

Verum focus in update semantics

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1 Introduction

This squib is motivated by two observations about verum focus. First, despite the intuitive idea that a verum-focused proposition $\mathbf{vf}(p)$ requires a salient alternative $\neg p$ (see e.g. Goodhue 2018), there are cases where this is not so clear. Sometimes, a speaker can use verum focus in order to express endorsement of an interlocutor’s opinion, as in (1). In such cases, it is not obvious that a negative alternative ever has to be uttered, or even inferred.

- (1) A: It’s really nice out today.
B: It is really nice out.

Second, sometimes a linguistic expression appears to act as an antecedent for a subsequent verum focus, but only when the antecedent and verum-focused proposition are in a certain logical configuration. For instance, while expressions of the form *if p , then $\mathbf{vf}(p)$* are infelicitous (2a) (Stockwell 2020: ch.2), expressions of the form *if p —and $\mathbf{vf}(p)$* , with *and $\mathbf{vf}(p)$* an appositive, are infelicitous (2b).

- (2) a. # If it’s raining, it is raining.
b. If it’s raining—and it is raining—I don’t want to go outside.

To account for these and other data, I argue for the following condition on using a verum-focused proposition $\mathbf{vf}(p)$, stated in the framework of update semantics.

- (3) A sequence of updates $[\phi_1] \cdots [\phi_n][\mathbf{vf}(p)]$ is felicitous only if $\exists \phi_i, 1 \leq i \leq n$, such that

$$\begin{cases} [\phi_i] \neq [p] & \text{if } p \text{ is deaccented} \\ [\phi_i] \neq [\text{alt}(p)] & \text{if } p \text{ contains focus} \end{cases}$$

where $\text{alt}(p)$ is some contextually relevant focus alternative of p .

2 Defining an update semantics

2.1 Variables

Our metalanguage consists of

- (4) a. Atomic propositions p, q, \dots
b. Connectives \neg, \wedge , and \rightarrow , and the modal operator \diamond .
c. Non-atomic propositions (ϕ, ψ, \dots) , computed recursively from atomic propositions and the operations in (b).

- d. A variable π denoting atomic *subjective* propositions. Subjective propositions include sentences involving predicates of personal taste like *Roller coasters are fun* and *This chili is tasty* (Lasersohn 2005), but also sentences involving what Lasersohn (2005: 645) calls “more philosophically ‘charged’ predicates,” such as *This candle smells good* and *It’s a beautiful day*.¹
- e. Contexts (c, c', \dots) are sets of worlds w . The ignorant context W is the set of all worlds. The null context \emptyset is the context which *rules out* all worlds.
- f. Eliminative updates $[\phi]$ and additive updates $[\phi]$. $[\cdot]$ and $[\cdot]$ turn propositions (= sets of worlds, type $\langle s, t \rangle$), into updates (= functions from sets of worlds to sets of worlds, type $\langle \langle s, t \rangle, \langle s, t \rangle \rangle$).
- g. A variable $[\cdot]$ over the set $\{[\cdot], [\cdot]\}$. (When we use an expression like $[\phi]$, it means that all updates in a definition/equation containing ϕ either all evaluate to $[\phi]$ or all evaluate to $[\phi]$.)

2.2 Support and Entailment

We also define notions of *support* (corresponding to Veltman’s 1996: 221 *acceptance*) and *dynamic entailment* (corresponding to Veltman’s 1996: 224 *validity*₂). Note that our notions of support and entailment are defined over updates, rather than the propositions contained in those updates. This will be important for working out the entailment relations between additive and eliminative updates.

- (5) SUPPORT. A context c supports an update $[\phi]$ iff $c[\phi] = c$.
- (6) ENTAILMENT. $[\phi] \models [\psi]$ iff for any context c , $c[\phi] = c[\phi][\psi]$.

2.3 Eliminative Updates

We proceed by defining how metalanguage expressions eliminatively update the context.

- (7) ELIMINATIVE UPDATE RULES
 - a. *Atomic propositions.* $c[p] = c \cap p$
 - b. *Negation.* $c[\neg\phi] = c \setminus c[\phi]$
 - c. *Conjunction.* $c[\phi \wedge \psi] = c[\phi][\psi]$
 - d. *Conditionals.* $c[\phi \rightarrow \psi] = \begin{cases} c & \text{if } c[\phi][\psi] = c[\phi] \\ \emptyset & \text{if } c[\phi][\psi] \neq c[\phi] \end{cases}$
 - e. *Epistemic possibility.* $c[\diamond\phi] = \begin{cases} c & \text{if } c[\phi] \neq \emptyset \\ \emptyset & \text{if } c[\phi] = \emptyset \end{cases}$
 - f. *Subjective propositions.* $c[\pi]_{\mathbf{J}} = \{w \in c \mid \mathbf{J} \in J_w(\pi)\}$

The rules for atomic propositions, negation, and epistemic possibility are Veltman’s (1996). Conjunction is sequential update, as in e.g. Groenendijk, Stokhof, and Veltman (1996).

The exact update effect of conditionals is not all that important for the present purposes

¹ We use π to remind us of the \mathbf{p} in “personal taste,” but also because—of course— π is tasty!

(all that's important is for *if* p to not entail p). I've opted for a particular instantiation of the "Ramsey test" for conditionals, in this case borrowing from Willer and Kennedy (2020: 19–20). $c[\phi \rightarrow \psi]$ just tests whether the local context $c[\phi]$ supports $[\psi]$. If it does, return c . If it doesn't, return \emptyset .

Subjective propositions use a "judge-based" analysis, inspired by Lasersohn (2005). Updates are annotated with a source J , which denotes the individual from whom the information in the update comes. (We can assume that all updates have a source of information, but we omit the J when the source of the information has no effect on the update potential.) We also make use of a function J_w , which stores for each subjective proposition π a set of individuals J such that J finds π true in w .

2.4 Additive updates

The point of an additive update $[\phi]$ is to add some ϕ -worlds to the context. But which ones? It turns out that additive updates are more complicated to define than eliminative updates, in part because we can't use simple intersection or union. For example, if we let $c[p] = c \cup p$, then we might end up adding worlds from p which are inconsistent with worlds in c ! In lieu of defining additive updates, I will just list some properties that I intend additive updates to have.

(8) ADDITIVE UPDATE PROPERTIES

- a. $[\phi] \models [\diamond \phi]$
- b. $\emptyset[\phi] = \phi$
- c. If $c[\diamond \phi] = c$, then $c[\phi] = c$.
- d. $[\phi] \models [\phi]$
- e. $[\phi] \neq [\phi]$

Property (8a) just says that an additive update should *pay off*, in the sense that updating any context c with $[\phi]$ should add at least one ϕ -world to c . This means that $c[\phi]$ should be able to pass any *might*- ϕ test: $c[\phi][\diamond \phi] = c[\phi]$.

Property (8b) just says that updating a null context with $[\phi]$ will return all the worlds in which ϕ is true.

Property (8c) says that updating a context c which is already compatible with ϕ will have no effect on the context. Note that under the definition of dynamic entailment in (6), it does *not* follow from (8b) that $[\diamond \phi] \models [\phi]$. Observe that for contexts c incompatible with ϕ , $c[\diamond \phi] = \emptyset$, while $c[\diamond \phi][\phi] = \emptyset[\phi] = \phi$. (It makes sense for $[\diamond \phi]$ not to entail $[\phi]$. All $[\diamond \phi]$ does is test whether the context is compatible with ϕ . $[\phi]$, on the other hand, sometimes has a non-idle effect.)

Property (8d) just says that $[\phi]$ is idempotent. Updating a context c twice with $[\phi]$ is equivalent to updating it once with $[\phi]$: $c[\phi][\phi] = c[\phi]$.

Finally, property (8e) says that performing an additive update $[\phi]$ to a context c does not guarantee that $c[\phi]$ supports $[\phi]$. To see why, consider a context c' which supports $[\neg \phi]$. Does the updated context $c'[\phi]$ equal $c'[\phi][\phi]$? No. $c'[\phi]$ will include both ϕ -worlds and

($\neg\phi$)-worlds, but $c'[\phi][\phi]$ will only include ϕ -worlds. So $[\phi] \neq [\phi]$. (Note that this is why we had to define dynamic entailment over updates in (6), rather than over propositions.)

Property (8e) will be the crucial property that explains the felicity of verum focus in contexts of *realization* (§5).

3 Conditionals, conjunction, negation, and might

3.1 “If p then $\text{vf}(p)$ ” vs. “If p—and $\text{vf}(p)$ ”

Stockwell (2020: ch.2) discusses contrasts similar to (9).²

- (9) a. If it's raining, it's raining.
 b. # If it's raining, it is raining.

In order to explain the unacceptability of sentences like (9b), Stockwell invokes the distinctness clause from Rooth (1992).

- (10) Rooth's INDIVIDUAL CASE (Rooth 1992: 93)
 A phrase ϕ with a focus antecedent γ “presupposes that γ is an element of the focus semantic value for ϕ **distinct from the ordinary semantic value** of ϕ .”

The sentence in (9b) is bad according to Stockwell because both the verum-focused expression in the consequent of the conditional, and its alternative in the conditional antecedent, have the same ordinary semantic value: $[[\gamma]]^o = [[\phi]]^o$.

- (11) # If [γ it's raining], [ϕ it is raining].

However, the sentence in (12b) is problematic for Stockwell's analysis.

- (12) a. # If it's raining—and it's raining—I don't want to go outside.
 b. If it's raining—and it is raining—I don't want to go outside.

(12b) shows verum focus being allowed in an appositive which intervenes between a conditional antecedent and its consequent. However, (12b) still has two phrases whose ordinary semantic values are the same: $[[\gamma]]^o = [[\phi]]^o$.

² Stockwell's examples actually use VP ellipsis for (9b), a difference which will not matter for these cases. In general though, verum focus and VP ellipsis do not always track perfectly in English. For one thing, VP ellipsis is allowed with focus falling on the subject instead of the auxiliary, in which case there is no verum interpretation:

- (i) Mary's having a party, and John is, too.

For another thing, verum focus and VP ellipsis sometimes give rise to different kinds of inferences about the epistemic state of the speaker. The answer in (iia) seems to suggest prior doubt—that B thought that A did *not* go to California—while the answer in (iib), though compatible with prior doubt, can also simply suggest mild surprise. (Cf. Goodhue's 2018 distinction between “strong” and “weak” epistemic bias.)

- (ii) A: I went to California this past weekend.
 a. B: You did go to California?
 b. B: You did?

(13) If [γ it's raining]—and [ϕ it is raining]

If this was simply about finding some contrasting antecedent somewhere in the prior discourse, we would expect *if p—and $\mathbf{vf}(p)$* to be bad, contrary to fact.

The difference between *if p—and $\mathbf{vf}(p)$* and *if p, then $\mathbf{vf}(p)$* seems to be that the local context for ϕ in *if p—and $\mathbf{vf}(p)$* is simply the global context c , while the local context for ϕ in *if p, then $\mathbf{vf}(p)$* is the global context c updated with γ . Updating the context with γ seems to rule out verum focus in ϕ .

How can we explain this using the condition we proposed in (3)? My update semantics doesn't have a rule for appositives, so I am going to assume that appositives intervening between a conditional antecedent and consequent just update the context after the local context of the conditional is closed off, as in (14b). This ensures that the appositive always makes an update effect on the global context, and not inside the conditional, as desired. Obviously, a more sophisticated update semantics for appositives is desired (though I should point out that all that's needed to make the theory work is having the antecedent of the conditional not entail its prejacent in the global context).

- (14) a. # $c[p \rightarrow \mathbf{vf}(p)]$
 b. $c[p \rightarrow q][\mathbf{vf}(p)]$

The infelicity of (14a) comes about when the conditional is expanded: $c[p \rightarrow \mathbf{vf}(p)] = c$ iff $c[p][\mathbf{vf}(p)] = c[p]$. In order for $\mathbf{vf}(p)$ to be admitted, we must compute $c[p][\mathbf{vf}(p)]$, but this sequence of updates is infelicitous. The update $[p]$ entails the prejacent of $[\mathbf{vf}(p)]$, hence by (3), we get infelicity. Crucially, the infelicity of *if p, then $\mathbf{vf}(p)$* comes about *within* the local context of the conditional.

The felicity of (14b) is explained because the update $[p \rightarrow q]$ does not entail $[\mathbf{vf}(p)]$.

3.2 Conjunction, negation, and might

Turning to some new data, we can see that verum focus is infelicitous in $p \wedge \mathbf{vf}(q)$ sequences, but felicitous in $\neg p \wedge \mathbf{vf}(q)$ and $\diamond p \wedge \mathbf{vf}(q)$ sequences:

- (15) a. # He's crazy, and he is stupid. # $p \wedge \mathbf{vf}(q)$
 b. He's crazy, and he's stupid.
 (16) a. He's not crazy, but he is stupid. $\neg p \wedge \mathbf{vf}(q)$
 b. He's not crazy, but he's stupid.
 (17) a. He might be crazy. He definitely is stupid. $\diamond p \wedge \mathbf{vf}(q)$
 b. He might be crazy. He's definitely stupid.

Quick note: why did we put focus inside the verum-focused proposition here? It's important to always try to compare verum-focused expressions to their broad-focused counterparts, so that we can test whether the infelicity of $\mathbf{vf}(q)$ is a function of the verum focus \mathbf{vf} , or of the propositional content q . In this case, we put focus inside the verum-focused

proposition because expressions of the form $p \wedge p$, $\neg p \wedge p$, and $\diamond p \wedge p$ are infelicitous for independent reasons (i.e. even the broad-focused propositions in the (b)-examples above would have sounded bad): $p \wedge p$ and $\diamond p \wedge p$ are redundant, and $\neg p \wedge p$ is a contradiction.

What does adding focus inside $\mathbf{vf}(q)$ do? In this case, our condition in (3) tells us to test whether $\text{alt}(q) = p$ is entailed by some update in the update sequence. If it is, verum focus is infelicitous. Here's what we get:

(15a) is *infelicitous* because $c[p \wedge \mathbf{vf}(q)] = c[p][\mathbf{vf}(q)]$, and $[p] \models [p] = [\text{alt}(q)]$.

(16a) is *felicitous* because $c[\neg p \wedge \mathbf{vf}(q)] = c[\neg p][\mathbf{vf}(q)]$, and $[\neg p] \not\models [p] = [\text{alt}(q)]$.

(17a) is *felicitous* because $c[\diamond p \wedge \mathbf{vf}(q)] = c[\diamond p][\mathbf{vf}(q)]$, and $[\diamond p] \not\models [p] = [\text{alt}(q)]$.

4 Subjective propositions

One natural context in which verum focus seems to be productive is in exchanges involving subjective propositions:³

(18) A: This candle smells good.
B: It does smell good.

(19) A: That pizza last night was tasty.
B: It was tasty.

(20) A: It's nice out today.
B: It is nice out.

The updates for these exchanges all look like: $c[\pi]_{\mathbf{A}}[\mathbf{vf}(\pi)]_{\mathbf{B}}$. That is, A asserts π , and B asserts $\mathbf{vf}(\pi)$. With subjective propositions, it will always be the case that $[\pi]_{\mathbf{A}} \not\models [\pi]_{\mathbf{B}}$. The update $[\pi]_{\mathbf{A}}$ will narrow c down to those worlds w such that $\mathbf{A} \in J_w(\pi)$. However, this will not guarantee that all remaining w 's will be worlds in which $\mathbf{B} \in J_w(\pi)$, since it is possible for there to be worlds where $J_w(\pi)$ contains A but not B.

³ Bill and Koev (2021: 189) claim that the generalization is that these contexts involving "extreme" adjectives, like *amazing* in (i):

(i) A: Paula is an amazing linguist.
B: She is an amazing linguist.

I believe that this is the incorrect generalization. Rather, what (i) has in common with the examples in (18), (19), and (20) is that they all involve subjective propositions, propositions whose truth depends on who utters them.

5 Realization and re-membering

Sometimes, we wind up in situations where we realize that we are mistaken. Such situations are often contexts where verum focus seems natural. Compared to broad focus in the (a)-examples, the (b)-examples suggest that in some prior information state, the speaker thought: that it wasn't raining (21b), that there isn't a King of Sweden (22b), and that they didn't leave their keys on the counter (23b). Speakers are able to mark their mistakenness by using verum focus.

(21) [*looks out window*]

- a. Oh, it's raining.
- b. Oh, it is raining.

(22) A: The King of Sweden came to visit yesterday.

- a. B: There's a King of Sweden?
- b. B: There is a King of Sweden?

(23) a. That's right, I left my keys on the counter.

- b. That's right, I did leave my keys on the counter.

When we are mistaken, it is because we have eliminated possibilities that we realize still ought be considered as candidates for the actual world. In such cases, we would like to add worlds back to our information state that we'd previously thrown away. In other words, we'd like to re-member the worlds that we'd previously de-membered. (When de-membering is forgetting, as in (23), re-membering is just remembering.) I will assume that re-membering is performed across the board by additive updates $[\phi]$.

Consider (21). What kind of information state must the speaker be in to use verum focus in (21b)?

Assume first that the speaker is in an information state c which supports \neg **raining**. When the speaker looks out the window, they see that it is raining, and so they must re-member c with **raining**-worlds. They do this with the additive update $[\mathbf{raining}]$. They then utter $\mathbf{vf}(\mathbf{raining})$. This sequence is shown in (24a). As we saw in (8e), additive updates $[\phi]$ do not entail their corresponding eliminative updates $[\phi]$. Therefore, there is an update in the sequence in (24a), namely $[\mathbf{raining}]$, which does not entail the prejacent of the verum-focused proposition $[\mathbf{raining}]$. Thus, verum focus is felicitous in (24a).

Now consider what happens when the speaker is in an information state c' which is compatible with both **raining** and \neg **raining**. They look out the window, and see that it's raining. This time, they perform an eliminative update $[\mathbf{raining}]$, which throws out the \neg **raining**-worlds. Then they utter $\mathbf{vf}(\mathbf{raining})$. This sequence is shown in (24b). But now there is no update in the sequence (24b) which doesn't entail $[\mathbf{raining}]$, making verum focus infelicitous.

- (24) a. $[\mathbf{raining}]|\mathbf{vf}(\mathbf{raining})|$
b. # $[\mathbf{raining}]|\mathbf{vf}(\mathbf{raining})|$

What this tells us is that when we hear verum focus in (21b), we infer that the speaker was in a previous information state which supported \neg **raining**, i.e. that they previously thought it wasn't raining.

In order for this line of argumentation to pan out, it must be that speakers perform additive updates *optimally*, in the sense that they don't perform an additive update if it has an idempotent effect. So, if a speaker is in an information state which is compatible with it raining or it not raining, and they want to rule out the \neg **raining**-worlds, they will not update with [**raining**], since doing so would leave the information state unchanged (see (8c)), and in particular, would not achieve the desired effect of ruling out \neg **raining**.

Examples (22) and (23) work parallel to (21). Note, interestingly, that this analysis predicts that the felicity of verum focus in realization contexts does not depend upon the source x of the additive update $[\phi]_x$. It doesn't matter whether a speaker additively updates their information state by direct visual contact (21), hearsay (22), or remembering (23). Additive updates $[\phi]$ never entail their eliminative counterparts $[\neg\phi]$, so felicity of verum focus in realization contexts, as opposed to when subjective propositions are used, is not dependent upon the source of the information.

Now, analysis given in this section is a bit simplistic, in that it assumes $\mathbf{vf}(p)$ in the (b)-examples in (21)–(23) is used only when the speaker was in an information state c which supported $\neg p$. However, I think it is very reasonable to read $\mathbf{vf}(p)$ in (21b)–(23b) as suggesting not that one's prior *information state* supported $\neg p$, but that one's *expectations* supported $\neg p$, even when the larger context was compatible with both $\neg p$ and p . For now I leave out an analysis based on expectations (cf. Veltman 1996 for a formal model of expectations within information states), but this seems like the right way to go to get a more nuanced analysis out of (21)–(23).

6 Theoretical extensions

There are many ways we might consider extending the theory. These include:

- a more nuanced analysis of *realization*, in which mistakenness depends upon worlds falling outside of a set of *expected* worlds $e \subseteq c$. Cf. Veltman (1996) for some formal foundations for defining an expected set e .
- extension to cases involving verum focus embedded under other sentential operators. As it stands, the analysis does not yet predict the acceptability of B's use of verum focus in (25), because the local context of $\mathbf{vf}(p)$ is just A's utterance, which entails $[p]$. Maybe $\mathbf{vf}(p)$ always needs to be compared to its antecedent within the update it makes to the global context. So in (25), A's utterance does not entail $[\diamond \neg p]$, and maybe this is enough to make verum focus felicitous.

(25) A: Let's go to the museum tomorrow.
B: There might not be a tomorrow. (The exhibition closes today.) $\diamond \neg \mathbf{vf}(p)$

- incorporating salience/at-issueness. That this may be needed can be demonstrated by data like (26) from Goodhue (2018).

(26) a. *B thinks Sue is writing a book, but when she asks Sue, Sue denies it. Then A says, "I'm glad that Sue is writing a book."*
B: So she is writing a book.

b. *B can't find Sue. She asks C where Sue is, and C says that she is busy reading a book. A little later, A says, "I'm glad that Sue is writing a book."*
B: # So she is writing a book.

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