STUDI

Minds with meanings (pace Fodor and Pylyshyn)

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█ **Abstract** Jerry Fodor and Zenon Pylyshyn have proposed a purely referential-causal semantics, a semantics without meanings. Adopting Pylyshyn's previous treatment of the fact that we can perceive and track something before we have any idea of what that is, these authors claim that such causal relations to external entities allow us to word-label them and thereby build an entire lexicon with specific referents. I disagree and explain why I do so. The kind of semantics that I prefer is radically opposite: the one proposed by Noam Chomsky and Paul Pietroski. This is an internalist semantics that only has meanings, reference being indirect, often indefinite, sometimes problematic. Chomsky insists that the only posit that is tenable is the internal structure of the speaker-hearer, a complex, abstractly characterizable, computational-derivational apparatus, optimal if left alone, that interfaces with other cognitive apparatuses: the articulatory-perceptual one and the conceptual-intentional one, satisfying the constraints that they impose. I show that the semantics proposed by Fodor and Pylyshyn is especially problematic when inexistent entities, possible entities, fictional characters and objects in the remote past are examined. It is, however, problematic even when dealing with more ordinary concepts. On the contrary, an internalist semantics avoids all these problems.
KEYWORDS: Internalist Semantics; Theory of Meaning and Reference; Jerry A. Fodor; Noam Chomsky; Paul Pietroski

█ **Riassunto** *Menti con significati (con buona pace di Fodor e Pylyshyn)* – Jerry Fodor e Zenon Pylyshyn hanno proposto una semantica interamente causale-referenziale, una semantica priva di qualsiasi nozione di significato. Adottando la precedente trattazione di Pylyshyn di come è possibile percepire e inseguire oggetti prima di avere alcuna idea di cosa essi siano, questi autori pretendono che queste interazioni causali con enti esterni bastino a etichettarli con dei termini lessicali, costruendo un intero lessico con referenti specifici, senza la componente del significato. Io dissento e spiego perché. Il tipo di semantica che adotto è diametralmente opposto, una semantica che ha solo significati, per la quale i referenti esterni sono indiretti, spesso non definiti, talvolta problematici. Noam Chomsky e Paul Pietroski hanno perfezionato questa semantica puramente internalista, insistendo che l'unico attributo sostenibile è la struttura mentale interna al locutore, una struttura complessa, caratterizzabile solo a un livello di astrazione adeguato, atta a soddisfare i vincoli imposti dai sistemi cognitivi con i quali interagisce: quello articolatorio-percettivo e quello concettuale-intenzionale. Mostro che la semantica proposta da Fodor e Pylyshyn si scontra con problemi insolubili quando tratta enti inesistenti, enti possibili, invenzioni letterarie e oggetti appartenenti a un passato remoto. In effetti, si scontra con problemi insolubili anche quando tratta oggetti e proprietà ordinari. Una semantica interamente internalista non incontra nessuno di questi problemi.
PAROLE CHIAVE: Semantica internalista; Teoria del significato e del riferimento; Jerry A. Fodor; Noam Chomsky; Paul Pietroski

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Introduction

I HAVE BEEN A FODORIAN for most of my academic life. I have been blessed with innumerable conversations with Jerry, by a long friendship and by coauthoring with him a quite controversial (but I think right) book *What Darwin got wrong*.[1] I have approvingly taught his ideas for many years and have recently defended them in writing *Fodor and the innateness of all (basic) concepts*.[2] However, I disagree with his proposal (coauthored with Zenon Pylyshyn) of a purely causalist-referentialist semantics.[3] After doing my best to summarize it, I will explain why I disagree, and what kind of semantic theory I prefer.

The Fodor & Pylyshyn referential-causal semantics

1.1 Abandoning intensions

Fodor's paradox:

So, on the assumption that learning a word is learning its definition, it follows that you can't learn the concept bachelor unless you already have the concept unmarried man (and, of course, vice versa). So you can't learn the concept bachelor (or unmarried man) at all. This consequence (sometimes known as "Fodor's paradox") is patently intolerable. (There is a way out of it…, but it is very expensive; it requires abandoning the notion that concepts have intensions).[4]

What Fodor and Pylyshyn (F&P) propose is a referential-causal semantics. A centerpiece of their semantic theory is Pylyshyn's previous treatment of the fact that we can perceive and track something before we have any idea of what that is.[5] Several dynamic demos by Zenon show that it is the case. These cognition-free (or pre-cognitive) processes have been labeled FINSTs (FINger INSTantiations). *Location* of visual features precedes *kind*. In early stages of visual processing there must be "place tokens" that enable subsequent stages of the visual system to treat locations independent of what specific feature type was at that location.

Imagine that, while I am writing these lines, something outside my window shoots across. I detect it in my peripheral vision and wonder what THAT is. I get up quickly, go to my window and a few seconds later I realize it's a small drone, remotely operated by a nearby kid. Well, I had perceived and tracked it *before* I knew what IT was. Pylyshyn stresses the similarity between demonstratives or indexicals (this, that, it) and FINSTs. that are opaque to the properties of the objects to which they refer.

This is essential to F&P semantics, because they claim that such causal relations to external entities allow us to word-label them (say, a drone) and thereby build an entire lexicon with specific referents. The content of a concept is, therefore, the causally introduced referent. F&P tell us that: "*Conceptual content is purely referential*". We are invited to notice the adverb "purely". Their story is committed to the view that most visual processing is carried out without input from the cognitive system, so that vision is by and large cognitively impenetrable and encapsulated in a modular architecture. The creation of "object files" allows object properties to be represented as conjoined or as belonging to a same object. But objects must be individuated *before* there is a decision of which properties belong to which object. F&P describe at great length many experiments by several authors (including quite a number by Pylyshyn and collaborators) that substantiate the dynamics of early, pre-cognitive, visual individuation, tracking and memorization, starting in early infancy. They conclude that:

Since tracking is a reflex, which is to say that it doesn't involve the application of any concept, the concept "object" need not come into the process of visual perception *at all*. […] Our treatment of the early stages in perception has turned on the notions

of *object* and of *tracking*, both of which are causal world-to-mind processes, and neither of which need involve conceptualization.[6]

1.2 Refuting other semantic theories

After examining all previously offered theories of meaning (definitions, association nets, inferential roles, sorting capacity) F&P conclude:

> We think, in semantics: the reason that nobody has found anything that can bear the weight that meaning has been supposed to bear – it determines extensions, it is preserved under translation and paraphrase, it is transmitted in successful communication, it is what synonymy is the identity of, it supports a semantic notion of necessity, it supports philosophically interesting notions of analytic necessity and conceptual analysis, it is psychologically real, it distinguishes among coextensive concepts (including empty ones), it is compositional, it is productive, it isn't occult, and, even if it doesn't meet quite all of those criteria, it does meet a substantial number – the reason that meaning has proved so elusive is that there is no such beast as that either. We think that, like the Loch Ness Monster, meaning is a myth.[7]

1.3 Problems with Frege

To repeat: according to Fodor and Pylyshyn, reference is the only relevant factor of content. An immediate problem for F&P seems to be the Fregean iconic case of the Morning Star and the Evening Star. Same referent, but, come to think of it, different meaning. They ask: something other than mere co-extensivity is required, but why should co-intension be the mandatory solution? The solution is compositionality. Morning appears in the first expression, while evening appears in the second. Different constituents! And differences between the morpho-syntactic forms of mental representations can do the job. Mental representations that express concepts must be compositional. F&P conclude:

> Frege cases don't show what Frege took them to: They don't show that purely referential semantics can't do what a semantics is supposed to: in particular, they don't explain why SI [Substitution of Identicals] and existential generalization fail in PA [Propositional Attitude] contexts. The result of Frege's missing this was a century during which philosophers, psychologists, and cognitive scientists in general spent wringing their hands about what meanings could possibly be.[8]

Later on, F&P specify that:

> We don't hold that the content of a concept is its referent; we hold that the content of a concept is its referent *together with the compositional structure of the mental representation that expresses the concept*.[9]

So, we have reference plus morpho-syntax. This is how the Frege cases are solved. But Chomsky (personal communication) says: The F&P response to Frege seems to me to differentiate meanings too finely. Do "I find the book difficult" and "I find the book to be difficult", or "the angry man" and "the man who is angry" have different meanings? (Though one might make an argument that they derive from the same underlying and perhaps universal structure – a rather subtle matter).

1.4 Some major problems

Inexistent entities, entities in the remote past, geographically remote entities, theoretical entities, characters in novels are a major problem. But first F&P have to deal with perceptual reference. And they do so.

A strategy of divide and conquer might help here: first provide a theory that ac-

counts for cases where the relevant causal relation between a symbol and its referent is relatively direct; then work outward from the core cases to ones where the relation is less direct. Perceptual reference – reference to things in the perceptual circle (PC) – is that if a causal theory of reference is ever to be true, the most likely candidate is the reference of a tokened mental representation to a thing that one perceives. [...]. reference supervenes on a causal chain from a percept to the tokening of a Mentalese symbol by the perceiver.[10]

We're assuming that reference is the only semantic relation between symbols-in-the-mind and things-in-the-world (there is, for example, no such thing as truth in virtue of meaning) this amounts to a (very schematic, to be sure) metaphysical theory of the content of mental representations; and, since the mind–world relations that this kind of theory invokes are, by assumption, causal, the proposal is thus far compatible with the demands that we're assuming naturalism imposes on the cognitive sciences.[11]

Our working assumption [...] is that semantic relations between the mind and the world are "grounded in" causal relations between the mind and things in the mind's perceptual circle. This isn't, of course, to say that all you can think about is the things that you can see. But it does claim that the mental representation of things that aren't in the perceptual circle depends on the mental representation of things that are. Very roughly, it depends on reference-making causal chains that run from things you can see (or hear, or touch, or smell, or otherwise sense) to mental representations of things outside the PC [Perceptual Circle]. In effect, reference in thought depends on perceptual reference, which in turn depends on sensory transduction; and at each step, it's causation that provides the glue.[12]

At long last, they try to solve the problem. One might have expected that the causal relation for inexistent entities, entities in the remote past, geographically remote entities, theoretical entities, characters in novels and the like is not with percepts, but with books or stories one has heard, or portraits, or paintings. This is a move that Umberto Eco would have recommended,[13] but F&P cannot adopt it, because it would ineliminably comport a connection with meanings. What F&P have to offer is something else. After discarding counterfactuals (wich will come back later) and remembrances, they introduce a "mobile" perceptual circle (PC), a PC that follows us around as we go from place to place. This is possibly OK for things far away in space, but what about time? Something that isn't in *anyone* PC *now*. A causal chain of transmission from the original baptismal ceremony *á la* Kripke seems to be capable of doing the job, provided, F&P say, that it can be *naturalized*.

> It seems to us to be mistaken to argue, as we take Kripke to do, that naturalists are prohibited from telling that story about how "Moses" got from Moses to us. It's true that, if the transmission of baptismal intentions were proposed as a metaphysical account of what *reference* is (i.e., what it is for "Moses" to refer to Moses), then it would indeed be circular. But the story about the *transmission* of baptismal intentions doesn't purport to be a theory of reference in that sense; rather, it's a theory of reference *transmission*. According to our kind of naturalist, reference consists of some sort of causal relation between a representation and the thing it refers to. According to our kind of naturalist, such chains are grounded in perceptual reference.[14]

The story about the transmission of reference along a causal chain is supposed to explain how, *assuming that a reference-making mind-world connection is in place*, it can be inherited from minds to minds over time. De facto, the causal chains that

connect our mental (linguistic) representations of things in the future, like mental representations of things in the past, include, in all sorts of ways, tokenings of beliefs, memories, intentions, and so on among their numerous links. But why should that perplex a naturalist? Transmission of reference is constituted by causal relations between people over time. But reference itself is a causal relation between mental representations and the things-in-the-world that they represent. A theory about the transmission of content can perfectly legitimately take contentful mental states for granted, even though a theory about what content is mustn't do so on pain of circularity.[15]

For this story to square, it suffices to say (contra Kripke) that the baptism was *not* an act of intentionality (which would lead to circularity in the F&P referential theory), but an act of *reference*. The name Moses, there and then, *referred* to that person. Then the causal chain of transmission of reference can proceed without a problem and be perfectly naturalistic.

▌ 1.5 Empty concepts

Next come empty concepts (Devil, unicorn, frictionless planes and similar). Reference is to be explained without meanings. What do they refer to? The empty set? Then Devil and unicorn and frictionless planes are the same. We do not want this, but we do not want meanings. Then what? We want different *kinds* of empty concepts, accessed by different kinds of counterfactuals, since different causal *laws* apply. Fictions (unicorns) are different from idealizations and extrapolations from the laws of mechanics (as in frictionless planes).

There aren't any true counterfactuals about unicorns because there aren't any laws about unicorns (not even physical laws; we think "if there were unicorns, they could run faster than light ..." is neither true nor false).[16]

What about impossible objects?

What about square circles? It's not just that there *aren't* any; it's that there *couldn't be* any. So the extension of "square circle" is *necessarily* empty, as is the extension of "round triangle". Nevertheless, the semantic content of "square circle" is intuitively different from the semantic content of "square triangle", which is again different from that of "round triangle".[17]

Being, or not being, a primitive concept is the key.

A purely referential semantics (PRS) would require *that no concept whose extension is necessarily empty can be primitive.* There couldn't, for example, be a syntactically simple mental representation that denotes all and only square circles. The reason is straightforward: as we've been describing it, PRS implies that the extension of a representation is determined *by actual or counterfactual causal interactions* between things in its extension and its tokens. But there are no possible (a fortiori, no actual) causal interactions between square circles and *anything* because "There are no square circles" is *necessarily* true. So if there is a concept square circle (we're prepared to assume, if only for the sake of argument, that there is), and if PRS is true, then the concept square circle must be compositional, hence structurally complex, hence not primitive.[18]

What about fictional characters? F&P examine and discard inferential roles, auras of associations, attitudes, feelings, beliefs, quasi-beliefs, recollections, expectations, and the like. But do not seem to be able (sort of admittedly) to offer a solution that really preserves a naturalistic purely referential semantics. They hint that a lot of all this is outside the domain of semantics altogether. What about too small and too big objects? Micro-

scopes, telescopes and the like appear to be able to bring such objects within the Perceptual Circle. Not clear what the causal-referential connection of concepts such as paramecia to an extension were *before* those instruments were available. F&P say: «we *now* can say what they *then* were referring to when they spoke of paramecia».[19]

Frankly, I (MPP) cannot make much sense of this (see below). Of all the problematic points in their book, this is especially puzzling. F&P concede that they are satisfied with treating clear cases, suspending judgment on these elaborate instances. An admission of impotence, it seems.

1.6 Finally: Abstracta

Admittedly, these cannot have any causal power.

> How could an utterance (/thought) refer to a property if properties are abstracta and reference is a causal relation between representations and their referents? Properties don't have effects (though a state of affairs consisting of a property's being instantiated by an individual perfectly well can).[20]

So, what is the solution? Tokening, possession conditions and second order properties.

> A purely referential semantics should say that what the concept red contributes to the semantics of the color red isn't its referent but its *possession condition*. In particular, to have the concept the color red, one must have the concept that "red" expresses in (for example) "that red house"; roughly, it's to have a Mentalese representation type that is caused to be tokened by red things as such.[21]

> Since we are, for better or worse, already committed to a sufficient condition for having the concept that "red" expresses in "that red house", the semantics of "red" in "the color red" doesn't show that the

causal-referential semantics game is over. It does, however, suggest that our "purely referential" semantics won't, after all, be *purely* referential. Having the concept that "red" refers to in "the color red" is having a mental representation type that is caused to be tokened by (actual and possible) things that are red; so the "red" in "the color red" expresses a *second-order property*; it's a property that representations have in virtue of the causal properties of *other* representations; in particular, in virtue of their capacity for being caused by instances of redness. That seems reasonably natural since, from the metaphysical point of view, properties do seem to be second-order sorts of things. For there to be the property red is for some (actual or possible) things to be instances of redness.[22]

Their concluding paragraph is:

> The fact that the kinds of putative counterexamples to causal theories of reference are so strikingly heterogeneous suggests to us that perhaps they can be dealt with piecemeal.[23]

> We think that (contrary to claims that philosophers and others have made from time to time) there are no really conclusive arguments against the view that conceptual content boils down to reference; or against the view that the vehicles of conceptual content are, in the first instance, mental representations; or against the view that the reference of mental representations supervenes on their causal relations. If we thought otherwise, we would have written some other book or no book at all.[24]

2 My objections

Aside from the major problems that F&P's semantics encounters with inexistent entities, possible entities, fictional characters and objects in the remote past, I think that even their

story on direct perception is flawed.

Granted, we can detect and track objects before we have any idea about their properties, but our applying names to them and activating the concepts is highly *constrained*. These, now well known, constraints apply to possible *meanings*, not to perception. The whole object bias, the no-synonym bias, the irrelevance of the surroundings, other kinds of irrelevances (the exemplar is pointing – say – to the East, happens to have a certain color, is a left shoe, is one feet above ground etc.) are all crucial constraints on possible *meanings*, on the content of simple concepts.[25] When the child is shown an object for which he/she already knows the word and a new word is pronounced, he/she spontaneously interprets the new word/concept as designating a larger category, or a special category, or the stuff of which it is made.[26] Which kind of causal connection can explain any of this, if meanings are not part of the process and constraints on possible meanings do not apply?

Then what about acquiring concepts such as "container", "vehicle", "furniture", "food" and the like? Some kind of collective causality? Is memory interacting with the Perceptual Circle? How are relevant memory items selected? By traces of specific percepts? F&P say (see above) that «the content of a concept is its referent *together with the compositional structure of the mental representation that expresses the concept*».[27] I see no compositional structure for container, vehicle, furniture, food and innumerable other categories at this level of generality. Nor do I see any compositional structure in the concept, say, of energy. Unlike their story for "redness", or "square circle" energy *as such* does not impact our Perceptual Circle. It's not overly problematic to explain how generalizations and abstractions can be derived from meanings, nor (say, in physics or biology) how generalizations and abstractions can be derived from different kinds of causality. But the latter require a host of meanings to work on, not a straight process from direct causal interactions.

Let me now come to another problematic ingredient of their semantics: laws and counterfactuals. Counterfactuals can only be made when there is a law supporting them (as we are reminded by F&P re frictionless planes). The power of counterfactuals and the severe epistemological limitations caused by the impossibility to reason counterfactually has been stressed (rightly) by Fodor for many years, notably in his critique of behaviorism and our analogous critique of explanations based on Darwinian natural selection.[28] Counterfactuals, by definition, have the logical form of a conditional where the antecedent is acknowledged to be false. When there is a law that grants the nomic invariance of the possible world in which the antecedent is, by hypothesis, false, then the counterfactual has a definite truth value. A ball rolling on a frictionless plane (Galileo taught us) would obey the laws of motion and follow a certain trajectory. Fine, but now take meanings out of the picture. What is that law? What does that law, or any natural law, say? "About" what is it? Some repetition in perceived causality? Albert Michotte has shown that we, indeed, directly perceive causality[29] very early so,[30] but the abstraction into a law cannot be made without any "aboutness" of what the coverage of a law is. Invoking laws and counterfactuals in a purely causal-referential cadre seems to me an impossibility.

Let's now review alternative theories of semantics, a classical truth-functional semantics and, finally, an internalist theory that is almost the exact opposite of F&P's

3 A (standard) compositional and truth-functional semantics

3.1 Knowledge of meaning

On this, I follow the teaching of another dear friend, the late James Higginbotham. Especially his insightful notion of elucidations of meaning.[31] This is, in my opinion, the best rendition of a compositional, truth-functional semantics.

The assigners of meaning are positions in derivations (nodes and roots, if one takes the tree representation seriously). There is (in his words) *determinism*: For each point in a tree, its meaning is unique. There is a fact of the matter as to what a linguistic expression *really* means. In the ideal case, *every* speaker of English may get it wrong (his famous example: *No eye-injury is too trivial to ignore,* is commonly interpreted as a possible fine motto for an eye clinic, while (if throughly analyzed) it means the opposite – never pay any attention to minor eye injuries). It means what it deep down means, and that can be shown to be the case via careful syntactic-semantic analysis (via some sort of mini-theorems). He insists that what is crucial is not "meanings," whatever they may be, but rather what it is to *know the meaning* of an expression (his former students Larson and Segal have used this expression as the title of their excellent textbooks of semantics *Knowledge of meaning*).[32] A crucial passage from one his papers:

> As is customary, even if surely an idealization, I will assume that knowledge of the meaning of an expression takes the form of knowledge of a certain condition on its reference (possibly given various parameters) that is uniform across speakers; that is, that we can sum up what is required to know the meaning of an expression in a single statement, and that we do not adjust that statement so as to reflect, for instance, the different demands that may be placed upon speakers, depending upon their age, profession, or duties.[33]

As a consequence, the *immediate* first-blush intuitions of the *single* native speaker are *not* always the supreme judges (at least not in every case). The very notion of "elucidations of meaning"[34] entails a work of clarification that goes beyond direct individual intuitions. Educated (parametrized, across-speakers, context-independent) intuitions is what you need. In an e-mail message to me (October 2002), Jim says:

Elucidations are statements of what one knows who knows the meaning of something. They are not paraphrases of anything. They do, however, play the role of one notion of senses as in Frege, namely that of "cognitive significance". This is close to one version of "mode of presentation".[35]

Jim has insisted, contra Fodor, that, although definitions (or paraphrases) do *not exhaust* lexical meanings, yet, this does not entail that they are *worthless*. They may well contribute to the elucidation of meaning, and be a component of meaning. In that e-mail, Jim also says:

> Fodorian atomism is consistent, I think, with there being elaborate things one has to know to know the meaning of something, even if there are no "definitions", in some strict sense.[36]

An example of elucidation from Jim: The meaning of "heed" (I had wondered about this meaning, untranslatable into Italian with a single word):

The data:

> *heed a warning/command*
> *heed advice*
> *Heed my words!*
> *heed the man*
> **heed an order*
> *heed the instructions*
> **heed the book*
> *heed the Bible*
> *heeded nought/*nothing*
> **heed the stove*
> *heed the advanced passed pawn*

Jim adds*:*

I think (that is to say, it accords with my judgment: I haven't looked up the word). The curiosity is that, while "heed" does indeed mean to pay attention to, or to take into consideration, it applies only to

acts of speech or to portents (direct, like warnings, or from the source, like the Bible: hence the difference between "the book" and "the Bible" as objects, and hence, while one can pay attention to the stove, or take it (its condition) into consideration, one can't heed the stove – naturally, all the starred examples can be rescued by a sufficiently thick context); and the speech acts must be acts of advisement or exhortation (hence you can heed a command, but not an order, for an order must be obeyed). You can heed a threat (the advanced passed pawn), and in this sense you could heed the weather, I suppose; but you can't heed an ordinary object. I am ready to believe, upon reflection, that the word is not translatable![37]

He tends to minimize Chomsky's challenge of the existence of referents (see below). The paradoxes are explicable via "a change in context" (personal communication). Within the same sentence, context can change, (I MPP add that usually the standard cases are, in fact, generated via adjunction or coordination). So, you have book as an abstract and then as a concrete, London as a set of buildings, then as a way of life etc. Chomsky, however, dissents. In an email to me (November 2019), he says:

> Context doesn't help in the least for sentences like "I visited London last year, found it polluted, and heard that after it was destroyed by fire and rebuilt with totally new materials 10 miles up the Thames it's far more livable and I plan to visit it next year." Or "it's an easy book to read but too heavy to carry". And the fact that we can arrange to meet in London at the Tate tomorrow tells us nothing about whether "London" has a referent.[38]

3.2 On compositionality

The risk of the standard compositionality thesis is that it «verges on the trivial».[39]

For, there being nothing else but the parts of a sentence and the way they are combined to *give* the interpretation of a sentence, what else could interpretation be determined by? The thesis is not quite trivial, however, inasmuch as it presupposes that there is such a thing as "the interpretation of a sentence or discourse" *in a proper sense*.[40]

There being a "proper sense", and the importance of this fact, is central to his semantic theory. He has insisted, over the years that what is in the lexicon is a highly theoretical issue. One is *not* entitled (*contra* Grimshaw, and siding with Larson, for instance) to discharge a huge portion of syntax onto the lexicon, then (allegedly) claim one has reduced syntax, somehow. Jim also attributed this sin to Chomsky.

In particular, when and why two lexical items are, or are not, to be considered as *synonymous* is a serious matter. One of his examples is "autobiography" versus "the history of the life of its own author". There is a split here between syntax and semantics.

(1) John wrote his autobiography.
(2) *John wrote his history of the life of his own author.

The second expression is:

(2) (the x) history of the life of its own author(x) & **R**(John,x)
where **R** can be anything,

whereas *John's autobiography* is:
(1) (the x) autobiography(-of) (John,x)

autobiography has *two* open positions, *history of the life of its own author* <u>only one</u>. At the same time, these expressions are synonymous, considered as predicate nominals.

Syntactic headedness and semantic headedness usually map consistently and biunivocally one onto the other (this is the default

hypothesis that the child brings onto her learning of the local language), but there are interesting exceptions. *Alleged thief* is syntactically a modification of the noun, but it is semantically a modification of the adjectival phrase. Other examples in his papers.

The lesson: No need to introduce higher semantic types. Switched-headedness between syntax and semantics accounts for all these cases. Syntactic headedness has to do with *licensing* the presence of the other. Semantic headedness has to do with *argument-taking*. Whichever takes the other as argument is the head. Usually one head maps onto the other head, but not always. A nominal projection *alleged thief*, can have the noun as, in fact, the complement of the adjective. Semantically this is very clear: An alleged thief is a person x of whom it is alleged: *that* x is a thief. Other examples (with adverbials such as *eagerly*) make all the standard inferences come out right.

3.3 Higginbotham on syntax and semantics

A famous thesis of his (ever since *On semantics*)[41] is that semantics is partially insensitive to questions of grammaticality. *Likely* and *probable* <u>are</u> synonymous, though *probable* does not admit subject-to-subject raising. This explains the quartet (3)-(6) (taken from Gazdar):[42]

> (3) It is likely that Alex will leave
> (4) It is probable that Alex will leave
> (5) Alex is likely to leave
> (6) *Alex is probable to leave

It would be a mistake to question this synonymy. (6) *is* synonymous with (5), though it is ungrammatical. In fact, over the years (rightly I think), Jim has stressed the importance of the corrections that native speakers (modulo considerations of politeness) suggest to non-native speakers (or writers) toward saying correctly what they want to say. If *this* is what you want to say, then *this* is the way to say *it*. Ungrammatical ex-

pressions may well have perfectly clear meanings. (See also Chomsky's old example, to the same effect: *The child seems sleeping*). So clear, indeed, that the native speaker instantly finds the grammatically correct way of expressing *that* meaning. Of course this is *not always* possible, but it is often possible. This fact, Higginbotham underlined, rules out the Quinean idea that a language is the infinite set of grammatical utterances produced by native speakers. One speaker understanding the ungrammatical expression of another speaker and precisely correcting it is inexplicable in a Quinean frame.[43]

3.4 Possible failures of compositionality

Compositionality, in order to be an interesting hypothesis, has to be a *locality condition* on semantics.

Moreover, semantics has to be *parametrized*. It's a system with a small set of restricted choices of semantic composition-combination. See the example of the English *there* and the Italian *ci*.

English and Italian have different indefiniteness conditions for their respective versions of *there*-insertion. *There is John in the garden* only has a "list" interpretation (John and Mary and Tom, or John but not Mary). The Italian "*C'è Gianni in giardino*" has the event-existential interpretation (*It so happens that John is in the garden*). The choice is between tracing a *lexical* distinction between *there* and *ci*, with different lexical selections, versus admitting a difference in combinatorial powers between the two languages. Simple (so to speak) syntactic differences, with no semantic import, would amount to a failure in compositionality. The difference in meaning would be inexplicable. But the lexical distinction would be totally arbitrary. So, semantic compositionality must admit of parametric differences. Strict universality would lead to cheating.

Higginbotham offered a long and subtle analysis of conditionals as *prima facie* violations of compositionality (*the tip of a large*

iceberg). Compositionality is restored via complex syntactic, logical and semantic considerations.

Other apparent exceptions to compositionality emerge in the interpretation of deontics (expressions of obligation or permission), in many languages. These appear (much in tune with Fodor's critique, but leading to a different conclusion) *not* to be compositional.

> *John may not leave*

The meaning is that John is denied permission to leave. But the constituent structure is

> *[may [not leave]]*

and shotgun compositionality would give the interpretation that John is given permission not to leave. Various remedies can be concocted (different interpretations of the negation, special features of deontics, higher order logic). The "graininess" of the units to be composed can be a crucial issue. The general lesson is:

> In formulating a restrictive semantic theory, we face a problem not in one or two unknowns, but three. There is, first of all, the problem of saying precisely what the meaning of a sentence or other expression actually is, or more exactly what must be known by the native speaker who is said to know the meaning. Second, there is the question what the inputs to semantic interpretation are: single structures at LF, or possibly complexes consisting of LF structures and others, and so forth. And third, there is the question what the nature of the mapping from the inputs, whatever they are, to the interpretation, whatever it may turn out to be. In the inquiry, therefore, we must be prepared for implications for any one of these questions deriving from answers to the others.[44]

Compositionality is a "working hypothesis" that has proved to be a good hypothesis. It leads to interesting and hard choices on where to trace certain crucial dividing lines (the lexicon, syntax, parametrization versus universality, switched heads etc.)

Higginbotham is arguably offering the arguments and the data that Fodor wanted. He agrees with Fodor in considering semantic compositionality (in a restricted sense) a well-tested empirical hypothesis. He considers the arguments persuasive and the data supportive, though Fodor does not, for natural languages, only for the *Language of thought* (LOT). After having maintained for years that there are no semantic parameters (only syntactic ones) and that the mapping of LF to interpretation is universal, Jim later on introduced semantic parameters (headedness being the central one). Or, at any rate, parametric variations in the mapping to interpretation. It remains (to me MPP at least) problematic how the child can *learn* the values of a semantic parameter. He also introduces (in other papers) a role for knowledge of the context. Something close to a refined pragmatics. These components are learned, but, Jim claims, the distinction between semantics and pragmatics is clear enough to avoid all confusion.

4 A non-truth-conditional non-referential semantics[45]

4.1 The impossibility of external referents

This is quite a departure from F&P, and a bold revision (even a refutation) of truth-functional semantics. I am personally persuaded that this internalist semantics is right. Take the sentence: *London is polluted, mostly Victorian, very expensive and culturally vibrant.*

No physical, external, mind-independent entity *can* be at the same time a bubble of air, a set of buildings, a place for economic transactions and a set of cultural initiatives. In the same vein, Paul Pietroski suggests:

France is an hexagonal republic.

No physical, external, mind-independent entity can be at the same time a form of government and a geometric shape. Examples are abundant: *My book over there, the one with the blue cover, is very generativist, has sold 200,000 copies and has been translated into eleven languages.* No physical, external, mind-independent entity *can* be at the same time a concrete object, be theoretically inspired, and have a content translated. These considerations have been dealt with by means of an intensionalist, internalist semantics.[46] There are no external entities that are truth-makers: «Lexical meanings are *instructions* for how to access concepts of a special sort, and phrasal meanings are *instructions* for how to build concepts that are monadic and conjunctive».[47]

> Theories of meaning are theories of how language expressions are related to human concepts, whose relation to truth may turn out to be quite complicated and orthogonal to the central issues concerning how meanings compose.[48]

The complicated relations to truth are mediated by features and truth "indicators" (sic)

> There is independent reason for thinking that natural language provides a constrained system of grammatical features that can be used as rough indicators of various possession relations, [...]. Perhaps such features serve as "adaptors" that make it possible for us to connect concepts of different types, thereby forming the kinds of complex concepts that we regularly deploy in ordinary human though*t*.[49]

This kind of internalist, totally intensional semantics is close to a refutation, certainly a radical revision, of truth-functional semantics. One passage, on abstract meanings, is a clear counter to F&P:

> [This theory invites] the thought that linguistic meanings are involved in making it possible for humans *to connect percepts with a capacity for abstract thought that would lie "untriggered" if not for the language faculty*. Perhaps we could not think about (the various things that can count as) triangles, as opposed to merely being able to classify certain things as triangular, without two integrated and integrating capacities: an ability to lexically connect concepts corresponding to perceptual prototypes, an abstract notion of space, and the idea of proof or necessity; and an ability to create sentential concepts unavailable without mediation by linguistic expressions that have the right features.[50]

The language faculty cited by Pietroski contains meanings in-eliminably.

4.2 On saturation

Let's assume that a relational concept can combine with the relevant number of singular/denoting concepts to form a complete thought. Pietroski cashes this out in terms of Frege's and Higginbotham's notion of saturation, but with a distinguo. The semantic effect of combining a name with a predicate is often described in terms of saturation, but, by contrast, Pietroski eschews the usual semantic typology for linguistic expressions, and describes meaning composition in terms of conjunction.

In essence: Pietroski says that combining expressions does not strictly signify saturation. In any given phrase, the grammatical arguments of a verb V are phrasal constituents to which V bears certain structural relations, which correspond to thematic concepts that can be conjoined with others. I was perplexed about denying saturation and asked him. In an email to me (April 2019), he says:

> I have nothing against saturation. Some systems of thought may involve saturation of one concept by another. For rea-

sons I discuss in chapter three, nobody can really think that saturation is the fundamental operation for combining meanings or "semantic values." But semanticists often confuse their operation "function application" with saturation. My main reasons for not appealing to "function application" are that (i) it leads to wild overgeneration of possible lexical types, via the infamous principle "if <A> and <B> are types, so is <A, B>"and (ii) it isn't needed, once we admit that we need other operations for adjunction and relative clauses in any case. In practice, "function application" gets invoked for internal arguments (first merge), quantifiers, and various posited functional items. But I think when you look at even these cases in detail, it becomes clear that the powerful rule is neither needed nor wanted. In the end, I think appeals to "function application" confuse composition with abstraction. Also, I find it hard to believe that every expression of natural language is a kind of denoting expression, and that there are no genuine predicates. But that's a matter of taste.[51]

4.3 Lexical polysemy

According to Pietroski lexical addresses can be shared by concepts of different types. The lexical entry FRANCE is accessed by a geometric type concept and a government type concept. BOOK is accessed by a physical type concept and a written-contents type concept. And so on.

He reminds us of the classic experiments by David Swinney, Marc Seidenberg and Michael Tanenhaus to the effect that presenting a lexical item primes all its meanings. A story about roaches and ants primes "bug", but them "bug" also primes "microphones" and "spying". Cars and trucks prime "tires", "deflate" and "wheels" but then "tires" also primes "fatigue".[52] Pietroski suggests that this generalizes to many, maybe all, lexical items, for instance "London", "France" and "book".

If one adheres to the idea that combining expressions is fundamentally an instruction to construct conjunctive concepts, along with the idea that open class lexical items are instructions to fetch concepts with independent content, one is led to say that certain aspects of syntax and various functional items are *instructions* to convert fetchable/constructable concepts into concepts that can be systematically conjoined with others. Perhaps this is the *raison d'être* of syntax that goes beyond mere recursive concatenation: grammatical relations, like being the internal/external argument of a verb or determiner, can carry a kind of significance that is intriguingly like the kind of significance that prepositions have. These old ideas can be combined in a Minimalist setting devoted to asking which conversion operations are required by a spare conception of the recursive composition operations that human I-languages can invoke in directing concept assembly.

4.4 Truth indications

According to Chomsky,

We cannot assume that statements (let alone sentences) have truth conditions. At most, they have something more complex: "ruth indications", in some sense. The issue is not "open texture" or "family resemblance" in the Wittgensteinian sense. Nor does the conclusion lend any weight to the belief that semantics is "holistic" in the Quinean sense that semantic properties are assigned to the whole array of words, not to each individually. Each of these familiar pictures of the nature of meaning seems partially correct, but only partially. There is good evidence that words have intrinsic properties of sound, form, and meaning; but also open texture, which allows their meanings to be extended and sharpened in certain ways; and also holistic properties that allow some mutual adjustment. The intrinsic properties suffice to establish certain formal rela-

tions among expressions, interpreted as rhyme, entailment, and in other ways by the performance systems.[53]

Chomsky insists that the *only* posit that is tenable is the internal structure of the speaker-hearer, a complex, abstractly characterizable, computational-derivational apparatus, optimal if left alone, that interfaces with other cognitive apparatuses (the articulatory-perceptual one, via PF, and the conceptual-intentional one, via LF), satisfying the constraints that they impose. *Any* notion of a "relationship" between the speaker-hearer's internal systems and some abstraction (even Fodor's *The language of thought* – LOT) is un-scientific, and has to be eliminated. Chomsky says that his own older terminology, the very title of his book *Knowledge of language*[54] is to be taken with great precaution, because it suggests a relation between a speaker and an external entity.

He is relentless in reminding us that we should not forget the important lesson that certain analytic philosophers (Moore, Strawson and Co.) have taught us. Ordinary language bamboozles us into giving reality to mere ways of saying (knowledge of language, and *representations* being among them). Everything is now in Minimalism to be cashed in terms of derivations, eliminating representations altogether, as well as trees, branches, indices, and so on (except as innocent, easily convertible abbreviations, for didactic purposes). Also: Strictly speaking, only *people* refer to this and that. The extension of "referring" to apply to items in the lexicon is an improper extension, a trick of ordinary language.

Jerry Fodor, in private conversation, told me that this is crazy (sic). We *causally* relate to cities in this way. We relate to buildings, to activities and a lot more. If we decide to meet in London next Wednesday, by all means, we *will* meet in London next Wednesday. Ditto on how we causally relate to books.

Fodor said that it cannot *just* be an assumption that natural language (L) is compositional, and that there is a strictly compositional level of representation (LF) *of L,* such that *everything* is made explicit at that level. This is a very strong hypothesis, that forces one to hypothesize hugely complicated underlying structures, with a huge amount of silent components (empty categories, deleted copies, functional categories of all sorts, projections of all sorts) *just because* the theory imposes that LSs are strictly compositional. A theory that imposes so many diversified and complex posits ought to reconsider the basic assumption that make these inevitable, i.e. the assumption of compositionality.

However, the *language of thought* (LOT) *is* compositional (this is *still* non-negotiable), and so is syntax (the algorithmic construction of sentence types from sentence tokens, as Jerry puts it). As we saw, compositionality and morpho-syntactic forms are still a centerpiece of F&P's semantics.

5 Concluding remarks

As we saw, the F&P's semantics of causal relations and pure reference is especially problematic when inexistent entities, possible entities, fictional characters and objects in the remote past are examined. As to objects too small (paramecia) or too large (the cosmos) and the later discovery of instruments capable of making them causally accessible in our Perceptual Circle (PC), the issue of their referents *before* such discoveries is left open. I have pointed out other, more basic flaws of their semantic theory. They say that these are heterogeneous objections, to be treated piecemeal, but there is another way of looking at it: this heterogeneity looks a bit like multiple battalions, from different directions, independently assaulting their fortress. The fortress is hard to defend from these multiple assaults. Since not *even* Jerry and Zenon did really manage to make their theory convincing, I bet no one else will.

Acknowledgements

comments and suggestions on a previous version of this paper.

▎ Notes

[1] Cf. J.A. FODOR, M. PIATTELLI-PALMARINI, *What Darwin got wrong*, Farrar, Straus & Giroux, New York 2010; see also J.A. FODOR, M. PIATTELLI-PALMARINI, *What Darwin got wrong*, Picador Macmillan, New York 2011 (*Paperback edition, with an update, and a reply to our critics*).

[2] Cf. M. PIATTELLI-PALMARINI, *Fodor and the innateness of all (basic) concepts*, in: R.G. DE ALMEIDA, L.R. GLEITMAN, (eds.), *Concepts, modules, and language: Cognitive science at its core*, Oxford University Press, Oxford 2018, pp. 211-237.

[3] Cf. J.A. FODOR, Z.W. PYLYSHYN, *Minds without meanings. An essay on content of concepts*, MIT Press, Cambridge (MA) 2015.

[4] *Ibid.*, p. 39.

[5] Cf. Z.W. PYLYSHYN, *Seeing and visualizing: It's not what you think*, MIT Press, Cambridge (MA) 2003.

[6] J.A. FODOR, Z.W. PYLYSHYN, *Minds without meanings. An essay on content of concepts*, MIT Press, Cambridge (MA) 2015, p. 116.

[7] *Ibid.*, p. 58.

[8] *Ibid.*, p. 75.

[9] *Ibid.*, p. 130 – emphasis in original.

[10] *Ibid.*, pp. 85-86.

[11] *Ibid.*, p. 88.

[12] *Ibid.*, pp. 126-127.

[13] Cf. U. ECO, *Kant and the platypus. Essay on language and cognition* (1997), translated by A. MCEWENHartcourt, London/New York.

[14] *Ibid.*, p. 140.

[15] *Ibid.*, pp. 140-141.

[16] *Ibid.*, p. 143.

[17] *Ibidem*.

[18] *Ibid.*, p. 144.

[19] *Ibid.*, p. 147.

[20] *Ibid.*, p. 151.

[21] *Ibid.*, p. 152.

[22] *Ibid.*, pp. 152-153.

[23] *Ibid.*, p. 154.

[24] *Ibid.*, p. 156.

[25] Cf. S.L. ARMSTRONG, L.R. GLEITMAN, H. GLEITMAN, *What some concepts might not be*, in: «Cognition», vol. XIII, n. 3, 1983, pp. 263-308; L.R. GLEITMAN, *The structural sources of verb meanings*, in: «Language Acquisition», vol. I, n. 1, 1990, pp. 3-55; L.R. GLEITMAN, B. LANDAU (eds.), *The Acquisition of the Lexicon*, MIT Press, Cambridge (MA) 1994; L.R. GLEITMAN, B. LANDAU, *Every child an isolate: Nature's experiments in language learning*, in: M. PIATTELLI-PALMARINI, R.C. BERWICK (eds.), *Rich Languages from Poor Inputs*, Oxford University Press, Oxford 2013, pp. 91-106; L.R. GLEITMAN, K. CASSIDY, R. NAPPA, A. PAPAFRAGOU, J.C. TRUESWELL, *Hard words*, in: «Language Learning and Development», vol. I, n. 1, 2005, pp. 23-64.

[26] Cf. E.M. MARKMAN, *Categorization and naming in children: Problems of induction*, MIT Press, Cambridge (MA) 1989, E.M. MARKMAN, *Constraints children place on word meanings*, in: «Cognitive Science», vol. XIV, n. 1, 1990, pp. 57-78.

[27] J.A. FODOR, Z.W. PYLYSHYN, *Minds without meanings*, cit., p. 130 - emphasis in original.

[28] Cf. J.A. FODOR, M. PIATTELLI-PALMARINI, *What Darwin got wrong*, cit.; J.A. FODOR, M. PIATTELLI-PALMARINI, *What Darwin got wrong*, (paperback edition), cit.

[29] Cf. A. MICHOTTE, *The perception of causality* (1954), translated by T.R. MILLS, E. MILLS, Routledge, London/New York 1963.

[30] Cf. A.M. LESLIE, *The perception of causality in infants*, in: «Perception», vol. XI, n. 2, 1982, pp. 173-186.

[31] Cf. J. HIGGINBOTHAM, *On semantics*, in: «Linguistic Inquiry», vol. XVI, n. 4, 1985, pp. 547-593; J. HIGGINBOTHAM, *Knowledge of reference*, in: A. GEORGE (ed.) *Reflections on Chomsky*, Blackwell, Oxford 1988, pp. 153-174; J. HIGGINBOTHAM, *Elucidations of meaning*, in: «Linguistic & Philosophy», vol. XII, n. 3, 1989, pp. 465-517.

[32] Cf. R. LARSON, G. SEGAL, *Knowledge of meaning: An introduction to semantic theory*, The MIT Press, Cambridge (MA) 1995.

[33] J. HIGGINBOTHAM, *Remarks on compositionality*, in: G. RAMCHAND, C. REISS (eds.), *The Oxford handbook of linguistic interface*, Oxford University Press, Oxford 2007, pp. 427-444, here pp. 429-430.

[34] J. HIGGINBOTHAM, *Elucidations of meaning*, cit.

[35] J. Higginbotham, personal communication.

[36] J. Higginbotham, personal communication.

[37] J. Higginbotham, personal communication.

[38] N. Chomsky, personal communication.

[39] J. HIGGINBOTHAM, *Remarks on compositionality*, in: G. RAMCHAND, C. REISS (eds.), *The Oxford handbook of linguistic interfaces*, Oxford University Press, Oxford 2007, pp. 425-444, here p. 426.

[40] J. Higginbotham, Personal communication - emphasis in the original.

[41] Cf. J. HIGGINBOTHAM, *On semantics*, cit.; see also J. HIGGINBOTHAM, *The autonomy of syntax and semantics*, in: J.L. GARFIELD (ed.), *Modularity in knowledge representation and natural-language understanding*, MIT Press, Cambridge (MA) 1987, pp. 119-131.

[42] Cf. G. GAZDAR, E. KLEIN, G. PULLUM, I. SAG, *Generalized Phrase Stucture Grammar*, Harvard University Press, Cambridge (MA) 1985, p. 32.

[43] Chomsky says that the Quinean frame is incoherent. The notion of E-Language (external language) is incoherent.

[44] J. Higginbotham, personal communication.

[45] It seems to me, Chomsky says (personal communication), that we simply have to face the fact that language has no semantics (in the technical sense of Peirce, Frege, Tarski, Quine, etc.). Or model-theoretic semantics or any other variant. Just syntax and pragmatics. I think you [MPP] underestimate the significance of the evidence, going back to classical Greece, that there is no reference relation for human language, only acts of referring. I've been arguing this for 40 years with examples like "London" and many others and have gotten nowhere, so don't expect to convince any professional philosophers (except Jim McGilvray and Paul Pietroski, maybe a few others). But I think it's true.

[46] Cf. J. MCGILVRAY, *Meanings are syntactically individuated and found in the head*, in: «Mind & Language», vol. XIII, n. 2, 1998, pp. 225-280; P.

PIETROSKI, *Meaning before truth*, in: G. PREYER, G. PETER (eds.), *Contextualism in philosophy: Knowledge, meaning and truth*, Oxford University Press, Oxford 2005, pp. 253-300; P. PIETROSKI, *Minimalist meaning, internalist interpretation*, in: «Biolinguistics», vol. II, n. 4, 2008, pp. 317-341; P. PIETROSKI, *Conjoining meanings: Semantics without truth values*, Oxford University Press, Oxford 2018; N. CHOMSKY, *New horizons in the study of language and mind*, Cambridge University Press, Cambridge 2000.

[47] P. PIETROSKI, *Conjoining meanings: Semantics without truth values*, cit., p. 1 - emphasis added.

[48] *Ibid.*, p. 115.

[49] P. PIETROSKI, *Meaning before truth*, cit., p. 271.

[50] *Ibid.*, p. 273 - emphasis added.

[51] P. Pietroski, personal communication.

[52] These experiments were evoked and approvingly stressed by Fodor in his book on modularity, as an instance of modular bullheadedness. See J.A. FODOR, *The modularity of mind: An essay on faculty psychology*, MIT Press, Cambridge (MA) 1983; J.A. FODOR, *Précis of The modularity of mind*, in: «Behavioral & Brain Sciences», vol. VIII, n. 1, 1985, pp. 1-5.

[53] N. CHOMSKY, *Powers and prospects*, South End Press, Boston (MA) 1996, p. 52.

[54] Cf. N. CHOMSKY, *Knowledge of language: Its nature, origin, and use*, Praeger Scientific, New York 1986.

References

ARMSTRONG, S.L., GLEITMAN, L.R., GLEITMAN, H. (1983). *What some concepts might not be*. In: «Cognition», vol. XIII, n. 3, pp. 263-308.

CHOMSKY, N. (1986). *Knowledge of language: Its nature, origin, and use*, Praeger Scientific, New York.

CHOMSKY, N. (1996). *Powers and prospects*, South End Press, Boston (MA).

CHOMSKY, N. (2000). *New horizons in the study of language and mind*, Cambridge University Press, Cambridge.

ECO, U. (2000). *Kant and the platypus. Essay on language and cognition* (1997), translated by A. MCEWEN, London/New York.

FODOR, J.A. (1983). *The modularity of mind: An essay on faculty psychology*, MIT Press, Cambridge (MA).

FODOR, J.A. (1985). *Précis of The modularity of mind*. In: «Behavioral & Brain Sciences», vol. VIII, n. 1, pp. 1-5.

FODOR, J.A., PIATTELLI-PALMARINI, M. (2010). *What Darwin got wrong*, Farrar, Straus & Giroux, New York.

FODOR, J.A., PIATTELLI-PALMARINI, M. (2011) *What Darwin got wrong*, Picador Macmillan, New York, Paperback edition, with an update, and a reply to critics.

FODOR, J.A., PYLYSHYN, Z.W. (2015). *Minds without meanings. An essay on content of concepts*, MIT Press, Cambridge (MA).

GAZDAR, G., KLEIN, E., PULLUM, G., SAG, I. (1985). *Generalized phrase stucture grammar*, Harvard University Press, Cambridge (MA).

GLEITMAN, L.R. (1990). *The structural sources of verb meanings*. In: «Language Acquisition», vol. I, n. 1, pp. 3-55.

GLEITMAN, L.R., CASSIDY, K., NAPPA, R., PAPAFRAGOU, A., TRUESWELL, J.C. (2005). *Hard words*. In: «Language Learning and Development», vol. I, n. 1, pp. 23-64.

GLEITMAN, L.R., LANDAU, B. (2013). *Every child an isolate: Nature's experiments in language learning*. In: M. PIATTELLI-PALMARINI, R.C. BERWICK (eds.), *Rich languages from poor inputs*, Oxford University Press, Oxford, pp. 91-106.

GLEITMAN, L.R., LANDAU, B. (eds.) (1994), *The Acquisition of the Lexicon*, MIT Press, Cambridge (MA).

HIGGINBOTHAM, J. (1985). *On semantics*. In: «Linguistic Inquiry», vol. XVI, n. 4, pp. 547-593.

HIGGINBOTHAM, J. (1987). *The autonomy of syntax and semantics*. In: J.L. GARFIELD (ed.), *Modularity in knowledge representation and natural-language understanding*, MIT Press, Cambridge (MA), pp. 119-131.

HIGGINBOTHAM, J. (1988). *Knowledge of reference*. In: A. GEORGE (ed.) *Reflections on Chomsky*, Blackwell, Oxford, pp. 153-174.

HIGGINBOTHAM, J. (1989). *Elucidations of meaning*. In: «Linguistic & Philosophy», vol. XII, n. 3, pp. 465-517.

HIGGINBOTHAM, J. (2007). *Remarks on compositionality*. In: G. RAMCHAND, C. REISS (eds.), *The Oxford handbook of linguistic interface*, Oxford University Press, Oxford, pp. 427-444.

LARSON, R., SEGAL, G. (1995). *Knowledge of meaning: An introduction to semantic theory*, The MIT Press, Cambridge (MA).

LESLIE, A.M. (1982). *The perception of causality in infants*. In: «Perception», vol. XI, n. 2, pp. 173-186.

MARKMAN, E.M. (1989). *Categorization and naming in children: Problems of induction*, MIT Press, Cambridge (MA).

MARKMAN, E.M. (1990). *Constraints children place on word meanings*, in: «Cognitive Science», vol. XIV, n. 1, pp. 57-78.

MCGILVRAY, J. (1998). *Meanings are syntactically individuated and found in the head*, in: «Mind & Language», vol. XIII, n. 2,1998, pp. 225-280.

MICHOTTE, A. (1963). *The perception of causality* (1954), translated by T.R. MILLS, E. MILLS, Routledge, London/New York.

PIATTELLI-PALMARINI, M. (2018). *Fodor and the innateness of all (basic) concepts*. In: R.G. DE ALMEIDA, L.R. GLEITMAN, (eds.), *Concepts, modules, and language: Cognitive science at its core*, Oxford University Press, Oxford, pp. 211-237.

PIETROSKI, P. (2005). *Meaning before truth*. In: G. PREYER, G. PETER (eds.), *Contextualism in philosophy: Knowledge, meaning and truth*, Oxford University Press, Oxford, pp. 253-300.

PIETROSKI, P. (2008). *Minimalist meaning,*

internalist interpretation. In: «Biolinguistics», vol. II, n. 4, pp. 317-341.

PIETROSKI, P. (2018). *Conjoining meanings: Semantics without truth values*, Oxford University Press, Oxford.

PYLYSHYN, Z.W. (2003). *Seeing and visualizing: It's not what you think*, MIT Press, Cambridge (MA).