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Issues with Molecules in Natural Semantic Metalanguage

Abstract: The paper examines the theoretical merit of "semantic molecules" in Natural Semantic Metalanguage (NSM). Although semantic molecules are said to trace semantic dependence and necessity, compress complexity, and to account for what I call its productivity, that doesn't appear to be the case. This can be illustrated on the basis of a comparison of two explications for the same complex meaning—one containing a molecule and the other its decomposed elements. Counterfactual considerations suggest that the latter is not semantically dependent on the lexicalized molecule and that it is, in turn, not necessary. The other side of the comparison cements the point. This leaves the issue of compression, complexity, and productivity—none of which are helped by semantic molecules, as they appear to do little more than conceal complexity. Meanwhile, they are not required to account for productivity. It seems that molecules may need to be rethought.

Keywords: Equivalence, Semantic molecules, Theory, NSM, Compression

Pioneered and championed by Anna Wierzbicka, Cliff Goddard, and others, Natural Semantic Metalanguage (NSM) is a robust semantic program (Wierzbicka, 1996; Wierzbicka & Goddard, 2014; see also Peeters, 2006). Focusing on primitive meanings, non-circular definitions, and interlingual analyses, it offers a unique take on linguistic phenomena and endeavors to shed light on increasingly neglected areas like lexical meaning. Of particular import is its thorough use of empirical research. That being said, over the years, NSM has faced a significant amount of criticism concerning its key ideas, like semantic primitives, the universality of its generalizations, and its plausibility.[1] Even so, NSM has persevered—refining its work, lodging responses,[2] and continuing to grow.

Among the more recent developments in NSM is an increasing focus on the place and nature of "semantic molecules," both as a partial solution to old problems and as a desirable advancement in its own right. They feature quite prominently in the architecture of the theory itself, and appear to be quite intuitive at first glance. However, the theoretic merit, substance, and contribution of semantic molecules is far from clear when considered in a broader meta-theoretic context, which becomes more apparent when examined with the logical tools of philosophy of language and its built-in concern for conceptual rigor. In what follows, I propose to examine semantic molecules within the framework of NSM in terms of their theoretical contribution as such—that is, in terms of whether they are capable of doing the theoretical work expected of them, given NSM's extant commitments. The argument below neither problematizes different languages nor makes much ado about semantic primitives. Instead, it relies on simple counterfactuals, clarifications, and equivalences to outline the theoretical issues that semantic molecules appear to be troubled by in their current form.

The paper begins with an overview of the relevant features and mechanics of NSM in section 1. I conclude the section by stating the claims that I will aim to scrutinize—including the idea that semantic molecules are a matter of semantic dependency, that they are necessary elements of explications, and that they explain NSM's productivity as well as offer a form of semantic compression. In section 2, I present an argument concerning semantic dependency and necessity. In section 3, I outline compression and endeavor

[1] See Murray & Button (1988), Harré & Krausz (1996, pp. 41-48), Riemer (2006).
[2] See, addressing the first two in the preceding note, Wierzbicka (1988), Goddard (1998).

to show that semantic molecules offer no respite for complexity (and hence, no help in terms of plausibility). I provide a summary along with concluding remarks in section 4.

1. Natural Semantic Metalanguage

NSM is an admirably accessible theory, both thanks to its intrinsic structure and its aversion to technical language. It centers on reductive paraphrase, wherein meanings are explained and defined through simpler, more accessible terminology. It avoids circularity by making use of a core of semantic primitives—a collection of inherent concepts whose meanings are indefinable. These primitives are considered the 'simple universal concepts that are embedded in the lexicons of all (or most) human languages' (Wierzbicka & Goddard, 2014, p. 11). Universal semantic primitives are referred to as "semantic primes" in NSM. Primes have a corresponding (and equally universal) grammar which allows them to be put together in sentences. Hence, 'semantic primes and their grammar together constitute a kind of mini-language which can be thought of as the "intersection of all languages"' (2014, p. 12). There are, to date, 65 primes, and their English-language exponents are presented below (table 1):

I~ME, YOU, SOMEONE, SOMETHING~THING, PEOPLE, BODY	Substantives
KIND, PARTS	Relational substantives
THIS, THE SAME, OTHER~ELSE	Determiners
ONE, TWO, SOME, ALL, MUCH~MANY, LITTLE~FEW	Quantifiers
GOOD, BAD	Evaluators
BIG, SMALL	Descriptors
KNOW, THINK, WANT, DON'T WANT, FEEL, SEE, HEAR	Mental predicates
SAY, WORDS, TRUE	Speech
DO, HAPPEN, MOVE, TOUCH	Actions, events, movement, contact
BE (SOMEWHERE), THERE IS, BE (SOMEONE)'S, BE (SOMEONE/SOMETHING)	Location, existences, possession, specification
LIVE, DIE	Life and death
WHEN~TIME, NOW, BEFORE, AFTER, A LONG TIME, A SHORT TIME, FOR SOME TIME, MOMENT	Time
WHERE~PLACE, HERE, ABOVE, BELOW, FAR, NEAR, SIDE, INSIDE	Space
NOT, MAYBE, CAN, BECAUSE, IF	Logical concepts
VERY, MORE	Intensifier, augmentor
LIKE~WAY~AS	Similarity

Table 1 (Wierzbicka & Goddard, 2014, p. 12) – Semantic primes, grouped into related categories [3]

The nature of primes, their interplay with use, and their other theoretical features won't be at issue here. What will be at issue is the way these semantic primes, with their essentially simple, indefinable

[3] It should be noted that these primes are supposed to be expressible in practically any language—representatives of the NSM program have produced equivalent tables for a number of other languages. I have glossed over their details, as they are beyond the scope of the paper.

meanings, interface with the complex meanings that populate most of a given language. Complex meanings are precisely meanings that *are* effectively definable.

The relationship between complex meanings and primes is captured through a complex meaning's *explication*. An explication is essentially a bundle of sentences that provides a unique semantic description for a given complex meaning. These sentences are composed of primes and their inherent grammar. Explications play a central role in the theory. We can examine Wierzbicka and Goddard's example of the English word "children" (2014, p. 30):

CHILDREN – explication:

a. people of one kind
b. all people are people of this kind for some time, they can't be people of this kind for a long time
c. when someone is someone of this kind, it is like this:
d. this someone's body is small
e. this someone can do some things, this someone can't do many other things
f. because of this, if other people don't do good things for this someone at many times, bad things can happen to this someone

They admit that these sentences sound strange, but they contend that what they convey is understandable across cultures and time due to their composition. Their conjunction formally singles out, defines, and comprises a complex concept.

The key is that the sentences are composed of primes and obey a purportedly universal grammar. Such a sentence is therefore conceptually accessible to any human language. If you populate an explication with prime-sentences, then the explicated concept is also rendered accessible. In other words, even though a concept in itself may seem impenetrable and culture specific, it can be reconstructed using NSM 'without loss or distortion of meaning' (Wierzbicka and Goddard, 2014, p. 17). Hence, these explications define lexical items through conceptually basic complex expressions.

This simple picture is then compounded. Complex concepts may be introduced into explications directly. As Wierzbicka and Goddard put it, 'many explications include not only semantic primes but also various complex word meanings, themselves decomposable into semantic primes' (2014, p. 18). These embedded complex meanings are termed "semantic molecules" and marked with [m] in explications. By way of example, CHILDREN is said to be embedded in the explication of WOMEN as follows (2014, p. 37):

WOMEN – explication:

a. people of one kind
b. people of this kind are not *children [m]*
c. people of this kind have bodies of one kind
d. the bodies of people of this kind are like this:
e. inside the body of someone of this kind there can be for some time a living body of a ------------*child [m]*

The idea of a semantic molecule is straightforward enough; it imports the semantic content of the concept it represents. Although the notion does seem quite intuitive, the mechanism itself receives little further theoretical clarification—though examples in use are abundant. Granted, that may not strike one as immediately problematic.

The motivation behind the introduction of semantic molecules is two-fold:

> Using semantic molecules means that explications can be phrased more simply and comprehensibly, but this is not the main rationale for using them. Rather, using semantic molecules in explications embodies a claim about semantic dependency between concepts. For example, by including the molecule “child [m]” in the explication for woman, we are claiming that the concept behind woman depends conceptually (in part) on the concept of “child”. Likewise, by including the molecule “hand [m]” in the explication for hold, it is claimed that from a conceptual point of view, the idea of holding something includes the idea of doing something with one’s hands. (Wierzbicka & Goddard, 2014, p. 18)

So, (1) molecules are ‘themselves decomposable’ and used for the sake of explications being ‘phrased more simply and comprehensibly.’ These two features suggest that molecules are essentially abbreviations. They offer convenient shorthand. However, more importantly, they also (2) embody a ‘semantic dependency between concepts.’ Naturally this is not the syntactic notion of semantic dependency, but rather a dependency wherein the meaning of a concept relies on the meaning of some other, distinct concept(s). In other words, semantic molecules map and substantiate the constitutive relations that hold between lexical items in NSM. This is a rather tame form of semantic dependency, but one in which molecules appear to play a crucial role. Though tame, it bears a resemblance to the varieties of dependence that have been hotly debated in philosophy of language in the form of semantic holism (see Davidson, 1967; Block, 1993, cf. Fodor and Lepore, 1992)[4] and which makes appearances in linguistics through, for instance, some species of frames (Fillmore, 1977; Langacker, 1987).

These two central aims are further complicated by tentative claims that semantic molecules provide a theoretical explanation for how NSM’s relatively small core of primes can account for and cope with the vast array of meanings across languages—a feature that I will call *productivity*.[5] They purportedly facilitate a compression of semantic content, thereby allowing speakers to make use of immensely complex meanings through embedded collections and networks of molecules. As Goddard puts it, ‘semantic molecules enable an incredible compression of semantic complexity, but at the same time this complexity is disguised by its being encapsulated and telescoped into lexical units embedded one in another, like a set of Russian dolls’ (2012, p. 734).[6] He also backs the notion that ‘some explications require no molecules at all, and others require only one or two’ (Goddard, 2016, p. 31). Though subtle, the idea that semantic molecules are *required* is to say that they are somehow *necessary*—a claim that has far reaching implications if left unchecked.

In effect, it looks as if the claims surrounding semantic molecules come down to expecting them to work as both (1) abbreviations and as (2) a mechanism for semantic dependency. This is then amplified by recent appeals to molecules for explaining NSM’s productivity and its complexity, as well as contending that semantic molecules are necessary elements of NSM’s explications.

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[4] Semantic holism, broadly speaking, holds that the meaning of a given expression is determined and constituted by its relation to the whole (or most of the) language in which it is situated (see Block, 1995)—the dependence it proposes is therefore quite radical. I would not suggest that NSM entertains anything nearly that strong, however, the core idea that there is some such relation embedded in language does appear to be shared.

[5] See Goddard (2016; 2012; 2010), Wierzbicka (2009, 854). For their place in exceptionally complex cases like natural kinds, see Goddard (2018a).

[6] Note, Goddard attributes the quote to Wierzbicka’s (2009) in some places (Goddard, 2016; 2018b).

I will endeavor to argue that none of these ideas concerning semantic molecules are warranted aside from (1); ultimately, the rather clear sense in which (1) is evidently satisfiable undercuts the case for (2), rendering semantic molecules demonstrably unnecessary and perhaps even theoretically superfluous. It also undermines the notion that semantic molecules provide an explanation for the breadth of NSM's applicability—something which, I would argue, can be explained on the basis of its inherent grammar and the nature of explications in and of themselves. All of these conclusions have a bearing on the plausibility of NSM as a whole as well as its theoretical soundness.

2. An Equivalence and Semantic Dependence

I'd like to begin with a more careful appraisal of what it means for a semantic molecule to feature in an explication. Consider (1) again; molecules are decomposable in and of themselves, and they offer a rather clear bit of convenience. The convenience seems to come from the fact that, while they are decomposable, being able to simply write child [m] is much easier than writing out the entire explication that defines the meaning of CHILDREN proper—that is, without writing out precisely those elements that it actually decomposes into in its explication.

Of course, it seems that there is nothing stopping one from forfeiting this luxury. Insofar as molecules decompose into a definite set of elements, we can write an explication in two ways—either with or without its molecule(s). So, for instance, the explication for WOMEN can be written either as α or β below:[7]

WOMEN (α) – explication:

a. people of one kind
b. people of this kind are not *children [m]*
c. people of this kind have bodies of one kind

WOMEN (β) – explication:

a. people of one kind
b. people of this kind are not this:
b1. *people of another kind*
b2. *all people are people of this other kind for some time, they can't be people of this other kind for a long time*
b3. *when someone is someone of this other kind, it is like this:*
b4. *this someone's body is small*
b5. *this someone can do some things, this someone can't do many other things*
b6. *because of this, if other people don't do good things for this someone at many times, bad things can happen to this someone*
c. people of this kind have bodies of one kind

The only difference between the two is that (b) has been extended to accommodate the full explication of CHILDREN. The crucial question is, are α and β equivalent? Do they pick out the same meaning? If a molecule really does point to some other explication, and that explication is definitional for the concept or meaning it expresses, then surely it follows that the molecule can be exchanged for that explication with no

[7] I've shortened the canonical explication of WOMEN (used earlier) for the sake of conciseness. This shortened version is sufficient for making my point.

appreciable difference. Therefore, both versions should pick out the same concept or meaning. The two have every reason to be considered equivalent, even if they are obviously not identical—much like "ER" is not identical to "emergency room," but they both pick out the same thing.

This is precisely what we should expect from an abbreviation. As such, (1) is quite comfortably satisfied. That being said, as we will see, it undercuts (2) and precludes the possibility of semantic molecules being necessary.

The equivalence alone is rather innocuous; the inferences we can make on the basis of it are not. We can begin by noticing that β doesn't explicitly mention CHILDREN, which indicates that its explication of WOMEN offers nothing in terms of semantic dependence. If we understand that dependence to be a reliance on the meaning of another term or concept, then that term or concept must formally turn up in order to be relied upon. Now, one might argue that β clearly contains the entirety of CHILDREN's elements, and therefore that WOMEN β *is* dependent upon CHILDREN for its meaning—in other words, even though it is missing the molecule, it still has the content; isn't that enough to say that β is dependent? While that sounds reasonable, to *depend* on something and to *contain* its elements are two different things. Even if that does not appear to be the case at first glance, the theoretical difference between the two is significant and demonstrable. I will use the equivalence we've constructed above to do so.

To that end, we will need to use some counterfactual reasoning—that is, reasoning involving contrary-to-fact conditions. This type of approach allows us to map the theoretical structure of a position that might otherwise remain out of reach. Suppose, for a moment, that there is no such lexical unit as "children."[8] That would render α incomplete, as one of its components is children [m]. However, β would remain unaffected, as it is purely composed of primes (which are themselves unaffected). Where α would fail to pick out the same content it did before the counterfactual assumption was made, β would continue to pick out the same content without a hitch. Hence, β does not depend on CHILDREN even if it contains the same parts. In other words, if β depended on CHILDREN for its conceptual content, then stipulating that there is no lexicalized item corresponding to CHILDREN would invalidate β, but making such a stipulation does not invalidate β, so β is not dependent on CHILDREN. Of course, β does depend on a particular set of prime-sentences (including the same set picked out by CHILDREN), but that set of prime-sentences exists independently of any molecule or lexicalization. The point is not that β doesn't depend on anything: the point is that it doesn't depend on CHILDREN.

Furthermore, the same case straightforwardly illustrates that semantic molecules are not necessary elements of the explications they feature in. Again, putting it schematically, if the molecule were necessary, then obviously stipulating that there is no such molecule would invalidate both sides of the equivalence. It does not invalidate both sides of the equivalence (i.e., it does not invalidate β); therefore, the molecule is not necessary. That is a rather round-about way of pointing out that the equivalence itself indicates that, per the fundamentals of necessary conditions, the molecule isn't necessary. Granted, as noted, molecules are said to be necessary in *some* explications, and all that I've shown is that it doesn't appear to be necessary for WOMEN. But it seems to me that the operation I've outlined may be applied to *all* explications given that all molecules are decomposable; if that is the case, then molecules are never necessary.

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[8] A precondition for being a semantic molecule is its being lexicalized in a given language (Goddard, 2012, 720; 2010, 124)—so the counterfactual effectively eliminates the molecule while uncontroversially preserving its content, which proves useful presently.

One might object, however, that while β and its *decomposed* molecule are not semantically dependent on CHILDREN, α and its molecule surely are. For that to be observable, the molecule must carry some sort of update function or enduring connection to whatever the explication of CHILDREN is; in doing so, it ought to exhibit a form of semantic dependency not unlike those found in treatments of semantic holism—one that is sensitive to change. Taking it a step further, we can frame another counterfactual case exemplifying this hunch. Suppose that the explication of CHILDREN is altered, so that one of its components is modified, as follows:

CHILDREN – explication:	CHILDREN* – explication:
d. this someone's body is small	d*. this someone's body is **very** small

If that were the case, then presumably, the molecule in α would jump into action here; it would import the new, modified version of its associated explication. Consequently, α would contain the explication of CHILDREN* (and its new element, d*) while β would not. This would lead us to believe that α and β were only superficially equivalent and that molecules *are* necessary because they substantiate this functional difference. The objection sounds compelling, but it carries a serious flaw.

Insofar as CHILDREN* has a different explication than CHILDREN, it technically picks out a different concept or meaning. NSM is quite rigid in this sense; a slightly different explication is still a different explication, and where explications pick out concepts, different explications pick out different concepts. With that in mind, there is no discernible reason for the molecule in α to update using this distinct explication. After all, children [m] is tied to a meaning that is specifically defined by the explication of CHILDREN, *not* CHILDREN*. And WOMEN α is defined through that particular molecule, so WOMEN continues to be defined by CHILDREN. The counterfactual move to CHILDREN* therefore nullifies its connection to both CHILDREN and WOMEN. Hence, the rigidity of NSM implies that no such demonstration of a term's semantic dependency can be successful. This is in part due to the austerity of NSM's theoretical commitments. It makes practically no mention of possible worlds semantics, and it makes little use of reference and extension—theoretical tools that could otherwise provide solutions to this problematic rigidity. If an explication/molecule pairing cannot change, then there is no sense in which they can be shown or proven to be semantically dependent.[9] In a word, the molecule's capacity for semantic dependence is inert. I suppose it goes without saying that there is no place for inert features in a good theory.

The equivalence survives, and so do our conclusions. One side of the equivalence, β, is demonstrably independent of CHILDREN and simultaneously shows that semantic molecules are not theoretically necessary to do the job. The other side of the equivalence, α, can be shown to be incapable of proving that it can meaningfully account for semantic dependency. While I cannot show that it is not semantically dependent simpliciter, I believe it is quite clear that whatever semantic dependence it might exhibit is surely not the inter-lexically salient semantic dependence being promised. That is, the semantic

[9] Of course, abbreviations are in some sense semantically dependent—for instance, the way that "IL" is dependent on "Illinois." One might not be able to demonstrate that they are semantically dependent in the sense outlined above, largely because "IL" is just an arbitrary, norm-governed shorthand for "Illinois" (granted, for proper nouns it is still plausibly demonstrable, but less so with examples like "LED"). Hence, "IL" is trivially dependent on "Illinois." However, the dependence at issue is not one that ends at the link between an abbreviation and what it abbreviates. Rather, the link being scrutinized is the one between CHILDREN and WOMEN on the basis of child [m], as a mechanism or some structural feature. This is analogous to trying to draw a semantic link between Illinois and the United States on the basis of "IL." Although there are many, many relations between Illinois and the United States, none of them rely on the structural place or semantic mechanisms of its abbreviation as "IL."

molecule does not play a structurally relevant or unique role in explications beyond whatever elements it is shorthand for.[10]

3. Productivity and Complexity

In light of the arguments above, the recent appeals to semantic molecules as an explanatory factor in NSM's productivity and handling of complexity also warrant attention. As noted earlier, the basic intuition is that NSM's small base of semantic primes should have some problems with accounting for the immense breadth of human languages; molecules are thought to be of help here. The way they can be embedded in explications suggests that they can be used to compress semantic content—packing far reaching and dense chains of semantic material into neat, easy to use molecules. This may seem intuitive, but, again, there is reason to be suspicious. And again, the problem lies in the superficial theoretical nature of semantic molecules.

Curiously, Goddard conveys the problem I have in mind in the quote mentioned earlier, 'complexity is disguised by its being encapsulated and telescoped into lexical units embedded one in another, like a set of Russian dolls' (2012, p. 734). *Disguised* complexity is not complexity avoided, and Russian dolls are a telling example of something that *seems* to be compression but which is nothing of the sort. The motivation here is perhaps not merely to provide an explanation for the productivity of NSM, but also to avoid issues of plausibility noted by Wierzbicka's (1996) where, in discussing the complexity of explications for things like sky and sun, she writes:

> I acknowledge that [these explications] *are* complex—too complex for global, all-embracing, one-level paraphrases couched exclusively in terms of semantic primitives to be fully intelligible. It is desirable, therefore, and perhaps necessary, that our definitions of concrete concepts such as names of body parts … should include semantic "molecules" as well as semantic "atoms". (Wierzbicka, 1996, p. 221)[11]

Whatever the motivation might be, there is no reason to think that molecules affect complexity. Compression generally consists in an omission of information which can then be reproduced on the basis of some external operation; the most familiar examples come from computer science. So, for instance, an image may be compressed by reducing redundant information to an interpretable formula for a receiving system, which can then reproduce the image without having the original image as a reference. There is a literal omission of information which is then reconstructed. The crucial difference between that and NSM's take on molecules is that in order to comprehend a semantic molecule, one must already be familiar with the content that it seemingly compresses. There is no formula or operation that can be applied to CHILDREN in order to ascertain its explication, which is precisely how theoretical compression works. Rather than *reconstructing* it, one must simply *recognize* the word. Hence, while the complexity of its explication may be masked by a molecule, it does not appear to reduce or simplify the content that it represents. Of course, using shorthand and abbreviations certainly does make the practical side of dealing with NSM's explications easier, but it

[10] I'd like to thank the anonymous reviewer who raised an interesting point: if semantic molecules may really be boiled down to their explications, then the issue of semantic dependence and conceptual relatedness falls squarely on explications. At which point, explications themselves might be delimited on cognitive grounds to help shield against this type of argument. The antecedent of the conditional is in line with what I aim to show, while the consequent is an interesting potential development in response to it.

[11] This is also, in part, the motivation in recent times to model semantic molecules as somehow necessary (Goddard, 2012, 720).

remains to be seen precisely how molecules could alter semantic content. By analogy, Russian dolls might nest into one another and thereby take up less space in your bag, but simply nesting them into one another won't make them weigh any less—indeed, nesting won't do anything whatsoever to the dolls themselves. Semantic molecules seem to behave similarly. Perhaps they make handling explications easier, but that does not mean they compress complexity or, in turn, that they can be relied upon to uniquely account for NSM's productivity.

While I don't believe molecules have a role to play in explaining that productivity, it seems to me that NSM does not need to take recourse to theoretical intermediaries to begin with. The notion of explication alone is more than sufficient to account for it. This straightforwardly follows from two features. First, the explication format is effectively a list of sentences that collectively define a complex meaning. That list, however, is not limited. One can continue to ascribe and compound the entries in the list without limit. Therefore, one can generate defined complex meanings without limit—in other words, one can field an immense potential productivity (i.e., one that is more than sufficient). Second, the fact that primes come with a primitive grammar also goes hand in hand with the possibility of building increasingly long sentences through, for instance, recursion (though this is often overstated in theory; see Pullum and Scholz, 2010). Thus, one can theoretically build an unlimited number of distinct explications on the basis of a single modulated prime-sentence.[12] As such, there are two axes along which the requisite productivity can be achieved using explications—the unlimited number of entries an explication can hold and the unlimited length an individual entry can be. Notice that neither of them are limited by the relatively small number of semantic primes at NSM's disposal. Crucially, the plausibility of an explication that runs hundreds of entries is another story. While there is a clear sense in which NSM's productivity can be accounted for on formal, theoretical grounds, the well-founded concerns surrounding its plausibility will not be mitigated by semantic molecules in their current form. This is doubly so given that their current form seems to be confined to (1).

4. Concluding remarks

In summary, semantic molecules can be framed by an equivalence consisting of two unique explications that share one and the same complex concept or meaning—one side containing a semantic molecule and the other containing only fully decomposed elements. The decomposed half of the equivalence makes no room for semantic dependency and simultaneously establishes that semantic molecules are not necessary features of explications. The other half of the equivalence provides material for a simple counterfactual test, one which indicates that semantic molecules cannot demonstrate semantic dependency—effectively rendering their potential dependence inert. Put together, the equivalence bolsters (1) and seriously undermines (2).

Setting aside the nature of semantic molecules themselves, their place in explaining NSM's productivity, mitigating its complexity, and, ultimately, improving its plausibility are also at risk. There is no discernible sense in which molecules affect semantic content in a way that would be relevant to these aims—no compression, no omission. This is supported by the fact that (1) also appears to be the only tenable interpretation of semantic molecules on the cards at the moment. What is more, NSM's productivity may actually be accounted for on other grounds—though it comes on pain of exposing increasingly implausible explications.

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[12] This is, of course, not a very satisfying notion. Presumably, one could simply compound "very" indefinitely in an otherwise static sentence. Satisfying or not, it is theoretically sound.

Now, as Goddard has noted, 'the details of the molecule theory are still being worked through, and […] refinements and adjustments are ongoing' (2016, 30). Semantic molecules are a work in progress, and there is still room for changing course. Indeed, the concerns I have raised above do not even necessarily require that semantic molecules be reworked, but they do require that they be clarified. Any attempt at disarming or criticizing the case I've made will inextricably come with explicit commitments concerning the fuzzy theoretical character of semantic molecules—a consequence I would happily welcome. However, if no convenient clarifications are at hand, then I believe that more than minor adjustments will be needed.

Precisely what those changes will be is an open question. However, a few things must be kept in mind. Although NSM has long relied on its robust empirical background, the problem I have posed is anything but empirical. Counterfactual cases and productivity outrun empirical research, precisely because they are issues that revolve around theory and possibility. Nor does it address the two most well-worn (and controversial) areas of NSM; the points above have little to do with semantic primes themselves and just as little to do with coordinating, analyzing, or translating different languages. If semantic molecules really do require rethinking, it will take its theorists well wide of familiar territory.

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