

Cognitive Significance¹

Penultimate version. To appear in *The Routledge Handbook on Linguistic Reference* Stephen Biggs and Heimur Geirsson, Eds. Please cite the published version.

Aidan Gray
University of Illinois at Chicago

Frege's Puzzle is a founding problem in analytic philosophy. It lies at the intersection of central topics in the philosophy of language and mind: the theory of reference, the nature of propositional attitudes, the nature of semantic theorizing, the relation between semantics and pragmatics, *etc.*

The puzzle concerns the relation between the referential significance of a sentence (or utterance)—*i.e.*, the way it portrays properties and relations as distributed over objects—and its cognitive significance. 'Cognitive significance' is an umbrella term, used to pick out a range of cognitively relevant features of a sentence: the state of mind a speaker could express with it, the kinds of evidence the speaker takes to be relevant to it, the states of mind in others she can use it to report, *etc.* Frege's Puzzle seems to show that reference and cognitive significance don't align in the way that independent considerations suggest they should. This chapter is an overview of the puzzle and of the space of contemporary approaches to it.

1 Frege's Challenge

The background for discussions of cognitive significance is a puzzle introduced by (Frege, 1892). Our interest is not historical, so I will present it in anachronistic form. It is generated by a tension between two plausible theses about meaning: one linking meaning with reference; another linking meaning with cognition.

Millianism: The meaning of a proper name² is its referent.

Meaning and Cognitive Significance: The meaning of a sentence determines its cognitive significance.

Millianism should be understood against the background of compositional theories of

¹ This chapter benefited from helpful feedback from the editors of this volume and from David Braun.

² For the sake of brevity, I'll focus on proper names here. But analogous issues arise for other singular terms, and for expression of other semantic types.

meaning. In a compositional theory, the meaning of a complex expression is a function of the meaning of its parts, and their mode of combination. The meanings of simple expressions are assigned directly. It is natural, in a theory of this kind, to hold that the meaning of a proper name is the object to which it refers; that is, the meaning “London” is London (the city), the meaning of “Bob Dylan” is Bob Dylan (the man), *etc.* This is the simplest hypothesis about the meaning of a name that explains the contribution a name makes to the conditions under which a sentence containing it is true.

Let’s call pairs of sentences that apparently differ only in the substitution of coreferential names ‘Frege-pairs’. Given Millianism, compositionality, and the assumption that there are no ‘hidden’ semantic differences between Frege-pairs, it follows that Frege-pairs have the same meaning. So it follows, given that Robert Zimmerman is Bob Dylan, that (1a) and (1b) have the same meaning.

(1a) Bob Dylan is Bob Dylan

(1b) Robert Zimmerman is Bob Dylan

Frege claimed that pairs like (1a)/(1b) differ in cognitive significance. Identity statements of the form in (1a) are knowable *a priori* and analytic; while statements of the form in (1b) are not to be knowable *a priori* and contain “valuable extensions of our knowledge”. Frege took the difference in cognitive significance between (1a) and (1b) to entail that they differed in meaning. Here, he was relying on *Meaning and Cognitive Significance*.

We can motivate *Meaning and Cognitive Significance* with simple reflection on the explanatory role of meaning. Meaning (or, perhaps, knowledge of meaning) bridges the gap between cognition and linguistic behaviour. Given I believe that *p* why did I assert sentence *S*? Because *S* means that *p*. Given I had evidence *e*, why did I assent to *S*? Because *S* means that *p* and *e* is relevant to the truth of *p*. And so forth. We’ll see shortly that this story is too crude. But it illustrates why *Meaning and Cognitive Significance* is a natural place to start our semantic theorizing.

Frege also introduced a more direct challenge for Millianism. In sentences that report propositional attitudes, or speech acts—call these ‘ascriptions’ for short—substitution of coreferential names can, apparently, alter truth-values. Consider the following vignette. Smith knew Robert Zimmerman as a child. She is aware of the famous musician Bob Dylan, but is unaware that the boy she knew as a child is Dylan. As far as she knows, the boy she grew up with went on to lead an unmusical life. In relation to this situation, speakers judge (2a) to be

true but (2b) to be false.

(2a) Smith believes that Bob Dylan is a musician

(2b) Smith believes that Robert Zimmerman is a musician

If we accept these judgments, we have a more direct problem for Millianism. Relying only on the assumption that truth-conditions are compositional and that (utterances of) (2a) and (2b) semantically differ only in the substitution of coreferential names, we predict that (2a) and (2b) must have the same truth-value.

2 Sense and ‘The New Theory of Reference’

Frege responded to these considerations by rejecting Millianism. He held that singular terms had two kinds of linguistic significance: sense and reference. The sense of an expression, for Frege, was the way that the expression ‘presented’ its referent. The sense of an expression, for Frege, determines its reference. But two expressions with the same reference could ‘present’ it in different ways; so coreferential names could differ in sense.

He proposed to explain differences in cognitive significance between Frege-pairs with differences in sense, and so developed a theory of the role that sense played in linguistic understanding and semantics. Speakers understand an expression by being in cognitive contact with its sense (by ‘grasping’ it). Reference is the level at which compositional determination of truth-conditions occurs. The sense of an expression determines its cognitive significance. The contrast between (1a) and (1b) shows that ‘Bob Dylan’ and ‘Robert Zimmerman’ have different senses.

Frege held that ascriptions generate a ‘shift’ in meaning: when it is embedded under an attitude verb, an expression refers to its ‘customary’ sense (*i.e.* the sense it has when not so embedded). This allows Frege to capture the differences in truth conditions between (2a) and (2b). As they occur in those sentences, ‘Bob Dylan’ and ‘Robert Zimmerman’ have different referents (because they have different senses when they occur unembedded). So Frege can hold that (2a) and (2b) are not, contrary to appearances, related by substitution of coreferential expressions; so he can explain their difference in truth-conditions without violating compositionality.

This framework is elegant. But its plausibility depends, *inter alia*, on giving an account of sense. Frege didn’t offer an account. When he characterizes the sense of an expression, he

tends to reach for *descriptions*. For example, the sense of ‘Aristotle’, for some speakers, might be *the pupil of Plato and teacher of Alexander the Great*. These remarks suggest a theory that formed the background to 20th century work in the theory of reference: the sense of a name, *n*, for a speaker, *S*, is a description, *d*, that *S* associates with *n*; *n* refers to whatever satisfies *d*. Call this *Descriptivism*.³

Space does not allow us to recapitulate the arguments against Descriptivism.⁴ Suffice it to say that seminal work in the 1960s and 1970s—by Donnellan, Kripke, Putnam, Kaplan, Burge, and others—was taken by many to decisively refute it. In brief, the claim that linguistic reference is always mediated by *descriptive identification* of an object was taken to be implausible as an account of linguistic competence and to make false predictions about the epistemic and modal features of sentences involving names (Kripke, 1980). In its place, the ‘new’ theory of reference held that reference is typically determined, in part, by factors that are ‘external’ to a speaker’s cognition—for example, the chain of uses of a term that links a speaker’s use back to an original baptism.⁵

The work of the ‘new theorists’ is taken not just to refute Descriptivism, but to motivate Millianism. Though non-Millians remain⁶, Millianism forms the background for most contemporary discussions of cognitive significance. The ‘new theory’ is also taken to weaken, or complicate, our commitment to *Meaning as Cognitive Significance*. We motivated it above by reflecting on the explanatory role of meaning: grasp of meaning is the bridge between cognition and language-use. But the externalism embodied in the new theory—the idea that the meaning of a term for a speaker depends on facts that are external to the speaker’s psychology—complicates this explanatory picture. Given externalism, it is possible for a speaker to be unaware that two expressions mean the same thing (because she is unaware, for example, that the chain of uses leading from her use of ‘Dylan’ and the one leading from her use of ‘Zimmerman’ converge on the same man). In the context of the new theory, difference in cognitive significance does not entail difference in meaning. A significant literature has developed around the issue of the extent to which externalism about meaning entails that meaning is not cognitively ‘transparent’ to speakers.⁷

³ For discussion see (McLeod & Dunbar, n.d.)

⁴ See (Nelson, n.d.)

⁵ For an overview, see (Soames, n.d.)

⁶ See (Chalmers, 2002) and (Jackson, n.d.), (Schoubye, n.d.), and (Sawyer, n.d.) for different departures from Millianism.

⁷ See (Boghossian, 1992) for a classic discussion.

3 Clarifying the Challenge(s)

Frege's Puzzle appears to offer two distinct, but related, challenges: to explain the difference in *cognitive significance* between Frege-paired 'simple sentences'; and to explain the apparent differences in *truth-conditions* of Frege-paired ascriptions. In this section, we examine the challenges in more detail.

3.1 Simple Sentences

What, exactly, does Frege challenge us to explain? We introduced the challenge in relation to true identity statements, but it is broader. A competent, rational, speaker who doesn't know that Dylan is Zimmerman, might accept (3a) while rejecting (3b).

(3a) Dylan is a musician

(3b) Zimmerman is a musician

Identity statements dramatically illustrate a more general point: Frege-paired declarative sentences can differ in the evidence that competent, rational, speakers would require to endorse them. And given the kind of connection between meaning and cognition that Frege is assuming, this poses a perfectly general problem.

Even if we reject *Meaning and Cognitive Significance*—as new theorists might—we are still left with a question: what is the difference between Frege-pairs? How should we explain the different way they interact with linguistic cognition and communication?

It is not uncommon to find discussions of Frege's challenge framed in terms of the problem of explaining why a competent, rational, speaker might assent to, or accept, an utterance of a declarative sentence *S* while failing to assent to, or accept, an utterance of a *S'*, when *S* and *S'* are Frege-pairs. But the challenge is broader than this in several ways.

First, it shows up with non-declarative sentences. Consider (4a)/(4b).

(4a) Is Dylan a musician?

(4b) Is Zimmerman a musician?

These pairs exhibit an analogous contrast to that exhibited by (3a)/(3b), *modulo* the communicative role of interrogative sentences. A speaker who is unaware that Dylan is Zimmerman could respond differently to each pair in a way that is functionally analogous the difference between acceptance/rejection in the case of declarative sentences. Such a speaker

might treat (4b) but not (4a) as an attempt to change the subject (if the conversation had been about Dylan), or might treat (4a) but not (4b) as an attempt to reopen a question that had already been settled (if it was common ground in the conversation that Dylan was a musician). Analogous points could be made with respect to other non-assertoric speech acts.

There are also challenges associated with speakers who are *aware* of the relevant identities. Suppose Brown *believes* that Zimmerman is Dylan but is unaware he is a Minnesotan; contrast the effects on Brown of accepting the discourses in (5a)/(5b).

(5a) Dylan is a Minnesotan. But Dylan is not Zimmerman.

(5b) Zimmerman is a Minnesotan. But Dylan is not Zimmerman.

Notice two things. First, Brown would be in a different attitude states as a result of accepting (5a) as compared to accepting (5b): just consider how she would respond to the question, “Is Zimmerman a Minnesotan?”, after accepting each discourse. So the two discourses, as a whole, must differ in cognitive significance for her. But notice, also, that the *second* sentence of each discourse is the same. So if the two discourses differ in cognitive significance for Brown, it must be because the first uttered sentences differ in cognitive significance for her (or, equally puzzling, that the cognitive significance of a discourse is not determined by the cognitive significance of its component utterances). Recall, though, when the first sentence is uttered, Brown believes that Dylan is Zimmerman. This suggests that Frege-pairs can have different cognitive effects on speakers who *believe* that they are referentially equivalent.

Theorists sometimes appeal directly to speakers’ judgments about sameness/difference of meaning. We might simply ask speakers whether Frege-pairs have the same meaning. Many theorists hold that untutored intuitions tell us that the pairs have different meanings. Perhaps this, itself, requires explanation. Similarly, Frege-pairs appear to participate differently in intuitive evaluation of inferences.

There are a few upshots to this. The first is that there appear to be a whole range of phenomena which are such that we are inclined, in explaining them, to appeal to the meaning of sentences or utterance, *and* such that Frege-pairs participate differently in them (no doubt the list above could be extended). There is no simple, precise, statement of what it is for two sentences to differ in cognitive significance. So it’s not obvious how much uniformity there is in ‘the’ challenge posed by Frege’s puzzle.

This has two important lessons for us. First, without a precise, pre-theoretical, characterization of cognitive significance, we can’t put much weight on *Meaning and*

Cognitive Significance. That the meaning of a sentence plays some, yet to be precisely characterized, role in each of the above phenomenon is little reason to be troubled by the fact that sentences with the same meaning might play different roles. More interestingly, perhaps, the variety also suggests that we shouldn't be too quick to assume that what is required is a unitary explanation. The literature is replete with apparently competing responses to Frege's challenge. It would be salutary to keep in mind that apparently competing strategies might be complementary—either by applying to different aspects of Frege's challenge, or by working together in relation to explain some aspects.

3.2 Attitude Ascriptions

Frege claimed that sentences like (2a) ["Smith believes that Bob Dylan is a musician"] and (2b) ["Smith believes that Robert Zimmerman is a musician"] can differ in truth-value. The source of this claim is simply that there are circumstances in which competent speakers, even those who know that Dylan is Zimmerman, would accept (2a) while rejecting (2b) (and would even do so by calling one "true" and the other "false"). Contemporary theorists are cautious about moving directly from speakers' judgments about the truth-values of utterances to claims about the truth-values of the uttered sentences. Put roughly, we now assume that speakers have generally reliable judgments, at most, about, what we might call, 'the conveyed content' of an utterance. Conveyed content is not always identical to the semantic content of the uttered sentence. It often includes substantial influence of various kinds of pragmatic processes.

So we should be careful about how we describe the data. Instead of saying that the relevant pairs differ in truth-value, we'll say that they differ in 'acceptability'. 'Acceptable'/'Unacceptable' are technical terms, used to characterize speaker's intuitive evaluations of uttered sentences in a way that doesn't presuppose that speakers are making accurate judgments about the uttered sentence's truth-value. We'll see below that some accounts of ascriptions insist that if we focus on the semantic properties of the uttered sentence, (2b) is *true*. When speakers reject it as unacceptable, the thought goes, they are responding to some feature of its conveyed content distinct from the semantic value of the uttered sentence.

This redescription allows us to characterize a choice-point in approaches to Frege's challenge: should we give *the same* response to both aspects of the challenge? That is, do the same explanatory mechanisms explain the data about simple sentences and attitude

ascriptions? Frege-paired simple sentences cannot differ in truth-value.⁸ This is why we had to gesture at the difficult-to-characterize idea of differences in cognitive significance. If we say the same thing about Frege-paired ascriptions—if we say that the relevant sentences cannot differ in truth-value—it is open to us to offer the same explanation of the perceived differences in meaning that we offer in the case of simple sentences.

This is an important choice point. Some theorists approach the challenge in a hybrid way, positing a semantic difference between pairs of ascriptions while positing some other kind of difference between pairs of simple sentences. Others argue that a unified approach is possible, and preferable on the grounds of simplicity.

It's worth pausing to discuss features of the data that are relevant to the prospects of a unified approach. Let's extend our vignette from above. Suppose Smith is friends with Jones. Jones and Smith are in the same situation with respect to Dylan/Zimmerman. Jones would accept (1a) but not accept (1b); she would also accept (2a) but not accept (2b). So far, so good. But suppose that Jones, but not Smith, learns that Zimmerman is Dylan. Jones will now accept both (1a) and (1b). But it's natural to think that so long as she thinks that Smith is still not in the know about Dylan's identity, and that Smith would still avow the same beliefs, Jones would continue to accept (2a) and not accept (2b).

It doesn't seem that learning that Dylan is Zimmerman puts any pressure on Jones to revise her judgments about (2a) and (2b). This, presumably, is at the heart of Frege's insistence that unlike simple sentences, *the truth-values* of ascriptions can be altered by substitution of coreferential names. The differences in acceptability for ascriptions persist even when audiences (but not attributees) are 'in the know' about the relevant identities.

There are two related things to highlight. The first is just that speakers are especially resistant to treating reports like (2b) as true (in scenarios of the kind just imagined). In many, though perhaps not all, cases in which the conveyed content of an utterance exceeds the semantic content of an uttered sentence, ordinary speakers can be brought to distinguish between the two, and so can be brought to acknowledge, for example, that the semantic content is true when conveyed content is false. It isn't clear that this is the case with (2b). Even philosophers—well-practiced in isolating semantic and pragmatic content—often claim to be unable to detect the putative truth semantically expressed by it. On the other hand, some theorists claim that ordinary speakers, perhaps with a little philosophical tutelage, can be

⁸ I'm glossing over some subtleties here. Most importantly, there are constructions which don't appear to take sentential complements, yet appear to display the same behaviour as ascriptions, for example 'intensional transitive verbs'.

brought to see that (2a) and (2b) have the same semantic content.⁹

Second, whatever we say about that, there is still the initial contrast: once you're in the know, you don't treat (1a) and (1b) as differing in acceptability; but you do continue to treat (2a) and (2b) as differing in acceptability (at least until you receive philosophical therapy). And this, itself, is an aspect of the data. The uniformity we posit in our account of simple sentences and ascriptions cannot be so *complete* as to leave us unable to explain why differences in acceptability are substantially *more robust* with ascriptions.

It's important to note, though, that it isn't clear that contrasts in acceptability for simple sentences *always* disappear for those in the know. Contrast (6a) and (6b) (imagine them in the context of a biography).

(6a) Zimmerman left Minnesota but Dylan arrived in New York.

(6b) Dylan left Minnesota but Zimmerman arrived in New York.

Even if one is in the know, it's quite natural to judge (6a) as acceptable and (6b) as unacceptable. Examples of this sort provide some support for a unified approach to simple sentences and ascriptions because they call into question the sharp cleavage in the data we claimed to find.¹⁰ How much support they provide will depend on the extent to which the explanation of the difference in acceptability between examples like this can be extended to ascriptions (consider: How much does the contrast between (6a) and (6b) depend on the narrative situation? How much does it depend on contrastive structure? How much does it depend on the fact that the speaker has chosen to use a second name rather than an anaphoric pronoun?).

Finally, we should keep in mind that there is context-sensitivity in the acceptability of ascriptions.¹¹ Consider Kripke's (1979) example: Pierre grew up in Paris, hearing about the beautiful English capital; so he would sincerely assert "Londres est jolie". Having been transported to London at a later time, learning English there, failing to realize that the city he now lives in is the one he calls 'Londres', and finding it distasteful, he would sincerely assert "London is not pretty". Consider (7).

(7) Pierre thinks that London is pretty.

⁹ This claim is commonly made by Millians. One influential version of it motivates acceptance of the initially doubtful ascription by showing how it follows from other, intuitively acceptable, principles. An influential version of this idea can be found in (Richard, 1983).

¹⁰ This kind of example is introduced in (Saul, 1997) and explored in (Braun & Saul, 2002; Saul, 2010).

¹¹ See (Richard, n.d.) for an overview.

If we imagine it uttered in the context of a discussion of Pierre’s beliefs about the relative attractiveness of capitals (“Pierre thinks that Paris is pretty, that Madrid is not pretty, that London is pretty...”), it appears acceptable. If we imagine it uttered in the context of a discussion of Pierre’s views about his current living situation (“Pierre loves living in London. He has a great job, he thinks that London is pretty”), it appears unacceptable. Part of answering Frege’s challenge is explaining this context-sensitivity.

4 A Taxonomy of Approaches

The literature on Frege’s Puzzle is voluminous and the variety of approaches is bewildering. In this section, I’ll provide an (admittedly incomplete) taxonomy.

Consider the components of a linguistic exchange. On one side, we have a speaker’s cognitive situation: their attitudes, representations of the speech situation, their communicative intentions, and their knowledge of their language. On the basis of that, the speaker utters a sentence with certain semantic features (relative to the context of utterance). Those features, in conjunction with facts about the communicative situation, determine the conveyed content of the utterance. On the basis of those things, the utterance has an effect on the cognitive state of the audience (principally on their attitudes).

We can understand the space of responses to Frege’s challenge by starting from a set of ‘default’ assumptions about these components. We can think of the defaults as claims that theorists in this area ‘get for free’. This is not to say that they are uncontroversial or true. It’s only to say they are typically taken as an acceptable ground-zero for theorizing about cognitive significance. Additions or modifications to them are justified by their role in responding to the challenge. The defaults are:

- i)* Propositional content is Russellian. That is, propositions are complexes of objects, properties, and operators and they have a sentence-like structure.¹² So Russellian propositions are the contents of attitudes, uttered sentences, and communicative acts.
- ii)* The attitude state of a speaker can be modeled as a collection of relations to Russellian propositions (*i.e.* a set of propositions believed, a set of propositions desired, *etc.*).

¹² See, e.g., (Salmon, 1986), (Soames, 1987a), (King, 2007). This is a controversial component of the default. Many philosophers of language and mind hold that propositional content does not have sentence-like structure.

iii) Meaning is Millian and compositional. The semantic contribution of an uttered name n in sentence S is the object n introduces into (the relevant part of) the proposition expressed by S . So Frege-pairs semantically express the same proposition.

iv) In an attitude ascription $\ulcorner X v \text{ 's that } p \urcorner$, v expresses a relation between individuals and propositions. The ascription is true iff the individual denoted by X stands in the relation denoted by v to the proposition denoted by p .

v) No pragmatic effects—assertoric enrichment, conversational implicature, pragmatic modulation, *etc*—are relevant to Frege’s challenge.

Jointly, these assumptions set the background for Frege’s challenge. They assume that sentences that appear only to differ in the substitution of coreferential names, really do only differ in that way. So Frege-pairs have the same semantic value. And they assume that there are no post-semantic mechanisms at play to generate different conveyed contents. And they offer no hint of how Frege-pairs might differ in relation to cognition. We can understand approaches to cognitive significance in terms of which of these assumptions they reject and how. Keep in mind that particular theories will often depart from more than one assumption.

4.2 Pragmatic Departures

Perhaps the simplest, and probably the most popular, approach is to depart from (v). We can keep everything else in place and simply hold that Frege-pairs, though they don’t differ in their semantic content, can nevertheless differ in conveyed content.¹³ The challenge for approaches of this kind is to specify the way in which the conveyed content diverges from the semantic content and to offer a non *ad hoc* account of the pragmatic mechanism that brings that divergence about.¹⁴

If this approach does not diverge from (i), it must locate the difference between semantic content and conveyed content in Russellian terms. This is done by positing *descriptively-enriched* Russellian propositions as conveyed content. So, given the appropriate context, the conveyed content of an utterance of (3a)[“Dylan is a musician”] might include the proposition that Dylan, the famous sixties folk icon, is a musician, while the conveyed content

¹³ There is also a possibility of claiming that utterances of Frege-pairs don’t convey different contents, but they differ pragmatically in some other way; perhaps there are different pragmatic conditions on their appropriate utterance. Soames sometimes talks this way—see (Soames, 1987b).

¹⁴ For overviews see (Saul, 1998) and (Nelson, 2019, section 5). For criticisms of Berg’s implicature approach, see (Davis, 2017).

of an utterance of (3b)[“Robert Zimmerman is a musician”] might include the proposition that Zimmerman, the son of Abram Zimmerman from Duluth, is a musician. Given that these are distinct Russellian propositions, the conveyed content of the two utterances will be distinct. And the difference in cognitive significance between the two utterances will be explained in terms of differences in conveyed content.

It isn't clear that this approach can explain the cognitive difference in the sort of cases on which the debate usually focuses.¹⁵ Nor is it clear that accounts of this form will explain the full range of facts about cognitive significance canvassed in section (3.1). (Note: I don't mean to suggest that it is clear that this approach *won't* work either).

There are different conceptions of the mechanisms that generate the conveyed content. We could hold that it is conversationally implicated¹⁶ or that it is asserted.¹⁷ In either case, the challenge is to show that the enrichments are independently motivated by our general theories of implicature and assertion, and not simply stipulated as convenient solutions to Frege's challenge.

A variant of this approach holds that utterances always express multiple layers of Russellian content, related according to general principles of information-theory¹⁸. And that differences in the way that semantic content is expressed—for example, the difference between using “Zimmerman” or “Dylan”—will generate different propositions at ‘token- reflexive’ levels of conveyed content (roughly: levels of conveyed content that are *about* how the semantic content of an utterance is determined).

The most committed pragmatic theorist will offer the same explanation of simple sentences *and* ascriptions. As with simple sentences, we can hold that the extra content in ascriptions is asserted or that it is implicated. There are different approaches with respect to the nature of the extra content. Some theorists treat it as adding extra specification of the *content* of ascriber's first-order attitudes (Soames, 2002); (for example, the conveyed content of an utterance of (2a) might contain the proposition that Smith believes that Dylan, the famous sixties folk icon, is a musician). Others treat the extra content as characterizing the ascriber's cognitive state in terms of linguistic behaviour or attitudes about language (for example, the conveyed content of (2 a) might contain the proposition that Smith would assent to the

¹⁵ See (Sider & Braun, 2006), (Caplan, 2007), and (Speaks, 2011).

¹⁶ See (Richard, 1986), (Soames, 1987b,a), (Salmon, 1986, 1989), (Berg, 1988), (Saul, 1997, 1998). Sometimes these theorists speak generally about ‘conveyed content’ without specifying whether this is implicature or some other (unspecified) pragmatic mechanism.

¹⁷ (Soames, 2002)

¹⁸ (Perry, 2001), (Korta & Perry, 2011).

sentence “Dylan is a musician”, or that Smith believes that this sentence is true.).¹⁹ Still others characterize it in terms of psychological posits like ‘guises’ (Saul, 1998). It isn’t clear that any non ad-hoc pragmatic story will provide satisfying explanations here. It is worth noting, though, that if one can be developed in a non *ad hoc* way, it would likely explain the context-sensitivity of ascriptions.

4.2 Propositional Departures

Some theorists hold that responding to Frege’s challenge requires abandoning (*i*); that is, revising our account of propositions. Consider two subjects, each ignorant that Dylan is Zimmerman. Xavier believes (as we would naturally describe it) that Dylan is a musician and that Zimmerman is from Minnesota. Wyatt believes that Dylan is a musician and that Dylan is from Minnesota. Given the default assumptions, we have no way to distinguish the two attitude states: each believes the same Russellian propositions. This seems like a bad consequence; there are cognitive differences between the subjects that are relevant to their linguistic behaviour (and their behaviour more generally). We might, then, develop a more fine-grained conception of propositions: one that distinguishes the propositional objects of the belief that Dylan is a musician and the belief that Zimmerman is a musician. This was an aspect of Frege’s response: he held that the objects of the attitudes are *thoughts*—that is, abstract objects composed of senses (Frege, 1918). The new theory of reference discouraged theorists from adopting a descriptivist version of Frege’s theory, but there are non-descriptive approaches to sense.

One tradition holds that given a proper understanding of semantic theorizing, differences in sense will be easy to capture. Suppose that a semantic theory takes the form of a collection of sentences assigning meanings to lexical items, and rules that generate the meanings of complex expressions compositionally. In that context, the clause that specifies the meanings of “Bob Dylan” might be (8a) while the clause that specifies the meaning of “Robert Zimmerman” might be (8b).

(8a) “Bob Dylan” refers to Bob Dylan

(8b) “Robert Zimmerman” refers to Robert Zimmerman

These are distinct sentences in our theory of meaning, so it’s open to us to hold that

¹⁹ See (Salmon, 1986, pg. 117) (Soames, 1987a) (Berg, 1988, n.d.).

they represent “Bob Dylan” and “Robert Zimmerman” as having different meanings (thus rejecting (iii)).²⁰ This difference ramifies through the compositional rules and generates different meanings for sentences containing the names. So the theory assigns different meanings to Frege-pairs. So we can locate the difference in cognitive significance between Frege-pairs at the level of content.

This kind of approach has some appeal; it inherits the elegance of Frege’s approach in that it offers a unified and simple response to the challenges. But it is often held to be unsatisfying. Note that the theory specifies the difference in meaning between “Bob Dylan” and “Robert Zimmerman” by *using* those expressions in the metalanguage. It thus provides no *independent* grip on that difference (something we might have hoped that our theory would provide). Proponents of the view insist that this demand is misplaced. They hold that (8a), for example, *displays* the sense of “Bob Dylan” even if it doesn’t *describe* it (because all it does is assign a referent to the name). Whether this sort of response is satisfactory will depend substantially on what one thinks we are entitled to expect from a theory of meaning. Suffice it to say for our purposes that many theorists want more. There *are* forms of non-descriptive Fregeanism that offer substantive theories of sense; we will postpone discussion of those until the next section.

There are other fine-grained conceptions of propositions. Insofar as the problem non-descriptive Fregeanism is the difficulty in giving a clear account of sense, we might be tempted to develop a conception of propositions that invokes entities we have a clearer antecedent grip on. An approach of this kind holds that linguistic expressions are, themselves, components (or, at least, ground the individuation) of propositions.²¹ We can start from Russellian propositions—which, recall, are complexes of worldly entities—and construct linguistically-enhanced propositions by replacing every occurrence of a worldly entity with a pair comprising that entity and a linguistic expression that denotes it. So for example, whenever we find Dylan in a proposition, we will replace him with the pair <“Bob Dylan”, Dylan> or the pair <“Robert Zimmerman”, Dylan> (or some other pair involving a different expression that denotes Dylan). In this way we retain the basic structure of Russellian propositions, but individuate proposition more finely by including linguistic expressions as propositional constituents. (This is an oversimplification, but will do for our purposes).

This approach can distinguish the object of the belief that Dylan is a musician from the

²⁰ This idea is most closely associated with Davidsonian approaches to semantics (see especially (Mc- Dowell, 1977). But it finds its way into model theoretic semantics approached too. See discussion in (Yalcin, 2018).

²¹ See (Harman, 1972), (Higginbotham, 1991), (Segal, 1989), (Larson & Ludlow, 1993).

object of the belief that Zimmerman is a musician. One proposition contains the name “Dylan” while the other contains the name “Zimmerman”. It appears to have other virtues: it offers an account of propositions that is finer-grained than Russellianism, but also provides clear individuation conditions. It is also possible to supply a compositional theory that associates linguistically-enhanced propositions with sentences. And it fits with a plausible background ideology that holds propositional thought is linguistically mediated (whether by public language or the language of thought).

A worry about the approach is that it individuates propositions *too* finely; it entails, for example, that no sentences in distinct languages can express the same proposition.²² The extent of the issue here depends on how this account of propositions interacts with a semantics for ascriptions, so we will postpone discussion of it.

Finally, we can mention *relationist* approaches to propositional content. Recall our initial problem in this section: how to distinguish Xavier and Wyatt’s attitude state. The options we have explored so far have proposed adding additional *objects* into propositional content—either senses or linguistic expressions. An alternative adds additional *relational structure* into propositions. The crucial difference, it seems, between Xavier and Wyatt is that Wyatt’s attitude state *encodes* that the person who is represented to be a musician and the person who is represented to be from Minnesota, are *the same person*. Other fine-grained accounts of propositions understand this encoding of sameness as the *re-occurrence* of propositional constituents. We could, instead, posit *relations between* propositional constituents. This is Semantic Relationism.²³ It identifies the content of an attitude state with a collection of Russellian propositions along with a coordination relation on those propositions. The coordination relation captures which propositional constituents are encoded as identical.

Semantic Relationism is a fine-graining of propositional content that avoids awkward questions about the individuation of propositional constituents. It achieves this by replacing propositional constituents with relations. This benefit has a potential down-side, though. It involves a significant departure from traditional approaches to compositionality and the aggregation of attitude states; the semantic contribution of a representation cannot be ‘localized’ to its immediate syntactic environment, because it might introduce semantically relevant relations to syntactically distant expressions.²⁴

²² Worries of this kind go back to Church’s (1950) discussion of (Carnap, 1947).

²³ See (Taschek, 1995, 1998), (Fine, 2007, 2010b), (Pinillos, 2011, 2015), (Gray, 2017). For related views, see (Heck, 2012) and (Pryor, 2016).

²⁴ See (Fine, 2007, 2010a). For further discussion see (Pickel & Rabern, 2016, 2017).

4.3 Cognitive Departures

We just considered attempts to distinguish Xavier's and Wyatt's attitude state in terms of content. Other approaches agree that we need to distinguish those states, but deny that they need to be distinguished in terms of content. These approaches respond to Frege's challenge by complicating our theory of the nature of attitude states without complicating our theory of their content (so rejecting (ii) but not (i)).

The most standard version of this approach is to hold that a two-place attitude relation— X *v*'s that p —holding between a subject and a proposition is grounded in a three-place relation. The three-place relation holds between a subject, a proposition, and some third term—options here include *an expression in the language of thought, a character, a guise, a notion, a way of believing, etc.*²⁵ These are different proposals about features of the psychological state of a subject that partially ground the intentional features of their attitudes. The idea, for example, is that although Xavier's belief that Dylan is from Minnesota and her belief that Zimmerman is from Minnesota relate Xavier to the same proposition, they differ in their third term. She is belief-related to the same proposition 'twice-over' in virtue of tokening different internal mental 'symbols'.

It is important to recognize that this claim is *not*, in the first instance, a claim about the semantics of ascriptions; it is not, for example, the claim that 'believe' semantically expresses a three-place relation. Rather, it is a claim about the metaphysics of the attitudes. So without other additional hypothesis, it makes no new predictions about the semantics of attitude ascriptions. We will see below that some theorists incorporate this extra cognitive structure into the semantics of ascriptions. But some, like Salmon (1986), do not. He opts, instead, to mix this picture of the attitudes with a pragmatic account of the difference in cognitive significance between Frege-paired ascriptions.

Because accounts like this do not locate these differences at the level of content, they owe us some explanation of why differences in the 'third term' generate differences in cognitive significance. In the case of simple sentences, this is typically done by gesturing at the way that the third terms affect a subject's linguistic behaviour: Salmon (1986) suggests that they have an effect on one's ability to 'recognize' propositions when they are encountered;

²⁵ For 'expression in the language of thought' see (Fodor, 1975, 1990); for 'character' see (Kaplan, 1989); for 'guise' see (Salmon, 1986, 1989); for 'notion' see (Crimmins & Perry, 1989; Perry, 2001; Crimmins, 1992); for 'way of believing' see (Braun, 1998). The list could be extended.

Braun (1998) talks about their effect on dispositions to accept sentences, Fodor (1975) characterizes names in the language of thought in terms of their causal/functional roles. These are, presumably, promissory notes awaiting the redemption of some future psychological theory. The central point here is that these approaches typically reject *Meaning and Cognitive Significance*. They hold that the cognitive differences between Frege-pairs, at least for simple sentences, has no reflection at the level of meaning. It is psychological but not semantic. The cognitive difference between Frege-pairs boils down to the different way that they interface with a speaker's idiosyncratic psychology.

A distinct class of approaches offers a *relational* account of the nature of the attitudes. They see attitudes as bundled into *dossiers, files, webs, etc.*²⁶ Attitudes that are bundled in this way—that are part of the same file or web, *etc.*—are claimed to stand in important functional relations. In particular, they are functionally related so that the subject can ‘trade on the identity’ of their referents (in the sense of (Campbell, 1987)). This means that the subject is disposed to deploy those attitudes in reasoning and action in a way that presupposes that they are about the same thing and does so without the presence of a representation of their identity.

With this sort of functional organization in our theoretical repertoire, we can distinguish Xavier's and Wyatt's attitude-states. In Wyatt's case, the two attitudes are bundled together. In Xavier's case they are not. In effect, bundling takes the place of the Fregean notion of *sameness-of-sense*. These functional differences will have a downstream effect on how Xavier and Wyatt are disposed to deploy their attitudes. The hope is that this will provide an explanation of range of phenomena we canvassed above. Consider, for example, the phenomenon exhibited by (5a)/(5b). If we hold the Zimmerman-bundle and the Dylan-bundle can be distinct even when a subject believes that Dylan is Zimmerman (in file-speak, if the files are linked but not merged), we could explain the cognitive difference between the two utterances. The first sentence in (5a) adds a belief to the Dylan-bundle; the first sentence in (5b) adds a belief to the Zimmerman-bundle.

The relation between the bundle approach and Fregeanism is somewhat delicate. Certain versions of it conceive of themselves as a kind of neo-Fregeanism.²⁷ They conceive of mental files as senses and assign to them many of the semantic roles that Frege assigned to sense. From one perspective, then, we could think of these theories as offering a substantive account of non-descriptive senses (and so, attempting to respond to the worry that non-

²⁶ (Evans, 1982), (Forbes, 1990), (Perry, 1980), (Millikan, 1997), (Recanati, 2012), (Pryor, 2016), Geirsson (n.d.)

²⁷ (Evans, 1982), (Forbes, 1990), (Recanati, 2012).

descriptive Fregeanism is non-explanatory). On the other hand, some bundle theorists take a leaf from the three-place relation theorist's book and claim that differences in cognitive significance are psychological but not semantic. (Geirsson, n.d.), for example, holds that distinct names are psychologically associated with different webs of information and that utterances involving different names 'elicit' information from different webs.

Finally we can mention a somewhat different kind of cognitive departure. The two approaches we have canvassed so far are alike in focusing on the nature of the attitudes. A different approach focuses on, what we can call, 'evaluative heuristics'. According to this view, Frege-pairs differ in the way that they interact with the psychological mechanisms by which speakers evaluate utterances for truth/falsity²⁸. Theorists who take this approach hold that Frege-pairs exploit a kind of systematic weakness in speakers' ability to track utterance-truth and a systematic reluctance to use known identities to make relevant inferences. This approach fits naturally with, though perhaps does not require commitment to, the relational accounts of cognitive architecture just mentioned.

4.4 Semantic Departures

It is often thought that Frege's challenge requires us to depart from the default picture of the semantics of ascriptions. The most popular idea is to start from the 'three-place' relation approach to the attitudes. We can hold that ascriptions are semantically sensitive not only to *which* Russellian propositions an ascriber has attitudes towards, but also to *how* those attitudes are cognitively realized. Approaches differ with respect to how this cognitive structure is semantically encoded. They agree, though, that what particular cognitive information is encoded by the utterance of an ascription is dependent on context.

On 'hidden indexical' approaches—(Schiffer, 1977, 1987, 1992),(Crimmins & Perry, 1989)—utterances of ' X 's that p ' can make reference either to a particular mental symbol that carries (a part of) the content of p in a subject's attitude state, or to a property of such symbols (perhaps the property of having a certain psychological or functional role). So the truth of an utterance of (2b) might require more than that Smith has a belief with the Russellian content that Dylan/Zimmerman is a musician. It might require also that this representation of Dylan/Zimmerman is carried by some particular one of Smith's mental names for Dylan/Zimmerman, or by a symbol that is connected functionally to the name "Zimmerman".

²⁸ (Braun, 1998; Braun & Saul, 2002; Saul, 2010)

Given that it isn't plausible that reference to mental symbols, or their properties, is carried by any piece of the syntax of ascriptions, Crimmins & Perry hold that they are 'unarticulated constituents' of the content of uttered ascriptions. It's part of the meaning of ascriptions that utterances of them can be semantically filled-out in this way (as, perhaps, the meaning of "It's raining" requires that the location of the putative rain be supplied by context). So although Frege-paired ascriptions, *qua* sentences, have the same linguistic meaning, utterances of them typically have different truth-conditions. For example, the use of "Dylan" rather than "Zimmerman" to report Smith's belief will typically generate requirements on the properties of the mental symbol by which Smith grasps the relevant proposition. The story, though, about how context supplies information about mental symbols must be more complicated (it cannot simply appeal to the names used in the report). Our example of 'Paderewski' above already shows that.

Richard (1990) offers a different approach for semantically capturing the context-sensitivity of ascriptions. He posits two 'layers' of meaning associated with p in ' X v 's that p '. This approach to ascriptions is structurally similar to the linguistically-enhanced approach to propositions canvassed above. The semantic contribution of p in an ascription is a complex consisting of Russellian content and the linguistic expressions that carry that content in the sentence (Richard calls these 'RAMs'). Given the three-place relation approach to attitudes, we can think of a subject's attitude state, itself, as a collection of relations to RAMs. The truth of an utterance of ' X v 's that p ' requires that the v -part of X 's attitude state contains a RAM that stands in a contextually appropriate relation to the RAM expressed by p .

An overarching worry for contextualist approaches to ascriptions is that we might lose the ability to capture cognitive relations between speakers, and systematic semantic relations between ascriptions. One danger for Richard's view, for example, is that it makes the semantics of attitude ascriptions *too* fine-grained. Any difference in the expressions contained in p and p' will entail that they express different RAMs when embedded. It entails, for example, that (9a) and (9b) have distinct context-invariant meanings, given that their complement clauses express distinct RAMs (this example is from (Larson & Ludlow, 1993)).

(9a) Galileo believed the Earth moved

(9b) Galileo believed the Earth is non-stationary

This is troubling insofar as it is natural to think that (9a) and (9b) make the same claim: it is hard to see how they could come apart in truth-value. Related worries arise for inferential relations between attitude ascription—(Richard, this volume)—and more generally for

psychological generalizations framed in terms of ascriptions (Goodman & Lederman, 2018).

Contextualist theories must respond to these worries by characterizing restrictions, or systematic patterns, in the way that context determines the class of RAMs that are taken to be contextually similar to the RAM expressed by p in an utterance of $\ulcorner X v \text{'s that } p \urcorner$.

Perhaps, for example, in any normal context, the RAMs expressed by the complements in (9a) and (9b) will count as similar enough that any subject whose attitude state contains a RAM that stands in the contextually appropriate relation to one will thereby contain a RAM that stands in the contextually appropriate relation to the other. This would explain why it is hard to imagine contexts in which the truth values of (9a) and (9b) might come apart. (To clean up a left-over strand from above, note that proponents of linguistically-enhanced propositions offer essentially the same response to corresponding worries about their approach). But as Goodman & Lederman (2018) show, it remains to be seen whether it's possible to characterize contextual restrictions of this kind that capture all of the systematic relations between ascriptions that we might like.²⁹

One more potential worry. A common complaint—see, *e.g.*, (Schiffer, 1992), (Braun, 1998), (Soames, 2002)—has been that it is implausible that ordinary speakers, when they utter ascriptions, are referring to, or more generally communicating about, the cognitive structures posited by three-place theories of attitudes. The worry is that this approach imputes more theoretical sophistication to ordinary speakers than is plausible. The question for contextualists is whether the folk-theoretical way that subjects keep track of other people's psychological perspectives has enough determinacy to do the context-determining work that the theory requires of them.

5 Interactions

Space doesn't allow us to evaluate the various strategies. But I will emphasize something that is, perhaps, already clear. Much of the work in unraveling the issues here comes in understanding the interaction between the different departures. We have seen this already in previous section. But I'll offer a related impression: it seems unlikely that the full range of phenomena will be explained by any one approach. Recall, the challenge is quite open-ended: to explain how Frege-paired sentences can differ in relation to cognition. There is little reason to think that investigation will reveal that all such differences have exactly the same character,

²⁹ For related technical worries about approaches of this kind, see (Sider, 1995), (Soames, 1995).

and little reason to think that many differences will be explicable without appealing to the interaction between different departures from the default.

To justify this impression, I'll offer one more example. It's plausible that at least part of the cognitive difference between Frege-pairs is pragmatic; we have general reasons to believe that, very often, the conveyed content of an utterance is distinct from the semantic content of the uttered sentence. And the determinants of conveyed content are many and varied, including subtle linguistic choices and rich psychological background information. So suppose we grant that in some context the conveyed content of an utterance of (3a) might include the Russellian proposition that Dylan/Zimmerman, the famous sixties folk icon, is a musician; while the conveyed content of an utterance of (3b) might include the Russellian proposition that Dylan/Zimmerman, the son of Abram Zimmerman from Duluth, is a musician.

There is still the question: *why* do utterances of those different sentences have different conveyed contents? Abstracting away from the details of any particular explanation it's unavoidable that we would need to appeal to *some* cognitive difference in the relation that agents stand in to the two sentences. But without departing from the default conception of semantics, propositions, or of cognitive structure, how could we capture any such difference?

To see this, contrast two speech situations. On the one hand, we have Smith and Jones from above. Let's stipulate that utterances of (3a) and (3b) would have the conveyed content just described. On other hand, consider Bizzaro-Smith and Bizzaro-Jones, whose cognitive relation to "Dylan" and "Zimmerman" means that the conveyed contents of (3a) and (3b) would be *reversed* compared to Smith and Jones' context. The conveyed content of an utterance of (3a), for them, would include the Russellian proposition that Dylan/Zimmerman, the son of Abram Zimmerman from Duluth, is a musician. The conveyed content of (3b), for them, would include the Russellian proposition that Dylan/Zimmerman, the famous sixties folk icon, is a musician. How, without departing from default assumptions, can we understand the difference between Smith and Jones, on one hand, and Bizzaro-Smith and Bizzaro-Jones on the other?

The details here will depend on what kind of pragmatic story one is telling. But any story will have to appeal to some difference like this: Smith believes that the name "Dylan" refers to a folk icon; she doesn't believe that the name "Zimmerman" refers to folk icon, *etc.* Bizarro-Smith believes that "Zimmerman" refers to a folk icon; she doesn't believe that "Dylan" refers to a folk icon, *etc.* Thus Smith and Bizarro-Smith believe different Russellian propositions.

But this is presumably not a *brute* fact about the psychology of Smith and Bizarro-Smith. It ought to be explained by something else. Focus on the following question: why is it that Smith believes that “Dylan” refers to a folk icon but Bizarro-Smith doesn’t believe that “Dylan” refers to a folk icon. Presumably this ought to be explained by a conjunction of linguistic knowledge and non-linguistic knowledge. We might point to the fact that Smith believes the Russellian propositions in (10a)-(10b).

(10a) that “Dylan” refers to Dylan/Zimmerman

(10b) that Dylan/Zimmerman is a folk icon

This might seem promising. But note that Bizzaro-Smith *also* believes those Russellian propositions. She would express the (10b)-proposition differently than Smith would; she would express it by saying “Zimmerman is a folk icon”. But this is precisely what the default story cannot explain.³⁰ Recall from above that if we all say about Smith’s attitude state is that it contains a beliefs with the Russellian contents in (10a)-(10b), we have said nothing that entails that Dylan is represented ‘as the same’ in those two attitudes. So we’ve said nothing that entails that Smith is in a position, for example, to infer from them that “Dylan” refers to a folk icon. So we can’t capture the difference between Smith and Jones’s context and Bizarro-Smith and Bizarro-Jones’s context that explains the difference in the conveyed content for utterances of (3a) and (3b).

It seems, then, that any pragmatic story, presupposes either a propositional or cognitive departure from the default assumptions. And given that, we should examine the interaction between those two kinds of explanation, and the relative contribution of each to the various challenges posed by cognitive significance.

Suggested Further Reading

- Frege, Gottlob. 1892. On Sinn and Bedeutung. In: *The Frege Reader*. Blackwell.
Fine, Kit. 2007. *Semantic Relationism*. Wiley-Blackwell.
Heck, Richard Kimberly. 2012. Solving Frege’s Puzzle. *The Journal of Philosophy*, 109, 132–174. (originally published under the name "Richard G. Heck, Jr").
Recanati, François. 2012. *Mental Files*. Oxford University Press
Richard, Mark. 1990. *Propositional attitudes: An essay on thoughts and how we ascribe them*. Cambridge University Press.
Salmon, Nathan. 1986. *Frege’s Puzzle*. Ridgeview Publishing Company.
Saul, Jennifer M. 2010. *Simple sentences, substitution, and intuitions*. OUP Oxford.
Goodman, Jeremy, & Lederman, Harvey. 2018. *Perspectivism*. *Noûs*.

³⁰ For versions of essentially the same worry, see (Braun, 2003) and (Heck, 2012).

References

- Berg, Jonathan. Conversational Implicature in Belief Reports. In: Biggs, Stephen, & Geirsson, Heimir (eds), *The Routledge Handbook on Linguistic Reference*.
- Berg, Jonathan. 1988. The pragmatics of substitutivity. *Linguistics and Philosophy*, 355–370.
- Boghossian, Paul A. 1992. Externalism and inference. *Philosophical issues*, 2, 11–28.
- Braun, David. 1998. Understanding belief reports. *The Philosophical Review*, 107(4), 555–595.
- Braun, David. 2003. Scott Soames. 2002. Beyond Rigidity: The Unfinished Semantic Agenda of Naming and Necessity. *Linguistics and Philosophy*, 26(3), 367–379.
- Braun, David, & Saul, Jennifer. 2002. Simple sentences, substitutions, and mistaken evaluations. *Philosophical Studies*, 111(1), 1–41.
- Campbell, John. 1987. Is sense transparent? Pages 273–292 of: *Proceedings of the Aristotelian Society*, vol. 88. Aristotelian Society.
- Caplan, Ben. 2007. Millian descriptivism. *Philosophical Studies*, 133(2), 181–198.
- Carnap, Rudolf. 1947. *Meaning and Necessity: a study in semantics and modal logic*. University of Chicago Press.
- Chalmers, David J. 2002. On sense and intension. *Nous*, 36(s16), 135–182.
- Church, Alonzo. 1950. On Carnap's analysis of statements of assertion and belief. *Analysis*, 10(5), 97–99.
- Crimmins, Mark. 1992. *Talk about beliefs*. MIT Press.
- Crimmins, Mark, & Perry, John. 1989. The prince and the phone booth: Reporting puzzling beliefs. *The Journal of Philosophy*, 86(12), 685–711.
- Davis, Wayne A. 2017. Berg's answer to Frege's puzzle. *Philosophia*, 45(1), 19–34.
- Evans, Gareth. 1982. *The Varieties of Reference*. Clarendon Press.
- Fine, Kit. 2007. *Semantic Relationism*. Wiley-Blackwell.
- Fine, Kit. 2010a. Comments on Scott Soames "Coordination problems". *Philosophy and Phenomenological Research*, 81(2), 475–484.
- Fine, Kit. 2010b. Semantic Necessity. In: Hale, Bob, & Hoffmann, Aviv (eds), *Modality: Meta-physics, Logic, and Epistemology*. Oxford University Press.
- Fodor, Jerry. 1990. Substitution arguments and the individuation of beliefs. Pages 63–79 of: Boolos, George (ed), *Meaning and method: Essays in honor of Hilary Putnam*. Cambridge University Press.
- Fodor, Jerry A. 1975. *The language of thought*. Harvard University Press.
- Forbes, Graeme. 1990. The indispensability of Sinn. *The Philosophical Review*, 99(4), 535–563.
- Frege, Gottlob. 1892. On Sinn and Bedeutung. Pages 151–171 of: *The Frege Reader*. Blackwell.
- Frege, Gottlob. 1918. The Thought: A logical inquiry. In: *The Frege Reader*. Blackwell.
- Geirsson, Heimir. Eliciting and conveying information. In: Biggs, Stephen, & Geirsson, Heimir (eds), *The Routledge handbook on linguistic reference*.
- Goodman, Jeremy, & Lederman, Harvey. 2018. Perspectivism. *Noûs*.
- Gray, Aidan. 2017. Relational approaches to Frege's puzzle. *Philosophy Compass*, 12(10).
- Harman, Gilbert. 1972. Logical form. *Foundations of Language*, 38–65.
- Heck, Richard Kimberly. 2012. Solving Frege's Puzzle. *The Journal of Philosophy*, 109, 132–174. (originally published under the name "Richard G. Heck, Jr").
- Higginbotham, James. 1991. Belief and logical form. *Mind & language*, 6(4), 344–369.
- Jackson, Frank. The foundations of two-dimensionalism. In: Biggs, Stephen, & Geirsson, Heimir (eds), *The Routledge Handbook on Linguistic Reference*.
- Kaplan, David. 1989. Demonstratives. Pages 481–563 of: Joseph Almog, John Perry, & Wettstein, Howard (eds), *Themes from Kaplan*. Oxford University Press.
- King, Jeffrey C. 2007. *The nature and structure of content*. Oxford University Press.
- Korta, Kapa, & Perry, John. 2011. *Critical pragmatics: An inquiry into reference and communication*. Cambridge University Press.
- Kripke, Saul. 1979. A puzzle about belief. Pages 239–283 of: Margalit, A. (ed), *Meaning and Use*. D Reidal.
- Kripke, Saul. 1980. *Naming and Necessity*. Harvard University Press.
- Larson, Richard K, & Ludlow, Peter. 1993. Interpreted logical forms. *Synthese*, 305–355.

- McDowell, John. 1977. On the Sense and Reference of a Proper Name. *Mind*, **86**(342), 159–185.
- McLeod, Stephen, & Dunbar, Ian. Fregean Descriptivism. In: Biggs, Stephen, & Geirsson, Heimir (eds), *The Routledge Handbook on Linguistic Reference*.
- Millikan, Ruth Garrett. 1997. Images of identity: In search of modes of presentation. *Mind*, **106**(423), 499–519.
- Nelson, Michael. The case against descriptivism. In: Biggs, Stephen, & Geirsson, Heimir (eds), *The Routledge Handbook on Linguistic Reference*.
- Nelson, Michael. 2019. Propositional Attitude Reports.
<<https://plato.stanford.edu/archives/spr2019/entries/prop-attitude-reports/>>.
- Perry, John. 1980. A Problem about Continued Belief. *Pacific Philosophical Quarterly*, **61**(4), 317–322.
- Perry, John. 2001. *Reference and reflexivity*. CSLI Stanford.
- Pickel, Bryan, & Rabern, Brian. 2016. The antinomy of the variable: A Tarskian resolution. *The Journal of Philosophy*, **113**(3), 137–170.
- Pickel, Bryan, & Rabern, Brian. 2017. Does Semantic Relationism Solve Frege’s Puzzle? *Journal of Philosophical Logic*, **46**(1), 97–118.
- Pinillos, N Ángel. 2011. Coreference and meaning. *Philosophical Studies*, **154**(2), 301–324.
- Pinillos, N Ángel. 2015. Millianism, Relationism, and Attitude Ascriptions. Pages 322–334 of: Bianchi, Andrea (ed), *On Reference*. Oxford.
- Pryor, James. 2016. Mental Graphs. *Review of Philosophy and Psychology*, **7**(2), 309–341.
- Recanati, François. 2012. *Mental files*. Oxford University Press.
- Richard, Mark. The context sensitivity of ‘believes’. In: Biggs, Stephen, & Geirsson, Heimir (eds), *The routledge handbook for linguistic reference*.
- Richard, Mark. 1983. Direct reference and ascriptions of belief. *Journal of Philosophical Logic*, **12**(4), 425–452.
- Richard, Mark. 1986. Attitude ascriptions, semantic theory, and pragmatic evidence. Pages 243–262 of: *Proceedings of the Aristotelian Society*, vol. 87. JSTOR.
- Richard, Mark. 1990. *Propositional attitudes: An essay on thoughts and how we ascribe them*. Cambridge University Press.
- Salmon, Nathan. 1986. *Frege’s Puzzle*. Ridgeview Publishing Company.
- Salmon, Nathan. 1989. Illogical belief. *Philosophical perspectives*, **3**, 243–285.
- Saul, Jennifer M. 1997. Substitution and simple sentences. *Analysis*, **57**(2), 102–108.
- Saul, Jennifer M. 1998. The pragmatics of attitude ascription. *Philosophical Studies: An International Journal for Philosophy in the Analytic Tradition*, **92**(3), 363–389.
- Saul, Jennifer M. 2010. *Simple sentences, substitution, and intuitions*. OUP Oxford.
- Sawyer, Sarah. Names as predicates. In: Biggs, Stephen, & Geirsson, Heimir (eds), *The Routledge Handbook on Linguistic Reference*.
- Schiffer, Stephen. 1977. Naming and knowing. *Midwest Studies in Philosophy*, **2**, 28–41.
- Schiffer, Stephen. 1987. The ‘Fido’-Fido Theory of Belief. *Philosophical perspectives*, **1**, 455–480.
- Schiffer, Stephen. 1992. Belief ascription. *The Journal of Philosophy*, **89**(10), 499–521.
- Schoubye, Anders. Variabilism. In: Biggs, Stephen, & Geirsson, Heimir (eds), *The Routledge Handbook on Linguistic Reference*.
- Segal, Gabriel. 1989. A preference for sense and reference. *The Journal of Philosophy*, **86**(2), 73–89.
- Sider, Theodore. 1995. Three problems for Richard’s theory of belief ascription. *Canadian Journal of Philosophy*, **25**(4), 487–513.
- Sider, Theodore, & Braun, David. 2006. *Kripke’s revenge*.
- Soames, Scott. Fruits of the causal theory of reference. In: Biggs, Stephen, & Geirsson, Heimir (eds), *The Routledge Handbook on Linguistic Reference*.
- Soames, Scott. 1987a. Direct reference, propositional attitudes, and semantic content. *Philosophical Topics*, **15**(1), 47–87.
- Soames, Scott. 1987b. Substitutivity. *On being and saying: Essays for Richard Cartwright*, 99–132.
- Soames, Scott. 1995. Beyond singular propositions? *Canadian Journal of Philosophy*, **25**(4), 515–549.
- Soames, Scott. 2002. *Beyond Rigidity*. Oxford University Press.
- Speaks, Jeff. 2011. Frege’s Puzzle and Descriptive Enrichment. *Philosophy and Phenomenological Research*, **83**(2), 267–282.

- Taschek, William W. 1995. Belief, substitution, and logical structure. *Noûs*, **29**(1), 71–95.
- Taschek, William W. 1998. On ascribing beliefs: Content in context. *The Journal of philosophy*, **95**(7), 323–353.
- Yalcin, Seth. 2018. Semantics as model-based science. *The Science of Meaning*. Oxford University Press, forthcoming.