INQU Inquiry
An Interdisciplinary Journal of Philosophy

INQUIRY
An Interdisciplinary Journal of Philosophy

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/sinq20

The representational structure of linguistic understanding

J. P. Grodniewicz

To cite this article: J. P. Grodniewicz (2023): The representational structure of linguistic understanding, Inquiry, DOI: 10.1080/0020174X.2023.2228368

To link to this article: https://doi.org/10.1080/0020174X.2023.2228368

Published online: 24 Jun 2023.

INQUIRY
https://doi.org/10.1080/0020174X.2023.2228368

Routledge
Taylor & Francis Group

The representational structure of linguistic understanding

J. P. Grodniewicz

Copernicus Center for Interdisciplinary Studies, Jagiellonian University, Krakow, Poland

ABSTRACT

The nature of linguistic understanding is a much-debated topic. Among the issues that have been discussed, two questions have recently received a lot of attention: (Q1) 'Are states of understanding *direct* (i.e. represent solely what is said) or *indirect* (i.e. represent what is said as being said/asserted)?' and (Q2) 'What kind of mental attitude is linguistic understanding (e.g. knowledge, belief, seeming)?' This paper argues that, contrary to what is commonly assumed, there is no straightforward answer to either of these questions. This is because linguistic understanding cannot be identified with a single mental attitude towards a particular representation. Instead, we should characterize states of linguistic understanding as involving complex representational structures generated by a dual-stream process. The first stream operates on direct representations of what is said, while the second operates on representations of what is said as being said/asserted by a given source. Both these streams feed a situation model, i.e. a complex representation of a state of affairs described by a given piece of discourse.

ARTICLE HISTORY Received 3 May 2022; Accepted 19 June 2023

KEYWORDS Linguistic understanding; language comprehension; Cartesian vs Spinozan model; validation; epistemic vigilance; testimony

1. Introduction

Linguistic understanding is a central element of our social lives. It contributes to successful communication, action coordination, and transmission of knowledge. Nevertheless, there is no consensus regarding the best way to characterize states of linguistic understanding.[1] Two questions have recently received a lot of attention:

CONTACT J. P. Grodniewicz j.grodniewicz@gmail.com

[1]While talking about linguistic understanding, we might have in mind either a disposition to understand utterances of sentences in a given language (i.e., knowledge of a given language), a representational state that results from exercising this disposition upon encountering a linguistic input (i.e., state of

Q1: Are states of understanding *direct* (i.e. represent solely what is said) or *indirect* (i.e. represent what is said as being said/asserted)?

Q2: What kind of mental attitude is linguistic understanding (e.g. knowledge, belief, seeming)?

Following these two questions we can draw a map of the current philosophical debate about linguistic understanding. The answer to **Q1** divides available theories of linguistic understanding into *indirect* and *direct*.[2] According to indirect views, the content of an utterance is represented *as being said/asserted*.[3] For example, if Rebeka tells Hamid that the average lifespan of a starfish is 35 years, Hamid's state of understanding of this utterance has the content: *that it has been said/asserted (or that Rebeka said/asserted) that the average lifespan of a starfish is 35 years*. According to direct views, on the other hand, the content of a state of understanding is just the content of the utterance, e.g. *that the average lifespan of a starfish is 35 years*.

In current debates, we encounter three indirect views, which differ in how they answer **Q2**: the knowledge view, the linguistic seeming view, and the indirect belief view. According to *the knowledge view*, Hamid's understanding of Rebeka's utterance is identical with his propositional knowledge that it has been said/asserted that the average lifespan of a starfish is 35 years (Evans 1982; Heck 1995). The knowledge state represents the content of Rebeka's utterance indirectly, i.e. as something said/asserted. Obviously, we could not demand from a comprehender to have a direct knowledge of whatever was the content of an understood utterance; one can understand a false utterance, but one cannot know what is not true.

understanding) or, finally, a process that generates this state. This paper is devoted to the topic of states of linguistic understanding and discusses the process only as far as it illuminates the nature of resulting states (for a separate discussion of the process of understanding, see Grodniewicz 2021). Moreover, I am focusing on the nature of states of understanding, leaving many interesting epistemic and normative questions aside (but see Section 4 for a brief discussion of the epistemic consequences of my account).

[2]This has been suggested by Longworth (2018), who uses different terminology: *first-order* and *second-order* states of understanding. I prefer to talk about 'direct' and 'indirect' states to avoid the association with a different use of 'first-order' and 'second-order' in the discussion about first- and second-order beliefs. Importantly, this distinction is independent from (and should not be confused with) the distinction into direct/literal vs. indirect/non-literal (e.g., implicated) meaning. Both literal and non-literal meaning can be represented directly or indirectly in the current sense.

[3]Given that indirect representations have direct representation embedded in them, I will also refer to indirect representations as *meta-representations* (cf. Sperber 2000). Moreover, I am using assertoric speech just as an example. In other cases, the contents of utterances will be represented as being asked, ordered, etc.

According to the *the linguistic seeming view* formulated by Elisabeth Fricker (2003), understanding is a type of seeming (she uses the term *quasi-perception*) of the content and force of an utterance.

> The most immediate personal-level psychological effect of her [a hearer's] auditing of the utterance is that she enjoys a representation of a distinctive kind special to language understanding: a conscious representation of the content and force of the utterance. (Fricker 2003, 325)

When Hamid hears Rebeka's utterance, it seems to him that it has been asserted that the average lifespan of a starfish is 35 years.[4] As in the case of the knowledge view, the content of the seeming is not the same as the content of the utterance. It does not seem to Hamid that the average lifespan of the starfish is so and so, only, that it has been asserted that it is so and so.[5]

Finally, according to the *indirect belief view* (cf. Balcerak Jackson 2019), Hamid's understanding of Rebeka's utterance is identical with his belief that it has been said/asserted that the average lifespan of a starfish is 35 years. Just like in other indirect views, the state of understanding meta-represents the content of the target utterance as being said/asserted.

On the other side of the barricade, we find two prominent views which give a different answer to **Q1**: states of understanding are direct, i.e. represent exclusively the content of the target utterance. Nevertheless, the two views differ with respect to **Q2** ('What kind of mental attitude is linguistic understanding?'). According to Guy Longworth's (2018) *content-entertaining view*,[6] to understand an utterance is to entertain the very proposition expressed by this utterance (p), and not some other proposition about p, e.g. r = that it has been said/asserted that p. On this account, Hamid's understanding of Rebeka's utterance equals his engaging with or, entertaining that the average lifespan of a starfish is 35 years (as a result of perceiving Rebeka's utterance). Importantly, according to Longworth, entertaining does not entail belief.

On the other hand, according to the *direct belief view* (Millikan 2004; 2005; cf. Mandelbaum 2014; Mandelbaum and Quilty-Dunn 2015; Recanati 2002):

[4]On Fricker's account, linguistic seemings are *prima facie* justificatory for beliefs about the force and content of the speaker's utterance. For a discussion see (Balcerak Jackson 2019; Grodniewicz 2022b).

[5]A related view has been offered by David Hunter (1998). Hunter identifies linguistic understanding with an experiential state 'of immediate awareness … of the text's or speaker's meaning' (p. 577).

[6]What I describe here is Longworth's theory of linguistic understanding as presented in his (2018). His full theory of language comprehension is fairly nuanced (and in many respects similar to my positive proposal). Crucially, he distinguishes *comprehension* from *understanding* and treats comprehension as a super-faculty constituted by two sub-faculties: understanding, and speech perception (Longworth 2008, 363). More on this below.

> We do not first understand what is said and then evaluate whether to believe it. Rather, we first believe what is said and then, if we are not under too much cognitive stress, we may think it over critically and reject it. (Millikan 2004, 121)

On this view, for Hamid to understand Rebeka's utterance is to form a belief that the average lifespan of a starfish is 35 years.

Despite what is commonly assumed by the proponents of these accounts, I do not think that there is a straightforward answer to either **Q1** or **Q2**. Even though the views enumerated above highlight important aspects of linguistic understanding, they all end up offering a too simplified, and thus inadequate, picture of this phenomenon. The goal of this paper is to argue that we should abstain from identifying linguistic understanding with a single mental attitude towards a particular representation. Instead, we should characterize the state of linguistic understanding as involving multiple interdependent representations. On the model I will propose, the representational architecture of understanding consists of at least three elements: (i) direct representations of the content of an utterance or its fragment; (ii) indirect representations of the content as being said/asserted by a given source; and (iii) complex representations consisting of beliefs about (and other, non-doxastic and possibly non-conceptual representations of) the states of affairs described in a given discourse, which, following the psychological literature, I will call 'situation models.' What is crucial, moreover, is how these representations are organized. In the picture I will offer, the representations belong to two streams of processing: faster, which under a further specified condition updates direct representations of contents into situation models; and slower, which operates on indirect representations and enables monitoring of the source of a given piece of information.

The model is a result of an inference to the best explanation based on the analysis of available philosophical theories as well as data coming from the empirical research on language processing, text comprehension, belief-fixation, and source monitoring. Contrary to the available accounts, it explains this data in a consistent, empirically informed, and uniform manner. Moreover, it outlines the major constraints that we ought to take into account when appealing to the nature and function of linguistic understanding in debates concerning mechanisms of linguistic communication and the epistemology of testimony. The main consequence for the latter, concerns our ability to filter out unreliable testimony. According to an influential view in the epistemology of testimony, we are entitled to form beliefs based on what other people say, because we are equipped

with filtering mechanisms which enable us to detect whether our interlocutors are truthful and competent, and thus to catch unreliable testimony on the fly (e.g. Fricker 1994; 1995). If the model of language comprehension I offer below is correct, this view cannot be right. I briefly come back to this issue in the concluding Section 4, however, a full discussion of the consequences the proposed model has for the epistemology of testimony is to be found in (Grodniewicz 2022a).

The plan of the paper is as follows. In Section 2, I discuss research that sheds light on the representational structure of linguistic understanding. In Section 3, I offer a new model of this structure. I argue that it consists of three types of representations generated by a dual-stream process. In the concluding Section 4, I briefly outline philosophical consequences of my model.

2. Towards a new account

2.1. From propositional representations to situation models

A good place to start our investigation of the representational structure of linguistic understanding is the classical Construction-Integration model of language comprehension (van Dijk and Kintsch 1983; Kintsch 1988; Kintsch and van Dijk 1978).[7] The model distinguishes three levels of representations, two of which are particularly relevant to our discussion: *propositional textbase representation*, and *situation model*.[8] The construction of a propositional representation is postulated as an initial step of text processing.

> The textbase level is represented in terms of propositions. One important assumption of the model is that the fundamental unit of processing is the proposition, which consists of a predicate and argument(s). The proposition generally represents one complete idea. (McNamara and Magliano 2009, 309)

At the first stage of processing, comprehension generates propositional representations of bits of discourse. The characterization of propositions used by van Dijk and Kintsch is closely related to a fairly standard

[7]In subsections 2.1, and 2.2, I will be focusing mostly on models of text comprehension. It is commonly believed that assumptions about processing of written text extend to comprehending speech. Nevertheless, due to relative difficulty of empirical testing of speech comprehension in comparison with text comprehension, the body of empirical research on representing spoken discourse comprehension is still small (but see, e.g., Piest, Isberner, and Richter 2018).

[8]The third level of representation is the *surface structure* representation, i.e., the result of 'decoding of phonetic and graphic strings, the identification of phonemes/letters, and the construction of morphemes' (van Dijk and Kintsch 1983, 13).

philosophical characterization: 'a proposition is an abstract, theoretical construct, which is used to identify the meaning, or what is expressed by a sentence under specific contextual restrictions (speaker, time, place), and which is related to truth values' (van Dijk and Kintsch 1983, 111). These representations are encoded in the episodic memory and become, at least to some extent, available to the hearer or reader.

I think it is fair to say that the philosophical debates on **Q1** and **Q2** are almost exclusively focused on this level of comprehension. Kintsch and van Dijk agree that the formation of propositional representations of linguistic input is an important element of discourse processing, however, they make the following reservation:

> One must, however, guard against the view that they [propositional representations] are all purpose representations, and, in particular, provide 'the' representation of meaning. (van Dijk and Kintsch 1983, 38)

They highlight that:

> … discourse understanding involves not only the [propositional] representation of a textbase in episodic memory, but, *at the same time*, the activation, updating, and other uses of a so-called situation model in episodic memory: this is the cognitive representation of the events, actions, persons, and in general the situation, a text is about. (van Dijk and Kintsch 1983, 11; *emphasis mine*)

Even though most of the contemporary theories of language processing agree that propositional representations play a role in text comprehension, it is the notion of *situation model* that made the biggest career in the last thirty-five years (Johnson-Laird 1983; van Dijk and Kintsch 1983; cf. McNamara and Magliano 2009). So, what are situation models?

A situation model is a complex representation of a state of affairs described by a given piece of discourse and constantly updated upon reading subsequent clauses and sentences (cf. Richter and Singer 2018; Richter, Schroeder, and Wöhrmann 2009; Wyer and Radvansky 1999; Zwaan 2016; Zwaan and Radvansky 1998; Zwaan, Langston, and Graesser 1995). Construction of a situation model — even though spontaneous (i.e. independent of reader's conscious decision) — requires integration and elaboration of information presented across sentences with information in readers' background knowledge. Thus, contents of situation models go beyond the meanings of individual phrases and sentences. Researchers typically focus on five dimensions integrating the information represented in situation models: space, time, causality (i.e. causal relations between events), intentionality (i.e. intentions guiding agents' actions),

and entities (either agents or objects) (cf. Wyer and Radvansky 1999; Zwaan and Radvansky 1998). For example, while comprehending a narrative, we build a complex, unfolding representation of protagonists, the space–time locations they occupy, as well as how and why they interact with their environment and each other. In more abstract, informational discourses, such as scientific articles or lectures, information about space and time usually does not play such a significant role. Nevertheless, a crucial element of comprehension of such discourses is building a situation model focused primarily on a reconstruction of logical and causal relations obtaining between particular entities and themes invoked in the discourse. Therefore, situation models are commonly considered primary sources of information about the discourse content and a comprehender's elaboration of a situation model — the best measure of the depth of comprehension (Long and Freed 2018).[9]

How, then, are propositional representations of pieces of linguistic inputs and situation models related? According to the psychology of text comprehension, propositional representations of currently read sentences or clauses are *updated* or *incorporated* into the situation model. The process is cyclical and occurs whenever a representation of a short sentence or phrase is generated (Kintsch 1988). During processing of a compound sentence (even outside the context of a longer text or discourse), a reader's cognitive system generates a propositional representation for every clause or phrase and integrates it into the model of the described situation. It is, thus, impossible to point out *the* single representation, formation of which would equal understanding of utterances of even such apparently uncomplicated sentences as 'I really need to go to work, but I am too sick to drive.' While comprehending an utterance of this sentence, a reader's cognitive system generates two propositional representations (one for each clause) which are subsequently integrated into a situation model representing the described state of affairs. Moreover, if the next sentence says: 'I have to call a taxi or ask Mark to give

[9]As complex representations, situation models are themself constituted of simpler representations. It is a common assumption in the empirical literature that comprehension delivers representations of multiple formats, all of which contribute to a situation model.

> … comprehension involve multiple modalities and modes of representation, including verbal, symbolic, and iconic modalities. The creation of images while understanding discourse is assumed to be fundamental process of comprehension … Certainly, all comprehension models assume that the reader is creating iconic images while reading … The alternative notion is simply ridiculous. (McNamara and Magliano 2009, 348)

Although the topic of the plurality of representational formats involved in language comprehension is intriguing, I have to leave it for another occasion. In this paper, when talking about situation models, I will be referring exclusively to their conceptual/propositional components.

me a lift,' propositional representations generated as a result of processing this input get integrated with the same situation model.[10]

When asked about the content of a comprehended bit of discourse, readers often retrieve information which belongs to situation models but *does not* belong to the remembered propositional representations. As demonstrated by Johnson, Bransford, and Solomon (1973), people are likely to claim that they recognize sentences which did not appear in a text they read, but which express information consonant with what they have read. For example, readers claim that they recognize 'John was using the hammer … ' (a sentence that did not appear in the text) after reading a text containing 'John was trying to fix the bird house. He was pounding the nail … ' The information that John was using a hammer to pound the nail, even though it does not appear explicitly in the narrative, is a part of how readers represent the described situation. Similarly, in a study conducted by Potts (1972) after reading 'The bear was smarter than the hawk,' 'The hawk was smarter than the wolf,' and 'The wolf was smarter than the deer' participants were faster to judge that 'The bear was smarter than the deer,' than 'The bear was smarter than the hawk,' even though only the latter, and not the former sentence explicitly appeared in the text. These early results shape the way we think about the relationship between textbase representations and situation models to this day (Singer 2017).

Finally, it is a crucial assumption of the leading psychological models of comprehension, that the information from propositional representations is updated to the situation model *automatically*. Does it mean that we automatically believe whatever we comprehend? In the following subsection, I take a closer look at this exact question.

2.2. Comprehension, acceptance, and validation

Millikan (2004, 121; 2005, 117) motivates her theory of understanding as a direct belief by appealing to research of a psychologist Daniel Gilbert (cf. Kissine and Klein 2013; Mandelbaum 2014; Mandelbaum and Quilty-Dunn 2015). In the early '90s, Gilbert and his colleagues published several studies designed to test two competitive models of acquisition of beliefs through linguistic comprehension (Gilbert 1991; Gilbert, Krull,

[10]Notably, it is possible to be building two (or more) distinct situation models at once. This happens, for example, if one reads a book about the World War II while simultaneously listening (or half-listening) to their friend describing his day at work.

and Malone 1990; Gilbert, Tafarodi, and Malone 1993). According to the so-called *Cartesian* model, people do not believe everything they comprehend. Understanding is separated from acceptance; when we comprehend an utterance, we first entertain a proposition it expresses and then, in a subsequent step, either accept or reject it. This view is in line with Longworth's (2018) content-entertaining view. Discussing an example of understanding 'Smoking is dangerous,' Longworth says:

> Although understanding such an assertion involves engaging the content that smoking is dangerous at first order [directly], it does not—or need not—involve accepting that content. (Longworth 2018, 824)

According to the second model discussed by Gilbert, the so-called *Spinozan* model, understanding is believing. Acceptance is a default position towards comprehended content, while rejection is an effortful activity, which requires time and cognitive resources, and happens only after a belief has been already acquired (cf. Mandelbaum 2014; Recanati 2002). Loosely speaking, we cannot prevent the content we comprehend from getting into our belief-box. All we can do is try and get rid of it once it is already there.

Gilbert argued that the Spinozan model is correct. One of the first studies designed to establish it was 'The Hopi Language' experiment (Gilbert, Krull, and Malone 1990, Study 1). Participants of this experiment read a series of statements of the form *An X is a* Y, with an English noun in place of *Y* and what they were supposed to believe is a Hopi word (in fact a nonsense string of letters) in place of *X* (e.g. *A tarka is a wolf.*). Some of the statements were followed by a display of the word *true* (indicating that the previous sentence was true), others with *false*, yet others with no display of either *true* or *false*. Most importantly, during the presentation of some statements, participants heard a tone. Earlier, they had been instructed to press a button as quickly as possible each time they heard it. This 'interruption task' was intended to increase the cognitive load and make the subjects' processing of the information on the screen more challenging.

The initial learning phase was followed by a testing phase where participants were asked about the meanings of words, which they had learnt through the statements presented in the learning phase (*Is X a Y?*). According to Gilbert and his colleagues, if it would turn out to be the case that the additional cognitive load makes it difficult to tag statements as false but does not influence tagging statements as true, the Spinozan model would be vindicated; accepting comprehended propositions is

automatic but rejecting them is costly and requires effort. The results revealed the expected pattern and supported the Spinozan model.

It is, however, unclear whether this experiment tested comprehension-based belief-fixation or just memory of the learned information (cf. Kissine and Klein 2013). To make sure the Spinozan model is correct, Gilbert and his colleagues conducted another set of experiments (Gilbert, Tafarodi, and Malone 1993). In one of them, participants read crime reports consisting of multiple statements, some of which were false (as indicated by use of the red font) while others were true (displayed in black font). As in the Hopi Language experiment, researchers used an additional interruption task, to selectively increase cognitive load. Crucially, after the learning phase, participants were asked not only memory retrieval questions (about whether a given statement appeared as true, as false, or did not appear at all). They were also asked, for example, to recommend a prison term for the perpetrators based on the crime reports just read. The results showed that: 'Interrupted subjects recommended that perpetrators serve nearly twice as much time when the false statements contained in the police reports exacerbated (rather than extenuated) the severity of the crimes.' (Gilbert, Tafarodi, and Malone 1993, 225). Again, it seems that—as predicted by the Spinozan model—participants initially accepted all information as true. Those of them, who were simultaneously distracted by an interruption task, did not manage to remove the propositions explicitly indicated as false from their belief box. As a result, they kept assuming this information to be true while recommending a prison term.

As far as the results of Gilbert's experiments go, Millikan's direct belief view of understanding looks convincing. However, the last 25 years of research on the relation between comprehension and acceptance push us towards a more nuanced picture. Hasson, Simmons, and Todorov (2005) conducted two experiments designed to test the Spinozan model. In the first experiment, a list of statements was first rated based on their informativeness, i.e. how much would one learn about a 30-year-old person by learning solely that this statement is either true or false about them, and divided into four categories: (i) informative both when true and when false, e.g. 'this person is a liberal,' (ii) informative only when true, e.g. 'this person walks barefoot,' (iii) informative only when false, e.g. 'this person owns a television,' and (iv) uninformative both when true and false, e.g. 'this person drinks tea for breakfast.' In the learning stage, participants were presented with a series of statements from the list, each labeled as either true or false. In the test

stage, they were presented with the same statements and asked to determine whether they were earlier presented as true or false. Importantly, informative-when-false sentences indicated to be false in the learning phase were *not* remembered as true even if participants operated under cognitive load. Gilbert and his colleagues' (1990) results were thus replicated *only* for uninformative-when-false sentences. In the second experiment, Hasson et al. demonstrated that in a lexical decision task, participants were considerably faster to associate an adjective (e.g. *optimist*) with someone who has been previously characterized with a matching statement (e.g. *this person thinks that things turn out for the best*) if the statement was said to be true of a person in comparison to it being said to be false or neither true nor false. This suggests that, in contrast with Gilbert's assumption, sentences marked as false and sentences whose veracity is unknown might not be automatically encoded as true: some degree of belief suspension is possible (*see also* Street and Richardson 2015).

These results suggest that an alternative to Spinozan and Cartesian view of language comprehension is needed. A promising avenue for developing such an alternative is indicated by research on so-called *validation* (cf. Isberner and Richter 2014; Kendeou 2014; O'Brien and Cook 2016; Richter 2015; Richter, Schroeder, and Wöhrmann 2009; Schroeder, Richter, and Hoever 2008; Singer 2006; 2013; 2019; Wyer and Radvansky 1999). Validation is a process of monitoring incoming information both for internal consistency and consistency with a comprehender's knowledge (Richter, Schroeder, and Wöhrmann 2009).[11] If a comprehender has relevant background information, either active in working memory or easily accessible in long-term memory, this information will be used to validate the content of a linguistic input independently of cognitive load.[12] Minimally, validation is assumed to detect 'violations of factual world knowledge (e.g. *Soft soap is edible*), implausibility (e.g. *Frank has a broken leg. He calls the plumber*), inconsistencies with antecedent text (e.g. *Mary is a vegetarian … She orders a cheeseburger*), and semantic anomalies (e.g. *Dutch trains are sour*).' (Isberner and Richter 2014, 246).[13]

[11]This mechanism is similar to what Sperber et al. (2010) call *vigilance towards the content*.

[12]This is compatible with results of Gilbert's Hopi Language experiment where participants lacked background information against which the linguistic input could be validated.

[13]Importantly, in this paper, I focus on comprehending discourses that are *not* established or recognized as fictional. In the case of comprehending fiction, validation is *recalibrated*: ' … specific discourse contexts, most notably stories that create a fictional story world, seem to modulate validation to some degree.' (Richter and Singer 2018, 184). Situation models constructed while comprehending fiction contain beliefs about the world of the fiction. Therefore, if it is sufficiently obvious that we speak

Validation is *routine* and *non-strategic*, i.e. independent of subject-specific processing goals.[14] For example, Richter, Schroeder, and Wöhrmann (2009) demonstrated that participants asked to monitor the orthographical correctness of a statement, produced affirmative orthographical judgment (that the target word in the statement was spelled correctly) slower and with lower accuracy when the target statement was false.[15]

Crucially, validation serves as a precondition on updating a situation model with the information captured in propositional textbase representations (Wyer and Radvansky 1999). According to Schroeder, Richter, and Hoever (2008), the construction of a situation model is guided by two main directives: *accuracy* (to represent the state of affairs described in the discourse as accurately as possible) and *stability* (to represent the state of affairs described in the discourse in a stable and consistent way).

> How do comprehenders manage to achieve both accurate and stable representations? We suggest that they carry out epistemic validation processes that monitor whether incoming information is consistent with other ideas provided in the text, with the current state of the situation model, and with general world knowledge. We assume that these validation processes are routinely carried out when situation models are updated and that they are a major determinant of whether a particular piece of information is integrated into the situation model, with the potential consequence of altering a comprehender's world view. (Schroeder, Richter, and Hoever 2008, 238)

The fact that the formation of situation models is guided not only by accuracy but also stability has some troublesome consequences from the epistemic point of view. According to Schroeder, Richter, and Hoever (2008), once information passes the gatekeeper of validation and gets integrated with the situation model, it becomes a background for further validation of new information. This means that, if the information was false, there is even more chance that we will acquire further false information – coherent with this one – down the road. The richer and more coherent the body of false information becomes, the less likely we are to revise it. In short, the barrier of validation, once compromised, generates a cascading effect and contributes to further deterioration of our epistemic standing. Validation is thus by

about a fictional world, e.g., *the Incredible Hulk has thrown a lorry*, can successfully pass validation and get integrated with the situation model.

[14]Comprehenders *can* engage in validation strategically (cf. Singer 2019) but not all kinds of validation are strategic and intentional. In this paper I focus on the routine validation (sometimes called *epistemic monitoring* (cf. Schroeder, Richter, and Hoever 2008)).

[15]See Isberner and Richter (2013, Experiment 2) for similar effect obtained using non-linguistic, color judgment task.

no means a perfect counter-deceptive tool. It has considerable limitations: it employs only *available* and *activated* background information (which may in itself be false), it often fails to filter out sufficiently plausible false information, and it is based only on quick and incomplete analysis (Isberner and Richter 2014; Marsh, Cantor, and Brashier 2016; Richter 2015).

The evidence presented in this subsection supports the following picture of linguistic comprehension. Comprehension generates two types of representation: propositional representations and situation models. When we understand an utterance of a compound sentence (not to mention a bigger piece of discourse), the information extracted from propositional representations of particular phrases and clauses gets cyclically updated to the situation model. The update is conditional on its passing by the gatekeeper of validation.[16] Therefore, neither the content-entertaining view, which follows the Cartesian model nor the direct belief view, inspired by the Spinozan model, got it quite right. We do not automatically believe *everything* we are told, but we automatically believe everything that is not filtered out by validation.[17]

2.3. Vigilance towards the source

Let us now go back to **Q1**: 'Are states of understanding *direct* (i.e. represent solely what is said) or *indirect* (i.e. represent what is said as being said/asserted)?' Thus far I did not say anything about representing the content of a linguistic input indirectly, i.e. as being said/asserted. Does it mean that indirect views of linguistic understanding are totally off the mark? I do not think so. Representing a given content not only as being said/asserted but as being said/asserted by a particular source is one of the crucial components of comprehension.

The literature on the phenomenon of so-called *source monitoring* or *vigilance towards the source* is vast, and I will not attempt to review it in this paper. Different aspects of this phenomenon were to this day investigated in dozens of empirical studies and incorporated in multiple

[16]It is still to some extent an open question what happens to information that does not pass the gatekeeper of validation. One hypothesis is that if the falsehood is informative and the subject knows that it is false, they represent it in terms of what its falsity implies. If I learn that *Lin does not have a sister* is false, I might update my situation model with the information *Lin has a sister*. However, if I learn that *Lin is a pilot* is false, I probably update my situation model with the information *Lin is a pilot* with a *falsity tag*. Apparently, this second way of updating makes me much more prone to the error of misremembering the information as true (which helps explain the results of Gilbert's Hopi language experiment) (Hasson, Simmons, and Todorov 2005).

[17]For a similar assessment of the relation between Spinozan and Cartesian models see (Kissine and Klein 2013).

theoretical models (for reviews see, e.g. Johnson, Hashtroudi, and Lindsay 1993; Mercier 2017; Sperber et al. 2010). The core assumption of this research program is that language speakers routinely track the identity of their informational sources, which, in consequence, allows them to monitor the *competence* and *benevolence* of these sources. Some of the hottest questions in the debate concern: the exact mechanisms employed by vigilance towards the source, the effectiveness of our monitoring mechanisms, and the development of vigilance during human ontogenesis, i.e. at what age children become vigilant language users.

Research on source monitoring and epistemic vigilance offers a straightforward lesson about language comprehension: we routinely track which information comes from whom, which requires meta-representing given content as being said/asserted by a given source. It is a separate question whether source monitoring accompanies linguistic understanding or belongs to it. The former option is endorsed by Guy Longworth (2018) as a consequence of his earlier distinction (Longworth 2008) into understanding and comprehension. According to this distinction, comprehension is a super-faculty consisting of an intellectual faculty of linguistic understanding, and perception. The information about the source is not represented in the state of understanding but it is delivered by perception: 'The outputs of the super-faculty are cognitions to the effect that that particular utterance gave expression to a particular entertained content … ' (Longworth 2008, 363).

I think that Longworth's theory of comprehension is on the right track, but he underestimates to what degree what he calls 'understanding' (i.e. the intellectual component of comprehension) is integrated with perception (cf. Drożdżowicz 2023). As indicated by Falandays et al. (2020): ' … speech perception is readily influenced by lexical and semantic context … [t]he current state of the literature now definitively points to a highly parallel, interactive architecture of speech perception.' (2). For example, by manipulating voice onset times, i.e. the amount of time between the release of a stop consonant and the onset of a vowel sound, Borsky, Tuller, and Shapiro (1998) created a 10-step continuum of auditory stimuli ranging from GOAT to COAT. Participants were presented with stimuli from the continuum and asked whether they hear words simultaneously displayed on a screen (either 'coat' or 'goat'). Borsky et al. observed that participants replied faster in the congruent scenarios, e.g. when they were asked whether they heard 'goat' in the GOAT-biased contexts, such as 'The laughing dairyman hurried to milk the … in the drafty barn,' than in the incongruent ones, e.g. when they were asked whether

they heard 'goat' in the COAT-biased context, such as 'The expert tailor tried to shorten the … in the cluttered attic.' Crucially, however, the effect has been observed *only for ambiguous stimuli* (from the middle of the continuum), and not for the unambiguous stimuli near the boundary. If the congruency effect was observed across the continuum — Borsky and colleagues suggested — we could ascribe it to post-perceptual processes (cf. Connine and Clifton 1987). In contrast, the obtained results suggest that semantic sentence context influences already the perceptual processing of a stimuli. In short, ambiguous acoustic stimuli are perceived differently depending on the meaning of their antecedents. Therefore, I do not subscribe to Longworth's distinction between comprehension and understanding and I will keep using these two terms interchangeably. If someone wants to preserve the distinction, they should think about my theory of understanding/comprehension as corresponding with Longworth's theory of comprehension.

As I suggested from the outset, I think that there is no straightforward answer to **Q1**. What we know about source monitoring in language comprehension, suggests that an indirect or meta-representation of an utterance as being said/asserted by a given source is yet another element of the representational structure generated and employed during linguistic understanding.[18] We can think about this meta-representation as having two slots: SOURCE(CONTENT). The slot for SOURCE is filled with a more or less fine-grained representation of the source available to the comprehender, e.g. *someone in the crowd*; *my mum*; *the author of this article*; *the girl with a weird accent*, etc.[19] The slot for CONTENT is filled with a representation of the utterance content similar to the propositional representation.[20]

3. The representational structure of linguistic understanding

It is time to take stock. In the Introduction, I enumerated five theories of states of understanding. According to three of them, states of understanding represent the content of the utterance indirectly as being said/asserted. According to the remaining two, while understanding an

[18]See Sperber (1997, 2000) for a discussion of the role of meta-representations in language comprehension.

[19]Obviously, this is a simplification. There might be important differences between different ways of identifying a given source, for example, an underspecified source in audible space (e.g., someone in the crowd) vs. someone well known (e.g., my mum), that are yet to be investigated empirically.

[20]Plausibly, these representations have a further slot for the illocutionary force: SOURCE(FORCE (CONTENT)). I find this possibility worth exploring but cannot do it in the present discussion.

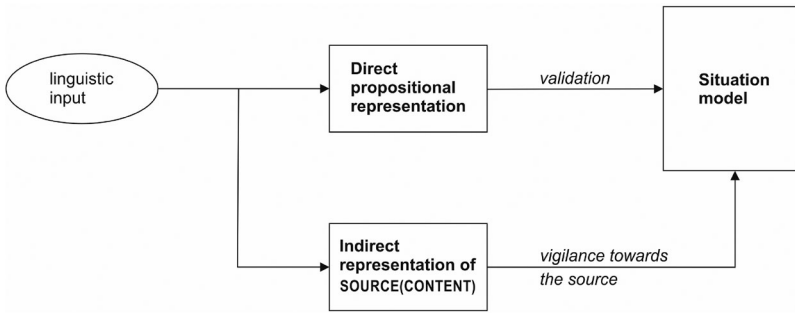

Figure 1. The representational structure of linguistic understanding.

utterance, we engage with its content directly. The empirical data reviewed in Section 2 does not favor either of these approaches. Instead, the data seems to suggest that in order to explain how we understand language, we have to postulate at least three types of interdependent representations: (i) direct propositional representations; (ii) indirect meta-representations of the content as being said/asserted by a given source; and (iii) situation models, i.e. complex representations consisting of beliefs about (and other, non-doxastic and possibly non-conceptual representations of) the states of affairs described in a given piece of discourse.

I will now provide a model of the representational structure of linguistic understanding which demonstrates how these representations are related to each other and offers a new, alternative picture on the state of linguistic understanding (Figure 1). This model is a result of an inference to the best explanation based on empirical research discussed in Section 2.

According to the model I propose, the process of understanding runs in two streams. The first, *direct* stream is faster. It involves the production of the direct propositional representation which, if it passes the filter of validation, gets automatically integrated into the situation model and shapes our beliefs about the world.[21] This stream is responsible for the aspect of linguistic understanding that the direct views focus on: upon understanding a linguistic input, we immediately and directly engage with its content. When you tell me that a given car is brand new, it makes me think about the car (that it is brand new) and not about you (that you have said that the car is brand new). The evidence of the

[21] As I mentioned above, it shapes our beliefs about the world when the comprehended linguistic input is *not* recognized as fictional. In the case of comprehending fiction, it shapes our beliefs about the world of the fiction.

existence of such a stream came from Gilbert's original research on the Spinozan model of linguistic comprehension, updated with the more recent research on validation (both discussed in Section 2.2).

The second, *indirect stream* is slower. It generates a meta-representation of the content of an utterance as being said/asserted by a given speaker or as coming from a given source. This representation is filtered by vigilance towards the source, which serves as an additional gatekeeper of the situation model. If the filter detects that the information comes from an unreliable source, the subject can *attempt* an update of the situation model and belief revision.[22] If, for example, I know that you are very desperate to sell me the car, I may end up revising my belief that it is brand new. The evidence of the existence of such a stream came from the research on vigilance towards the source, discussed in Section 2.3. The limited effectiveness of the kind of information filtering occurring in this stream results from the fact that upon recognizing the unreliability of one's source, one cannot simply prevent the update of information to the situation model but can, at most, try and revise information which has already been updated via the faster, direct stream.

Three comments are in order. Firstly, the hypothesis about asynchrony of the two streams finds support in empirical research. Relying on the results of Sparks and Rapp (2011) and Nadarevic and Erdfelder (2013), Weil, Schul, and Mayo (2020) suggest that ' … readers consider the credibility of a source only after they have comprehended information and evaluated its consistency with the active memory contents. Accordingly, source credibility might not influence the initial encoding of the information, but rather, encoding might be modified after validation is completed' (231).

Secondly, I do not suggest that no information about the source contributes to the linguistic processing occurring in the direct stream. Some such information, e.g. regarding the speaker's perspective, might be necessary to retrieve the meaning of a comprehended utterance. For example, if you say: 'This is hot,' I would not form a full-fledged propositional representation or update my situation model appropriately unless I take into account the fact that you are looking at the cup you are holding. There is much more to be said about how semantic and pragmatic subprocesses contribute to the generation of each of the types of

[22]Often, after the indirect SOURCE(CONTENT) representation passes through the filter of vigilance towards the source, the source of information gets forgotten (Begg, Anas, and Farinacci 1992; cf. Michaelian 2010).

representations I am discussing here, but this would require a separate paper. What is important is that, in the direct stream, the information about the source (for example, that he is a highly determined car salesman) does not influence whether a given content is updated into the situation model.[23]

Finally, the current model is a dual-stream model and not a default-interventionist dual-process model (cf. Gawronski, Sherman, and Trope 2014).[24] Comprehension routinely runs through both the direct and indirect stream. The only exception might be very early childhood; it is possible that in human ontogeny the direct stream develops first,[25] and that there is a period in which children are already able to understand language but not yet able to monitor the source of comprehension-based information. At the same time, we have evidence of source monitoring and source identification already in infants (Polka and Nazzi 2018), and we know that children as young as 3-years-old display some selective trust based on source identity (cf. Hermes, Behne, and Rakoczy 2018). The issue remains open until more empirical evidence is collected.

The model I offered illustrates why there are no straightforward answers to **Q1** and **Q2**. When it comes to **Q1** ('Are states of understanding direct or indirect?'), based on the research on the relationship between propositional textbase representations and situation models, as well as the cooccurrence of validation and vigilance towards the source, the model demonstrates that both direct and indirect representations contribute to the representational structure of linguistic understanding, so we cannot say that states of understanding are either direct or indirect. When it comes to **Q2** ('What kind of mental attitude is linguistic understanding?'), the model shows that states of understanding involve multiple representations with different contents. Neither of them can be singled out as *the* representation identical with linguistic understanding

[23]Thanks to Anna Drożdżowicz for drawing my attention to this fact.

[24]An example of the default-interventionist model of comprehension is Mark Jary's *hybrid* view of assertion interpretation (Jary 2010; cf. Thagard 2005). According to Jary, an analog of my indirect stream is 'brought to bear on the interpretive process only when needed, such as when the speaker is judged to be incompetent, unreliable or untrustworthy, or when, for example, the nature of the interaction makes it obvious that the speaker is not intending to inform, but to persuade, as in academic discourse.' (Jary 2010, 45). However, for the subject to be able to detect at a given situation that the default stance should be abandoned, some sort of 'low-key monitoring' (Sperber 2013, 64) of the source has to be in place all the time. Otherwise, how would the hearer know, e.g., that the speaker is incompetent or unreliable? This is why I prefer the dual-stream model to the default-interventionist solution.

[25]Although I do not want to engage in evolutionary speculations, I think that it is also quite likely that the direct stream appeared first in human *phylogeny* as evolving from older, perceptual mechanisms (cf. Kissine and Klein 2013).

or as *the* content which is known, believed, or entertained by someone who understands a given utterance. Therefore, there is no straightforward answer to **Q2**. Undoubtedly, in different contexts, linguistic understanding gives rise to different mental attitudes such as knowledge or belief that someone said so and so, the belief in the very thing that was said, etc.[26] But linguistic understanding is not identical to any one of these attitudes.

4. Conclusions

I would like to conclude by enumerating three most important gains of the model of the representational structure of linguistic understanding offered in this paper. Firstly, the model reveals that both direct and indirect views point out important aspects of the state of linguistic understanding. Direct views are right that upon hearing or reading an utterance we directly engage with its content. I argued that we do it through situation models built primarily on the basis of propositional representations. Simultaneously, indirect views are right that we also represent the content as being said/asserted. We do it in order to monitor the source of a given linguistic input. Current empirical evidence suggests that if the representation of content *as coming from a given source* does not pass the filter of vigilance towards the source, we make an attempt to update the situation model by removing the information coming from an unreliable source. One thing does not exclude the other — comprehension flows in two streams.

Secondly, the model helps to spell out the complicated relation between comprehension and acceptance. Neither the content-entertaining nor the direct belief view captures this relation well. As demonstrated in the research on validation, even though we do not automatically accept *everything* we hear or read — validation filters out inputs that are in contradiction with relevant background information active in our working memory or easily accessible in long-term memory — we cannot freely choose what to believe and what to reject.

Thirdly, even though the detailed discussion of this topic is beyond the scope of the present paper, this model has important consequences for the debate about the epistemic role of linguistic understanding. One thing that makes linguistic understanding philosophically interesting is that it enables the acquisition of two types of knowledge: knowledge

[26]Cf. (Drożdżowicz, ms).

about what other people say; and knowledge about the world based on what other people say (testimonial knowledge). In most theories it remains unclear how exactly these two types of knowledge relate with each other (but see, e.g. Peet 2018). The model I offer could help us to spell out this relationship.

The knowledge about what other people say originates from the indirect stream of comprehension, which involves the representation of content as being said/asserted by a given source. How it happens can be explained in different ways, and I do not attempt to resolve this matter here.[27] In a nutshell, we can either assume that our default attitude towards the indirect representation of SOURCE(CONTENT) is a belief (cf. Balcerak Jackson 2019) or some other attitude, e.g. a seeming (Fricker 2003). If it is a belief, we must explain how it is justified and whether it amounts to knowledge about what other people say. If it is a seeming, we could argue — as Fricker (2003) does — that it provides *prima facie* justification for beliefs, which (plausibly under further conditions) amount to knowledge about what other people say.

When it comes to testimonial knowledge, the whole dual-stream process of comprehension (with all the representations and filtering mechanisms involved) contributes to its acquisition. The more we know about how comprehension works, the more adequate our assumptions about its role in the generation of testimonial knowledge. Let me illustrate it with just one (however, quite prominent) example. According to a *local reductionist* view of testimony (Fricker 1994; 1995), for a receiver's testimonial beliefs to be justified, the receiver has to establish whether the source of the information is trustworthy regarding this particular information on this particular occasion. Crucially, Fricker admits that, for her view of testimony to be accurate, it has to be the case that 'it is not intrinsic to the state of understanding an utterance that it compels the hearer towards belief in what she grasps as being asserted' (1994, 157). However, for example, Kourken Michaelian (2010) suggests that Gilbert's studies put some pressure on this assumption, and thus on Fricker's account.

As I argued extensively in Section 2.2, although Gilbert's view is a little too strong, we actually *are compelled to believe* what we understand. Information that passes the gatekeeper of validation gets automatically updated into the situation model. Importantly, the gatekeeper is not very difficult to pass, as it blocks only information contradictory with our easily accessible background knowledge. Moreover, pieces of information

[27] But see (Grodniewicz 2022b).

which have already passed validation become a part of the informational background against which new information is evaluated, and thus increase the probability that further inputs coherent with it will pass validation as well — the more pieces of false information we have already received, the more prone we are to accept further falsehoods. Therefore, we certainly should not rely on validations as *the* filter which can protect us from acquiring information based on deceitful or incompetent testimony.

What about the vigilance towards the source — the filter controlling the indirect stream? Firstly, there are good reasons to doubt that we are efficient in recognizing whether a given source tries to deceive us (Grodniewicz 2022a; Michaelian 2010; 2013; Shieber 2012, 2015). It is commonly assumed that our ability to detect deception is only slightly better than chance (e.g. Bond and DePaulo 2006). But even if we were good at recognizing that someone lies to us, if the model proposed here is correct, the indirect stream is slower than the direct one. Once we recognize that a piece of information comes from an unreliable source, it is too late to prevent it from getting updated to the situation model — it has already been updated *via* the direct stream. At best, we can try and revise our situation model (and even this, only if we have sufficient cognitive resources). Therefore, as I argue much more extensively in (Grodniewicz 2022a), the model offered in this paper turns out to be highly relevant to the debate about epistemology of testimony.[28]

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by Priority Research Area 'Society of the Future' under the Strategic Programme 'Excellence Initiative' at Jagiellonian University.

References

Balcerak Jackson, B. 2019. "Against the Perceptual Model of Utterance Comprehension." *Philosophical Studies* 176 (2): 387–405. https://doi.org/10.1007/s11098-017-1021-3.

[28]Thanks to Bartłomiej Czajka, Sanford Goldberg, Peter J. Graham, Alex Krauss, and Josefa Toribio for helpful comments and suggestions. Special thanks to Anna Drożdżowicz, Manuel García-Carpintero, and Grzegorz Gaszczyk for countless illuminating conversations on the topics discussed in this paper.

Begg, I. M., A. Anas, and S. Farinacci. 1992. "Dissociation of Processes in Belief: Source Recollection, Statement Familiarity, and the Illusion of Truth." *Journal of Experimental Psychology: General* 121 (4): 446–458. https://doi.org/10.1037/0096-3445.121.4.446.

Bond, C. F., and B. M. DePaulo. 2006. "Accuracy of Deception Judgments." *Personality and Social Psychology Review* 10 (3): 214–234. https://doi.org/10.1207/s15327957pspr1003_2.

Borsky, S., B. Tuller, and L. P. Shapiro. 1998. ""How to Milk a Coat:" The Effects of Semantic and Acoustic Information on Phoneme Categorization." *The Journal of the Acoustical Society of America* 103 (5): 2670–2676. https://doi.org/10.1121/1.422787.

Connine, C. M., and C. Clifton. 1987. "Interactive use of Lexical Information in Speech Perception." *Journal of Experimental Psychology: Human Perception and Performance* 13 (2): 291–299. https://doi.org/10.1037/0096-1523.13.2.291.

Drożdżowicz, A. 2023. "Do we Hear Meanings? – Between Perception and Cognition." *Inquiry*, 1–33. https://doi.org/10.1080/0020174X.2019.1612774.

Drożdżowicz, A. ms. Varieties of Linguistic Understanding - On How We Engage with Linguistic Information.

Evans, G. 1982. *The Varieties of Reference*. New York: Oxford University Press.

Falandays, J. B., B. J. Batzloff, S. C. Spevack, and M. J. Spivey. 2020. "Interactionism in Language: From Neural Networks to Bodies to Dyads." *Language, Cognition and Neuroscience*, 1–16. https://doi.org/10.1080/23273798.2018.1501501.

Fricker, E. 1994. "Against Gullibility." In *Knowing from Words*. Synthese Library, Vol. 230, edited by A. Chakrabarti, and B. K. Matilal. Dordrecht: Springer.

Fricker, E. 1995. "Critical Notice." *Mind* 104 (414): 393–411. https://doi.org/10.1093/mind/104.414.393.

Fricker, E. 2003. "Understanding and Knowledge of What is Said." In *Epistemology of Language*, edited by A. Barber, 325–366. New York: Oxford University Press.

Gawronski, B., J. Sherman, and Y. Trope. 2014. "Two of What? A Conceptual Analysis of Dual-Process Theories." In *Dual-process Theories of the Social Mind*, edited by B. Gawronski, J. Sherman, and Y. Trope, 3–19. New York: Guilford Press.

Gilbert, Daniel T. 1991. "How Mental Systems Believe." *American Psychologist* 46 (2): 107–119. https://doi.org/10.1037/0003-066X.46.2.107.

Gilbert, Daniel T., D. S. Krull, and P. S. Malone. 1990. "Unbelieving the Unbelievable: Some Problems in the Rejection of False Information." *Journal of Personality and Social Psychology* 59 (4): 601–613. https://doi.org/10.1037/0022-3514.59.4.601.

Gilbert, D. T., R. W. Tafarodi, and P. S. Malone. 1993. "You Can't Not Believe Everything You Read." *Journal of Personality and Social Psychology* 65 (2): 221–233. https://doi.org/10.1037/0022-3514.65.2.221.

Grodniewicz, J. P. 2021. "The Process of Linguistic Understanding." *Synthese* 198 (12): 11463–11481. https://doi.org/10.1007/s11229-020-02807-9.

Grodniewicz, J. P. 2022a. "Effective Filtering: Language Comprehension and Testimonial Entitlement." *The Philosophical Quarterly*, https://doi.org/10.1093/pq/pqac064.

Grodniewicz, J. P. 2022b. "The Justification of Comprehension-Based Beliefs." *Review of Philosophy and Psychology* 13 (1): 109–126. https://doi.org/10.1007/s13164-021-00575-0.

Hasson, U., J. P. Simmons, and A. Todorov. 2005. "Believe It or Not." *Psychological Science* 16 (7): 566–571. https://doi.org/10.1111/j.0956-7976.2005.01576.x.

Heck, R. 1995. "The Sense of Communication." *Mind* 104 (413): 79–106. https://doi.org/10.1093/mind/104.413.79.

Hermes, J., T. Behne, and H. Rakoczy. 2018. "The Development of Selective Trust: Prospects for a Dual-Process Account." *Child Development Perspectives* 12 (2): 134–138. https://doi.org/10.1111/cdep.12274.

Hunter, D. 1998. "Understanding and Belief." *Philosophy and Phenomenological Research* 58 (3): 559. https://doi.org/10.2307/2653756.

Isberner, M.-B., and T. Richter. 2013. "Can Readers Ignore Implausibility? Evidence for Nonstrategic Monitoring of Event-Based Plausibility in Language Comprehension." *Acta Psychologica* 142 (1): 15–22. https://doi.org/10.1016/j.actpsy.2012.10.003.

Isberner, M.-B., and T. Richter. 2014. "Comprehension and Validation: Separable Stages of Information Processing? A Case for Epistemic Monitoring in Language Comprehension." In *Processing Inaccurate Information: Theoretical and Applied Perspectives from Cognitive Science and the Educational Sciences*, edited by David N. Rapp and Jason L.G. Braasch, 245–276. Cambridge, MA: The MIT Press.

Jary, M. 2010. *Assertion*. Palgrave Macmillan UK. https://doi.org/10.1057/9780230274617.

Johnson-Laird, P. N. 1983. *Mental Models: Towards a Cognitive Science of Language, Inference, and Consciousness*. Cambridge, MA: Harvard University Press.

Johnson, M. K., J. D. Bransford, and S. K. Solomon. 1973. "Memory for Tacit Implications of Sentences." *Journal of Experimental Psychology* 98 (1): 203–205. https://doi.org/10.1037/h0034290.

Johnson, M. K., S. Hashtroudi, and D. S. Lindsay. 1993. "Source Monitoring." *Psychological Bulletin* 114 (1): 3–28. https://doi.org/10.1037/0033-2909.114.1.3.

Kendeou, P. 2014. "Validation and Comprehension: An Integrated Overview." *Discourse Processes* 51 (1-2): 189–200. https://doi.org/10.1080/0163853X.2013.855874.

Kintsch, W. 1988. "The Role of Knowledge in Discourse Comprehension: A Construction-Integration Model." *Psychological Review* 95 (2): 163–182. https://doi.org/10.1037/0033-295X.95.2.163.

Kintsch, W., and T. A. van Dijk. 1978. "Toward a Model of Text Comprehension and Production." *Psychological Review* 85 (5): 363–394. https://doi.org/10.1037/0033-295X.85.5.363.

Kissine, M., and O. Klein. 2013. "Models of Communication, Epistemic Trust and Espistemic Vigilance." In *Social Cognition and Communication*, edited by J. P. Forgas, O. Vincze, and J. László, 139–154. https://doi.org/10.4324/9780203744628.

Long, D. L., and E. M. Freed. 2018. "A Memory Retrieval View of Text Comprehension." In *Deep Comprehension*. 1st ed., edited by K. Millis, D. L. Long, J. P. Magliano, and K. Wiemer, 27–40. https://doi.org/10.4324/9781315109503-4

Longworth, G. 2008. "Comprehending Speech." *Philosophical Perspectives* 22 (1): 339–373. https://doi.org/10.1111/j.1520-8583.2008.00151.x.

Longworth, G. 2018. "Understanding What was Said." *Synthese* 195 (2): 815–834. https://doi.org/10.1007/s11229-016-1243-5.

Mandelbaum, E. 2014. "Thinking is Believing." *Inquiry* 57 (1): 55–96. https://doi.org/10.1080/0020174X.2014.858417.

Mandelbaum, E., J. Quilty-Dunn, and The Harvard Review of Philosophy. 2015. "Believing without Reason: Or: Why Liberals Shouldn't Watch Fox News." *The Harvard Review of Philosophy* 22: 42–52. https://doi.org/10.5840/harvardreview2015226.

Marsh, E. J., A. D. Cantor, and N. M. Brashier. 2016. "Believing That Humans Swallow Spiders in Their Sleep: False Beliefs as Side Effects of the Processes that Support Accurate Knowledge." In *Psychology of Learning and Motivation*, Vol. 64, edited by B. H. Ross, 93–132. https://doi.org/10.1016/bs.plm.2015.09.003

McNamara, D. S., and J. Magliano. 2009. "Psychology of Learning and Motivation." *In Psychology of Learning and Motivation* 51: 297–384. https://doi.org/10.1016/S0079-7421(09)51009-2.

Mercier, H. 2017. "How Gullible are We? A Review of the Evidence from Psychology and Social Science." *Review of General Psychology* 21 (2): 103–122. https://doi.org/10.1037/gpr0000111.

Michaelian, K. 2010. "In Defence of Gullibility: The Epistemology of Testimony and the Psychology of Deception Detection." *Synthese* 176 (3): 399–427. https://doi.org/10.1007/s11229-009-9573-1.

Michaelian, K. 2013. "The Evolution of Testimony: Receiver Vigilance, Speaker Honesty and the Reliability of Communication." *Episteme* 10 (1): 37–59. https://doi.org/10.1017/epi.2013.2.

Millikan, Ruth G. 2004. *Varieties of Meaning: The 2002 Jean Nicod Lectures*. Cambridge, Massachusetts : MIT Press.

Millikan, Ruth G. 2005. *Language: A Biological Model*. Oxford: Oxford; New York: Clarendon Press; Oxford University Press.

Nadarevic, L., and E. Erdfelder. 2013. "Spinoza's Error: Memory for Truth and Falsity." *Memory & Cognition* 41 (2): 176–186. https://doi.org/10.3758/s13421-012-0251-z.

O'Brien, E. J., and A. E. Cook. 2016. "Separating the Activation, Integration, and Validation Components of Reading." In *Psychology of Learning and Motivation*, Vol. 65, edited by B. Ross, 249–276. Cambridge, Massachusetts: Elsevier.

Peet, A. 2018. "Testimonial Knowledge without Knowledge of What is Said." *Pacific Philosophical Quarterly* 99 (1): 65–81. https://doi.org/10.1111/papq.12137.

Piest, B. A., M.-B. Isberner, and T. Richter. 2018. "Don't Believe Everything you Hear: Routine Validation of Audiovisual Information in Children and Adults." *Memory & Cognition* 46 (6): 849–863. https://doi.org/10.3758/s13421-018-0807-7.

Polka, L., and T. Nazzi. 2018. "Interacting Processes and Developmental Biases Allow Learners to Crack the "What" Code and the "who" Code in Spoken Language." *Applied Psycholinguistics* 39 (4): 757–761. https://doi.org/10.1017/S0142716418000218.

Potts, G. R. 1972. "Information Processing Strategies Used in the Encoding of Linear Orderings." *Journal of Verbal Learning and Verbal Behavior* 11 (6): 727–740. https://doi.org/10.1016/S0022-5371(72)80007-0.

Recanati, F. 2002. "Does Linguistic Communication Rest on Inference?" *Mind & Language* 17 (1 & 2): 105–126. https://doi.org/10.1111/1468-0017.00191.

Richter, T. 2015. "Validation and Comprehension of Text Information: Two Sides of the Same Coin." *Discourse Processes* 52 (5-6): 337–355. https://doi.org/10.1080/0163853X.2015.1025665.

Richter, T., S. Schroeder, and B. Wöhrmann. 2009. "You Don't Have to Believe Everything you Read: Background Knowledge Permits Fast and Efficient Validation of Information." *Journal of Personality and Social Psychology* 96 (3): 538–558. https://doi.org/10.1037/a0014038.

Richter, T., and M. Singer. 2018. "Discourse Updating: Acquiring and Revising Knowledge through Discourse." In *The Routledge Handbook of Discourse Processes*, edited by M. F. Schober, D. N. Rapp, and M. A. Britt, 167–190. New York: Routledge.

Schroeder, S., T. Richter, and I. Hoever. 2008. "Getting a Picture that is Both Accurate and Stable: Situation Models and Epistemic Validation." *Journal of Memory and Language* 59 (3): 237–255. https://doi.org/10.1016/j.jml.2008.05.001.

Shieber, J. 2012. "Against Credibility." *Australasian Journal of Philosophy* 90 (1): 1–18. https://doi.org/10.1080/00048402.2011.560953.

Shieber, J. 2015. *Testimony: A Philosophical Introduction*. New York: Routledge, Taylor & Francis Group.

Singer, M. 2006. "Verification of Text Ideas During Reading." *Journal of Memory and Language* 54 (4): 574–591. https://doi.org/10.1016/j.jml.2005.11.003.

Singer, M. 2013. "Validation in Reading Comprehension." *Current Directions in Psychological Science* 22 (5): 361–366. https://doi.org/10.1177/0963721413495236.

Singer, M. 2017. "Memory for Text and Discourse: Retrieval and Comprehension." In *Learning and Memory: A Comprehensive Reference*, 357–381. Elsevier. https://doi.org/10.1016/B978-0-12-809324-5.21065-1

Singer, M. 2019. "Challenges in Processes of Validation and Comprehension." *Discourse Processes* 56 (5-6): 465–483. https://doi.org/10.1080/0163853X.2019.1598167.

Sparks, J. R., and D. N. Rapp. 2011. "Readers' Reliance on Source Credibility in the Service of Comprehension." *Journal of Experimental Psychology: Learning, Memory, and Cognition* 37 (1): 230–247. https://doi.org/10.1037/a0021331.

Sperber, D. 1997. "Intuitive and Reflective Beliefs." *Mind and Language* 12 (1): 67–83. https://doi.org/10.1111/1468-0017.00036.

Sperber, D. 2000. "Introduction." In *Metarepresentations: A Multidisciplinary Perspective*, edited by D. Sperber, 3–13. New York: Oxford University Press.

Sperber, D. 2013. "Speakers Are Honest Because Hearers Are Vigilant Reply to Kourken Michaelian." *Episteme* 10 (1): 61–71. https://doi.org/10.1017/epi.2013.7.

Sperber, D., F. Clément, C. Heintz, O. Mascaro, H. Mercier, G. Origgi, and D. Wilson. 2010. "Epistemic Vigilance." *Mind & Language* 25 (4): 359–393. https://doi.org/10.1111/j.1468-0017.2010.01394.x.

Street, C. N. H., and D. C. Richardson. 2015. "Descartes versus Spinoza: Truth, Uncertainty, and Bias." *Social Cognition* 33 (3): 227–239. https://doi.org/10.1521/soco.2015.33.2.2.

Thagard, P. 2005. "Testimony, Credibility, and Explanatory Coherence." *Erkenntnis* 63 (3): 295–316. https://doi.org/10.1007/s10670-005-4004-2.

van Dijk, T. A., and W. Kintsch. 1983. *Strategies of Discourse Comprehension*. New York: Academic Press.

Weil, R., Y. Schul, and R. Mayo. 2020. "Correction of Evident Falsehood Requires Explicit Negation." *Journal of Experimental Psychology: General*. https://doi.org/10.1037/xge0000635.

Wyer, R. S., and G. A. Radvansky. 1999. "The Comprehension and Validation of Social Information." *Psychological Review* 106 (1): 89–118. https://doi.org/10.1037/0033-295X.106.1.89.

Zwaan, R. A. 2016. "Situation Models, Mental Simulations, and Abstract Concepts in Discourse Comprehension." *Psychonomic Bulletin & Review* 23 (4): 1028–1034. https://doi.org/10.3758/s13423-015-0864-x.

Zwaan, R. A., M. C. Langston, and A. C. Graesser. 1995. "The Construction of Situation Models in Narrative Comprehension: An Event-Indexing Model." *Psychological Science* 6 (5): 292–297. Retrieved from JSTOR. https://doi.org/10.1111/j.1467-9280.1995.tb00513.x

Zwaan, R. A., and G. A. Radvansky. 1998. "Situation Models in Language Comprehension and Memory." *Psychological Bulletin* 123 (2): 162–185. https://doi.org/10.1037/0033-2909.123.2.162.