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NORMATIVITY, VALIDITY AND SEMIOTIC IMPLICATION

Abstract: Validity of an inference depends on the implication involved, as Hartry Field (Field, 2009, p. 342, p. 349) stresses “our views about implication constrain our views about *how we ought to reason*, or (perhaps better) about *the proper interrelations among our beliefs*.” Hence, the relation of implication “has a broadly normative component.”

A non-standard implication is introduced, I call it *semiotic implication*. It will be argued that semiotic implication is an important interpretative tool and some formal characteristics will be discussed. Since the latter differentiate it from standard implication the sign “ $\div$ ” for it is introduced. I define semiotic implication (x) ($P(x) \div Q(x)$) as: P is an index of Q , for any P and Q , and Q is an icon of P , for Q different from P .

Semiotic implication can be linked to semiotic validity (cf. Trajkovski, 2024) which differs from deductive validity. In this context, it can be examined whether and in what way semiotic implication calls into question the normativity of classical logic. Especially, the enthymematic potential of semiotic implication supports abductive validity.

Hence, we can distinguish three deviations from the norm in connection with semiotic implication: deductive validity is defined through an index; the enthymeme might be taken as a category of natural reasoning implying abductive validity defined through an icon. However, it will be argued that the deviations are not necessary, with certain limitations, the notion of semiotic implication can be adapted to the norm.

Keywords: normativity, enthymeme, validity, semiotic implication.

Introduction

Semiotic implication was introduced in “The Origin of Semiotic Validity – Peirce and Aristotle on Reasoning by Signs” (Trajkovski, forthcoming 2024) where I discussed the notion of semiotic validity. There I

argued that a universal premise “All M is P”, i.e. “For all x, if x is M, then x is P” in deduction, is to be read: M is an index for P, while, in abduction, it is to be read: P is an icon for M. Hence, in general the conditional states a semiotic relationship between M and P which says that M is an index of P, and P is an icon of M.

Semiotic validity has to do with the semiotic connection between the premises and the conclusion entailed; this is the theme of Section 1. In Section 2, I point out the flaw in Peirce’s logical argument for the claim that the set of premises of induction as an index signifies the conclusion. Section 3 analyzes logical reasons that might support Peirce’s later but metaphysically grounded view that the set of premises of induction as a symbol signifies the conclusion, and points out a mistake in this argument as well. Section 4 gives the solution, and semiotic implication is introduced. Section 5 discusses normative and formal aspects of semiotic implication. Finally, the conclusion summarises the results of previous sections and stresses why semiotic implication is of substantial importance.

1. The premises signify their conclusions

The idea that the premises signify their conclusion is natural, for premises point to the conclusion, they refer to it. In a Brentanian framework, it could be said that the premises intend the conclusion, in Husserl’s that they constitute it, in Peirce’s the premises represent or signify the conclusion – premises are the sign of the conclusion.

More generally, the conclusion is the object to which the premises refer. Observing the conclusion as an object represented by the premises, it is clear that different types of argument will differ according to the way in which their premises denote their object: the conclusion.

With regard to the relationship between the sign and the object, Peirce distinguishes three ways in which the sign indicates the object: through similarity with the object, or by being in a real relationship with the object, or by convention. They are, respectively: icon, index and symbol. Since Peirce distinguishes three basic types of reasoning – deduction, abduction and induction – his question is how their premises are related to their respective conclusions. When he asks this question, Peirce does not look for an answer in anything like modern predicate logic. First, in “On a New List of Categories” (1868), he tried to find the solution in the syllogistic framework, later; in *Minute Logic* (1902) he sought it in phaneroscopy – the study of three categories of reality: firstness, secondness and thirdness. Briefly, these two approaches of Peirce can best be presented through quotations.

1) The 1868 view:

“In an argument, the premisses form a representation of the conclusion, because they indicate the interpretant of the argument, or representation representing it to represent its object. The premisses may afford a likeness, index, or symbol of the conclusion. In deductive argument, the conclusion is represented by the premisses as by a general sign under which it is contained. In hypotheses, something like the conclusion is proved, that is, the premisses form a likeness of the conclusion. Take, for example, the following argument:

M is, for instance, P', P'', P''', and P'''';
S is P', P'', P''', and P'''';
[Ergo,] S is M.

Here the first premiss amounts to this, that “P', P'', P''', and P''''” is a likeness of M, and thus the premisses are or represent a likeness of the conclusion. That it is different with induction another example will show.

S', S'', S''', and S'''' are taken as samples of the collection M;
S', S'', S''', and S'''' are P;
[Ergo,] All M is P.

Hence the first premiss amounts to saying that “S', S'', S''', and S''''” is an index of M. Hence the premisses are an index of the conclusion.” (Peirce, 1868, pp. 296–297)

2) The 1902 view:

“Argument is of three Kinds: Deduction, Induction and Abduction (usually called adopting a hypothesis.)

An Obsistent Argument, or Deduction, is an argument representing facts in the Premiss such that when we come to represent them in a diagram we find ourselves compelled to represent the fact stated in the Conclusion; so that the Conclusion is drawn to recognize that quite independently of whether it be recognized or not the facts stated in the premisses are such as could not be if the fact stated in the conclusion were not there; that is to say the Conclusion is drawn in acknowledgement that the facts stated in the Premiss constitute an Index of the fact which it thus compelled to acknowledge. Deduction is Obsistent in respect to being the only kind of argument which is compulsive...

Originary Argument or Abduction is an argument which presents facts in its Premiss which present a similarity to the fact stated in the Conclusion but which could perfectly well be true without the latter being so much more without its being recognised; so that we are not led to assert the Conclusion positively but are only inclined towards admitting it

as representing a fact of which the facts of a Premiss constitute an Icon... (An Abduction is Originary in respect to being the only kind of argument which start a new idea)

A Transuasive Argument or Induction is an Argument which sets out from a hypothesis resulting from a previous Abduction and from virtual prediction drawn by Deduction of the results of possible experiments and having performed the experiments concludes that the hypothesis is true in the measure in which those predictions are verified this conclusion however being held subject to probable modification to suit future experiments. Since the significance of the facts stated in the premisses depends upon their predictive character which they could not have had if the conclusion had not been hypothetically entertained; they satisfy the definition of a Symbol of the fact stated in the conclusion. This argument is Transuasive also in respect to its alone affording us a reasonable assurance of an ampliation of our positive knowledge." (Peirce, 1902, pp. 136–139)

A few pages earlier Peirce explains the terms Originality, Obsistence, Transuasion:

"Obsistence (suggesting obviate, object, obstinate, obstacle, insistence, resistance, etc) is that wherein secondness differs from firstness; or is that element which taken in connection with Originality makes one thing such as another compels it to be.

Transuasion (suggesting translation, transaction, transfusion, transcendental, etc.) is mediation or the modification of firstness and secondness by thirdness taken apart from the secondness and firstness; or is being in creating Obsistence.

Although Originality is the most primitive, simple and original of the categories it is not the most obvious and familiar." (ibid, p. 128)

There is no difference between these two solutions regarding abduction. But according to 1), the premises of deduction represent the symbol of the conclusion, and the premises of induction are the index of the conclusion, while according to 2), it is the other way around. More precisely:

In 1) we see that (despite using the statistical terms of sample and collection) the arguments are presented syllogistically and it is claimed that the sign of the middle term is the sign of the conclusion. (The middle term is the one that appears in both premises but not in the conclusion. It should be emphasized that the reference to middle terms does not require syllogistic logic, as can be seen from the definition.) A meta-reason for the 1868 account could be the fact that deduction does not depend on a context, nor does symbol, while index and induction do. These could be the reasons why some Peircean scholars still do not question the view that the middle term of the induction is an index. (cf. Paavola, 2004, 2011)

In 2) we see that Peirce relates the kinds of argument to the categories of firstness, secondness, thirdness. Unlike the complexity of Peirce's terminology, the idea presented in 2) is very simple. The category of the first is potentiality, some quality, so it corresponds to an icon; the second is actuality, something individualized, it corresponds to an index; the third is generality that seeks convention – it corresponds to a symbol. Yellow, for example, as a quality *can* represent the Sun, my hand pointing to the Sun *is* representing the Sun, and the word “Sun” *is to* represent the Sun. Indeed, the conclusion of abduction is a possibility, of deduction the conclusion is that which is the case, and the conclusion of induction is a derived, the projected generalization.

2. The flaw in Peirce's argument

Although he starts from the natural idea that the semiotic relationship of the premises as a whole with the conclusion has its counterpart in the semiotic relationship within the premises, Peirce seeks this relationship in the relationship of syllogistic terms, thus taking a step backwards. Moreover, despite Peirce's competence, the argument that he makes in 1868 is inherently logically flawed. With regard to his argument, two things should be emphasized:

- (i) Peirce looked for the key to the semiotic relationship within the premises in the logic of terms, not in propositional/predicate logic.
- (ii) The semiotic relationship that Peirce identifies between the terms in the syllogism is not set consistently.

It is clear from (i) that the semiotic implication that I am introducing is not present in Peirce's analysis, from (ii) it follows that even the translation into modern logic would not have given rise to it.

Let us see this more closely.

In the given abductive reasoning: *M is, for instance, P', P'', P''', and P''''; S is P', P'', P''', and P''''; Ergo: S is M*; the term “P', P'', P''', and P''''” is obviously the middle term, and Peirce says it “is a likeness of M”, which means, in his later terminology, that it is an icon of M.

In the given inductive reasoning: *S', S'', S''', and S'''' are taken as samples of the collection M; S', S'', S''', and S'''' are P; Ergo: All M is P*; “S', S'', S''', and S''''” is the middle term. For this term Peirce says it “is an index of M”.

Note that Peirce sets up the generalization: from *S', S'', S''', and S'''' are taken as samples from the collection M*, Peirce concludes that “S', S'', S''', and S'''' is an index of M.

But note that the 1868 account relies on another generalization as well: the sign of the middle term corresponds to the semiotic relationship in which the premises stand to the conclusion.

Now, if the premises as an index point to the conclusion (just as “now” points to the moment of an utterance, or “I” to the person who utters it) it does not look like a relationship between the premises of the induction and its conclusion, which might not follow. More precisely, as Peirce correctly observes in 1902, such is the relationship between the premises of a deduction and its conclusion.

To conclude, it seems clear that Peirce, because his 1868 solution does not satisfy the conditions he set, had to abandon it. These conditions are:

- I) The middle term is the argument sign;
- II) The premises of the argument signify its conclusion in the manner of the argument sign.

A correct solution should meet both requirements.

3. One solution

Applied to each of the three signs, the requirements I) and II) give:

- 1) If the middle term is an index, the premises as an index point to the conclusion.
- 2) If the middle term is an icon, the premises as an icon point to the conclusion.
- 3) If the middle term is a symbol, the premises as a symbol point to the conclusion.

Specifically: if it is claimed that the relationship between the premises of the induction and its conclusion is the relationship of the symbol to its object, as claimed by Peirce in 1902, then the middle term of the induction must be a symbol as well. In view of one specific assumption present in the 1868 account it appears that this would mean that the sample of a population, instead of being an index, is a symbol of the population. Previously I defended this position in *Creative Enthymeme* (Anđelković, 2007, pp. 25–33) but also in the paper “Reasoning by Signs: Peirce and Aristotle” presented at Charles S. Peirce International Centennial Congress, Lowell, 2014. The solution that I offered in this presentation was accepted and cited in Lorenzo Magnani’s “The eco-cognitive model of abduction II – Irrelevance and implausibility exculpated”, *Journal of Applied Logic* 15 (2016) and “Naturalizing the logic of abduction”, *Logic Journal of the*

IGPL 24 (4) (2016). In coming to this solution I used Aristotle's examples for arguments based on signs as a guide.

Aristotle's text is a good guide for two reasons: a) Aristotle's approach is syllogistic like Peirce's and b) because Peirce himself, in order to defend the introduction of abduction, pointed out the connection between deduction, abduction and induction and the first, second and third syllogistic figures respectively. It should be emphasized though, that Peirce does not draw the connection between his and Aristotle's teaching on signs.

a) In *Prior Analytics* (II 27), Aristotle says:

"An enthymeme is a syllogism from probabilities or signs; and a sign can be taken in three ways—in just as many ways as there are of taking the middle term in the several figures: either as in the first figure or as in the second or as in the third. E.g., the proof that a woman is pregnant because she has milk is by the first figure; for the middle term is 'having milk'...The proof that the wise are good because Pittacus was good is by the third figure. ...The proof that a woman is pregnant because she is fallow is intended to be by the middle figure; for since fallowness is a characteristic of women in pregnancy, and is associated with this particular woman, they suppose that she is proved to be pregnant." (Aristotle, 1962, p. 525)

b) As we saw above, Peirce presented induction and abduction syllogistically in the form of the second and third figures. Aristotle's syllogism *Barbara* Peirce takes as "the primitive type of inference" corresponding to deduction and consisting of three statements expressing a rule, a case and a result. (cf. Peirce, 1931–35, 2.710)¹

Aristotle's examples looked as if they could provide a direct solution is suggested already at the level of language. For "milk" in the first figure, Aristotle uses the term *tekmérion*, which is translated into Latin as "index" (cf. Weidemann, 1989, p. 343, Fidora, 2014, p. 12). As the middle term of the third figure, Aristotle takes Pittacus, which can be seen as a sample of the population of sages, but this cannot be understood as a random sample. Pittacus can be seen as a paradigmatic case of the wise man, or simply as a symbol of the wise man.

Later, after looking more broadly at Peirce's dilemma, I saw a flaw in this explanation. Concretely, dealing with the question of semiotic validity in general, I noticed that the material implication in predicate logic can be interpreted semiotically. I motivated it in the presentation "The Origin of Semiotic Validity" I gave at the Symposium *Validity throughout History*, UCLA, 2019. In the paper "The Origin of Semiotic Validity – Peirce and

1 More about this in Trajkovski 2024.

Aristotle on Reasoning by Signs” which followed (Trajkovski, forthcoming 2024) I formally introduced the semiotic implication. There I argued that a universal premise “All M is P”, i.e. “For all x, if x is M, then x is P” in deduction is read: M is an index for P. In abduction, it reads: P is an icon for M. Since in general the conditional can be read as stating a semiotic relationship between M and P, I called it semiotic implication.

4. The solution

The translation of Aristotle’s examples into predicate notation highlights the fact that in induction the middle term is an individual constant, not a predicate one as in the case of deduction and abduction. Hence its middle term is a name whose referent is the name bearer, which means that it functions as a symbol. But then, “Pittacus” is a symbol of Pittacus, not the symbol of wise men. So in Trajkovski (2024) I conclude that the names serve as middle terms in induction; therefore, induction is based on symbols.

Aristotle’s examples presented in predicate logic are:

Proof I: $M(s)$
 $(x)(M(x) \supset P(x))$
 [Ergo]
 $P(s)$

where “P” stands for “is pregnant”, “M” for “is having milk”, and “s” for “this woman”.

Proof II: $P(s)$
 $(x)(M(x) \supset P(x))$
 [Ergo]
 $M(s)$

where “P” stands for “is fallow”, “M” for “is pregnant”, and “s” for “this woman.”

Proof III: s is a sample of M
 $P(s)$
 [Ergo]
 $(x)(M(x) \supset P(x))$

where “P” stands for “is good”, “M” for “is wise”, and “s” for “Pittacus”.

If in proof I, the major premise $(x)(M(x) \supset P(x))$ we read “M is an index for P”, and in proof II, the major premise $(x)(M(x) \supset P(x))$ we read “P is an icon for M”, the two-way semiotic reading of the implication $(x)(Y(x) \supset Z(x))$ is almost imposed.

Let us note that the semiotic relationship establishing the sign of the middle term in I and II is set in their major premises. To see this we need to introduce some relevant notions:

“The term which is contained in both premises is the middle term; the predicate of the conclusion is the major term; and the subject of the conclusion is the minor term. The premise which contains the major term is the major premise, and the premise containing the minor term is the minor premise. The order in which the premises are stated does not, therefore, determine which is the major premise. In the syllogism *All mystery tales are a danger to health, for all mystery tales cause mental agitation, and whatever is a cause of mental agitation is a danger to health* the conclusion is stated first, and the major premise last. It is usual, however, to state the major premise first.” (Cohen & Nagel, 1955, pp. 77–78)

If we now look at proof III and the premise “Pittacus is wise”, we see that it has been omitted like the premises “Having milk means being pregnant” and “Sallowiness is a characteristic of women in pregnancy” in the quote from Aristotle. This is understandable because Aristotle gives these examples in his definition of enthymemes (as inferences based on signs) and enthymemes omit what can be implied.” If only one premiss is stated, we get only a sign; but if the other premiss is assumed as well, we get a syllogism.” In the footnote attached, it says: “strictly an enthymeme”, and in the margin there is a comment: “a sign may regarded as a syllogism with one premise suppressed.” (Aristotle, 1962, p. 525)

Let us return to the question of what is the semiotic role of the middle term in induction. If the basic semiotic relation should be sought in the omitted premise, then in the case of proof III it should be sought in “Pittacus is wise”. Then Pittacus can be seen either as a symbol or as an index of the population of wise men. The former would be in line with the solution I give in *Creative Enthymeme*. The latter would be in line with Peirce’s 1868 view that the semiotic relationship of the sample to the population is indexical.

We should go back and look once more at which premise gives the ground for the sign of an argument. Peirce gives examples of abduction and induction and insists that the semiotic relationship is found in the first premise. He says:

in abduction “the first premiss amounts to this, that “P’, P”, P””, and P””” is a likeness of M”, and

in induction “the first premiss amounts to saying that “S’, S”, S””, and S””” is an index of M”.

It seems that Peirce conversationally implied that the key to the semi-otic relation is given in the major premise of an argument. In the example of abduction, this is the case, because the premise “M is, for instance, P’, P”, P””, and P””” contains the major term M, that is, the predicate of the conclusion, so it is the major premise. In the case of induction, the premise “S’, S”, S””, and S””” are taken as samples of the collection M” contains a minor term M, namely, the subject of the conclusion, hence it is the minor premise.

It is obvious that in the examples given by Aristotle, premises that are known have been omitted, and this as an epistemic criterion need not be logically uniform. And really, in proofs I and II the major premises are omitted while in proof III the minor premise is. If we set the condition that the criterion for the premises in which the sign of the argument is given should be logically uniform, then Peirce’s 1868 argumentation is clearly inconsistent.

Let us set a consistent criterion:

If the middle term in the major premise is index, icon, or symbol, then the relationship of the premises to the conclusion is index, icon, or symbol, respectively.

Now we see that in Proof I the middle term is M, and the major premise is $(x)(M(x) \supset P(x))$, so the semiotic role of M in that premise determines the sign of the argument. Having milk is a sign that a woman is pregnant. It is a sure indicator, that is, an index.

We can see that in Proof I the middle term is P, and the major premise is $(x)(M(x) \supset P(x))$, so the semiotic role of P in that premise determines the sign of the argument. Being pale can be an indicator that a woman is pregnant, but it is not a sure indicator because someone can be pale for other reasons, a pale woman looks like a pregnant woman, paleness is an icon here.

Finally, we see that in Proof III the middle term is s, and the major premise is $P(s)$, therefore the semiotic role of s in that premise determines the sign of the argument. The role of s here is to denote Pittacus, it functions as a symbol.

To conclude: the names serve as middle terms in induction; therefore, induction is based on symbols.

5. Some normative and formal aspects of semiotic implication

This section is about formal importance of semiotic implication, but also stresses how it deviates from the norm. The symbolic notation for semiotic implication is introduced, as well as its definition and some basic principles. Finally, I emphasize that abductive validity does not follow from the principles of semiotic implication, which only allows the expansion of the framework in such a way that non-standard validity can be grounded on rational reasons.

The formal importance of the semiotic implication is reflected in the fact that it enables writing in the object language that, for example, milk is an index of pregnancy, or that a human is an index of an animal, while an animal is an icon for a human being. Qualities are semiotically related to other qualities, for example, smoke is a sign of fire.

Thus, the index and the icon as semiotic factors are introduced into the symbolic language. Properties in relation to each other do not function as symbols, but as indices or icons, for properties are indicators of other properties not by convention.

Deviations from the norm:

1. The argumentation that I have presented allows deduction to be defined through index as an argument in which the sign of the argument is an index. Thus, instead of deductive validity, one can speak of indexical validity, which would be a deviation from the norm. About how far-reaching this deviation is, is an issue that requires special consideration.
2. The enthymematicity of intuitionistic implication motivated me to argue that the semiotic implication is enthymematic in a complementary way. Intuitionistic implication, as a major premise, is sufficient according to Anderson and Belnap (1961, p. 719). In Trajkovski (2024) I argued that semiotic implication as a major premise is not necessary.² In short, the point I am making is that if we take the sentence “For any x , if x is M , x is A ” (“ M ” stands for “a man”, and “ A ” stands for “an animal”) as a missing premise in the argument: t is M ; so t is A . I take as a starting point a prag-

2 These ideas were presented in M. Trajkovski, “Semiotic implication” (1st International Congress on Logic, Epistemology & Methodology, 2021, Philosophy Department of the University of Costa Rica) and “Semiotic, material and logical validity” (3rd Context, Cognition and Communication Conference Varieties of Meaning and Content, 2022, Faculty of Philosophy, University of Warsaw).

matic understanding of attributing to a cognitive subject that s/he has the concept X. If this is the case then the subject must connect this concept with at least one other concept which either implies X or is implied by X. Hence, the subject who claims “M(t)” must at least, for some Y and Z, have an understanding of either “(x) (Y(x)⊃M(x))” or “(x) (M(x)⊃Z(x))”.

Therefore, an abridged deduction $M(t)$; [Ergo] $A(t)$, or an abridged abduction $M(t)$; [Ergo] $B(t)$ can be assumed. The point is, as is argued, that claiming “M(t)” assumes that “M” as a sign is, by the subject, connected with at least one more sign “X” in a sense that “M” is either an index or an icon for it. As a conclusion it follows that semiotic implication as a major premise is not necessary if the subject making the inference believes and understands the minor premise.

3. The principle of identity $(x)(P(x)⊃P(x))$ does not hold.

This conditional would be semiotically read as:

A) P is an index of P

and

B) P is an icon of P.

While A) seems natural, B) does not: I wouldn't say that I am my own icon.

This creates the need for a special sign for semiotic implication, so I introduce the following sign: $\div$.

Definition and basic principles

$(x)(P(x)\div Q(x))$ reads: P is an index of Q, for any P and Q, and Q is an icon of P, for Q different from P.

This leads to the basic principle:

$(P(x)\div Q(x)) \leftrightarrow ((P(x) \supset Q(x)) \wedge P \neq Q)$, for all x.

Other principles are:

Contraposition: $(x)((P(x)\div Q(x)) \leftrightarrow (\neg Q(x) \div \neg P(x)))$, it says that if an x does not have property Q which is the icon of property P, then it is not P.

Transitivity: $(x)((P(x)\div Q(x)) \wedge (Q(x)\div R(x))) \supset (P(x)\div R(x))$, it says that if Q is an icon of P and index of R, then P is an index of R.

Finally, the deviations are not necessary, for semiotic implication does not entail the validity of abduction since the conjunction $P(x)\div Q(x)$ and

$Q(x)$ does not entail $P(x)$. Namely, if an x has property Q which is an icon of property P , it does not mean that it has property P . This is in accord with the general definition of an icon as a sign – it can be present in an absence of its referent.

Conclusion

In the text, I discussed some formal features of semiotic implication; first of all there is non-reflexivity due to which the semiotic relationship of the predicates in the implication cannot be expressed by a standard implication. Hence, I introduce a special symbol “ $\div$ ” for the semiotic implication which I define as P is an index of Q , for any P and Q , and Q is an icon of P , for Q different from P , formally: $(x)(P(x) \div Q(x))$. This implication is transitive and contraposes. I accept Peirce’s idea that different arguments correspond to different signs and agree with Aristotle and Peirce that the sign should be sought in the middle term, I point out the key error in Peirce’s argumentation and show that the sign should be sought in the major premise. I also underline that the syllogistic approach that Peirce opted for directed my attention to Aristotle’s understanding of syllogisms based on signs that I referred to in my analyses, but that it made it impossible for Peirce himself to see the semiotic implication. As Aristotle talked about signs in the context of enthymemes and Anderson and Belnap about intuitionistic implication as being enthymematic, I asked the question about the relationship between semiotic implication and enthymeme. I present the thesis that the semiotic implication is enthymematic in a way complementary to the intuitionistic one: when the major premise in the syllogism is an intuitionistic implication, the minor one is not necessary, while when the semiotic implication is the major premise, then the minor premise is not necessary. I also highlighted several aspects in the system based on semiotic implication that deviate from the norm. I emphasized, however, that with certain limitations, the notion of semiotic implication can be adapted to the norm.

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