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ARTICLE

Lexical effects on mood interpretation in French adverbial clauses

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Abstract

The late-acquired French subjunctive–indicative contrast conveys important information about event realization and is characterized by bound morphology, form ambiguity, contextual restrictedness, and the infrequency of the subjunctive. This study contributes underrepresented adverbial-clause interpretation data and incorporates lexical effects to extend what is known about why French mood is late-acquired. We assess interpretation of four adverbial conjunctions which primarily co-occur with subjunctive or indicative mood in corpus searches. Analysis of 77 participants revealed a statistically significant interaction between mood and proficiency, with more proficient learners affected by mood, whereas clause order influenced less proficient learners. Moreover, lower-proficiency learners treated adverbs within a particular class of co-occurrence more similarly across the 32 items than our advanced learners or native speakers, who were sensitive to lexical effects, attributable to the roles of frequency and semantics. The study contributes to the growing body of research on late-acquired structures, for which learners attend to evolving cues across acquisitional trajectories.

Keywords: tense-mood-aspect; adverbial clauses; French; variation; usage-based approaches

Résumé

Le contraste subjonctif–indicatif acquis tardivement en français véhicule des informations importantes sur la réalisation d'événements et se caractérise par une morphologie flexionnelle, une ambiguïté de forme, une restriction contextuelle et la rareté du subjonctif. La présente étude apporte des données sous-représentées sur l'interprétation des clauses adverbiales et incorpore les effets lexicaux afin d'étendre les connaissances sur les raisons de l'acquisition tardive du mode en français. Nous évaluons l'interprétation de quatre

conjonctions adverbiales qui coïncident principalement avec le subjonctif ou l'indicatif dans les recherches de corpus. L'analyse de 77 participants a révélé une interaction statistiquement significative entre le mode et le niveau de compétence, les apprenants ayant une compétence plus avancée étant affectés par le mode, tandis que l'ordre des clauses influençait les apprenants moins avancés. En outre, les apprenants ayant une compétence moins avancée ont traité les adverbes d'une classe particulière de cooccurrence de manière plus similaire sur les 32 items que nos apprenants avancés ou nos locuteurs natifs, qui étaient sensibles aux effets lexicaux, attribuables au rôle de la fréquence et de la sémantique. L'étude contribue au nombre croissant de recherches sur les structures acquises tardivement, pour lesquelles les apprenants sont attentifs aux indices évoluant à travers les trajectoires d'acquisition.

1. Introduction

Numerous French verbs use the same or homophonous forms for indicative and subjunctive mood (McManus and Mitchell 2015), and many contexts may permit native speaker (NS) variability (Gudmestad 2018). The French subjunctive is typically described as late-acquired, with low use reported for adult first- (L1) and second-language (L2) French users, as well as delayed sensitivity to factors that constrain the mood contrast across production and grammaticality judgment tasks (Bartning and Schlyter 2004; Howard 2008, 2012; Ayoun, 2013; Gudmestad and Edmonds 2015; McManus and Mitchell 2015; see Gudmestad 2018 for an overview).

The study of the acquisition of the mood contrast in French thus stands to contribute to our knowledge of late-acquired structures because it is characterized by redundant semantic contexts, use of bound morphology, and a lack of one-to-one form-meaning correspondences (Ellis 2016). The current study diverges from its predecessors by implementing subjunctive-indicative pairs that differ morphologically, pairing each mood with especially reliable adverbs of co-occurrence substantiated by corpus findings, and assessing possible lexical effects in order to determine whether our task could elucidate learner sensitivity to differential cues across proficiency levels.

2. Background

We first consider the acquisition of L2 variable structures and usage-based approaches to language development. We then describe the French mood contrast, focusing on adverbial clause contexts.

2.1 Acquisition of L2 variation: Underpinnings from functional approaches

A primary acquisitional challenge is that language learners must learn how to reliably link form to meaning as they attend to their interlocutor's message. Moreover, learners experience prolonged stages of associating one form with one meaning (the One-to-One Principle, Andersen 1984), with an early tendency to assign temporal-modal-aspectual meaning based on perceived pragmatic (e.g., assumption of chronological ordering) and lexical (e.g., temporal adverbial) cues, which precede

dependable reliance on bound verb morphology (as seen in functional, concept-oriented approaches, Bardovi-Harlig 2017). Even when we might expect a particular morphological contrast, lexical effects may reveal that certain members within the same class of co-occurrence diverge based on factors including frequency, regularity, salience, and semantics (Bybee 2017, Goldberg 2019). For example, the class of French verbs that allow (or prescriptively require) the subjunctive in their nominal clause complements (i.e., verbal governors of the subjunctive) includes *falloir* 'be necessary' and *aimer* 'love', although diachronic analysis reveals differentiation, with greater co-occurrence of the subjunctive following *falloir* (Poplack et al. 2013, 2018).

In considering learners' attempts to connect form to meaning, variationist approaches to L2 acquisition consider the multiple factors that constrain learner grammars along acquisitional trajectories as learners select one form over another based on linguistic, social, or stylistic constraints (Bayley and Tarone 2012, Geeslin with Long 2014, Gudmestad 2018). This body of work has shown that learners become sensitive to additional variables as trajectories unfold, integrating target-like predictors of language variation in a piecemeal fashion. For example, in varying between overt and unexpressed subject pronouns in L2 Spanish, learners are first affected by switches in reference and then by the verb's tense-mood-aspect as well (Linford and Shin 2013). A subset of this research considers whether characteristics of individual lexical items (e.g., token frequency, semantic properties) contribute to patterns of language use (e.g., Linford and Shin 2013, Bayley et al. 2017). According to usage-based approaches that often underpin variationist research, grammar is extracted from language experience and is inseparable from information about the frequency of use of linguistic elements, their associations, and their most likely contexts of occurrence (Bybee 2010, 2017; Ellis 2016; Goldberg 2019).

In usage-based accounts, possible distinctions between lexical and grammatical (i.e., lexico-grammatical) components are considered along a continuum and are subject to change (Tomasello 2009): through grammaticalization, lexical information may become grammatical over time and forms may develop additional grammatical functions, as exemplified in the next section (see Howe 2018). Accordingly, usage-based accounts do not assume an a priori existence of grammatical structure but instead the emergence of structure through recurrent usage patterns (see Bybee 2010).

Since language use is contextual, the usage frequency of a lexical item in conjunction with other forms in its vicinity is important to consider. A French speaker stores information not only about the phonological and semantic properties of the adverbial conjunction *tandis que* 'while/whereas', but also contextual properties such as settings of probable use and other constructions likely to co-occur. For instance, *tandis que* typically collocates with predicates that encode indicative mood (Poplack et al. 2013), as in *tandis qu'elle va* 'while she goes'. Pairing with one mood versus another in high relative frequency heightens representational strength for a particular collocation, as network models posit lexical connections that reflect contextual information and account for storing multi-word constructions (Bybee 2010, Goldberg 2019). Thus, speakers likely perceive collocations as a chunk (meaningful bundle), since constructions that frequently co-occur are stored together in a single node and become entrenched, blocking potential competitors (such as *tandis que* plus subjunctive) through statistical preemption when speakers select forms.

Similarly, if used frequently, an adverb paired with subjunctive mood (such as *avant que* 'before') may resist an analogical shift to the dominant type frequency (the overall more widespread pattern of adverb plus indicative). Alternatively, an infrequent pairing or one linked to substantial variability rather than one particular mood (such as *après que* 'after', robust with both moods, see Poplack et al. 2013) may be less resistant to change (i.e., may allow subsequent change). Greater exposure to input should gradually increase such probabilistic sensitivity (Tomasello 2009, Bybee 2010, Goldberg 2019): thus, lower-proficiency learners may not match native speakers (NSs) and proficient learners in this regard.

Stronger representations for more consistent form-meaning pairings are congruent with the formation of prototypes that foment development within a particular class/category (Quesada 1998, Goldberg 2019). Accordingly, lower-level learners may create a strong prototype for a high-frequency form, revealing sensitivity to its characteristics before those of less frequent forms. Similar to the role of lexical frequency, multi-word constructions with high collocational frequency tend to be facilitative for L2 learners (Yi 2018). Even when lexical frequency does not predict language variation, it has revealed a mediating effect for other variables, such as significant differences in overt subject expression within semantic classes when divided by verb frequency (Erker and Guy 2012). Frequency is thus a relevant variable but should be analyzed alongside others multi-factorially rather than as the lone constraint driving acquisition (Ellis and Wulff 2020).

Having considered functional underpinnings to the L2 acquisition of variation, we turn to concerns related to tense-mood-aspect and the French subjunctive.

2.2 Tense-mood-aspect, morphological marking, and the formation of French subjunctive

Tense-mood-aspect categories offer a complex interdependence. While these three constructs convey separate information, changes to the value of one often reverberate for another. For example, futurity encompasses not only tense but mood (Bardovi-Harlig 2017). As Dahl (1985: 103) notes, "when we talk about the future […] we are making a(n) […] extrapolation from the present", meaning that future-time reference differs modally from non-future; thus, for the future "the distinction between tense and mood becomes blurred." Moreover, modality divides realis and irrealis categories, classifying both future and subjunctive as irrealis (Palmer 2001).

Consequently, irrealis meanings associated with future and subjunctive forms are likely to co-occur across contiguous contexts, contributing to the syntactic-semantic link between the two. This congruity also surfaces diachronically: forms indicating irrealis modalities (intention, obligation) grammaticalize into future and subjunctive inflectional morphology. For example, the Latin obligative construction [infinitive + *habere* 'to have to'] grammaticalized into inflectional future endings seen across numerous contemporary Romance languages, revealing remnants of the latter verb (see Howe 2018).

In modern French, many verbs do not differentiate morphologically between present indicative and subjunctive for most persons/numbers, including regular -*er* verbs, which only differ for first- and second-person plural (Howard 2008). For

instance, 3SG *parle* could be indicative or subjunctive ('speaks/might speak'). Alternatively, irregular (i.e., suppletive) verbs (e.g., *aller* 'go') and most *-ir/-re* verbs (e.g., *sortir* 'go out/leave', *mettre* 'put') offer additional differences, such as the 3SG contrast *met* 'puts' versus *mette* 'might put'. Some verbs make this distinction orthographically, but may be pronounced identically (Valdman 1976, Gudmestad 2018), like the homonymous *je cours* 'I run' and *je coure* 'I might run'. Unsurprisingly, then, O'Connor DiVito's (1997) multi-genre corpus analysis of native oral and written French yielded unambiguous subjunctive use in just 1% and 2% of clauses, respectively.

2.3 Mood distinction in French adverbial clauses: Grammars and usage

French grammars typically describe adverbial conjunctions as co-occurring with one particular mood. For example, Boularès and Frérot (2019: 60) note that certain conjunctions are followed by the subjunctive, introducing states or events before some possible realization. The authors include within this group adverbs of anteriority/anticipation, listing *avant que* 'before' and *jusqu'à ce que* 'until'.

Consequently, the adverb-plus-mood combination affects the co-occurring main clause. Since adverbial clauses with *avant que* or *jusqu'à ce que* plus subjunctive are thought to describe events that have not yet occurred, they pair with a main clause conveying similar information (future or conditional meanings). In (1), note juxtaposition of *jusqu'à ce que* plus subjunctive (*tu reviennes* 'you return') in the adverbial clause and the future in the main clause (*on attendra* 'we will wait'):

(1) On   attendra jusqu'à ce que   tu   reviennes
    one   wait.FUT until   COMP 2SG   return.PRS.SBJV
    'We will wait until you come back.' (Boularès and Frérot, 2019: 54)

Alternatively, Boularès and Frérot (2019: 60) explain that other conjunctions pair with indicative, introducing realized actions. These comprise adverbial conjunctions of simultaneity, including *quand* 'when' and *tandis que* 'while/whereas'. Thus, such clauses match the realis notion of realization in a particular moment or habitual occurrence. Accordingly, in (2) the *tandis que* adverbial clause contains indicative mood (*je fais* 'I do') and the main clause conveys present tense (*elle s'occupe* 'she occupies herself'):

(2) Elle   s'occupe   du   bébé tandis que je   fais
    3SG   occupies.herself.PRS of.the   baby while COMP   1SG   do.PRS.IND
    tout   le   travail.
    all   the   work
    'She looks after the baby while I do all the work.' (Hawkins and Towell 2010: 411)

These examples reiterate that modality is a feature extending beyond the form of one particular verb: (ir)realis notions are expressed across clauses. Thus, adverb semantics, adverbial-clause mood, and main-clause tense-mood-aspect collectively render the speaker's perspective. According to grammatical descriptions, consistent combinations convey the intended temporal-modal meaning.

To better ascertain whether usage matches such descriptions, Poplack et al. (2013) compared grammars and oral corpora. Among few persistent, diachronic prescriptions in grammars were *avant que* 'before' and *jusqu'à ce que* 'until' triggering subjunctive and *quand* 'when' and *tandis que* 'while/whereas' indicative. The subjunctive's most commonly recurring semantic readings included nonfactive modalities and irrealis states. Three oral corpora of Quebec French revealed that *avant que* was increasingly linked to the subjunctive, and, despite few uses, *jusqu'à ce que* co-occurred with the subjunctive categorically in the 20th and 21st centuries. Although numerous "indicative" governors actually co-occurred with subjunctive, *quand* and *tandis que* did not. Overall, oral data showed the subjunctive to be connected to particular governors (i.e., lexical effects), morphology of embedded verbs (i.e., irregular/suppletive), and the complementizer *que*.

Poplack et al. (2018) echo the 2013 study in demonstrating that currently French mood expression reflects relatively few governors of the subjunctive, which nevertheless reliably yield subjunctive usage. The authors consider subjunctive's grammaticalization (i.e., evolution) into a subordination marker across the Romance languages. Their comparison of French, Spanish, Italian, and Portuguese reveals that the subjunctive is least productive (occurs with the fewest governors and embedded verbs) in French but that it is very reliably selected in those contexts. Unsurprisingly, French leads the other languages in its level of syncretism (homophony across moods). Moreover, in each language there is more variability across governors than within governors: each language has "lexical bias" as the major predictor of subjunctive mood (i.e., certain governors reliably predict subjunctive) rather than selecting mood based on *sets* of related governors or meanings. Thus, careful analysis of particular governors of mood is necessary.

2.4 L2 acquisition of French subjunctive and remaining gaps

Research on the L2 acquisition of French mood has generally covered diverse syntactic contexts and meanings (Bartning and Schlyter 2004; Howard 2008, 2012; Ayoun 2013; McManus et al. 2014; Gudmestad and Edmonds 2015; McManus and Mitchell 2015) rather than targeting a particular function (see Gudmestad 2018 for an overview). Verbal governors (e.g., *falloir* 'be necessary') have been highlighted over non-verbal subjunctive triggers such as adverbial conjunctions, although the latter may be reported, often in small counts due to subjunctive's infrequency and form ambiguity. Production data have pervaded, with occasional exceptions of grammaticality judgment tasks (GJTs: McManus et al. 2014, McManus and Mitchell 2015), although learner linkage of these clauses to temporality/realization (i.e., connection of subjunctive with non-realized or not presently occurring action) remains uninvestigated. We focus on the few studies that have included adverbial clauses among broader results.

For instance, in Howard's (2008) sociolinguistic interviews *avant que* 'before' and *jusqu'à ce que* 'until' were the two most frequent subjunctive governors for learners who had completed two years of university study or spent one year in France. Using similar methods, McManus and Mitchell (2015) analyzed 29 third-year English-speaking learners of French, collecting longitudinal data before, during, and after a nine-month stay in France. In semi-structured oral interviews, *avant*

que was among the most frequently used subjunctive triggers in the collections abroad, despite low use overall; it was among the top five subjunctive triggers that together accounted for nearly 65% of uses. In a written task, adverbial conjunctions were more commonly produced than in oral speech. In a timed GJT, higher-proficiency learners did not score significantly higher than lower-proficiency learners for adverbial conjunctions at the compared times, and neither group approximated NSs.

McManus et al. (2014) focused on 23 participants from the 2015 study. Their time-limited GJT revealed no main effect for syntactic context but one for proficiency level. The authors noted benefits of their more controlled task, which allowed them to test an infrequent structure with exclusively morphologically-differing forms. Subjunctive was still developing among their relatively advanced group, and the authors called for subsequent use of independent measures of proficiency to disentangle relevant differences within groups. They also encouraged consideration of semantics, following its effect for L2 Spanish mood (Gudmestad 2018).

Especially relevant are the controlled elicitation results of Gudmestad and Edmonds (2015), who assessed L2 learners and NSs of French in contextualized clause and verb elicitation tasks. Among the contexts analyzed were adverbials, including *avant que, jusqu'à ce que,* and *quand.* Unlike the NSs, no learner group responded categorically to these three adverbs. Nevertheless, learners generally moved toward native-like rates of mood use for these adverbs, although the trajectory was not always linear. Learners also differentiated between *avant que* and *jusqu'à ce que* more as proficiency increased. Semantic category (e.g., temporal uses in adverbial clauses) was a strong predictor for NSs and learners. The first two learner levels significantly favoured subjunctive when the clause's temporality was futurate, reflecting the subjunctive's irrealis nature.

Though these studies generally reveal the increasing connection between *avant que/jusqu'à ce que* and subjunctive in L2 French production as learners gain proficiency (Howard 2008, Gudmestad and Edmonds 2015, McManus and Mitchell 2015), we concur with McManus et al. (2014) that the late-acquired, infrequent, and potentially formally-ambiguous nature of subjunctive benefits from controlled, written data and independent proficiency measures to disentangle developmental shifts. Consequently, new methods may reveal greater fine-grained (subtle, piecemeal) development regarding how learners respond to mood (especially at earlier levels) if this contrast is assessed through more dependable form-meaning combinations: unambiguous verb forms and mood-adverb combinations consistently linked in corpus data. Informed by cross-linguistic predictions that learner associations with tense-mood-aspect evolve from pragmatic and lexical to morphological stages (Klein 1995, Bardovi-Harlig 2017), such a design can also manipulate factors expected to affect each stage, positioning the instrument to reveal micro-development, even for an otherwise low-frequency form. In determining what features this task might include, we consider recent mood interpretation studies for Spanish.

2.5 Mood interpretation in Romance adverbial clauses

Two investigations of mood interpretation in Spanish adverbial clauses inform our study. Using a written interpretation task, Kanwit and Geeslin (2014) had

participants indicate whether an event was habitual, had not yet occurred, or if both interpretations were possible. They manipulated adverbial-clause mood, clause order, (ir)regularity of the adverbial-clause verb, and the adverb itself. The adverbs included commonly occur with both moods (*cuando* 'when', *hasta que* 'until', *después de que* 'after'), and mood itself can be manipulated to indicate event realization, with Spanish verbs offering contrastive conjugations. Overall, lower-level learners did not use mood to interpret the utterances, relying instead on other perceived cues, such as clause order and morphological regularity, whereas advanced learner and NS interpretations were primarily constrained by mood. Furthermore, learners generally differentiated less across individual adverbs than NSs did.

In a follow-up study to compare multi-mood adverbs to those more closely linked to one mood, Kanwit and Geeslin (2018) manipulated three of the same factors (mood, morphological regularity, and adverb). The new interpretation task contained six adverbs, categorized according to degree of variability and frequency, based on the *Corpus del español*. For this task, participants chose the main clause that best matched their interpretation of the provided adverbial clause, selecting present temporality, future temporality, or that both were equally possible. Adverbs common to both moods in the corpus data tended to convey less variable interpretations for advanced learners and NSs, since use of a particular mood was interpreted as conveying event realization. Conversely, adverbs strongly linked to one mood allowed more flexible interpretations for these more proficient participants, since mood could not be productively manipulated to indicate this distinction. Nevertheless, adverbs within the same class diverged for NSs and some learner groups based on lexical differences according to frequency of co-occurrence and semantic properties (e.g., temporal versus causal relationship).

Thus, clause order, morphological regularity, mood, and individual adverbs may constrain event interpretation, and they are predicted to do so at different stages, consistent with gaining piecemeal sensitivity to target-like factors and learner movement from attending to pragmatic and lexical to morphological cues. Nevertheless, it remains unknown whether learners of French, with a mood contrast of lower dependability than Spanish, will show similar development. This study aims to determine whether, despite having less reliable form-meaning cues in the input, learners of French will treat forms that diverge by mood differently from each other. It also investigates whether other factors will first constrain learners instead and whether development will be fine-grained – in other words, whether a controlled task will reveal gradual sensitivity to new variables, such as mood and the individual adverb.

3. The current study

In light of the low frequency of the subjunctive, learner progression from pragmatic and lexical strategies to morphological stages, and the gap in the literature on adverbial clause interpretation in L1 and L2 French, this study was designed to answer the following questions:

1. To what degree do learners and NSs of French interpret adverbial clauses that contain indicative or subjunctive forms as compatible with present or future temporality, respectively?

2. How do responses change as a function of L2 proficiency?
3. To what extent are responses influenced by mood, clause order, verb morphological regularity, and the individual adverbial conjunction?

In the following sections, we describe our interpretation task and the variables we manipulated before providing hypothesized answers to the above questions. Our general prediction is that NSs and advanced learners will link indicative forms to present temporality and subjunctive forms to future temporality, whereas learners with lower proficiency scores will be less influenced by mood and show a stronger effect for factors such as clause order and morphological regularity.

3.1 Participants

Our 77 participants included 64 English-speaking learners of French and 13 NSs of French. The NSs were French-English bilinguals originating from France. All had resided in the US for at least one year, currently lived in the same mid-Atlantic city as the learners, and were graduate students or instructors of French at the learners' university. They represent department demographics, approximate the multi-variety classroom input provided to the learners, and offer a logical bilingual target for our learners (Geeslin with Long 2014), rather than reflecting one particular variety of French.[1] The learners were born in the US to monolingual English-speaking families and were recruited from three different French courses: two were mid-level content courses that focused on skill development directly following the program's four required language classes, and the third was an upper-level course with a prerequisite of at least one of the mid-level courses.[2] More advanced learners were also recruited from the university's graduate program and instructor pool.[3]

Based on a cloze test (see section 3.3), proficiency scores were calculated to provide both a continuous measure and the basis for assigning learners to motivated groupings through subsequent hierarchical cluster analysis (Staples and Biber 2015), to help elucidate additional developmental patterns identifiable when numerous learners were grouped together. The analysis suggested three clusters, with maximum cloze scores of 14.5, 26.5, and 44 (Table 1). Mixed-effects regression with proficiency score as the dependent variable, proficiency group as the independent variable, and the individual as a random effect revealed that proficiency group was significant overall ($p < 0.001$). Parameter estimates revealed that both Level 2 (estimate 0.64, 95% confidence interval [CI] [0.04, 1.25], standard error [SE] 0.31, $z = 2.08$, $p = 0.038$) and Level 3 (estimate 1.30, 95% CI [0.65, 1.95], SE 0.33, $z = 3.93$, $p < 0.001$) scored significantly higher than the reference level, Level 1.[4] Figure 1 presents plotted

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[1]By "multi-variety", we refer to the fact that the NSs hailed from or were familiar with various regions, and that the learners were therefore exposed to more than one type of French in the classroom.

[2]Seventeen learners reported knowledge of other Romance languages: Spanish (12), Italian (4), both (1). This variable was not significant in a non-best-fit regression ($p = 0.726$), nor were its interactions.

[3]Two advanced learners completed an M.A. degree in French literature at a separate public institution. Both had taught high school French. One continued in the role; the other returned to doctoral study. They similarly clustered into Level 3 of our groupings.

[4]We thank an anonymous reviewer for suggesting this method over ANOVA given the differential group sizes.

Table 1. Description of participants

Group	Number of Participants (n = 77)	Mean Age	Cloze Test Results		
			Mean	Range	SD
Level 1	17	20.5	10.4	4-14.5	3.3
Level 2	27	22.1	19.0	15-26.5	3.2
Level 3	20	33.9	36.5	29-44	5.1
Native speakers	13	34.8	–	–	–
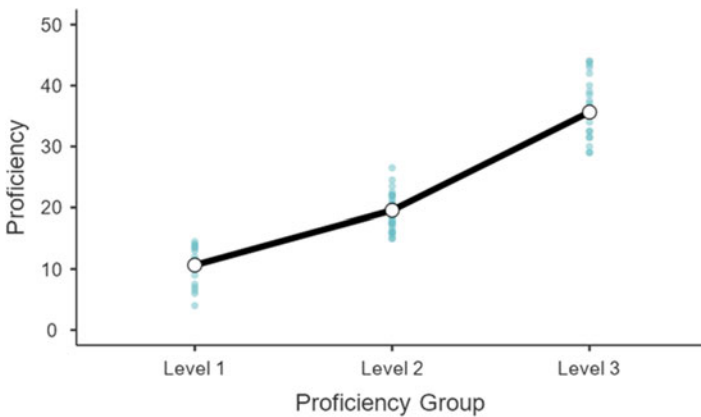
Figure 1. Proficiency scores by level

proficiency scores. Level 3 learners approximated the NSs' age, whereas Levels 1-2 were traditional undergraduate age. In Level 3, 18 of 20 learners had spent 3+ weeks in a French-speaking country (France in each case; four months to 2.5 years, $M = 12.5$ months), compared to only 2/17 and 6/27 learners at the lower levels.

3.2 Corpus confirmation of adverbial patterns

To confirm the descriptions of adverb-mood pairings described in grammars, we searched the *Corpus de Français Parlé Parisien des années 2000* (CFPP2000) 'Corpus of Spoken Parisian French of the 2000s', containing over 700,000 words of conversational speech elicited in Paris and surrounding suburbs (Branca-Rosoff et al. 2012). Table 2 lists our adverbial conjunctions in descending order of token frequency, indicating rates of co-occurrence with each mood and with verb forms classified as orthographically ambiguous. Each adverb's second row contains percentages recalculated when excluding ambiguous contexts.

   Corpus results confirmed each adverb's reliable link to one mood, with no unambiguous uses of *avant que* or *jusqu'à ce que* with indicative or of *tandis que* with subjunctive, and just 0.3% use of *quand* with unambiguous subjunctive. Thus, high rates of

Table 2. Mood pairings with adverbial conjunctions in CFPP2000

Adverb	Type	Indicative		Subjunctive		Ambiguous	
		n	%	n	%	n	%
quand	simultaneity	852	75.3	3	0.3	276	24.4
'when'		852	99.7	3	0.3	–	–
tandis que	simultaneity/concessive	9	50.0	0	0	9	50.0
'while/whereas'		9	100	0	0	–	–
avant que	anteriority/anticipation	0	0	7	77.8	2	22.2
'before'		0	0	7	100	–	–
jusqu'à ce que	anteriority/anticipation	0	0	4	66.7	2	33.3
'until'		0	0	4	100	–	–

co-occurrence of *quand* and *tandis que* with indicative and *jusqu'à ce que* and *avant que* with subjunctive were supported. Nevertheless, ambiguous contexts represented 22–50% of use for each adverb, contributing to learners' potential difficulty in linking mood with adverbial governors. Although each adverb paired with its predicted mood, *quand* sizably yielded the most tokens, suggesting much greater frequency in the input.[5] Finally, although *jusqu'à ce que* and *avant que* yielded single-digit token counts, co-occurrence with subjunctive is consistent with the high rates (80–100%) reported for both forms in other 20th and 21st century corpora (Poplack et al. 2013: 176).

3.3 Instruments

Participants completed three tasks, in the following order: a written interpretation task, a cloze test, and a language background questionnaire.[6] As the interpretation task provides the language data for analysis and is the original task designed for the study, it is detailed in the next section. The 45-item French cloze test (Tremblay 2011) determined learners' proficiency scores and informed the hierarchical cluster analysis. It was designed to differentiate among lower- and higher-level learners, was adapted from a short, nontechnical newspaper article, and required learners to fill in blanks for content and function words. Finally, the background questionnaire elicited information about participants' language learning histories, origin, residence, and experience abroad, as summarized in section 3.1.

3.3.1 Written interpretation task

The 32-item interpretation task was adapted from prior tasks that elicited L2 interpretation of adverbial-clause mood (Kanwit and Geeslin 2014, 2018). Participants

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[5]Written corpora likely yield more of the other adverbs, but CFFPP2000 reveals *quand*'s notably higher frequency. Since conversation fosters more innovation (Bayley and Tarone 2012), oral results connecting each adverb to one mood are compelling.

[6]The cloze test can be accessed at https://doi.org/10.1017/S0272263111000015 and the other tasks at https://osf.io/a8v2r/.

read a sentence containing an adverbial clause and, based on their interpretation of that clause, selected a main clause that contained a verb in the present indicative (indicating that an event had already occurred or occurs habitually), the inflectional future (conveying that an event had not yet occurred), or indicated that both responses were equally acceptable in the given context.

This design matches Kanwit and Geeslin (2018). Although Kanwit and Geeslin (2014) had participants directly select whether they interpreted an action as having already occurred, we prefer the later design for two reasons. Firstly, to avoid revealing whether the action had already occurred, the earlier Spanish study controlled all main-clause verbs via present morphology, which can be unnatural for items containing subjunctive adverbial clauses. Although there are relevant cross-linguistic differences, the tendency in French (and Spanish) is to pair an unrealized adverbial clause with a main clause containing future morphology (Boularès and Frérot 2019). Secondly, the earlier study's responses were English interpretations of the adverbial clause content, and we argue that performing the entire task in the target language better taps target abilities. Nevertheless, having participants indicate interpretation of event realization through selection of temporality is less direct than the earlier method, although the later study revealed congruent patterns with its predecessor in terms of learner development and the role of independent linguistic variables (Kanwit and Geeslin 2014, 2018). Both designs follow the call to implement controlled tasks to offset subjunctive's infrequency and potential form ambiguity (McManus et al. 2014).

Items were contextually independent so that responses would stem from information presented in the item rather than from potential influences in interconnected items. The present and future response orders were randomized throughout the task to encourage participants to read all options. Two versions of the task were created, with the second version placing the second half of items (i.e., 17–32) as the first 16 to determine whether ordering affected responses. Item ordering was not significant and is hereafter excluded.[7] During piloting, an NS of Hexagonal French and an experienced coordinator in the language program reviewed the items to ensure comprehensibility and conformity with norms of expression, suggesting changes to three items (one item in common [a missing accent mark] and one each individually [a regional vocabulary item and a suggested preposition change]) and then agreeing upon the revised items. Participants performed the task on paper, requiring 18–28 minutes. Overall, the 77 participants completed 2,448 of the 2,464 possible item responses (i.e., 99.4% of items received a response).

Four independent linguistic variables (mood, adverb, clause order, and verb morphological regularity) were manipulated throughout the task, creating two items for each possible combination of variables. Sixteen items contained an adverbial-clause verb in present indicative, with the other 16 using present subjunctive. Only forms that differ morphologically by mood for the particular person/number were used (e.g., *sort* 'leaves' 3SG indicative vs. *sorte* 'might leave' 3SG subjunctive). Indicative items included the adverbs *quand* or *tandis que,* with subjunctive items containing *jusqu'à ce que* or *avant que.* Each adverb appeared in eight items. For 16 items,

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[7]In non-best-fit models, *p*-values were 0.868 and 0.508 for learners and NSs, respectively.

the adverbial clause preceded the main clause, with this order reversed for the other 16. Finally, the adverbial-clause verb was morphologically irregular, containing a different stem in indicative versus subjunctive mood, such as *il va* 'he goes' and *il aille* 'he might go' for 16 items, and regular, with the same stem for both moods, as in *sort* vs. *sorte* in the other 16.

In addition to manipulating variables, we controlled other potential factors. Items contained no other indicators of futurity (no temporal adverbs such as *demain* 'tomorrow') or habituality (e.g., *fréquemment* 'frequently') to eliminate other possible cues to temporality and event realization. To not introduce further variation, we also controlled the *tense* of the adverbial-clause verb, only using present (indicative or subjunctive). We limited our main-clause response options to present indicative and inflectional future to represent habituality and futurity, respectively, although periphrastic future is also a common variant for fulfilling the latter function (Gudmestad and Edmonds 2016). Inflectional future was chosen because it is presented as the main-clause form in co-occurrence with the subjunctive in the university's grammar texts (Hawkins and Towell 2010, Boularès and Frérot 2019) and because both lower proficiency at-home learners and higher proficiency learners who have studied abroad prefer it to other written forms (Gudmestad and Edmonds 2016).[8] Moreover, inflectional future has been reported as the more frequent variant in Hexagonal French (58% use in the GARS corpus, according to Jeanjean 1988) and as conveying less certainty (Lachet 2010, Howard 2012), which pairs well with subjunctive adverbial clauses. Finally, all syntactic subjects were human and differed across the two clauses. See (4) for a sample item with English translation and coding:

(4) _____ *tandis que Marc fait le sien.*
  a. *Paul finira son devoir*
  b. *Paul finit son devoir*
  c. *Les deux sont également possibles.*

  '_____ while Marc does his.
  a. Paul will finish his homework
  b. Paul finishes his homework
  c. Both are equally possible.'

(Mood of *fait*: indicative; adverbial clause position: post-posed [i.e., after main clause]; morphological regularity of *fait*: irregular; adverb: *tandis que*)

3.3.2 Task predictions

We predict that sentences containing indicative mood (with *quand* and *tandis que*) should yield greater selection of present temporal interpretation for the main clause, whereas those containing the subjunctive (with *jusqu'à ce que* and *avant que*) should favour the future

_____

[8]Nevertheless, the periphrastic variant was favoured by higher proficiency at-home learners and lower proficiency learners who had studied abroad. The futurate present also conveys future but typically pairs with lexical temporal indicators to bolster futurity. As we excluded such indicators, inflectional future was preferred.

response. Nevertheless, based on past research and our corpus findings, these patterns will likely differ according to the adverbial. Research on Spanish has shown that learners generally move toward native-like patterns of interpretation in gradually linking subjunctive mood to an interpretation that an action has not yet occurred, after first being influenced by factors other than mood, as described below. French requires further study, given different form-function relationships in adverbial and main clauses, different rates of co-occurrence of individual adverbs with each mood, and greater ambiguity in the input (Poplack et al. 2013, Gudmestad 2018). Despite possible differences with L2 Spanish, we hypothesize that English-speaking learners of French, whose L1 does not robustly encode event realization through adverbial-clause mood, will first attend to other factors. Research across other structures and L2s has shown that less proficient learners assume chronological/natural order (Klein 1995) at earlier, pragmatic stages before using and interpreting temporality through morphology (Bardovi-Harlig 2017). Likewise, irregular verbs have favoured subjunctive selection in studies of L2 French and Spanish based on greater salience and higher token frequency (Collentine 1997, Quesada 1998, Howard 2012, Gudmestad 2018). Alternatively, for advanced learners and NSs, mood should primarily constrain event interpretation. Finally, lower-level learners may treat adverbs within the same pattern of co-occurrence more uniformly than NSs rather than revealing lexical effects according to semantics or frequency within a particular adverbial class (Kanwit and Geeslin 2014, 2018).

3.4 Analysis

For the interpretation task, we first provide overall response rates contextualized according to mood. We then report mixed-effects multinomial logistic regressions to determine predictors of responses for our participants, using SPSS 27 (IBM Corp. 2020). Values reported in the multinomial regression tables and model summary information come from final models, which only included significant predictors and interactions and yielded the lowest AIC/BIC values.

Individual participants were entered as a random effect in all models because participants provided multiple data points. Task item was also included as a random effect. Although the two moods, two clause orders, and two regularity categories were evenly distributed, recall that two adverbs were used only with subjunctive and two only with indicative based on the corpus searches. Including the item as a random effect helps attenuate its role, which would otherwise present as an effect for independent variables (Tagliamonte 2012).

4. Results

4.1 Rates of selection

We first consider overall response rates contextualized according to the mood of the adverbial-clause verb (Table 3). Rates of selection of the present indicative (congruent with the realis interpretation) were nearly identical for the Level 1 learners regardless of the mood of the adverbial-clause verb (about 42%, visualized in Figure 2). Beginning at Level 2, a distinction began to emerge, with learners selecting the "present" response about 10% more in co-occurrence with the indicative than the subjunctive. This gap continued to grow at Level 3 (50% greater selection of

Table 3. Distribution of responses according to mood

| Group	Adverbial Clause Mood	Present Indicative Response		Inflectional Future Response		Both Equally Possible		Total	
		#	%	#	%	#	%	#	%
Level 1 (n = 17)	Indicative	116	42.8	88	32.5	67	24.7	271	100
	Subjunctive	112	41.3	107	39.5	52	19.2	271	100
	Total	228	42.1	195	36.0	119	22.0	542	100
Level 2 (n = 27)	Indicative	147	34.4	85	19.9	195	45.7	427	100
	Subjunctive	107	25.2	147	34.6	171	40.2	425	100
	Total	254	29.8	232	27.2	366	43.0	852	100
Level 3 (n = 20)	Indicative	182	56.9	30	9.4	108	33.8	320	100
	Subjunctive	20	6.3	126	39.4	174	54.4	320	100
	Total	202	31.6	156	24.4	282	44.1	640	100
NSs (n = 13)	Indicative	161	77.8	17	8.2	29	14.0	207	100
	Subjunctive	7	3.4	69	33.3	131	63.3	207	100
	Total	168	40.6	86	20.8	160	38.6	414	100
Group total:								2,448	
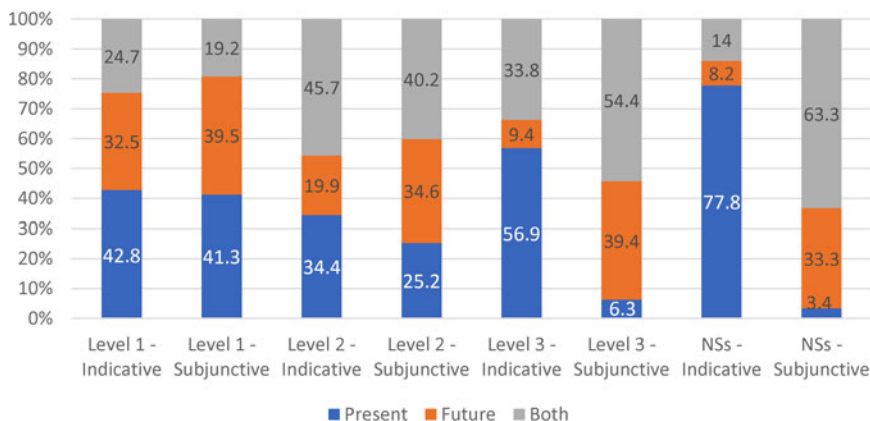
Figure 2. Response selection by group according to mood (%)

the present with indicative forms) and for the NSs (70% greater). Results for sentences with verbs in the subjunctive largely presented a mirror image, as selection of the inflectional future (consistent with the interpretation that the action had not yet occurred) was rather similar at Level 1 regardless of mood, with Level 2 learners beginning to differentiate such contexts. Level 3 learners and the NSs also preferred the future over the present for subjunctive items, although the difference they showed was less noteworthy than the disparity within indicative items, largely because the "both interpretations are equally possible" response was especially viable for them with subjunctive. We analyze whether mood yielded statistical significance for our learners and NSs in the subsequent section.

4.2 Mixed-effects regressions

To determine whether the independent variables manipulated in our task significantly affected responses, we performed a mixed-effects multinomial regression, considering mood, clause order, verb regularity, and participant group as main effects and the individual participant and the item as random effects. Since mood and adverb are not orthogonal (i.e., adverbs only co-occurred with one mood each), we considered these variables in separate models (Tagliamonte 2012).

Each table summarizes one multinomial regression that includes two comparisons. We entered the present response as our reference value, meaning that the "future" and "both" responses are our application values. Thus, positive estimates and z-values indicate favouring of the "future" or "both" interpretation (in the left or right half of each table, respectively), whereas negative values indicate disfavouring of those responses (i.e., favouring of "present"). Values further from 0 generally indicate a stronger effect, although the standard error refers to the level of variability in the category and a larger standard error indicates general weakening (i.e., less consistency) of a possible effect. P-values below 0.05 indicate significant comparisons. Within each independent variable, one category serves as a reference category for the others. For example, in the first results row of Table 4, the positive estimate (4.54) and z-value indicate that the

Table 4. Mixed-effects multinomial regression of selection of future or "both" responses

Variable	Est.	95% CI	Std. error	z-value	p-value	Est.	95% CI	Std. error	z-value	p-value
Future vs. Present						**"Both" vs. Present**				
(Intercept)	-2.48	[-3.12, -1.84]	0.33	-7.56	<.001	-1.64	[-2.13, -1.15]	0.25	-6.53	<.001
Mood										
Indicative	reference					reference				
Subjunctive	4.54	[3.61, 5.47]	0.47	9.60	<.001	4.64	[3.79, 5.50]	0.44	10.61	<.001
Group										
NSs	reference					reference				
Level 1	2.23	[1.51, 2.96]	0.37	6.01	<.001	1.26	[0.64, 1.87]	0.31	4.01	<.001
Level 2	2.18	[1.45, 2.90]	0.37	5.88	<.001	2.32	[1.76, 2.89]	0.29	8.04	<.001
Level 3	0.57	[-0.24, 1.36]	0.41	1.38	0.167	1.29	[0.71, 1.87]	0.30	4.34	<.001
Interactions										
Group: Mood										
NSs	reference					reference				
Level 1: Subjunc.	-4.31	[-5.31, -3.31]	0.51	-8.42	<.001	-4.86	[-5.83, -3.90]	0.49	-9.86	<.001
Level 2: Subjunc.	-3.67	[-4.67, -2.67]	0.51	-7.22	<.001	-4.45	[-5.37, -3.53]	0.47	-9.50	<.001
Level 3: Subjunc.	-0.90	[-2.01, 0.21]	0.57	-1.58	0.113	-1.96	[-2.96, -0.96]	0.51	-3.82	<.001
Group: Clause										
NSs	reference					reference				
Level 1: Adv. Pre-	-0.06	[-0.44, 0.33]	0.20	-0.29	0.774	-0.34	[-0.79, 0.10]	0.23	-1.50	0.133
Level 2: Adv. Pre-	-0.44	[-0.81, -0.07]	0.19	-2.36	0.018	-0.78	[-1.10, -0.45]	0.17	-4.65	<.001

(*Continued*)

Table 4. (*Continued.*)

Variable	Est.	95% CI	Std. error	z-value	p-value	Est.	95% CI	Std. error	z-value	p-value
Level 3: Adv. Pre-	0.20	[-0.30, 0.70]	0.26	0.80	0.425	-0.35	[-0.76, 0.07]	0.21	-1.65	0.099
Random Effects		Variance	SD	N			Variance	SD	N	
Participant		0.86	0.93	77			1.13	1.06	77	
Item		0.07	0.27	32			0.23	0.48	32	
N = 2,448; AIC = 4712; BIC = 4851; $R^2_{Negelkerke}$ = 0.17										

"future" interpretation was favoured over the present when the adverbial-clause verb was subjunctive, as opposed to indicative. This difference was significant based on the low *p*-value (< 0.001). Significant comparisons have been shaded.

We considered models with proficiency either as a continuous value or via the three proficiency groups suggested by the cluster analysis. We have retained the latter, since the model containing group produced a lower AIC and also enabled us to implement a reviewer's suggestion of fitting all groups' data in one model.

Overall, mood significantly constrained responses (Table 4) but clause order and regularity did not (*p* = .077 and .235, respectively), as anticipated, and thus were not included in the final model. Participants favoured the "future" and "both" interpretations over "present" when the adverbial-clause verb was subjunctive. There was also a significant interaction between group and mood, with Level 1 and Level 2 learners each selecting "future" for subjunctive items significantly less than the NSs, and with Levels 1–3 selecting "both" over "present" significantly less than the NSs for subjunctive items. It can also be noted that effect sizes decreased from Level 1 to Level 2 to Level 3 for both comparisons, indicating that learners responded more similarly to the NSs with increasing level.

The most proficient cluster (Level 3) thus most matched the NS pattern of linking the "future" response with subjunctive and "present" with indicative, along with high rates of accepting the "both" response with subjunctive (see Figure 2). At Level 1, learners selected "present" at nearly identical counts, whether the verb was expressed by indicative or subjunctive mood, and "future" and "both" responses were also quite stable across moods. Level 2 learners began to select "future" more with subjunctive and "present" more with indicative, but these links were subtler than those of Level 3 or the NSs (who showed greater differentiation between those responses and did not significantly differ from each other in the future-present comparison).

Clause order was not significant overall, but did reveal a significant interaction with group (Table 4), with Level 2 learners selecting "future" and "both" significantly less when the adverbial clause occurred before the main clause. Although Level 1 learners also selected "future" and "both" over "present" less when the adverbial clause preceded the main clause, these comparisons were not significant. Lesser selection of "both" for Level 2 when the adverbial clause was pre-posed was the result of higher selection of the present response in that context. For the NSs, "present" was selected at nearly identical rates across orderings, with "present" and "both" also showing similar rates to each other (Figure 3). The significance of clause order at Level 2 can be seen in the lower selection of "present" following pre-posed adverbial clauses and greater selection of "both" with post-posed adverbial clauses. Level 3 selection of "present" was similar regardless of clause ordering, which was also the case at Level 1.

The regularity of the adverbial-clause verb was not significant for participants on the whole, nor did it significantly interact with group. Nevertheless, Level 1 showed more sensitivity to this variable than the other learner groups, selecting "present" less when the verb was irregular, whereas the other levels showed similar rates of "present" selection regardless of regularity (Figure 4).[9]

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[9]A previous model that separated learner levels revealed that regularity yielded significance only for Level 1 (*p* = 0.046): regular verbs favoured the present response (estimate 0.42).
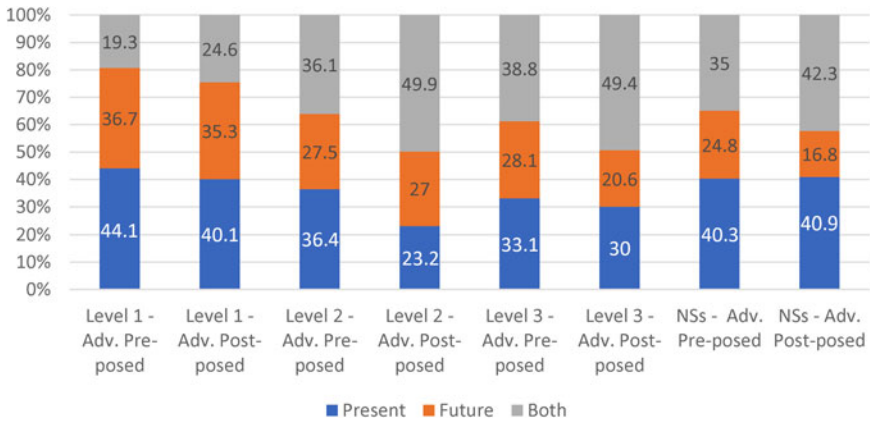
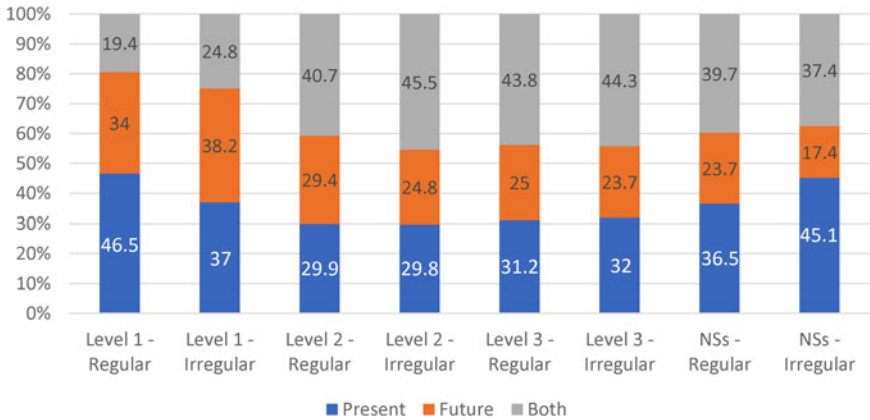**Figure 3.** Response selection by group according to clause order (%)

Figure 4. Response selection by group according to regularity (%)

When considered in a separate regression model (since it is non-orthogonal with mood), adverb yielded significance for participants overall (Appendix Table A1). Participants selected the "future" and "both" responses significantly less with *quand* and *tandis que* than with *avant que*, although they did not show significant differences between *jusqu'à ce que* and *avant que*. Related to the analogous finding for mood, group and adverb significantly interacted: Levels 1 and 2 favoured "future" and "both" with *tandis que* and *quand* compared to the NSs' treatment of *avant que*, whereas Level 3 did not significantly differ from the NSs in the "future" comparison for *tandis que* and *quand* or in the "both" comparison for *quand*. The one significant difference between Level 3 and the NSs was for the "both" response with *tandis que*.

Figures 5 and 6 further illuminate how greater proficiency yielded stronger pairing of *jusqu'à ce que/avant que* with future and *quand/tandis que* with present, respectively. Moreover, both Level 3 and the NSs treated *jusqu'à* and *avant* similarly to each other, while differentiating between *quand* and *tandis que*. Consequently, similar to
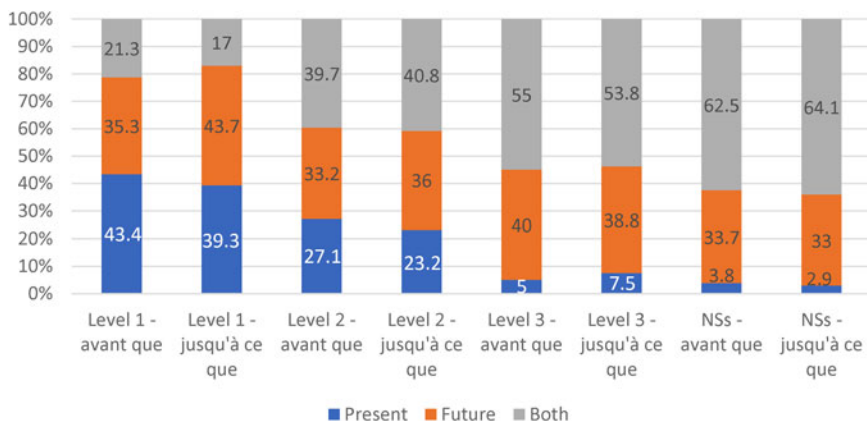
Figure 5. Response selection by group according to subjunctive adverbs (%)
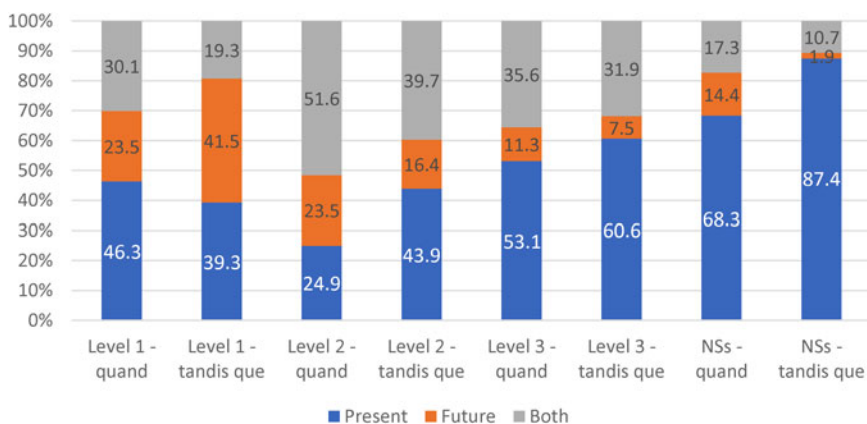

Figure 6. Response selection by group according to indicative adverbs (%)

the NSs, Level 3 selected the future less with *quand* and *tandis que* than with *avant que*, and treated *jusqu'à ce que* and *avant que* more similarly to each other. Level 1 learners tended to treat the four adverbs rather comparably (i.e., selecting "present" at similar rates). Although Level 2 learners did not show the stronger distinctions of Level 3 and the NSs, they selected "future" least often with *tandis que*, which matched Level 3 and the NSs but diverged from Level 1, who selected it often with *tandis que*. Accordingly, Level 2 learners matched Level 3 and the NSs in selecting "future" less often with *tandis que* than with *avant que*, although, unlike for those more proficient groups, *quand/avant que* differences were less noteworthy at Level 2.

5. Discussion

Our findings reflect two principal themes that contribute to issues in SLA and functional linguistics, such as concept-oriented and usage-based approaches to language

development. These include 1) lack of attending to verb inflection at lower proficiency levels due to other perceived cues and 2) primary influence of mood at higher levels, with variability across adverbs explainable by factors such as semantics and lexical frequency.

5.1 Other cues prior to mood

Lower-level learners were not influenced by mood: Level 1 learners selected the "present" response at nearly the same rate regardless of adverbial-clause mood. This finding is interpretable by a range of SLA constructs and contributes to our knowledge of learner early expression (and interpretation) of tense-mood-aspect through resources other than verb suffixation. Consistent with functional, concept-oriented approaches to the acquisition of temporality (Bardovi-Harlig 2017), we predicted that learners would reveal piecemeal progress in connecting form and meaning, but that they would use pragmatic and lexical strategies in attending to clause order (i.e., assumed chronological ordering) and verb regularity (i.e., treating irregular lexical items differently) before primarily basing interpretation on mood morphology. Attributing additional temporal meaning to clause ordering reflects the tendency to produce and interpret L2 utterances as occurring in chronological order (the natural order principle, see Klein 1995 and Bardovi-Harlig 2017), as in selecting the "future" and "both" responses more when the adverbial clause has not yet been listed (i.e., is postposed). Similarly, for these learners, it would also seem sensible to permit "both" more when the adverb and its concomitant mood have not yet been specified.

Moreover, significant interactions of group with both clause order and mood at Level 2 show evidence of how one cue begins to yield to another: as learners continue to gain sensitivity to mood, other factors like clause order play a role only in the *absence* of increasingly meaningful subjunctive morphology. Thus, the search for event-interpretation cues based on chronological ordering of sentential elements represents partial progress on the path toward processing morphology as a reliable indicator of tense-mood-aspect (Klein 1995, Bardovi-Harlig 2017). Furthermore, since, minimally, our learners were enrolled in a mid-level course that followed four required language courses, beginning with a lower level might have revealed a group sensitive only to clause order. Alternatively, production data, more commonly used to attest these stages (Bardovi-Harlig 2017), may reveal our lower-level learners to depend more on this strategy (i.e., they might first produce this temporal-modal relationship only through clause ordering before being able to manipulate mood productively).

The lack of sensitivity to mood at lower levels is likely exacerbated for French subjunctive, since only a few freestanding lexical items (e.g., certain adverbials) reliably co-occur in the contexts where speakers encounter subjunctive forms (Poplack et al. 2013, 2018) and the temporality of the main-clause verb further cues tense-mood-aspect. Thus, learners can attend to the easier-to-process freestanding adverbials rather than the developmentally subsequent bound verb morphology, as predicted by functional, concept-oriented approaches (Klein 1995, Bardovi-Harlig 2017), but also by approaches such as input processing (see VanPatten 2020), which similarly predicts processing of freestanding lexico-temporal information developmentally prior to that of grammatical forms (e.g., verbal inflection).

5.2 Increasing role for mood, individual adverb

More proficient participants attended to morphology: Level 3 and NSs selected the present at high rates for indicative items and low rates for subjunctive items, and learners began to show a distinction by mood beginning at Level 2, despite continuing to differ significantly from the NSs. Mood's strength in predicting adverbial clause interpretation for more proficient participants is consistent with research on L2 and native Spanish, as are the findings that less proficient learners attended more to morphological regularity and clause ordering (Kanwit and Geeslin 2014, 2018). Nevertheless, even within the same mood, participants may respond to individual adverbials differently. In fact, the adverb significantly predicted responses overall. Significance of mood and adverb supports prior research demonstrating that NSs utilize both patterns of collocation and a lexical basis for interpretation (Bybee 2010, Kanwit and Geeslin 2018, Goldberg 2019). This contributes to a few important themes for language development: as usage-based analyses have argued (see Bybee 2010), speakers store information about contextualized uses of forms in networks that link similar forms based on factors including similarity of form, meaning, and context of use, as we will explore in the current section.

   Lexical differences found in the present study support the central role of vocabulary in conditioning the acquisition of morphosyntactic structures (Gudmestad 2018), predicted by usage-based approaches which view grammar as built from the use of particular lexical items in constructions, rather than existing a priori, and which allow for meaningful storage and linkage of multi-word units (Bybee 2010, Ellis 2016, Goldberg 2019), such as a particular adverbial plus a certain verb inflected for mood (e.g., *avant que tu reviennes* 'before you might return'). At Level 2, *tandis que* became a greater indicator of a realized action than *quand*, and both adverbs, in turn, conveyed this interpretation more than *avant que* and *jusqu'à ce que*, which yielded interpretation of irrealis or posteriority.[10] Interpretation was then strongly linked to mood at Level 3. This may reflect a reliable link between these adverbials and subjunctive in the input, consistent with oral L1 (present corpus results, Poplack et al. 2013, Gudmestad and Edmonds 2015) and L2 data (Howard 2008). Cross-contextually, this recalls verbal governors such as Spanish *querer* 'want' (Quesada 1998) and French *falloir* 'be necessary' (Bartning and Schlyter 2004, Howard 2012) as prototypes (Goldberg 2019) of nominal-clause subjunctive mood.

   Participants overall selected the "future" interpretation significantly less with *quand* and *tandis que* than with *avant que*, but did not differentiate between the latter and *jusqu'à ce que*. Level 3 was the lone learner group to differentiate between *tandis que* and *quand*, similar to the NSs, which helps explain why three comparisons that were significantly different between the NSs and Levels 1 and 2 for *quand* and *tandis que* were not significant between Level 3 and the NSs. The disparate rates of adverbial use in our corpus results previewed adverbs' possible divergence on our task. On the one hand, it is surprising that *quand* permitted more of the interpretation that usually pairs with the subjunctive, since its frequent indicative co-occurrence should contribute to a strong prototype of adverbial-clause indicative mood, building resistance to

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[10]Within-mood comparisons offer greater certainty that only the adverb has conditioned interpretive differences.

class shift (Bybee 2010, Goldberg 2019). Alternatively, as *quand* was the only adverb to yield any corpus findings for unambiguous use with the innovative mood pairing (i.e., subjunctive, in its case), participants may have greater exposure to innovation with *quand* adverbial clauses. Indeed, for our NSs and Levels 2–3, *quand* permitted more future interpretation than *tandis que,* whereas the opposite held at Level 1. Thus, the strength of absolute (i.e., overall) frequency for the prototype linking *quand* and indicative is especially powerful for lower proficiency learners. As higher proficiency learners likely gain more exposure to variable (lower relative rate of unambiguous indicative use with *quand*) or ambiguous input (ample for *quand*), they are more likely to accept alternative interpretations. Moreover, the high token frequency of *quand* may raise its familiarity and generalizability, lowering its specificity of meaning for more proficient participants (Bybee 2010, Ellis 2016) and permitting novel interpretations.

Unlike forms with similar meanings, forms with more notable semantic distinctions will show a weaker relationship, allowing greater autonomy to each. A form's autonomy can also be strengthened by its usage frequency (Bybee 2010). Thus, a highly frequent form, and one which differs notably in meaning with another form in the same class, may develop quite differently. Besides frequency differences, the two forms may have yielded divergent responses because, although they are both classified as governing indicative, *quand* has a more purely temporal meaning ('when'), but *tandis que* 'while/whereas' offers a concessive component (Hawkins and Towell 2010). Differential treatment of two adverbial conjunctions within the same class supports the French mood contrast as lexically constrained rather than uniform across a particular semantic class or predicate type (O'Connor DiVito 1997; Poplack et al. 2013, 2018; Gudmestad and Edmonds 2015). Moreover, the potential for concessive meaning contributed only by *tandis que* may raise its level of informativity (Ellis 2016), which helps to explain why it first diverges from the subjunctive adverbs at Level 2.

Conversely, two forms with more similar meanings and rates of usage (i.e., the subjunctive adverbs), neither of which is particularly frequent, are predicted to maintain more comparable patterns of interpretation and use. Thus, unlike with the indicative adverbs, responses only slightly differed when the subjunctive adverbs were compared. For the NSs and Level 3 learners, this reflected very high acceptance of future for both adverbs, consistent with our corpus data in the similar rates of occurrence (cf. the larger *quand/tandis que* disparity) and the absence of unambiguous indicative results with subjunctive adverbs. Additionally, the semantics of the two subjunctive adverbs is more temporal in nature ('before' and 'until'), contributing to their parallel patterning. Congruous responses may moreover stem from the subjunctive adding further meaning (irrealis, additional speaker viewpoint information, etc.), whereas indicative may be more neutral (Dahl 1985, Palmer 2001), possibly depending more on the adverbial to ensure the relevant interpretation, as anticipated for default forms with greater cross-contextual functionality (Bybee 2010). These results support claims from collocational research (Yi 2018) and the mood contrast specifically (Gudmestad and Edmonds 2015) that, as predicted by usage-based approaches, what would otherwise be considered lexical and syntactic choices *correlate* rather than varying independently. Consequently, the presence of subjunctive mood and *avant que/jusqu'à ce que* likely co-contributed to conveying notions

such as irrealis and posteriority in favouring the "future" response for our more advanced learners and NSs. Since both cues were present, subsequent work may succeed in teasing apart whether knowledge of adverbial semantics or tense-mood-aspect plays a more prominent role for proficient speakers, although at lower levels the freestanding adverbial plays a greater role, as noted in the lack of significance of mood at Level 1, and as predicted by concept-oriented approaches and input processing (Bardovi-Harlig 2017, VanPatten 2020). As Level 2 learners differentiate more according to mood, this is likely further bolstered by the co-occurring adverbial. Although Level 3 and the NSs attend more robustly to mood than the less fluent participants, freestanding adverbials continue to contribute to their interpretations. Some role for both the adverb and the mood is also consistent with the notion of chunking (Bybee 2010, Goldberg 2019), as speakers may store and access information about a particular adverb plus mood-inflected verb at once (e.g., *avant que tu reviennes*).

Although advanced learners and NSs more closely linked the "future" interpretation to the subjunctive and the "present" interpretation to the indicative, no group made such connections categorically. This supports the generally non-categorical nature of mood expression in L1 and L2 French (Jones 2000; Bartning and Schlyter 2004; Howard 2008, 2012; Poplack et al. 2013, 2018; McManus et al. 2014; Gudmestad and Edmonds 2015; McManus and Mitchell 2015; Gudmestad 2018), along with similar findings for the variable interpretation of adverbial clauses in Spanish (Kanwit and Geeslin 2014, 2018). In departing from prior methods, however, our study generally shows earlier evidence of differential responses by mood, greater differentiation across levels, and more linear development.

6. Conclusions, limitations, and future directions

Our findings contribute to research on late-acquired structures, building on prior findings that lower-level learners are less receptive to morphologically encoded indicators of tense-mood-aspect, instead attending to other perceived cues such as the ordering of sentential elements. That mood did not predict interpretation for our lower-proficiency learners supports the complexity of French mood: many persons/numbers of verb lexemes are indistinguishable across moods and, when used, the subjunctive occurs at low rates, in syntactically complex environments, and as a bound, morphological functor (Ellis 2016). Despite these challenges, our mid- and high-level learners were significantly affected by mood in interpreting event realization. Beyond mood, individual lexical items (adverbs) further constrained event interpretation, consistent with prior findings that NSs and proficient learners further differentiate within a particular class of co-occurrence, sensitive to other usage-based factors that can affect interpretation such as semantics and collocational frequency. Thus, learners made piecemeal progress in adding mood and individual adverbs as predictors of their responses and moving away from the tendency to depend on clause order.

Future research should consider additional adverbial conjunctions, including *après que* 'after', which permits greater variability and should yield larger interpretive consensus when paired with a particular mood based on this productive distinction, following similar Spanish adverbs. Subsequent work will further consider how the main-clause future form may constrain responses, manipulated as an additional

variable or controlled via a different future variant. Although we designed our study to use unambiguous mood contrasts and to bolster results from prior research on production and judgment/preference data and foci on non-adverbial contexts, future investigations will benefit from triangulating instruments such as ours with the aforementioned tasks for varying levels of control, especially since a production task may elicit more non-standard (i.e., innovative) form-meaning combinations. In sum, the study adds to the small but growing body of research on the interpretation of variable patterns of language use, especially for late-acquired structures where learners may attend to a range of different perceived cues across acquisitional trajectories.

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Appendix

Table A1. Influence of adverb on "future" and "both" interpretations (reference level: present tense)

Variable	Est.	95% CI	Std. error	z-value	p-value	Est.	95% CI	Std. error	z-value	p-value
Future vs. Present						"Both" vs. Present				
(Intercept)	1.94	[0.84, 3.04]	0.56	3.46	<.001	2.86	[1.80, 3.92]	0.54	5.30	<.001
Adverb										
Avant que	reference					reference				
Jusqu'à ce que	0.26	[-1.31, 1.83]	0.80	0.32	0.745	0.30	[-1.23, 1.84]	0.78	0.39	0.700
Quand	-3.73	[-4.90, -2.55]	0.60	-6.20	<.001	-4.16	[-5.30, -3.03]	0.58	-7.18	<.001
Tandis que	-5.98	[-7.73, -4.24]	0.89	-6.72	<.001	-4.89	[-6.08, -3.71]	0.61	-8.06	<.001
Interactions										
Group: Adverb [reference – NSs: *avant*]										
Level 1: *jusqu'à*	0.05	[0.05, -1.61]	0.85	0.063	0.950	-0.43	[-2.10, 1.24]	0.85	-0.50	0.615
Level 1: *quand*	3.25	[1.95, 4.56]	0.67	4.88	<.001	4.44	[3.16, 5.72]	0.65	6.80	<.001
Level 1: *tandis*	6.24	[4.41, 8.07]	0.93	6.71	<.001	4.89	[3.53, 6.24]	0.69	7.07	<.001
Level 2: *jusqu'à*	-0.02	[-1.67, 1.63]	0.84	-0.02	0.981	-0.12	[-1.73, 1.50]	0.82	-0.14	0.888
Level 2: *quand*	3.47	[2.18, 4.76]	0.66	5.28	<.001	4.51	[3.28, 5.74]	0.63	7.19	<.001
Level 2: *tandis*	4.78	[2.96, 6.60]	0.93	5.15	<.001	4.39	[3.12, 5.66]	0.65	6.77	<.001
Level 3: *jusqu'à*	-0.70	[-2.54, 1.14]	0.94	-0.74	0.458	-0.73	[-2.53, 1.07]	0.92	-0.79	0.427
Level 3: *quand*	0.09	[-1.38, 1.57]	0.75	0.13	0.901	1.36	[-0.03, 2.75]	0.71	1.92	0.054
Level 3: *tandis*	1.81	[-0.17, 3.80]	1.01	1.79	0.074	1.85	[0.41, 3.28]	0.73	2.53	0.012

Random Effects	Variance	SD	N		Variance	SD	N
Participant	0.89	0.95	77		1.15	1.07	77
Item	0.03	0.17	32		0.18	0.42	32

N = 2,448; AIC = 4694; BIC = 4926; $R^2_{Negelkerke}$ = 0.18