The Philosophical Quarterly Vol. 71, No. 3 2021
ISSN 0031-8094 doi: 10.1093/pq/pqaa054
Advance Access Publication 7th August 2020

SUBJECT MATTER: A MODEST PROPOSAL

By Matteo Plebani[1] and Giuseppe Spolaore[2]

The notion of subject matter is a key concern of contemporary philosophy of language and logic. A central task for a theory of subject matter is to characterise the notion of sentential subject matter, that is, to assign to each sentence of a given language a subject matter that may count as its subject matter. In this paper, we elaborate upon David Lewis' account of subject matter. Lewis' proposal is simple and elegant but lacks a satisfactory characterisation of sentential subject matter. Drawing on linguistic literature on focus and on the question under discussion, we offer a neo-Lewisian account of subject matter, which retains all the virtues of Lewis' but also includes an attractive characterisation of sentential subject matter.

Keywords: subject matter, aboutness, focus, questions, David Lewis.

I. INTRODUCTION

Subject matter (SM) has become a hot topic in contemporary philosophy of language and logic (see, e.g. Yablo 2014; Fine 2016; Osorio-Kupferblum 2016; Hawke 2017; Berto 2018; Felka 2018; Moltmann 2018). It is widely held that an important task for a theory of SM is to include a satisfactory characterisation of the notion of *sentential* SM: to be able to tell, given a sentence ϕ, which SM(s) ϕ is about (see, e.g. Yablo 2014: 1, Hawke 2017: section 3).

In this paper, we take as our starting point one of the earliest and simplest accounts of SM, David Lewis' (1988a, 1988b) proposal. Lewis' account has many virtues, but Lewis does not offer a plausible characterisation of sentential SM. Drawing on insights from the linguistic literature on the notions of focus and of question under discussion, we show how to extend Lewis' proposal to an account of SM that retains all the virtues of the original one, but also yields an attractive characterisation of sentential SM. We will refer to our neo-Lewisian account as *the modest proposal*.

There are many reasons to be interested in the notion of (sentential) SM and cognate notions like aboutness (the relation that a sentence bears to its SM). Yablo (2014, *Introduction*) mentions three. The first is that these notions are interesting in their own right: we ordinarily employ them, and yet it is hard to characterise them precisely. A second motivation is that sentential SM (what a sentence is about) can play an important role in a theory of meaning: Yablo is interested in making 'SM an independent factor in meaning, constrained but not determined by truth conditions' (2014: 2). Finally, SM can help shed light on traditional metaphysical issues, for instance on the problem of the ontological commitment of number talk (see Yablo 2014: chapter 5).

In this paper, we are mainly concerned with the first two motivations to care about SM.

As for the first motivation, the modest proposal contributes to the task of elucidating the notion of sentential SM by modifying an elegant and powerful account of SM. The modest proposal is based on a combination of ideas from the philosophical and linguistic literature on SM that is so natural to seem obvious, but has never been fully developed and compared with alternative accounts.[1] This paper, then, fills a gap in the literature. Moreover, as we point out in the concluding section, the modest proposal has some advantages over rival accounts and is flexible; hence it could be fruitfully compared to and integrated with existing approaches. Finally, the modest proposal deepens our understanding of Lewis' account of SM, showing that most of the standard objections against it can be addressed rather easily.

Concerning the second motivation, our account provides an example of a two-component semantics (Berto et al. 2019). In a two-components semantics, not only truth conditions do not determine SM (i.e., SM is hyperintensional), but also SM does not determine truth conditions. SM is hyperintensional on most of the existing accounts. It is pretty customary to let two tautologies like 'Grass is green or it is not' and 'Snow is white or it is not' be about different SMs. However, our account does something more. In our account, there is no general rule to recover the truth conditions of a sentence from its SM. Moreover, the account allows some logically independent (atomic) sentences to be about the same SM. We will elaborate upon this theme in the concluding section of the paper, where we also discuss some limitations of the account in its present form.

In sum, the modest proposal is a simple, intuitive account of sentential SM that combines ideas from the philosophical and linguistic literature and has some original, attractive features. In light of these considerations, we think that the modest proposal should be part of the conversation on SM.

Let us look ahead. In Sections II and III, we introduce Lewis' account of SM and explain why Lewis does not provide a satisfactory characterisation of sentential SM. In Sections IV–VI, we present our neo-Lewisian account of sentential SM. Finally, in section VII, we highlight the virtues of the modest

[1] A footnote in Rothschild 2017: 790 (fn 5) hints in a direction close to that of the modest proposal. However, Rothschild neither develops the idea nor compare it with alternative accounts.

proposal, along with some limitations, and compare it to alternative accounts of SM presently available.

II. LEWIS ON SM

A Lewisian SM is a partition of the set of possible worlds (the logical space) or the equivalence relation induced by such a partition.[2] A Lewisian SM can also be presented as a set of propositions, namely, the set of those propositions that count as complete answers to a certain interrogative sentence. If we follow a common practice among semanticists and we equate a question with the set of its complete answers,[3] we can also say that a Lewisian SM is a question (see Yablo 2014: section 2.1–2.3 for a discussion). For instance, using boldface for SMs, **the number of stars** is the family of sets of possible worlds composed by the set of worlds in which there are no stars, the set of worlds in which there is exactly one star, the set of worlds in which there are exactly two stars, and so on. **The number of stars** can also be identified with the equivalence relation that relates two worlds w and w' if and only if in w there are as many stars as in w'. **The number of stars** can also be presented as a set of propositions (conceived here as sets of possible worlds): the propositions *that there are no stars*, *that there is one star*, *that there are two stars*, . . . , i.e., the answers to the interrogative sentence 'How many stars are there?'. Finally, **the number of stars** can be identified with the question expressed by the interrogative sentence 'How many stars are there?'. We say that two worlds agree on SM **m** if and only if they are **m**-equivalent, i.e., when the same answer to the relevant question is true in both worlds.

It's true that sometimes we think of SMs not as questions but rather as parts of the world (see Lewis 1988a: 161–2 and Hawke 2017). However, it appears that some SMs do not correspond to parts of the world. Lewis' example is **the number of stars**.

> Maybe an ingenious ontologist could devise a theory saying that each world has its *nos-part*, as we may call it, such that the nos-parts of two worlds are exact duplicates iff those two worlds have equally many stars. Maybe—and maybe not. We shouldn't rely

[2] A partition F of the set S is a family of nonempty, mutually disjoint subsets of S (called *cells*) whose union is equal to S. An equivalence relation is a binary relation R that is reflexive (for all x, xRx), symmetric (if xRy, then yRx), and transitive (if xRy and yRz, then xRz). Partitions and equivalence relations are interdefinable: if we start with an equivalence relation R on S and assign every element of S to the set of elements of S that are in R with it, we obtain a partition of S; if we start with a partition F of S, the relation *belonging to the same cell of* F is an equivalence relation.

[3] The first semantic treatment of questions as sets of potential answers is in Hamblin 1973. The idea that the content of a question can be equated with the set of the propositions expressed by its *complete* possible answers (and thus with a partition of the logical space) is due to Groenendijk and Stokhof (1984). See Cross and Roelofsen 2018 for an overview of the semantics and pragmatics of questions.

> on it. Rather, we should say that being exactly alike with respect to a subject matter may or may not be a matter of duplication between the parts of worlds which that subject matter picks out. (Lewis 1988b: 12)

Moreover, as Lewis (1988a) notes, given a part of the world, we can define an equivalence relation: two worlds are equivalent if, and only if, the relevant part of one world is exactly alike its counterpart in the other world. Two worlds are equivalent with respect to the SM **the XVII century** if, and only if, either the XVII century of one world is an exact duplicate of the XVII century of the other, or both worlds lack a counterpart of the XVII century (see Humberstone 2000 and Yablo 2014: section 2.1). Thus, arguably, partition-based accounts of SM are more general than part-based ones.

Lewis' account is simple and elegant. It preserves the natural connection between SMs and questions: the act of addressing a SM can be smoothly described as an attempt to answer a question (see also Hawke 2017). Moreover, Lewis' account allows us to define many interesting relations between SMs, such as:

Parthood: m is *part* of **n** if and only if **n** is a refinement of **m** (i.e., if and only if **n**-equivalence entails **m**-equivalence). For instance, **the number of stars and the number of planets** includes as part **the number of stars** because two worlds cannot have the same number of stars and the same number of planets without having the same number of stars.

Orthogonality: m is *orthogonal* to **n** if and only if every **m**-cell intersects every **n**-cell. If we think of SMs as questions, this means that every answer to the question **m** is compatible with every answer to the question **n**. In this sense, **the number of dodos** is orthogonal to **the number of goats**.

III. LEWIS ON SENTENTIAL SM

Lewis' definition of SM as a partition of the logical space does not tell us, given a sentence ϕ, how to find the SM(s) of ϕ. Lewis *is* able to define an interesting relation between sentences and SMs, namely, that of a sentence being *entirely about* a SM. A sentence ϕ is entirely about **m** if and only if ϕ has the same truth-value in all **m**-equivalent worlds. 'The number of planets is nine', for instance, is entirely about **the number of planets**, because if the number of planets is the same in w and w', then either 'The number of planets is nine' is true in both worlds or it is false in both worlds.

However, for any sentence ϕ, there are *lots* of SMs ϕ is entirely about. At one extreme, ϕ is entirely about the SM with the thinnest possible cells: one world per cell (see Yablo 2014)—let us call it the *universal* SM. At the other extreme, ϕ is entirely about the SM with just two cells, one containing the worlds where ϕ is true and the other, the worlds where ϕ is not true—let us call it the *binary* SM of ϕ.

Neither extreme is, in general, a good choice for the role of sentential SM. On the one hand, if we assign to every sentence the universal SM as its SM, then all the sentences turn out to have the same SM. On the other hand, if we assign to each sentence its binary SM as its SM, then we face at least three problems:

- Sentential SMs fail to be hyper-intensional: if ϕ and ψ are true in the same possible worlds, then ϕ and ψ have the same SM. This is an unwelcome result: it is commonly considered a desideratum for a theory of aboutness to distinguish the SM of two tautologies with different non-logical vocabularies: e.g. 'John is bald or John is not bald' should be about John's hairiness, 'Mary is rich or Mary is not rich' should be about Mary's economical status (see, e.g. Hawke 2017: section 3.2).
- Inclusion relations between distinct sentential SMs are blocked: a two-cells partition $\mathbf{m}$ refines a two-cells partition $\mathbf{n}$ only if $\mathbf{m} = \mathbf{n}$. Given that binary SMs are two-cells partitions, this means that if the SM of ϕ is part of that of ψ, then ϕ and ψ have the same SM. However, there should be cases where the SM of a sentence properly includes the SM of another: e.g. the SM of a conjunction should contain the SMs of both of its conjuncts as proper parts.
- Orthogonality overgeneralises: if ϕ and ψ are logically independent, then the SM of ϕ is orthogonal to that of ψ (see Lewis 1988b). As a result, e.g. independent sentences of form *Fa* and *Fb* are bound to have orthogonal SMs despite sharing the same predicate. Or, to take an example similar to the one in Lewis 1988a: 169–70, 'John is in London or John is in Paris' and 'John is in London or John is in Berlin' end up being about orthogonal SMs, whereas intuitively both sentences are about **John's whereabouts**.

Even ignoring these problems, the view that, at least in many cases, the SM of a sentence lies somewhere in between the universal SM and the sentence's binary SM is plausible. Think again about the sentence 'The number of planets is nine'. There seems to be a natural candidate for the role of SM of this sentence: 'The number of planets is nine' is about **the number of planets**, which is neither the universal SM nor the binary SM of 'The number of planets is nine'.

In what follows, we will describe one way to associate sentences with Lewisian SMs that (with rare exceptions) lie in between the universal SM and the sentences' binary SMs.

IV. INFORMAL OUTLINE OF THE PROPOSAL: ATOMIC SENTENCES

Let us take stock. The goal we have just set for ourselves is that of extending Lewis' proposal with an account of sentential SM, that is to say, that of making precise which Lewisian SM, or SMs, correspond to each sentence of a given language. To this aim, Lewis' notion of *being entirely about* is a useful starting point: it is plausible to require that a sentence ϕ be entirely about its SM(s), viz., that all worlds agreeing on ϕ's SM also agree on ϕ's truth value. However, this requirement does not suffice to reduce the number of possible options enough: given a sentence ϕ, there are too many SMs ϕ is entirely about. And, as seen in the previous section, simply choosing either the universal SM or ϕ's binary SM will not do. We need another way to associate sentences with SMs on principled grounds.

We have seen that Lewisian SMs can be thought of as questions. Accordingly, the relation between Lewisian SMs and sentences perfectly parallels the one between questions and their possible answers. Thus, our problem becomes: how is it possible to associate sentences and questions on principled grounds?

Luckily enough, this problem—the problem of associating a sentence with a corresponding question ('the question under discussion')—has received wide attention in the philosophical and linguistic literature. What has emerged is that there is an intimate relation between the questions corresponding to a simple sentence and the sentence's possible *focus structures*, viz., the ways in which the sentence can be focused upon.[4] In the literature on focus it is standard to distinguish between different types of focus (see, e.g. Kiss 1998; Gussenhoven 2007). Throughout the paper, reference is always to so-called *information* (or *presentational*) focus, viz., the kind of focus whose role is that of marking certain sentential constituents as conveying new or non-presupposed information. Consider, for instance, a simple sentence like

(1) Fiona is happy.

There are basically three focus structures this sentence can have (small caps mark prosodic emphasis):

(1a) FIONA is happy;
(1b) Fiona is HAPPY;
(1c) Fiona IS happy.

[4] See, e.g. Rooth 1996: 271. For an early discussion of the relation between questions and focus, see Prior and Prior 1955: 44–5; see also Dretske 1972 on the significance of focus. See Rooth 1985, 1992 for semantic proposals in which focus structures are made to correspond to the contents of questions, understood as sets of alternatives.

Table I. Sentence (1): focus structures, correlated questions and SMs.

Focus structure	Question	SM
FIONA is happy (term focus)	Who is happy?	**Happy individuals**
Fiona is HAPPY (predicate focus)	How is Fiona?	**Fiona**
Fiona IS happy (sentence focus)	Is Fiona happy?	(1)'s binary SM

In (1a) the focus is on the term (*term focus*), in (1b) it is on the predicate (*predicate focus*), and in (1c) the focus is on the whole sentence's truth (*sentence focus*). Statements (1a)–(1c) are perfectly on-topic answers to, respectively:

(1a′) Who is happy?
(1b′) How is Fiona?
(1c′) Is Fiona happy?

Let us observe that the focus part of each sentence can be offered as an answer to the corresponding question (see, e.g. Gussenhoven 2007: 91). For instance, the focus expression in (1a), 'Fiona', provides a perfectly appropriate answer to the corresponding question (1a′), 'Who is happy?'. Let us also note that an answer with the 'wrong' focus structure, for instance (1a) as an answer to (1b′), sounds slightly off topic and pragmatically infelicitous in ordinary contexts.

Now, our guiding thought is that what holds for a sentence's correlated questions also holds for the sentence's correlated (Lewisian) SMs. Thus, (1) will have three correlated SMs, each corresponding to questions (1a′)–(1c′): **Happy individuals**, **Fiona** (or **Fiona's mood**), and (1)'s binary SM, respectively. The correlation between (1)'s possible focus structures and the corresponding questions and SMs is summarised in Table I.

As for the SM **Happy individuals**, we shall identify it with the equivalence relation two worlds are in if and only if the same individuals are happy in both worlds *and the same individuals are not happy in both worlds*. The second, negative requirement is harmless in practice, and it will prove useful in the formal development of the proposal. The SM **Fiona** can be identified with the equivalence relation holding between two worlds exactly when Fiona has the same intrinsic properties in both (see Lewis 1988a, 1988b).

The same pattern holds in general: a sentence of the form *Fa* will have three potentially correlated questions: *What is F?*, *How is a?*, and *Whether Fa*. In turn, these questions correspond to three SMs: **things that are F**, **a** (or **a's features**), and the sentence's binary SM.

It is straightforward to extend our approach to binary relational sentences like:

(2) Al is married to Tom.

The main difference is that, in this case, we have five focus structures instead of three (see Table II).

Table II. Sentence (2): focus structures, correlated questions and SMs.

Focus structure	Question	SM
AL is married to Tom	Who is married to Tom?	**Tom's better half**
Al is married to TOM	Who is Al married to?	**Al's better half**
AL is married to TOM	Who is married to whom?	**Married couples**
Al is MARRIED to Tom	How is Al related to Tom?	**Al's relations to Tom**
Al IS married to Tom	Is Al married to Tom?	(2)'s binary SM.

It is a common assumption that English simple sentences receive a default focus structure in silent reading and in the absence of contextual information to the contrary (see, e.g. Carlson 2015: 64). More specifically, the focus is by default on the predicate in simple unary sentences (predicate focus), and on the second term in binary, relational sentences (term focus). We assume that sentence focus is a highly marked, limiting case.

The general idea should be clear enough. Once the focus structure of a sentence is made precise, the sentence can be made to correspond to a question on principled grounds. Questions, in turn, naturally correspond to SMs.[5]

So far so good as for an intuitive presentation of our approach to the sentential SM of atomic sentences. In the next section, we shall make these informal insights more precise and general, with reference to a very simple formal language.

V. A FORMAL PRESENTATION OF THE PROPOSAL

Let L^{-} be an ordinary first order language with individual variables $x, x_1 \ldots,$ individual constants $a, a_1 \ldots$ and predicates $F, F_1, \ldots, F_1^2, \ldots, F_1^3 \ldots$ We assume that L^{-} has been defined in the usual way.

Our language L is identical to L^{-} except for a single addition: constants and predicates can be *boldfaced*. Boldfaced constants are called *f-constants* and boldfaced predicates are called *f-predicates*. We shall speak of *f-terms* to indicate both f-constants and variables of L. For any individual or predicate constant l, the corresponding f-letter $\mathbf{l}$ is called the *f-variant* of l. Intuitively, f-letters are letters with focus. Thus for instance, in $F\mathbf{a}$ the focus is on the constant a, in

[5] There is a debate in the linguistic literature on the extent to which focus is a semantic phenomenon rather than a pragmatic one. Our account of sentential SM is close in spirit to semantic approaches to focus such as the alternative semantics proposed in Rooth 1985, 1992 (see Rooth 1996 for an overview of the semantic approaches to focus). We take no stance as to whether our proposal can be made consistent with other, more pragmatically oriented approaches such as those proposed in Ginzburg 1996 and Roberts 2012.

Fa the focus is on the predicate F, and so on. If no f-letter occurs in an atomic sentence p, then p is sentence-focused. Thus, e.g. Fa is a sentence-focused sentence of L.[6] Language L can be formally defined as follows:

- If p is an atomic sentence of L^-, then p is a sentence-focused atomic sentence of L.
- If p is an atomic sentence (formula) $F^n_m(t_1, \ldots, t_n)$ of L^-, then any sentence (formula) $p\,[\mathbf{c_i}, \ldots, \mathbf{c_j}]$ obtained by replacing constants $c_i, \ldots, c_j$ in p with their f-variants $\mathbf{c_i}, \ldots, \mathbf{c_j}$ is a term-focused atomic sentence (formula) of L.
- If p is an atomic sentence $F^n_m(c_1, \ldots, c_n)$ of L^-, then $\mathbf{F^n_m}(c_1, \ldots, c_n)$ is a predicate-focused atomic sentence of L.
- If ϕ and ψ are formulae of L and v any variable, then $\neg\phi$, $\forall v\phi$, and $\phi \wedge \psi$ are formulae of L.

It is worth noting a limitation of our formal treatment: it does not allow having quantifiers in bold (i.e., quantifiers cannot be focused upon). However, as we are going to see in section VI, our proposal is still able to assign intuitively plausible SMs to quantified sentences.[7]

We assume that a standard possible-world semantics has been defined for L. More specifically, we assume that (i) each predicate of L has been made to correspond to an intension, viz., a function from possible worlds to extensions; and (ii) for each world w, the domain D_w of the individuals that exist relative to w has been defined (we make no assumption as to whether the underlying model involves a single domain or variable domains); (iii) for each formula ϕ of L and each assignment g to the variables of L, a corresponding set of worlds $|\phi|_g$ has been defined, which represents ϕ's satisfaction-conditions relative to g, viz., the set of worlds where ϕ is satisfied by assignment g. We write $w, g \vDash \phi$ to mean that $w \in |\phi|_g$, viz., that ϕ is satisfied by g in w. We assume that truth is defined in the usual way, as satisfaction by all assignments. We write $w \vDash \phi$ to mean that ϕ is true in world w.

Our aim is to provide an account of the sentential SM of all sentences of L, that is, to specify, for each sentence of L, the corresponding SM. Here is our general plan:

A. Provide an account of the sentential SM of atomic sentences of L;
B. Extend the account A to atomic formulae of L (deal with variables);
C. Extend the account B to molecular formulae of L (deal with connectives);
D. Extend the account C to quantified formulae of L (deal with quantifiers).

[6] Let us stress that this notational choice is only due to simplicity: we do not mean to suggest that sentence focus is the default case. Quite to the contrary, we take sentence focus as a limiting case (see above, p. 8).

[7] Not allowing to have focus on the quantifiers helps us to keep the framework as simple as possible. We plan to explore other ways to assign SMs to quantified statements in future work.

V.1. An account of the sentential SM of atomic sentences of L

Atomic sentences of L can have three kinds of focus structures, namely, sentence focus, predicate focus, and term focus. We shall discuss these possibilities in turn. Hereafter, we write $\sigma(\phi)$ for the SM of the formula ϕ.

If p is a sentence-focused atomic sentence of L, we stipulate that the SM of p is just its binary SM, viz., the two-cells SM upon which two worlds agree if and only if p has the same truth-value in both. More formally:

Sentence focus:

If p is a sentence-focused atomic sentence, $\sigma(p) = \{(w, w') : w \vDash p \Leftrightarrow w' \vDash p\}$

As for predicate focus, let us start with the monadic case for illustrative purposes. Intuitively, given a predicate-focused, monadic atom $\mathbf{F}a$, its SM, $\sigma(\mathbf{F}a)$, is such that two worlds agree upon it if and only if the individual a has the same relevant features in both worlds. Reference to *relevance* is important: arguably, if two worlds agree on *every* feature possessed by an individual a, including such 'bogus' conditions as *being such that individual b is a plumber*, then they must be identical *simpliciter*. Here we remain silent as to how this notion of relevance is cashed out, provided that the set of relevant predicates (those expressing relevant properties) includes the predicate used in the atomic sentence.[8] How to extend these informal remarks to the relational case is obvious. From a formal viewpoint, our approach can be spelled out as follows:

Predicate focus,

monadic: $\sigma(\mathbf{P}c) = \{(w, w') :$ For all relevant predicates X, $w \vDash Xc \Leftrightarrow w' \vDash Xc\}$.

n-adic: $\sigma(\mathbf{R}(c_1, \ldots, c_n)) = \{(w, w') :$ For all relevant predicates X^n, $w \vDash X^n(c_1, \ldots, c_n) \Leftrightarrow w' \vDash X^n(c_1, \ldots, c_n)\}$.

Let us turn to term focus. As hinted at in the informal presentation of our proposal, we require that two worlds agree on the SM of a term-focused monadic sentence if and only if they agree on both the extension *and the anti-extension* of the corresponding condition, which means that they agree on both the extension of that condition and on their domain.[9] Such a requirement is irrelevant in the atomic case, and we impose it for the sake of uniformity, in light

[8] One might identify, as we did with **Fiona** in the previous section, the individual's relevant properties with its intrinsic properties; see also Hawke 2017.

[9] Here we are using 'extension' and 'anti-extension' in an intuitive sense: the extension of a condition at a world w is the subset of the domain of w composed by the objects satisfying that condition, and the anti-extension is the complement of the extension relative to the domain of w. The way we set up things in the formal development of the proposal ensures that when two worlds agree on the SM of an atomic sentence with term focus, then the (anti)extension, in this intuitive sense, of the corresponding condition is the same in the two worlds.

of our approach to quantified formulae (more on this point in due course). Also for the sake of uniformity, we assume that a set of *extended* assignments $g^+, g_1^+ \ldots$ has been defined, which assign a value to all *f-terms* of *L*, that is, to both variables *and f-constants* of *L*. In other words, for any f-term **t** and any extended assignment g^+, $g^+(\mathbf{t})$ is an element of the domain of individuals (possibly, a different element for different assignments). The notion of a sentence ϕ being true in a world w relative to extended assignment g^+ (in symbols: $w, g^+ \vDash \phi$) is defined in a way that perfectly parallels the definition of the standard notion of satisfaction by an assignment in a world. Intuitively, for the limited purpose of providing an account of sentential SM for *L*, we treat f-constants exactly as if they were variables.

Term focus,
monadic: $\sigma(P\mathbf{c}) = \{(w, w') : D_w = D_{w'}$ and, for any $g^+ : w, g^+ \vDash P\mathbf{c} \Leftrightarrow w', g^+ \vDash P\mathbf{c}\}$.
general: If p is an atomic sentence of L involving f-constants $\mathbf{c_1}, \ldots, \mathbf{c_n}$, then $\sigma(p) = \{(w, w') : D_w = D_{w'}$ and for any g^+: $w, g^+ \vDash p \Leftrightarrow w', g^+ \vDash p\}$.

V.2. An account of the sentential SM of atomic formulae of L

In dealing with open formulae of *L*, our guiding thought is that free variables have the same impact on SM as f-constants. This is reasonable. Let us ask, for instance, what SM might correspond to an open formula like 'Al is married to *x*'. By far the most natural choice is **Al's better half**, viz., the same SM we associated with 'Al is married to *Tom*'. This choice allows us to deal with term focus and open formulae in a uniform way, by means of a single clause (remember that an f-term is a term that is either an f-constant or a variable):

Open atoms and term focus: If p is an atomic formula of L involving f-terms $\mathbf{t_1}, \ldots, \mathbf{t_n}$, then $\sigma(p) = \{(w, w') : D_w = D_{w'}$ and for all g^+: $w, g^+ \vDash p \Leftrightarrow w', g^+ \vDash p\}$.

Let us summarise our general account of the sentential SM of atoms of *L*. If p is any atomic formula of *L*, we have that:

If p is sentence-focused, then $\sigma(p) = \{(w, w') : w \vDash p \Leftrightarrow w' \vDash p\}$;
If $p = \mathbf{R}(c_1, \ldots, c_n)$, then $\sigma(\mathbf{R}(c_1, \ldots, c_n)) = \{(w, w') :$ For all X^n, $w \vDash X^n(c_1, \ldots, c_n) \Leftrightarrow w' \vDash X^n(c_1, \ldots, c_n)\}$;
If p is an atomic formula of L involving f-terms $\mathbf{t_1}, \ldots, \mathbf{t_n}$, then $\sigma(p) = \{(w, w') : D_w = D_{w'}$ and for all g^+: $w, g^+ \vDash p \Leftrightarrow w', g^+ \vDash p\}$.

Now consider an atomic sentence p:

Fact. Sentence p is entirely about its SM (in the sense of section III: if two worlds agree on $\sigma(p)$, they agree on the truth value of p).

Proof. We prove this fact by cases:

1. Sentence focus: trivial.
2. Predicate focus: in order for w and w' to agree on $\sigma(p)$ it must be the case that, for all relevant X, $X(a_1, \ldots, a_n)$ is true in w if and only if $X(a_1, \ldots, a_n)$ is true in w'. In V.1, we required that the property or relation expressed by p's predicate be one of the relevant Xs. Thus, p is true in w if and only if p is true in w'.
3. Term focus: w and w' agree on $\sigma(p)$, so the same n-tuples satisfy the condition associated with p in both worlds, hence the n-tuple formed by the individuals denoted by the focused terms present in p satisfies the condition associated with p in w if and only if that n-tuple satisfies the condition associated with p in w'. Hence p is true in w if and only if p is true in w'. □

VI. CONNECTIVES AND QUANTIFIERS

We deal with complex sentences by adopting an *atom-based* approach in the sense of Hawke (2017). Using $\sigma(\phi)$ to denote the SM of ϕ and the symbol $+$ to denote the operation of combining two SMs, we have that:

Negation: $\sigma(\neg\phi) = \sigma(\phi)$
Conjunction: $\sigma(\phi \wedge \psi) = \sigma(\phi) + \sigma(\psi)$

The SM of the negation of a formula is identical to the SM of the original formula, and the SM of a formula whose main connective is a conjunction (or any other truth-conditional binary connective we might want to introduce in the language) is the smallest SM that contains as parts the SMs of its immediate subformulae (remember the definition of the parthood relation between SMs from section II). Since SMs are equivalence relations in our proposal, it is natural to identify $+$ with set-theoretical intersection, for the intersection of two equivalence relations is an equivalence relation stronger than both. In what follows, we assume that $+$ has been defined in this way.

Having assigned SMs to open formulae, we can take as the SM of a quantified sentence the SM of its immediate subformula:

Quantifiers: $\sigma(\forall x\phi) = \sigma(\exists x\phi) = \sigma(\phi)$.

This approach is fairly plausible: 'Everyone loves Maria' is a perfectly felicitous answer to *Who loves Maria?*, so its SM is **Maria's lovers**.

As a consequence of our construction, we have that:

Containment. The SM of a sentence contains as parts (see section II) the SMs of the sentence's subformulae.

We can now prove the following:

Result. Every sentence is entirely about its SM.

If we focus on quantifier-free sentences, **Result** follows from (i) the fact that atomic sentences are entirely about their SMs, (ii) **Containment** and (iii) the following fact, discussed in Humberstone 2000: 57 and Lewis 1988a (where it is called 'Special Compositional Principle'): if each of sentences $\phi_1, \ldots, \phi_n$ is entirely about a SM **m**, then any truth-functional compound of these sentences is entirely about **m**. In order to cover also quantified sentences, here is the full proof by induction on the complexity of formulae.

Proof. Suppose that w and w' agree on $\sigma(\phi)$, and let g^+ be any assignment. We shall prove that $w, g^+ \vDash \phi \Leftrightarrow w', g^+ \vDash \phi$.

1. Base case: for atomic sentences, see section V.2; for atomic formulae, the result follows from the clause in section V.2.
2. Inductive step: Let ϕ be $(\phi_1 \wedge \phi_2)$. Given that w and w' agree on $\sigma(\phi)$, by **Containment** they must agree also on $\sigma(\phi_1)$ and $\sigma(\phi_2)$; by the inductive hypothesis, this entails that they agree on the truth-value of ϕ_1 and on the truth-value of ϕ_2, hence they must agree on the truth value of $(\phi_1 \wedge \phi_2) = \phi$. The case where $\phi = \neg\phi_1$ is analogous. If $\phi = \forall x \phi_1$, then either the quantification is vacuous or not. If it is vacuous, then $\forall x \phi_1$ is equivalent to ϕ_1, so the result follows by the inductive hypothesis. If the quantification is not vacuous, then there must be at least one atomic subformula ψ of ϕ containing x. Given that w an w' agree on $\sigma(\phi)$, then (by **Containment**) they must also agree on $\sigma(\psi)$, which entails, given the clause from section V.2, that $D_w = D_{w'}$. Let g^+ be any assignment: by the inductive hypothesis, for every x-variant g' of g^+, we have that $w, g' \vDash \phi_1 \Leftrightarrow w', g' \vDash \phi_1$; given that $D_w = D_{w'}$, $g'(x) \in D_w \Leftrightarrow g'(x) \in D_{w'}$, so $w, g^+ \vDash \forall x \phi_1 \Leftrightarrow w', g^+ \vDash \forall x \phi_1$. □

VII. THE DISCREET CHARM OF THE MODEST PROPOSAL

In Section III, we discussed the problems raised by the idea of identifying the SM of a sentence with its binary SM. The modest proposal solves all these problems:

- The modest proposal is hyperintensional: two sentences endowed with the same truth conditions need not have the same SM. E.g., provided that the SMs of *Fa* and *Gb* are different, the SM of $Fa \wedge \neg Fa$, which is identical to that of *Fa*, is different from that of $Gb \wedge \neg Gb$ (which is identical to that of *Gb*). This result holds independently of the focus structure of the atomic sentences.

- Intuitive inclusion relations are preserved: e.g. the SM of a sentence ψ is a proper part of the SM of $\phi \wedge \psi$.
- The orthogonality problem disappears: e.g. 'FIONA is happy' and 'AL is happy' share the same SM even though the two sentences are logically independent.

Moreover, sentences of the forms $R(\mathbf{a}, b)$ and $R(\mathbf{b}, a)$ are about different SMs, thus satisfying a natural desideratum (Yablo 2014; Hawke 2017). In our account, 'AL is married to Tom' is about **Tom's better half**, whereas 'Al is married to TOM' is about **Al's better half** (see section IV).

Finally, note that, in our account, the SM of an arbitrary statement like $G\mathbf{b}$ need not be included in a SM of a contradiction like $F\mathbf{a} \wedge \neg F\mathbf{a}$. This marks a further point of departure from Lewis (see 1988b).

A minor modification of our proposal yields an even stronger result. If we limited ourselves to requiring, for two worlds to agree on the SM of an atomic sentence with term focus, that the same individuals satisfy the predicate in both worlds, then the SM of $F\mathbf{a} \wedge \neg F\mathbf{a}$ could be made orthogonal to that of $G\mathbf{b}$. This means that, in the resulting account, there is ground for regarding some instances of *Ex Falso Quodlibet* as fallacies of irrelevance, in the specific sense that the SM of the premise is orthogonal to that of the conclusion. Again, this is not the case in Lewis' (1988b) original account.

These results are interesting, because they show that one can obtain a fine characterisation of sentential SM without departing from standard semantic practice. Our account does not require the underlying semantics to use anything but run-of-the-mill, possible-world semantic resources. For instance, it does not require truthmaker semantics (cf. Yablo 2014; Fine 2016), impossible worlds (Lewis 1988b), or structured propositions (Hawke 2017). (Although the basic idea behind our account—taking focus as a guide to connecting SMs with linguistic structures—is consistent with any of these nonstandard semantic approaches.)

But the account has other virtues beyond its conservativity. Just as the original account by Lewis, it preserves the intuitive connection between SMs and questions. It also links the question associated with a sentence to the sentence's focus structure, connecting Lewis' notion of SM and the linguists' treatment of the *question under discussion*.

It preserves the idea, which inspired early accounts of the notion of aboutness by Ryle (1933), Goodman (1961) and others, that what a sentence is about depends in part on its non-logical vocabulary (non-logical vocabulary is not the only factor, though: remember that the SMs of $R(\mathbf{a}, b)$ and $R(\mathbf{b}, a)$ are different). A further virtue of the account is its uniformity: sentential SMs are the same kind of things as SMs in general, namely, Lewisian SMs (i.e., partitions or equivalence relations on the set of possible worlds or, if you prefer, questions, in the sense made clear in section II). Each sentence of *L* is assigned one SM, not a pair composed of its pro-SM and its anti-SM, like in Yablo 2014.[10]

Moreover, the account respects the idea, defended by Yablo, that truth conditions and SM are two independent factors that jointly determine the meaning of a sentence (Yablo 2014: 2). Not only truth conditions cannot determine SM; in our account, also the reverse holds: there is no way to recover the truth conditions of a sentence from its SM. Indeed, something even stronger holds: there is also no way to recover the binary SM of a sentence from its SM.[11]

In our framework, when an atomic sentence receives sentence focus, then the SM of the sentence is its binary SM. However, it is not possible to define a function that takes as input the SM of a formula and outputs its binary SM, simply because there are formulas with the same SM but different binary SMs. For instance, the SM of 'FIONA is happy' and 'AL is happy' is the same, i.e., **happy people**, despite the fact that the two sentences have different binary SMs.

We are not the only ones to regard the impossibility of recovering the truth conditions of a sentence from its SM as a virtue of an account of sentential SM (Berto et al. 2019). After all, it is plausible to hold that knowing what a sentence is about is not sufficient for knowing its truth conditions: 'FIONA is happy' and 'AL is happy' are both about **happy people**, in the sense that they are both answers to the question 'Who is happy?', but they say something different about that topic, precisely because they have different truth conditions.

The full independence of truth conditions and sentential SM tells the modest proposal apart from other accounts. In our framework, there is no operation that takes as input the SM of a formula and outputs its binary SM. This entails that there is no operation that takes as input the SM of a formula and outputs its truth conditions.

In those approaches in which the positive SM of a sentence is the set of its truthmakers, the positive SM of a sentence determines its truth conditions, because the worlds in which the sentence is true are precisely those in which at least one of its truthmakers obtains (see Fine 2020: section 1).

Also Hawke's (2017) proposal suffers from a similar problem: in his account, the SM of an atomic sentence is akin to a structured proposition; such a proposition does not determine a sentence's truth conditions but, contrary to the present account, it does determine its binary SM.

[10] Another respect in which Yablo's account is less uniform than the present one is that he has to use Lewisian SMs for some purposes (see Yablo 2014: section 3.3), even though in his account the SM of a sentence is not Lewisian.

[11] The reasons why this result is stronger is that identity of truth conditions entails identity of binary SM, but not vice versa (a sentence and its negation share the same binary SM, but have different truth conditions).

Our account differs also from Yablo's account. Yablo (2014) defines the positive SM of a sentence ϕ as a *cover* of the truth-set $|\phi|$ of that sentence (i.e., as a family of subsets of $|\phi|$ such that their union is identical to $|\phi|$). The negative SM of a sentence is a cover of the set of worlds where ϕ is not true. The overall SM of a sentence is the unordered pair of its positive and negative SMs. This means that in Yablo's account it is possible to define a function that takes as input the overall SM of a formula, i.e., the unordered pair of its positive and negative SM, and returns as output the binary SM of the formula, because the binary SM of a formula is identical to the unordered pair of the union of its positive SM and the union of its negative SM.

A further virtue of the account is that it is flexible: we have presented the version of the account in which (i) SMs are questions, (ii) questions are sets of propositions, and (iii) propositions are sets of possible worlds, but other variants might be obtained by retaining (i) and (ii) and giving up the intensional conception of propositions, that is, (iii).

In our account, the SMs of logically equivalent formulae might be different, as we noted. And the SM of 'Obama is human', i.e., **human beings**, is different from the SM of 'Felix is a cat', i.e., **cats**, even though they both involve essential properties. If we switch to other examples, though, the situation is more problematic: the SM of 'Two is even' should be **even numbers** and that of 'Two is prime' should be **prime numbers**. But prime and even numbers are the same in all worlds, so both **even numbers** and **prime numbers** are SMs over which all worlds agree: conceived as partitions, they are the trivial partition with just one cell containing all worlds.

The source of this problems lies in the Lewisian conception of SMs as (the partitions generated by) equivalence relations, quite independently of how SMs are connected to sentences. In the Lewisian framework it might be natural to identify **arithmetic** with the SM over which two worlds agree exactly when the arithmetical truths are the same in both worlds and **topology** with the SM over which two worlds agree exactly when the same topological truths hold in both. But given that the arithmetical and the topological truths are necessary, **arithmetic** and **topology**, conceived in this way, turn out to be the same SM, i.e., the trivial SM. Lewis (1988b) calls this *the librarian problem*, on account of the fact that, from the perspective of a librarian, topology and number theory are two different subjects matter, with different sections of the library dedicated to them.

How to modify the modest proposal in order to obtain an even more fine-grained account of (sentential) SM is an interesting question, but one that we must leave for future work. Here, we confine ourselves to a few brief remarks.

First, it might be that, in order to solve the librarian problem, we need to use impossible worlds, as Lewis suggested.[12] But a virtue of the modest account is to make it clear that we do not need impossible worlds to account for some phenomena related to hyperintensionality. As an example, we do not need impossible worlds to show that some instances of *Ex Falso Quodlibet* constitute a fallacy of relevance.

Second, as we noted, it is possible to abandon the conception of propositions as sets of possible worlds and still retain many aspects of the modest proposal (that SMs are questions, that a question is a set of propositions, that there is a link between the SM of a sentence and its focus structure).

Summing up: we have proposed an account of sentential SM that combines Lewis' conception of SM with some ideas from the linguistic literature on the notions of focus and of question under discussion. The result is technically simple and intuitively plausible. Maybe we need to go beyond the modest proposal to obtain a fully satisfactory theory of SM. Maybe, but we still think that the modest proposal deserves to be part of the conversation on SM: it shows how much can be obtained with conventional semantic tools, thereby deepening our understanding of where exactly the need for non-conventional semantic tools arises.[13]

REFERENCES

Berto, F. (2018) 'Aboutness in Imagination', *Philosophical Studies*, 175/8: 1871–86.

Berto, F., Hawke, P. and Hornischer, L. (2019) 'Foundations of Two-Component Semantics', unpublished manuscript.

Carlson, K. (2015) 'Clefting, Parallelism, and Focus in Ellipsis Sentences', in L. Frazier and E. Gibson (eds.) *Explicit and Implicit Prosody in Sentence Processing*, 63–83. Dordrecht: Springer.

[12] Actually, even in a purely intensional framework, the intension of 'prime number' is different from the intension of 'even number'. This difference might be exploited to distinguish the two SMs **prime numbers** and **even numbers** without resorting to impossible worlds. Here we do not have the space to discuss this strategy and how it can be made compatible with Lewis' conception of SM.

[13] The authors of this paper contributed equally to it. The ideas and results presented in this paper derive from an extensive collaboration between the authors. Sections 1 and 7 were jointly written. Matteo Plebani wrote section 2, 3, and 6. Giuseppe Spolaore wrote sections 4 and 5. Matteo Plebani acknowledges that the research activity that led to the realization of this paper was carried out within the Department of Excellence Project of the Department of Philosophy and Educational Sciences of the University of Turin (ex L. 232/2016). Matteo Plebani also acknowledges financial support from FEDER/Ministerio de Ciencia, Innovación y Universidades - Agencia Estatal de Investigación - Proyecto (FFI2017-82534-P). Giuseppe Spolaore acknowledges support from the project 'Polarization of irrational collective beliefs in post-truth societies. How anti-scientific opinions resist expert advice, with an analysis of the anti-vaccination campaign' (PolPost) - CARIPARO Foundation — Ricerca Scientifica di Eccellenza 2018. Many thanks to Peter Hawke and Sandro Zucchi, to audiences in Amsterdam, Novara, Milan and Madrid, and to two anonymous referees who provided excellent comments on a previous version of the paper.

Cross, C. and Roelofsen, F. (2018) 'Questions', in E. N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*, Spring 2018 edition. Stanford: Metaphysics Research Lab. <https://plato.stanford.edu/archives/spr2018/entries/questions/> accessed 14 July 2020.
Dretske, F. I. (1972) 'Contrastive Statements', *Philosophical Review*, 81/4: 411–37.
Felka, K. (2018) 'Comments on Stephen Yablo's *Aboutness*', *Erkenntnis*, 83/6: 1181–94.
Fine, K. (2016) 'Angellic Content', *Journal of Philosophical Logic*, 45: 199–226.
——— (2020) 'Yablo on Subject-Matter', *Philosophical Studies*, 177/1: 129–71.
Ginzburg, J. (1996) 'Dynamics and Semantics of Dialogue', in J. Selignman and D. Westerstahl (eds.) *Language, Logic and Communication*, 221–37. Stanford: CSLI.
Goodman, N. (1961) 'About', *Mind*, 70/277: 1–24.
Groenendijk, J. and Stokhof, M. (1984) *Studies on the Semantics of Questions and the Pragmatics of Answers*. PhD thesis, Department of Philosophy, University of Amsterdam.
Gussenhoven, C. (2007) 'Kinds of Focus in English', in C. Lee, M. Gordon and D. Büring (eds.) *Topic and Focus: Cross-Linguistic Perspectives on Meaning and Intonation*, 83–100. Dordrecht: Springer.
Hamblin, C. L. (1973) 'Questions in Montague English', *Foundations of Language*, 10/1: 41–53.
Hawke, P. (2017) 'Theories of Aboutness', *Australasian Journal of Philosophy*, doi:10.1080/00048402.2017.1388826.
Humberstone, L. (2000) 'Parts and Partitions', *Theoria*, 66/1: 41–82.
Kiss, K. É. (1998) 'Identificational Focus Versus Information Focus', *Language*, 74/2: 245–73.
Lewis, D. (1988a) 'Statements Partly About Observation', *Philosophical Papers*, 17/1: 1–31.
——— (1988b) 'Relevant Implication', *Theoria*, 54/3: 161–74.
Moltmann, F. (2018) 'An Object-Based Truthmaker Semantics for Modals', *Philosophical Issues*, 28/1: 255–88.
Osorio-Kupferblum, N. (2016) '*Aboutness*, Critical Notice', *Analysis*, 76/4: 528–46.
Prior, A. and Prior, M. (1955) 'Erotetic Logic', *Philosophical Review*, 64/1: 43–59.
Roberts, C. (2012) 'Information Structure in Discourse: Towards An Integrated Formal Theory of Pragmatics', *Semantics and Pragmatics*, 5/6: 1–69.
Rooth, M. (1985) *Association with Focus*. PhD thesis, Department of Linguistics, University of Massachusetts.
——— (1992) 'A Theory of Focus Interpretation', *Natural Language Semantics*, 1: 75–116.
——— (1996) 'Focus', in S. Lappin (ed.) *The Handbook of Contemporary Semantic Theory*, 271–97. London: Basil Blackwell.
Rothschild, D. (2017) 'Yablo's semantic machinery', *Philosophical Studies*, 174/3: 787–96.
Ryle, G. (1933) 'About', *Analysis*, 1/1: 10–12.
Yablo, S. (2014) *Aboutness*. Princeton: Princeton University Press.

[1] *Università degli studi di Torino, Italy. E-mail: plebani.matteo@gmail.com*
[2] *Università degli studi di Padova, Italy. E-mail: giuseppe.spolaore@unipd.it*