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Previous research has suggested that some discourse relations are easier to convey implicitly than others due to cognitive biases in the interpretation of discourse. In this article we argue that relations involving a perspective shift, such as confirmation relations, are difficult to convey implicitly. We assess this claim with two empirical studies involving the ambiguous French connective *en effet*, which can either convey a causal relation or a confirmation relation. First, we compare the processing of implicit and explicit causal and confirmation relations conveyed by this connective in a self-paced reading experiment and show that removing the connective in confirmation relations disturbs processing. Second, we compare the percentage of implicit translations of *en effet* for both discourse relations across three target languages using parallel directional corpora and find that causal relations always lead to more implicit translations than confirmation relations.

INTRODUCTION

Sentences forming a text or a discourse are linked by coherence relations, such as cause and temporal precedence, as illustrated in (1) and (2). These relations can be made explicit by the use of discourse connectives as in (1a) and (2a) but can also be left implicit and reconstructed by inference as in (1b) and (2b).

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(1)   a. Peter married Jane because he loved her.
       b. Peter married Jane. He loved her.
(2)   a. Peter ate breakfast before he left for school.
       b. Peter ate breakfast. He left for school.

However, a fact often also observed in the literature is that some discourse relations like concession, as in (3a), and relations of temporal succession in which the order of the segments reverses the order in which events occurred in the world, as in (4a), are more difficult to infer in the absence of a connective, as illustrated in (3b) and (4b).

(3)   a. Peter married Jane even though he didn't love her.
       b. Peter married Jane. He didn't love her.
(4)   a. Peter left for school after he ate breakfast.
       b. Peter left for school. He ate breakfast.

This difference has received several explanations in the literature. According to the continuity hypothesis (Murray, 1995, 1997), readers have default expectations about the organization of discourse that bias their interpretation. More specifically, readers expect that a new discourse segment will be causally congruent with the preceding context and that events will follow each other in a temporally linear manner. As a result, discontinuous relations such as concession (3) and temporal succession (4) are hypothesized to be more difficult to process in the absence of a connective than continuous relations. Another explanation is the "causality-by-default hypothesis" (Sanders, 2005) stating that readers start out by assuming that the relation between discourse segments is causal, unless the semantic content of the segments prevents a causal interpretation. Because readers first try to find cause–consequence relations between discourse segments, it is expected that these relations will be processed faster compared with noncausal relations.

The roles of continuity and causality for discourse processing have been confirmed in a number of experimental studies. When subjects are asked to continue a sentence that ends with a period, their answers are often causally related to the first segment (Murray, 1997). In addition, when a segment is preceded by a causal connective, it is read faster and also recalled better than when it is preceded by an additive connective (Sanders & Noordman, 2000). Causal inferences also influence the processing of upcoming words in a sentence even in the absence of a connective (Kuperberg, Paczynski, & Ditman, 2011), and causal expectations influence the processing of implicit relations and relations signaled by *because* but not the processing of relations signaled by *but* or *and* (Koornneef & Sanders, 2013; Mak & Sanders, 2010). Finally, the processing of concessive connectives is delayed compared with causal connectives (Köhne & Demberg, 2013).

Another line of evidence confirming the validity of these hypotheses comes from corpus data. In the Penn Discourse Tree Bank (PDTB; Prasad et al., 2008), continuous relations are conveyed implicitly much more frequently compared with discontinuous relations (Asr & Demberg, 2012). The causality-by-default hypothesis is also confirmed to the extent that causal relations, even though they are not the only ones to have a high ratio of implicitness, are the most frequent type of implicit relation in the PDTB, with a significantly higher ratio compared with other relations.

In a nutshell, there is ample evidence in the literature that some discourse relations involving temporal continuity and causality can be more easily conveyed implicitly than relations like concession or temporal discontinuity, due to cognitive biases in the interpretation of discourse. Crucially, however, these principles cannot explain all cases of imbalance in the explicit versus implicit communication of discourse relations. For example, conditional relations are almost never communicated implicitly in the PDTB, yet these relations cannot be categorized as either continuous or discontinuous (Asr & Demberg, 2012).

In this article we argue that continuity can be broken for other reasons than a lack of temporal continuity or causality and broaden Murray's (1997) notion of discontinuity to encompass all discourse relations involving a perspective shift between two related segments. We first define the notion of perspective shift and show how such shifts apply to confirmation relations that are conveyed by the ambiguous French connective *en effet*. We further argue that this connective provides a well-suited case study for this comparison, because it can either convey a continuous causal relation or a confirmation relation involving a perspective shift.

In Study 1, we compare the way confirmation and causal relations conveyed with and without the connective *en effet* are processed in a self-paced reading experiment. To our knowledge, this experiment is the first to assess the role of perspective shifts on readers' ability to process implicit relations and to analyze differences of processing between coherence relations conveyed by the same lexicalized connective.

In Study 2, we take a multilingual perspective on the notion of implicitation, with a cross-linguistic corpus analysis performed on directional parallel corpora: in other words, corpora containing original texts and their translations. We compare the percentage of implicit translations of *en effet* across three target languages (English, German, and Spanish) when this connective conveys confirmation and causal relations.

Perspective Shift Hypothesis and the French Connective *en Effet*

Within a text or a discourse, segments are always presented from a certain perspective, whether the speaker, narrator, or an external source (Sanders, 1994).

In some cases discourse relations involve a shift of perspective between an external source and the speaker's own perspective. Such shifts operate between the two related segments (Pander Maat, 1998) as illustrated in (5).

(5)   The government proposed new rules, but I doubt that they will be efficient.

In this example, there is a shift of perspective between the government proposing new rules in the first segment and the speaker's own assessment of them in the second segment. When arguments are presented from an external perspective, the speaker is not taken to endorse by default the truth of the segment, contrary to segments in which the speaker presents his or her own subjective claims, as in the second segment of (5), or relates objective facts, as in the second segment of (6).

(6)   Emma thought that Bill would marry Ann, but the marriage did not take place.

Assuming a shift of perspective is in addition necessary to account for relations presenting contradictory information such as (6) because the proposition "P, but not P" is anomalous, and both propositions cannot be true together (Sanders, 1994). These examples thus involve the simultaneous activation of two mental spaces (Fauconnier, 1985), each represented in one of the discourse segments. Such anomalies occur in relations of correction, in which the speaker's perspective is introduced to correct the false belief entertained by the reported external source (Pander Maat, 1998).

In this article we argue that a similar shift of perspective also occurs in confirmation relations, as illustrated in (7).

(7)   Emma thought that Bill would marry Ann. And indeed, the marriage took place last June.

In confirmation relations, the speaker does not shift perspective to correct an external belief but to add credit to it. Note that by contrast a continuous second segment for (7) would consist in keeping the perspective of Emma, as in (8), in which the pronoun "she" in the second segment is coreferent with Emma.

(8)   Emma thought that Bill would marry Ann. She hoped that they would invite her to their wedding.

We argue that when perspective shifts occur as in (6) and (7), it is not straightforward to reconstruct the intended coherence in the absence of a connective, as illustrated in (9) and (10), because the perspective shift breaks the narrative continuity of a discourse.

(9)   Emma thought that Bill would marry Ann. The marriage did not take
       place.
(10)   Emma thought that Bill would marry Ann. The marriage took place
       last June.

We therefore predict that removing the connective in relations involving a
perspective shift will produce a breakdown in continuity, leading to a disruption
of processing. We assess this hypothesis through the case study of the French *en
effet*.

Linguistic Description of the French Connective *en Effet*

The connective *en effet* provides a valuable case study for the perspective shift
hypothesis, because it can be used to convey two discourse relations (Charolles &
Fagard, 2012; Danlos, 2011; Iordanskaja & Mel'cuk, 1999; Rossari, 2002) not
predicted to be equally easy to convey implicitly. On one hand *en effet* can be
used to convey a discontinuous relation of confirmation involving a perspective
shift, as in (11),[1] and on the other hand a continuous causal relation, as in (12).

(11)   Emma pensait que Max épouserait Anne. Le marriage a *en effet*
       eu lieu en juin.
       *His father thought that Max would marry Anne. The marriage has
       CONNECTIVE taken place in June.*
(12)   Anne ne sera bientôt plus célibataire. *En effet*, elle va épouser Max le
       mois prochain.
       *Anne won't be single anymore soon. CONNECTIVE she is going to
       marry Max next month.*

When it conveys a relation of confirmation, *en effet* is a close equivalent of the
English connectives *indeed* and *in fact*. The causal relations conveyed by *en effet*
correspond to a form of subjective causality, in which the causal connective
relates the speaker's own claims and conclusions rather than events occurring in
the world (e.g., Sanders, 1997; Sweetser, 1990). In such uses the connective *en
effet* is interchangeable with the French subjective causal connective *car*
(Charolles & Fagard, 2012; Danlos, 2011). In present-day English, no connective

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[1]The relation of confirmation can also be used in dialogues. In these cases the relation serves to
confirm an utterance produced by another speaker or to endorse a fact presented by another speaker.
We do not elaborate on these uses here, because they do not correspond to a different discourse
relation. In addition, confirmation relations involving one single speaker are more straightforwardly
comparable with causal relations because they involve a similar structure.

truly fulfills the role of *en effet* in causal relations, because the subjective causal connective *for* is very infrequent and the more generic connective *because* is used for all types of causal relations (Zufferey & Cartoni, 2012).

As illustrated in examples (13) and (14), the two relations that can be conveyed by *en effet* are prototypically associated with a different position in the sentence. Although the relation of confirmation is frequently conveyed with the connective in clause-medial or clause-final position, the relation of causality is conveyed with the connective in clause-initial position. Several studies (Charlolles & Fagard, 2012; Danlos, 2011) note, however, that *en effet* can be used to convey a confirmation relation in clause-initial position if it is preceded by the connective "et" (the French equivalent of the English *and*), as in (13).

(13)   Emma craignait que Max n'épouse Anne. *Et* en effet marriage a
        eu lieu en juin.
        Emma feared that Max would marry Anne. And CONNECTIVE the
        wedding took place in June.

The addition of "et" (*and*) before the connective pragmatically indicates a temporal sequence that is not compatible with a causal relation, in which the cause following the connective typically occurs before the consequence presented in the first segment. Therefore, the locution *et en effet* is an effective way to ensure a confirmation rather than a causal relation is conveyed. Otherwise, in sentence initial position the very frequent causal meaning of *en effet* could lead the reader to infer the wrong relation, as predicted by the "causality-by-default" hypothesis discussed earlier (Sanders, 2005).

In sum, we argue that when *en effet* conveys a relation of subjective causality, the connective can be removed without disturbing processing, as demonstrated in previous work with causal connectives. Yet, we claim that the relation of confirmation is more difficult to convey implicitly because it involves a perspective shift between the two segments. We empirically assess this claim in Study 1.

STUDY 1: ONLINE PROCESSING OF IMPLICIT AND EXPLICIT RELATIONS CONVEYED BY *EN EFFET*

In Study 1 we assess the processing of sentences conveying causal and confirmation relations, with and without the connective *en effet*, using a self-paced reading experiment. We assess the role of two factors: the difference between explicit and implicit relations and the difference between causal and confirmation relations. We predict that explicit relations will be easier to process than implicit relations, as previous work has demonstrated (Britton, Glynn, Meyer, & Penland, 1982; Haberlandt, 1982; Sanders & Noordman, 2000).

Crucially, however, we also hypothesize that removing the connective *en effet* will be more detrimental for confirmation than for causal relations.

These two effects are expected to occur at different points during the processing of the segment following the connective. Indeed, although self-paced reading experiments have presented segments to participants one clause at a time, eye-tracking experiments have provided a more fine-grained estimation of the time course of effects provoked by connectives. More specifically, these effects have been revealed to occur already before the reader has finished reading a segment. When the connective was ambiguous between several relations, the effect occurred as soon as the linguistic content of the segment provided enough information for disambiguation (e.g., Traxler, Bybee, & Pickering, 1997). When the connective provided unambiguous processing instructions, the effect occurred at the words immediately following it (Canestrelli, Mak, & Sanders, 2013). We therefore expect the presence or absence of connectives to affect reading very rapidly. More specifically, the processing of explicit relations should be faster than that of implicit relations already at the words immediately following the connective.

The second effect sought in this experiment is the disruption of online processing hypothesized to happen when the connective is removed in discontinuous relations. This effect should occur when the reader fails to construct a continuous relation after reading the second segment. Indeed, in eye-tracking experiments, when connectives convey relations that are not compatible with the linguistic content of the related segments, disruptive effects often appear at a time when readers have finished reading a segment and failed to construct a coherent relation. These effects often appear in measures of regression paths durations, which include rereading previous segments (Canestrelli et al., 2013; Zufferey, Mak, Degand, & Sanders, 2015). To verify these hypotheses, we divided the clause following the connectives into three separate reading segments to have a more fine-grained estimation of the time course of processing effects compared to previous self-paced reading studies.

Participants

Participants were 31 students and staff from the Universities of Fribourg and Geneva in Switzerland (mean age, 24 years [range, 18–42]; 21 women). All participants were native speakers of French. Participants were paid for their participation.

Material

Participants read 40 test items, created in four different versions. For all items the critical segment was the same, but two different precritical sentences were inserted to create either a relation of confirmation (14) or cause (15).

(14)   Albert pensait qu'il serait puni pour avoir poussé sa sœur.
       Albert thought he would be punished for pushing his sister.
       Et en effet, son père lui a confisqué son vélo pour un mois.
       And CONNECTIVE his father took his bike for a month.
(15)   Albert a probablement fait une bêtise.
       Albert must have done something wrong.
       En effet, son père lui a confisqué son vélo pour un mois.
       CONNECTIVE his father took his bike for a month.

For both relations one version of the experimental item contained the connective *en effet*, whereas another version contained an implicit relation, as in (16) and (17).

(16)   Albert pensait qu'il serait puni pour avoir poussé sa sœur.
       Albert thought he would be punished for pushing his sister.
       Son père lui a confisqué son vélo pour un mois.
       His father took his bike for a month.
(17)   Albert a probablement fait une bêtise.
       Albert must have done something wrong.
       Son père lui a confisqué son vélo pour un mois.
       His father took his bike for a month.

To have an identical word order across all conditions for the critical segment following the connective, enabling a comparison of reading times, the relation of confirmation was conveyed in the experimental items by adding *et* before *en effet* rather than moving the connective in clause-medial or clause-final position. This slight difference in the connective used between for the two relations is not problematic, because our aim is to test differences between discourse relations in terms of perspective shift rather than test the connective *en effet*.

In addition, in confirmation relations the perspective shift between beliefs held by an external source and the speaker's own confirmation was systematized across all items by the insertion of a lexical marker explicitly indicating the source of belief in the precritical sentence. In example (18) the indication is "Albert thought." In the case of causal relations, one of the difficulties of having an implicit relation is that readers may interpret them as forward cause–consequence relations instead of subjective backward consequence–cause relations. For example, in (19) the fact that Albert has done something wrong could be interpreted as a cause and his father's taking his bike as its consequence. To prevent readers from inferring a forward cause–consequence relation, a lexical marker of subjectivity was systematically included in all precritical

sentences (e.g., Pander Maat & Degand, 2001; Degand & Pander Maat, 2003). For example, in (19) this marker is the epistemic adverb *probably*. This marker leads the reader to interpret the first segment as a subjective conclusion rather than an objective cause.

The critical clause was divided into three reading segments, designed as follows. The first segment contained the subject and verb of the clause and was on average made of 3 words ($SD = 0.7$), corresponding to 12 characters ($SD = 4$). The second segment contained the complement (direct object) of the first clause and was on average made of 3 words ($SD = 0.8$) corresponding to 15 characters ($SD = 4.2$). The last reading segment contained a syntactically optional adjunct that was on average made of 2.7 words ($SD = 0.7$), corresponding to 12 characters ($SD = 4$). A list of all experimental items is provided in the Appendix.

Procedure

The experiment was run using the Zep self-paced reading software (Veenker, 2013). Participants were tested individually, and each session began with written instructions about the experiment, followed by a training phase, in which participants read sentences similar to the experimental and filler items. At the end of the training phase participants were given the opportunity to ask questions to the experimenter before the actual experiment began. All trials began with a fixation point indicating where the sentence would start to appear. Participants could progressively read the sentences by pressing the space bar. The sentences were divided into seven reading segments, appearing consecutively on a computer screen, as illustrated in (18).

(18)   [Albert pensait 1] [qu'il serait puni 2] [pour avoir poussé sa soeur. 3] [Et en effet, 4] [son pére a confisqué 5] [son vélo 6] [pour un mois. 7] [*Albert thought* 1] [*that he would be punished* 2] [*for pushing his sister.* 3] [CONNECTIVE, 4] [*his father took* 5] [*his bike* 6] [*for a month.* 7]

The previous segments of the sentence disappeared from the screen as the readers went on to the next one. This design was meant to prevent participants from displaying the whole sentence by pressing several times on the space bar before starting to read it.

The stimuli were divided into four lists using a Latin square design, with only one version of a particular dialogue included per list. The order of presentation was randomized. In addition, 32 filler items containing object and subject relative clauses were inserted in each list. Verification statements were inserted randomly after 50% of the trials to assess participants' level of attention. For example, the

(false) statement following (18) was "le pére d'Albert a confisqué sa télévision" (*Albert's father took his television*). When such statements occurred, participants were asked to click on a "true" or "false" button appearing below the statements to enter their answer. No time constraint was imposed for the task, and participants completed it in about 15 minutes.

Results

Only the reading times for the second segment were comparable across all conditions, because the first sentence varied across the two types of relations (confirmation vs. cause). These regions correspond to the reading segments 5 to 7, as indicated in (18) and repeated in (19) for convenience.

(19)   [Son pére a confisqué 5] [son vélo 6] [pour un mois 7]

In all analyses, reading times that were three standard deviations above or below each participant's means were replaced by their cut-off values. They represented 1.97% of the data (1.83% for segment 5, 2.33% of segment 6, and 1.75% of segment 7).

One participant reached a score below 80% of correct answers at the verification statements and produced a lot of missing data because of very fast and almost continuous pressing on the space bar. This participant was therefore removed from the analysis. The other participants reached a mean score of 94% on the verification statements (range, 84–100%), indicating they reliably read the sentences for meaning.

Because we had clear hypotheses as to the different three target segments (i.e., segments 5, 6, and 7), we present three separate analyses. Mean reading times per critical segment and per condition are reported in Table 1.

To include both participants and items as random factors in all analyses, therefore avoiding the "language-as-fixed-effect-fallacy" by separating F1 and F2 analyses (Brysbaert, 2007; Clark, 1973), data were analyzed by fitting linear mixed-effects models using the R software (R Development Core Team, 2010, version 3.1.2). Models were tested using the *lmer()* function of the *lmer4* package of R, and model comparisons were assessed using the *anova()* function, which calculate the chi-square value of the log-likelihood to evaluate the difference between models, following Baayen's (2008) procedure. Finally, p values, F values, and degrees of freedom estimates were obtained with the *mixed()* function (from the *afex* package by Singmann, Bolker, & Westfall, 2015), the degrees of freedom computed from the Kenward-Roger correction using *pbkrtest*.

In this experiment we were particularly interested in the effect of Connective (Explicit vs. Implicit) and a possible interaction effect with Relation (Confirmation vs. Cause). Therefore, and to follow Field's (2014) advice to go

TABLE 1
Mean Reading Times and Standard Deviations (in Parentheses) per Condition
and per Segment

Condition		Segment (ms)		
		Segment 5 Subject and Verb	Segment 6 Complement	Segment 7 Final Adjunct
Confirmation	Explicit	736	807	820
		(334)	(326)	(361)
	Implicit	784	795	964
		(345)	(342)	(431)
Cause	Explicit	733	798	831
		(346)	(331)	(411)
	Implicit	805	785	888
		(356)	(351)	(473)

from the simplest model to the one of interest, for each segment analyses we first tested a model that only encompassed items and participants as random factors (i.e., random intercepts). We then compared this model to one including Connective (Explicit vs. Implicit) as a fixed factor and finally one that incorporated both Connective and Relation (and their interaction) as fixed factors.

Segment 5.   Adding Connective to the first model, which only included items and participants as random factors, significantly improved the model ($\Delta\chi^2 = 11.36$, $\Delta df = 1$, $p < .001$). Adding Relation, however, did not further improve the model's fit ($\Delta\chi^2 = 1.32$, $\Delta df = 2$, *ns*). The model including Connective as fixed factor and items and participants as random factors showed that when segment 5 was introduced by an explicit connective, participants were faster to read it ($M = 732$ ms; $SD = 456$) than when no connective was present ($M = 785$ ms; $SD = 496$), $F(1, 1137.44) = 11.43$, $p < .001$.

Segment 6.   Neither adding Connective ($\Delta\chi^2 = .17$, $\Delta df = 1$, *ns*) nor Connective and Relation ($\Delta\chi^2 = .65$, $\Delta df = 3$, *ns*) improved the initial model, which only included items and participants as random factors.

Segment 7.   As for segment 5, adding Connective to the first model (i.e., only including items and participants as random factors) significantly improved the model ($\Delta\chi^2 = 15.51$, $\Delta df = 1$, $p < .001$). However, contrary to segment 5, adding Relation further improved the model's fit ($\Delta\chi^2 = 8.21$, $\Delta df = 2$, $p < .02$). The final model, including both Connective and Relation as fixed factors, showed a significant main effect of Connective, $F(1, 1140.36) = 15.36$, $p < .001$, as well as a significant Connective by Relation interaction effect, $F(1; 1135.54) = 5.16$, $p < .03$. For the former effect, as in segment 5, when segment 7 was introduced by

an explicit connective, participants were faster to read it ($M = 823$ ms; $SD = 579$) than when no connective was present ($M = 919$ ms; $SD = 673$). The Connective by Relation interaction effect was characterized by a significant Connective pairwise comparison difference when considering the relation of confirmation (explicit: $M = 817$ ms; $SD = 559$; implicit: $M = 965$ ms; $SD = 622$, $p < .001$)[2] but not when considering causal relations (explicit: $M = 828$ ms; $SD = 599$; implicit: $M = 871$ ms; $SD = 622$, *ns*).

Discussion

We conducted a self-paced reading experiment to assess the difference between the explicit and implicit communication of two different discourse relations conveyed by the same connective. This experiment showed two distinct effects.

First, we observed a main effect of connective in the early target segment. This effect is congruent with previous studies indicating that sentences with connectives are read faster compared with implicit relations (e.g., Britton et al., 1982; Haberlandt, 1982; Sanders & Noordman, 2000). In addition, the early occurrence of this effect at the words immediately after the connective is consistent with results from previous studies indicating that connectives influence language comprehension very rapidly (e.g., Canestrelli, et al., 2013; Kehler, Kertz, Rohde, & Elman, 2008; Koorneef & Sanders, 2012; Mak & Sanders, 2010; Traxler et al., 1997; Zufferey et al., 2015) and not only at the end of the sentence, as was initially believed (e.g., Millis & Just, 1994). Importantly, this effect was independent of the discourse relation conveyed. This implies that the processing of the segment following the connective is not dependent on the context set up by the first segment, at least when the same connective is used for both relations, as in our experiment.

The second effect was visible at the sentence-final segment, with a difference of reading time between explicit and implicit relations, but affecting more strongly the relation of confirmation than the causal relation. This late effect is consistent with our hypothesis about the role of perspective shifts for implication. Because causal relations are continuous and therefore highly expected, they can be understood easily even in the absence of a connective. For this reason removing a connective in a causal relation creates less processing difficulties compared with confirmation relation. This is because the confirmation relations are discontinuous, in the sense that they involve a shift of perspective from an external point of view to the present mental states of the speaker. The fact that processing difficulties arise at the sentence-final segment is also congruent with previous processing studies (e.g., Canestrelli et al., 2013).

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[2]Post-hoc comparisons were calculated with the *glht* function, with Tukey pair-wise comparisons with the Bonferonni correction.

The absence of an effect in segment 6, containing the verbal complement, tends to confirm that the effects occurring in segment 5 and 7 are two different effects. First, explicit relations are processed faster than implicit relations independently of the relation conveyed, and, second, there is a greater difficulty when the implicit relation is discontinuous.

STUDY 2: CROSS-LINGUISTIC CORPUS STUDY

We argued earlier that differences between continuous and discontinuous relations reflected universal cognitive constraints affecting discourse processing. We therefore expect them to be consistent cross-linguistically. More specifically, even though connectives are often removed or added in translated texts (Becher, 2011; Zufferey & Cartoni, 2014), this variability should be lower for discourse connectives conveying relations that are difficult to reconstruct by inference compared with easily inferable relations. We assess this hypothesis in this study, with a cross-linguistic corpus study using parallel directional corpora, containing original texts and their translations in several target languages. We compare the translations of *en effet* produced in original French texts across three target languages: English, German, and Spanish. We predict that the proportion of implicit relations should be higher for causal than for confirmation relations across all target languages, independently of translation equivalents offered by the target language system.

Corpus Data and Annotation

To compare the translations of *en effet* across several target languages, we used the Europarl corpus (Koehn, 2005), a large collection of minutes from the European Parliament. During the parliamentary sessions deputies speak in their own language, and each statement is then translated into the other official languages of the European Union. Because of the wide scope of parliamentary debates, the corpus includes a wide range of topics. The language used in the corpus is intermediate between speech and written language, as deputies' statements are spoken during the session and these statements are later transcribed from recordings and edited. Europarl is a multilingual corpus that contains 506 parallel subcorpora, in other words, bilingual corpora with original texts and their translations. Another advantage of the Europarl corpus is that translations were produced by a large number of translators and do not therefore reflect individual biases in language use.

To compare the use of connectives across languages, the source and the target languages have to be clearly identified for each set of parallel sentences, forming directional corpora. The methodology used to build directional parallel corpora from Europarl is described in Cartoni, Zufferey, and Meyer (2013).

For our analyses we used three parallel corpora: French-English, French-German, and French-Spanish. In all these corpora, texts are originally produced by native French speakers. For each parallel corpus, we randomly extracted 500 sentences containing *en effet* in the original French part of the corpus aligned with its translation, using the bilingual concordance tool ParaConc (Barlow, 2008).[3] We then proceeded to manually spot the translation of all occurrences of *en effet* in the target sentences. In addition, we annotated the discourse relations conveyed by 500 occurrences of *en effet* in the source text as either *confirmation* or *cause*. We used the same method across the three different target languages: English, German, and Spanish.

Results

We present separately the translation equivalents of *en effet* in the three target languages, with the number of causal and confirmation relations conveyed in each case. Implicit relations are coded as "zero translations." This label is given only when the connective was replaced by a comma or a full stop in the translation but not when it was translated by an alternative lexical formulation or a syntactic construction (relative clauses, present participle, etc.). Indeed, in the latter cases the relation cannot be considered to be fully implicit (for a scale of implicitation in translation, see Zufferey & Cartoni, 2014), because a causal meaning, for example, can be conveyed by a relative clause or a present participle as well as a connective. For all three target languages we only report the translation equivalents accounting for more than 10% of the occurrences to identify the main equivalents and to compare their number across languages. All other explicit translations, including connectives, paraphrases, and syntax, are reported together in the category "other." Results of the translation spotting for the French-English pair are reported in Table 2. For all languages we computed the percentage of zero translations per relation and compared this proportion to the number of explicit translations using 2×2 χ^2 tests of independence. The explicit category sums up all the translation choices presented in Tables 2 to 4 except for the zero category.

In English, the most frequent translation of *en effet* is not an equivalent connective but a zero translation, in other words, an implicit relation in 44% of the occurrences. When computed according to each discourse relation, the proportion of zero translations is 48% when *en effet* conveys a causal relation and

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[3]The same French sentences were annotated and compared across the three target languages. Some small variations occurred because a few statements were not translated in one of the target language. In such cases additional occurrences were annotated to reach a total of 500 occurrences in each target language.

TABLE 2
Annotation and Translation Spotting in English Translations

	Zero	Indeed	In Fact	*Other*	*Total*
Cause	202 (40%)	51 (10%)	75 (15%)	94 (19%)	422 (84%)
Confirmation	19 (4%)	35 (7%)	5 (1%)	19 (4%)	78 (16%)
Total	221 (44%)	86 (17%)	80 (16%)	113 (23%)	500 (100%)

TABLE 3
Annotation and Translation Spotting in German Translations

	Zero	Denn	Nämlich	In Der Tat	*Other*	*Total*
Cause	153 (31%)	75 (15%)	57 (11%)	32 (6%)	103 (21%)	420 (84%)
Confirmation	10 (2%)	6 (1%)	4 (1%)	28 (6%)	32 (6%)	80 (16%)
Total	163 (33%)	81 (16%)	61 (12%)	60 (12%)	135 (27%)	500 (100%)

24% when it conveys a confirmation relation. A χ^2 test of independence reveals that the number of implicit relations is significantly higher when *en effet* conveys a causal relation compared with a confirmation relation[4] ($\chi^2 = 14.49$, df = 1, $p < .001$). Results of the translation spotting for German as a target language are reported in Table 3.

With German as a target language, zero is again the most frequent translation of *en effet*, corresponding to 33% of the occurrences. The second most frequent translation is the subjective causal connective *denn*, corresponding to 16% of the occurrences. When separated per discourse relation, the percentage of implicit relations is 36% when *en effet* conveys a causal relation and 12% when it conveys a confirmation relation. A χ^2 test of independence (2 × 2) again confirms that the difference of implicitation between the relations of confirmation and cause is statistically significant ($\chi^2 = 17.51$, df = 1, $p < .001$). In other words, *en effet* produces more implicitation when it conveys a causal than a confirmation relation in German translations. Results of the translation spottings with Spanish as a target language are reported in Table 4.

With Spanish as a target language, the most frequent translation is the cognate connective *en efecto*, totaling 60% of the occurrences. Zero is only the third most frequent equivalent of *en effet*, totaling 18% of the occurrences. The fact that Spanish possesses a close translation equivalent of *en effet*, contrary to English and German, is because French and Spanish are both romance languages and the two connectives have evolved from a similar origin (Bertin, 2002; Fagard, 2011).

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[4]For causal relations there are 220 implicit cases and 202 explicit cases, and for confirmation relations there are 19 implicit cases and 59 explicit cases.

TABLE 4
Annotation and Translation Spotting In Spanish Translations

	En Efecto	Efectivamente	Zero	Other	Total
Cause	237 (47%)	64 (13%)	76 (15%)	14 (3%)	391 (78%)
Confirmation	64 (13%)	28 (6%)	12 (2%)	5 (1%)	109 (22%)
Total	301 (60%)	92 (19%)	88 (17%)	19 (4%)	500 (100%)

When separated per relation, the proportion of implicit relations is 19% when *en effet* conveys a causal relation and 11% when it conveys a relation of confirmation. A χ^2 test of independence (2 × 2) reveals, as for translations into English or German, that the difference of implicitation between the relations of confirmation and cause is statistically significant ($\chi^2 = 4.18$, df = 1, $p < .05$). This result thus indicates that causal relations are more often left implicit than confirmation relations when Spanish is the target language, even though contrary to English and German, zero is not the most frequent translation choice.

Discussion

We performed a cross-linguistic analysis of the translations of *en effet* into three target languages to compare the proportion of implicitation produced by this connective across its two discursive functions. The translation spotting method revealed that the three languages included in our study differ in terms of the range of explicit connectives they offer to translate the causal relations conveyed by *en effet*. Although English is devoid of a specifically subjective causal connective, German possesses the subjective causal connective *denn* and Spanish possesses the very close translation equivalent *in efecto*. The latter is a cognate connective to the French *en effet* that can also be used for both confirmation and causal relations (Bertin, 2002; Fagard, 2011). The difference of translation equivalents between the three target languages offers a plausible explanation for the important variation in the proportion of relations that are implicit between them, ranging from 44% in English to only 18% in Spanish.

The proportion of zero translations produced by *en effet* was high—even in Spanish—compared with the number of implicit relations triggered by other French causal connectives in the Europarl corpus. Zufferey and Cartoni (2012) reported that with English as a target language, the percentage of implicit relations ranges from 4.5% for *parce que* to 7.5% for *car*. This difference may be because, contrary to other French causal connectives, *en effet* is prototypically used in sentence initial position when it conveys a causal relation and therefore involves the division of the segments into two separate sentences. This syntactic specificity of *en effet* makes it an attractive choice when long segments are involved (Danlos, 2011). The division of the segments into two separate sentences also implies that

juxtaposition becomes a salient option in translation, and, indeed, in both English and German zero is the main translation equivalent. This fact is not reported in bilingual dictionaries that tend to provide only explicit translation choices.

Crucially, however, our results indicate that, independently of the target language, the proportion of implicitation is significantly higher for causal relations compared with confirmation relations. This discrepancy supports the perspective shift hypothesis discussed in this article. Our cross-linguistic corpus study thus brings an additional argument to the claim that the explicit or implicit communication of discourse relations depends on cognitive principles that are coherent across languages.

These results are compatible with previous work focusing conversely on the explicitation of connectives in translated texts. In their analysis of the explicitation of connectives in translated texts from the Europarl corpus, Zufferey and Cartoni (2014) found that when *en effet* is added in French translations, causal relations were more frequently made explicit by French translators than confirmation relations. This result stems from the fact that confirmation relations are already explicitly marked in English, leaving less room for explicitation in translations. By contrast, causal relations are easily conveyed implicitly and consequently more volatile than other relations in translation (Halverson, 2004).

Finally, it is noticeable that the two discourse functions conveyed by *en effet* have a very different frequency in Europarl. In the 500 samples of the three directional corpora, causal relations amounted to about 80% of the occurrences. More extensive corpus studies should confirm whether confirmation relations are always less frequent than causal relations across other text genres in French. Similarly, our study does not bring information about the frequency of causal and confirmation relations in original English, German, and Spanish texts or about the frequency of the connectives used as translation equivalents for *en effet* in original texts written in these languages.

GENERAL DISCUSSION

In this study our goal was twofold. First, we empirically tested the hypothesis that perspective shifts break the continuity of discourse, thus rendering relations more difficult to convey implicitly. Second, we assessed whether the cognitive constraints affecting the explicit and implicit communication of discourse relations are constant cross-linguistically. As predicted, our online processing study demonstrated that the removal of connectives had a different effect for causal and confirmation relations. Whereas removing the connective *en effet* disturbed the processing of confirmation relations in the sentence final segment, the processing of causal relations was less affected. We concluded that confirmation relations were indeed more difficult to interpret in the absence of

a connective than causal relations. In addition, our cross-linguistic corpus study confirmed that implicitation followed a similar pattern across three target languages. As predicted, the percentages of implicit relations were always significantly higher for causal than for confirmation relations, even though the percentage of zero translations was quite variable between languages and depended on the explicit translations equivalents available in a given language.

We suggest that the notion of perspective shift can be used to explain additional cases of discourse relations with a low ratio of implicitness. In Asr and Demberg's (2012) corpus study, conditional relations were almost never conveyed implicitly, but this imbalance could not be explained using Murray's (1997) definition of continuity. By contrast, the notion of perspective shift provides a broader account of discontinuity that can encompass a range of different relations. In the literature, conditional relations have been argued to involve the activation of a hypothetical mental space in addition to the reality space (Dancygier, 1999). We argue therefore that understanding conditional relations requires the ability to shift perspective from the reality space to the hypothetical space and that this perspective shift blocks the implicit communication of conditional relations. Pander Maat (1998) also argues that some negative discourse relations (Sanders, Spooren, & Noordman, 1992) involve a perspective shift. Future work should seek to assess further how the perspective shifts involved in these relations affect their online processing as well as their explicit and implicit translations.

Another issue that requires further empirical evaluation concerns the role of alternative lexical, syntactic, and graphic signals for the explicit or implicit realization of discourse relations. More specifically, based on existing corpus studies (e.g., Das & Taboada, 2013), it is expected that the difficulty of processing implicit discourse relations depends on the salience of these alternative signals. For example, in the case of contrastive relations, the lexical and syntactic cues play an important role for the rather high ratio of implicitness for contrastive relations compared with concessive relations (Asr & Demberg, 2012). The role of these signals in the processing of continuous and discontinuous discourse relations should be assessed in a systematic manner to deepen our understanding of the factors influencing the on-line processing of implicit discourse relations.

In addition to comparing the explicit and implicit communication of distinct discourse relations, more fine-grained studies will also be required to analyze differences in the potential for implicitation of connectives conveying a single discourse relation. For example, in French a causal relation can be conveyed by the connectives *parce que, car,* and *puisque,* among others. These connectives are, however, not equivalent and cannot be used interchangeably (Zufferey, 2012). The connective *puisque,* for example, does not only convey a causal meaning but also acts as an accessibility marker indicating that the cause is part of the common ground (Zufferey, 2014). We predict therefore that this connective should be less easy to convey implicitly than *parce que*, because it does not only convey a causal

meaning but also additional information about accessibility. For example, in a cross-linguistic corpus study on the Europarl corpus, Zufferey and Cartoni (2014) reported that *puisque* is indeed the most frequently added causal connectives in translated texts. Future work will need to assess whether these results are matched by differences in online processing.

Finally, we showed that causal relations always lead to a higher percentage of implicit relations in translation, even when the target language possessed a cognate connective, as in the case of Spanish. A multilingual perspective on the constraints affecting the explicit or implicit realization of discourse relations will benefit from integrating a broader range of languages and connectives to confirm the existence of cross-linguistic patterns affecting discourse processing. The study of languages with different ways of signaling relations than lexicalized connectives will be particularly illuminating in this respect. In turn, these studies will provide valuable data with clear applications to multilingual fields of study such as second language teaching, machine translation, and lexicography.

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APPENDIX

List of Experimental Items

1. Max pensait que sa femme avait une liaison.
   Et en effet/Ø Elle a un amant depuis plusieurs mois.
   Max ne doit pas être très proche de sa femme.
   En effet/Ø Elle a un amant depuis plusieurs mois.
2. Pierre pensait que le gardien était un excellent joueur.
   Et en effet/Ø L'adversaire n'a pas réussi à marquer de but de toute la partie.
   Le gardien de but est de toute évidence un excellent joueur.
   En effet/Ø, l'adversaire n'a pas réussi à marquer de but de toute la partie.
3. Emilie avait l'impression d'avoir froid au dos ce matin.
   Et en effet/Ø, elle a un grand trou dans son manteau d'hiver.
   Emilie ne prend visiblement pas soin de ses affaires.
   En effet/Ø, elle a un grand trou dans son manteau d'hiver.
4. Susanne avait l'impression qu'il lui manquait quelque chose.
   Et en effet/Ø, elle a oublié son portefeuille dans le bus.

Susanne ne fait manifestement pas attention à son argent.
En effet/Ø, elle a oublié son portefeuille dans le bus.

5. Les élèves craignaient que leur enseignant soit sévère.
Et en effet/Ø, il crie souvent très fort pour un rien.
Le maître d'école doit être un peu fatigué.
En effet/Ø, il crie souvent très fort pour un rien.

6. Albert pensait qu'il serait puni pour avoir poussé sa sœur.
Et en effet/Ø, son père lui a confisqué son vélo pour un mois.
Albert a probablement fait une bêtise.
En effet/Ø, son père lui a confisqué son vélo pour un mois.

7. Karine soupçonnait que son amie avait un amoureux secret.
Et en effet/Ø, elle vient de se marier avec un beau garçon.
Karine a une amie très chanceuse.
En effet/Ø, elle vient de se marier avec un beau garçon.

8. Luc pensait que son travail était apprécié.
Et en effet/Ø, son directeur vient de le nommer chef d'équipe.
Luc est visiblement un excellent travailleur.
En effet/Ø, son directeur vient de le nommer chef d'équipe.

9. Franck pensait que ses voisins ne sortaient pas de la journée.
Et en effet/Ø, ils regardent des séries télévisées toute la journée.
Franck a des voisins manifestement très incultes.
En effet/Ø, ils regardent des séries télévisées toute la journée.

10. Barbara pensait que sa sœur perdrait au tennis.
Et en effet/Ø, elle l'a battue une fois de plus en deux sets.
Barbara semble plus en forme physiquement que sa sœur.
En effet/Ø, elle l'a battue une fois de plus en deux sets.

11. Rick avait l'impression d'avoir la tête qui tourne.
Et en effet/Ø, il est tombé en faisant du vélo ce matin.
Rick semble avoir un mauvais sens de l'équilibre.
En effet/Ø, il est tombé en faisant du vélo ce matin.

12. Jean craignait que les sportifs soient des fêtards.
Et en effet/Ø, les footballeurs ont passé toute la nuit au pub.
Le match a dû être un succès.
En effet/Ø, les footballeurs ont passé toute la nuit au pub.

13. Max s'imaginait que Matthieu n'avait pas de voiture.
Et en effet/Ø, il va travailler à vélo tous les jours.
Matthieu ne doit pas avoir son permis de conduire.
En effet/Ø, il va travailler à vélo tous les jours.

14. Robert craignait de se faire mal en faisant du sport.
Et en effet/Ø, il s'est blessé en jouant au hockey.
Robert doit avoir très mal à la jambe.
En effet/Ø, il s'est blessé en jouant au hockey.

15. Lise pensait qu'on avait cambriolé son appartement.
Et en effet/Ø, on a volé sa nouvelle télévision et ses bijoux.
La porte d'entrée de Lise a probablement été forcée.
En effet/Ø, on a volé sa nouvelle télévision et ses bijoux.

16. Louis pensait que son cousin avait un poste d'ouvrier.
Et en effet/Ø, il travaille comme ouvrier du bâtiment depuis six mois.
Louis doit avoir de la force dans les bras.
En effet/Ø, il travaille comme ouvrier du bâtiment depuis six mois.

17. Diane craignait de se faire renverser en faisant son jogging.
Et en effet/Ø, elle a été renversée par une voiture devant chez elle.
Diane ne devait pas porter de vêtements fluorescents.
En effet/Ø, elle a été renversée par une voiture devant chez elle.

18. Jeanne s'attendait à être augmentée par son patron.
Et en effet/Ø, elle a reçu une grosse augmentation le mois passé.
Jeanne doit faire du bon travail.
En effet/Ø, elle a reçu une grosse augmentation le mois passé.

19. Hélène s'attendait à avoir faim depuis qu'elle était au régime.
Et en effet/Ø, elle a déjà faim à 11 heures du matin.
Hélène a certainement oublié de prendre son petit déjeuner.
En effet/Ø, elle a déjà faim à 11 heures du matin.

20. Jean craignait qu'on lui vole ses affaires pendant son voyage.
Et en effet/Ø, il s'est fait voler son vélo hier matin.
Jean n'a probablement pas de câble antivol.
En effet/Ø, il s'est fait voler son vélo hier matin.

21. Tina pensait qu'elle pourrait avoir des problèmes en route.
Et en effet/Ø, sa voiture est tombée en panne sur l'autoroute.
Tina a probablement oublié de faire le plein.
En effet/Ø, sa voiture est tombée en panne sur l'autoroute.

22. Les sapeurs-pompiers pensaient que l'incendie se propagerait rapidement.
Et en effet/Ø, le feu s'étend à une allure foudroyante.
Les sapeurs-pompiers ont dû arriver trop tard près du bâtiment.
En effet/Ø, le feu s'étend à une allure foudroyante.

23. Marc pensait qu'Elise descendrait les marches trop vite.
Et en effet/Ø, elle a descendu les escaliers quatre à quatre.
Elise doit être très pressée ce matin.
En effet/Ø, elle a descendu les escaliers quatre à quatre.

24. Line espérait courir avec David.
Et en effet/Ø, ils ont fait la course ensemble hier soir.
Line et David semblent être de bons amis.
En effet/Ø, ils ont fait la course ensemble hier soir.

25. Martine craignait de faire naufrage.
Et en effet/Ø, les vagues ont fait chavirer le bateau tout de suite.
La mer doit être démontée.
En effet/Ø, les vagues ont fait chavirer le bateau tout de suite.

26. Jacques craignait d'arriver en retard s'il prenait sa voiture.
Et en effet/Ø, il est arrivé cinq fois en retard au travail ce mois-ci.
Jacques doit avoir des problèmes personnels.
En effet/Ø, il est arrivé cinq fois en retard au travail ce mois-ci.

27. Valérie espérait pouvoir déménager dans le Sud.
Et en effet/Ø, elle a déménagé en Espagne au printemps.
Valérie aime certainement le soleil et la chaleur.
En effet/Ø, elle a déménagé en Espagne au printemps.

28. François avait l'impression d'avoir mal répondu aux questions.
Et en effet/Ø, il a encore raté son examen de linguistique ce semestre.
François n'est probablement pas un bon étudiant.
En effet/Ø, il a encore raté son examen de linguistique ce semestre.

29. Anne pensait pouvoir aller skier prochainement.
Et en effet/Ø, elle est allée skier toute la journée lundi dernier.

Anne semble être en bonne condition physique.
En effet/Ø, elle est allée skier toute la journée lundi dernier.

30. Jean pensait que Pierre avait des tableaux de peintres connus.
Et en effet/Ø, il a trois tableaux de Picasso dans son salon.
Pierre doit être très riche.
En effet/Ø, il a trois tableaux de Picasso dans son salon.

31. Le ministre de l'agriculture avait des prévisions pessimistes pour les fermiers.
Et en effet/Ø, beaucoup de fermiers vont essuyer des pertes cette année.
La politique du ministre de l'agriculture ne semble pas porter ses fruits.
En effet/Ø, beaucoup de fermiers vont essuyer des pertes cette année.

32. Sophie pensait que beaucoup de gens avaient un long trajet le matin.
Et en effet/Ø, de plus en plus de gens prennent le train pour aller travailler.
La compagnie des chemins de fer fournit certainement d'excellents services.
En effet/Ø, de plus en plus de gens prennent le train pour aller travailler.

33. Sandra craignait que les alpinistes soient mal équipés.
Et en effet, ils n'ont pas pris le bon matériel avec eux.
Les alpinistes semblent être très inexpérimentés.
En effet/Ø, ils n'ont pas pris le bon matériel avec eux.

34. Les politiciens étaient certains de gagner les élections.
Leur parti a encore gagné les élections ce mois-ci.
Les politiciens ont assurément mené une bonne campagne.
En effet/Ø, leur parti a encore gagné les élections ce mois-ci.

35. Marie pensait que les tableaux de Serge auraient du succès.
Et en effet, ses tableaux se vendent partout dans le monde.
Ce peintre est vraisemblablement très à la mode.
En effet/Ø, ses tableaux se vendent partout dans le monde.

36. Les soldats craignaient une attaque de leurs ennemis.
Et en effet/Ø, leurs ennemis sont arrivés par surprise depuis la ville voisine.
Les soldats étaient probablement mal préparés.
En effet/Ø, leurs ennemis sont arrivés par surprise depuis la ville voisine.

37. Emilie pensait qu'elle aurait congé.
Et en effet/Ø, les cours sont annulés exceptionnellement demain matin.
La maîtresse doit être malade.
En effet/Ø, les cours sont annulés exceptionnellement demain matin.

38. Léa pensait que le bébé était en train de faire ses dents.
Et en effet/Ø, ses premières dents sont en train de pousser ces jours-ci.
Le bébé doit avoir entre six et douze mois.
En effet/Ø, ses premières dents sont en train de pousser ces jours-ci.

39. Paul craignait que son téléphone soit de mauvaise qualité.
Et en effet/Ø, ses batteries sont toujours plates très vite.
Ce téléphone est visiblement de mauvaise qualité.
En effet/Ø, ses batteries sont toujours plates très vite.

40. Max craignait de tomber malade.
Et en effet, il vient de s'enrhumer à nouveau.
Max semble avoir une santé fragile.
En effet/Ø, il vient de s'enrhumer à nouveau.