The “Fodor”-FODOR fallacy bites back

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Abstract

The paper argues that Fodor and Lepore are misguided in their attack on Pustejovsky’s Generative Lexicon, largely because their argument rests on a traditional, but implausible and discredited, view of the lexicon on which it is effectively empty of content, a view that stands in the long line of explaining word meaning (a) by ostension and then (b) explaining it by means of a vacuous symbol in a lexicon, often the word itself after typographic transmogrification. (a) and (b) both share the wrong belief that to a word must correspond a simple entity that is its meaning. I then turn to the semantic rules that Pustejovsky uses and argue first that, although they have novel features, they are in a well-established Artificial Intelligence tradition of explaining meaning by reference to structures that mention other structures assigned to words that may occur in close proximity to the first. It is argued that Fodor and Lepore’s view that there cannot be such rules is without foundation, and indeed systems using such rules have proved their practical worth in computational systems. Their justification descends from line of argument, whose high points were probably Wittgenstein and Quine that meaning is not to be understood by simple links to the world, ostensive or otherwise, but by the relationship of whole cultural representational structures to each other and to the world as a whole.

1 Introduction

Fodor and Lepore (FL from here on) have saddled up recently and ridden again at the Windmills of Artificial Intelligence (AI): this time against Pustejovsky’s Generative Lexicon (Pustejovsky, 1995: FL call the work TGL), so as to make an example for the rest of us. I want to join in because FL claim he is part of a wider movement they call Informational Role Semantics (which I will call IRS as they do), and I count myself a long term member of that movement. But their weapons are rusty: they wave about as their sword of truth an old and much satirised fallacy, which Ryle (1957) called the “Fido”-Fido fallacy: that

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1 One might say: the ostensive definition explains the use – the meaning – of a word when the overall role of the word in language is clear. Thus if I know that someone means to explain a colour-word to me the ostensive definition “That is called ‘sepia’” will help me to understand the word” (Wittgenstein, 1953, p. 30).
to every word corresponds a meaning, be it abstract denotation (as for FL), a concept, or a real world object. The special quality of the fallacy is the simple one-to-one mapping, and not the nature of what corresponds to a word.

In the first part of this paper I want to show that the fallacy cannot be pressed back into service: it is old and overexposed. It is important to do this (again) even though, as the paper progresses, FL relent a little about the need for the fallacy, and even seem to accept a part of the IRS position. But they do this as men convinced that, really and truly and after all concessions are made, the fallacy is still true. It is not, and this needs saying yet again. In the second part of the paper, I will briefly touch on issues specific to Pustejovsky’s (JP) claims; only briefly because he is quite capable of defending his own views. In the third and final part I will make some points to do with the general nature of the IRS position, within AI and computational natural language processing, and argue that the concession FL offer is unneeded: IRS is a perfectly reasonable doctrine in its own right and needs no defence from those who really believe in the original fallacy.

2 “Fido” and FIDO

Fodor and Le Pore’s dissection of JP’s book is, and is intended to be, an attack on a whole AI approach to natural language processing based on symbolic representations, so it is open to any other member of that school to join in the defence. IRS has its faults but also some technological successes to show in the areas of machine translation and information extraction (e.g. Wilks et al., 1993), but is it well-founded and philosophically defensible?

Many within IRS would say that does not matter, in that the only defence lexical or other machine codings need in any information processing system is that the system containing them works to an acceptable degree; but I would agree with those who say it is defensible, or is at least as well founded as the philosophical foundation on which FL stand. That is, I believe, one of the shakiest and most satirised of this century, and loosely related to what Ryle (1957) called the “Fido”-Fido fallacy: the claim that to every word corresponds a concept and/or a denotation, a view that has crept into everyday philosophical chat as the joke that the meaning of life is life’ (life prime, the object denoted by “life”

2). It is a foundation of the utmost triviality, that comes from FL (op.cit., p.1) in the form:

(1) The meaning of “dog” is DOG.

2 'Fido’ or Fido-prime are common notations for denotations corresponding to words. FL seem to prefer small caps FIDO, and I will use that form from their paper in the argument that follows.
They seem to embrace it wholeheartedly, and prefer it to any theory, like TGL, offering complex structured dictionary entries, or even any paper dictionary off a shelf, like Webster’s, that offers even more complex structures than TGL in a form of English. FL embrace an empty lexicon, willingly and with open eyes: one that lists just DOG as the entry for “dog”. The questions we must ask, though the answer is obviously no in each case, are:

- is (1) even a correct form of what FL wants to say?
- could such a dictionary consisting of statements like (1) serve any purpose whatever, for humans or for machines?
- would one even need to write such a dictionary, supposing one believed in a role for such a compilation, as opposed to say, saving space by storing one as a simple rule for capitalizing any word whose meaning was wanted?

The first of these points brings back an age of linguistic analysis contemporary with Ryle’s, in particular the work of writers like Lewy (1964); put briefly, the issue is whether or not (1) expresses anything determinate (and remember it is the mantra of the whole FL paper), or preferable to alternatives such as:

(2) The meaning of “dog” is a domestic canine animal.

or

(3) The meaning of “dog” is a dog.

or even

(4) The meaning of “dog” is “domestic canine animal”.

not to mention

(5) The meaning of “dog” is “dog”.

The two sentences (2) and (3) are perfectly sensible, depending on the circumstances: (2) is roughly what real, non-Fodorian, dictionaries tell you, which seems unnecessary for dogs, but would be more plausible if the sentence was about marmosets or wombats. (3) is unhelpful, as it stands, but perhaps that is accidental, for if we translate it into German we get something like:

(3a) Die Bedeutung von “dog” ist ein Hund.

which could be very helpful to a German with little or no knowledge of English, as would be
To continue with this line of argument one needs all parties to accept the reality of translation and its role in argument: that there are translations, at least between close languages for simple sentences, and no amount of philosophical argument can shift that fact. For anyone who cannot accept this, there is probably no point in arguing about the role of lexicons at all.

Both (2) and (3), then, are sensible and, in the right circumstances, informative: they can be synonymous in some functional sense since both, when translated, could be equally informative to a normal fluent speaker of another language. But (4) and (5) are a little harder: their translations would be uninformative to a German when translated, since translation does not translate quotations and so we get forms like:

(5a) Die Bedeutung von "dog" ist "dog".

and similarly for a German (4a) version of the English (4). These sentences therefore cannot be synonymous with (3) and (2) respectively. But (4) might be thought no more than an odd form of a lexical entry sentence like (3), spoken by an English speaker.

But what of (1); who could that inform about anything? Suppose we sharpen the issue by again asking who its translation could inform and about what:

(1a) Die Bedeutung von "dog" ist DOG.

(1a) tells the German speaker nothing, at which point we may be told that DOG stands for a denotation and its name is arbitrary. But that is just old nonsense on horseback: it implies that the English speaker cannot understand (1) either, since DOG might properly be replaced by G00971 if the final symbol in (1) is truly arbitrary. It is surely (3), not (1), that tells us what the denotation of "dog" is, in the way language is normally used to do such things.

DOG in (1) is simply a confidence trick: it is put to us as having the role of the last term in (3). When and only when it is in the same language as the final symbol of (3) (a fact we are confidently assured is arbitrary) it does appear to point to dogs. However, taken as the last term in the synonymous (1a) it cannot possibly be doing that for it is incomprehensible, and functioning as an (untranslated) English word, exactly as in the last term of (5). But, as we saw, (5) and (3) cannot be synonymous, and so DOG in (1) has two incompatible roles at once, which is the trick that gives (1) interpretations that flip uncontrollably between the (non-synonymous) (3) and (5). It is an optical illusion of a sentence.

In conclusion, then, (1) is a dangerous sentence, one whose upper case-inflation suggests it has a function but which, on careful examination, proves not to be there: it is either (case-deflated) a form of the commonsense (3), in
which case it loses its capitals and all the role FL assign to it, since it is vacuous in English, or just a simple bilingual dictionary entry in German or some other language. Or it is a form or (5), uninformative in any language or lexicon but plainly a triviality, shorn of any philosophical import.

Those who still have worries about this issue, and wonder if capitalizing may not still have some merit, should ask themselves the following question: which dog is the real DOG? The word “dog” has 24 entries even in a basic English dictionary like Collins, so how do FL know which one is intended by (1)? If one is tempted to reply, well DOG will have to be subscripted then, as in DOG1, DOG2 etc, then I shall reply that we will then be into another theory of meaning, and not one of simple denotations. My own suspicion is that all this can only be understood in terms of Fodor’s Language of Thought (1975) and that DOG for FL is a simple primitive in that language, rather than a denotation in the world or logical space. However, we have no access whatever to such a language, though Kay among others has given arguments that, if anything like an LOT exists, it will have to be subscripted (Kay, 1989), in which case the role of (1) will have to be rethought from scratch. All the discussion above will still remain relevant to such a development, and the issue of translation into LOT will then be the key one. However, until we can do that, and in the presence of a LOT native speaker, we may leave that situation aside and await developments.

The moral for the rest of the discussion, and the role of IRS and TGL, is simple: some of the sentences numbered above are like real, useful, lexical entries: (3) is a paradigm of an entry in a bilingual lexicon, where explanations are not crucial, while (2) is very like a monolingual lexical entry, where explanations are the stuff of giving meaning.

3 Issues concerning TGL

The standard of the examples used by FL to attack TGL is not at all challenging; they claim that JP’s:

(6) He baked a cake.

is in fact ambiguous between JP’s create and warm up aspects of “bake”, where baking a cake yields the first, but baking a potato the second. JP does not want to claim this is a sense ambiguity, but a systematic difference in interpretation given by inferences cued by features of the two objects, which could be labels such as ARTIFACT in the case of the cake but not the potato.

“But in fact, bake a cake is ambiguous. To be sure, you can make a cake by baking it; but also you can do to a (pre-existent) cake just what you can do to a (pre-existent) potato: viz. put it in the oven and (non creatively) bake it.” (op.cit. p.7)

From this, FL conclude, “bake” must be ambiguous, since “cake” is not. But
all this is absurd and untrue to the simplest facts. Of course, warming up a (pre-existent) cake is not baking it; whoever could think it was? That activity would be referred to as warming a cake up, or through, never as baking it. You can no more bake a cake again, with the other interpretation, than you can bake a potato again and turn it into an artifact. FL like syntactically correlated evidence in semantics, and they should have noticed that a baked potato is fine but a baked cake is not, which correlates with just the difference JP requires (cf. baked fish/meat).

It gets worse: FL go on to argue that if ARTIFACTs are the distinguishing feature for JP then bake a trolley car should take the creative reading since it is an artifact, completely ignoring the fact that the whole JP analysis is based on the (natural) assumption that potatoes and cakes both share some attribute like FOOD (as trolley cars do not) which is the only way the discussion can get under way: being a FOOD is a necessary condition for this analysis of “bake” to get under way.

FL’s key argument against TGL is that it is not possible to have a rule, of the sort JP advocates, that expands the content or meaning of a word in virtue of (the meaning content of) a neighbouring word in a context, namely, a word in some functional relation to the first. So, JP, like many in the IRS tradition, argues that in:

(7) John wants a beer.

the meaning of “wants” in that context, which need not be taken to be any new or special or even existing sense of the word, is to be glossed as wants to drink a beer. This is done by a process that varies in detail from IRS researcher to researcher, but comes down to some form of:

(8) X wants Y ⇒ X wants to do with Y whatever is normally done with Y.

An issue over which AI researchers have differed is whether this knowledge of normal or default use is stored in a lexical entry or in some other computational knowledge form such as one that was sometimes called a script (Schank and Abelson, 1997) and thought of as indexed by words but was much more than a lexical entry. It is not clear that one needs to discriminate between structures, however complex, if they are indexed by a word or words. JP stores the inference captured in (8) within the lexical entry under a label TELIC that shows purpose. In earlier AI systems, such information about function might be stored as part of a lexical semantic formulas attached to a primitive GOAL (Charniak and Wilks,
1976, or (depending on its salience) within an associated knowledge structure. Some made the explicit assumption that a system should be sufficiently robust that it would not matter if such functional information was stored in more than one place in a system, perhaps even in different formats.

For FL all this is unthinkable, and they produce a tortuous argument roughly as follows:

- “Fido”. FIDO may not be the only form for a lexicon, but an extension could only be one where an expansion of meaning for a term was independent of the control of all other terms, as it is plainly not in the case of JP’s (8)).
- Any such extension would be to an underlying logical form, one that should also be syntactically motivated.

FL then produce a complex algorithm (op.cit. p.10) that expands “want” consistently with these assumptions, one which is hard to follow and comes down to no more than the universal applicability (i.e. if accepted it must be applied to all occurrences of “want” regardless of lexical context) of the rule:

\[(9) \text{X wants Y } \Rightarrow \text{X wants to have Y.}\]

This, of course, avoids, as it is intended to, any poking about in the lexical content of Y. But it is also an absurd rule, no matter what dubious chat is appended to it about the nature of “logical form”. Consider:

\[(10a) \text{I want an orange.}\]
\[(10b) \text{I want a beer.}\]
\[(10c) \text{I want a rest.}\]
\[(10d) \text{I want love.}\]

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3 In preference semantics (Wilks) “door" was coded as a formula (that could be displayed as a binary tree) such as:
\[((\text{THIS}((\text{PLANT STUFF})\text{SOUR})) (((((\text{THRU PART})\text{OBJE}) (\text{NOTUSE *ANI})\text{GOAL}) ((\text{MAN USE} (\text{OBJE THING}))))))\]
where the subformula:
\[((((\text{THRU PART})\text{OBJE}) (\text{NOTUSE *ANI})\text{GOAL})\]
was intended to convey that the function of a door is to prevent passage through an aperture by a human.

4 Such larger knowledge structures were called pseudo-texts (Wilks) in preference semantics (to emphasize the continuity of language and world knowledge): one for “car” (written [car]) would contain a clause like [car consume gasoline] where each lexical item in the pseudo-text was an index to a semantic formula (in the sense of note 3) that explicated it.
(10a) and (10b) seem intuitively to fit the IRS rule (8) and the FL rule (9). (10c) might conform to some appropriate IRS coding to produce (from (8)): X wants to experience a rest, but the apparently felicitous application of FL’s (9), yielding X wants to have a rest, is purely fortuitous, since have a rest is a lexicalised form having nothing at all to do with possession, which is the only natural interpretation of (9). This just serves to show the absurdity of FL’s “content-free” rule (9) since its application to (10c) cannot possibly be interpreted in the same way as it was when producing X wants to have a beer.

Only the IRS rule (8) distinguishes appropriate from inappropriate applications of rules to (10c). One could make the same case with (10d), where the FL rule (9) produces only ambiguous absurdity, and the applicability of the IRS rule (8) depends entirely on how the function of “love” has been coded, if at all. However, the purpose of this section has been not to defend an IRS view or rule (8) in particular, but to argue that there is no future at all in FL’s grudging, context free, rule (9), in part because it is context free.

JP’s specific claim is not that the use of rule (8) produces a new sense, or we would have a new sense corresponding to many or most of the possible objects of wanting, a more promiscuous expansion of the lexicon (were it augmented by every rule application) than would be the case for bake a potato/cake where JP resisted augmentation of the lexicon, though other researchers would probably accept it. Nor is this like the application of “normal function” to the transformation of

(11) My car drinks gasoline.

in (Wilks, 1980) where it was suggested that “drink” should be replaced by the structure for “consume” (as in note 4 below) in a context containing broken preferences (unlike (7)) and where augmentation of the lexicon would be appropriate (like (11)) and if the “relaxation”, as some would call it, became statistically significant, as it has in the case of (11).

It is not easy to pin down quite why FL find the rule (8) so objectionable, since their rule (9), like (8), is not, as they seem to believe, distinguished by logical form considerations. The traditional (Quine, 1953) logical opacity of “want” is such that inferences like (8) and (9) can never be supported by strong claims about logical form whose transformations must be deductive, and one can always want X without wanting Y, no matter what the logical relations of X and Y. Hence, neither (8) nor (9) are deductive rules, and FL have no ground in context-dependence to swallow the one but not the other.

Contrary to what FL seem to assume, an NLP algorithm to incorporate or graft part of the lexical entry for one word (e.g. “beer”) into another (e.g. “want”) is not practically difficult. The only issue for NLP research is whether and when such inferences should be drawn: at first encounter with such a collocation, or when needed in later inference, a distinction corresponding roughly to what is distinguished by the oppositions forward and backward inference, or
data-driven and demand-driven inference. This issue is connected with whether a lexical entry should be adapted rather than a database of world knowledge and, again contrary to FL’s assumptions, no NLP researcher can accept a firm distinction between these, nor is there one, any more than a firm analytic-synthetic distinction has survived decades of scepticism.

One can always force such a distinction into one’s system at trivial cost, as Carnap (1947) did with his formal and material modes of sentences containing the same information:

(12f) “Edelweiss” has the property “flower”.

(12m) An Edelweiss is a flower.

but the distinction is wholly arbitrary.

JP’s treatment of more structural intensional verbs like “believe” is far more ingenious than FL would have us believe, and an interesting advance on previous work: it is based on a richer notion of default than earlier IRS treatments. JP’s position, as I understand it, is that the default, or underlying, structure associated with “believe” is:

\[ X \text{ believes } p \]

where \( p \) is expanded by default by the rule:

(13) \( X \text{ believes } p \Rightarrow X \text{ believes } (Y \text{ communicates } p) \).

FL of course object again to another expansion beyond their self-imposed limit of context-freeness for which, as we saw, there is no principled defence, while failing to notice that (13) is in fact context-free in their sense.

For me, the originality of (13) is not only that it can expand forms like:

(14) John believes Mary.

but can also be a general (context-free) default, overriding forms like:

(15) John believes pigs eat carrots.

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5 Provided one remembers always that forms like:

“Edelweiss” has nine letters

is in material mode even though it could look like the formal mode. The formal mode of what it expresses is:

“Edelweiss” has the property “nine letters”.

9
in favour of the more complex:

(16) John believes (Y communicates (pigs eat carrots)).

which is an original expansion according to which all beliefs can be seen as the result of some communication, often from oneself (when Y = John in (16)). There certainly were default expansions of "believe" in IRS before JP but not of this boldness.\footnote{In preference semantics (Wilks, 1972) "believe" had a lexical entry showing a preference for a propositional object, so that "John believes Mary" was accepted as a preference-breaking form but with a stored expansion of the object in the lexical entry for "believe" of a simple propositional form (Mary DO Y) with what is really an empty verb variable DO, and not a communication specifically act like TGL.}

4 Some general IRS principles

Once (Wilks, 1971, 1972) I tried to lay out principles for something very like IRS, and which still seem to underlie the position arrived at in this discussion; it would be helpful for FL to see IRS not simply as some form of undisciplined, opportunistic, discipline neighbouring their own professional interests. Let me restate two of these principles that bear on this discussion:

- Meaning, in the end, is best thought of as other words, and that is the only position that can underpin a lexicon- and procedure-based approach to meaning, and one should accept this, whatever its drawbacks, because the alternative is untenable and not decisively supported by claims about ostension. Quine (1953) has argued a much more sophisticated version of this for many years, one in which representational structures are only compared against the world as wholes, and local comparisons are wholly symbolic. Meanings depend crucially upon explanations and these, formally or discursively, are what dictionaries offer. This solution to the problem is indeed circular, but not viciously so, since dictionaries rarely offer small dictionary circles (Sparck Jones, 1966) like the classic, and unsatisfying, case where “furze” is defined as “gorse” and vice versa. Meanings, in terms of other words, is thus a function of circle size: furze gorse is pathological, in the sense of unhelpful, yet, since a dictionary definition set is closed, and must be circular, not all such circles can be unhelpful or dictionaries are all and always vacuous.

On the other hand, FL’s original position of the section 2 above, is not really renounced by the end of their paper, and is utterly untenable, not only for the analytic reasons we have given, but because it could not form the basis of any possible dictionary, for humans (seeking meaning explanations) or for NLP.
Indeed, as we pointed out earlier, no lexicon is needed for the “dog”-DOG theory, since a simple macro to produce upper-case forms will do, give or take a little morphological tweaking for the “boil”-BOILING cases.

- Semantic well-formedness is not a property that can decisibly be assigned to utterances, in the way that truth can to formulas in parts of the predicate calculus, and as it was hoped for many years that “syntactically-well formed” would be assignable to sentences.

This point was made in some detail in (Wilks, 1971) on the basis that no underlying intuition is available to support semantic well-formedness, since our intuitions are dependent on the state of our (or our machine’s) lexicons when considering an utterance’s status, and that we are capable of expanding our lexicons (in something like the ways discussed in this paper) so as to bring utterances iteratively within the boundary of semantic well-formedness, and in a way that has no analogy in truth or syntax. Thus, no boundary drawing, of the sort required for a decidable property, can be done for the predicate Semantically-well-formed. Belief in the opposite seems one of the very few places where JP and FL agree, so further discussion may prove necessary.

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7This property must intuitively underlie all decidability claims and procedures: Goedel’s proof that there are true but undecidable sentences in a class of calculi only makes sense on the assumption that we have some (intuitive) way of seeing those sentences are true (outside of proof)
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