Advanced learners' comprehension of discourse connectives: the role of L1

transfer across on-line and off-line tasks.

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Abstract

Discourse connectives are important indicators of textual coherence, and mastering them is an essential part of acquiring a language. In this paper, we compare advanced learners' sensitivity to the meaning conveyed by connectives in an off-line grammaticality judgment task and an on-line reading experiment using eye-tracking. We also assess the influence of L1 transfer by comparing learners' comprehension of two non native-like semantic uses of connectives in English, often produced by learners due to transfer from French and Dutch. Our results indicate that in an off-line task, transfer is an important factor accounting for French- and Dutch-speaking learners' non native-like comprehension of connectives. During on-line processing however, learners are as sensitive as native speakers to the meaning conveyed by connectives. These results raise intriguing questions regarding explicit *vs*. implicit knowledge in language learners.

I.   Introduction

In a text or a discourse, sentences are linked together coherently, and such coherence is often marked by the use of discourse connectives (e.g. Halliday & Hasan, 1976; Mann & Thompson, 1988; Sanders, Spooren & Noordman, 1992; Knott & Dale, 1994). For example, in (1) the connective *if* conveys a conditional relation between the event of not waking up in time and the event of calling a taxi and in (2) the connective *while* conveys a contrastive relation between people's reaction in New York and in Texas.

(1)   I will take a train to go to the meeting. **If** I don't wake up in time tomorrow, I will call a taxi.

(2)   The admission policy for foreign students is variable across universities. **While** in some of them all students can enrol, in others there is an entrance examination.

The meaning conveyed by connectives is crucial for building coherence between discourse segments. Indeed when a connective conveys a relation that is not compatible with the semantic content of the segments that it relates, reconstructing the intended coherence becomes difficult. For example, if the conditional connective *if* in (1) is replaced by the temporal connective *when* as in (3), or if the contrastive connective *while* is replaced by the conditional connective *if* as in (4), the intended coherence between the segments is lost.

(3)   ? I will take a train to go to the meeting. **When** I don't wake up in time tomorrow, I will call a taxi.

(4)   ? The admission policy for foreign students is variable across universities. **If** in some of them all students can enrol, in others there is an entrance examination.

In the case of (3), the temporal reading of *when* is incompatible with the co-occurring temporal adverb (*tomorrow*) and the future tense used in the second segment, thus producing an incoherent relation. In the case of (4), the conditional meaning of *if* also clashes with the semantic content of the segments, because they contain explicit lexical marking of a comparison (*some* and *others*) and can therefore not be interpreted as the antecedent and consequent of a conditional relation.

Yet, advanced foreign language learners have often been found to produce non native-like uses of connectives such as (3) for Dutch-speaking learners and (4) for French-speaking learners. An important number of studies have analyzed students' production of connectives, both in naturalistic and elicited writings (Crewe, 1990; Field & Yip, 1992; Milton & Tsang, 1993; Lamiroy, 1994; Granger & Tyson, 1996; Altenberg & Tapper, 1998; Bolton, Nelson & Hung, 2002; Müller, 2005; Tapper, 2005; Degand & Hadermann, 2009). Results indicate that students overuse some connectives while underusing others compared to the production of native speakers. These studies also confirm that learners use some connectives to convey coherence relations that are not part of their meaning in the target language system as in (3) and (4), and insert them in non-prototypical syntactic positions in the sentence.

The prevalence of connectives used to convey incorrect coherence relations is however never systematically discussed in these studies. It is therefore possible that these productions are due to limitations of performance but do not reflect learners' inaccurate understanding of the meaning of connectives in L2. In other words, it leaves open the possibility that learners competently understand the meaning of connectives in a foreign language despite the fact that they sometimes produce non native-like occurrences. In the International Corpus of Learner

English (Granger, Dagneaux, Meunier & Paquot, 2009), we found that Dutch-speaking learners produce conditional relations incorrectly with *when* instead of *if* as in (3) in 7.3% of the cases[1] and French-speaking learners produce contrastive relations incorrectly with *if* as in (4) in 13% of the cases[2], confirming that these production errors are far from systematic. In order to address the question of learners' competence with connectives, production data must be complemented by controlled experiments of language comprehension. We discuss the tasks that can be used to assess the comprehension of connectives in Section II.2.

A second open issue from the literature concerns the causes of these non native-like uses. Granger & Tyson (1996: 22) attribute the overuse of corroborative connectives such as *in fact, indeed* and *actually* in English by native French-speakers to the frequent use of the connective *en effet* in French, in other words to L1 transfer. But Tapper (2005: 124) notes that a similar overuse is found in texts from Swedish native speakers, and concludes that this phenomenon could be a "shared learner language feature". In order to assess the role of L1 transfer for learners' non native-like use of connectives, several cases or errors that are related to licensed uses in different languages must be included in controlled experiments.

Finally, in theoretical studies of discourse connectives, it has been argued for a long time that connectives do not encode a concept, contrary to most other lexical items, but a procedure instructing the hearer on how to reconstruct the coherence relation between discourse segments (e.g. Ducrot, 1980). Further work has since demonstrated that procedural meaning is characteristically difficult to access consciously even for adult speakers in their L1 (Sperber &

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[1] Learners produced 49 incorrect conditional relations with *when* and 622 correct conditional relations with *if*.

[2] Learners produced 12 incorrect contrastive relations with if and 80 correct occurrences with while or whereas.

Wilson, 1993; Blakemore, 2002; Wilson, 2011). From the perspective of L2 learning, this implies that learners could in turn experience more difficulties in tasks targeting their ability to explicitly reason about the meaning of connectives compared to tasks involving intuitive knowledge.

In this paper, we address these issues by providing the first study of learners' comprehension of connectives and by systematically comparing Dutch-speaking and French-speaking learners' comprehension of non native-like uses of *when* as in (3) and *if* as in (4) across an on-line reading experiment target intuitive knowledge and an off-line grammaticality judgment task targeting explicit knowledge. These two non native-like uses can be directly related to transfer effects from the learners' first languages. In the case of *when*, the problem comes from the ambiguity of the Dutch connectives *als* and *wanneer*, that can be used to convey both a temporal and a conditional meaning. In the case of French-speakers, the use of *if* in contrastive relations comes from the fact that the French connective *si* can be used to convey both a conditional and a contrastive meaning, respectively corresponding to the meaning of *if* and *while* in English. These semantic ambiguities are not carried over between the two languages. In the ICLE corpus, Dutch-speaking learners were never found to produce incorrect contrastive relations with *if* and French-speaking learners never produced incorrect conditional uses of *when*, confirming that these non native-like uses are not common features of language learners. French and Dutch-learners thus provide a good case study to study the role of L1 transfer, as the prototypical non native-like uses that we identified for each group of learners is not shared by the other group.

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The paper is organized as follows. In Section II, we discuss the importance of connectives for text processing and comprehension and present the methodologies used in the literature to assess the comprehension of connectives' meanings. In Section III, we discuss hypotheses related to the assessment of language transfer and to the comparison of on-line and off-line methods to study language comprehension. In Section IV, we present the participants and the materials used in two comprehension experiments. Section V reports the results from the eye-tracking experiment and Section VI from the grammaticality judgments. Finally, Section VII discusses future avenues of enquiry for the study of connectives in second language acquisition.

II. Discourse connectives

1. *Importance for text processing and comprehension*

The importance of discourse connectives for text processing and comprehension has long been demonstrated in the literature involving adult native speakers. Many studies report for example that when sentences are linked together by a connective, the second segment is read faster compared to relations conveyed by juxtaposing segments (Britton et al., 1982; Haberland, 1982; Sanders & Noordman, 2000). Some studies also report that readers have a better recall of the content of the relation when a connective is used (Caron, Micko & Thüring, 1988). In addition, readers generate more inferences from discourse relations conveyed by connectives compared to implicit relations (Millis, Golding & Barker, 1995; Degand, Lefèvre & Bestgen, 1999) and they also answer questions faster (Millis & Just, 1994). Even young readers benefit from the presence of connectives (Mouchon, Fayol & Gaonac'h, 1995; Cain & Nash, 2011, van Silfhout et al., 2014). Conversely, when connectives are not correctly used to mark coherence relations,

processing is disrupted (Murray, 1997; Ferstl & van Cramon, 2001). In the field of second language learning, Degand and Sanders (2002) found that readers benefit from the presence of connectives in both their first and second languages, as demonstrated by their increased ability to answer off-line comprehension questions about the text when connectives were used. What is however not known from this body of literature is how learners process the meaning of connectives during reading and whether L1 transfer influences their understanding of connectives in a foreign language. These questions are addressed in the present paper.

2. *Methods for studying knowledge of connectives*

The most frequent methods used in the literature to assess subjects' perception of the adequacy of a connective in a given context are sentence completions tasks and judgment tasks (for a combination of these methods, see Cain & Nash, 2011; Zufferey, 2012). While completion tasks provide information about subjects' preferences for a connective over another in a given linguistic environment, judgment tasks directly reflect participants' perception of the linguistic and pragmatic contexts in which a connective can and cannot be used. In our experiments, we use a judgment task in order to determine whether learners are able to detect non native-like uses of connectives and to rate them as inappropriate.

Off-line tasks such as the ones described above reflect participants' conscious evaluation of connectives, but they do not provide information about the way readers intuitively process the information conveyed by connectives in the course of utterance interpretation.

In order to study learners' intuitive reactions to non native-like uses, on-line measures such as self-paced reading (Sanders & Noordman, 2000; Zufferey, 2014) and eye-tracking (Traxler,

Bybee & Pickering, 1997; Canestrelli, Mak & Sanders, 2013) must be used. The self-paced reading method provides information about the reading times of each pre-defined segment of the sentence. The rationale behind this method is that increased processing effort in one experimental condition (e.g. the inappropriate use of a connective) is visible in the longer reading times compared to other conditions (e.g. the appropriate use of a connective). In addition to measures of reading times, eye-tracking also provides information about which parts of the sentence readers go back to during processing, in other words about regressions. Eye-tracking also provides a more natural assessment of reading behaviors compared to self-paced reading, because sentences are read as a whole and not divided into segments appearing consecutively on the screen. For these reasons, we use eye-tracking to assess learners' intuitive reaction to native-like and non native-like uses of connectives.

In many experiments, on-line and off-line methods have provided a diverging picture of language acquisition, with children typically showing an earlier implicit comprehension in on-line tasks compared to off-line tasks in experiment targeting procedural words like pronouns and connectives (Sekerina, Stromswold & Hestvik, 2004; Cain & Nash, 2011). In the field of second language learning, Hopp (2010) noted the reverse phenomenon, with learners having a decreased performance with inflection in L2 in on-line compared to off-line tasks, an effect that he attributed to processing limitations in L2. More generally, Ellis (2006) observed implicit and explicit knowledge do not develop synchronously. For some syntactic structures, learners display a good implicit knowledge that is not matched by explicit knowledge, while for others this pattern is reversed.

Differences between on-line and off-line tasks have also been found to affect the role of L1 transfer. Roberts, Gullberg and Indefrey (2008) report that German-speaking learners perform on a par with native Dutch speakers on the resolution of ambiguous subject pronouns in an off-line task, contrary to Turkish-speaking learners who reached a lower performance. L1 transfer seems to cause this difference, as German is a nonnull subject language like Dutch, whereas Turkish is a null subject language. A similar transfer effect was however not found in an eye-tracking experiment, as both groups of learners performed lower than native speakers. The authors conclude that the processing limitations experienced by learners in an on-line task had overridden transfer effects.

In order to reach a full picture of learners' comprehension of connectives, we use both an off-line judgment task testing learners' conscious evaluation of the meaning of connectives, and an on-line task assessing their intuitive perception during reading. We discuss the hypotheses related to each task in the next Section.

III. Hypotheses

One of our goals is to assess whether the non native-like uses of connectives evidenced in learners' productions reflect an inaccurate comprehension of connectives. If these production errors are solely due to performance limitations but do not reflect a lack of competence, we expect learners to have either equal scores as native speakers on both comprehension tasks or lower performances in the on-line task only, reflecting processing limitations in L2 similar to those evidenced in previous work (Roberts et al., 2008; Hopp, 2010).

A second possibility is that advanced learners' competence with connectives in L2 is not native-like. This lack of competence should be reflected in learners' lower scores compared to native speakers at the two comprehension experiments. Their performance may also be variable between the tasks, as observed by Ellis (2006).

One possible scenario is that learners' ability to understand connectives in L2 results from positive transfer from their L1, and that they only misunderstand them when negative transfer occurs. Another scenario is that more general limitations in proficiency prevent learners from understanding the meaning of all connectives in L2, regardless of their relations to their L1. These two scenarios will be tested in our experiments by comparing two types of non native-like uses. If L1 transfer is involved, Dutch-speaking learners should not be sensitive to typical "Dutch errors" but should be as sensitive as native speakers to typical "French errors" whereas for French-speaking learners the expectations are reversed. If L1 is not the most decisive factor, but general limitations of proficiency are, no differences should be found between the French-speaking and the Dutch-speaking learners, and the native speakers of English should outperform the two groups.

IV.   Participants and materials for the two comprehension experiments

In order to compare advanced learners' competence across on-line and off-line tasks, the same participants took part in both experiments. In this section, we report the linguistic profile of the English-, Dutch-, and French-speakers who participated in the experiments and describe the materials that we used across the two experiments.

1. Participants

The participants were 32 advanced Dutch-speaking learners of English (28 female, mean age: 23, range: 19–27 years); 21 advanced French-speaking learners of English (15 female, mean age: 25, range: 19–38 years) and 34 native English speakers (21 female, mean age: 29, range: 22–39 years). All participants had normal or corrected to normal vision and were paid for their participation.

2. Evaluation of proficiency

French- and Dutch-speakers' proficiency in English was assessed with two different measures, chosen to provide indications about overall proficiency. First, they were asked to fill in the LEAP-Q2007 self-assessment questionnaire, which has been found to be a reliable indicator of global language performance (Marian, Blumenfeld & Kaushanskaya, 2007). From this questionnaire, we recorded subjects' overall self-rating of proficiency across the three dimensions of speaking, understanding spoken language and reading. In each dimension, participants could evaluate their proficiency on a 1 to 10 scale. Therefore, the best possible global proficiency score was 30. We also recorded subjects' evaluation of their reading skills separately as our tasks included a reading experiment. In this case, the best score was 10. In the questionnaire, participants also had to list their other foreign languages and estimate their level of proficiency in each of them.

After filling in the questionnaire, participants were asked to take the LexTALE vocabulary test (Lemhöfer & Broersma, 2012) in order to complement self-assessment with a language test. In this test, subjects are presented with 60 possible English words (40 existing words and 20 non-

words) and asked to decide whether each of them is an existing English word or not. The score

returned is a percentage of correct answers. This test has also been found to be a good predictor

of general language proficiency (Lemhöfer & Broersma, 2012). Based on the LexTALE scores,

one French-speaking participant was removed from the experiment.

Results from the measures of proficiency are reported in Table 1.

* INSERT TABLE 1 ABOUT HERE *

A one-way between subjects ANOVA was performed to assess differences of scores at the

LexTALE between the three populations. Results indicate that there is a difference of scores

between groups [$F(2; 84) = 58$, $p < 0.001$]. Post-hoc comparisons using the Bonferroni test

indicate that the mean score of native English speakers is significantly higher than the means of

the two groups of learners (English versus Dutch: $p < 0.001$; English versus French: $p < 0.001$).

The mean scores of Dutch- and French-speaking learners do not differ ($p = 1.0$). Their score is

in addition very close to the mean score reported by LexTALE for a large group of advanced

learners (70.7%), which provides some confirmation that our samples are made of advanced

learners.

Independent sample t-tests were also performed to assess the differences of proficiency

measured through self-assessment between the two groups of learners. Results indicate that

French-speaking and Dutch-speaking learners do not differ in their global self-assessment

[$t(51) = -0.31$, $p = 0.76$] nor in their self-assessment of reading skills [$t(51) = -0.56$, $p = 0.56$].

Taken together, the scores of the two groups of learners on self-assessment and LexTALE

indicate that potential differences between groups in our experiments cannot be attributed to global differences of proficiency between them.

In the LEAP-Q2007 questionnaire, none of the Dutch-speaking participants reported having more than a basic knowledge of French and none of the French-speaking participants reported having more than a basic knowledge of Dutch. English-speaking participants had on average a basic knowledge of French and an intermediate knowledge of Dutch (the latter follows from the fact that the experiment was run in Utrecht and many of the participants had been living in the Netherlands for a while).

3. *Materials*

For the *if* and the *when* native and non native-like uses of connectives, 16 sentences were created in two different versions: one version contained the correct connective and the other version contained the incorrect connective typically produced by learners because of L1 transfer. Example (5) illustrates the case of a conditional sentence involving the incorrect use of *when* (5a) and its correct equivalent with *if* (5b). Example (6) illustrates a contrastive sentence with an incorrect use of *if* (6a) and its correct version with *while* (6b).

(5) a. The kids don't look very tired today. **When** they don't take a nap now, we can go out for a walk.

b. The kids don't look very tired today. **If** they don't take a nap now, we can go out for a walk.

(6) a. The admission policy for foreign students is variable across universities. **If** in some of them all students can enroll, in others there is an entrance examination.

b. The admission policy for foreign students is variable across universities. **While** in some of them all students can enroll, in others there is an entrance examination.

A temporal marker was systematically inserted at the end of the first clause of conditional sentences with *when* in order to exclude the possibility of a temporal reading. In example (5), this element is *now*. In the case of contrastive sentences with *if*, a lexical contrast was systematically inserted in the two clauses in order to prevent a conditional reading. In example (6), the contrast is marked by the opposition between *some* and *others*.

Correct uses of *when* with a temporal meaning and *if* with a conditional meaning were also included in order to prevent subjects from inferring that all the uses of connectives in the experiment were incorrect. Uses of *if* with a conditional meaning were already represented in the data, in the correct version of the conditional sentences. We therefore only added eight sentences with *when* to mark temporal relations, as illustrated in (7). In these sentences, a temporal marker of past, compatible with *when*, was always inserted at the end of the first clause to encourage a temporal reading (for example 'ten years ago' in example 7).

(7)   Mary and John are very happily married. **When** they first met ten years ago, they fell in love with each other instantly.

A full list of experimental items is provided in Appendix A. The materials also included 32 filler sentences consisting of relative clauses with correct and incorrect uses of *who* and *whom* as in (8) and (9) following the rules presented in grammars of English (Leech & Svartvik, 1994).

(8)   a. There were only three boys in the classroom yesterday. The boy **who** asked Mary a question came again this morning.

       b. There were only three boys in the classroom yesterday. The boy **whom** asked

       Mary a question came again this morning.

(9)   a. Max has seven teachers in his school this year. The teacher **whom** you met at the

       class meeting is teaching geography.

       b. Max has seven teachers in his school this year. The teacher **who** you met at the

       class meeting is teaching geography.

The distinction between *who* and *whom* is however not clear-cut anymore in contemporary English. The use of *whom* especially has become rare even in the written mode (Aarts & Aarts, 2002), and *who* is now used in subject and object relative clauses. As a result, English speakers do not have strong intuitions about the grammaticality of *whom*, which led Lasnik and Sobin (2000) to argue that *whom* is not part of the Present-Day English case system, but works as extra-grammatical support for a set of ad hoc rules and therefore represents an object of instruction rather than natural language acquisition. Because of these features, the who/whom alternation represented a valuable case of filler sentences for our experiments. First, they target a different area of the grammar compared to connectives (relative clauses). Second the fact that *whom* is highly marked in subject relatives should raise subjects' awareness to the fact that some uses of connectives in the experiments are not part of the target language system.

V.   Eye-tracking experiment

In order to assess learners' reactions to connectives during reading, we performed an eye-tracking experiment with the materials described in Section IV.

1. *Apparatus and Procedure*

The experiment was run using an EyeLink 1000 eye-tracker, sampling one eye at 500 Hz with a tracking range of 32 degrees horizontally and 25 degrees vertically. The gaze position accuracy is 0.5 degrees. For all subjects, the right eye was sampled. The system was piloted by the ZEP software (Veenker, 2013).

Participants were tested individually in a booth at the university. Before the experiment began, participants were informed about the procedure and asked to read the instructions provided to them on paper. The experiment began by a calibration procedure followed by a validation. During this procedure, participants had to fixate a sequence of dots appearing on various locations on the screen. The experiment itself began with a trial of four practice items.

In total, every subject read 72 sentences, divided into 32 filler sentences (16 subject relatives with *who* or *whom*, and 16 object relatives with *who* or *whom*) and 40 sentences containing a connective: sixteen conditional relations with either correct *if* or incorrect *when*, sixteen contrastive relations with correct *while* or incorrect *if*, and eight correct temporal relations with *when*. For each sentence, the two versions were divided into two lists, so that each list always contained only one version of each sentence. The order of experimental items and fillers was randomized.

Verification statements were evenly distributed over all stimuli and randomly inserted in about 25% of the sentences. For example, the (false) statement following (5) was "The kids look ill today". These statements were designed to assess participants' level of attention. Subjects entered their answers to these statements by pressing the 'yes' or 'no' button box situated in front of them in the eye-tracking booth.

2. Analysis

Subjects obtained a mean score of 96% on the verification statements (lowest score 75%) and consequently no subject was removed from the analysis.

For the purposes of the analysis, sentences containing connectives were divided into the following five regions:

1. The kids don't look very tired today. (pre-critical)

2. **If** they don't take (subject and verb of 1st clause)

3. a nap now, (complement of 1st clause)

4. we can go out (subject and verb of 2nd clause)

5. for a walk. (spill-over)

Four processing measures were used. First-pass reading time, also called 'first gaze durations', is the total time spent in a region before the reader either moves forward or backward to other regions. For example, all the fixations occurring in region (2) before the reader moves to region (3) or goes back to region (1). Regression path duration, also called 'total pass reading time' or 'go past reading time', is the sum of all fixations from the first fixation in a region until the reader moves on the next region. For example, all the fixations from the first one occurring in region (2) plus all the fixations regressing to region (1) until the reader moves to region (3). These two measures correspond to the first reading of the sentence. Probability of regression corresponds to the percentage of regressive eye-movements from a region, for example all the eye-movements in region (2) leading to a next fixation in region (1). Finally, total fixation duration is the sum of all fixations occurring within a region. For example, all the fixations occurring in region (2) irrespective of where the reader moves on next and whether the fixations

are part of the first reading of the sentence or a subsequent reading. The last two measures thus

include both the first reading and additional readings of portions of the sentence.

Prior to analyses, all reading time measures diverging from more than two standard deviations

from both the participant's mean and the item's mean for one region in a particular condition

were treated as missing data. This led to a removal of < 1% of the data.

3. Results

We report mean reading times for conditional sentences with correct uses of *if* and incorrect

uses of *when* per sentence region and per language group in Table 2.

* INSERT TABLE 2 ABOUT HERE *

We performed by-participant and by-item Repeated Measures ANOVA with the two-level

within subject factor Connective (correct *if* / incorrect *when*) and the three-level between subject

factor Language (French, Dutch and English) for all processing measures and all sentence

regions.

We first analyzed the correct and incorrect conditional relations. In Region 1, containing the

segment preceding the connective, and in Region 5, containing the last words of the sentence,

the analysis did not return any main effects or any interactions for any of the four processing

measures. Several reliable main effects were found however in the critical regions.

In Region 2, containing the connective and the subject and verb of the first clause, there was a

main effect of Connective in first-pass reading time $[F_1\ F(1;83) = 21.32,\ p < 0.001;\ F_2$

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$F(1;45) = 10.87$, $p < 0.01$], regression path duration [F_1 $F(1;83) = 33.89$, $p < 0.001$; F_2 $F(1;45) = 11.4$, $p < 0.01$] and total fixation time [F_1 $F(1;82) = 48.41$, $p < 0.001$; F_2 $F(1;45) = 73.94$, $p < 0.001$]. Reading times were longer in the incorrect condition.

In Region 3, containing the complement of the first clause following the connective, a main effect of Connective was found in total fixation time [F_1 $F(1;82) = 7.65$, $p < 0.01$; F_2 $F(1;45) = 19.04$, $p < 0.001$]. Subjects reread this part of the text more in the incorrect condition.

In Region 4, containing the subject and verb of the second clause, a main effect of Connective was found in regression path duration [F_1 $F(1; 83) = 6.38$, $p < 0.05$; F_2 $F(1; 45) = 4.86$, $p < 0.05$] and percentage of regression [F_1 $F(1; 82) = 4.67$, $p < 0.05$; F_2 $F(1; 45) = 7.38$, $p < 0.01$]. Reading times were longer and regressions more numerous in the incorrect condition.

There were no interactions of Language and Connective across both *F1* and *F2* for any of the measures. The three groups thus had a similar reaction to the incorrect use of *when*.

We report the mean reading times for contrastive sentences with correct uses of *while* and incorrect uses of *if* per sentence region and per language group in Table 3.

* INSERT TABLE 3 ABOUT HERE *

Similarly for contrastive relations, we performed by-participant and by-item Repeated Measures ANOVA with the two-level within subject factor Connective (correct *while* / incorrect *if*) and the three-level between subject factor Language (French, Dutch and English) for all sentence regions and all processing measures.

In Region 1, containing the segment preceding the connective, and in Region 5, containing the last words of the sentence, the analysis did not return any main effects or any interactions for any of the four processing measures. Several reliable effects were found however in the critical regions.

In Region 2, containing the connective and the subject and verb of the first clause, no main effect nor any interaction with processing measures of first-pass reading was found. However, a main effect of Connective was found in total fixation time [$F_1 F(1;82) = 10.97$, $p < 0.001$; $F_2 F(1;45) = 10.24$, $p < 0.01$], and an interaction effect between Connective and Language was also significant ([$F_1 F(1;82) = 4.37$, $p < 0.05$; $F_2 F(1;45) = 4.72$, $p < 0.05$]). Paired t-tests were used to explore further the effect of connectives for each language group separately. A significant effect was found for Dutch speakers ([$t(31) = -2.93$, $p < 0.01$) and for English speakers ([$t(31) = -3.67$, $p = 0.001$) but not for French speakers ([$t(20) = 0.57$, $p = 0.57$). An inspection of the means indicates that Dutch- and English-speaking participants spent more time in this region when the incorrect connective *if* was used. The fact that the effects only occurred in the total reading time indicates that they are due to rereading of this part of the text after regressions from later parts of the text.

In Region 3, containing the complement of the first clause following the connective, a main effect of Connective was found in regression path duration [$F_1 F(1; 84) = 14.6$, $p < 0.001$; $F_2 F(1;45) = 10.12$, $p < 0.01$], and total fixation time [$F_1 F(1; 82) = 19.52$, $p < 0.001$; $F_2 F(1;45) = 7.51$, $p < 0.01$]. Subjects went back to the previous regions more in the incorrect condition and also spent more time rereading it.

In Region 4, containing the subject and verb of the second clause, a main effect of Connective was found in total fixation time [F_1 $F(1; 82) = 6.23$, $p < 0.05$; F_2 $F(1;45) = 10.24$, $p < 0.01$]. Subjects spent more time rereading this portion of the sentence in the incorrect condition.

4. Discussion

Using an eye-tracking experiment, we measured the processing of sentences in which a connective conveying a relation incompatible with the semantic meaning of the segments was inserted. The two incorrect uses of connectives included in the experiment were meant to probe the role of L1 transfer for learners' ability to detect them. We found that advanced learners are as sensitive to all incorrect uses of connectives as native English speakers. In other words, learners were immune to transfer effects. Indeed, we found only one interaction of Connective and Language in the whole analysis. In view of these results, it seems that learners are as competent as native speakers with connectives and that the production errors evidenced in the literature do not result from a deficit in comprehension.

It is noticeable that the difference in reading times between the correct and the incorrect version of the sentence appeared very early for both relations: immediately after the connective for the incorrect use of *when* in conditional relations and at the end of the first clause for the incorrect use of *if* in contrastive relations. In both cases, these effects precede the point where lexical indications rendering the sentence incompatible with a temporal or a conditional interpretation were inserted. This means that other cues from the preceding linguistic context already make the interpretation indicated by the connective implausible, and that subjects constantly integrate new elements and actively seek to build a coherent representation as the sentence unfolds. In the

case of our sentences, the context set by the first pre-critical sentence already biased the interpretation and therefore produced an early effect after the connective. For example, in the case of *if* in contrastive sentences, the pre-critical sentence already indicated that 'the policy was variable across universities', setting up expectations about an explanation of this variability, reinforced by the use of 'some of them' in the first clause of the critical sentence. These early effects are consistent with results from previous experiments indicating that connectives influence language comprehension very rapidly (Canestrelli, Mak & Sanders, 2013; Kehler, Kertz, Rohde & Elman, 2008; Koorneef and Sanders, 2012; Mak & Sanders, 2010; Traxler, Bybee & Pickering, 1997) and not only at the end of the sentence, as was initially believed (e.g. Millis & Just, 1994).

In the eye-movement data, the two relations included in the experiment led to different patterns of readings. In the case of *when* misused with a conditional meaning, readers slowed down immediately after reading the incorrect connective and went back to the previous sentence, presumably checking the context against which to build a temporal relation. Even though the first-pass reading times were not longer in the next regions, subjects kept on regressing to the previous regions of the sentence. The effect found in total fixation time across the two regions forming the first clause of the sentence indicates that subjects also read them again when they failed to build a coherent relation between segments in later regions. In the case of *if* misused with a contrastive meaning, readers did not immediately slow down at any region in first-pass reading. However, as soon as they reached the end of the first clause, they started regressing to previous regions. In addition, the effect in total fixation time found across all critical regions, from the words immediately following the connective to the first part of the second clause,

indicates that subjects read these portions of the sentence again once they failed to derive a coherent relation after the first reading. The fact that French-speakers did not spend more time in the connective region in the incorrect condition, contrary to the Dutch- and English speakers, indicates that they may be more tolerant towards this use, even though they clearly detect its inappropriateness. The effect produced by *when* already during the first-pass reading of words immediately following the connective might also reflect the fact that this error is more salient than the incorrect use of *if* in contrastive relations. Participants' judgments of both errors in the next Section will shed further light on this phenomenon.

VI.   Grammaticality judgment task

Immediately after participating in the eye-tracking experiment, subjects were asked to evaluate the grammaticality of a subset of the sentences created for the eye-tracking experiment. The same sentences were used in both tasks because our aim was to evaluate whether participants had noticed the incorrect uses that they had just read and would consciously evaluate them as such. We report results from this task in this section.

1. *Materials*

Subjects were presented with 25 experimental items with the following repartition: 5 correct conditional *if*, 5 incorrect contrastive *if*, 5 correct contrastive *while*, 5 incorrect conditional *when*, and 5 correct temporal *when*. Twenty sentences per condition from the filler sentences were also selected in the following manner: 5 subject relative with *who*, 5 subject relative with

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whom, 5 object relative with *whom*, 5 object relative with *who*. Finally, 10 sentences containing very obvious mistakes were inserted in order to assess the vigilance of our participants. These sentences played a similar role as the verification statements used in the eye-tracking experiment. Five of these sentences contained an inappropriate subject-verb agreement as in (10) and five contained an irregular verb conjugated with a regular *–ed* past tense form (11). The task contained a total of 55 sentences.

(10) The children **does** not like to play outside. They prefer to watch TV all afternoon.

(11) Ella was surprised to see you this morning. She **thinked** that you were abroad.

2. *Procedure*

Immediately after participating in the eye-tracking experiment, subjects were told that they were going to see again a selection of the sentences from the eye-tracking experiment on paper. They were asked to read them silently and to judge them as either correct or incorrect by ticking a box. If a sentence was judged to be incorrect, they were instructed to circle the mistake in the sentence. The task did not include any time constraint, in order to allow access to explicit knowledge (Loewen).

3. *Scoring*

For every accurate rating of a sentence (correct sentences rated as correct and incorrect ones rated as incorrect), one point was credited. For every condition, the maximum score was 5, if all cases were correctly identified. The possible mean score for each condition therefore varies between 0 and 5 for all participants. The score given in Table 4 is the mean score obtained per

language group. In the case of obvious mistakes, the five sentences involving agreement and the

five sentences with incorrect regular past tense are merged and the total score is 10.

4. Results

Results from the grammaticality judgment task are reported in Table 4.

* INSERT TABLE 4 ABOUT HERE *

First, the three groups do not differ on their ability to detect obvious mistakes [$F(2,86) = 1.92$,

$p = 0.15$]) and no subjects scored below 7, therefore all subjects were included in further

analyses. A one-way between subjects ANOVA was conducted to compare the mean scores

between the three populations of students for all correct and incorrect uses of connectives. There

was a significant difference between the scores of the three groups for the incorrect uses of

when: [$F(2,84) = 38.52$, $p < 0.001$]. Post-hoc comparisons using the Bonferroni test indicate that

the mean score of Dutch-speaking learners is significantly lower than the other two groups

(Dutch versus English: $p < 0.001$; Dutch versus French: $p < 0.001$). French-speaking learners

and native English speakers do not differ ($p = 0.63$). A significant difference between the three

groups was also found for the incorrect uses of *if* [$F(2,84) = 12.74$, $p < 0.001$]. Post-hoc

comparisons using the Bonferroni test indicate that the mean score of French-speaking learners

is significantly lower than the other two groups (French versus Dutch: $p < 0.001$; French versus

English $p < 0.001$). Dutch-speaking learners and native English speakers do not differ ($p = 1.0$).

The analysis did not return any significant difference between groups for all the correct uses of

connectives (temporal uses of *when* [$F(2,84) = 1.66$ $p = 0.2$]; conditional uses of *if* [$F(2,84) = 2.47$, $p = 0.09$]; contrastive uses of *while* [$F(2,84) = 0.17$, $p = 0.84$]). Finally, a dependent sample t-test performed with the English-speaking group reveals that their performance is not equivalent across the two incorrect uses, as their score is significantly higher for the *when* misuse compared to the *if* misuse [$t(33) = 2.96$, $p < 0.01$].

5. Discussion

We conducted a grammaticality judgment task in order to assess whether advanced learners could identify non native-like uses of connectives in a task requiring them to consciously reflect about the grammaticality of sentences. We also tested whether a transfer effect was affecting their ability to detect these errors. The main result from this task is that contrary to the on-line data, a clear transfer effect is observed for both populations of learners, as French-speakers perform significantly lower on the contrastive uses of *if* and Dutch-speakers on the conditional uses of *when*. It is also noticeable that, with the exception of these transfer effect cases, learners' scores are not significantly different from the performance of native English-speakers. This finding rules out the interpretation that learners have generalized problems with the mastery of connectives in a foreign language. Learners' proficiency is also apparent from their high scores with correct uses of connectives, which never differ from that of native English speakers. This task thus reveals that learners do not have a native-like ability to consciously evaluate the correct and incorrect uses of connectives only when their L1 produces negative transfer effects. Another interesting result from this experiment is native English speakers score at ceiling with target-like uses but not with non target-like uses. This result corroborates previous findings

indicating that native speakers judge more confidently and with a higher accuracy acceptable uses of connectives compared to unacceptable ones (Zufferey, 2012; 2014). The absence of ceiling effects for native speakers is however not problematic for the comparisons that we make in the experiment. Indeed, the crucial point that appears clearly in the data is that non native-like uses are judged in a similar manner by native speakers and learners as long as they are not part of their L1, but very differently by learners for whom this is a frequent use of a similar connective in their L1.

It is also noticeable that the scores obtained by the group of English speakers are not equal across the two errors, as they identified with more accuracy the incorrect use of *when* in conditional relations than incorrect uses of *if* in contrastive relations. This effect cannot be due to the linguistic profile of our group of native speakers, as they reported a higher level of proficiency in Dutch than in French, and should therefore be more lenient with the *when* cases, if their score reflected the influence of a second language. We argue that this difference can instead be related to the frequency of conditional sentences conveyed with *if* compared to contrastive relations marked with *while*. Indeed, contrastive connectives such as *while* and *whereas* are used much less frequently compared to the conditional connective *if* in the large corpus data from the Penn Discourse Tree Bank (The PDTB Research Group, 2007). It is therefore plausible that the less clear-cut intuitions of native speakers reflect the fact that they use them less frequently. Native speakers' hesitations are also noticeable from the fact that they do not score at ceiling on their rating of correct uses of *while*, contrary to the more frequent connectives *if* and *when*. This confirms that even native speakers do not have clear-cut intuitions about some connectives that are not frequently used in their mother tongue.

VII.   General discussion

In this paper, our aims were twofold. First, we complemented the literature on production data with two comprehension experiments, in order to assess whether the production errors evidenced in previous work reflected genuine problems in comprehension. Second, we assessed the role of L1 transfer for learners' ability to detect non native-like uses of connectives.

Results from the off-line judgment task clearly demonstrated that advanced learners' persisting problems with connectives come from negative transfer effects from their L1 rather than from generalized limitations in proficiency. Indeed, learners were as able as native speakers to identify both correct uses of connectives and incorrect uses provided that they did not correspond to licensed uses in their L1. Transfer effects were however not evidenced in the on-line eye-movement data, as both groups of learners and native English speakers reacted in an identical manner to all uses. Thus, contrary to the pronoun resolution task of Roberts et al. (2008), our on-line task did not involve additional processing load affecting the performance of learners during reading. This result indicates that processing load varies depending on the nature of the linguistic phenomenon under study, and future work should seek to explore further the causes of these differences.

Our on-line and off-line comprehension experiments also revealed important differences between learners' intuitive and conscious knowledge of connectives in a foreign language. Our on-line eye-tracking experiment revealed that advanced learners reach a native-like implicit ability to understand connectives in L2, but their intuitions are not translated into explicit judgments. In the latter case, learners seem to apply the rules governing the use of connectives

in their L1, producing negative transfer effects. A likely explanation for learners' difficulties in the off-line judgment task, as suggested in the introduction, is that these difficulties result from the fact that connectives encode procedural meaning that is not easily accessible to consciousness. The exact nature of learners' explicit knowledge of the meaning of connectives in L2 as well as their apparent reliance on their L1 when they reason about the uses of connectives in L2 will need to be specifically assessed in future work.

The discrepancy that we found between on-line and off-line tasks is reminiscent of a pattern that has often been evidenced in the literature on first language acquisition. Children go through a phase in their linguistic development when on-line tasks reveal an implicit sensitivity to the meaning of connectives during reading that is not matched by a conscious ability to deal with them in off-line sentences cloze tasks and judgment tasks (Cain & Nash, 2011). A similar pattern is observed in our results, with language learners exhibiting implicit awareness of the meaning of connectives while being unable to consciously categorize them as incorrect. Future work should explore the nature and extent of learners' implicit knowledge of connectives, and assess whether the discrepancy between implicit and explicit knowledge of connectives reflects a transitory phase in second language learning or learners' ultimate attainment. These results also raise the questions of whether and to what extent teaching can affect the transfer from implicit to explicit knowledge (cf. Hulstijn & De Graaff, 1994). Conversely, another important issue concerns the stage of acquisition where the implicit knowledge of connectives first emerges in the acquisition process. Our experiments were limited to homogeneous groups of advanced learners, and therefore did not provide indications about earlier stages of acquisition. Another important dimension for future work will be to assess whether the effects reported in

this paper are replicable with less salient misuses of connectives, and whether they are limited

to semantic rather than syntactic errors. Data from the eye-tracking experiment revealed that

both errors led to a different pattern of reactions, independently of the mother tongue of the

readers. Other types of non native-like uses must be included in similar experiments in order to

assess the robustness of the effects reported here.

From a theoretical perspective, these results open new avenues of enquiry for studying the

semantic relationships between different discourse relations. On the basis of categorical

distinctions (e.g. Sanders, Spooren & Noordman, 1992), we can predict that semantically

similar relations are likely to be more difficult to detect than less similar relations. The two non

native-like uses included in our experiments corresponded to distinct types of discourse

relations, as the relations of *condition*, *contrast* and *temporality* all belong to distinct classes in

recent taxonomies (e.g. the PDTB Research Group, 2007). However, fine-grained semantic

distinctions such as the one separating concessive and contrastive relations or objective and

subjective causal relations may prove to be more difficult to detect.

Finally, an interesting follow-up for our experiments will consist in testing whether applying

time constraints in an off-line task, for example in the form of a speeded grammaticality

judgment task (e.g. Meng & Bader, 2000), affects the pattern of results. Indeed, under time

constrains, subjects may come to rely more on their intuitive than explicit knowledge, and this

may provide some additional information about their intuitive understanding of connectives.

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Table 1. Proficiency scores per group, with 95% confidence intervals in parentheses.

	LEAP-Q2007 global proficiency	LEAP-Q2007 reading proficiency	LexTALE vocabulary test
Dutch-speaking learners	22.3 (21.1–23.5)	7.5 (7–7.9)	70.3% (65.7–74.8)
French-speaking learners	22.6 (21.1–24.1)	7.7 (7.2–8.2)	69.7% (62.5–77)
Native English speakers	N/A	N/A	96.9% (95.2–98.5)

Table2. Mean reading times (in ms) for conditional sentences per processing measure, connective and region, with standard deviations in parentheses.

			Region				
			Pre-critical	Connective + subject and verb	Complement of 1st clause	Subject + verb of 2nd clause	Spill-over
First-pass reading time	Dutch	*if*	2036 (557)	542 (220)	655 (185)	424 (128)	501 (165)
		when	2039 (572)	601 (212)	690 (151)	421 (114)	490 (178)
	English	*if*	1692 (512)	484 (183)	564 (168)	438 (152)	483 (185)
		when	1766 (431)	529 (209)	555 (201)	417 (148)	459 (203)
	French	*if*	2080 (470)	642 (192)	730 (184)	514 (154)	579 (266)
		when	2071 (490)	783 (222)	713 (198)	512 (165)	559 (178)
Regression path duration	Dutch	*if*	2036 (557)	600 (213)	782 (221)	466 (160)	1416 (837)
		when	2039 (572)	730 (306)	858 (222)	518 (232)	1422 (752)
	English	*if*	1692 (512)	507 (178)	745 (209)	466 (157)	1218 (497)
		when	1766 (431)	599 (227)	779 (266)	573 (315)	1438 (669)

	French	*if*	2080 (470)	710 (219)	802 (178)	557 (170)	1211 (515)
		when	2071 (490)	819 (219)	826 (192)	609 (182)	1392 (672)
Percentage of regression	Dutch	*if*	0	0.05 (0.05)	0.11 (0.08)	0.05 (0.06)	0.50 (0.19)
		when	0	0.07 (0.09)	0.13 (0.11)	0.09 (0.09)	0.54 (0.12)
	English	*if*	0	0.03 (0.05)	0.16 (0.10)	0.04 (0.04)	0.45 (0.15)
		when	0	0.04 (0.05)	0.20 (0.17)	0.12 (0.10)	0.45 (0.11)
	French	*if*	0	0.05 (0.08)	0.10 (0.09)	0.07 (0.08)	0.44 (0.23)
		when	0	0.03 (0.06)	0.12 (0.09)	0.05 (0.06)	0.37 (0.14)
Total fixation time	Dutch	*if*	2513 (569)	761 (239)	768 (304)	542 (249)	657 (303)
		when	2521 (480)	883 (263)	821 (356)	539 (244)	663 (243)
	English	*if*	2192 (501)	751 (207)	770 (299)	564 (230)	681 (289)
		when	2189 (348)	1036 (283)	884 (322)	620 (230)	722 (252)
	French	*if*	2808 (480)	968 (358)	981 (449)	687 (278)	896 (371)
		when	3011 (726)	1206 (396)	1047 (436)	762 (253)	961 (320)

Table3. Mean reading times (in ms) for contrastive sentences per processing measure, connective and region, with standard deviations in parentheses.

			Region				
			Pre-critical	Connective + subject and verb	Complement of 1st clause	Subject + verb of 2nd clause	Spill-over
First-pass reading time	Dutch	*while*	689 (209)	785 (176)	460 (158)	526 (161)	611 (314)
		if	631 (242)	792 (237)	488 (147)	539 (170)	585 (255)
	English	*while*	598 (195)	659 (193)	438 (189)	474 (158)	477 (188)
		if	591 (212)	672 (248)	451 (145)	456 (168)	483 (259)
	French	*while*	802 (232)	802 (189)	559 (227)	586 (173)	500 (241)
		if	795 (271)	868 (163)	587 (162)	583 (206)	551 (227)
Regression path duration	Dutch	*while*	2624 (565)	814 (220)	875 (229)	652 (181)	987 (640)
		if	2509 (817)	784 (305)	1027 (310)	656 (228)	901 (407)
	English	*while*	2125 (613)	706 (228)	861 (252)	529 (192)	824 (429)
		if	2088 (817)	737 (293)	936 (246)	586 (212)	959 (752)
	French	*while*	2605 (700)	961 (280)	907 (234)	661 (196)	882 (274)
		if	2550 (593)	876 (269)	972 (198)	635 (144)	755 (291)
Percentage of regression	Dutch	*while*	0	0.08 (0.10)	0.07 (0.08)	0.20 (0.15)	0.34 (0.26)
		if	0	0.10 (0.07)	0.15 (0.09)	0.16 (0.12)	0.32 (0.24)
	English	*while*	0	0.07 (0.09)	0.19 (0.16)	0.18 (0.14)	0.13 (0.10)
		if	0	0.10 (0.09)	0.27 (0.17)	0.22 (0.10)	0.15 (0.09)
	French	*while*	0	0.11 (0.11)	0.10 (0.11)	0.11 (0.11)	0.33 (0.24)
		if	0	0.05 (0.10)	0.09 (0.10)	0.08 (0.09)	0.24 (0.17)
Total fixation time	Dutch	*while*	3024 (842)	902 (213)	957 (251)	659 (261)	641 (233)
		if	3088 (916)	1050 (382)	1090 (332)	728 (323)	639 (270)
	English	*while*	2564 (606)	846 (203)	901 (285)	690 (328)	582 (188)
		if	2596 (693)	1096 (325)	1093 (400)	753 (289)	593 (222)
	French	*while*	3357 (987)	1065 (209)	1039 (351)	818 (400)	720 (342)
		if	3358 (1161)	1032 (254)	1120 (344)	785 (298)	856 (197)

Table 4. Mean scores at the grammaticality judgment tasks per connective and relation, with confidence intervals in parentheses.

connective relation	*when* conditional	*if* conditional	*if* contrastive	*while* contrastive	*when* temporal	*obvious* *mistakes*
Dutch learners	1.56 (0.94–2.18)	4.75 (4.48–5.02)	3.03 (2.35–3.70)	4.75 (4.5–4.9)	4.84 (4.68–5)	9.19 (8.91–9.47)
French learners	3.95 (3.42–4.48)	4.95 (4.85–5.05)	1.09 (0.34–1.84)	4.61 (4.13–5.1)	4.8 (4.5–5.11)	9.19 (8.77–9.61)
English speakers	4.44 (4.04–4.84)	5.0	3.44 (2.87–4.01)	4.74 (4.41–5.06)	5.0	9.53 (9.28–9.78)

Appendix A: List of experimental items

Conditional relations
1. You are all invited to participate in the competition. When/if you are under 18, bring an authorisation form from your parents.
2. The kids don't look very tired today. When/if they don't take a nap now, we can go out for a walk.
3. You can invite the neighbours for dinner. When/if Mary doesn't want to come on Wednesday, you can ask Sarah instead.
4. I will take a train to go to the meeting. When/if I don't wake up in time tomorrow, I will call a taxi.
5. Sarah has invited Mary to eat at the Chinese restaurant next door. When/if it is fully booked tonight, they will go to the Indian restaurant instead.
6. The class starts in less than five minutes. When/if we go out for coffee now, we are certainly going to be late.
7. I have just bought Amanda's new novel. When/if you liked her previous books, you will like this one too.
8. There is a new Chinese take-away close to the university. When/if you have not eaten yet, we could go there for lunch.
9. There is a wet season in Thailand. When you decide to go there in July, you will probably get a lot of rain.
10. The wedding will take place next Saturday by the lakeside. When/if it rains in the afternoon, it will take place inside the church instead.
11. Alex is in his room studying for the next exam. When/if he doesn't come to have dinner in five minutes, you can knock on his door.
12. The policemen are patrolling in the area. When/if Peter doesn't remove his car from the pavement straight away, he will get fined.
13. Mary has been sunbathing in the garden for hours. When/if she does not put some more sun cream on soon, she will get badly sunburned.
14. The kids have been watching television all afternoon. When/if they don't go playing outside now, they will be overexcited at bedtime.
15. Arthur is a successful businessman. When/if he wants to retire now, he will be a very wealthy pensioner.
16. The meeting is going to end soon. When/if Emma leaves now, she will certainly catch her plane.

Contrastive relations
17. Many products are exported from Switzerland at various scales. If/while Swiss chocolate is universally known, Swiss wines are known only by the specialists.
18. People across the country got a very different reaction to the president's speech. If/while he had a lot of support in New York, in Texas many people were appalled.
19. The admission policy for foreign students is variable across universities. If/while in some of them all students can enrol, in others there is an entrance examination.
20. Foreign language teachers have different ways to assess their students. If/while some of them use only written tests, others also evaluate students' participation in the classroom.
21. Peter and his sister Maggie don't look alike at all. If/while Peter has light blond hair and blue eyes,

Maggie's hair and eyes are dark brown.

22. There are many different forms of intelligence. If/while some people are very good at maths, others have a talent for writing and communicating ideas.
23. Martin and his wife have very different tastes in food. If/while Martin loves Thai and Japanese cooking, his wife only eats pasta and pizza.
24. Not all dogs have the same reaction to young children. If/while some dogs are very calm and gentle, others are aggressive.
25. Eve has written many books about German philosophers. If/while some of them are short introductions, others include detailed and complicated analyses.
26. People don't always like the same kind of holidays. If/while some people love to bathe in the sea, others prefer to walk in the mountains.
27. Many children have marked preferences for toys. If/while some children enjoy playing with modelling clay, others prefer building towers with Lego bricks.
28. The new shop around the corner sells many different brands of clothes. If/while some of them are affordable, others are extremely expensive.
29. Not all members of the party got the same reaction to Julian's proposals. If/while some members found them realistic, others found them too pessimistic.
30. Painters like to paint different types of subjects. If/while some painters mostly paint portraits, others prefer to paint landscapes.
31. Tennis can be played on several different surfaces. If/while some players play best on red clay, others play better on grass.
32. Volcanoes can be divided into two broad categories. If/while red volcanoes have lava flows, grey volcanoes send hot ashes into the air.

Temporal relations
33. There isn't any coffee left in the coffee machine. When you go shopping tomorrow, make sure to buy some.
34. Mary and John are very happily married. When they first met ten years ago, they fell in love with each other instantly.
35. Sarah is a spoiled princess. When her mother refused to buy her a toy yesterday, she started a dreadful tantrum.
36. David is a very dedicated teacher. When some of his students failed their exam last spring, he spent extra hours helping them.
37. There are many beautiful beaches on the Spanish coast. When the weather gets a bit warmer over the summer, we can go to one of them.
38. Jane enjoys knitting a lot. When she had some free time during the holidays last month, she made three jumpers for her children.
39. Lara is quite fluent in French. When we go to Paris next weekend, you will be surprised to hear how well she speaks.
40. Flynn is an excellent skier. When he was in his twenties, he won a number of international competitions.