Abstract
Coherence relations are expressed differently across languages, often leading to language learners misusing discourse connectives. We argue that the ability to detect these errors crucially depends on the coherence relation under scrutiny, as errors may remain unnoticed when the relation is clause-internal and marked with a highly optional connective. We focus, therefore, on specifications, a relation that German-speaking learners sometimes struggle to correctly indicate when writing in French. We assessed whether non-native readers detect this error and show preferences for either explicit or implicit marking of specifications. Findings show that non-native speakers were generally able to detect the error in a sentence-evaluation task but did not react to it in a self-paced-reading task, contrary to native speakers. They also judged implicit specifications as more correct than explicitly marked specifications. We conclude that non-native speakers do not always benefit from connectives during text processing, especially when they are highly optional.

Keywords: discourse coherence, specifications, connectives, online processing, offline judgment task

1. Introduction
When reading a text in a second language, correct identification and interpretation of the underlying coherence relations can be challenging. Non-native readers are confronted with difficulties such as complex or opaque connectives that are used to signal them (Wetzel, Zufferey & Gygax, 2020, Zufferey & Gygax, 2017), relations with a high degree
of cognitive complexity (Sanders, Spooen & Noordman, 1992) or relations that are indicated by infrequent or underspecified connectives (Crible, Wetzel & Zufferey, 2021). Furthermore, given that coherence relations are expressed differently across different languages (e.g., Kanno, 1989), it is not surprising that non-native writers also produce erroneous uses of connectives, due to cross-linguistic influences from their first language (e.g., Field & Yip, 1992; Lamiroly, 1994; Granger & Tyson, 1996; Altenberg & Tapper, 1998). While these kinds of errors are well documented in several corpus studies, research on second language acquisition lacks experimental data to determine whether L2 readers are able to identify these mistakes and are affected by the resulting incoherence while reading. Among the few studies that have taken an experimental approach to assess connectives in L2, Zufferey, Mak, Degand and Sanders (2015) showed that, in an eye-tracking experiment, L2 readers were indeed able to show a native-like detection of erroneous uses of connectives, but they failed to do so in a sentence evaluation task.

However, it is not certain that these findings are generalizable for all kinds of coherence relations. Firstly, like most research in this field, Zufferey et al.’s (2015) study only concentrated on coherence (or lack thereof) between two clauses. However, coherence relations can also arise more locally, on a clause-internal level. It can be expected that incoherence occurring within a clause is resolved differently than incoherence occurring in the link between two clauses, given that local incoherence does not necessarily affect the general meaning of a sentence or the logical structure of a text. Secondly, their study only assessed the reading fluency of language learners for relations such as contrast or conditions, hence relations for which a connective is very frequently used, if not compulsory. Yet not all coherence relations have to be marked with a connective in order to be correctly interpreted (Asr & Demberg, 2012a; 2012b; Sanders,
2005). Given that connectives are not always mandatory and may even prevent text comprehesion if used excessively or inappropriately (Crewe, 1990, Hartnett, 1986), it is still unknown to what extent non-native speakers rely on highly optional connectives to interpret and understand the logical links within a text.

In the present paper, we attempt to fill these gaps in the literature by focusing on a relation that is often expressed clause-externally, namely specifications, as illustrated in the following examples (1) with the connective that is and (2) implicitly.

1) The woman, that is, my old neighbor from above, is nice.

2) The woman, my old neighbor from above, is nice.

We focus on specifications because they provide a good example of local, intra-sentential coherence, which does not, however, affect the semantic meaning conveyed by the sentence. For this reason, specifications are very often conveyed implicitly (example 2, see also Asr & Demberg, 2012a, 2012b) which might lead language learners to rely less on the meaning conveyed by the connective than for other coherence relations. Also, given that the relations of specifications are typically expressed by different connectives in German and French, we assess whether German-speaking readers are able to detect a misuse of a connective, when this connective corresponds to a close translation of the connective typically used in their L1.

By conducting both an offline and online task, namely a sentence evaluation task and a self-paced-reading task, we assess the implicit and explicit knowledge of German-speaking readers in French. According to Ellis (2004, 2006), these two types of knowledge are dichotomous dimensions of L2 language proficiency. Explicit knowledge involves conscious awareness, is potentially verbalizable and is more weakly held, whereas implicit knowledge is more systematic, more deeply embedded and more
unconscious. By assessing both dimensions of knowledge, we shed new light on the processing of discourse relations in a second language by focusing on clause-internal coherence for which the use of a connective is optional and therefore highly variable across languages.

2. Research background

The production, processing and comprehension of coherence relations appear to be challenging for language learners (e.g., Jiang, 2021a). Research has identified several factors that render signaling of coherence relations with connectives rather complex for learners, due to, for example, the fact that connectives are often polyfunctional (Zufferey & Gygax, 2017) or semantically opaque (Wetzel et al., 2020). A recurrent factor often discussed in the literature for the over-, under- or even erroneous signaling of coherence relations in the texts produced by learners are linguistic interferences from their L1.

Granger and Tyson (1996) analyzed English text productions by French- and German-speaking learners and demonstrated that the French-speaking writers tended to misuse the connective on the contrary and overused the connectives indeed and in fact. None of these errors were observed for German-speaking learners, which led the authors to conclude that they reflected cross-linguistic interferences. While many other corpus studies have documented similar effects (e.g., Altenberg & Tapper, 1998; Bolton, Nelson & Hung, 2002; Degand & Hadermann, 2009; Field & Yip, 1992; Kanno, 1989; Lamirov, 1994; Tapper, 2005), the impact of these errors on the way learners read and process discourse relations is still understudied. Among the few studies dealing with this subject, Zufferey et al. (2015) assessed whether Dutch and French speakers detect misuses of the English connective when in conditional relations (which was expected to trigger transfer effects for the Dutch speakers) and if in contrastive relations (which was expected to
trigger transfer effects for the French speakers). Results show that in a sentence evaluation task, L2 readers were not able to detect the misuses due to transfer from their L1, as Dutch speakers showed problems in rejecting the inappropriate uses of *when* while French speakers failed to reject the inappropriate uses of *if*. Interestingly, in an eye-tracking experiment, the same participants showed a native-like sensitivity to detect misuses of both connectives. The researchers concluded that the detection of these misuses depended on the type of knowledge (i.e., explicit or implicit knowledge) the readers are able to access while reading. While this study demonstrates that cross-linguistic transfer appears to be an important factor to account for the insufficient mastery of discourse connectives in L2, these findings cannot be generalized for all kind of coherence relations, as the study did little to assess the relations for which alternative signals might compensate for connectives. Indeed, the tested relations (i.e., conditions and contrast) of Zufferey et al. (2015) need to be marked explicitly by a connective to be understood, which highlighted the incoherence of inappropriately used connectives. However, there are also coherence relations (e.g., specifications, see below) that do not need to be explicitly marked with connectives in order to be understood. It can even be expected that non-native readers might overlook connectives in relations in which they are highly optional, thus failing to detect inappropriate uses, since they process sentences on a shallower level than native speakers (Clahsen & Felser, 2006).

An example of a coherence relation in which connectives are highly optional are *specifications*. We understand specifications as in (3) as clauses that give a more detailed description of a previously mentioned element (similar to *expansion* according to del Saz Rubio & Fraser, 2003; see also Dal Negro & Fiorentini, 2014; as well as Blakemore 1993; Cuenca, 2003), however without correcting it (as would a *repair*).
3) The woman, that is, my old neighbor from above, is nice.

In this respect, specifications do not only contain a repetition or a reformulation, but specify the previously mentioned element further (and thus differ from reformulations or paraphrases; cf. Cuenca, 2003). Note that while specifications can occur at an inter-sentence level, we focus here on specifications at the intra-clausal level. Importantly for this study, a particular characteristic of specifications is the fact that they do not have to be marked explicitly by a connective (example 4).

4) The woman, my old neighbor from above, is nice.

Studies by Asr and Demberg (2012a, 2012b) have shown that in English, relations similar to specifications such as relations in the restatement group (including specifications) were among the least frequently explicitly marked relations in the Penn Discourse Treebank (Prasad, Dinesh, Lee, Miltsakaki, Robaldo, Joshi & Webber, 2008). Similarly, in the RST Signalling Corpus (Das & Taoboada, 2018), relations similar to specifications such as elaboration or restatements are most frequently conveyed by cues other than connectives (Das, 2014; see also Taboada, 2006). When not conveyed by a connective, specifications can be indicated by punctuation, such as the use of commas (e.g., ‘This woman, my neighbor, is nice.’), dashes (e.g., ‘This woman – my neighbor – is nice.’) or parentheses (e.g., ‘This woman (my neighbor) is nice.’). Aside from punctuation marks, the second mention of the subject (‘woman’) in a more precise manner (‘neighbor’) also semantically indicates the specification, in a relation of hyponymy.

In this regard, it is a common feature across different languages that specifications do not need to be marked with a connective. For example, in both French (example 5) and German (example 6), specifications without a connective can be left implicit without loss of coherence (all French examples are taken from the French Web corpus frTenTen17;
Jakubiček, Kilgarriff, Kovář, Rychlý & Suchomel, 2013; all German examples are taken from the German corpus German WebTenTen13, Jakubiček et al., 2013; by using the search engine SketchEngine; Kilgarriff, Baisa, Bušta, Jakubiček, Kovář, Michelfeit, et al., 2014).

5) Les balançoires à Canastel, une corde et un morceau de pneu, et la vie était belle.

‘The swings in Canastel, a rope and a piece of tire, and life was beautiful.’

6) In unserer Gemeinde, dem Christus Centrum Neumünster, wollen wir Gott erfahrbar machen.

‘In our congregation, the Christus Centrum Neumünster, we want to make God tangible.’

It is, however, also possible in both languages to explicitly mark specifications. In French, this can be done with the connective c’est-à-dire (‘that is’, example 7), in German with the connective also (‘that is’, example, 8).

7) Pour ma part, je n’étais pas excessivement myope mais je serais incapable de taper sur l’ordinateur si je n’avais pas mon œil “malade”, c’est à dire non opéré.

‘For my part, I was not excessively short-sighted but I would be unable to type on the computer if I did not have my ‘sick’, C’EST-A-DIRE, non-operated, eye.’

8) Kausalität, also der Zusammenhang von Ursache und Wirkung, wie wir ihn in unserer Raum-Zeit erleben, ist auf der Quantenebene nicht […]

‘Causality, ALSO, the link between cause and effect, as we experience it in our space-time, is not […] on the quantum level.’
Yet, there is an important difference between the marking of specifications in these two languages: specifications in French are much more commonly left implicit than in German. An analysis of corpus translations indeed revealed that specifications conveyed with German *also* are translated in only roughly half of the cases (i.e., 45%) with a corresponding connective in French. In contrast, occurrences of the French connective *c’est-à-dire* (‘that is’) indicating a specification were translated into German more often explicitly (i.e., 91%). For these analyses, we examined 100 random occurrences of French *c’est-à-dire* and German *also* when indicating a specification in the German-French parallel corpus of debates at the European parliament (*Europarl*, Koehn, 2005) and compared them to their translations in the target language, that is, either German or French.

Given that specifications are visibly expressed differently across French and German, it is unsurprising that language learners struggle to express them appropriately in a second language. As anecdotal evidence of a misuse due to cross-linguistic interferences, we would like to briefly discuss Example 9, a case of misuse of the French connective *alors* (‘so’), found in a seminar paper of a German-speaking student, corrected by one of the authors.

1) *Même si certains morphèmes ne se constituent que d’une seule lettre, alors un graphème ou un phonème, ils sont importants puisqu’ils portent un sens.*

*‘Even if some morphemes consist of only one letter, ALORS a grapheme or phoneme, they are important since they carry meaning.’*

In this example, *alors* is erroneously used as it does not indicate a consequence or temporality but functions as an indicator for a specification. We believe that this...
erroneous use is due to cross-linguistic interferences from the writer’s first language, which is German.

3. Current study

Given the orthographic similarity between the French connective *alors* and the German connective *also* (‘so’) as well as the fact that both connectives share several functions (e.g., indicating a consequence, functioning as discourse marker), we believe that the writer mistakenly used French *alors* in the way they would produce German *also* (‘so’) in their native language. While a more systematic analysis of corpus data is not possible due to the lack of a sufficient corpus of text productions by German-speaking learners of French, we still suspect, based on this and similar pieces of evidence, that German-speaking learners do not have a native-like representation of the way a specification should be expressed in French and that they translate literally from the German *also* (‘so / that is’). This leads to the following research questions:

First, do non-native readers detect the misuse of *alors* (‘so’) when accessing their explicit knowledge? Even though studies have shown that L2 readers generally benefit from connectives (Crosson & Lesaux, 2013; Degand and Sanders, 2002; Van den Bosch, Segers & Verhoeven, 2018), it can be assumed that other semantic cues and punctuation marks in the sentence represent sufficient cues for L2 readers to infer the specification, given its high degree of implicitness. As such, the error may remain unnoticed. An indication that this assumption might be on the right track comes from the observation that connectives do not always represent a benefit for non-native readers (Crible et al. 2021; Zufferey & Gygax, 2017).

Second, do non-native readers detect the misuse of *alors* (‘so’) when accessing their implicit knowledge? As a reminder, in Zufferey et al.’s (2015) study, participants
showed a native-like ability to detect transfer-related errors in an online task but failed to do so in an offline task. Yet, for specifications, hence a relation that does not have to be marked with a connective and establishes coherence only on a clause-internal level, it is likely that highly optional connectives are easily overread, causing the error to remain unnoticed.

Third, are French native speakers affected by the erroneous use of *alors* (‘so’) while online processing? While native speakers should be able to detect this error when consciously judging sentences, it is less clear whether this error also leads to processing disruption, as the use of a connective in specifications is highly optional and an inappropriate use does not necessarily change the overall meaning of the sentence.

Fourth, do native speakers show greater ease while processing implicit specifications than (correct) explicitly marked specifications? Given the high frequency of implicit specifications in French, native speakers may process implicit sentences more quickly than specifications marked with a (correct) connective. However, given that explicit versions still arise frequently in language use (as attested in written corpora), it may be just as well that native speakers process both versions equally well.

In order to answer these questions, we empirically assess whether French native speakers and German-speaking learners of French are able to detect the erroneous use of French *alors* in specifications both when accessing explicit knowledge, using a sentence evaluation task, and implicit knowledge, using a self-paced reading task (Ellis, 2004, 2006, see also Cho, 2020; Jiang, 2013). Aside from the detection of the erroneous use of *alors* (‘so’), we also test whether specifications that are introduced by a correct connective (i.e., with *c’est-à-dire*, ‘that is’) are processed more easily than when they are left implicit.

We make the following hypotheses:
Hypothesis 1): German-speaking learners of French will face difficulties in detecting the erroneous use of *alors* (‘so’) while accessing their explicit knowledge. Also, they might not have integrated the rather infrequent *c’est-à-dire* (‘that is’) yet, even if it represents a correct way of conveying a specification in French.

Hypothesis 2): The erroneous use of the *alors* (‘so’) should not affect their online processing of the sentences, because they might rely on other signals (such as punctuation and the semantic content) to identify the specifications.

Hypothesis 3): Native speakers will reject the incorrect use of *alors* (‘so’) in the sentence evaluation task. Their evaluation will, however, not differ between sentences marked with *c’est-à-dire* (‘that is’) and implicit ones, as both versions are correct.

Hypothesis 4): Native speakers will show processing disruption for the incorrect use of *alors*. Implicit and explicit versions, however, should not affect their reading fluency, as both represent correct ways to express specifications.

3.1. **Experiment 1: Sentence Evaluation Task**

We asked native French speakers and German-speaking learners of French to perform a web-based judgment task to judge the correctness of sentences containing specifications, which were presented in three conditions: 1) specifications conveyed by the appropriate connective *c’est-à-dire*, 2) specifications conveyed by the inappropriate connective *alors* and 3) specifications that were implicit. We also assessed learners’ level of proficiency in French using the French version of the Lextale-test (Brysbaert, 2013), which enabled us to uncover further interacting effects between language proficiency and the ability to detect misuses of *alors*. 
3.1.1. Participants

We recruited participants on the Prolific platform (Prolific, Oxford, UK, 2021) and among undergraduate students of universities in French- and German-speaking Switzerland. Prolific participants showed a good participation in previous experiments on the Prolific platform (a minimum of 95% of good ratings) and were paid 2.10 GBP in our experiment. The participating undergraduate students were remunerated with a voucher for a mail-order business worth 5 CHF. For our control group of native speakers, we excluded participants that had a non-native like level in French (a score inferior to 30 in the Lextale task). In total, the data of 72 German-speaking participants and 103 native speakers were analyzed. All participants gave informed consent for inclusion.

In order to assess the language proficiency of our L2 participants, we conducted the French version of the Lextale-test (Brysbaert, 2013), a vocabulary test in which participants are asked to indicate all the French words they recognise from a given list. This list contains 56 real French words as well 28 non-existent but French sounding words. This test has been shown to be a reliable measurement of L2 proficiency in previous experiments, as Wetzel et al. (2020) showed solid correlations between the French Lextale score and scores of a grammar task, measurements of exposure to print and the mastery of French discourse connectives in an offline task. In addition, a correlation was also found for native speakers between the mastery of discourse connectives and Lextale.

The detailed information of all tested participants including their Lextale scores are reported in Table 1.

Table 1. Experiment 1. Demographic information of all participants including their Lextale scores.

<table>
<thead>
<tr>
<th>n</th>
<th>female</th>
<th>age mean</th>
<th>age SD</th>
<th>Lextale scores mean</th>
<th>Lextale scores SD</th>
<th>Lextale scores %</th>
</tr>
</thead>
</table>

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Aside from the Lextale task, we asked all participants to self-evaluate their language proficiency in French across the three levels of written production, oral production and oral comprehension (following the LEAP questionnaire by Kaushanskaya, Blumenfeld & Marian, 2019). These scores can be found in the supplementary analyses (accessible on https://osf.io/qzteh/?view_only=8f912d6877974618abc9b5fa7089e482).

### 3.1.2. Materials

We created 30 experimental items in French, all containing a specification. As seen in Table 2, we constructed three versions for each item: the first containing the inappropriate connective *alors* (‘so’), the second the appropriate connective *c’est-à-dire* (‘that is’) and the third, an implicit specification.

<table>
<thead>
<tr>
<th>condition</th>
<th>item</th>
</tr>
</thead>
<tbody>
<tr>
<td>transfer</td>
<td>* Mon voisin d’autrefois, alors le vieil homme qui habitait à coté, était très sympathique.</td>
</tr>
<tr>
<td></td>
<td>*'My neighbor from the old days, <em>ALORS</em> the old man who lived next door, was very nice.’</td>
</tr>
<tr>
<td>explicit</td>
<td>* Mon voisin d’autrefois, c’est-à-dire le vieil homme qui habitait à coté, était très sympathique.</td>
</tr>
<tr>
<td></td>
<td>‘My neighbor from the old days, that is, the old man who lived next door, was very nice.’</td>
</tr>
<tr>
<td>implicit</td>
<td>* Mon voisin d’autrefois, le vieil homme qui habitait à coté, était très sympathique.</td>
</tr>
<tr>
<td></td>
<td>‘My neighbor from the old days, the old man who lived next door, was very nice.’</td>
</tr>
</tbody>
</table>

In order to ensure that the items themselves would not bias the correctness judgment, we created three lists using a Latin square design (3 conditions x 30 items). In addition to
our experimental items, we added 40 filler items: 28 sentences containing either a correct
use of French pronouns or an incorrect use, as well as 12 sentences displaying *alors* in its
correct use (i.e., conveying a cause-consequence relation), as seen in examples 10) and
11).

2) *Martina se souvenait de la fête au cours de laquelle elle avait rencontré sa*
*meilleure amie.*

‘Martina remembered the party during which she met her best friend.’

3) *Robin aime faire du camping, alors Fabrice lui offre une tente et un sac de*
*couchage.*

‘Robin likes to go camping, so Fabrice offers him a tent and a sleeping bag.’

This way we ensured that items containing *alors* were also sometimes correct in the
experiment.

3.1.3. Procedure

We used the Qualtrics software (Qualtrics LLC, Provo, UT, USA) to design the
experiment and the participants accessed it online via a weblink. Before the actual
experiment, the participants were asked to read a consent form carefully. After accepting
it, the experiment began, and participants were asked to judge the correctness of each
sentence by placing a cursor on a continuous horizontal scale from ‘I am sure this is
incorrect’ on the far left to ‘I am sure this is correct’ on the far right. Sentences were
presented in isolation, one after the other. After this main task, participants completed the
French Lextale task. Finally, participants self-evaluated their language proficiency in
French on a scale from 0 to 10. The whole experiment lasted for approximately 20
minutes.
3.1.4. Results

The answers for the main task resulted in values on a scale from 0.0 to 10.0 (10.0 indicating that the participant was certain that the item was correct). The evaluation scores for this task are reported in Table 3. We also included filler items (correct and incorrect uses of pronouns, as well as fillers containing correct uses of *alors*), as these conditions provide supplementary indications about the language level of the non-native speakers group.

Table 3. Sentence evaluation task: evaluation scores of native and non-native speakers for the experimental and filler items

<table>
<thead>
<tr>
<th>condition</th>
<th>native speakers</th>
<th></th>
<th></th>
<th>non-native speakers</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mean</td>
<td>SD</td>
<td>median</td>
<td>mean</td>
<td>SD</td>
<td>median</td>
</tr>
<tr>
<td>transfer</td>
<td>1.41</td>
<td>2.75</td>
<td>0</td>
<td>5.54</td>
<td>3.33</td>
<td>6.3</td>
</tr>
<tr>
<td>explicit</td>
<td>8.59</td>
<td>2.58</td>
<td>10</td>
<td>7.24</td>
<td>2.87</td>
<td>8.6</td>
</tr>
<tr>
<td>implicit</td>
<td>8.60</td>
<td>2.62</td>
<td>10</td>
<td>7.75</td>
<td>2.68</td>
<td>8.1</td>
</tr>
<tr>
<td>correct fillers</td>
<td>8.60</td>
<td>2.77</td>
<td>10</td>
<td>6.54</td>
<td>3.14</td>
<td>7.5</td>
</tr>
<tr>
<td>correct fillers <em>alors</em></td>
<td>9.17</td>
<td>1.99</td>
<td>10</td>
<td>6.92</td>
<td>3.16</td>
<td>8.0</td>
</tr>
<tr>
<td>incorrect fillers</td>
<td>1.74</td>
<td>3.13</td>
<td>0</td>
<td>4.16</td>
<td>3.55</td>
<td>3.3</td>
</tr>
</tbody>
</table>

We fitted linear-mixed-effects models using R (R-Core-Team, 2020) and built our models using the *lmer* function of the *lme4* package (Bates et al, 2014), following a forward-testing approach (Baayen, 2008). The dependent variable was the correctness judgement score (from 0 - 10; 10 corresponding to ‘I am sure this is correct’), independent variables were the *Language Group* (i.e., native or non-native speakers) and the *Condition* (i.e., transfer, implicit, explicit). We assessed the fit of the models (i.e., calculating the \( \chi^2 \)-value of the log-likelihood test) using the *anova* function of the *base R* package (R Core Team, 2020) and obtained \( p \) values by using the *summary* function from the *car* package (Fox & Weisberg, 2019). As a post-hoc test we computed the least squares means of the fixed effects, using the *emmeans* function of the *emmeans*
package (Lenth, 2020). For all models, including our null models, we included *Participants* and *Items* as random effects. The filler items were not included in the data analysis.

Adding *Language group* to our null model (that included only *Participants* and *Items* as random effects and no fixed effects) improved the model’s fit significantly ($\chi^2(1) = 15.12, p < .001$). Adding the interaction with the factor *Condition* improved the model further ($\chi^2(4) = 3670.5, p < .001$). The final model thus included *Language group* and *Condition* as interacting fixed effects and *Participants* and *Items* as random effects. The output from this model is reported in Table 4.

**Table 4.** Output of our final model.

|                               | $\beta$ | $SE$ | $df$    | $t$   | Pr($>|t|)$ |
|-------------------------------|---------|------|---------|-------|------------|
| (Intercept: language German : condition transfer) | 5.53    | .17  | 196.05  | 33.29 | $<.001$ ***|
| language French               | -4.12   | .18  | 367.60  | -22.36| $<.001$ ***|
| condition explicit            | 1.70    | .14  | 5019.26 | 12.31 | $<.001$ ***|
| condition implicit            | 2.23    | .14  | 5019.26 | 16.17 | $<.001$ ***|
| language French : condition explicit | 5.47    | .18  | 5018.74 | 30.41 | $<.001$ ***|
| language French : condition implicit | 4.96    | .18  | 5018.74 | 27.54 | $<.001$ ***|

Post-hoc comparisons showed that German speakers tended to judge the transfer condition as more correct than the native speakers ($\beta(5214)= 4.12, SE = .14, p < .0001$). They did however judge it to be less correct than both the explicit ($\beta(5214)= 1.70, SE = .15, p < .0001$) and the implicit version ($\beta(5214)= 2.20, SE = .14, p < .0001$). They also rated the two correct versions of the specifications (i.e., implicit specifications and specifications explicitly introduced by *c’est-à-dire*) differently, as they judged the implicit version as more correct than the explicit version ($\beta(5214)= -0.51, SE = .14, p < .01$) whereas the French participants did not evaluate one of the two appropriate
conditions as more correct ($\beta(5214)= -0.01, SE = .12, \ p > .99$). The results are displayed in Figure 1.

**Figure 1.** Sentence evaluation task: box and whisker plots for the evaluation ratings by French- and German-speaking participants (10 representing the highest certainty that the presented item was correct).

![Box and whisker plots for evaluation ratings](image)

**Lextale scores**

Lextale scores were calculated by adding +1 point for each correctly identified existing word and subtracting -1 point for each incorrectly identified invented word. Consequently, the maximum score was 56.

In order to see whether Lextale scores were predictive for the detection of inappropriate uses of *alors*, we once more ran linear mixed models. Since the Lextale scores were highly correlated with the language groups, we ran separate models for the
L1 and L2 datasets, thus ensuring the assumption of absence of multicollinearity (Schreiber-Gregory, 2018). For the dataset containing only native speakers, adding *Condition* to the null model improved its fit ($\chi^2(2) = 3213.9, p < .0001$), adding the interaction with the *Lextale score* improved it further ($\chi^2(3) = 57.06, p < .0001$). The output of this final model is reported in Table 5.

**Table 5.** Sentence evaluation task, output of our final model for native speakers. The model included *Condition* and *Lextale score* as interacting fixed effects and *Participants* and *Items* as random effects.

|                | $\beta$ | $SE$ | $df$ | $t$ | $Pr(>|t|)$  |
|----------------|---------|------|------|-----|-------------|
| (Intercept)    | 7.00    | 1.09 | 221.65 | 6.44 | < .001 ***  |
| condition implicit | -1.01  | 1.06 | 2925.25 | -0.95 | .342        |
| condition *alors* | -0.80  | 1.06 | 2925.25 | -0.75 | .453        |
| *Lextale*      | .03     | .02  | 216.33 | 1.47  | .142        |
| condition implicit : *Lextale* | .02    | .02  | 2925.19 | .97   | .331        |
| condition *alors* : *Lextale* | -0.14  | .02  | 2925.19 | -6.03 | < .001 ***  |

We conclude that a higher *Lextale* score predicted a better detection of incorrect uses of *alors* for native speakers.

For non-native speakers, adding *Condition* as a fixed effect improved the model fit as well ($\chi^2(2) = 234.58, p < .0001$), which was also the case when adding the interaction with the scores of the *Lextale* task ($\chi^2(3) = 50.53, p < .0001$). The output is reported in Table 6.

**Table 6.** Sentence evaluation task, output of our final model for non-native speakers. The model included the *Condition* and the *Lextale score* as interacting fixed effects and *Participants* and *Items* as random effects.

|                | $\beta$ | $SE$ | $df$ | $t$ | $Pr(>|t|)$  |
|----------------|---------|------|------|-----|-------------|
| (Intercept)    | 6.64    | .32  | 151.14 | 20.88 | < .001 ***  |
| condition implicit | .70    | .29  | 2079.46 | 2.43  | .0153 *     |
| condition *alors* | -0.05  | .29  | 2079.46 | -0.20 | .8447       |
| *Lextale*      | .03     | .03  | 141.35 | 2.22  | .0283 *     |
| condition implicit : *Lextale* | -0.01 | .02  | 2080.66 | -0.73 | .4647       |
| condition *alors* : *Lextale* | -0.08  | .02  | 2080.66 | -6.52 | < .001 ***  |
As can be seen in Figure 2, for both language groups, a higher score in the Lextale task predicted a better detection of the inappropriate use of *alors*. In other words, the higher a participant's Lextale score was (as displayed on the X-axis of Figure 2), the more likely they were to rate the sentences containing the inappropriate connective *alors* as incorrect (as displayed on the Y-axis).

**Figure 2.** Ratings for experimental items containing erroneous uses of *alors* and Lextale scores for both groups of participants.

### 3.1.5. Discussion

In an offline sentence evaluation task, we asked native French speakers and German-speaking learners of French to evaluate the correctness of French sentences.

Results regarding the detection of the inappropriate use of *alors* show, as expected, strong ceiling and floor effects (respectively for correct and incorrect items) for native speakers, which indicates that French speakers were quite certain which sentences were overall acceptable and which were not. For the German-speaking learners of French,
results show that they were able to detect the misuse of *alors* as they discriminated between correct uses (explicit, implicit) and inappropriate use. This means that when asked to consciously evaluate sentences, they were able to surpass potential cross-linguistic influences from their L1. However, there are also indications that they struggled to do so. Results show that they were not as confident as native speakers in their judgments. They displayed great variance in the transfer condition and tended to judge these sentences on average as more correct than incorrect. This finding cannot be explained by a low level of language proficiency, since they rejected with more confidence the incorrect filler items. Although these findings are not entirely conclusive (given that there might be differences in difficulty between the items containing inappropriate uses of *alors* and the inappropriate pronouns within the filler items), they still hint at the difficulty of German speakers to consistently reject inappropriate uses of *alors* to convey specifications due to an influence from their first language.

In addition, our findings show that the detection of incorrect uses of *alors* was predicted by a high Lextale score, which leads us to conclude that errors due to cross-linguistic influences can be at least partially eliminated with a high language proficiency. However, we only assessed the language proficiency of our participants using the Lextale task. Although this task is known to be a solid measure of language proficiency (e.g., Wetzel et al., 2020), future research should assess more precisely which dimensions of proficiency are predictive of the detection of transfer-related errors. Interestingly, our findings also demonstrate that even the native speakers’ ability to detect the inappropriate uses of *alors* was predicted by their score in the Lextale task. This finding is in line with studies that report individual variations of competence with connectives, even among native speakers (Scholman, Demberg & Sanders, 2020; Zufferey & Gygax, 2020), and
that their competence can be predicted by vocabulary measurements such as Lextale (Wetzel et al., 2020).

Finally, our results show that native speakers evaluated both correct forms of specifications (i.e., the implicit and explicit versions) as equally correct, confirming that both uses are indeed adequate. In contrast, non-native speakers judged specifications containing the explicit version as less correct than the implicit version. Although correct, the rather infrequent connective *c'est-à-dire* gave rise to a slight uncertainty among the non-native speakers. This might be due to the fact that, as mentioned earlier, specifications in French are less often explicitly marked with a connective than specifications in German. When a German-speaking learner of French is confronted with the redundant and perhaps somewhat unexpected connective *c'est-à-dire*, they struggle to accept this use as correct. As a result, they displayed a preference for sentences that do not contain a connective at all. A similar pattern was found by Zufferey & Gygax (2017) who report that learners prefer implicit than correct explicit marking when connectives are not familiar. We will come back to this preference in the General Discussion.

In sum, our first experiment showed that German-speaking learners of French showed a preference for specifications that were implicit over specifications that were explicitly marked. Furthermore, despite potential cross-linguistic interferences from their L1, they were generally able to discriminate specifications that were marked correctly (i.e., implicit, with *c’est-à-dire*) from incorrectly marked specifications (i.e., with *alors*), but to a smaller degree than native French readers. In a next step, we will assess whether non-native speakers are equally able to detect the error when accessing their implicit knowledge and whether the preference for implicit sentences is equally visible during sentence processing by conducting a self-paced reading task.
3.2. Experiment 2: Self-paced reading task

In our second experiment, we assess the implicit knowledge of native and non-native participants by using a self-paced reading task. We assume that French-speaking participants will reject inappropriate uses of *alors*, which will in turn affect their processing of sentences containing it. Indeed, previous research has shown that connectives, when inappropriately used, slow down processing (e.g., Murray, 1997; Xu et al., 2018). By contrast, German-speaking learners of French might have trouble detecting the misuse due to interferences from their native language, and as a result, read all segments equally quickly. Given that *c’est-à-dire* and implicit specifications are both correct ways to mark a specification, we predict that native and non-native speakers will not read those conditions at different speeds.

3.2.1. Participants

We recruited 63 speakers of French and 51 native German speakers who indicated that they could read French fluently via the Prolific platform. Each participant showed a good participation in previous studies on the Prolific platform (more than 95% of approved participations) and was remunerated with GBP 2.63. All participants gave informed consent for participation. Given that the Lextale scores indicated a comparable language level with the participants of the first experiment, we decided not to recruit further among university students. The demographic information of all participants as well as their scores in the Lextale task are reported in Table 7.

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>female</th>
<th>age mean</th>
<th>age SD</th>
<th>Lextale scores mean</th>
<th>Lextale scores SD</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-native speakers</td>
<td>51</td>
<td>36</td>
<td>28.2</td>
<td>8.57</td>
<td>20.03</td>
<td>11.20</td>
<td>36</td>
</tr>
<tr>
<td>Native speakers</td>
<td>63</td>
<td>28</td>
<td>29.3</td>
<td>10.4</td>
<td>45.3</td>
<td>5.65</td>
<td>81</td>
</tr>
</tbody>
</table>

Table 7. Experiment 2. Demographic information of all participants including their Lextale scores.
As for the previous experiment, the auto-evaluation scores of all participants for their language proficiency in French can be found in the supplementary analyses (accessible on https://osf.io/qzteh/?view_only=8f912d6877974618abc9b5fa7089c482).

### 3.2.2. Materials

We segmented the items used in our first experiment into five reading segments (as shown in Example 12).

4) *Mon voisin d’autrefois, // alors le vieil homme // qui habitait à coté, // était // très sympahtique.*

‘My neighbor from the old days, // CONNECTIVE the old man // who lived next door, // was // very nice.’

In order to preserve a natural rhythm of reading, we decided to include the connective in the second segment. Consequently, the third, fourth and fifth segments were the same for all three conditions (i.e., no connective, *alors, c’est-à-dire*) and were therefore comparable for data analysis. As in previous literature on this subject (e.g., Crible et al., 2021), a verification question appeared after each item (as shown in Example 5). Participants had to indicate whether the statement was either true or false.

5) *Le voisin était aimable. Vrai ou faux ?*

‘The neighbor was amiable. True or false?’

Accuracy of responses to the verification question as well as response times were collected. These measurements allowed us to analyze potential spill-over effects of processing difficulties in post-critical wrap-up regions of the sentences (see also Lyu et al., 2020 for similar measurements). Furthermore, it enabled us to exclude participants who did not pay attention while performing the task. Based on a threshold of 80% of correct responses, we excluded one non-native participant (96% of correct answers by
native speakers on average, 94% of correct answers by non-native speakers). As in our
first experiment, all participants also saw 30 filler items, of which twelve contained
appropriate uses of *alors*, in order to ensure that the target connective also appeared in
correct sentences.

3.2.3. Procedure

Participants first accepted the consent form on *Qualtrics* (Qualtrics LLC, Provo, UT,
USA) and were then guided to the self-paced-reading task, which was designed using
*Psychopy* software (Version 2020.2.6; Peirce, Gray, Simpson, MacAskill, Höchenberger,
Sogo, Kastman, and Lindeløv, 2019) and hosted on *Pavlovia* servers
(*https://pavlovia.org*). Before the actual experiment, two training items were presented in
order to familiarize the participants with the task. After completing this training, they read
filler and experimental items, one at a time in a randomized order.

Before every first segment of a sentence, a screen showing the phrase “Press space
bar in order to see the next sentence” was displayed. After pressing the space bar, a red
cross was presented for one second exactly at the place where the first segment of the
next sentence would appear. Every segment of each item was presented in the middle of
the screen, with a black, easy to read font against a white background. In order to progress
through the segments, participants pressed the space bar. Upon reading the last segment
of a sentence, the comprehension question was presented. Participants answered by
pressing ‘v’ (for *vrai* ‘true’) or ‘f’ (for *faux* ‘false’). After the main task, participants
moved on to the *Lextale* task. The whole experiment lasted approximately twenty-five
minutes.
3.2.4. Results

We fitted linear mixed models on the reading times for segments 3, 4 and 5, that were built and tested as described in section 7.5. This time, the dependent variable was the reading time for each segment, and the independent variable was the Condition (i.e., transfer, implicit, explicit). In addition, we conducted supplementary analyses of the reading times and correctness of the responses to the comprehension questions that can be found at https://osf.io/qzteh/?view_only=8f912d6877974618abc9b5fa7089c482. These results show no effect of the condition on the participants’ answers and response times.

In order to reduce the positive skew of our reading time data (as tested by the skweness() function of the moments package, Komsta & Novomestky, 2015), we set cut-off values at 50 ms and 5 sec for the reading times and additionally performed log-transformations (as in Crible et al., 2021).

Visual representation then indicated normal distributions. All data and R-scripts can be found at https://osf.io/qzteh/?view_only=8f912d6877974618abc9b5fa7089c482. As we anticipated a strong effect of Language group (i.e., native readers reading faster than non-native readers), we decided to conduct separate analyses for both groups. This approach enabled us to detect smaller within-group differences that might have gone unnoticed (Crible et al., 2021). Still, analyses of the dataset including both groups can be found in the supplementary materials. As reported there, we not only found the consistent and strong difference that native readers read all segments significantly faster than non-native readers, but also an interaction with the condition in Segment 4 and a statistical trend for this interaction in Segment 3.
Native speakers

Segment 3

Adding Condition as a fixed effect improved the model’s fit ($\chi^2(2) = 7.89, p < .05$). The resulting final model showed that segment 3 was read significantly more slowly when it was indicated by alors than when the specification was left implicit ($\beta(1787) = .06$, SE = .02, $t = 2.77, p < .01$).

Segment 4

Adding Condition improved the model’s fit ($\chi^2(2) = 7.76, p < .05$). The resulting final model showed that participants read the fourth segment significantly more slowly when the specification was indicated by the inappropriate alors in segment 2 than the implicit version of the specification ($\beta(1790) = .05$, SE = .02, $t = 2.79, p < .01$).

Segment 5

Adding Condition to the null model did not improve its fit ($\chi^2(2) = 2.01, p = .37$). Hence, native participants read the last segment equally quickly across all three conditions. The reading times of the native speakers for all three segments are displayed in Figure 3.
Non-native speakers

Segment 3, 4, 5

In the non-native group, adding Condition to the null model did not improve its fit in any of the three segments (Segment 3: $\chi^2(2) = .80, p = .67$; Segment 4: $\chi^2(2) = 2.86, p = .24$; Segment 5: $\chi^2(2) = 0.13, p = .94$). Hence, non-native participants did not slow down their reading for any of the three conditions throughout the whole sentence. The reading times for segments 3, 4 and 5 of the non-native speakers are displayed in Figure 4.
Figure 4. Reading times for the segments 3, 4 and 5 of the non-native speakers.

<table>
<thead>
<tr>
<th></th>
<th>Segment 3</th>
<th>Segment 4</th>
<th>Segment 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>c’est-à-dire</td>
<td>1.50</td>
<td>1.25</td>
<td>1.00</td>
</tr>
<tr>
<td>alors</td>
<td>1.25</td>
<td>1.00</td>
<td>0.75</td>
</tr>
<tr>
<td>implicit</td>
<td>1.00</td>
<td>0.75</td>
<td>0.50</td>
</tr>
</tbody>
</table>

**Lextale Scores**

A chi-square test was performed to compare the Lextale scores across the two experiments. Results revealed no significant difference between the groups ($\chi^2(1) = 5.68^{30}, p > .99$). This time, supplementary analyses showed that the Lextale scores were not predictive for any of the reading times we measured. However, more proficient non-native speakers responded more quickly and more correctly than less proficient non-native speakers to the verification questions (analyses can be found at https://osf.io/qzteh/?view_only=8f912d6877974618abe9b5fa7089e482).

### 3.2.5. Discussion

In a self-paced reading task, native French speakers and German-speaking learners of French read 30 French sentences containing specifications that were either introduced by an appropriate connective (*c’est-à-dire* ‘that is’), an inappropriate connective (*alors* ‘so’) or left implicit. The sentences were divided into five segments.
Regarding the detection of the inappropriate connective *alors*, results show that native speakers slowed down their reading in segments 3 and 4 when the specification was introduced by the inappropriate connective *alors* (‘so’) in segment 2, compared to when the specification was left implicit. This confirms our finding of the first experiment that native speakers reject *alors* as inappropriate when it is used to indicate a specification, which demonstrates that this use also affects online processing. However, this effect was only temporary as it was only observed in the two segments immediately following the connective, but did not last until the end of the sentence. This shows that native speakers are able to infer a relation of specification even in the presence of an incorrect connective, and that the latter only temporarily affected reading fluency. In contrast, the non-native speakers appeared to be insensitive to the incorrectness of specifications indicated by *alors*. In contrast to Experiment 1, where we found a general ability to detect this misuse across native and non-native speakers, the results of our second experiment show that specifications indicated by *alors* did not provoke longer reading times in comparison to the two appropriate versions (i.e., the implicit version and the version with *c’est-à-dire*) of the specifications. Hence, similarly to false cognates (e.g., French *enfant* ‘child’ vs. English *infant*) which are assumed to complicate the acquisition and mastery of conceptual words in a second language (e.g., Janke & Kolokonte, 2015), we conclude that cross-linguistic influence can equally hinder the detections of inappropriately used words carrying procedural meaning while reading.

Finally, our results show that native speakers did not read implicit specifications more quickly or more slowly than those indicated with the appropriate connective *c’est-à-dire* (‘that is’), which suggests that native speakers did not necessarily benefit from the presence of this connective. This finding is however not surprising since our first
experiment showed that both versions are considered highly appropriate, and since specifications are regularly left implicit in French. For non-native speakers, our findings also show that they read segments equally quickly, independently of whether the specification had been introduced by the correct connective *c’est-à-dire* or without a connective at all. Hence, although we found a preference for implicit specifications in Experiment 1 compared to the appropriate use of *c’est-à-dire*, this preference was not matched by corresponding reading times. This might indicate that, while reading, non-native speakers overread the highly optional connectives (correct or incorrect), suggesting that non-native speakers rely less on the connective and are able to insert specifications thanks to semantic and structural cues.

### 3.3. General discussion

Languages differ in the way they encode coherence relations, causing erroneous uses of connectives in L2. In order to assess the extent of these difficulties, we tested the misuse of the French connective *alors* (‘so’) by German-speaking learners, who erroneously use this connective to indicate specifications due to an influence of their first language. Given that this coherence relation holds a great degree of implicitness, we simultaneously assessed the extent to which specifications that are communicated without a connective obstruct or facilitate understanding and processing by non-native readers. With these conditions (i.e., implicit marking, explicit marking, incorrect explicit marking), we conducted a sentence evaluation task and a self-paced-reading task.

First of all, our results show that L2 readers do not appear to benefit from the correct but highly optional connective *c’est à dire* (‘that is to say’), as they judged specifications conveyed by this connective as less correct than implicit specifications. We believe that learners’ lack of reliance on the information conveyed by *c’est à dire* might
reflect an uncertainty to accept optional uses of connectives when accessing their explicit knowledge and that they rely mainly on literal and primary meanings of connectives. Importantly, the use of *c’est-à-dire* in specification is correct but might not be familiar to leaners of French, given that specifications are frequently left implicit in French. As a result, when confronted with these correct uses, the non-native speakers show uncertainty, to the point that they even reject them. Yet, non-native speakers did not process implicit specifications more quickly than specifications indicated by a connective in the self-paced reading task. We believe, therefore, that further research is needed to examine the potential benefit of optional connectives while processing in a second language.

Regarding the misuse of *alors* indicating a specification, our study shows that native speakers reacted to it both in the sentence evaluation task and while reading. More precisely, results show that native speakers clearly reject the use of *alors* in specifications, as they judged those specifications consistently and with great confidence as incorrect in the sentence evaluation task. We also observed in this task that the certainty with which native speakers rejected this use was linked to their level of language proficiency, as measured by the Lextale scores. In other words, French native speakers who were more competent in their native language were also more confident in rejecting the inappropriate uses of *alors*. In this regard, our study supports previous work showing that there is important variation among native speakers and their decoding of coherence relations (Scholman et al., 2020; Zufferey & Gygax, 2020). Results of the self-paced reading task further showed that the inappropriate use of *alors* also affected their online processing, as participants slowed down their reading for specifications indicated by *alors* in comparison to implicit specifications, while the reading times for implicit and correctly
indicated specifications did not differ. This finding thus confirms that the use of *alors* for specifications is clearly rejected by native speakers.

Regarding the German-speaking participants, our findings show that they were generally able to detect the incorrect use of *alors* in the offline task. However, contrary to native speakers, German speakers were not affected by this incorrect use during reading, as they did not slow down when they encountered this error. A possible interpretation for the mismatch between the online and the offline task is that the detection of the error depended on the type of knowledge the participants were able to access. When accessing their explicit knowledge, readers were more consciously aware of the functions of *alors* and were thus more likely to reject the incorrect use. However, non-native speakers might not have developed an unconscious knowledge and automatic processing (see Ellis, 2004) of the functions of *alors*, which prevented the detection of the error in the online task.

Our results thus do not appear to match those obtained by Zufferey et al. (2015), who found that language learners were overall sensitive to transfer-related misuses in an online reading task, but not in an offline sentence evaluation task. We believe that this divergence can be explained by the specificity of the relation we tested. While Zufferey et al. (2015) tested relations that held a low degree of implicitness (especially the conditional relations), specifications can be left implicit more easily. This characteristic appears to lead non-native readers to overread the highly optional connective, especially as they tend to process sentences on a shallower level overall than native speakers (Clahsen & Felser, 2006) and are thus not as sensitive to detecting erroneous uses of connectives. This is further reinforced by the fact that the coherence established by a connective in a specification occurs only locally and does not necessarily change the
outcome or main message of the sentence. We thus conclude that the degree of (in)coherence, as well as the impact of the connective, depend strongly on the context of the respective coherence relation, or in other words, when connectives are highly optional, L2 readers are not affected while reading by the loss of coherence due to their incorrect uses as these do not change the main message of a sentence.

Finally, our results also hint at the conclusion that erroneous cross-linguistic interferences from the speakers’ L1 can be eliminated with a high language proficiency in L2 (see also Haastrip, 1989 for this effect on conceptual words). In the sentence evaluation task, we observed that more proficient L2 speakers of French tended to be more confident in rejecting the inappropriate uses of *alors* despite a potential negative transfer.

4. Conclusion

In our study, we observed that non-native speakers preferred sentences that did not contain a highly optional connective over sentences that were indicated by this connective. This pattern is reminiscent of the one documented by Zufferey and Gygax (2017) who showed that language learners preferred implicit versions of cause and confirmation relations when they were conveyed by the French connective *en effet* (‘indeed’). These findings also support and complement the findings of Crible et al. (2021) who demonstrated that language learners had difficulties building the correct relation when the connective used did not typically convey it (i.e., *et* ‘and’ in contrastive relations), even though this use was considered to be correct by native speakers. We conclude that connectives do not always represent a benefit or the preferred option when reading in a second language. It appears instead that a connective only represents a benefit for processing in a second language when it conveys the coherence relation that learners
expect it to convey (Crible et al., 2021), and, importantly, only within relations that they
expect to be marked explicitly. For coherence relations that have a high degree of
implicitness, such as specifications, second language learners do not rely on the
connective and even prefer the type of sentence they are more familiar with, namely the
implicit version. Furthermore, our results indicate that incoherence affects reading
fluency less strongly when it occurs on a clause-internal level than when it occurs between
two clauses (as in Zufferey et al., 2015).

Our study thus fits in the context of current research that investigates the extent to
which processing in a second language differs from processing in a first language (e.g.,
Jiang, 2021; Taft, Li & Aryanti, 2021; Witzel & Witzel, 2021). In this regard, we
conclude that negative cross-linguistic interferences can impact the way readers process
discourse. Importantly, that learners lack awareness for errors caused by cross-linguistic
interferences while reading does not imply that they are not able to detect this error when
accessing their explicit knowledge.

A limitation of our study, and thus, an intriguing direction for future studies,
concerns a more detailed assessment of the learners’ linguistic profile and individual
differences in terms of language proficiency. In our study, we only assessed the language
proficiency of our participants by testing the width of their vocabulary. Although the test
we used can be considered a solid measurement for language proficiency in general (e.g.,
Wetzel et al., 2020), future research is needed to determine more precisely which
linguistic skills have to be acquired (and, importantly, how) to detect and avoid misuses
of connectives due to cross-linguistic interferences.
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