



# The Linguistic Formulation of Fallacies Matters: The Case of Causal Connectives

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## Abstract

While the role of discourse connectives has long been acknowledged in argumentative frameworks, these approaches often take a coarse-grained approach to connectives, treating them as a unified group having similar effects on argumentation. Based on an empirical study of the straw man fallacy, we argue that a more fine-grained approach is needed to explain the role of each connective and illustrate their specificities. We first present an original corpus study detailing the main features of four causal connectives in French that speakers routinely use to attribute meaning to another speaker (*puisque*, *étant donné que*, *vu que* and *comme*), which is a key element of straw man fallacies. We then assess the influence of each of these connectives in a series of controlled experiments. Our results indicate each connective has different effects for the persuasiveness of straw man fallacies, and that these effects can be explained by differences in their semantic profile, as evidenced in our corpus study. Taken together, our results demonstrate that connectives are important for argumentation but should be analyzed individually, and that the study of fallacies should include a fine-grained analysis of the linguistic elements typically used in their formulation.

**Keywords** Straw man fallacy · Connectives · Subjectivity · Causality · Speaker attitude · Empirical validation

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## 1 Introduction

The straw man fallacy is commonly defined as a refutational move which operates by misrepresenting the content put forward by the opponent in order to attack it more easily (see e.g. Aikin and Casey 2011, 2016; van Eemeren et al. 2014; Oswald and Lewiński 2014). As such, it typically involves an unfaithful representation of the content put forward by the interlocutor, meaning that there has to be a discrepancy between what has been said by the speaker and what has been reported by the person uttering a straw man. What makes the straw man a complex fallacy to analyze is that the distortion oftentimes operates by hiding behind a resemblance, giving it the appearance of a legitimate representation. The misrepresentational aspect can be related to different elements of the content and take many different forms, as described by Aikin and Casey (2011, 2016).

However, the acceptability of an argument does not only depend on its content, but also on the linguistic elements and structures chosen to convey the informational content, as these formal cues have a bearing on the representation of the argument's content. Linguistic elements like connectives, in particular, play an important role for the interpretation of discourse because they can encode procedural meaning which provides indications on the way the conceptual information has to be processed (e.g. Blakemore 2002). By so doing, they influence the output representation, in other words whether an argument is interpreted as being acceptable or not (e.g. Kamalski et al. 2008). Thus, connectives can be considered to be an important aspect in the study of argumentative discourse.

Causal connectives are particularly important for the interpretation of discourse because causal relations create a high degree of coherence (Sanders 2005). The impact of causal connectives on discourse processing and discourse comprehension has long been demonstrated in discourse processing studies (e.g. Millis et al. 1995; Sanders et al. 2007; Zufferey and Gygas 2016). Their role has also been studied to a certain extent in argumentation theory (e.g. Anscombe and Ducrot 1983; Ducrot et al. 1980; van Eemeren, Houtlosser and Snoek Henkemans 2007a, b; Tseronis 2011). However, these studies often use a broad category that does not differentiate between elements such as discourse markers (*well, actually*) and connectives (*because, if*) that have been demonstrated in pragmatics and discourse studies to have only partially overlapping functions (e.g. Crible 2018). By contrast, many studies in the field of pragmatics have provided fine-grained analyses of connectives in corpus data (e.g. Degand 2004; Pit 2007; Zufferey 2012) and many psycholinguistic studies have demonstrated the fundamental role that connectives play for discourse processing and comprehension (e.g. Murray 1997; Sanders and Noordman 2000; Traxler et al. 1997; Zufferey and Gygas 2016). Yet, psycholinguistic studies have assessed the role of connectives in short expository texts and even in isolated sentences, but have not considered their use in argumentative contexts. This paper aims at applying the fine-grained method of pragmatics and psycholinguistics to analyze the role of causal connectives in argumentative contexts, more specifically in the case of the straw man fallacy. In so doing, it contributes to the development of a recent trend in argumentation

studies which tackles the relationships between argumentation and language (e.g. Herman et al. 2018; Hinton 2019; Oswald et al. 2018, 2020; Pollaroli et al. 2019).

This paper is structured as follows. Section 2 presents a state of the art starting with previous research on the straw man fallacy and the role of connectives in argumentation. After an overview of theoretical research, we present experimental research on fallacies. These considerations will lead us to the question of connectives and how they are described in argumentation. We then move on to completing the background on the function of connectives and present the findings from several pragmatic and psycholinguistic studies that have considered the role of connectives in discourse. In Sect. 3, we present an original corpus analysis of the four French causal connectives that convey attributed meaning and can therefore be used in the linguistic formulation of a straw man. This study leads us to define an empirically-based semantic profile for each connective. In Sect. 4, we assess the role of each connective for the persuasiveness of straw man fallacies in a series of experiments. We discuss the results of these experiments in light of the semantic profile of each connective based on corpus data, and present further avenues of enquiry for the role of connectives in argumentation in Sect. 5.

## 2 State of the Art

### 2.1 The Straw Man Fallacy and Connectives in Argumentation

While research on fallacies is now established as a core research topic in argumentation studies (Hamblin 1970; van Eemeren and Grootendorst 1992; Hansen and Pinto 1995; Walton 1995; Tindale 2007), the straw man fallacy itself has mostly been studied from one very specific perspective. Along with early pragma-dialectical considerations on the straw man in the 1990s (van Eemeren and Grootendorst 1992; van Eemeren and Houtlosser 1999), most theoretical approaches to this fallacy have explored it from a normative and/or descriptive perspective (Aikin and Casey 2011, 2016; van Eemeren et al. 2002, 2014; Lewiński 2011; and Lewiński and Oswald 2013; Oswald and Lewiński 2014 to a certain extent). Whilst these approaches diverge in their focus, they agree on the core features of the straw man and define it as a misrepresentation of an original position that seeks to weaken this position in order to make it more easily refutable (see e.g. Aikin and Casey 2011, 2016; Lewiński 2011; Oswald and Lewiński 2014). These definitions of the straw man focus on two essential aspects of the fallacy: first, the straw man distorts the original point of view, and second, it does so with the aim of refuting it. The straw man therefore relies on the dichotomy between form, its distorting element, and function, the refutational aim (see Lewiński 2011). When misrepresenting the opponent's position, the speaker of the straw man attributes the distorted version of the original position to the opponent. In doing so, arguers who perform a straw man distance themselves from a commitment to the misrepresenting version because they indirectly attribute commitment to the fallacious statement to their opponent. The straw man therefore not only qualifies as a misrepresentation of a position, but also as a misattribution of commitment regarding said position (see e.g. Müller 2020; de

Saussure and Oswald 2008; Walton 1996). Consequently, the position that is being refuted is a position that is distorted and falsely attributed to the opponent. According to Walton (1996), the dynamic of attributing a misrepresented version of a position to the opponent and introducing its refutation as a rightful refutation of the original position is an essential characteristic of the straw man's treacherousness.

The misrepresentational element of the straw man rests on its linguistic features: when committing the fallacy, the interlocutor reformulates the original content in a distorted and often exaggerated way. The straw man aims at creating the impression that the distorted argument is closely related to the original standpoint, where in reality the fallacy uses a new, fictitious position, as a basis for its attack. This weakens the original position and makes it easier to attack, which ultimately can lead to a reversal of the burden of proof (e.g. de Saussure 2018; Walton 1995; Walton et al. 2013). When a straw man fallacy is performed, a quite particular argumentative move happens: the interlocutor uttering the straw man attacks the speaker by misrepresenting their point of view, and as a result, the speaker now finds themselves in a defensive position and has to show that the interlocutor has misreported their speech. This misrepresentation does not only entail an infraction of the burden of proof by shifting the attention to the original speaker (van Eemeren et al. 2002; Walton 1995; Walton et al. 2013), but is, following the pragma-dialectical framework, a violation of the third rule for critical discussion which states that one has to attack the standpoint that has actually been brought forward (e.g. van Eemeren et al. 2002). Any distortion, oversimplification, exaggeration or other type of inaccurate reporting of the original standpoint would therefore be considered to be a fallacious argumentative move from a dialectical perspective. Yet, following de Saussure (2018), the straw man can remain a winning move from a rhetorical perspective because it shows the oratory skills of the individual producing the fallacy, even if it fails in persuading.

The above-mentioned selection of approaches has brought insights on a variety of observations regarding the straw man fallacy. These perspectives have not yet focused in depth on an empirical approach of the linguistic structure used to perform a straw man, which highlights that there is a need for complementary investigations with a more linguistic-oriented approach to this fallacy that take into consideration the structural elements that play a role for the communication of straw man fallacies. Such approaches provide a detailed understanding on how linguistic choices like the use of connectives, the locus of the misrepresentation, and many other factors, can alter the acceptability of fallacies like the straw man. In addition, such linguistic analysis should rest on empirical findings, as they can specifically target how different linguistic formulations are processed by ordinary arguers. Such studies enable an account of the way subtle changes in the wording of a fallacious argument like the straw man can influence how it is perceived by the interlocutor.

Despite the important body of literature that has discussed the straw man fallacy from a theoretical perspective, experiments on the straw man are still very rare, even though empirical approaches to the study of fallacies in general have increased in recent years (e.g. van Eemeren et al. 2009, 2012; Hahn and Hornikx 2016; Harris et al. 2016; Lillo-Unglaube et al. 2014; Ozols et al. 2016). Among all these studies, only the one by Bizer et al. (2009) focused on the straw man. In their experiments

(Bizer et al. 2009), they assessed the elements that influence the persuasiveness of the straw man and tested whether personal relevance plays a role on the fallacy's effectiveness. In a first experiment, they compared two political statements that were either placed in a high-relevance context (i.e. the content was important to the hearer) or a low-relevance context (i.e. the content was of no particular importance to the hearer). Their results showed that participants in the low-relevance condition were more likely to be persuaded by the straw man fallacy. In the second experiment, Bizer et al. (2009) assessed whether the effectiveness of a straw man was affected by individual differences in personality traits, like the need for cognitive closure, which is related to decisiveness and need for structure. Bizer et al. (2009) found that participants who had a low need for cognitive closure, in other words who were not in a hurry to get to a conclusion, were more influenced by straw man fallacies than participants with a high need for cognitive closure. These experiments have therefore demonstrated that there are indeed individual differences that influence the persuasiveness of straw man fallacies. This begged the question whether elements other than the cognitive features investigated by Bizer et al. (2009), especially linguistic elements pertaining to the formulation of the fallacy, can have an impact on its effectiveness as well.

In previous work (Schumann et al. 2019), we tackled this question and identified several linguistic factors that play a role on the acceptability of arguments containing a straw man fallacy in French. We defined the acceptability of the straw man based on the participants' ability to detect the fallacy: the lower the acceptability for a fallacious argument, the higher the likelihood that it was implicitly detected. In the first experiment, we investigated whether straw man fallacies were more acceptable (i.e., were more likely to remain undetected) when they targeted the opponent's standpoint or when they targeted the opponent's argument. Our results clearly indicated that the straw man was better accepted when it targeted the argument rather than the standpoint. We concluded that the straw man was less visible when it targeted the argument because it involved a lower-level disagreement. Indeed, it is possible to disagree with one specific argument but still agree with the general standpoint. In contrast, disagreement with the standpoint itself involves a global disagreement between speakers. The second experiment assessed the difference between a misrepresented content introduced explicitly by the French causal connective *puisque* (roughly equivalent to the English *since*) or implicitly, through the simple juxtaposition of the two segments. In both cases, the formulation of the fallacious argument remained identical, the only element that changed was the presence or absence of *puisque*. Results showed that the straw man was better accepted when the fallacious content was juxtaposed to the previous segment rather than introduced by the connective *puisque*. We concluded that because of its attributive meaning (i.e. the fact of presenting the content as attributed to the opponent), the connective *puisque* acted as a signpost alerting participants to the possible presence of misattributed content. In the third experiment, we tested for the difference between misrepresentations that were based on an explicit reformulation of the original speaker's argument and distortions that were grounded on an implicit reformulation. In the case of the explicit variant, the wording of the argument containing a straw man was kept as close as possible to the original, only exaggerating one noun phrase.

For example, in the original argument it was stated that ‘having a child means a lot of financial charges’ and the distorted version stated that ‘having a child means financial ruin’. For the implicit reformulation, the wording was more radically different and the reformulation relied on an implicit conclusion that could be drawn from the speaker’s meaning—i.e. ‘having a child means a lot of financial charges’ resulting in ‘it only is about the money’. We found that the straw man fallacies were more likely to be accepted when the misrepresented content was reformulated in an explicit rather than implicit way. We concluded that explicit reformulations created a sense of familiarity leading to a shallower processing of linguistic content. Taken together, the effects that we found in these experiments confirmed that the acceptability of the straw man fallacy, measured by hearers’ propensity to find them to be proportionate and coherent responses and to agree with the speaker who uttered them, can be increased or decreased by tweaking different linguistic factors. More important for the argument of this paper: the results we obtained for the connective *puisque* begged the question of whether other causal connectives could also influence the acceptability of straw man fallacies and if the effects we found for *puisque* are related specifically to this causal connective, or if other causal connectives that convey attributive meaning as well lead to similar effects.

The role of discourse markers, a notion including—but not limited to—discourse connectives, has long been acknowledged and discussed in several argumentative frameworks. Connectives like the French *mais* (closest to *but* in English), have been studied from a very early stage by Anscombe and Ducrot (1977), and they are still an object of inquiry today as Uzelgun et al. (2015) illustrate in their corpus analysis of “yes,but...” constructions in climate change debates and Rocci et al. (2020) demonstrate in their recent cross-linguistic investigation on the use of adversative connectives like *mais* in young children’s argumentation, showing that even the youngest amongst arguers resort to linguistic resources like argumentative indicators to structure discourse. Various collaborations in the field of argumentation and language (e.g. Herman, Jacquin and Oswald 2018; Oswald et al. 2018) highlight that research on linguistic markers in argumentation has mostly been analyzed from two perspectives. The first approach follows the French tradition (e.g. Anscombe and Ducrot 1983; Ducrot et al. 1980) which theorizes that discourse markers or, following their terminology, words of discourse (*les mots du discours*, see Ducrot et al. 1980) have distinct functions in argumentative contexts: they indicate discursive relations between the segments of the utterance they link together, and shape the way the utterance is oriented or interpreted (Anscombe and Ducrot 1983). They therefore opt for a more language-oriented approach—an argumentation-within-language perspective (*l’argumentation dans la langue*)—because argumentation simply cannot be isolated from its discursive intentions and argumentative orientations. This approach has been discussed and developed further by Anscombe and Ducrot themselves (e.g. Anscombe 2001; Anscombe et al. 2013; Ducrot 1993) and many other researchers in similar fields of investigation (Carel 1999; Moeschler 1989; Roulet 1984).

The second approach, put forward by pragma-dialecticians (e.g. van Eemeren et al. 2007a, b), focuses on argumentative indicators in a broader sense, including any form of linguistic marker that serves as an indicator of the argumentative move that has been made within the four stages of a critical discussion. When resolving a difference

of opinion, the ideal model postulates four stages that the arguers are going through: the confrontation stage during which the interlocutors acknowledge that there is a difference of opinion, the opening stage during which the interlocutors set up the rules for resolving the difference of opinion, the argumentation stage during which the interlocutors defend their respective standpoints, and the concluding stage during which the interlocutors evaluate if their difference of opinion has been solved or not (van Eemeren and Grootendorst 1992). Pragma-dialecticians argue that the role of argumentative indicators is related to the type of argumentative move which is being carried out, meaning that not every expression, or marker, or connective, or other type of indicator is used at the same stage when resolving a difference of opinion. If we look at the connective *since* for example, the pragma-dialectical framework (van Eemeren et al. 2007b, p.119) describes it as an indicator of a starting point of a discussion, because it implicitly conveys the meaning that all the parties involved in the discussion have agreed on the content of the segment following the connective.

Even if the argumentation-within-language approach and the pragma-dialectical approach differ in the way they tackle the subject, they both agree on the importance of linguistic markers, such as connectives, for argumentation. Nevertheless, the first approach is not sufficiently detailed in describing the distinct roles of the different words of discourse and pragma-dialecticians are more focused on a top-down process, first identifying the argumentative move within a discussion and only then shifting the attention towards the indicators used to carry out the argumentative move. In order to get a more fine-grained understanding on how these markers work in specific argumentative situations, empirical research in the form of corpus studies (see e.g. Uzelgun et al. 2015) and experimental studies (see e.g. Schumann et al. 2019) have to be conducted to investigate the role of connectives within argumentation. In this paper, we take a bottom-up perspective, and first perform a corpus study in order to define the core characteristics of each causal connective that can typically be used to introduce a straw man in the discourse segment following the connective. In turn, this empirically grounded description of the semantic profile of each connective will enable us to assess their role in experiments focusing on a specific argumentative situation. Taken together, these studies will both deepen our understanding of the functions of these connectives and show a link between their uses in corpus data and their role in an argumentative context. Before turning to our corpus study in Sect. 3, we present studies that have assessed the roles of connectives for discourse processing and comprehension in the next section.

## 2.2 The Function of Connectives from a (psycho-) Linguistic Perspective

Discourse connectives are linguistic elements used to structure discourse and increase textual coherence by establishing coherence relations between discourse segments (Halliday and Hasan 1976; Knott and Dale 1994; Mann and Thompson 1988). Applied to an argumentative context, this means that connectives are used to indicate relations between standpoints and arguments, and the different positions held by the interlocutors. In addition, connectives are non-truth-conditional, more precisely, the semantic meaning of a proposition is not influenced by their presence.

Sentences (1) and (2) below express the same informational content, which illustrates the fact that the meaning in (2) is not affected by the absence of the causal connective *as*:

- (1) The Earth is round, as it has been proven by empirical data.
- (2) The Earth is round. It has been proven by empirical data.

When they are used however, connectives facilitate the processing and comprehension of discourse (Caron et al. 1988; Cozijn et al. 2011; Sanders and Noordman 2000; Sanders et al. 2007; Zufferey and Gygax 2016). In example (1), the connective *as* instructs the reader to process the content following the causal connective as an argument in support of the preceding statement. Causal connectives, as referred to in this paper, are to be understood as a subcategory of connectives that encode coherence relations based on a cause, an argument or a reason (see e.g. Pit 2003; Stukker and Sanders 2012). The causality has therefore more of a semantic and less of a material or physical orientation.

Another specificity of connectives is that they are polyfunctional, in other words they are used to express different relations depending on the context. The connective *as*, for example, can introduce a cause or a reason like in (1), but it can also be used to express a relation of temporal simultaneity as in (3):

- (3) The rest of the group arrived as we were leaving.

The absence of a biunivocal relation between connectives and discourse relations can also be approached from the other side: in the majority of the cases, the same discourse relation can be expressed by different connectives. For example, a cause or a reason can be conveyed by several connectives like *because*, *since*, *as*, *given that*, etc. Yet, corpus studies have shown that these connectives are not interchangeable, as each of them has specific nuances of meanings (e.g. Pit 2007; Zufferey and Carton 2012). In this paper, we compare the role of four French causal connectives that convey attributive meaning, in other words that can be used to introduce an argument implicitly attributed by the speaker to an external source, as these connectives can be used to introduce straw man fallacies.

So far, most studies that have assessed the roles of connectives empirically in pragmatics and psycholinguistics have made use of very short expository texts, or even no text at all but only sentences presented in isolation. To the best of our knowledge, only one empirical study has conclusively demonstrated that connectives play a specific role in persuasive texts. Kamalski et al. (2008) uncovered an important difference in the role played by objective causal connectives, namely connectives used to link facts and events in the world (4), and subjective connectives, namely connectives that are used to link claims or arguments and conclusions drawn in the mind of the speaker (5).

- (4) Henry was late for work because he missed his train.



(5) Henry must have missed his train, since he still hasn't arrived.<sup>1</sup>

They found that in persuasive texts, the presence of subjective causal connectives created a *forewarning effect*, alerting readers to the persuasive intention of the writer and decreasing their willingness to accept its content. In a first experiment, Kamalski et al. (2008) included offline measures of persuasion targeting the readers' beliefs, attitudes and intentions following reading. They found that texts containing subjective connectives were less persuasive compared to texts containing objective connectives. This effect was in addition related to participants' perception of the writer's intention. With subjective connectives, the intention of the writer was perceived to be more strongly persuasive compared to the version containing objective connectives. It seems, therefore, that when participants encounter subjective connectives, it forewarns them to the persuasive intention of the writer and this may create resistance and lower acceptance of textual content. In this experiment, Kamalski et al. (2008) did not find a difference between texts containing almost no connectives and texts containing subjective connectives. It seems therefore that the most persuasive version of a text is one that specifically contains objective connectives. In a second experiment, Kamalski et al. (2008) investigated the role of the forewarning effect even further. In an online reading task, they tested the processing of short texts containing an explicit formulation of the causal connection with either subjective connective or no connective and another version with either an objective connective or no connective. In this second experiment, they found that the short texts containing subjective connectives were less convincing compared to the implicit version, thus providing further evidence for the existence of a forewarning effect linked to the use of subjective connectives.

In sum, Kamalski et al.'s was the first study to uncover a forewarning effect linked to the use of subjective connectives. In our paper, we pursue this line of investigation further by assessing the role of subjective connectives in a specific type of argumentative context, namely the acceptability of fallacious arguments. In addition, Kamalski et al. considered subjective connectives only as a global category in which many different connectives are included. Yet, subjectivity is a scalar notion (Degand and Pander Maat 2003) and some connectives are more strongly subjective than others (Pit 2007; Zufferey and Cartoni 2012). In this paper, we will assess the way specific connectives differing in their degree of subjectivity create a forewarning effect in argumentative contexts. We will also show that subjectivity is not the only relevant criterion that separates causal connectives, and that other semantic factors such

<sup>1</sup> An anonymous reviewer highlights that the difference between both examples can also be looked at in terms of a difference in the argumentation schemes they instantiate. Following the pragma-dialectical framework (e.g. Eemeren et al. 2002; Eemeren et al. 2014), (4) could indeed be described as instantiating a causal argumentation scheme, while (5) would be a case of symptomatic argumentation. However, although it would be tempting to investigate whether a difference of persuasiveness between both types of connectives translates into a difference of persuasiveness between types of argument schemes, our data does not allow us to answer this particular question. An experimental study in this direction should moreover establish beforehand whether there is a univocal correspondence between the use of a particular connective and one argumentation scheme – which is still, at this point, an open question.

as the speaker's attitude towards the attributed meaning and the type of information that is introduced—given or new—also play a role in argumentative contexts.

### 3 French Causal Connectives with an Attributive Meaning

Previous experimental research on French causal connectives has demonstrated that frequently used connectives like *parce que*, *car*, and *puisque* cannot be used interchangeably (Zufferey 2012). Using corpus data, other research has shown that a crucial difference between *parce que* on the one hand and *car* and *puisque* on the other lies on the degree of subjectivity of the relations that they typically convey (Pit 2007; Simon and Degand 2007), as the connective *car*, and to an even greater extent *puisque*, are typically used more often to convey subjective causal relations such as claims and conclusions, while *parce que* is mostly used to convey objective relations between facts and events occurring in the world. Other studies focusing specifically on *puisque* have underlined that this connective is typically used to convey information that is already known to the addressee or at least that the speaker puts forward as being easily retrievable in the hearer's cognitive environment. In other cases, the information presented by *puisque* is new for the hearer, but what is put forward as being known or indisputable is the causal link between the two segments (Franken 1996; Zufferey 2014). In a contrastive corpus study between French and English causal connectives, Zufferey and Cartoni (2012) have found that *puisque* does indeed convey a majority of given information.

In this paper, we focus more specifically on a partially different subgroup of connectives, which can be used to convey a meaning the speaker attributes to someone else. Accordingly, because these are attributive connectives, we consider that they are linguistic expressions that are typically eligible to partake in the formulation of straw man fallacies, which function as misattributions. These connectives are in French: *puisque*, *étant donné que*, *vu que* and *comme*, and can roughly be translated with *since*, *given that*, *seeing that*, and *as* in English. We investigated three potentially relevant features that may differentiate these connectives in language use: their degree of subjectivity, their propensity to convey given information; the speaker's attitude towards the attributed content. The first two features were defined using similar criteria as those from earlier corpus studies on causal connectives (see especially Zufferey and Cartoni 2012 for an operationalized definition of subjectivity and givenness). The last feature was not used in previous work. However, we deem it to be particularly relevant to assess connectives that convey attributive meaning because the attitude a speaker holds toward the expressed content can serve as an indicator for disagreement. According to Sperber and Wilson (1986), interpretive uses of language can convey either an endorsing, a neutral or a dissociative attitude. We therefore use these three categories in our corpus study. Subjectivity, givenness and speaker attitude can all be related to the straw man fallacy. First, the straw man is mostly construed around claims that are distorted, rather than facts that are reformulated in a sound way. As we have seen with Kamalski et al. (2008) in the previous section, using subjective connectives to introduce arguments can diminish their persuasiveness compared to objective connectives. This may therefore also apply to

fallacious arguments like the straw man. Second, connectives shape readers' expectations about the informational status of the segment following them, in other words whether it is given (i.e. already known or easily accessible) or new. The straw man creates the illusion that the distorted argument is given, as it is part of the common ground, whereas it is in fact a misrepresentation, as it contains new elements added by the speaker uttering the straw man rather than given information. Third, the attitude of the speaker performing the straw man towards the expressed content may also influence how it is accepted. Using a connective with a dissociative meaning such as *puisque* to introduce an argument suggests that the speakers are distancing themselves from the content they are expressing, attributing it to the opponent or even a third party involved in the argument. In case of a straw man, this could further highlight the difference of opinion between the interlocutors. The disagreement may be less evident if the fallacious arguments is preceded by a neutral connective or a connective used to convey an attitude of implicit endorsement.

In order to gather empirical data enabling us to compare the profile of these four connectives, we performed a corpus annotation of a randomly selected sample of 200 occurrences of each connective from the *French Web 2017* corpus (available through the Sketch Engine platform, Kilgarriff et al. 2014). This corpus was chosen because its size (over 6 billion words) and content (texts collected through web crawling) makes it possible to gather a highly varied sample in terms of speaker type, genre, etc. For the connectives *puisque* and *étant donné que*, all occurrences sampled from the corpus could be included in the analysis, as these connectives do not have alternative non-causal meanings. By contrast, the connective *vu que* is also found in non-connective uses (e.g. *Nous avons vu que ce c'était possible*). These non-connective uses represent about 18% of the data and were manually excluded. Additional occurrences were selected in order to reach a sample of 200 occurrences with a causal meaning. The connective *comme* is more problematic to analyze, because it is highly polyfunctional and has several other functions (temporal, comparative) as well as non-connective uses. As causal uses of this connective are said to be preferentially found in sentence-initial position in the LEXCONN database of French connectives (Roze et al. 2012) the corpus search was limited to sentence initial uses. Even so, *comme* was found to convey a causal meaning in only about 16% of the occurrences. As a result, about 1200 occurrences had to be examined in order to reach the number of 200 occurrences for the analysis.

In order to ensure the reliability of the data annotation, 10% of the occurrences were double coded by the first and the second author. As agreement was high between them on all three features (between 80 and 95% of agreement for all connectives on the three features), the rest of the occurrences was coded only by the second author, who has extensive experience with the annotation of these features in corpus data.

Table 1 reports the number of subjective and objective relations conveyed by each connective in the corpus. A chi-square test of independence indicates that the distribution between objective and subjective relations is significantly different across connectives ( $\chi^2 = 105.41$ ,  $df(3)$ ,  $p < 0.001$ ). An inspection of standardized residuals indicates that this difference is due to an overuse of *puisque* (+2.41) and *vu que* (+2.5) to convey subjective relations as well as an underuse of *comme* (-3.86),

**Table 1** Subjective and objective relations conveyed by each connective

	<i>puisque</i>	<i>étant donné que</i>	<i>vu que</i>	<i>comme</i>
Subjective relation	176	134	177	100
Objective relation	24	66	23	100
Total	200	200	200	200

**Table 2** Given and new information conveyed in the cause segment following each connective

	<i>puisque</i>	<i>étant donné que</i>	<i>vu que</i>	<i>comme</i>
Given information	102	56	52	29
New information	98	144	148	171
Total	200	200	200	200

**Table 3** Speaker attitude towards the content of the cause following the connective

	<i>puisque</i>	<i>étant donné que</i>	<i>vu que</i>	<i>comme</i>
Neutral attitude	137	102	95	135
Endorsing attitude	49	88	99	65
Dissociative attitude	14	0	6	0
Total	200	200	200	200

whereas *étant donné que* does not significantly differ from the others ( $-1.05$ ). The difference is also due to an overuse of *comme* to convey objective relations ( $+6.41$ ) as well as an underuse of *puisque* ( $-4.01$ ) and *vu que* ( $-4.15$ ), whereas *étant donné que* does not significantly differ ( $+1.75$ ). In other words, *puisque* and *vu que* are the two most subjective connectives, not differing from each other, while *étant donné que* is less subjective and *comme* is the most objective of all four connectives.

Table 2 reports the number of segments containing new and given information in the segment following the four connectives. A chi-square test of independence indicates that the distribution between given and new information is significantly different between connectives ( $\chi^2 = 66.94$ ,  $df(3)$ ,  $p < 0.001$ ). An inspection of standardized residuals indicates that the difference is due to an overuse of *puisque* to convey given information ( $+5.47$ ) and an underuse of *comme* ( $-3.98$ ). The other two connectives do not differ ( $-0.49$  for *étant donné que* and  $-1$  for *vu que*). The difference is also due to an overuse of *comme* to convey new information ( $+2.6$ ) and an underuse of *puisque* ( $-3.57$ ). Again, the other two connectives do not differ ( $+0.32$  for *étant donné que* and  $+0.65$  for *vu que*). This means that *puisque* is the connective of choice to convey given information, followed by *étant donné que* and *vu que*, and lastly *comme*, a connective that is only marginally used with this function.

Table 3 reports the number of occurrences in which the speaker expresses a neutral, endorsing or dissociative attitude towards the causes it introduces. A chi-square test of independence indicates that the repartition between the three types of attitudes is significantly different between connectives ( $\chi^2 = 58.18$ ,  $df(6)$ ,  $p < 0.001$ ). An inspection of standardized residuals indicates that the difference is due to an

**Table 4** Profile of each connective based on the three relevant features: subjectivity, givenness and polarity of attitude

	Degree of subjectivity	Degree of givenness	Polarity of attitude
<i>puisque</i>	High	High	More dissociative
<i>étant donné que</i>	Middle	Middle	Neutral
<i>vu que</i>	High	Middle	More endorsing
<i>comme</i>	Low	Low	Neutral

underuse of *vu que* to convey a neutral attitude ( $-2.18$ ) whereas the other connectives do not differ ( $+1.68$  for *puisque*,  $-1.02$  for *étant donné que*, and  $+1.49$  for *comme*). In addition, there is a significant difference in speaker's endorsing attitude, that is significantly linked to the use of *vu que* ( $+2.61$ ) and avoidance of *puisque* ( $-3.12$ ), whereas the other two connectives do not differ ( $+1.87$  for *étant donné que* and  $-1.37$  for *comme*). Finally, there is also a significant difference for the communication of a dissociative attitude, a function that is specifically linked to the use of *puisque* ( $+3.97$ ) and the avoidance of *vu que* ( $-2.19$ ) and *comme* ( $-2.25$ ). By contrast, *étant donné que* does not significantly differ from the others ( $+0.49$ ).

Based on these corpus results, we summarize the semantic profile of each connective in Table 4.

Based on these profiles, we can make the following hypotheses regarding the role of each connective for the acceptability of straw man fallacies. If subjectivity is indeed the only factor influencing the role of discourse connectives, as identified in the forewarning effect put forward by Kamalski et al. (2008), we expect that *puisque* and *vu que* will lead to lower acceptability scores, and consequently facilitate the detection of a straw man, because they will act as forewarners, whereas *étant donné que* and *comme* will not lessen the acceptability in a similar manner due to their lower degree of subjectivity. But if we are right to assume that the other two factors that we have identified also play a role in determining whether a specific connective acts as a forewarner or not, then we can expect different effects for each connective, as they all have a different profile based on these three factors. More specifically, we expect that *puisque* will play a stronger role, increasing the detectability of the straw man and decreasing its acceptability, compared to the other three connectives, because in addition to being highly subjective, it is most frequently used to convey given information and with an openly negative attitude. This would make it, next to the other three, the most suitable connective to express disagreement, i.e., a prominent linguistic resource for refutation. While the connective *vu que* is also highly subjective, it is not so strongly associated with the communication of given information and the speaker attitude is one of endorsement. Both factors should contribute to lowering its effect as a forewarner, and thus to increasing the acceptability of arguments. The connective *étant donné que* is more moderately subjective than *vu que* and *puisque*, but contrary to *vu que*, the speaker does not explicitly endorse the content of the cause as often. As a result, both connectives give more mixed signals than *puisque* and should therefore not lower acceptability scores. Finally, *comme* should not act as a forewarner at all, as it is

more objective and used mostly to convey new information with a neutral attitude. As a consequence, we expect *comme* to be the connective that yields high acceptability rates which increases the probability for the fallacy to remain undetected. We assess these hypotheses by designing an experimental study that was performed separately for each connective, as we now outline.

## 4 Testing the Role of Causal Connectives for the Acceptability of Straw Man Fallacies

In four similar experiments, we investigated the role of four causal connectives in French that encode attributive meaning, using the same experimental framework as in (Schumann et al. 2019). The first connective we tested was *puisque*, which can roughly be translated by the English *since*, even though these connectives are not fully equivalent (Zufferey and Cartoni 2012). As *puisque* was already tested in experiment 2 from (Schumann et al. 2019), we simply replicated this experiment for the current paper with new participants in order to further assess the existence of the reported effect. The experiments on the other connectives, namely *étant donné que* (closest to English *given that*), *vu que* (closest to English *seeing that*) and *comme* (closest to English *as*), are based on the same experimental design. All four experiments were conducted separately. The overall aim was twofold: determine whether there is a difference on the acceptability of straw man fallacies when the fallacious segment is introduced explicitly by using a causal connective with attributive function, and when the fallacious argument is simply juxtaposed to the previous segment without the use of a connective, and to compare the role of each causal connective with one another in order to assess the roles of the features identified in Sect. 3.

### 4.1 Participants

We recruited 162 French-speaking participants (64 women, mean age: 25, age range: 18–70) via the University of Fribourg and the crowdsourcing Platform Prolific® (Prolific, Oxford, UK). Participants recruited via the University of Fribourg were all first-year psychology students and received 30 min in experimental points for their participation. The participants recruited via Prolific were rewarded 2.70£ for their participation. All participants had to give their informed consent before taking part in the experiment. On average the participants needed 25 min to complete the study.

### 4.2 Materials

The participants were presented with 40 short dialogues about various topics between two persons, Barbara and Alexandre. All the items followed the same structure. The first part of the dialogue was always expressed by Barbara. As illustrated in (6), the first segment “It is crucial to better support young parents”, contained a standpoint which was then followed by an argument in support of the

standpoint “having a child means a lot of financial charges”. The two segments were linked with the causal connective *parce que* (which can roughly be translated with *because*).

- (6) Barbara : Il est crucial de mieux soutenir les jeunes parents parce qu’avoir un enfant signifie beaucoup de charges financières.

*Barbara: It is crucial to better support young parents because having a child means having a lot of financial responsibility.*

The first part of the dialogue remained the same in all four conditions. The critical statement was always expressed by Alexandre in the second part of the dialogue and sometimes contained a straw man and sometimes a legitimate argument. The first condition, illustrated in (7), represents a case of straw man where the fallacious argument is introduced with a connective. The first segment (S1) “Let’s raise the family allowance” constitutes a possible consequence drawn from the argument given by Barbara. As illustrated in examples (7) to (10), this initial part of Alexandre’s statement did not change across conditions. The first segment of Alexandre’s statement was then followed by the connective *puisque, comme, étant donné que, or vu que* (roughly equivalent respectively to: *since, as, given that, seeing that*) which signaled that the second segment (S2) containing an exaggerated version of Barbara’s argument resulting in “it only is about the money”, was a content that Alexandre attributed to Barbara. The structure of the statements remained the same (‘S1 connective S2’) throughout the conditions.

- (7) Alexandre : Augmentons les allocations familiales CONNECTEUR on ne pense qu’à l’argent.

*Alexander: Let’s raise the family allowance CONNECTIVE it is only about the money.*

In (8), the second condition reproduces the same statement but this time, the fallacious argument is juxtaposed to the previous segment (through a removal of the connective) and the causal relation is left implicit.

- (8) Alexandre : Augmentons les allocations familiales. On ne pense qu’à l’argent.

*Alexander: Let’s raise the family allowance. It is only about the money.*

The third experimental condition in (9) illustrates a non-fallacious reformulation of the argument given by Barbara. Again, we find the same first segment than in the previous conditions. The reformulated but non-fallacious argument “parents are under economic pressure” is introduced with the connective in the second segment.

- (9) Alexandre : Augmentons les allocations familiales CONNECTEUR les parents sont sous pression économique.

*Alexander: Let’s raise the family allowance CONNECTIVE the parents are under economic pressure.*

The fourth and last condition is shown in (10). It is the exact same sentence as in (9) but without any connective linking both segments.

- (10) Alexandre : Augmentons les allocations familiales. Les parents sont sous pression économique.  
*Alexander: Let's raise the family allowance. The parents are under economic pressure.*

The four experimental conditions were attributed to four lists using a Latin square design, to ensure that all the participants only saw one out of the four possible conditions per item. Every participant read and evaluated ten items per condition, meaning that they saw forty dialogues in total. Since we tested four different connectives, there were four versions of the experiment run with a between-subject design to ensure that every participant saw the experimental conditions with only one of the connectives.

### 4.3 Procedure

The experiment was set up on Qualtrics© (Qualtrics LLC, Provo: Utah, USA) and sent to the participants via a weblink. The participants received short preliminary instructions before starting the experiment. They were informed that they were about to read forty dialogues taking place between two persons named Barbara and Alexandre on various societal topics. They were asked to take their time reading the dialogues and to respond intuitively to the four questions that would appear for every item. The participants were also asked to respond to socio-demographic questions about gender, age, native language, and place of residence. After completing this first phase, participants were given two trial dialogues to get them familiarized with the task. The experimental part followed this brief introduction. During the experimental phase, participants read the forty dialogues in a randomized order. For each dialogue, they had to respond to four questions on a 6-point Likert scale ranging from 'no, absolutely not' to 'yes, absolutely' with an additional option ('I don't know') they could select when they weren't able or did not want to give an answer. The first two questions, illustrated in (11) and (12) aimed to assess their evaluation of two core features of the straw man fallacy.

- (11) Est-ce que la conclusion d'Alexandre est proportionnée par rapport à ce qu'a affirmé Barbara ?

*Is the conclusion reached by Alexander proportionate to what Barbara has said?*

- (12) Est-ce que la conclusion d'Alexandre découle de ce qu'a affirmé Barbara ?

*Does the conclusion reached by Alexander follow from what Barbara has said?*

The first question in (11) targeted the exaggerative nature of the straw man. This question aimed to assess whether participants were able to spot the more extreme positions in Alexandre's reply compared to Barbara's statement. The second question in (12) aimed to assess whether participants noticed that the misrepresentation



disrupted the coherence relation between the two statements, as the segment following the connective did not contain the cause initially presented by the speaker but a distorted version of it, while the connective used indicated that this cause should contain attributed content.

Questions 3 and 4 aimed to assess participants' level of agreement with both Alexandre (13) and Barbara (14).

- (13) Êtes-vous d'accord avec Alexandre ?  
*Do you agree with Alexander?*
- (14) Êtes-vous d'accord avec Barbara ?  
*Do you agree with Barbara?*

We expected different patterns of responses for the two questions. On the one hand, we expected the responses concerning participants' agreement with Alexandre to be influenced by the type of argument he presented (*viz.* fallacious or non-fallacious). If participants do detect fallacies, their agreement should be lower in these cases. On the other hand, the agreement with Barbara was designed as a control question. The responses to this question were expected to be based on the participants' own opinions and world views since Barbara uttered her own opinion and did not react to someone else's statement. The idea was that in answering (14), participants would only agree or disagree with Barbara's views directly, without reacting to Alexandre's discursive move, which came after Barbara voiced her opinion.

#### 4.4 Analysis

The analysis was performed with a  $2 \times 2$  repeated measure ANOVA with two within-subject factors: the type of argument (fallacious or non-fallacious) and the connective (present or absent). A separate analysis was run with all four connectives. For the data analysis we only included responses given on a scale from 1 to 6; results given on the additional option 'I don't know' were treated as missing data.

#### 4.5 Results for the Connective *puisque*

The means for the acceptability of each condition and the standard deviation are reported in Table 5.

For the first question, there was a significant effect for the nature of the argument. Fallacious responses were less accepted ( $M=3.221$ ) than non-fallacious ones ( $M=4.07$ ) [ $F_1(1, 40)=122.52, p<0.001$ ;  $F_2(1, 39)=72.43, p<0.001$ ]. The results returned a significant effect for the presence or absence of *puisque* in the participant analysis ( $F_1$ ), but only approaching significance in the item analysis ( $F_2$ ) [ $F_1(1, 40)=4.30, p=0.04$ ;  $F_2(1, 39)=3.10, p=0.08$ ].

For the question targeting the logical link between statements, results indicated two main effects: non-fallacious arguments were more accepted ( $M=4.22$ ) than fallacious ones ( $M=3.68$ ) [ $F_1(1, 40)=47.90, p<0.001$ ;  $F_2(1, 39)=39.71, p<0.001$ ]. An argument introduced by *puisque* was less accepted ( $M=3.86$ ) compared to

**Table 5** Experiment 1b testing the presence of *puisque* vs. the absence of *puisque*

	Mean	Standard deviation
<i>Question 1: Proportion</i>		
Fallacious argument with <i>puisque</i>	3.095	0.764
Fallacious argument without <i>puisque</i>	3.346	0.739
Non-fallacious argument with <i>puisque</i>	4.072	0.663
Non-fallacious argument without <i>puisque</i>	4.074	0.773
<i>Question 2: Coherence</i>		
Fallacious argument with <i>puisque</i>	3.545	0.708
Fallacious argument without <i>puisque</i>	3.822	0.653
Non-fallacious argument with <i>puisque</i>	4.172	0.587
Non-fallacious argument without <i>puisque</i>	4.271	0.640
<i>Question 3: Agreement with Alexandre</i>		
Fallacious argument with <i>puisque</i>	3.162	0.734
Fallacious argument without <i>puisque</i>	3.440	0.687
Non-fallacious argument with <i>puisque</i>	4.190	0.650
Non-fallacious argument without <i>puisque</i>	4.404	0.579
<i>Question 4: Agreement with Barbara</i>		
Fallacious argument with <i>puisque</i>	4.354	0.580
Fallacious argument without <i>puisque</i>	4.451	0.694
Non-fallacious argument with <i>puisque</i>	4.586	0.552
Non-fallacious argument without <i>puisque</i>	4.645	0.511

the implicit version ( $M=4.05$ ) [ $F1(1, 40)=10.09, p=0.003$ ;  $F2(1, 39)=7.97, p=0.007$ ].

The third question, targeting the agreement with Alexander, returned the same pattern. A significant effect was found for the type of argument, with non-fallacious arguments yielding a higher acceptability score ( $M=4.30$ ) compared to fallacious ones ( $M=3.30$ ) [ $F1(1, 40)=95.82, p<0.0001$ ;  $F2(1, 39)=85.77, p<0.001$ ]. Arguments introduced by *puisque* were less accepted ( $M=3.68$ ) compared to implicit ones ( $M=3.92$ ) [ $F1(1, 40)=8.08, p=0.007$ ;  $F2(1, 39)=13.01, p=0.001$ ].

The question targeting the agreement with Barbara did return an effect of the type of argument. Non-fallacious arguments were better accepted ( $M=4.62$ ) than fallacious ones ( $M=4.40$ ) [ $F1(1, 40)=12.50, p=0.001$ ;  $F2(1, 39)=13.02, p=0.001$ ]. As expected, no effects were found for the use of the connective [ $F1(1, 40)=1.77, p=0.19$ ;  $F2(1, 39)=1.11, p=0.30$ ].

#### 4.6 Results for the Connective *étant donné que*

In Table 6, we report the means and standard deviation regarding the acceptability of the four different conditions for each question.

The results on the first question indicate two significant effects. Fallacious responses were less accepted ( $M=4.02$ ) than non-fallacious ones ( $M=4.78$ ) [ $F1(1, 40)=71.37, p<0.001$ ;  $F2(1, 39)=57.34, p<0.001$ ]. We also report a significant effect for the presence or absence of *étant donné que*: statements with a

**Table 6** Experiment 1b testing the presence of *étant donné que* vs. the absence of *étant donné que*

	Mean	Standard deviation
<i>Question 1: Proportion</i>		
Fallacious argument with <i>étant donné que</i>	3.971	0.898
Fallacious argument without <i>étant donné que</i>	4.058	0.799
Non-fallacious argument with <i>étant donné que</i>	4.680	0.602
Non-fallacious argument without <i>étant donné que</i>	4.880	0.599
<i>Question 2: Coherence</i>		
Fallacious argument with <i>étant donné que</i>	4.349	0.735
Fallacious argument without <i>étant donné que</i>	4.407	0.733
Non-fallacious argument with <i>étant donné que</i>	4.743	0.615
Non-fallacious argument without <i>étant donné que</i>	4.883	0.607
<i>Question 3: Agreement with Alexandre</i>		
Fallacious argument with <i>étant donné que</i>	3.989	0.739
Fallacious argument without <i>étant donné que</i>	3.942	0.772
Non-fallacious argument with <i>étant donné que</i>	4.681	0.592
Non-fallacious argument without <i>étant donné que</i>	4.877	0.578
<i>Question 4: Agreement with Barbara</i>		
Fallacious argument with <i>étant donné que</i>	4.799	0.623
Fallacious argument without <i>étant donné que</i>	4.803	0.517
Non-fallacious argument with <i>étant donné que</i>	4.988	0.491
Non-fallacious argument without <i>étant donné que</i>	4.897	0.607

connective introducing the argument were less accepted ( $M=4.33$ ) than statements with an implicit causal relation ( $M=4.47$ ) [ $F1(1, 40)=6.05, p<0.05$ ;  $F2(1, 39)=7.740, p<0.01$ ].

On the question targeting the logical link between Barbara's and Alexandre's statements, the analysis returned a significant effect on the nature of the argument: non-fallacious arguments were more accepted ( $M=4.81$ ) than fallacious ones ( $M=4.38$ ) [ $F1(1, 40)=38.46, p<0.001$ ;  $F2(1, 39)=24.54, p<0.001$ ]. For the presence or absence of the connective *étant donné*, the analysis returned results approaching significance in both analyses [ $F1(1, 40)=3.98, p=0.05$ ;  $F2(1, 39)=3.25, p=0.08$ ].

The third question returned a similar pattern. For the type of argument, the analysis returned a significant effect, non-fallacious arguments were more accepted ( $M=4.78$ ) than fallacious ones ( $M=3.97$ ) [ $F1(1, 40)=105.56, p<0.001$ ;  $F2(1, 39)=55.13, p<0.001$ ]. No effect was found between statements with or without connective [ $F1(1, 40)=1.03, p=0.31$ ;  $F2(1, 39)=1.54, p=0.22$ ].

The results on the fourth question, the agreement with Barbara, did not return a significant effect for the type of argument even though the values approach significance [ $F1(1, 40)=3.63, p=0.06$ ;  $F2(1, 39)=3.87, p=0.05$ ] or the presence or absence of the connective *étant donné que* [ $F1(1, 40)=0.65, p=0.42$ ;  $F2(1, 39)=0.54, p=0.47$ ].

**Table 7** Experiment 1c testing the presence of *vu que* vs. the absence of *vu que*

	Mean	Standard deviation
<i>Question 1: Proportion</i>		
Fallacious argument with <i>vu que</i>	3.412	0.721
Fallacious argument without <i>vu que</i>	3.656	0.775
Non-fallacious argument with <i>vu que</i>	4.235	0.706
Non-fallacious argument without <i>vu que</i>	4.341	0.879
<i>Question 2: Coherence</i>		
Fallacious argument with <i>vu que</i>	3.845	0.722
Fallacious argument without <i>vu que</i>	3.989	0.861
Non-fallacious argument with <i>vu que</i>	4.349	0.736
Non-fallacious argument without <i>vu que</i>	4.492	0.813
<i>Question 3: Agreement with Alexandre</i>		
Fallacious argument with <i>vu que</i>	3.611	0.632
Fallacious argument without <i>vu que</i>	3.684	0.601
Non-fallacious argument with <i>vu que</i>	4.378	0.659
Non-fallacious argument without <i>vu que</i>	4.376	0.689
<i>Question 4: Agreement with Barbara</i>		
Fallacious argument with <i>vu que</i>	4.519	0.589
Fallacious argument without <i>vu que</i>	4.496	0.695
Non-fallacious argument with <i>vu que</i>	4.601	0.615
Non-fallacious argument without <i>vu que</i>	4.587	0.745

#### 4.7 Results for the connective *vu que*

The means and standard deviation for the acceptability of each condition are reported in Table 7.

The question targeting proportionality returned a significant effect for the nature of the argument. Non-fallacious responses scored a higher acceptability ( $M=4.29$ ) than fallacious ones ( $M=3.53$ ) [ $F_1(1, 39)=59.33, p<0.001$ ;  $F_2(1,39)=70.24, p<0.001$ ]. The results also returned a significant effect for the presence or absence of *vu que*. Statements with the causal connective introducing the argument were less accepted ( $M=3.82$ ) than statements with an implicit causal relation ( $M=3.40$ ) [ $F_1(1, 39)=6.30, p=0.02$ ;  $F_2(1,39)=5.94, p=0.02$ ].

We found the same pattern on the question about the logical link between the statements. Again, the results indicated two main effects: fallacious arguments were less accepted ( $M=3.92$ ) than non-fallacious ones ( $M=4.42$ ) [ $F_1(1, 39)=40.09, p<0.001$ ;  $F_2(1,39)=32.67, p<0.001$ ] and statements without the connective *vu que* were more accepted ( $M=4.24$ ) compared to the explicit version with the connective ( $M=4.10$ ) [ $F_1(1, 39)=4.47, p=0.04$ ;  $F_2(1,39)=4.19, p=0.04$ ].

For the third question, we found a significant effect for the nature of the argument: non-fallacious arguments were better accepted ( $M=4.38$ ) than fallacious ones ( $M=3.65$ ) [ $F_1(1, 39)=43.85, p<0.001$ ;  $F_2(1,39)=42.98, p<0.001$ ]. No effect was found for the presence or absence of the connective [ $F_1(1, 39)=0.28, p=0.60$ ;  $F_2(1,39)=0.15, p=0.70$ ].

**Table 8** Experiment 1d testing the presence of *comme* vs the absence of *comme*

	Mean	Standard deviation
<i>Question 1: Proportion</i>		
Fallacious argument with <i>comme</i>	3.462	0.635
Fallacious argument without <i>comme</i>	3.587	0.788
Non-fallacious argument with <i>comme</i>	4.494	0.708
Non-fallacious argument without <i>comme</i>	4.449	0.753
<i>Question 2: Coherence</i>		
Fallacious argument with <i>comme</i>	4.067	0.628
Fallacious argument without <i>comme</i>	4.135	0.718
Non-fallacious argument with <i>comme</i>	4.556	0.609
Non-fallacious argument without <i>comme</i>	4.623	0.627
<i>Question 3: Agreement with Alexandre</i>		
Fallacious argument with <i>comme</i>	3.512	0.694
Fallacious argument without <i>comme</i>	3.527	0.586
Non-fallacious argument with <i>comme</i>	4.517	0.557
Non-fallacious argument without <i>comme</i>	4.472	0.716
<i>Question 4: Agreement with Barbara</i>		
Fallacious argument with <i>comme</i>	4.761	0.525
Fallacious argument without <i>comme</i>	4.711	0.568
Non-fallacious argument with <i>comme</i>	4.855	0.512
Non-fallacious argument without <i>comme</i>	4.918	0.602

The question targeting the agreement with Barbara did not return any effect for the nature of argument [ $F1(1, 39) = 1.19, p = 0.28$ ;  $F2(1, 39) = 2.33, p = 0.13$ ]. No significant results were found on the presence or absence of the connective *vu que* [ $F1(1, 39) = 0.06, p = 0.81$ ;  $F2(1, 39) = 0.49, p = 0.49$ ].

#### 4.8 Results for the Connective *comme*

In Table 8 we report the means and standard deviation for the acceptability of the four experimental conditions per question.

For the first question targeting the proportionality of Alexandre's answer, the analysis returned a significant effect of the type of argument. Participants accepted the non-fallacious statements more ( $M = 4.47$ ) compared to fallacious ones ( $M = 3.52$ ) [ $F1(1, 39) = 102.44, p < 0.001$ ;  $F2(1, 39) = 56.74, p < 0.001$ ]. There was no effect of the presence or absence of *comme* [ $F1(1, 39) = 0.55, p = 0.46$ ;  $F2(1, 39) = 0.32, p = 0.57$ ].

Answers to the question targeting the logical link between the two statements yielded the same pattern of results. The analysis returned a significant effect of the type of argument: fallacious arguments were less accepted ( $M = 4.10$ ) compared to non-fallacious ones ( $M = 4.59$ ) [ $F1(1, 39) = 43.33, p < 0.001$ ;  $F2(1, 39) = 30.45, p < 0.001$ ]. Again, the presence or absence of *comme* did not trigger different acceptability scores [ $F1(1, 39) = 1.65, p = 0.21$ ;  $F2(1, 39) = 1.06, p = 0.31$ ].

Similar results were found for the question targeting the agreement with Alexandre. Fallacious arguments were significantly less accepted ( $M=3.52$ ) compared to non-fallacious ones ( $M=4.49$ ) [ $F1(1, 39)=104.73, p<0.001$ ;  $F2(1, 39)=62.31, p<0.001$ ]. The presence or absence of *comme* did not produce a significant effect [ $F1(1, 39)=0.03, p=0.85$ ;  $F2(1, 39)=0.02, p=0.88$ ].

Finally, the same pattern was again found for the question targeting the agreement with Barbara. Fallacious arguments were less accepted ( $M=4.74$ ) compared to non-fallacious ones ( $M=4.89$ ) [ $F1(1, 39)=6.29, p=0.02$ ;  $F2(1, 39)=7.15, p=0.01$ ]. with the connective *comme* did not produce a significant effect [ $F1(1, 39)=0.01, p=0.91$ ;  $F2(1, 39)=0.30, p=0.58$ ].

## 5 General Discussion

We pursued three goals with this paper: first, we wanted to investigate whether the acceptability of straw man fallacies could be influenced by the presence or absence of different causal connectives with attributive meaning. Second, we wanted to demonstrate that the individual nuances of each connective used in our experiments lead to different effects. Third, we wanted to show that subjectivity is not the only trigger influencing the acceptability of arguments.

Before we discuss the results regarding the main objectives of the paper, some general conclusions about the participants' capability to spot fallacies must be addressed. The results we obtained clearly show that participants intuitively spot the fallacies. Across all four experiments, they indicated strong preferences towards non-fallacious arguments compared to fallacious ones. As expected, the effect was always present for the first three questions targeting the exaggerative nature of the straw man, the logical link between both statements and the agreement with Alexandre. For the agreement with Barbara, we observe that sometimes we find significant effects and other times we do not. This is due to the fact that responses given on this question were not expected to be influenced by the manipulated variables as the first three questions, but by their personal opinions and preferences. We find, across all our studies, previous (Schumann et al. 2019) and present, that people are usually better at detecting fallacies than at not detecting them. This result also reflects the findings from van Eemeren et al. (2009) which showed that people generally prefer sound arguments over arguments that derail into unreasonableness and violate the norms for critical discussion. The results from van Eemeren et al. (2009) and the results obtained from the current study, taken together, also point towards the conclusion that investigating a fallacy's perceived reasonableness and assessing a fallacy's persuasiveness are intertwined to a certain extent. The chances for an argument to be persuasive increase when the argument is perceived as reasonable, or as we demonstrated, acceptable. To provide a more detailed account on the relationship between the reasonableness and the persuasiveness of fallacies, more experimental work needs to be conducted, specifically focusing on a separate assessment of both factors on the same data. Furthermore, our results are also consistent with the recent work of Mercier (2020) which demonstrates that people are generally more openly vigilant than one might assume. Now, our research also allows us to make justified

**Table 9** Summary of the effects found for the role of connectives

	Exaggeration	Logical link	Agreement with A	Agreement with B
<i>puisque</i>	Fuzzy	Yes	Yes	No
<i>étant donné que</i>	Yes	Fuzzy	No	No
<i>vu que</i>	Yes	Yes	No	No
<i>comme</i>	No	No	No	No

claims about what happens in cases in which participants do not detect the fallacy, and notably regarding the role of different connectives.

Turning to the main argument of this paper, we observe various effects for the use of causal connectives with an attributive meaning. All the results are summarized in Table 9. We used the tag ‘yes’ to indicate that there was a significant effect showing a lower acceptability for arguments (normal and fallacious) introduced with a connective, ‘no’ to indicate that there was no effect, and ‘fuzzy’ to indicate that the effect was only approaching significance in one of the analysis or both, which could be due to lack of statistical power.

Looking at the connective *puisque*, the results strongly indicate that it acts as the strongest forewarning device, leading participants to be more cautious when reading the segment following the connective. The strongly subjective nature of the connective results in lower acceptability rates compared to the implicit version without the presence of any connective. But as we illustrated in Sect. 3, subjectivity is not the only feature characterizing the connective. The fact that *puisque* is frequently used to express given information creates a discrepancy between the reader’s expectation to see known information, and the distorted version of the original argument found in the case of a straw man. In addition, the connective conveys a dissociative and therefore negative attitude towards the expressed content, clearly indicating that there is a distance between Alexandre’s reply and Barbara’s original statement. This could act as a hint, warning participants about Alexandre’s potentially biased attitude towards Barbara’s statement, and therefore leading them to be more vigilant and to endorse a more critical attitude towards the expressed content.

Comparing the results for *puisque* with the results for the other highly subjective connective *vu que*, we notice that the effect is still significant for the exaggerative nature and the logical link, but the agreement with Alexandre is not. This is due to the fact that compared to *puisque*, *vu que* does not express that same negative attitude, but indicates a much more endorsing attitude. *Vu que* therefore still acts as a forewarner, because it is a subjective connective and is used to convey given information, but it is not as strong as *puisque* because of the missing dissociative nature.

Comparing the results for the first two connectives with the results for *étant donné que*, we notice a much more mixed profile in this case. Not only is *étant donné que* weaker in terms of subjectivity and givenness, but it also conveys a much more neutral attitude towards the expressed content. This explains why we still find a forewarning effect to some degree when it comes to the exaggerative nature, but no effect at all for the logical link or the agreement with Alexandre.

Finally, the results for *comme* confirm that this connective does not act as a forewarner at all because it is a much more neutral connective frequently used to convey objective and new content, which was not the case for the other connectives, thus allowing for an increased chance of non-attributive interpretations—or for weaker attributive readings. It is therefore possible to create a profile of the connectives according to their strength as a forewarner as follows: *puisque* > *vu que* > *étant donné que* > *comme*. This scale is not only in line with the subjectivity and givenness of the different connectives, but it also takes into consideration the polarity of attitude.

In sum, the experiments described in this paper show that connectives do play a role for the communication of fallacious arguments. The results found in our research lend further support to our previous work (Schumann et al. 2019) and the conclusions put forward by Kamalski et al. (2008), namely the idea that argumentative texts with subjective connectives are less persuasive than their objective counterparts. According to our results, the connectives that are more marked not only on the subjectivity feature, but also on givenness and speaker attitude, like *puisque*, *vu que* and *étant donné que*, lead to lower acceptability scores for arguments, be they fallacious or non-fallacious. This strongly underlines the findings of Kamalski et al. (2008), pointing towards the conclusion that all these connectives really do announce some persuasive intention behind the statement. *Comme* stands out, as it is the only connective that is not marked on any of the features we described and subsequently does not create a forewarning effect, which provides further confirmation for the findings of Kamalski et al. (2008).

Importantly, we demonstrated that due to their various features, different connectives lead to different results. Even though subjectivity is a strong factor, it is not the only feature triggering lower acceptability scores for arguments. The polarity of the speaker's attitude towards the expressed content does indeed play a significant role for the communication of straw man fallacies.

Overall, this research has highlighted that findings from other fields of investigation like discourse processing and corpus studies give us a more fine-grained description of the characteristics of causal connectives which can be beneficial to the study of argumentation because it gives us a deeper understanding of the factors that influence the acceptability of fallacious and non-fallacious arguments. Such in-depth studies of the characteristics of connectives, focusing on their various features of meaning and usage, help assessing their function in argumentative settings, and help to uncover the role of linguistic elements as indicators of argumentative moves generally. The present paper shows that we are able to capture general intuitions from argumentative practice, by demonstrating that people confide in linguistic formulations to orient themselves across an argumentative context, i.e. to find a potential difference of opinion, to discern the argument, or to interpret the coherence relation between the discourse segments. In turn, these formulations also coerce the extent of the resources people use to evaluate an argumentation by guiding their interpretation of the information, helping us to enlighten some rhetorical properties of a given message: will it be accepted without a notable counter-effort (like with *comme*) or will it make strides (like with *puisque*)?



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**Data Availability** At request.

## Compliance with Ethical Standards

**Conflict of interest** None.

**Consent to Participate** Informed consent was obtained from all individual participants included in the studies.

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