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Résumé de l'article

Nous soutenons que l'outil FM2.0 de Conces et de Walters est utile mais ne démontre pas que le faux dilemme est un sophisme formel. Le FM2.0 suppose une utilisation ambiguë du terme « sophisme formel », différente de son utilisation en logique, et peut montrer que tout argument est un sophisme formel. De plus, le FM2.0 est développé en adoptant un type de faux syllogisme disjonctif. Cependant, l'application adéquate du FM2.0 au faux dilemme ne conduit pas à un argument augmenté non valide, contrairement à ce qui est attendu dans le FM2.0, même en supposant l'utilisation ambiguë du terme « sophisme formel ».

# Is False Dilemma Really a Formal Fallacy? : A Reply to Conces and Walters


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**Abstract:** We argue that Conces' and Walters' tool FM2.0 is valuable but does not show that false dilemma is a formal fallacy. The FM2.0 assumes an ambiguous use of the term 'formal fallacy', different from how the term is used in logic, and may show that any argument is a formal fallacy. Moreover, the FM2.0 is developed by using one type of *false disjunctive syllogism*. However, the adequate application of FM2.0 on *false dilemma* does not lead to an invalid augmented argument, contrary to what is expected in FM2.0, even assuming the ambiguous use of the term 'formal fallacy'.

**Résumé:** Nous soutenons que l'outil FM2.0 de Conces et de Walters est utile mais ne démontre pas que le faux dilemme est un sophisme formel. Le FM2.0 suppose une utilisation ambiguë du terme « sophisme formel », différente de son utilisation en logique, et peut montrer que tout argument est un sophisme formel. De plus, le FM2.0 est développé en adoptant un type de faux syllogisme disjonctif. Cependant, l'application adéquate du FM2.0 au faux dilemme ne conduit pas à un argument augmenté non valide, contrairement à ce qui est attendu dans le FM2.0, même en supposant l'utilisation ambiguë du terme « sophisme formel ».



**Keywords:** false dilemma, formal fallacies, FM2.0, ambiguity, straw man, fallacy, false disjunctive syllogism, logical invalidity, logical validity, informal reasoning


 
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## 1. Introduction

Conces and Walters (2023) have suggested a tool for analyzing one type of false disjunctive syllogism (FDS), which builds on Tomić's analysis of this type of FDS (Tomić 2021, pp. 607–39). Conces and Walters call the logical tool "FM2.0". It consists of formalizing a given argument and of defining what they call the "real" argument resulting from changing one of the premises in the initial argument by adding the relevant missing information to the premise:
**The formalized given argument** for the type of *false disjunctive syllogism* (sic and N.B.) that Conces and Walters discuss is expressed as the logical schema of disjunctive syllogism with including disjunction:

(Arg. 1) $L \vee N, \neg L \vDash N$

According to Tomić's analysis, Arg. 1 becomes the unsound disjunctive syllogism with incomplete disjunction if its disjunctive premise is a non-exhaustive disjunction (Tomić 2021, pp. 620–21; 627–29). In assuming Tomić's description of this type of false disjunctive syllogism, Conces and Walters (2023, p. 286) provide what they call **the "real argument":** a formalization of a textual argument they use in the text:

(Arg. 2) $[(S \wedge F) \vee N] \vee B, \neg (S \wedge F) \vDash N$

*Pace* Conces and Walters, we may, in the "real argument" above, substitute the conjunction $(S \wedge F)$ by a single meta-propositional letter (L), *salva veritate*. This allows us to rewrite the "real argument" by using the propositional letters from the given argument where the additional disjunct B is added to the non-exhaustive disjunctive premise, $L \vee N$. This makes the "real argument" more directly related to the given argument (Arg.1):

(Arg. 2a) $L \vee N \vee B, \neg L \vDash N$

As Conces and Walters show by a truth table (2023, p. 288), Arg. 2 (and thus also Arg. 2a) is logically invalid, which is the reason why they conclude that false dilemma is a formal fallacy. The analysis from (Arg. 1 to Arg. 2a) defines the FM2.0. Now, FM2.0 is certainly useful for analyzing the false disjunctive syllogism with non-

exhaustive disjunctive premise, showing that the change in the disjunctive premise makes the augmented argument logically invalid. However, this analysis is not a good rationale for Conces' and Walters' conclusion that the false dilemma fallacy (FDF) is a formal fallacy. Unfortunately, their analysis and the conclusion involve the fallacy of ambiguity and the straw man fallacy. This is shown in the continuation of this article, thus revealing that Conces' and Walters' claim that the FDF is a formal fallacy is unwarranted.

## 2. The fallacy of ambiguity in the reasoning of Conces and Walters

### *2.1 The ambiguous use of the term 'the real argument'*

In introducing the term, Conces and Walters claim that "the real argument" (Arg.2a above) makes Arg. 1 "more realistic" (2023, p. 286). This is true, as Tomić wrote (2021, pp. 627–29), pointing out that at least one additional relevant disjunct should be considered when drawing the conclusion from the given premises in Arg.1, indeed showing that the given disjunctive premise is non-exhaustive. It is thus certainly more realistic to take into account an additional disjunct and show that if we do, conclusion N would not follow from the augmented disjunctive premise together with the initial negation-premise. Nevertheless, the crucial question here is if Arg.2a is the "real" version of Arg.1, as Conces and Walters would like to have it. This is a controversial, but crucial step for the acceptability of Conces' and Walters' conclusion that *this type of false disjunctive syllogism* is a formal fallacy. The step is controversial because Arg.2a is not a result of specifying any implicit premises or implicit information that could obviously be found in what is expressed in the given argument. Instead, the disjunctive premise is *changed* by adding new relevant information. This makes Arg.2a completely different from Arg.1. What is at stake in analyzing the validity of this type of false disjunctive syllogism is the validity of the initial argument and the truth or completeness of the information in its premises, not the validity of a different but related argument with the changed premises. By using the term 'the real argument' Conces and Walters make us believe that Arg.2a expresses something that is "really

claimed" in Arg.1, which is not the case. The specific feature of this type of false disjunctive syllogism is that nothing, neither in the textual nor in the formalized expression of Arg.1, suggests (explicitly or implicitly) that an additional disjunct may be added to the disjunctive premise. Instead, an active informal analysis has to be performed so as to realize that the relevant information is (consciously or unconsciously) concealed from the disjunctive premise making it non-exhaustive. The next informal step is to add the new relevant disjuncts to the premise.

### *2.2 The ambiguous use of the term 'formal fallacy'*

Formal fallacies, such as "denying the antecedent" and "affirming the consequent", are formal because of their truth-functional invalidity[1], that is because their conclusion may be false when its premises are true. But Conces and Walters claim that "[t]ruth value is not relevant in [their] model" (2023, p. 287) – which is strange because the (in)validity of any argument presupposes the analysis of all the possible variations and combinations of the truth values of the basic statements in the argument. We will return to this in section 4.

Let us get back to Conces' and Walters' ambiguous use of the term 'formal fallacy'. In logical theory, formal fallacies such as "denying the antecedent*"* and "affirming the consequent*"* are invalid arguments, which can be shown by formal logical analysis – that is, by formalization and a suitable method of proving deductive (in)validity of a given argument, as initially given. Eventually, the given argument can be reconstructed in providing formalization that makes explicit the implicit information obviously contained in the natural language formulation of the argument. This is quite different from the Conces' and Walters' FM2.0 in the following respects:

> In formal fallacies, we do not need to change any of the premises, nor to construct any augmented argument so as to show the truth-functional invalidity of the initial argument.

[1] Or, "invalidity in structure" as Conces and Walters put it (2023, p. 287).

> The FM2.0 shows rather that the augmented argument is invalid (where to get the augmented argument some of the initial premises are changed).
>
> - In showing the invalidity of the formal fallacies, we *refute* the initial argument. But in showing what is wrong with the specific type of false disjunctive syllogism by means of FM2.0, we do not refute but rather defeat the initial argument through an additional argument, different from the initial one that still stays valid.

Thus, Conces and Walter's ambiguous use of the term 'formal fallacy' suggests that an argument contains a formal fallacy if we can show truth-functional invalidity of the augmented argument resulting from changing a premise in the initial argument. But in this way, Conces' and Walters' FM2.0 can "prove" that any argument is a formal fallacy. This is a major problem with FM2.0. Consider the following initial argument (IA):

(IA) $C \vee D \rightarrow K, C \vee D \vDash K$

From this valid *modus ponens*, we get the augmented argument (AA) by applying the FM2.0:

(AA) $C \vee D \rightarrow K, C \vee D \vee N \vDash K$

The augmented argument (AA) is obviously non-valid, due to a counterexample in which V(C) = F, V(D) = F, V(K) = F, and V(N) = T make the premises true but the conclusion false. But this does not show that the *modus ponens* is a formal fallacy, that is a truth-functionally invalid argument, even if one of its premises is a non-exhaustive disjunction.

Thus, it is controversial to claim that the false disjunctive syllogism with a non-exhaustive disjunctive premise is a formal fallacy, due to Conces' and Walters' ambiguous use of the term 'formal fallacy'. Nevertheless, *even if we assume, for the sake of the argument***,** that FM2.0 shows that the false disjunctive syllogism with non-exhaustive disjunctive premise is a formal fallacy, this still does not warrant the conclusion that the false dilemma fallacy (FDF) is a formal fallacy – as shown in sections 3.1-3.4 below. Before we move to this step, let us pay attention to another fallacy of ambiguity in Conces' and Walters' article (2023).

### *2.3 The ambiguous use of the term 'false dilemma fallacy'*

Conces and Walters use the term 'false dilemma fallacy (FDF)' when they actually refer only to one type of false disjunctive syllogism (FDS). In motivating this ambiguous language use, they claim that they "are not hung up on identifications" and that "whether the [false disjunctive syllogism with non-exhaustive disjunctive premise] is really the FDF or the fallacy of unsound disjunctive syllogism is not at issue here"; and that "the two fallacies have so much in common" (Conces and Walters 2023, p. 282).

However, the two fallacies differ from each other due to several reasons, one of the most important being the different logical schemas they explore (Tomić 2021, particularly sections 2, 6 and 7). Whereas the FDF explores the logically valid schema of simple and complex constructive and destructive dilemmas, the FDS explores disjunctive syllogism. The differences in the argumentation schemas explored in the two fallacies have important consequences for the unreliability of the Conces' and Walters' conclusion that the FDF is a formal fallacy – as we shall see in sections 3.1-3.4. Additionally, to ignore the differences between FDF and FDS is the same as if we were using the term 'affirming the consequent' to refer to the fallacy "denying the antecedent" due to the fact that the fallacies are similar because both involve a conditional premise (where they are indeed much more similar than FDF and FDS). However, due to logical, pedagogical and methodological reasons, we certainly do not do that.

## 3. The fallacy of straw man in the reasoning of Conces and Walters

The main straw man in their reasoning is reducing the several types of FDS and FDF to a specific type of FDS, so as to make the conclusion that FDF is a formal fallacy appealing. Conces and Walters (2023) analyze the unsound disjunctive syllogism with incomplete (i.e. non-exhaustive) disjunctive premise. On the basis of the controversial conclusion that this type of fallacy is a formal fallacy (see section 2.2 above), they conclude that a completely different type of fallacy, the false dilemma fallacy (FDF), is a formal fallacy.

Nevertheless, this way of arguing is not warranted, as we shall soon see (section 3.1-3.4).

The related issue is that the non-exhaustive disjunctive premise does not lie at the heart of each type of FDF, nor is it at the heart of each type of the FDS, contrary to what Conces and Walters claim (2023, p. 282), and which they also need for making the conclusion that the FDF is a formal fallacy appealing. As pointed out in Tomić (2013, pp. 356–58; 361–64), the non-exhaustive disjunctive premise is not at the heart of the following types of FDF, that moreover all are deductively valid and sound arguments:

- defeasible sound quandary (both the simple and the complex type)
- defeasible sound obstruction (both the simple and the complex type).

The non-exhaustive disjunctive premise is not at the heart of these types of the FDS either:

- The unsound disjunctive syllogism with factually false disjuncts, where the main fallacy-issue is the falsity of the given disjuncts in a presumably exhaustive disjunction (Tomić 2021, section 3.3.1 and 4.3),
- Affirming the disjunct, where the main fallacy issue is the ambiguous use of excluding and including disjunction (Tomić 2021, section 3.1 and 4.1),
- Using an irrelevant disjunction, where at the heart of the fallacy is the use of mutually irrelevant disjuncts in the disjunctive premise (Tomić 2021, section 3.2 and 4.2).

In that way, Conces and Walters completely ignore (or maybe simply miss or misunderstand) that some types of false dilemma fallacy, and even some types of false disjunctive syllogism, are fallacies due to other features than the non-exhaustive disjunctive premise. They construct and utilize their FM2.0 by analyzing only the unsound disjunctive syllogism with non-exhaustive disjunction (Tomić 2021, section 3.3.2 and 4.4), but draw a conclusion that the false dilemma fallacy is a formal fallacy (2023, p. 287). This conclusion however, requires an analysis of all the types of false dilemma fallacy in order to see if FM2.0 leads to the corresponding

invalid augmented arguments even there. Otherwise, as it turns out to be the case, they commit the fallacy of straw man, based on unwarranted simplification and misrepresentation.

Since Conces and Walters (2023) write about the false dilemma fallacy (FDF), we shall now check if their FM2.0 shows that the types of the false dilemma, where at the heart of the fallacy there are other reasons than the non-exhaustive disjunctive premise, are formal fallacies according to Conces' and Walters' ambiguous use of the term 'formal fallacy'. See section 2.2 above for the ambiguity. We shall also check the same thing even in the types of false dilemma in which the non-exhaustive disjunctive premise is at the heart of the fallacy. Thus, the above mentioned types of false disjunctive syllogism (FDS) will not be addressed here.

In applying the FM2.0 to the types of FDF discussed in 3.1-3.3 below, it is pointless to change the disjunctive premise by adding one or more disjuncts, because in these types of FDF the disjunctive premise is per definition true – since all the types of the arguments are per definition sound. Thus, adding a disjunct to the true disjunctive premise will not make the augmented arguments truth-functionally invalid. This may be enough to disqualify the FM2.0 as a tool for analyzing if false dilemma is a formal fallacy. This may also suffice to show that the FM2.0 does not turn the augmented arguments in these sound types of FDF into truth-functionally invalid arguments and thus does not show that FDF is a formal fallacy. However, we follow the principle of charity instead, and accommodate FM2.0 so as to still make it applicable to all the types of FDF. Thus, instead of adding an additional disjunct to the disjunctive premise (which will not make the FM2.0 work, due to the above mentioned reasons), we add the other significant information of relevance for the types of FDF discussed in 3.1-3.3 below, so as to see if the resulting augmented arguments turn to be truth-functionally invalid. If they do not we may not claim that the FDF is a formal fallacy, even if we accepted Conces' and Walters' controversial use of the term 'formal fallacy' (see section 2.2 above). For the significant missing information in the types of FDF discussed in 3.1-3.3 below, see Tomić 2013.

*3.1 Does FM2.0 show that the augmented argument is not valid, in the defeasible sound complex constructive dilemma?*

In this type of FDF (Tomić 2013, pp. 356–58), the given argument is:

$$A \vee B, A \rightarrow P, B \rightarrow D \vDash P \vee D$$

This is the valid logical rule of complex constructive dilemma. The disjunctive premise in the *defeasible sound complex dilemma* is per definition true. Hence, one of the disjuncts from the disjunctive premise in the initial argument has still to be true even in the augmented argument. Therefore, adding an additional disjunct to the disjunctive premise does not make the augmented argument truth-functionally invalid in this type of FDF (contrary to FM2.0). Instead, other additional information is relevant for defeating, even if not refuting, the argument. Typically, the missing information has other consequences of the disjuncts ($A \vee B$) than only those given in the initial argument (P and D). The additional information thus leads to an additional conclusion (here, $S \vee M$), without refuting the initial one ($P \vee D$). The preferences between acting according to the initial or the additional conclusion (usually with the advantage of the additional one) finally break the trap of the dilemma (Tomić 2013, pp. 356–58).[2] The augmented argument with the new relevant information is thus:

$$A \vee B, A \rightarrow P, B \rightarrow D, A \rightarrow S, B \rightarrow M \vDash P \vee D$$

Then, even another conclusion, different from the one considered so far, follows from the augmented set of premises, which gives another additional argument:

$$A \vee B, A \rightarrow P, B \rightarrow D, A \rightarrow S, B \rightarrow M \vDash S \vee M$$

Proof 1 in the Appendix shows that both arguments are still valid after including the concealed relevant information (contrary to FM2.0).

[2] For the sake of simplicity, we use the dichotomous version of the complex sound quandary.

The following example illustrates this:

(m1) We want to include training in emotional literacy or training in virtues in all educational programs.
(m2) If we include training in emotional literacy in all educational programs, we would need to have much higher economic resources for educational systems.
(m3) If we include training in virtues in all educational programs, we would need to include lots of extensive changes in many educational programs.
**[m4]** However, if we include training in emotional literacy in all educational programs, this will diminish human suffering.
**[m5]** If we include training in virtues, this will diminish human aggression.

---

(C1) We would need to have much higher economic resources for educational systems, or to include lots of extensive changes in many educational programs.
**[C2]** Human suffering or human aggression will diminish.

In the example, premises m1-m3 and conclusion C1 make the initial argument. Premises m4-m5 written in bold in the squared brackets are the additional premises that together with the initial premises make the augmented set of premises. Then, m1-m5, together with conclusion C1 make the first augmented argument, whereas m1-m5 together with the additional conclusion C2 make the second augmented argument.

The informal reasoning in analyzing this type of FDF is to point out other possible consequences from the disjuncts in the per definition true disjunctive premise (in this case S and M). Another informal aspect of the analysis is to choose to act according to one of the added consequents of the disjuncts, due to the stronger preferences for them, despite the validity of both the initial and the augmented argument.

To conclude this section: the strategy used in Conces' and Walters' FM2.0 does not show that the relevant augmented argument in this type of FDF is truth-functionally invalid. Moreover, informal reasoning is needed to defeat this type of FDF, despite its validity. Consequently, this type of FDF is not a formal fallacy, even in the Conces' and Walters' controversial meaning of the term. The same result is easily shown for the defeasible sound simple constructive dilemma.

*3.2 Does FM2.0 show that the augmented argument is not valid, in the defeasible sound simple destructive dilemma?*

In this type of FDF (Tomić 2013, pp. 363–64), the initial argument is:

$$A \rightarrow P, A \rightarrow D, \neg P \vee \neg D \vDash \neg A$$

This is the valid logical rule of simple destructive dilemma. In this type of FDF, the premises are per definition true (because the argument is per definition sound). Thus adding an additional disjunct to the true disjunctive premise (as in FM2.0) will not make the augmented argument truth-functionally invalid. However, other information may be concealed but relevant for circumventing this false dilemma. So, let us see if FM2.0 can be applied with regard to the other concealed and relevant information. Typically, the additional information points out that some other desirable consequences of A are possible (here, $A \rightarrow T$, $A \rightarrow R$), different from those given in the initial argument (Tomić 2013, pp. 363–64). To add this information to the initial argument brings the insight that the conclusion of the argument may still be defeated, despite the validity of the initial and the augmented argument (contrary to FM2.0). So, the augmented argument is:

$$A \rightarrow P, A \rightarrow D, \neg P \vee \neg D, A \rightarrow T, A \rightarrow R \ \vDash \neg A$$

Then another conclusion, different from the one considered so far, may be derived from the augmented set of premises, which gives another additional argument:

$$A \rightarrow P, A \rightarrow D, \neg P \vee \neg D, A \rightarrow T, A \rightarrow R \ \vDash A \rightarrow T \wedge R$$

Proof 2 in the Appendix shows that both augmented arguments are valid, contrary to FM2.0 and the related Conces' and Walters' claim that the FDF is a formal fallacy (2023).

Since both the augmented arguments are valid, the formal reasoning cannot help us to circumvent the dilemma, even if it helps to clearly see the arguments' structure and content. An informal aspect is needed, namely the insight that T and R are other desirable

consequences of A and therefore to choose to act according to A, despite the fact that one or both of its other desirable consequences stated in the initial argument may in reality not take place, as stated in the disjunctive premise. The following example illustrates this:

(q1) If humans eat less meat, this will minimize carbon dioxide emission in the near future.
(q2) If humans eat less meat, this will minimize humans' cruelty to animals in the near future.
(q3) However, carbon dioxide emission or humans' cruelty to animals will never be minimized.
**[q4]** If humans eat less meat, this will lead to a more healthy diet for many people.
**[q5]** If humans eat less meat, it will be easier to provide enough food and water for more people in the world.

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(C1) Humans should not eat less meat.
**[C2]** If humans eat less meat, this will imply that many people have a better diet and that it will be easier to provide enough food and water for more people in the world.

In the example, premises q1-q3 and conclusion C1 make the initial argument; the premises written in bold in the squared brackets are the additional premises that together with the initial premises make the augmented set of premises. Then q1-q5, together with conclusion C1, make the first augmented argument, whereas q1-q5 together with the additional conclusion C2 make the second augmented argument.

To conclude this section: even for this type of FDF, the strategy used in Conces' and Walters' FM2.0 does not show that the relevant augmented argument is logically invalid. Moreover, informal reasoning is needed to defeat even this type of FDF, despite its logical validity. The informal reasoning concerns knowing which consequences of the initial disjuncts are relevant for the augmented set of premises. It also concerns the preferences between the initial conclusion and the other possible conclusion logically following from the augmented set of premises, because choosing between these preferences finally help us to escape the hook of the dilemma. Consequently, this type of FDF is not a formal fallacy, even in Conces' and Walters' controversial meaning of the term 'formal fallacy'.

*3.3. Does FM2.0 show that the augmented argument is not valid, in the defeasible sound complex destructive dilemma?*

In this type of FDF, the initial argument is (Tomić 2013, p. 359):

$$F \rightarrow J, K \rightarrow L, \neg J \vee \neg L \vDash \neg F \vee \neg K$$

This is the valid logical rule of complex destructive dilemma. Even in this type of false dilemma (Tomić 2013, pp. 361–63), the premises are per definition true because the argument is per definition sound. Therefore, adding an additional disjunct to the true disjunctive premise will not make the augmented argument truth-functionally invalid, as suggested in FM2.0. In this type of false dilemma, information is concealed in the premises other than a missing disjunct or the falsity of the disjunctive premise. Let us see if FM2.0 can show that adding the other type of relevant concealed information to the premises would lead to a truth-functionally invalid augmented argument. In following Tomić (2013, pp. 361–63), the relevant additional premises make an augmented argument that is still valid, contrary to the corresponding strategy of Conces' and Walters' FM2.0:

$$F \rightarrow J, K \rightarrow L, \neg J \vee \neg L, F \vee K \vDash \neg F \vee \neg K$$

Nevertheless, the augmented set of premises leads to another conclusion different from the one considered so far, and we thus get an additional augmented and valid argument:

$$F \rightarrow J, K \rightarrow L, \neg J \vee \neg L, F \vee K \vDash J \vee L$$

Proof 3 in the Appendix shows the validity of both the augmented arguments. Now, since both arguments preserve validity even after adding the concealed relevant premises, the formal analysis alone cannot help us to circumvent this type of false dilemma – even if it helps to clearly see the arguments' structure and content. The insight that one of F or K may still be true even if at least one of them is false according to the per definition true premises of the initial argument leads to the additional conclusion. The additional conclusion may motivate us to still act according to F or K, due to their desirable consequences (J or L), rather than refraining from the action because one of F or K is presumably false as suggested in the

initial argument. This type of choosing among the different conclusions logically following from the augmented argument is based on informal reasoning, which is helpful in circumventing this type of FDF.

The following example illustrates this:

(r1) If we include training in emotional literacy in all educational programs, this will diminish human suffering.
(r2) If we include training in virtues in all educational programs, this will diminish human aggression.
(r3) However, human suffering or human aggression will never diminish.
**[r4]** Nevertheless, we include training in emotional literacy or training in virtues in all educational programs (which is still compatible with the argument from r1-r3 to S1).

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(S1) We should not include training in emotional literacy or we should not include training in virtues, in all educational programs.
**[S2]** Human suffering or human aggression will diminish.

In the example, premises r1-r3 and conclusion S1 make the initial argument; premise r4 written in bold in the squared brackets is the additional premise that together with the initial premises make the augmented set of premises. Then q1-q4, together with conclusion S1 make the first augmented argument, whereas q1-q5 together with the additional conclusion S2 make the second augmented argument.

We see that even for this type of FDF, the strategy used in Conces' and Walters' FM2.0 does not show that the relevant augmented argument is invalid. Moreover, informal reasoning is suitably used to defeat even this type of FDF, despite its logical validity. Consequently, this type of FDF is not a formal fallacy, even in Conces' and Walters' controversial meaning of the term 'formal fallacy'.

### *3.4 Does FM2.0 works only for the types of FDF where non-exhaustive disjunctive premise is at the heart of the fallacy?*

Someone may claim that Conces' and Walters' FM2.0 is meant to show that only the types of FDF where non-exhaustive disjunctive premise is at the heart of the fallacy are formal fallacies. Even if that were to be the case, their claim that the FDF is a formal fallacy is still obviously unwarranted: only if the augmented arguments in all

the types of the FDF would be logically invalid after applying the FM2.0, the conclusion that the FDF is a formal fallacy would be warranted. We have seen that this is not the case for the types of FDF discussed in 3.1-3.3 above. Moreover, even if applying the FM2.0 showed that only the types of the FDF where non-exhaustive disjunctive premise is at the heart of the fallacy are formal fallacies (according to Conces' and Walters' use of the term), this would still not be a warranted conclusion, due to the ambiguous use of the term 'formal fallacy' assumed in FM2.0 as shown in section 2.2 above. Finally, the augmented argument even in the types of FDF in which non-exhaustive disjunctive premise is at the heart of the fallacy is not always logically invalid. This is shown in the rest of this section, where we provide the answer to the question: *Does FM2.0 show that the augmented argument is not valid, in the false simple constructive dilemma in which non-exhaustive disjunctive premise is at the heart of the fallacy?*

In this type of FDF (Tomić 2013, pp. 351–52), the given argument is:

$$A \vee B, A \rightarrow C, B \rightarrow C \models C$$

This is the valid logical rule of simple constructive dilemma. Now, since at the heart of this type of the FDF is the non-exhaustive disjunctive premise, in applying FM2.0 we would need to add at least one additional disjunct to the disjunctive claim. However, unlike the specific type of false disjunctive syllogism that Conces and Walters use when developing their FM2.0, when it comes to the false simple constructive dilemma it is not enough to include an additional disjunct to the disjunctive premise only, so as to get an invalid augmented argument. Besides, in doing so, we would again meet the problem that FM2.0 can "prove" that any argument is a formal fallacy, as discussed in section 2.2 above. In this type of FDF, it is also important to see what the additional disjunct implies, since the (false) dilemma reasoning is grounded in the consequences of the given disjuncts together with the disjunctive premise. If the additional disjunct implies the same consequence as the given disjuncts, then the conclusion will be the same and the augmented argument will obviously be valid, contrary to what is expected in FM2.0. So, depending on the content of the information in the consequent of the

additional disjunct, the augmented argument may be valid or not. This clarifies that FM2.0 does not necessarily show that the augmented argument in this type of FDF is invalid. Let us look at this closer. Suppose that additional disjunct D implies C, which corresponds to the following example about choosing the best ways of improving someone's psychological well-being (who is expressing a need for that):

(s1) You could engage in an ACT-program (A), or in a positive psychology program (B), both supervised by a psychologist.
(s2) If you engage in the ACT program (A), you will improve your psychological well-being (C).[3]
(s3) If you engage in the positive psychology program (B), you will improve your psychological well-being (C).[4]

---

(C) You will improve your psychological well-being (C).

Let us apply FM2.0 to this argument: we thus add an additional disjunct D to s1, where D symbolizes the claim "You engage in a physical activity program". Then D implies that you will improve your psychological well-being (C) because regular physical activity also has been confirmed to improve it. In this case, we get the following augmented argument, which is obviously still valid, contrary to what is expected in FM2.0.

$$A \vee B \vee D, A \rightarrow C, B \rightarrow C, D \rightarrow C \models C$$

The initial argument in the example is based on constructive dilemma with a non-exhaustive disjunctive premise. Someone may wonder why we, in such cases, would bother to add an additional disjunct to the disjunctive premise, when both initial disjuncts lead to the desirable outcome specified in the conclusion. The simple

[3] Because the ACT program supervised by a psychologist will improve your psychological flexibility (a pragmatic phenomenon, well-defined in the ACT-framework), and enhancing psychological flexibility has been confirmed to improve well-being.
[4] Because the positive psychology program supervised by a psychologist will improve your character strengths, and enhancing character strengths has been confirmed to improve well-being.

reason is that a person may be very uncomfortable with going through psychological treatments, so that this would limit the enhancement of well-being that the two psychological treatments usually provide. In such cases, it is reasonable to consider whether an additional option (here the physical activity program) has equally desirable consequences as the initial disjuncts have. If so, the initial argument involves the false simple constructive dilemma. However, as shown above, applying the FM2.0 to this type of FDF would not work because the resulting augmented argument is still valid.

Someone may claim that FM2.0 works for this type of FDF, provided that the additional disjunct does not imply the outcome stated in the conclusion. This would mean that in adding a disjunct E to the initial disjunctive premise we would also need to add one of the following premises:

(p4) $\neg$ (E $\rightarrow$ C); or
(p5) E $\rightarrow \neg$C, or
(p6) E $\rightarrow$ T.

With such a constraint, applying FM2.0 to that type of FDF will result in an invalid augmented argument. For the actual example, this would be the case if the additional disjunct E symbolizes the claim "You could engage in extensive alcohol consumption", which obviously not only does not imply C (as in the constraint p4), but even implies $\neg$C (as in the constraint p5). Nevertheless, why would anybody, in the given situation, even consider adding a disjunct that does not lead to the desired outcome (the conclusion) in the initial argument, such as in the constraint p4 or p5? The constraint in p6 may suggest that T has to have constructive consequences, which would be the case if E symbolizes "You engage in a new relationship" and T symbolizes "You'll learn very much about another person". This shows that, depending on the content of the consequences of the additional disjunct together with constraint p6, applying FM2.0 to the false simple constructive dilemma may lead to an augmented invalid argument but with the conclusion irrelevant for the conclusion of the initial argument. Lastly but most importantly, using FM2.0 together with constraints p4 or p5 would make it trivial

in yet another way than the one we pointed out in section 2.2: we can namely turn any valid argument into an augmented invalid argument by adding an additional disjunct to one of its premises, together with the constraint that the additional disjunct implies negation of the conclusion.

In this way, we have shown two things: first, applying FM2.0 even in the case of an FDF in which non-exhaustive disjunctive premise is at the heart of the fallacy, does not necessarily turn the augmented argument into a logically invalid argument. Second, to see if adding the relevant information to the premises turns the augmented argument into a logically invalid argument or not, we would need to know the content of the consequences of the added disjunct, which involves informal reasoning. Thus, both these aspects show that not even false simple constructive dilemma with non-exhaustive disjunctive premise can be considered formal fallacy, even in the Conces' and Walters' controversial meaning of the 'formal fallacy' (discussed in section 2.2 above).

## 4. An additional straw man

Conces and Walters misrepresent Tomić's strategy of active criticism for the unsound disjunctive syllogism (FDS) with focus on incomplete disjunctive premise (Tomić 2021, pp. 620–21; 627–29), so as to challenge this misrepresented version. The misinterpretation is twofold:

(1) They interpret the strategy as if Tomić had suggested that simply including an additional disjunct to the incomplete disjunctive premise always turns the initial disjunctive premise into a factually false statement (Conces and Walters 2023, pp. 285–86).

(2) The strategy is misinterpreted as if Tomić had claimed that the falsity of the disjuncts is a required presumption for the FDF-fallacy (Conces and Walters 2023, pp. 286, 287).

Regarding (2) above, Tomić has not claimed that the falsity of the disjuncts is a requirement for the FDF-fallacy. This is clearly

shown in sections 3.1-3.3 above that rely on Tomić's exposition about the false dilemma fallacy (2013).

Regarding (1) above, what Tomić has suggested by explaining the strategy is that by adding *relevant* additional disjunct(s) *together with* thus showing that the initial conclusion no longer follows from the augmented set of premises, the initial disjunctive premise might turn out to be false, because due to the augmented information base we may rule out the non-negated disjunct(s) in the initial disjunctive premise (Tomić 2021, pp. 620, 627, 628).[5] This is very different from Conces' and Walters's claim that Tomić suggested that the disjunctive premise in the initial argument of this type of FDF "is false *simply because* there is at least one other possible disjunct that is concealed from the reader" (Conces and Walters 2023, p. 285, our italics); or that "the existence of such alternatives is sufficient warrant to make the disjunction false" (2023, p. 286). Neither has Tomić suggested that an additional disjunct always makes the non-negated disjunct factually false, nor that merely adding a disjunct is any evidence for the factual truth of the disjunctive premise in the initial argument - as Conces and Walters try to impose on Tomić's argumentative strategy. The non-denied disjunct in the initial argument may certainly still be factually true even after augmenting the information base by adding the new relevant disjunct(s). Tomić's strategy of active criticism for that type of FDS amounts instead to the following: we should choose such additional disjunct(s) that, on the basis of the new epistemic background they bring to the initial disjunctive premise, rule out the non-negated disjunct in the initial argument (thus making it untrue in the argument as a possible option for considered ways of action), which thus shows that the conclusion of the initial argument is false and does not logically follow from the augmented set of premises (Tomić 2021, pp. 620–21; 627–29). This type

[5] True, some of the related Tomić's formulations in the considered article (2021), if taken isolated, do not explicitly refer to the augmented information base and to some other clarifying aspects we suggest here. However, what we write in this section corresponds to what Tomić's formulations amount to, taken in their context of the argumentative strategy she advances for defeating the given type of FDS (Tomić 2021, pp. 620–21; 627–29), and as related to the content of the example she uses to illustrate the strategy.

of Tomić's active criticism may be expressed symbolically in the following way:

(the initial argument) $A \vee B, \neg B \vDash A$

(the first augmented valid argument
with a new conclusion, where the new
information base in the premises
rules out the conclusion of the initial argument)
$A \vee B \vee C, \neg B, \neg A \vDash C$

If we look at this closer, we realize that Conces' and Walters' FM2.0 relies heavily on Tomić's active criticism for this type of FDS, but without making explicit the information " $\neg A$". In FM2.0 we thus have:

(the initial argument) $A \vee B, \neg B \vDash A$
(the augmented invalid argument) $A \vee B \vee C, \neg B \vDash A$

However, as Tomić suggested, only if we choose a true additional disjunct with a content that together with the other premises also rules out the non-negated disjunct in the initial argument (A), as not any more a true possible option, can we have a counterexample to the truth-functional validity of the initial argument. Suppose though that A is still a true option after adding (the information of the) additional disjunct C to the disjunctive premise in the initial argument. This gives the following augmented argument in which we also make explicit that both A and C are still true options after adding disjunct C to the disjunctive premise in the initial argument:

(the initial valid argument) $A \vee B, \neg B \vDash A$
(the second augmented valid argument) $A \vee B \vee C, \neg B, A, C \vDash A$

So if A is still a true option after adding C to the disjunctive premise in the initial argument, the augmented argument is still valid, and the FM2.0 would not work. This is also clearly shown both in the truth

table of Conces' and Walters' article (2023, p. 288), and in the corresponding truth table in Figure 1, in the Appendix of this article. To be sure, neither of the truth tables tells us anything about the factual truth of the disjuncts in the augmented argument, because assigning truth values in truth tables is not about the factual truth of the states of affairs symbolized by propositional letters. But what both truth tables do show is that if we want to have a counterexample for the validity of the augmented argument in the actual type of FDS, then the non-negated disjunct from the initial argument and the already negated disjunct both have to be false in the augmented argument (thus making the initial disjunctive premise false), whereas the added disjunct needs to be true.

Nevertheless, if the augmented information base obtained by adding a true disjunct to the initial disjunctive premise does not rule out the disjunct A from the initial argument above, adding the additional disjunct may still defeat the initial argument, even if it does not refute it since the argument is still valid in this case. The defeating strategy in that case will be to show that both A and C follow from the augmented disjunctive premise in which all disjuncts are true except the disjunct negated in the initial argument. By using this other strategy of active criticism, we will obtain an additional augmented argument:

(the third augmented valid argument) $A \vee B \vee C, \neg B, A, C \vDash C$

In such cases, we step out of the dilemma's hook by making a choice between the preferences for conclusion A in the second augmented valid argument, and conclusion C in the third augmented argument, which both logically follow from the augmented information base.

Reflections in this section show that in this type of FDS, informal reasoning about the content and the actual truth value of the additional disjunct in its relation to the content and the truth values of the disjuncts in the initial argument are relevant even in FM2.0, contrary to what Conces & Walters claim (2023, pp. 286, 287).

## 5. Some pedagogical considerations

Teaching that false dilemma is a formal fallacy as suggested in Conces' and Walters' article (2023) is simply misleading and thus inconsistent with the basic pedagogical principle of teaching clear concepts and avoiding confusion of terms. Conces' and Walters' FM2.0 has the pedagogical advantage of clearly analyzing one type of FDS, as long as its scope of applicability is correctly stated. However, if FM2.0 is used to teach that false dilemma is a formal fallacy, it will have serious pedagogical disadvantages. One of them is to transfer to students an ambiguous way of using the concept of formal fallacy differently from how the term is used in logic (as shown in section 2.2 of this article). As a consequence, FM2.0 turns into a trivial tool that can show that any valid argument is a formal fallacy (see section 2.2 above), which is not good to teach. Another pedagogical disadvantage of FM2.0, if the tool is used for analyses of FDF as suggested by Conces and Walters, is that it will teach students to try to reduce FDF to only but one type of a completely different fallacy (the FDS-fallacy). Such a reduction is unwarranted, as shown in Tomić (2013, 2021), and throughout this paper.

Conces and Walters also impose misleading conceptions of treatment of fallacies in the entire field of informal logic and argumentation theory, in claiming that "[t]he categorization and explanation of fallacies is a messy landscape" (2023, p. 281). However, the only paragraph but one in which Conces and Walters present the current state of the categorization and explanation of fallacies is problematic because: (a) it involves the risk of presenting the textbooks as the main source of teachings on fallacies, and (b) it relies only on the evaluation from a portion of the untimely works of Finocchiaro (one from 1981, the other one from 2005, that were written 43 years ago and 19 years ago, respectively), and not on an account of their own analysis of relevant current textbooks (Conces and Walters 2023, p. 281). They do not mention the extensive development of the field during the last 50 years, except in referring to Hansen's encyclopedia text from 2020 and the initial works of Woods from 1992 and Woods and Walton from 1989 (Conces and Walters 2023, p. 281). This is quite different from a recent paper by David Hitchcock, where the current textbooks on fallacies are criticized not because they include

a "knotty discourse" as Conces and Walters suggest (2023, p. 281), but rather because they do not include the recent developments from the field (Hitchcock 2023). Moreover, Hitchcock carefully states that his analysis comprises only six English-language textbooks, although they have at least 10 editions each. It should be added that the educational resources used in teaching logical fallacies not only include textbooks but also selected scientific papers, book chapters and books. These other types of publications involve solid theories and methods for logical treatments of fallacies, as confirmed by relevant papers in the journals *Argumentation* (since 1987) and *Informal Logic* (since 1978), and the books of eminent researchers in the field (e.g. A. Blair, F. van Eemeren, T. Govier, H. Hansen, D. Hitchcock, R. Johnson, E. Krabbe, F. Macagno, C. Reed, C. Tindale, D. Walton – to mention a few). A Swedish textbook on critical thinking implements some recent developments in the logical treatments of fallacies, and provides many real-life examples (Tomić 2023).

The above mentioned also influences Conces' and Walters' way of presenting the works which address some issues related to FDF or FDS (2023, pp. 281–83). They provide a good addition of four textbooks to the works that Tomić presented in pointing out inadequacy in their approach to the two fallacies (2013, pp. 349–50; 2021, pp. 607–9). Nevertheless, Conces and Walters do not highlight that some of the works they appeal to analyze only dichotomous claims and not the arguments or the argument schemas constitutive for the two fallacies; that others among the works consider only well-formed dilemma arguments and not the false dilemma fallacy; and that yet others do not distinguish between the logical schemas of disjunctive syllogism and those of the dilemma arguments (as pointed out in Tomić 2013, pp. 349–50; 2021, pp. 607–9). Thus, the works that Conces and Walters refer to (2023, pp. 281–83) are not about one and the same type of reasoning or linguistic phenomena, but are treated by Conces and Walters as if they were and only suggest different solutions. This may be pedagogically confusing.

A possible objection concerning the pedagogical aspects of Tomić's approach is that it advances a too detailed variety of both FDF and FDS, and that teaching her approach in its entirety could therefore be too demanding for students at some levels. Nevertheless, it is always possible to include different parts of an approach in

various courses depending on teaching levels. From Tomić's approach, the main differences between FDF and FDS based on their logical forms, as well as her logical tools for analyzing the basic types of FDF (those based on simple constructive dilemma) and two subtypes of FDS (affirming the disjunct and the irrelevant disjunction), could usefully be taught at courses in logic or critical thinking at a basic undergraduate level. The more advanced courses could involve Tomić's analytical tools for the remaining subtypes of FDF and FDS. As a matter of fact, the respective parts of Tomić's approach already work well in basic and advanced logic courses at some European high schools and universities.

As a final consideration on the pedagogical advantages of Conces' and Walters' approach (S) on the one hand and of Tomić's approach (R) on the other: It would be too bad to end up in the FDS based on affirming the disjunct which would imply that adopting one of the approaches excludes adopting the other. Obviously, if considering which of the two approaches to adopt, (S $\vee$ R), the disjunction is including. Given the two possibilities, and claiming that R has clear pedagogical advantages, it does not logically follow that S does not have any. As always in good philosophical and other human praxis, we achieve the best results in carefully analyzing the real advantages of the suggested approaches and, if there are any, in teaching our students the best of both.

## 6. Conclusion

Conces' and Walters' FM2.0 (2023) is a good analytical tool that clearly shows what information is missing in only one type of *false disjunctive syllogism* and how changing the disjunctive premise in that type of false disjunctive syllogism (i.e. the unsound false disjunctive syllogism with focus on incomplete disjunctive premise - see Tomić 2021) can defeat this type of false disjunctive syllogism even if it does not refute it. That is, FM2.0 does not show that this type of false disjunctive syllogism is truth-functionally invalid; and therefore does not show that it is a formal fallacy. Moreover, Conces' and Walters' FM2.0 does not warrant their claim that *the false dilemma* is a formal fallacy (2023). This is due to the following three main reasons:

*Reason 1:* The FM2.0 assumes an ambiguous use of the term 'formal fallacy'. The problem with the ambiguous use of the term is that it differs from how the term is used in logical theories where a formal fallacy is a logically invalid *initially given* argument (where formalization of the initial argument is usually used, to be able to analyze its logical validity by formal methods). The other problem is that the strategy of FM2.0 presupposes *a change* of one of the premises in the given argument and then shows the invalidity of the resulting changed argument. But this is absurd because in that way we can show that any argument, even *modus ponens* is a formal fallacy. See sections 2.1 and 2.2 in the present article for elaboration of reason 1.

*Reason 2:* To be able to apply FM2.0, we need to perform some informal reasoning, which is not at all needed when applying the formal logical analysis to show that an argument contains a formal fallacy due to its truth-functional invalidity. See the following sections of the present article for the informal reasoning involved in FM2.0: section 2.1; the last two paragraphs of sections 3.1, 3.2 and 3.3; and the last paragraph of section 3.4.

*Reason 3:* As shown in sections 2.3 and 3 in the present article, the FM2.0 is developed by using only a specific type of false disjunctive syllogism and is tested only on it. However, when tested on false dilemma (which is a different type of fallacy), the adequate application of FM2.0 does not lead to a logically invalid augmented argument – even if we were to allow the Conces' and Walters' ambiguous use of the term 'formal fallacy'.

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## Appendix

Proofs 1-3 show the validity of the arguments from the augmented set of premises to the conjunction of the initial conclusion and the new conclusion – for every pair of the augmented arguments in sections 3.1-3.3. This makes the proofs simpler: if the conjunction between the initial conclusion and the new conclusion logically follows from the augmented set of premises, then even each of the conjuncts follows from the same set of premises. All the deductive proofs below apply the rules of natural deduction (Fitch 1952; Gentzen 1964 [1934], 1965 [1934]; Prawitz 1965).

**Proof 1:** Validity of the augmented arguments in the false dilemma type *defeasible sound complex constructive dilemma*

$A \vee B, A \rightarrow P, B \rightarrow D, A \rightarrow S, B \rightarrow M \vDash (P \vee D) \wedge (S \vee M)$

| | | |
|---|---|---|
| (1) | $A \vee B$ | Premise |
| (2) | $A \rightarrow P$ | Premise |
| (3) | $B \rightarrow D$ | Premise |
| (4) | $A \rightarrow S$ | Premise |
| (5) | $B \rightarrow M$ | Premise |
| (6) | ⌐Assume A | (the first disjunct in (1), for using $\vee$ Elim.) |
| (7) | \| P | (2, 6, $\rightarrow$ Elim.) |
| (8) | L $P \vee D$ | (7, $\vee$ Intro.) |
| (9) | $A \rightarrow P \vee D$ | (6-8, $\rightarrow$ Intro.) |
| (10) | ⌐Assume B | (the other disjunct in (1), for using $\vee$ Elim.) |
| (11) | \| D | (3, 10, $\rightarrow$ Elim.) |
| (12) | L $P \vee D$ | (11, $\vee$ Intro.) |
| (13) | $B \rightarrow P \vee D$ | (10-12, $\rightarrow$ Intro.) |
| (14) | $P \vee D$ | (1, 9, 13, $\vee$ Elim.) |
| (15) | ⌐Assume A | (the first disjunct in (1), to use the other $\vee$ Elim.) |
| (16) | \| S | (4, 15, $\rightarrow$ Elim.) |
| (17) | L $S \vee M$ | (16, $\vee$ Intro.) |
| (18) | $A \rightarrow S \vee M$ | (15-17, $\rightarrow$ Intro.) |
| (19) | ⌐Assume B | (the other disjunct in (1), to use the other $\vee$ Elim.) |
| (20) | \| M | (5, 19, $\rightarrow$ Elim.) |
| (21) | L $S \vee M$ | (20, $\vee$ Intro.) |
| (22) | $B \rightarrow S \vee M$ | (19-21, $\rightarrow$ Intro.) |
| (23) | $S \vee M$ | (1, 18, 22, $\vee$ Elim.) |
| (24) | $(P \vee D) \wedge (S \vee M)$ | (14, 23, $\wedge$ Intro.) |

**QED.**

**Proof 2:** Validity of the augmented arguments in the false dilemma type *defeasible sound simple destructive dilemma*

$A \rightarrow P, A \rightarrow D, \neg P \vee \neg D, A \rightarrow T, A \rightarrow R \models \neg A \wedge (A \rightarrow T \wedge R)$

| | | |
|---|---|---|
| (1) | $A \rightarrow P$ | Premise |
| (2) | $A \rightarrow D$ | Premise |
| (3) | $\neg P \vee \neg D$ | Premise |
| (4) | $A \rightarrow T$ | Premise |
| (5) | $A \rightarrow R$ | Premise |
| (6) | Assume A | (for *reductio*, contrary to the first conjunct in the conclusion) |
| (7) | P | (1, 6, $\rightarrow$ Elim.) |
| (8) | D | (2, 6, $\rightarrow$ Elim.) |
| (9) | Assume $\neg P$ | (the first disjunct in (3), to use $\vee$ Elim.) |
| (10) | $\perp$ | (7, 9, $\perp$ Intro.) |
| (11) | $\neg P \rightarrow \perp$ | (9-10, $\rightarrow$ Intro.) |
| (12) | Assume $\neg D$ | (the other disjunct in (3), to use $\vee$ Elim.) |
| (13) | $\perp$ | (8, 12, $\perp$ Intro.) |
| (14) | $\neg D \rightarrow \perp$ | (12-13, $\rightarrow$ Intro.) |
| (15) | $\perp$ | (3, 11, 14, $\vee$ Elim.) |
| (16) | $\neg A$ | (6-15, $\neg$ Intro.) |
| (17) | Assume A | (the antecedent in the second conjunct in the conclusion) |
| (18) | T | (4, 17, $\rightarrow$ Elim.) |
| (19) | R | (5, 17, $\rightarrow$ Elim.) |
| (20) | $T \wedge R$ | (18, 19, $\wedge$ Intro.) |
| (21) | $A \rightarrow T \wedge R$ | (17-20, $\rightarrow$ Intro.) |
| (22) | $\neg A \wedge ( A \rightarrow T \wedge R)$ | (16, 21, $\wedge$ Intro.) |

**QED.**

**Proof 3:** Validity of the augmented arguments in the false dilemma type *defeasible sound complex destructive dilemma*

$F \rightarrow J, K \rightarrow L, \neg J \vee \neg L, F \vee K \vDash (\neg F \vee \neg K) \wedge (J \vee L)$

| | | |
|---|---|---|
| (1) | $F \rightarrow J$ | Premise |
| (2) | $K \rightarrow L$ | Premise |
| (3) | $\neg J \vee \neg L$ | Premise |
| (4) | $F \vee K$ | Premise |
| (5) | Assume $\neg J$ | (the first disjunct in (3), to use $\vee$ Elim.) |
| (6) | Assume F | (for *reductio*, contrary to the disjunct in the conclusion) |
| (7) | J | (1, 6, $\rightarrow$ Elim.) |
| (8) | $\perp$ | (5, 7, $\perp$ Intro.) |
| (9) | $\neg F$ | (6-8, $\neg$ Intro.) |
| (10) | $\neg F \vee \neg K$ | (9, $\vee$ Intro.) |
| (11) | $\neg J \rightarrow \neg F \vee \neg K$ | (5-10, $\rightarrow$ Intro.) |
| (12) | Assume $\neg L$ | (the other disjunct in (3), to use $\vee$ Elim.) |
| (13) | Assume K | (for *reductio*, contrary to the disjunct in the conclusion) |
| (14) | L | (13, 2, $\rightarrow$ Elim.) |
| (15) | $\perp$ | (14, 12, $\perp$ Intro.) |
| (16) | $\neg K$ | (13-15, $\neg$ Intro.) |
| (17) | $\neg F \vee \neg K$ | (16, $\vee$ Intro.) |
| (18) | $\neg L \rightarrow \neg F \vee \neg K$ | (12-17, $\rightarrow$ Intro.) |
| (19) | $\neg F \vee \neg K$ | (3, 11, 18, $\vee$ Elim.) |
| (20) | Assume F | (the first disjunct in (4), to use $\vee$ Elim.) |
| (21) | J | (1, 20, $\rightarrow$ Elim.) |
| (22) | $J \vee L$ | (21, $\vee$ Intro.) |
| (23) | $F \rightarrow J \vee L$ | (20-22, $\rightarrow$ Intro.) |
| (24) | Assume K | (the other disjunct in (4), to use $\vee$ Elim.) |
| (25) | L | (2, 24, $\rightarrow$ Elim.) |
| (26) | $J \vee L$ | (25, $\vee$ Intro.) |
| (27) | $K \rightarrow J \vee L$ | (24-26, $\rightarrow$ Intro.) |
| (28) | $J \vee L$ | (4, 23, 27, $\vee$ Elim.) |
| (29) | $(\neg F \vee \neg K) \wedge (J \vee L)$ | (19, 28, $\wedge$ Intro.) |

**QED.**

| L | N | B | (L ∨ N) ∨ B | ¬L | N | |
|---|---|---|---|---|---|---|
| T | T | T | T T | F | T | |
| T | T | F | T T | F | T | |
| T | F | T | T T | F | F | |
| T | F | F | T T | F | F | |
| F | T | T | T T | T | T | |
| F | T | F | T T | T | T | |
| F | F | T | F T | T | F | Counterexample |
| F | F | F | F F | T | F | |

double lines: the columns with the propositional letters;
triple lines: columns with the premises;
simple lines: the columns with the conclusion.

**Figure 1:** Truth table showing the truth-functional invalidity of the augmented argument in the unsound disjunctive syllogism with focus on incomplete disjunctive premise.

The augmented argument (L ∨ N ∨ B, ¬L ⊨ N) is obtained when changing the disjunctive premise, by adding the disjunct B, in the truth functionally valid disjunctive syllogism, L ∨ N, ¬L ⊨ N, according to Conces' and Walters' FM2.0. In the counterexample to the augmented argument, the disjuncts from the initial disjunctive premise have to be false, namely V(L) = F, V(N) = F, contrary to what Conces and Walters claim (2023, p. 287) – otherwise there could be no counterexample, as obvious from the other relevant rows in the truth table.

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