pierre s’assure que Marie vient.IND à la fête. (French)  
‘Peter makes sure Mary comes to the party.’

In contrast to these semantic-linguistic studies, within the sociolinguistic variationist framework (Labov 1966; Sankoff 1988), an alternative view was put forward according to which the alternation

between subjunctive and indicative moods can be analysed as a linguistic variable (Poplack 1990 and Poplack et al. 2013 for Quebec French; Gudmestad & Edmonds 2015 for Hexagonal French; see also Gudmestad 2010 for Spanish). More specifically, it is argued that the subjunctive is inherently variable, and this variability cannot be explained by external factors, such as the meaning of the governor. More recently, Comeau (2020) argues, on the basis of data from Acadian French spoken in Baie Sainte-Marie in the Canadian province of Nova Scotia, that the alternation between subjunctive and indicative moods is not a linguistic variable and that the choice of the subjunctive depends not only on the matrix verb itself but, more importantly, on the semantic class of verbs which express a similar meaning that selects the subjunctive (volition, doubt, etc.) (cf. discussion in section 2.1).

Moreover, a certain number of limits have been identified to the assumption that mood choice depends mainly on the distributive patterns of the matrix verb (cf. discussion in section 2.1) and the question of what other factors (than verbal governors) affect mood choice was raised. Among the answers provided, we find non-verbal governors (i.e. expressions and connectives containing the complementiser *que*) (Bayole & Bavencoffe 1995; cf. Damar & Fourny 2015 for a comparison with the speakers' actual use), the type of sentence (declarative vs. interrogative), polarity (the presence of negation enhances the subjunctive) (Lesage 1991), the syntactic order of the propositions (Sabrsula 1974) and the social norm imposed (by the French Academy for example<sup>1</sup>) (cf. Damar 2008). Another factor comes from Chomsky's minimalism program (Chomsky 1995; 2001), where it is argued that the subjunctive in complement clauses is dependent on a higher syntactic structure – that of the matrix verb (Landau 2004; Manzini 2000; Quer 1998; 2006). Thus, under this theory, the tense and grammatical aspect of the matrix verb are expected to influence the mood choice in the subordinate clause (cf. sections 2.2 and 2.3 for a detailed discussion). Surprisingly, studies have not investigated experimentally how tense and the grammatical aspect of the main verb influence the choice of the mood of the complement clause, with the notable exception of Gudmestad & Edmonds (2015) (cf. section 2.2).

Our aim in this study is to verify experimentally the role of the distributive patterns of the matrix verb and to open a path towards considering other factors that might play a role for mood choice in complement clauses. For this, we focus on French and we investigate three properties of the matrix verb: its *distributive patterns* (verbs followed by the indicative, verbs followed by the subjunctive and verbs allowing an alternance between the two moods), its *tense* (present vs. past) and its *grammatical aspect* (perfective vs. imperfective). We seek to show whether the three sets of verbs, established on the basis of grammars and non-variationist linguistic approaches, are consistent with the speakers' actual usage, and whether tense and the aspect of the matrix verb affect mood choice independently or in interaction with the targeted distributive patterns. Our paper is structured as follows. In section 2, we review the most relevant literature to our research question. In section 3, we present our experimental studies. We discuss the results and conclude in sections 4 and 5, respectively.

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<sup>1</sup> <https://www.academie-francaise.fr/>.

## 2 Literature Review

### 2.1 The role of the distributive patterns of the matrix verb

Traditionally, in prescriptive grammars and also in some semantic studies, it is argued that the type of predicate from the main clause is the leading factor responsible for selecting the mood in the complement clause. More precisely, verbs expressing cognitive states and mental events such as fear, obligation, order, astonishment, pain, advice and expectation must be followed by the subjunctive whereas verbs expressing cognitive states and mental events such as certainty, probability, judgement, thought, belief and opinion must be followed by the indicative (Bescherelle 1990; 2019). The idea behind this distributive assumption is that the type of predicate from the matrix clause, that is evaluative/emotive vs. intellectual/cognitive, determines what type of cognitive states or mental events is expressed, as argued by studies with a focus on Greek (e.g. Giannakidou 1994; 1995; 1998), Italian (e.g. Giorgi & Pianesi 1997; see Mari 2016 for a different proposal), Spanish (e.g. Villalta 2000; 2006; 2008; Rubinstein 2012), Catalan (e.g. Quer 2001; 2006; 2009; 2010), French (e.g. Gosselin 2010; 2015; 2016; Schlenker 2005) or Romanian (Farkas 1985; 1992; Brasoveanu 2006).

Nevertheless, studies have also found that these classes of predicates are not necessarily uniform both with respect to the behaviour of certain individual verbs and cross-linguistically. According to Portner (2018), in most languages, the following predicates are indicative governors in Romance languages: predicates of knowledge and belief (e.g. *know*, *believe*), predicates of assertion (e.g. *say*, *declare*), predicates of inquiry (e.g. *ask*), perception predicates (e.g. *see*, *hear*), commissive predicates (e.g. *promise*) and predicates of fiction and mental creation (e.g. *imagine*, *dream*). In contrast, inquisitive predicates (e.g. *wonder*), preference predicates (e.g. *want*, *prefer*, *hope*), directive predicates (e.g. *order*, *require*), the negative counterparts of predicates of knowledge/belief and of predicates of assertion (e.g. *doubt*), and modal predicates (e.g. *be possible*) are subjunctive governors. The class of emotive factive predicates (e.g. *regret*) takes the subjunctive in certain languages (e.g. French) as in (5) while taking the indicative in others (e.g. Romanian) as in (6). Another example is that of the verb *believe*, which is predicted to be an indicative governor but which, in Italian (i.e. *credere*), can alternate between the subjunctive and the indicative (Mari 2016) as in (7). According to Mari (2016), polysemous verbs feature an *expressive* (a doxastic dimension, that is asserting certainty) and an *inquisitive* interpretation (which features both a doxastic and an epistemic dimension, the latter presupposing lack of knowledge). In (7), the mood alternance for the Italian *credere* ('believe') is explained by its polysemy: *expressive-credere* selects the indicative because it signals that the content of the opinion is personal and cannot be verified against a fact of the matter whereas the *inquisitive-credere* selects the subjunctive because it conveys, on the one hand, doxastic certainty at the level of the assertion, and, on the other hand, epistemic uncertainty at the level of the presupposition.

- (5) Pierre regrette que Marie vienne.SUBJ à la fête (French)  
‘Peter regrets that Mary comes to the party.’
- (6) Petru regretă că Maria vine.IND la petrecere. (Romanian)  
‘Peter regrets that Mary comes to the party.’
- (7) Credo che Maria sia.SUBJ / è.IND incinta. (Italian)  
‘I believe that Mary is pregnant.’

Working on Hexagonal French, Gosselin (2010: 433) classifies the predicates from the matrix clause according to whether they can be (almost) exclusively followed by one of the two moods and whether the choice of the mood generates or not a change in their meaning or that of the entire sentence. Gosselin’s classification consists of: (i) verbs which must, almost exclusively, be followed by one or the other mood (e.g. *croire* ‘believe’ must be followed by the indicative and the subjunctive is not acceptable, whereas *douter* ‘doubt’ must be followed by the subjunctive and the indicative is not acceptable), (ii) verbs that may be followed by one of the two modes with or without a change in meaning of the verb itself (e.g. *comprendre* ‘understand’ as in (8) and (9), and *espérer* ‘hope’ as in (10)), and (iv) verbs which require the indicative in affirmative sentences but change their requirement in negative, interrogative or imperative sentences (e.g. *supposer* ‘suppose’).

- (8) Pierre comprend ( $\approx$  prend conscience) que Luc est.IND là. (French) (Wilmet 1997: 307)  
‘Peter understands that Luc is there.’
- (9) Pierre comprend ( $\approx$  accepte) que Luc soit.SUBJ là. (French) (Wilmet 1997: 307)  
‘Peter accepts that Luc is there.’
- (10) Pierre espère que Marie vient.IND/vienne.SUBJ à la fête. (French)  
‘Peter hopes that Mary comes/will come to the party.’
- (11) Pierre suppose que Marie vient.IND à la fête. (French)  
‘Peter supposes that Mary comes to the party.’
- (12) Supposons que Marie vienne.SUBJ à la fête ! (French)  
‘Let’s suppose that Mary comes to the party!’

Gosselin’s classification, and more recently Baunaz & Puskás (2014, 2022) and Baunaz (2017), points to the fact that the predicates from the matrix clause may be classified in three main sets: those which require the *subjunctive*, those which require the *indicative* and those which accept an alternance between the two modes, with or without entailing a change in meaning. Regarding the first two classes, Baunaz & Puskás’s framework assumes that it is the syntactic feature make-up of the predicates that determines their selectional properties: verbs selecting the subjunctive present an *emotive* feature and it is this feature which licences the subjunctive. In contrast, verbs selecting the indicative lack the emotive feature and are neutral with respect

to emotivity. For them, the alternance of mood observed in the case of *comprendre* ('understand', 'accept') (example (8) vs. (9)) comes from the emotivity feature: when *comprendre* involves an intellectual component only (as in (8)) it selects the indicative, whereas when it involves some kind of empathy (as in (9)), it includes an emotive feature and it selects the subjunctive. As for the third class, the verbs and the conditions under which a verb accepts the alternance between the indicative and the subjunctive are numerous and varied.

While Soutet (2000) provides approximately 30 alternance verbs, Petkovic (2020) collects 75 alternance verbs for her empirical study. As observed by Gosselin, alternance may be completely free or allowed in some cases by the type of sentence (negative, interrogative). Amsili & Guida (2014) investigated the case of alternance in negative sentences. For them, the alternance between the indicative and the subjunctive in negative contexts is particularly frequent with some epistemic verbs (e.g. *penser* 'think', *croire* 'believe', *considérer* 'consider'). In contrast, factive and semi-factive predicates such as *savoir* 'know' or *réaliser* 'realise' (which require the indicative), as well as emotive factive predicates such as *regretter* 'regret' and *apprécier* 'appreciate' (which require the subjunctive), do not allow alternance when they occur under the scope of negation. Amsili & Guida (2014) carry out an elicitation experiment with a verb conjugation task, in which they test the role of four epistemic verbs selecting the indicative and of four emotive factives selecting the indicative in affirmative contexts, and their role for mood choice in negative contexts. They confirm that the verbs selecting the indicative and those selecting the subjunctive behave as predicted, and find that in negative contexts, the verbs tested are followed by the subjunctive in 75% of the cases (80% in a stricter analysis) and by the indicative in 25% of the cases (20% in a stricter analysis). Thus, the use of certain epistemic and emotive factives under the scope of negation privileges the use of the subjunctive but not exclusively.

In contrast to these semantic studies, Poplack et al. (2013) argue that there are no subjunctive governors, such as those listed above as belonging to the set of verbs selecting the subjunctive. In their study, they compare the prescriptions of grammars of French, published between 1530–1999, to the actual use of the subjunctive in spoken Quebec French during three periods of time (1940–1950, 1982, and 2005–2007). They find an important discrepancy regarding the type and the number of matrix verbs between grammars' prescriptions and speakers' actual use. For instance, while grammars predict more than 304 verbal governors for the subjunctive, their analysis of spoken data (spontaneous everyday speech) shows that the verbs *falloir* 'be necessary' expressing necessity, *vouloir* 'want' expressing volition and *aimer* 'like' expressing desire are the most frequent and the most productive governors of the subjunctive.<sup>2</sup> They write:

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<sup>2</sup> In their corpus-based study, the factors found to be statistically significant predictors of mood choice for spoken Quebec French included the tense of the matrix verb, presence or absence of the complementizer *que*, the semantic category of the governor, and the morphological form and frequency of the mood-choice verb. According to Poplack and colleagues, the significance of the semantic category factor comes from the fact that the vast majority of uses of the subjunctive are heavily concentrated in pre-fabricated sentences using a very limited number of matrix verbs (*falloir*, *vouloir* and *aimer*) and of embedded verbs (*aller* 'go', *avoir* 'have', *être* 'be' and *faire* 'make') combinations.

“Almost without exception, no governor of even moderate frequency (i.e. five occurrences) could be shown to trigger the subjunctive categorically. This is true not only of the hundreds prescribed throughout the grammatical tradition, but also of the few dozen that ever actually governed a subjunctive in usage. There are thus no subjunctive governors: only *potential* governors, each of which features its own characteristic associations” (2013: 190).

In other words, as put by Comeau (2020: 42), the subjunctive would be constrained not by semantic classes of verbs, but rather by a small set of main clause elements (verbal and/or non-verbal). Comeau (2020) puts forward data from Acadian French, spoken in the Baie Sainte-Marie region, that contrasts with Poplack et al.’s (2013) data. He argues that the subjunctive is not a linguistic variable in this variety of French: he finds that the subjunctive is governed by the meaning or the semantics of the matrix verb: the verbs *aimer que* ‘to like’, *espérer* ‘to hope’, *falloir que* ‘to be necessary’, *guetter que* ‘to wait’ and *vouloir que* ‘to want’ are exclusively followed by the subjunctive (100%). The only exception is that of *point croire que* ‘to not believe’, which was found to be followed by the subjunctive in 29% of the cases. Comeau explains this result by the fact that, in this negative context, the subjunctive expresses the semantic meaning of *doubt* (which is its main semantic function since its apparition in Latin, also confirmed for Old French, cf. Jensen 1974). This result is interpreted to show that the subjunctive isn’t always subject to inherent variability. For Comeau (2020), the alternation, in some varieties of French, between the indicative and the subjunctive moods may be explained by two main factors: the semantic class or the meaning of the matrix verb (such as, verbs expressing volition, doubt, etc.) and the tense concordance. More specifically, the loss or the weak frequency of past tenses within the subjunctive mood (e.g. the imperfect subjunctive) allowed for the subjunctive to vary with other moods (the indicative or the conditional) to ensure tense concordance.

In sum, most of the state of the research on Hexagonal French, as well as some other varieties of French (e.g. Acadian French spoken in the Baie Sainte-Marie region, but also in other Romance languages), suggests that the matrix verb (through its meaning) determines the mood choice in the complement clause. In this paper, we focus on three sets of matrix verbs established according to prescriptive grammars and linguistic studies: those expected to select only the subjunctive, those expected to select only the indicative and those expected to accept an alternance of moods. We will call this assumption the **prescriptive distributional hypothesis**.

## 2.2 The role of the tense of the matrix verb

As mentioned in the Introduction, studies at the syntactic-semantic interface have argued that the subjunctive mood in complement clauses is *deficient* or *anaphoric*, which means that it is dependent on the temporal properties of the matrix verb (Landau, 2004; Manzini 2000; Quer 1998, 2006) while the indicative mood in complement clauses is independent. As put by Socanac (2017: 59–60), in the case of indicative complement clauses, the embedded predicate can

generally denote all types of temporal relations with respect to the reference time of the matrix predicate, whereas in the case of subjunctives, the embedded predicate is typically restricted to a posterior-referring interval of time with respect to that of the matrix predicate. In other words, the tense of the matrix predicate constraints the tense used in the subjunctive complement clause in that the latter cannot denote an event that took place prior to the one denoted by the matrix predicate. This is illustrated in examples (13)-(14) from Socanac (2017: 60).

- (13) Je crois qu'il est venu.IND hier / vient.IND maintenant / viendra.IND demain. (French)  
'I believe that he has come yesterday / comes now / will come tomorrow.'
- (14) Je veux qu'il vienne.SUBJ.PRES / \*soit venu.SUBJ.PAST hier. (French)  
'I want that she comes/ has come yesterday'

The question is whether the subjunctive mood is dependent on other properties of the matrix predicate, such as its expression of past vs. present tense, and its denotation of perfective vs. imperfective eventualities via the category of grammatical aspect. Tense is defined as the grammatical category, obligatorily marked on the verb in tensed languages, locating eventualities in time (situation time TSit or event time E) with respect to the utterance time UT (or moment of speech S) and to a topic time TT (or reference moment) (Klein 1994, and respectively Reichenbach 1947). The distinction between past (E precedes S) and present tense (E is simultaneous to S) may be seen as parallel to the *realis* vs. *irrealis* distinction (used to describe the indicative vs. subjunctive mood division). As put by Mithun (1999) and Palmer (2001), *realis* depicts situations as actualized, as having occurred or actually occurring, accessible through direct perception. In contrast, *irrealis* presents a situation as belonging to the realm of thought, accessible through imagination. Such a comparison between tense and mood would then result in the following association: the past tense is associated with the indicative while the present tense with the subjunctive.

To the best of our knowledge, the role of tense from the matrix clause for mood choice has been mentioned in two previous empirical studies: Poplack et al. (2013) and Gudmestad & Edmonds (2015). First, Poplack et al. (2013), who analyzed three corpora of spoken Quebec French belonging to the 19<sup>th</sup> century, the 20<sup>th</sup> century and, respectively, the 21<sup>st</sup> century, found that the tense of the matrix verb played a significant role for mood choice in the 19<sup>th</sup> and the 20<sup>th</sup> century but this effect disappeared in the 21<sup>st</sup> century. More precisely, in their set of data, they found that a matrix verb in the present indicative tense was more frequently followed by the subjunctive (with a probability higher of 0.68 in the 20<sup>th</sup> century) than by other modes. Regarding past time, the authors report that a matrix verb in the *Imparfait* was less frequently followed by the subjunctive (a probability of 0.38 in the 19<sup>th</sup> century), and a matrix verb in the *Passé Composé* was also less frequently followed by the subjunctive (a probability of 0.42 in the 20<sup>th</sup> century) than by other modes. According to the authors' analysis, the role of the tense of the matrix clause was not found to be statistically significant in the 21<sup>st</sup> century corpus. Second, Gudmestad & Edmonds (2015) investigate experimentally mood choice complement clauses in



contemporary Hexagonal French. For this, they carry out two elicitation experiments to test three types of factors: the semantic category of the matrix verb, its temporality (past vs. present vs. future) and hypotheticality. They find that native speakers used the subjunctive in 78.2% of the cases when the matrix verb expressed future time, in 53% of the cases when it expressed present time and in 50.3% of the cases when it expressed past time.

In sum, previous research shows a link between the temporality of the matrix clause and mood choice, even if they are not perfectly consistent across centuries. Thus, we may formulate a **tense hypothesis**, according to which, in Hexagonal French, the tense of the matrix verb influences the mood choice in the complement clause. Specifically, the present tense features the use of the subjunctive whereas the past tense features the use of the indicative. If we follow Poplack and colleagues' findings for spoken Quebec French in the 19<sup>th</sup> and the 20<sup>th</sup> century, we may expect to find there still is a relation between tense and mood. In contrast, if Hexagonal French has the same behavior as spoken Quebec French in the 21<sup>st</sup> century, then we may expect that there is no influence of tense on mood choice in Hexagonal French.

### 2.3 The role of the aspect of the matrix verb

Grammatical aspect refers to “different ways of viewing the internal temporal consistency of a situation” (Comrie 1976: 3). For Comrie, perfective aspect indicates “the view of a situation as a single whole, without distinction of the various separate phases” and is, thus, associated with eventive meaning. Imperfective aspect, on the other hand, is used to denote progressive and ongoing events. In French, in the past time domain, the *Passé Composé* is regularly described as perfective<sup>3</sup> whereas the *Imparfait* is imperfective<sup>4</sup>. As for the present time domain, there is no grammatical distinction between the perfective and imperfective, as the *Présent* expresses both aspects.

The question of the relation between grammatical aspect (of the matrix clause) and mood (of the complement clause) arises. To our knowledge, there are no studies which have investigated or which mention this relation, with the exception of Poplack et al. (2013). As written in section 2.2., Poplack and colleagues report that having an *Imparfait* or a *Passé Composé* in the matrix clause may have an

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<sup>3</sup> The difficulty with categorizing the *Passé Composé* as fully *perfective* comes from its two main types (“a tense with two faces” in Martin’s 1971 words): anteriority (reference to a past situation disconnected from the present) and accomplishment or resultative (reference to a past situation with present relevance). While the former may perfectly be characterized as perfective and is similar to the Simple Past, the latter is better characterized as a perfect and is similar to the English Present Perfect. Yet, Comrie (1976) argues that the main aspectual opposition is that between perfective vs. imperfective, and that the perfect is “an aspect in a rather different sense” from the other two as “it expresses a relation between two time-points” (1976:52).

<sup>4</sup> It is a classical assumption that the imperfect in Romance languages, and thus the French *Imparfait*, is inherently imperfective (Imbs 1960; Martin 1971; Comrie 1976; Vetters 1996). Even if this assumption has been challenged by some scholars, such as Blücher (1974) or Baranzini & Ricci (2015), most linguists agree that imperfectivity characterizes the semantics of the imperfect and that its other usages (e.g. the narrative imperfect) are meaning effects (see Bres 2005; Patard 2007). Specifically, as put by Patard, the *Imparfait* encodes the instruction “not perfective” and it is this instruction that triggers the inference of imperfectivity.

influence on mood choice. More specifically, they report a probability of 0.38 in the 19<sup>th</sup> century corpus and of 0.65 in the 20<sup>th</sup> century corpus for having a subjunctive in the complement clause when the matrix verb is in the *Imparfait*. As for the *Passé Composé*, they report a probability of 0.42 in the 20<sup>th</sup> century corpus for having a subjunctive in the complement clause. Furthermore, other scholars have discussed how the mood from the matrix clause determines the choice of the grammatical aspect used in the complement clause, such as Giannakidou (2009) targeting Greek and Socanac (2017) targeting Balkan Slavic languages such as Bulgarian and Croatian. According to Giannakidou (2009: 1887), in the context of non-past tenses, Greek verbs associated with the imperfective aspect appear in indicative complement clauses introduced through the indicative marker *oti* whereas perfective verbs appear in subjunctive complement clauses introduced through the subjunctive marker *na*, as shown in examples (15) and (16), respectively. Indeed, the *na* particle and the perfective morpheme (present on the verb) are considered to be the overt marks of the subjunctive.

(15) Nomizo **oti** kerdizei o Janis. (Greek)  
 think.sg IND win3.sg.IMPERF the John  
 ‘I think that John is winning.’

(16) Thelo **na** kerdisi o Janis. (Greek)  
 want1.sg SUBJ win3.sg.PERF the John  
 ‘I want John to win.’

Thus, Greek and Bulgarian reveal that there is an interaction between mood and grammatical aspect (cf. also Hacquard 2009 regarding the interaction between aspect and modality). However, studies have not considered whether the grammatical aspect of the matrix verb influences the mood choice in the complement clause. In fact, to the best of our knowledge there are no studies investigating this specific configuration and its application to (European) French. A rapid look at examples containing predicates selecting the subjunctive as in (17) and (18), predicates selecting the indicative as in (19) and (20), or alternating predicates as (21) and (22) shows that the grammatical aspect of the matrix verb does not seem to influence the mood choice.

(17) Pierre a voulu.PC que Marie vienne.SUBJ à la fête. (French)

(18) Pierre voulait.IMP que Marie vienne.SUBJ à la fête. (French)  
 ‘Peter wanted Mary to come to the party.’

(19) Pierre a affirmé.PC que Marie vient/venait/allait venir.IND à la fête. (French)

(20) Pierre affirmait.IMP que Marie vient/venait/allait venir.IND à la fête. (French)  
 ‘Peter stated that Mary comes/was coming/was going to come to the party.’

(21) Pierre s’est plaint.PC que Marie est venue.IND/soit venue.SUBJ à la fête. (French)

(22) Pierre se plaignait.IMP que Marie venait.IND /soit venue.SUBJ à la fête. (French)  
 ‘Peter complained that Marie came to the party.’

This result is concordant with Poplack et al.'s (2013) findings for the 21<sup>st</sup> century: the grammatical aspect of the matrix verb was not statistically associated with the use (or not) of the subjunctive in the complement clause. Nevertheless, if we draw on their findings for the 19<sup>th</sup> and the 20<sup>th</sup> century corpora, we may expect that grammatical aspect orients the speaker towards a subjunctive or an indicative complement clause. We thus formulate the **aspect hypothesis** according to which the aspect of the matrix verb influences the mood choice in the complement clause.

## 3 Experimental study

### 3.1 Hypotheses and predictions

As discussed in Section 2, from the unclear literature (which provides, on the one hand, contrastive findings about the role of the matrix verb – its distributive patterns, and on the other hand, too little evidence about how the tense and the aspect of the matrix verb influence mood choice), we expect that the matrix verb, via its distributional patterns, its tense and its grammatical aspect, influences mood choice one way or another. On the basis of the three hypotheses formulated earlier, we provide a number of exploratory predictions in **Table 1**.

For the semantic predicate hypothesis to be validated, we expect that the distributive pattern of the matrix verb determines mood choice according to the three groups of verbs defined: *subjunctive\_only*, *indicative\_only* and *alternance*. In other words, in both Experiment 1 and 2, we expect to find that the verbs from the *subjunctive\_only* set are followed almost exclusively (> 90%)<sup>5</sup> by the subjunctive, verbs from the *indicative\_only* set are followed almost exclusively (> 90%) by the indicative, and verbs from the *alternance* set are followed either by the subjunctive or by the indicative according to a variable pattern. Assuming that there is no other factor playing a role in mood choice, the baseline for a variable pattern would correspond to a 50%-50% distribution between the subjunctive and the indicative. This type of result would mean that the three-way classification of predicates is meaningful. If the semantic predicate hypothesis does not hold (as found for spoken Quebec French), then we expect to find no significant associations between the verbs tested and mood choice in the complement clause.

For the tense hypothesis to be validated, in Experiment 1, we predict either a main effect of tense or an interaction effect between tense and the distributive pattern of the matrix verb. More precisely, we expect to find that a present tense in the matrix clause favors the use of the subjunctive whereas a past tense significantly favors the indicative. In the case of the interaction effect, we expect that this effect applies only to *alternance* verbs. In other words, the tense of the matrix verb orients mood choice only in the absence of a highly constraining semantics of the predicate (i.e. which requires one of the two moods). If the variety of French tested follows the pattern found for spoken Quebec French of 21<sup>st</sup> century, then we expect to find no statistically significant effect of tense on mood choice.

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<sup>5</sup> The threshold is at 90% given that participants may have made errors of inattention or of writing/typing.

Hypothesis	Prediction
<p><b>The prescriptive distributional hypothesis:</b></p> <ul style="list-style-type: none"> <li>Mood choice in the complement clause is determined by the distributive pattern of the matrix verb</li> </ul>	<p><u>Option 1:</u></p> <p>A main effect of the distributive pattern: subjunctive_only verbs are followed by the subjunctive mood, indicative_only verbs are followed by the indicative mood, and alternance verbs are followed either by subjunctive or the indicative mood, i.e. a variable pattern</p> <p><u>Option 2:</u></p> <p>No significant effect of the distributive pattern of the matrix verb.</p>
<p><b>The tense hypothesis:</b></p> <ul style="list-style-type: none"> <li>Mood choice in the complement clause is influenced by the tense of the matrix verb.</li> </ul>	<p><u>Option 1:</u></p> <p>A main effect of tense: a present tense in the matrix clause favours the use of the subjunctive whereas a past tense significantly favours the indicative.</p> <p><b>or</b></p> <p>An interaction effect between the distributive pattern and the tense of the matrix verb: the effect of tense applies only to the category of alternance verbs.</p> <p><u>Option 2:</u></p> <p>No significant effect of tense.</p>
<p><b>The aspect hypothesis:</b></p> <ul style="list-style-type: none"> <li>Mood choice in the complement clause is influenced by the grammatical aspect of the matrix verb.</li> </ul>	<p><u>Option 1:</u></p> <p>A main effect of grammatical aspect: a perfective aspect favours the use of the indicative whereas an imperfective aspect significantly favours the subjunctive.</p> <p><b>or</b></p> <p>An interaction effect between the distributive pattern and the aspect of the matrix verb: the effect of grammatical aspect applies only to the category of alternance verbs.</p> <p><u>Option 2:</u></p> <p>A main effect of grammatical aspect: a perfective aspect favours the use of the subjunctive whereas an imperfective aspect significantly favours the indicative.</p> <p><b>or</b></p> <p>An interaction effect between the distributive pattern and the aspect of the matrix verb: the effect of grammatical aspect applies only to the category of alternance verbs.</p> <p><u>Option 3:</u></p> <p>No significant effect of grammatical aspect.</p>

**Table 1:** Summary of hypotheses and exploratory predictions.

For the grammatical aspect hypothesis to be validated, in Experiment 2, we predict either a main effect of aspect or an interaction effect between the distributive pattern and the aspect of the matrix verb. With respect to the direction of the effect, we have identified two exclusive options. They depend on whether the influence of aspect is similar to that observed for Greek and Bulgarian for the choice of mood in the matrix clause (cf. discussion section 2.3) or to that observed for spoken Quebec French of the 19<sup>th</sup> and of 20<sup>th</sup> century. According to the first option, a perfective tense in the matrix clause favours the use of the subjunctive whereas an imperfective tense significantly favours the indicative. According to the second option, a perfective aspect favours the use of the indicative whereas an imperfective aspect significantly favours the subjunctive. In the case of the second option, the influence of grammatical aspect would be coherent to that of tense, if we assume that tense, grammatical aspect and mood concord: past/perfectivity/indicative and present/imperfectivity/subjunctive<sup>6</sup>. Finally, Option 3 assumes that if the variety of French tested follows the pattern found for spoken Quebec French of the 21<sup>st</sup> century, then we expect to find no statistically significant effect of grammatical aspect on mood choice.

### 3.2 Experimental design

In order to investigate the constraints imposed by the matrix verb – its distributive pattern, its tense and its grammatical aspect – on mood choice in the complement clause, we carried out two elicitation experiments with a 2x3 mixed design.

In Experiment 1, we manipulated two variables: the *distributive pattern of the matrix verb*, with three levels: predicates selecting only the subjunctive, predicates selecting only the indicative and predicates accepting both moods, and the *tense of the matrix verb*, with two levels: present and past time, as shown in **Table 2**. In Experiment 2, we manipulated two variables: *the distributive pattern of the matrix verb* as in the first experiment, and the *grammatical aspect of matrix verb*, with two levels: perfective and imperfective aspects, as shown in **Table 2**. In both experiments, the first variable was a within-group variable: participants read experimental items with verbs from all of the three semantic verb categories tested. The second variable was a between-group variable in Experiment 1 and a within-group variable in Experiment 2. In Experiment 1, half of the participants read experimental items in which the matrix verb was inflected in the *Présent* (of the Indicative) and half of the participants read experimental items in which the matrix verb was inflected in the *Passé Composé*. In Experiment 2, participants read some experimental items in which the matrix verb was inflected either in the *Passé Composé* and expressed the perfective aspect and others in which the matrix verb was inflected in the *Imparfait* and expressed the imperfective aspect.

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<sup>6</sup> As pointed out by one anonymous reviewer, the past/perfective/indicative concord is veridical (also “subjectively veridical” in the sense of Giannakidou & Mari 2018, 2021) while the present/imperfective/subjunctive is not.

Experiment 1	Distributive pattern of the matrix verb	Tense of the matrix verb	
		Subjunctive_only_Present tense	Subjunctive_only_Past tense
		Indicative_only_Present tense	Indicative_only_Past tense
		Alternance_Present tense	Alternance_Past tense
Experiment 2	Distributive pattern of the matrix verb	Grammatical aspect of the matrix verb	
		Subjunctive_only_Perfective	Subjunctive_only_Imperfective
		Indicative_only_Perfective	Indicative_only_Imperfective
		Alternance_Perfective	Alternance_Imperfective

**Table 2:** The experimental design of the two experiments.

### 3.3 Experiment 1

#### 3.3.1 Material and procedure

To test the role of the distributive pattern of the matrix predicate, we randomly selected 10 verbs from each set of verbs provided in grammar books and from the list provided by Petkovic (2020), as provided in **Table 3**.

Subjunctive_only	Indicative_only	Alternance verbs
<i>Apprécier</i> ‘appreciate’	<i>Affirmer</i> ‘state’	<i>Accepter</i> ‘accept’
<i>Approuver</i> ‘approve’	<i>Constater</i> ‘notice’	<i>Admettre</i> ‘admit’
<i>Attendre</i> ‘wait’	<i>Croire</i> ‘believe’	<i>Comprendre</i> ‘understand’
<i>Craindre</i> ‘fear’	<i>Déclarer</i> ‘declare’	<i>Concevoir</i> ‘understand’
<i>Exiger</i> ‘demand, require’	<i>Observer</i> ‘observe’	<i>Imaginer</i> ‘imagine’
<i>Ordonner</i> ‘order’	<i>Penser</i> ‘think’	<i>Nier</i> ‘deny’
<i>Permettre</i> ‘allow’	<i>Raconter</i> ‘tell’	<i>Rêver</i> ‘dream’
<i>Proposer</i> ‘propose, offer’	<i>Remarquer</i> ‘remark, note’	<i>S’assurer</i> ‘make sure’
<i>Redouter</i> ‘dread’	<i>Trouver</i> ‘find’	<i>Se plaindre</i> ‘complain’
<i>Souhaiter</i> ‘wish’	<i>Voir</i> ‘see’	<i>Supposer</i> ‘suppose’

**Table 3:** List of verbs in Experiment 1.

Using these verbs, we created a total of 30 experimental items (10 for each set of verbs), as illustrated in examples (23)–(28). The 30 experimental items were diversified in order to create two sets of items: a set in which the matrix verb was inflected in the present tense as in (23)–(25) and another set in which the matrix verb was inflected in the past tense (*Passé Composé*) as in (26)–(28). In all the experiment items, the subject of the complement clause was singular (e.g. *la direction* ‘the board, *l’équipe* ‘the team’, *la couturière* ‘the dressmaker’) to avoid having a

homograph form of the inflected verb for the subjunctive and the indicative. No criterion was applied for the selection of the verbs in the complement clause.

- (23) Les contrôleurs apprécient.PRES que la direction ..... (soutenir) la grève.  
‘The inspectors appreciate that the direction ..... (support) the strike.’
- (24) L’entraîneur croit.PRES que l’équipe ..... (être) bien préparée.  
‘The coach believes that team ..... (be) well prepared.’
- (25) La créatrice suppose.PRES que la couturière..... recevoir) les tissus avant la fin de la semaine.  
‘The designer supposes that the dressmaker ..... (receive) the fabrics before the end the week.’
- (26) Les contrôleurs ont apprécié.PAST que la direction ..... (soutenir) la grève.  
‘The inspectors appreciated that the direction ..... (support) the strike.’
- (27) L’entraîneur a cru.PAST que l’équipe ..... (être bien préparée).  
‘The coach believed that team ..... (be) well prepared.’
- (28) La créatrice a supposé.PAST que la couturière ..... (recevoir) les tissus avant la fin de la semaine.  
‘The designer supposed that the dressmaker ... (receive) the fabrics before the end the week.’

The participants’ task was to fill in the dots with the inflected form of the verb from the parentheses, provided in the infinitive, which they considered to be the most appropriate<sup>7</sup>. The expected answers (according to the type of verb from the matrix clause) are as provided in (29)–(31).

- (29) Les contrôleurs apprécient.PRES/ont apprécié.PAST que la direction soutienne.SUBJ la grève.  
‘The inspectors appreciate/appreciated that the direction supports/supported the strike.’
- (30) L’entraîneur croit.PRES/a cru.PAST que l’équipe est.IND bien préparée.  
‘The coach believes/believes that team is/was well prepared.’
- (31) La créatrice suppose.PRES/ a supposé.PAST que la couturière reçoive.SUBJ/reçoit.IND les tissus avant la fin du mois.  
‘The designer supposes/supposed that the dressmaker receives/received the fabrics before the end the week.’

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<sup>7</sup> According to one anonymous reviewer, this type of task is very similar to scholastic grammar exercises and it may have created an *over-correction bias*: when participants feel that there must be a “correct answer” to the question, they may tend to choose their higher register (i.e. the one prescribed by grammars). While we acknowledge this risk, this type of elicitation task has already been used in the literature to investigate mood choice in French, for example by Amsili & Guida (2014) and Gudmestad & Edmonds (2015). In fact, Gudmestad & Edmonds (2015) use two types of tasks: a sentence elicitation task and a verb elicitation task (identical to the one used in this study). They include the type of task in their statistical analysis of the data and find that the type of task does not influence mood choice. Nevertheless, future work should search for innovative alternative experimental tasks which move away from this specific type of elicitation task.

For each set of experimental material (with present tense vs. past tense in the main clause), we created three versions by randomizing the order of the items before printing the material. Participants were provided with one of the versions created so that we would have a similar number of participants who read experimental items with present or with past tense in the main phrase.

### 3.3.2 Participants

There were 67 participants (36 females, mean age: 22.16; range 18–30 years), all native speakers of French, students at the Faculty of Humanities at the University of Neuchâtel in Switzerland. They received financial compensation for their participation in the experiment. The task was performed in approximately 15 minutes. 35 participants read experimental items with verbs in the present tense and 32 verbs in the past tense.

### 3.3.3 Results

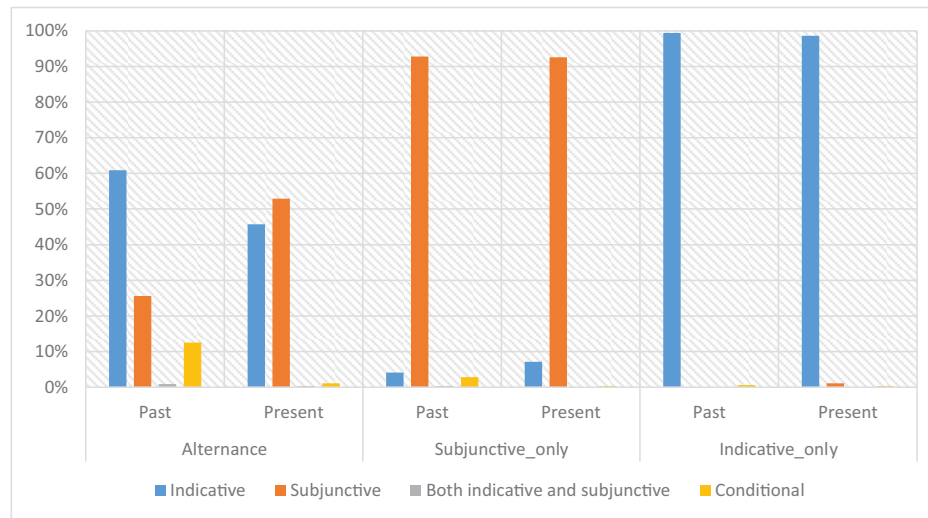
We coded participants' answers consisting of the inflected form of the verb from the subordinate phrase for mode: subjunctive, indicative and conditional. There were also cases when participants wrote two answers for a single experimental item: the form of the verb in the subjunctive and in the indicative. We coded these cases as *both* subjunctive and indicative. Data was analyzed in three steps. First, we carried out a quantitative descriptive analysis of the frequencies of mood types in the subordinate clause (indicative, subjunctive, *both* indicative and subjunctive, and conditional). Second, we fitted a generalized mixed model on the data points consisting of cases when participants answered either the subjunctive or the indicative. Third, we analyzed only the subset of alternance verbs in order to examine their overall behavior with respect to triggering a subjunctive or an indicative form in the complement phrase.

#### Quantitative descriptive analysis of the whole set of data

The results of the first quantitative descriptive analysis, carried out on the total number of data points (2010 observations) and investigating the role of the verb class and the verb tense expressed in the main clause, are provided in **Figure 1**. They revealed differences among the three semantic categories of verbs tested.

First, verbs belonging to the alternance category present a different behavior according to the verbal tense from the main phrase: they trigger more indicative forms (61%) than subjunctive forms (26%) when the matrix verb is the past tense, and more subjunctive forms (53%) than indicative forms (46%) when the matrix verb is in the present tense. Similarly, the conditional mood is used more frequently in the subordinate phrase when the matrix verb is the past tense (13%) than when it is in present tense (1%).





**Figure 1:** Frequencies of mood types in the complement clause- Experiment 1.

A closer look at the mood selection behavior of individual verbs from this set, provided in **Table 4**, reveals that it depends on the tense of the matrix verb. Specifically, with present tense, some verbs exhibit an almost 50/50 mood choice pattern, such as *concevoir*, *comprendre* and *se plaindre*. *S'assurer* is the only verb that presents such a behavior independently of the tense of the matrix verb. The verb *accepter*, in contrast, showed a strong preference for the subjunctive independently of the tense of the matrix verb. The verb *admettre* selects the indicative more frequently than the subjunctive, and this pattern is stronger when the matrix verb is in the past tense (81%) than in the present tense (63%). Finally, verbs such as *imaginer* and *supposer* reveal that that the indicative and the subjunctive are in a genuine competition with the conditional. Our manipulation of the tense of the matrix verb further revealed that this competition appears predominantly in the domain of past tense (as shown in **Table 4**).

Second, verbs belonging to the *subjunctive\_only* set of verbs triggered most frequently but not exclusively the subjunctive in the complement clause, and this both when the matrix verb was the present tense (93% subjunctive, 7% indicative and 0.3% conditional) and past tense (93% subjunctive, 4% indicative and 3% conditional). Similar to the verbs from the *alternance* group, having a past tense in the main clause increases the use of the conditional in the subordinate clause.

A closer look at the behavior of individual verbs from this category, provided in **Table 5**, reveals that there are some verbs, such as *apprécier*, *approuver* and *redouter*, which select the competing mood (here, the indicative) more frequently when the matrix verb is in the present tense (14%, 23%, and respectively 14%) than when it is in the past tense (3%, 19% and respectively 6%). For *approuver* and *craindre*, the subjunctive is in competition not only with the indicative but also with the conditional, and the effect is stronger when the matrix verb is in the past tense (19%, and respectively 9%) (**Table 5**).

Matrix verb	Past tense						Present tense									
	Indicative		Subjunctive		both		Indicative		Subjunctive		both		Cond			
	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.		
Accepter 'accept'	1	3%	31	97%	0	0%	0	0%	2	6%	33	94%	0	0%	0	0%
Admettre 'admit'	26	81%	4	13%	0	0%	2	6%	22	63%	11	31%	0	0%	2	6%
Comprendre 'understand'	31	97%	1	3%	0	0%	0	0%	15	43%	20	57%	0	0%	0	0%
Concevoir 'understand'	28	88%	4	13%	0	0%	0	0%	14	40%	20	57%	1	3%	0	0%
Imaginer 'imagine'	7	22%	2	6%	1	3%	22	69%	30	86%	4	11%	0	0%	1	3%
Nier 'deny'	23	72%	9	28%	0	0%	0	0%	13	37%	21	60%	0	0%	1	3%
Rêver 'dream'	23	72%	7	22%	1	3%	1	3%	2	6%	33	94%	0	0%	0	0%
S'assurer 'make sure'	17	53%	15	47%	0	0%	0	0%	18	51%	17	49%	0	0%	0	0%
Se plaindre 'complain'	25	78%	7	22%	0	0%	0	0%	18	51%	17	49%	0	0%	0	0%
Supposer 'suppose'	14	44%	2	6%	1	3%	15	47%	26	74%	9	26%	0	0%	0	0%
<b>Total</b>	<b>195</b>	<b>61%</b>	<b>82</b>	<b>26%</b>	<b>3</b>	<b>1%</b>	<b>40</b>	<b>13%</b>	<b>160</b>	<b>46%</b>	<b>185</b>	<b>53%</b>	<b>1</b>	<b>0%</b>	<b>4</b>	<b>1%</b>

Table 4: Individual verbs from the alternance set: Experiment 1.

Matrix verb	Past tense						Present tense							
	Indicative		Subjunctive		both		Cond		Indicative		Subjunctive		Cond	
	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.
Apprécier 'appreciate'	1	3%	31	97%	0	0%	0	0%	5	14%	30	86%	0	0%
Approuver 'approve'	6	19%	20	63%	0	0%	6	19%	8	23%	26	74%	1	3%
Attendre 'wait'	0	0%	32	100%	0	0%	0	0%	0	0%	35	100%	0	0%
Craindre 'fear'	3	9%	26	81%	0	0%	3	9%	2	6%	33	94%	0	0%
Exiger 'require'	1	3%	30	94%	1	3%	0	0%	1	3%	34	97%	0	0%
Ordonner 'order'	0	0%	32	100%	0	0%	0	0%	2	6%	33	94%	0	0%
Permettre 'allow'	0	0%	32	100%	0	0%	0	0%	0	0%	35	100%	0	0%
Proposer 'offer'	0	0%	32	100%	0	0%	0	0%	0	0%	35	100%	0	0%
Redouter 'dread'	2	6%	30	94%	0	0%	0	0%	5	14%	30	86%	0	0%
Souhaiter 'wish'	0	0%	32	100%	0	0%	0	0%	2	6%	33	94%	0	0%
<b>Total</b>	<b>13</b>	<b>4%</b>	<b>297</b>	<b>93%</b>	<b>1</b>	<b>0%</b>	<b>9</b>	<b>3%</b>	<b>25</b>	<b>7%</b>	<b>324</b>	<b>93%</b>	<b>1</b>	<b>0%</b>

**Table 5:** Individual verbs from the Subjunctive\_only set: Experiment 1.

Third, verbs belonging to the *indicative\_only* set of verbs present the most stable behavior among the three sets of verbs tested. As expected, they trigger almost exclusively the indicative mood in the complement clause, and this applies both when the matrix verb is in the past tense (99% indicative, 0% subjunctive and 1% conditional) and present tense (99% indicative, 1% subjunctive and 0.3% conditional). **Table 6** provides a finer-grained view of the stability found for the *indicative\_only* category. It is worth mentioning the case of the verb *croire* which selected the subjunctive in 6% of the cases independently of whether the matrix verb is in the past or the present tense (**Table 6**).

Matrix verb	Past tense				Present tense					
	Indicative		Cond		Indicative		Subjunctive		Cond	
	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.
Affirmer ‘state’	32	100%	0	0%	35	100%	0	0%	0	0%
Constater ‘notice’	32	100%	0	0%	34	97%	1	3%	0	0%
Croire ‘believe’	30	94%	2	6%	33	94%	2	6%	0	0%
Déclarer ‘declare’	32	100%	0	0%	35	100%	0	0%	0	0%
Observer ‘observe’	32	100%	0	0%	34	97%	1	3%	0	0%
Penser ‘think’	32	100%	0	0%	34	97%	0	0%	1	3%
Raconter ‘tell’	32	100%	0	0%	35	100%	0	0%	0	0%
Remarquer ‘remark’	32	100%	0	0%	35	100%	0	0%	0	0%
Trouver ‘find’	32	100%	0	0%	35	100%	0	0%	0	0%
Voir ‘see’	32	100%	0	0%	35	100%	0	0%	0	0%
<b>Total</b>	<b>318</b>	<b>99%</b>	<b>2</b>	<b>1%</b>	<b>345</b>	<b>99%</b>	<b>4</b>	<b>1%</b>	<b>1</b>	<b>0%</b>

**Table 6:** Individual verbs from the *Indicative\_only* set: Experiment 1.

### Analysis through logistic mixed-effects models

In order to better understand how the distributive patterns of the matrix verb and its tense influence, independently and in interaction, mood choice, we constructed logistic mixed-effects models on the data in which participants’ answers were a subjunctive or an indicative (this means, we excluded from the analysis the cases when participants used a conditional and when they explicitly provided *both* the indicative and the subjunctive). Precisely, models were fitted on 1948 data points.

To build the logistic mixed-effects models we used the R software (R Development Core Team, 2010, version 3.1.2). We included both participants and items as random factors in all

analyses. Models were tested using the `glmer()` function of the `lmer4` package of R, and model comparisons were assessed using the `anova()` function, which calculates the chi-square value of the log-likelihood to evaluate the difference between models, following Baayen's (2008) procedure. Following Field et al. (2014), we built the models by going from the simplest model to the one of interest. Precisely, we first tested a model that only encompassed items and participants as random factors (i.e., random intercepts). We then compared this model to one including the distributive patterns of the matrix verb as a fixed factor and finally one that incorporated both the category and the tense of the matrix verb, as well as their interaction, as fixed factors.

Adding the distributive patterns of the matrix verb as fixed factor to the simplest model, which only included items and participants as random effects, significantly improved the model ( $\Delta\chi^2 = 62.42$ ,  $\Delta df = 2$ ,  $p < .001$ ). Adding the tense of the matrix verb as a fixed factor further improved the model's fit ( $\Delta\chi^2 = 23.11$ ,  $\Delta df = 1$ ,  $p < .001$ ). Finally, adding the interaction between the distributive patterns factor and tense of the matrix verb also further improved the model's fit ( $\Delta\chi^2 = 28.91$ ,  $\Delta df = 2$ ,  $p < .001$ ). According to this final model, we find in our data a significant main effect of the semantic category of the matrix verb, a significant main effect of its tense and a significant interaction between them. Precisely, the significant main effect of the semantic category of the matrix verb confirms that, compared to the alternance category of verbs (which trigger the indicative in 57.1% and the subjunctive in 42.9% of the cases), subjunctive\_ only verbs trigger the use of the subjunctive (94.2%) ( $\beta = 5.13$ ,  $SE = 0.72$ ,  $p < .001$ ). The significant main effect of the tense of the matrix verb reveals that a present tense significantly increases the probability to have a subjunctive form in the complement clause (49.2%) rather than a past tense (41.9%) ( $\beta = 1.58$ ,  $SE = 0.24$ ,  $p < .001$ ). Finally, the significant interaction between the distributive patterns and the tense of the matrix verb indicates that verbs from the subjunctive\_ only category which are inflected in the present tense strongly decreases the probability to use the subjunctive mood (92.8%) compared to when they are inflected using a past tense (95.8%) ( $\beta = -2.14$ ,  $SE = 0.42$ ,  $p < .001$ ).

### **Analysis of the subset of alternance verbs**

To examine the role of the tense of the matrix clause for orienting the use of an indicative or a subjunctive mood in the complement clause independently of the semantics of the main verb, we carried out an analysis of the subset of alternance verbs only. As before, we built the models by going from the simplest model to the one of interest. Adding the tense of the matrix verb as a fixed factor to the simplest model, which only included items and participants as random effects, significantly improved the model ( $\Delta\chi^2 = 38.46$ ,  $\Delta df = 1$ ,  $p < .001$ ). According to the model including the tense of the matrix verb, inflecting alternance verbs in the present tense significantly increases the probability to use the subjunctive mood (53.6%) compared to when they are inflected in the past tense (29.6%) ( $\beta = -1.56$ ,  $SE = 0.23$ ,  $p < .001$ ).

### 3.4 Experiment 2

The imperfective vs. perfective manipulation was done only in the domain of past tense because, in French, aspect cannot be grammatically marked on the verb in the domain of present tenses (as it is the case of English, for example)<sup>8</sup>. Since Experiment 1 revealed that having a past tense matrix verb enhances the indicative and the conditional, the current experiment tests whether grammatical aspect has an additional influence on mood choice (compared to the effect already achieved by the tense of the matrix verb).

#### 3.4.1 Material and procedure

We extended the 30 experimental items from Experiment 1 to a total of 42 items (14 items for each set of verbs), as shown in Table 7.

Subjunctive_only verbs	Indicative_only verbs	Alternance verbs
<i>Apprécier</i> ‘appreciate’	<i>Affirmer</i> ‘state’	<i>Accepter</i> ‘accept’
<i>Approuver</i> ‘approve’	<i>Constater</i> ‘notice’	<i>Admettre</i> ‘admit’
<i>Attendre</i> ‘wait’	<i>Croire</i> ‘believe’	<i>Comprendre</i> ‘understand’
<i>Craindre</i> ‘fear’	<i>Décider</i> ‘decide’	<i>Dire</i> ‘say’
<i>Désirer</i> ‘desire’	<i>Déclarer</i> ‘declare’	<i>Expliquer</i> ‘explain’
<i>Douter</i> ‘doubt’	<i>Espérer</i> ‘hope’	<i>Ignorer</i> ‘ignore’
<i>Exiger</i> ‘demand, require’	<i>Estimer</i> ‘consider’	<i>Imaginer</i> ‘imagine’
<i>Ordonner</i> ‘order’	<i>Observer</i> ‘observe’	<i>Nier</i> ‘deny’
<i>Permettre</i> ‘allow’	<i>Penser</i> ‘think’	<i>Reconnaître</i> ‘recognize’
<i>Proposer</i> ‘propose, offer’	<i>Raconter</i> ‘tell’	<i>Rêver</i> ‘dream’
<i>Redouter</i> ‘dread’	<i>Remarquer</i> ‘remark, note’	<i>S’assurer</i> ‘make sure’
<i>Refuser</i> ‘refuse’	<i>Se douter</i> ‘suspect’	<i>Se plaindre</i> ‘complain’
<i>S’inquiéter</i> ‘worry’	<i>Trouver</i> ‘find, consider, believe’	<i>Suggérer</i> ‘suggest’
<i>Souhaiter</i> ‘wish’	<i>Voir</i> ‘see’	<i>Supposer</i> ‘suppose’

**Table 7:** List of verbs in Experiment 2.

<sup>8</sup> It is worth mentioning that, from a methodological point of view, tense and grammatical aspect ideally should be manipulated in the same experiment. In this study, we were not able to perform this manipulation because in French this aspectual distinction is not relevant for the domain of present tense. To bypass this difficulty, in future research, we would consider testing another aspectual opposition that may apply to both past and present tense domains: the habitual vs. continuous distinction. Nevertheless, both these aspectual values belong to the imperfective domain (Comrie 1976), and thus the study would investigate a different issue than the one we focus on in the current paper.

The 42 items were varied in order to create two versions of each item: a version in which the matrix expresses the imperfective aspect as in (32)-(34) and another version in which the matrix verb expresses the perfective aspect as in (35)-(37). As in Experiment 1, in all the experiment items, the subject of the complement clause was singular (*la direction* ‘the board’, *l’équipe* ‘the team’, *la couturière* ‘the dressmaker’) to avoid having a homograph form of the inflected verb for the subjunctive and the indicative. In addition, all items begin with a temporal adverbial, such as *au début de l’année* ‘at the beginning of the year’. This provides the temporal anchoring necessary for the *Imparfait*, which is referentially non-autonomous.<sup>9</sup> No criteria were applied for the selection of the verbs in the complement clause.

- (32) Au début de l’année, les contrôleurs appréciaient.IMP que la direction ..... (soutenir) la grève.  
 ‘At the beginning of the year, the inspectors appreciated that the direction ..... (support) the strike.’
- (33) Au moment de l’inscription au tournoi, l’entraîneur croyait.IMP que l’équipe ..... (être) bien préparée.  
 ‘At the time of the registration for the tournament, the coach believed that team ..... (be) well prepared.’
- (34) Au début de l’automne, la créatrice supposait.IMP que la couturière ..... (recevoir) les tissus avant la fin du mois.  
 ‘At the beginning of autumn, the designer supposed that the dressmaker ..... (receive) the fabrics before the end the month.’
- (35) Au début de l’année, les contrôleurs ont apprécié.PC que la direction ..... (soutenir) la grève.  
 ‘At the beginning of the year, the inspectors appreciated that the direction ..... (support) the strike.’
- (36) Au moment de l’inscription au tournoi, l’entraîneur a cru.PC que l’équipe ..... (être) bien préparée.  
 ‘At the time of the registration for the tournament, the coach believed that team ..... (be) well prepared.’
- (37) Au début de l’automne, la créatrice a supposé.PC que la couturière..... (recevoir) les tissus avant la fin du mois.  
 ‘At the beginning of autumn, the designer supposed that the dressmaker ..... (receive) the fabrics before the end the month.’

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<sup>9</sup> The French *Imparfait* is described as *referentially non-autonomous* or *anaphoric* (Ducrot 1979; Kamp and Rohrer 1983; Tasmowski-De Ryck 1985; Molendijk 1990; Kleiber 2003), which means it is dependent on a reference moment already existing in the context. This reference moment can be either provided by a temporal adverbial or by a referentially autonomous verb such, such as a simple past (*Passé Simple*) or a compound past (*Passé Composé*).

As in Experiment 1, the participants' task was to inflect the verb in the parenthesis. For each set of experimental material (with imperfective vs. perfective in the main clause), we created three versions by randomizing the order of the items before printing the material. Participants were provided with one of the versions created so that we would have a similar number of participants who read experimental items with imperfective or perfective in the main phrase.

### 3.4.2 Participants

There were 47 participants (39 females, mean age: 22.6; range 18–39 years), all native speakers of French, students at the Faculty of Humanities at the University of Neuchâtel in Switzerland. They received financial compensation for their participation in the experiment. The task was performed in approximately 15 minutes.

### 3.4.3 Results

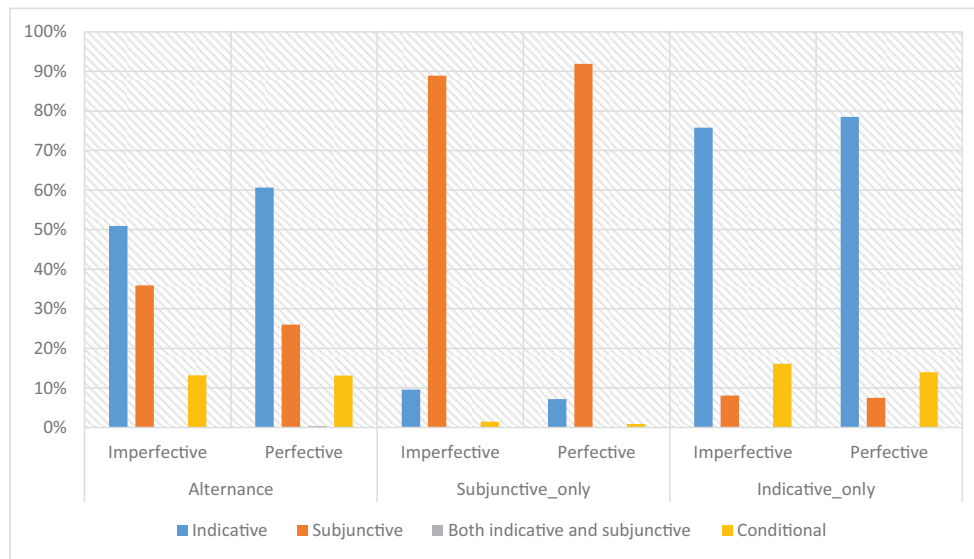
As in Experiment 1, we coded participants' answers consisting of the inflected form of the verb from the complement clause for mood: subjunctive, indicative and conditional. Cases when participants wrote two answers for a single experimental item (i.e. the form of the verb in the subjunctive and in the indicative) were coded as *both* subjunctive and indicative. Data was analyzed as in Experiment 1. First, we analyzed the frequencies of mood types in the complement clause. Second, we fitted a logistic generalized mixed model on the data points consisting of cases when participants answered either the subjunctive or the indicative. Third, we analyzed only the subset of alternance verbs in order to examine their overall behavior with respect to triggering a subjunctive or an indicative form in the complement clause.

#### Quantitative descriptive analysis of the whole set of data

The results of the quantitative descriptive analysis, carried out on the total number of data points (2016 observations) and investigating the role of the verb class and the verb tense expressed in the main clause, are provided in **Figure 2**. They revealed differences among the three sets of verbs tested.

First, verbs belonging to the alternance category present a different behavior according to the grammatical aspect of the main clause. Specifically, depending on whether the grammatical aspect of the matrix clause is the imperfective or the perfective, they trigger more indicative forms (60%) with the perfective than with the imperfective (51%). Also, more subjunctive forms (36%) are triggered when matrix verbs are in the imperfective than in the perfective (26%). Participants' choice of the conditional mood is not affected by the grammatical aspect of the matrix verbs: participants used in 13% of the cases independently of whether the matrix verb was the imperfective or the perfective.





**Figure 2:** Frequencies of mood types in the complement clause- Experiment 2.

Taking a closer look at the mood selection behavior of individual verbs from the alternance category (as shown in **Table 8**), Experiment 2 confirms the findings from Experiment 1. First, the verbs from this set present a variable pattern with respect to their selection of the indicative or the subjunctive. Second, the results confirm that there are verbs which manifest a strong preference for the indicative, such as *admettre*, *expliquer*, *ignorer* and *se plaindre*, and this independently of the grammatical aspect of the matrix verb. In contrast, *comprendre* and *s'assurer* have a strong preference for the indicative only when the matrix verb is in the perfective (100% and, respectively, 76%). Other verbs select most frequently the subjunctive, such as *accepter* and *suggérer*, and this independently of the grammatical aspect of the matrix verb. In contrast, the verb *rêver* selects more frequently the subjunctive when the matrix verb is in the imperfective (91%) than when it is in the perfective (40%). Finally, verbs such as *dire*, *imaginer*, *reconnaître* and *supposer* confirm that the conditional is an important competitor mood in the past tense domain, and this pattern does not seem to be affected by the grammatical aspect of the matrix verb (with the exception of *reconnaître*, for which the frequency of the conditional drops when a perfective is used in the matrix clause).

Second, verbs belonging to the subjunctive\_only set triggered most frequently but not exclusively the subjunctive in the complement clause, and this both when the grammatical aspect of the matrix verb was the imperfective (88% subjunctive, 10% indicative and 1% conditional) and the perfective (92% subjunctive, 7% indicative and 1% conditional). In other words, when verbs from the subjunctive\_only set are inflected in the perfective, they select less often the competing mood (here, the indicative) (7%) than when they are inflected in the imperfective (10%).

Matrix verb	Imparfait						Passé Composé							
	Indicative		Subjunctive		Cond		Indicative		Subjunctive		both		Cond	
	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.
Accepter 'accept'	1	4%	22	96%	0	0%		0%	25	100%	0	0%	0	0%
Admettre 'admit'	20	80%	4	16%	0	0%	23	100%	0	0%	0	0%	0	0%
Comprendre 'understand'	12	48%	11	44%	1	4%	23	100%	0	0%	0	0%	0	0%
Dire 'say'	14	61%	0	0%	9	39%	9	36%	2	8%	0	0%	14	56%
Expliquer 'explain'	23	100%	0	0%	0	0%	25	100%	0	0%	0	0%	0	0%
Ignorer 'ignore'	24	96%	1	4%	0	0%	18	78%	2	9%	0	0%	3	13%
Imaginer 'imagine'	10	43%	5	22%	8	35%	11	44%	4	16%	0	0%	9	36%
Nier 'deny'	18	72%	6	24%	1	4%	17	74%	5	22%	0	0%	1	4%
Reconnaître 'recognize'	18	78%	1	4%	4	17%	20	80%	4	16%	0	0%	1	4%
Rêver 'dream'	2	9%	21	91%	0	0%	13	52%	10	40%	1	4%	1	4%
S'assurer 'make sure'	6	26%	14	61%	3	13%	19	76%	6	24%	0	0%	0	0%
Se plaindre 'complain'	18	72%	7	28%	0	0%	18	78%	5	22%	0	0%	0	0%
Suggérer 'suggest'	0	0%	25	100%	0	0%	1	4%	21	91%	0	0%	1	4%
Supposer 'suppose'	4	16%	3	12%	18	72%	6	26%	3	13%	0	0%	14	61%
<b>Total</b>	<b>170</b>	<b>51%</b>	<b>120</b>	<b>36%</b>	<b>44</b>	<b>13%</b>	<b>203</b>	<b>60%</b>	<b>87</b>	<b>26%</b>	<b>1</b>	<b>0%</b>	<b>44</b>	<b>13%</b>

**Table 8** Individual verbs from the alternance set: Experiment 2.<sup>10</sup>

<sup>10</sup> Due to missing data caused by participants' lack of answer, for *admettre* (1 occurrence), *comprendre* (1 occurrence) and *imaginer* (1 occurrence), their relative frequencies do not add up to 100%.

A closer look at the behavior of individual verbs from this set, provided in **Table 9**, reveals that some verbs, such as *douter*, *redouter* and *s'inquiéter*, select the subjunctive less frequently (less than 90%) than expected (100%), and this effect is stronger when the matrix verb is in the imperfective. *Approuver* is shown to have an alternance behavior regardless of the grammatical aspect of the matrix verb: it selects the indicative in 44% of the cases when inflected as imperfective and 48% of the cases when inflected as perfective, while it selects the subjunctive in 52% of the cases when inflected as imperfective and 48% when inflected as perfective.

Third, verbs belonging to the *indicative\_only* set triggered most frequently but not exclusively the indicative mood, and this applies both when the matrix verb is in the imperfective (76% indicative, 8% subjunctive and 16% conditional) and in the perfective (78% indicative, 7% subjunctive and 14% conditional), as shown in **Table 10**. As it was the case for alternance verbs, the conditional is particularly frequent in the case of the *indicative\_only* set of verbs. A closer look at the behavior of individual verbs from the *indicative\_only* set shows that the indicative is in strong competition with both the subjunctive and the conditional when the matrix verb is *décider*, *déclarer*, *espérer* and *se douter*, regardless of their grammatical aspect. *Estimer* and *croire* diminish their preference for the indicative and increase their preference for the conditional, and this independently of whether they are inflected in the perfective or the imperfective. The other verbs tested, such as *constater*, *penser*, *raconter*, *trouver* and *voir*, remain relatively stable with respect to their selection of the indicative, and this pattern holds independently of their grammatical aspect.

### Analysis through logistic mixed-effects models

As in Experiment 1, in order to investigate how the distributive patterns of the matrix verb and its grammatical aspect influence mood choice, we constructed logistic mixed-effects models on the data in which participants' answers were a subjunctive or an indicative. The models were built following the same procedure as in Experiment 1 on 1808 data points.

Adding the distributive patterns of the matrix verb as a fixed factor to the simplest model, which only included items and participants as random effects, significantly improved the model ( $\Delta\chi^2 = 43.91$ ,  $\Delta df = 2$ ,  $p < .001$ ). Adding the grammatical aspect of the matrix verb as a fixed factor further improved the model's fit ( $\Delta\chi^2 = 6.26$ ,  $\Delta df = 1$ ,  $p < .001$ ). Finally, adding the interaction between the distributive patterns and tense of the matrix verb also further improved the model's fit ( $\Delta\chi^2 = 11.33$ ,  $\Delta df = 2$ ,  $p < .001$ ). According to this final model, we find in our data a significant main effect of the distributive patterns of the matrix verb, a significant main effect of its grammatical aspect and a significant interaction between them. Precisely, the significant main effect of the distributive patterns of the matrix verb confirms that, compared to the alternance category of verbs (which trigger the indicative in 64.3% and the subjunctive in 35.7% of the cases), *subjunctive\_only* verbs trigger the use of the subjunctive (91.5%) ( $\beta = 3.4730$ ,  $SE = 0.826$ ,  $p < .001$ ). The significant main effect of the grammatical aspect of the

Matrix verb	Imparfait						Passé Composé					
	Indicative		Subjunctive		Cond		Indicative		Subjunctive		Cond	
	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.
Apprécier 'appreciate'	0	0%	23	100%	0	0%	1	4%	24	96%	0	0%
Approuver 'approve'	11	44%	13	52%	0	0%	11	48%	11	48%	1	4%
Attendre 'wait'	1	4%	24	96%	0	0%	0	0%	23	100%	0	0%
Craindre 'fear'	2	9%	19	83%	1	4%	1	4%	24	96%	0	0%
Désirer 'desire'	0	0%	23	100%	0	0%	1	4%	24	96%	0	0%
Douter 'doubt'	4	16%	19	76%	2	8%	3	13%	20	87%	0	0%
Exiger 'require'	2	8%	23	92%	0	0%	1	4%	22	96%	0	0%
Ordonner 'order'	2	9%	20	87%	1	4%	0	0%	24	96%	1	4%
Permettre 'allow'	0	0%	23	100%	0	0%	0	0%	25	100%	0	0%
Proposer 'offer'	0	0%	23	100%	0	0%	1	4%	24	96%	0	0%
Redouter 'dread'	6	24%	19	76%	0	0%	2	9%	20	87%	1	4%
Refuser 'refuse'	0	0%	25	100%	0	0%	0	0%	23	100%	0	0%
S'inquiéter 'worry'	2	9%	20	87%	1	4%	3	12%	21	84%	0	0%
Souhaiter 'wish'	2	8%	21	84%	0	0%	0	0%	23	100%	0	0%
<b>Total</b>	<b>32</b>	<b>10%</b>	<b>295</b>	<b>88%</b>	<b>5</b>	<b>1%</b>	<b>24</b>	<b>7%</b>	<b>308</b>	<b>92%</b>	<b>3</b>	<b>1%</b>

**Table 9:** Individual verbs from the subjunctive\_only set: Experiment 2.

Matrix verb	Imparfait						Passé Composé					
	Indicative		Subjunctive		Cond		Indicative		Subjunctive		Cond	
	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.	abs. freq.	rel. freq.
Affirmer 'state'	24	96%	0	0%	0	0%	21	91%	1	4%	1	4%
Constater 'notice'	23	100%	0	0%	0	0%	23	92%	1	4%	0	0%
Croire 'believe'	23	92%	0	0%	2	8%	20	87%	0	0%	3	13%
Décider 'decide'	4	17%	1	4%	18	78%	2	8%	4	16%	19	76%
Déclarer 'declare'	19	83%	1	4%	3	13%	23	92%	1	4%	1	4%
Espérer 'hope'	7	28%	12	48%	6	24%	6	26%	12	52%	5	22%
Estimer 'consider'	8	35%	0	0%	15	65%	11	44%	0	0%	14	56%
Observer 'observe'	23	92%	2	8%	0	0%	22	96%	0	0%	1	4%
Penser 'think'	23	100%	0	0%	0	0%	25	100%	0	0%	0	0%
Raconter 'tell'	25	100%	0	0%	0	0%	23	100%	0	0%	0	0%
Remarquer 'remark'	24	96%	0	0%	1	4%	23	100%	0	0%	0	0%
Se douter 'suspect'	5	20%	11	44%	9	36%	16	70%	4	17%	3	13%
Trouver 'find, consider'	23	100%	0	0%	0	0%	24	96%	1	4%	0	0%
Voir 'see'	23	100%	0	0%	0	0%	24	96%	1	4%	0	0%
<b>Total</b>	<b>254</b>	<b>76%</b>	<b>27</b>	<b>8%</b>	<b>54</b>	<b>16%</b>	<b>263</b>	<b>78%</b>	<b>25</b>	<b>7%</b>	<b>47</b>	<b>14%</b>

Table 10: Individual verbs from the indicative\_only set: Experiment 2.

matrix verb reveals that the perfective aspect (here, the *Passé Composé*) significantly increases the probability to have an indicative in the complement clause (53.8%) compared to when the aspect is the imperfective (here, the *Imparfait*) (50.8%) ( $\beta = 0.9624$ ,  $SE = 0.2473$ ,  $p < .001$ ). Finally, the significant interaction between the distributive patterns and the aspect of the matrix verb indicates that verbs from the *subjunctive\_only* category which are expressed with the perfective aspect decrease the probability to use the indicative mood (7.2%) compared to when they are expressed using an imperfective aspect (9.8%) ( $\beta = -1.3158$ ,  $SE = 0.4010$ ,  $p < .001$ ).

#### Analysis of the subset of alternance verbs

As before, we analyzed the subset of alternance verb to investigate the role of grammatical aspect independently of the semantics of the main verb. We built the models by going from the simplest model to the one of interest. Adding the grammatical aspect of the matrix verb as fixed factor to the simplest model, which only included items and participants as random effects, significantly improved the model ( $\Delta\chi^2 = 16.547$ ,  $\Delta df = 1$ ,  $p < .001$ ). According to the model including the grammatical aspect of the matrix verb, having alternance verbs expressed in the *Imparfait* significantly decreases the probability to select the indicative mood (58.6%) compared to when they when they are expressed in the *Passé Composé* (70%) ( $\beta = -1.0047$ ,  $SE = 0.248$ ,  $p < .001$ ).

## 4 Discussion

As stated in the Introduction, our aim in this study was to verify experimentally the role of the distributive patterns of the matrix verb and two additional factors: its tense and its grammatical aspect. **Table 11** provides the summary of our results in the light of the hypotheses and the predictions formulated in section 3.1.

Our results confirm the existence of three semantic categories of predicates, whose mood selection behaviour was found to be influenced by the tense and of the aspect of the matrix verb. Our results also revealed important variability within each category at the level of the mood selection behaviour of the individual verbs tested. This variability also depends on the tense and on the aspect of the matrix verb. In what follows, we discuss each of these the three hypotheses in the light of the obtained results.

### 4.1 The role of the distributive pattern of the matrix verb

The semantics of the predicate hypothesis was tested in Experiment 1 and 2. As shown in **Table 11**, the results of our experiments confirm it partially. More specifically, we find that in each of the three sets of verbs tested (*indicative\_only*, *subjunctive\_only* and *alternance*), there are verbs which behave as predicted by grammars and semantic studies but also verbs which do not follow the predicted pattern. In other words, our results reveal a partial discrepancy between the theoretical prescriptions in terms of mood choice and the speakers' actual use of the indicative and the

	Hypothesis	Results
Exp 1 and Exp 2	<b>The distributive patterns hypothesis:</b> <ul style="list-style-type: none"> <li>▪ Mood choice in the complement clause is determined by the semantic category of the matrix verb</li> </ul>	<ul style="list-style-type: none"> <li>✗ Subjunctive_only verbs are followed by the subjunctive mood. <ul style="list-style-type: none"> <li>➤ Only for some verbs of this set</li> </ul> </li> <li>✓ Indicative_only verbs are followed by the indicative mood.</li> <li>✗ Alternance verbs are followed either by subjunctive or the indicative mood, i.e. a random variable pattern. <ul style="list-style-type: none"> <li>➤ Only for some verbs of this set</li> </ul> </li> </ul>
Exp. 1	<b>The tense hypothesis:</b> <ul style="list-style-type: none"> <li>▪ Mood choice in the complement clause is influenced by the tense of the matrix verb.</li> </ul>	<ul style="list-style-type: none"> <li>✓ A present tense in the matrix clause favours the use of the subjunctive whereas a past tense significantly favours the indicative.</li> <li>✓ Main effect</li> <li>✓ Interaction effect</li> </ul>
Exp. 2	<b>The aspect hypothesis:</b> <ul style="list-style-type: none"> <li>▪ Mood choice in the complement clause is influenced by the grammatical aspect of the matrix verb.</li> </ul>	<ul style="list-style-type: none"> <li>✗ French follows the Greek/Bulgarian pattern: a perfective tense in the matrix clause favours the use of the subjunctive whereas an imperfective tense significantly favours the indicative.</li> <li>✓ French follows the spoken Quebec French of the 20<sup>th</sup> century pattern: a perfective in the matrix clause favours the use of the indicative whereas an imperfective significantly favours the subjunctive.</li> <li>✓ Main effect</li> <li>✓ Interaction effect</li> </ul>

**Table 11:** Summary of results in the light of hypotheses and predictions.

subjunctive. For example, Gosselin (2010) argues that verbs such as *douter* ‘doubt’, *craindre* ‘fear’ or *souhaiter* ‘wish’ must be followed by the subjunctive and the indicative is not acceptable. Our results show that speakers do use these verbs with the indicative (13% for *douter* ‘doubt’ when inflected in the *Passé Composé* and 16% when inflected in the *Imparfait*, 6% for *craindre* ‘fear’ when inflected in the present tense, 9% in the *Imparfait* and 4% in the *Passé Composé*, and 6% for *souhaiter* ‘wish’ when inflected in the present tense and 8% when inflected in the *Passé Composé*). Another example is that of *supposer* ‘suppose’, *imaginer* (‘imagine’) and *admettre* ‘admit’ which are included in the alternance category because they require the indicative in affirmative sentences but change their requirement in negative, interrogative or imperative sentences (Gosselin 2010). Our findings show that these verbs accept the subjunctive in affirmative sentences as well (31% for *admettre* when inflected in the present tense and 16% when inflected in the *Imparfait*, 22% for *imaginer* when inflected in the *Imparfait*, 16% when inflected in the *Passé Composé*, 16% for *supposer* when inflected in the *Imparfait* and 13% when inflected in the *Passé Composé*). These results confirm the hypothesis put forth by Mari (2016), and then Giannakidou & Mari (2021),

that fictional predicates license both the indicative and the subjunctive, and this due to their “systematic polysemy” consisting of expressive and inquisitive interpretations. In addition, in the case of *imaginer* and *supposer*, the indicative is not only in competition with the subjunctive but also with the conditional when inflected in the past tense (35% for *imaginer* with the *Imparfait*, 36% with the *Passé Composé*, 72% for *supposer* with the *Imparfait*, 61% with the *Passé Composé*). Crucially, to the best of our knowledge, this result has not been predicted by theoretical studies.

Furthermore, our results indicate that the variety of French tested does not follow the same pattern found for spoken Quebec French by Poplack et al. (2013). Indeed, throughout the two experiments, we have found that there are subjunctive governors which were followed exclusively by the subjunctive, such as *attendre* ‘wait’, *permettre* ‘allow’, *proposer* ‘propose, offer’, *ordonner* ‘order’, or almost exclusively by the subjunctive (> 90% of the cases), such as *apprécier* ‘appreciate’, *craindre* ‘fear’, *exiger* ‘demand, require’, *ordonner* ‘order’ and *souhaiter* ‘wish’, when they are inflected in the past tense. This pattern is less systematic when these verbs are inflected in the present tense, with the exception of *attendre* ‘wait’, *permettre* ‘allow’, *proposer* ‘propose, which are exclusively followed by the subjunctive (Table 5). Regarding the category of *indicative\_only*, Experiment 1 showed that all the verbs tested behaved as predicted by grammars and semantic studies, with rates of indicative between 99%-100%, with the exception of *croire* ‘believe’, which was followed by the indicative in 94% of the cases. Unexpectedly, Experiment 2 revealed a strong interaction between grammatical and distributive patterns of the verb: the rate of the indicative for most of the *indicative\_only* verbs dropped significantly compared to Experiment 1 while the rates of the subjunctive and the conditional increased. This pattern is observed for *decider* ‘decide’, *espérer* ‘hope’, *estimer* ‘consider’ and *se douter* ‘suspect’ (cf. Table 10).

In sum, we argue that these sets of verbs are more heterogenous than initially supposed and that they should be rethought. We follow Comeau (2020), who argues that the subjunctive is governed by the meaning or the semantics of the matrix verb. In other words, the role of the matrix verb goes beyond simply belonging to fixed lexical constructions but this has been hidden by a methodological issue generally adopted in corpus-based studies. As put by Comeau:

*“By limiting the analysis to those contexts which can select the subjunctive (the main clause verbal and non-verbal elements), we do not clearly see whether these elements belong to larger semantic classes in the language or whether they are the sole members of such classes. To accurately assess the semantic aspects of these main clause elements, one would have to consider all main clause elements which select a finite embedded clause within a corpus. By considering whether there are other main clause verbs which fall into the same semantic classes (volition, doubt, etc.), then we might be able to see whether it is the larger semantic class of verbs which can express a similar meaning that selects the subjunctive or only a particular subset of this class (namely, those verbs which have been found to select the subjunctive).” (2020: 42).*



We thus put forward that the formulation of homogenous, semantically justified, classes of matrix verbs should be targeted, as the simplified method of applying a label (subjunctive-selecting or indicative-selecting) is not nuanced enough to account either for the empirical data or for the fine-grained analyses put forward in formal semantics (e.g. Mari 2016, Giannakidou & Mari 2021; cf. discussion in section 4.4). We leave this objective for future research. At the same time, it is crucial to remember that the distributive pattern of matrix verbs as indicative governors, as subjunctive governors and, respectively, as alternance verbs is strongly influenced by the tense and the grammatical aspect used in the matrix clause (as we discuss in sections 4.2 and 4.3).

## 4.2 The role of tense

The tense hypothesis was tested in Experiment 1. This experiment, in which the matrix verbs were inflected either with a past or a present tense, showed the following findings. First, the subjunctive is in strong competition with the indicative but also with the conditional, and this both in what concerns the alternance and the subjunctive\_only sets of verbs. Importantly, this effect is observed almost exclusively when the matrix verb is in the past tense. Two typical examples are *imaginer* (from the alternance set), which was followed by the conditional in 69% of the cases when it was inflected in the past tense compared to only 3% when it was inflected in the present tense (Experiment 1, **Table 4**), and *approuver* (from the subjunctive set), which was followed by the conditional in 19% of the cases when it was inflected in the past tense but only in 3% when it was inflected in the present tense (Experiment 1, **Table 5**).

Second, we found that, in general, there is a significant effect of the tense of matrix verb: past tense significantly boosts the indicative whereas present tense boosts the subjunctive. However, this effect comes from the alternance set of verbs. We thus find that when verbs from this set are inflected in the present tense the probability to have the subjunctive in the complement clause significantly increases (54%) compared to when they are inflected using a past tense (30%). For example, the verbs *comprendre* ‘understand’, *concevoir* ‘understand’, *nier* ‘deny’, *rêver* ‘dream’ frequently select the subjunctive (57% of the cases for *comprendre* and *concevoir*, 60% for *nier*, 94% for *rêver*) when they are inflected in the present tense whereas they select this mood less frequently (0% for *comprendre* and *concevoir*, 3% for *nier*, 3% for *rêver*) when they are inflected in the past tense. In contrast, the opposite effect is found for verbs from the subjunctive\_only set. We find that when verbs from this set were inflected with a present tense the probability to have the subjunctive in the complement clause decreased compared to when they were inflected using a past tense. For example, the verbs *apprécier* (‘appreciate’) and *redouter* (‘dread’) select the subjunctive in 86% of the cases when they are inflected in the present tense whereas they selected this mood in 97% and 94%, respectively, when they were inflected in the past tense.

In sum, Experiment 1 reveals the crucial effect of tense on the mood choice and, crucially, its interaction with the distributive patterns of the matrix verb (as discussed above).

### 4.3 The role of grammatical aspect

The grammatical aspect hypothesis was tested in Experiment 2. This experiment, in which all matrix verbs were either in the past perfective or the past imperfective, showed the following results. First, it confirmed that the subjunctive is in strong competition with the indicative but also with the conditional, and this both in what concerns the alternance and the subjunctive\_only sets of verbs. Second, we found a significant effect of grammatical aspect of the matrix verb: across all three sets of matrix verbs, the perfective aspect boosts the use of the indicative. Third, there was a significant interaction between the distributive pattern and the aspect of the matrix verb: for verbs from the subjunctive\_only category expressing the perfective strongly decreases the probability of using the main competing mood (the indicative) compared to when they express the imperfective. For example, the verbs *craindre* ‘fear’ and *redouter* ‘dread’ select the indicative in 4% and 9%, respectively, of the cases when the matrix verb is in the perfective and 10% and 24%, respectively, of the cases when the matrix verb is in the imperfective. Fourth, for the alternance distributive pattern only, the use of an imperfective matrix verb significantly decreases the probability to use the indicative mood compared to when they are inflected in the perfective. For example, the verbs *rêver* ‘dream’ and *s’assurer* ‘make sure’ select the indicative in 9% and 26%, respectively, of the cases when the matrix verb is inflected in the *Imparfait* whereas they select the indicative in 52% and 76%, respectively, of the cases when the matrix verb is inflected in the *Passé Composé*.

At a general level, our results confirm the aspect hypothesis and show that the variety of French tested does not follow the Greek/Bulgarian pattern (cf. discussion in 2.3) but that of the spoken Quebec French of the 20<sup>th</sup> century. The main effect of grammatical aspect is concordant with that of tense and they map mood choice straightforwardly. This mapping may be related to the fact that past/perfective/indicative seem to form one class with respect to veridicality whereas the present/imperfective/subjunctive form a different one. We leave this open for future research.

Furthermore, what has not been predicted is the direction of the interaction effect between grammatical aspect and the distributive patterns of the predicate, and more specifically, the effect on the subjunctive\_only set of verbs compared to that of alternance verbs. As observed by one anonymous reviewer, our findings reveal that the subjunctive is boosted with present tense on alternance verbs while present tense decreases its probability with subjunctive selecting verbs. Likewise, the probability of the indicative decreases with alternance verbs when inflected in the imperfective while the perfective decreases the probability of the indicative with subjunctive verbs. We address this mood choice puzzle in the following section.

#### 4.4 The interrelations between tense/aspect and the distributive patterns of the matrix verb

As suggested by one anonymous reviewer, one plausible explanation for this puzzle pertains to the ambiguity of different predicate types which belong to the subjunctive\_only or the indicative\_only distributive patterns. Indeed, as previously shown by Mari (2016) and Giannakidou & Mari (2021), some verbs (such as predicates of belief and fictional predicates) are in fact polysemous (cf. also Gosselin's 2007 classification of verbs that present a change in meaning when followed by the indicative or the subjunctive, as discussed in section 2.1 with reference to the verb *credere* 'believe'). Mari's (2016) distinction between *expressive* (a doxastic dimension) and *inquisitive* (which features both a doxastic and an epistemic dimension) interpretations holds also for the bouletic predicate *espérer* 'hope', as shown in examples (38) and (39). In (38), the hearer infers that it is already decided where the Olympics will take place and s(he) does not know it. Here, *espérer* has an inquisitive use, i.e. the matter is settled, and it is followed by a subjunctive. In contrast, in (39), the hearer infers that it is not already decided where the Olympics will take place. Here, *espérer* has an expressive use, i.e. the matter cannot be verified, and it is followed by an indicative.

(38) J'espère que les Jeux olympiques d'hiver aient lieu en Suisse. (French)  
'I hope that the next winter Olympic games take place in Switzerland.'

(39) J'espère que les Jeux olympiques d'hiver auront lieu en Suisse. (French)  
'I hope that the next winter Olympic games will take place in Switzerland.'

In this context, the effect of tense and grammatical aspect on mood choice, and its interaction with the distributive patterns of the matrix verb, may be better understood. In the case of subjunctive\_only verbs, the present/imperfective decreases the use of the subjunctive to convey that in the complement clause there is no fact of matter at stake. For example, in our data from Experiment 2, the verb *redouter* 'dread' is classified as a subjunctive\_only but it triggered the indicative for 8 observations, among which 6 observations corresponded to cases when the matrix verb is in the *Imparfait*. In contrast, in the case of alternance verbs, the present/imperfective increases the use of the subjunctive to convey that in the complement the matter is settled. For example, *admettre* 'admit' is classified as alternance verb (thus, we expect a variable pattern regarding the selection of the indicative and the subjunctive) but it triggered 16% subjunctive responses (4 observations), which all correspond to cases when the matrix verb is in the *Imparfait*.

The pairs of examples (40)–(41) and (42)–(43) illustrate the two possible interpretations of *redouter* and *admettre*, when they are followed by the subjunctive and, respectively, the indicative. Examples (40) and (42), the verbs *redouter* and *admettre* have an inquisitive use (i.e. a matter of fact is at stake) and the subjunctive is used in the complement clause to convey that the matter

is settled. In contrast, in (41) and (43) the verbs *redouter* and *admettre* have an expressive use (i.e. there is no fact of the matter at stake) and the indicative is used in the complement clause to convey that the matter is not settled.

- (40) Lors de son dernier voyage, le guide redoutait que les randonneurs veulent faire l'ascension dans la nuit. (French)  
 'On his last trip, the guide feared that hikers would want to make the climb at night.'
- (41) Lors de son dernier voyage, le guide redoutait que les randonneurs voulaient faire l'ascension dans la nuit. (French)  
 'During his last trip, the guide feared that the hikers wanted to make the ascent at night.'
- (42) La comptable admet que le rapport financier puisse avoir des erreurs. (French)  
 'The accountant admits that the financial report could have errors.'
- (43) La comptable admet que le rapport financier peut avoir des erreurs. (French)  
 'The accountant admits that the financial report may have errors.'

As such, our results reveal that verbs are much more polysemous than initially believed, and that this polysemy (linked to inquisitiveness vs. expressiveness) often determines their mood choice behavior.

## 5. Conclusion

In this study, we carried out two experiments with the purpose of verifying experimentally the role of the matrix verb on mood choice, through its distributive patterns: verbs selecting only the subjunctive, verbs selecting only the indicative and verbs accepting both moods, and of opening a path towards considering two other factors, the tense and the grammatical aspect of the matrix verb. Our results confirmed that mood choice in complement clauses depends on the meaning of individual matrix verbs and revealed that it also depends on their tense and on their grammatical aspect. First, we found some variability within the three sets of verbs tested, as there are several verbs, but not all, which do not behave as predicted (i.e. as categorized by the literature). Among verbs predicted to accept equally the indicative and the subjunctive, the verb *accepter* showed a strong preference for the subjunctive, whereas *se plaindre* 'complain' and *admettre* 'admit' selected the indicative more frequently than the subjunctive. Among verbs predicted to select only the subjunctive, the verbs *apprécier* 'appreciate', *redouter* 'dread', *approuver* 'approve' and *craindre* 'fear' select also the indicative and the conditional. Among verbs predicted to select only the indicative, almost all verbs followed this pattern with the exception of *croire* 'believe'. Our results support the hypothesis that the meaning of the matrix verb plays a role in mood choice and reveal that homogeneous classes, semantically defined, should be formulated (see Comeau 2020 for a similar claim).

Furthermore, our study revealed a clear influence of the tense and of the grammatical aspect of the matrix verb on mood choice, which had not been systematically investigated before. Surprisingly, we find an important interaction and dissimilar effect between tense/aspect and the distributive patterns of the verb. More specifically, the subjunctive is boosted with present tense on alternance verbs while present tense decreases its probability with subjunctive selecting verbs. Also, the probability of the indicative decreases with alternance verbs in the imperfective while the perfective decreases the probability of the indicative with subjunctive verbs. To interpret this puzzle, we draw on the work of Mari (2016) and Giannakidou & Mari (2021), to argue that some verbs are in fact polysemous. Precisely, when followed by a subjunctive, they have an inquisitive use and communicate that the matter is settled. When followed by an indicative, they have an expressive use and communicate that the matter is unsettled (but see Baunaz and Puskás 2022 for a different view). We show these two uses in concrete examples from our data. At a general level, we believe that the findings put forth in this paper have the potential to bring more light on the issue of mood choice and should be further considered and integrated in theoretical syntactic and semantic models.

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## Data accessibility statement

The items and the raw data from Experiments 1 and 2 are available on SWISSUbase <https://doi.org/10.48656/wqvx-pe84>.

## Ethics and consent

Following Swiss national and institutional — University of Neuchâtel — guidelines, Experiments 1 and 2 were exempt from the validation of an Ethics Committee due to the fact that they sample healthy adults, use behavioural non-invasive methods for data collection, and pose no risk or physical/emotional burden to participants. Participants signed an Informed Consent, and no personal or sensitive data was collected.

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## Competing interests

The authors have no competing interests to declare.

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