

Indexicality

I, Here, Now

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1 Introduction: getting an intuitive grip on indexicals

Using and interpreting language requires context. Indexicality is a special type of that ubiquitous and widely acknowledged context dependence in language. We speak of indexicality in relation to expressions whose very linguistic function is to exploit context in order to make it possible to talk about and express different things. Paradigmatic examples of indexicals are the expressions *I, you, here, now, today, tomorrow*. For example, the sentence *I will call you tomorrow* does not seem to express anything on its own. It only expresses a specific content when it is used by a speaker addressing a hearer on a particular day. If Yumi says this to Kamal on Monday July 24, 2017, then what the sentence expresses, in that context, is that Yumi will call Kamal on Tuesday July 25, 2017; if Kamal uses the same sentence when talking to his mother on the next day, then what it expresses is that Kamal will call his mother on Wednesday July 26. And so on. If we wanted to explain what the sentence *I will call you tomorrow* **means**, we could say that it is a sentence that a speaker **uses** to say that they will call the hearer on the day following the day on which the sentence is used.

The meaning of expressions such as *I, you, and tomorrow* contains instructions, so to speak, on how to make use of contextual features such as who is speaking, to whom, or when, in order to make reference to a given person, time, event, and whatnot. A characteristic feature of indexicals is that in virtue of their conventional meaning, they are assigned contextually determined values as their semantic values: an occurrence of the second person singular pronoun *you* gets Kamal as its semantic value when the sentence is addressed to Kamal, Fenrong when it is addressed to Fenrong, and so on.¹ The lexical meaning of the pronoun *you* is thus akin to an instruction that tells us how to assign a semantic value to an occurrence of *you* in a given context of use.

The best way to get an intuitive grip on indexicals is by way of examples. Nevertheless, the task of deciding which expressions should be classified as indexicals is by no means an easy one. Consider the sentence *Burping out loud is impolite*. Whether or not what a person expresses with this sentence is true also depends on the context. In many cultures (say, most European and Middle Eastern cultures) it is indeed impolite to burp out loud; yet there are cultures (say, Chinese or Indian) in which burping is not considered to be impolite. Hence, intuitively, if uttered in a British context, the sentence is true, but not so if uttered in a Chinese context. This dependence of the truth value on the context in which the sentence is used reveals a certain form of context dependence, one that may be traced to the predicate *impolite*. However, whether we ought to include predicates such as *impolite* among indexical expressions remains an open and controversial question.

Even more worrisome is the fact that sometimes even within a single lexical class, such as that of personal pronouns, there is no consensus on what demarcates indexical expressions from the rest. Thus consider the sentence *He will call her*, which differs from our example *I will call you* only in the choice of the pronouns. As before, the sentence on its own does not seem to express anything yet. In order to say something meaningful with this sentence, one needs to use it in a suitable

context. However, in contrast with our previous example, it is not enough to rely on such basic contextual features as who is speaking, to whom, where, or when. In order to determine for whom the third person pronouns *he* and *her* stand, we need to appeal to such features as who the speaker means to be referring to with the use of these pronouns, who the interlocutors can plausibly take the speaker to be referring to, who is sufficiently salient in the context of utterance, and so on. If I utter the sentence while pointing at Kamal and Yumi, and my interlocutors are aware of this, as well as of the fact that Kamal is male and Yumi female, then what I will express is that Kamal will call Yumi. But things do not always go smoothly: suppose that I happen to be pointing at Kamal's twin brother, whom I mistake for Kamal. I want to say that Kamal will call Yumi, and what is more, that is what I may well communicate to my interlocutors (for instance, if they have also taken Kamal's twin brother for him). Yet is the semantic value of *he* in this case Kamal or, rather, his twin brother? To put it differently, if Kamal will call Yumi, but his twin brother will not, will I be saying something true or not?

Considerations of the previous sort have led many theorists to draw a distinction between "pure indexicals," such as *I* or *today*, and "demonstratives," such as *this*, *that*, *he*, *she*, *they*, *there*, *then*. Once the distinction is drawn, the term "indexical" can be used in a broad sense, encompassing both pure indexicals and demonstratives, or in a narrow sense, for pure indexicals only. If used in a narrow sense, the distinguishing feature of an indexical expression would be that on the basis of its meaning and the basic contextual parameters (the speaker, the hearer, the time, the place, and the world of the utterance), we can determine its semantic value, without having to appeal to such rich pragmatic notions as salience or the speaker's communicative intentions. While the distinction between pure indexicals and demonstratives is far from uncontroversial (see, e.g., Mount 2008; Radulescu 2018), its well-foundedness fortunately does not affect the semantically interesting issues that are raised by indexicals (whether in a narrow or broad sense), issues that will concern us in this chapter. For the sake of simplicity, we will focus on expressions such as *I*, *here*, and *now*, leaving it open whether these are fundamentally different from demonstrative pronouns and other putative indexicals.

The chapter is structured as follows. Section 2 presents the core ideas of the semantics of indexicals that come from the work of David Kaplan. Sections 3 and 4 elaborate on some of these ideas: section 3 discusses the idea that there are two levels of meaning, namely characters and contents, while section 4 explores the relationship between indexicals, contexts, and logic, and critically assesses Kaplan's proposal that *I am here now* should be seen as a *logical* truth. Section 5 presents and discusses several alternatives to the Kaplanian framework.

2 The standard (Kaplanian) semantics for indexicals

While there are many controversial issues regarding indexicals, there is a widely shared agreement regarding one core idea. This idea is, in a nutshell, that in order

to evaluate a sentence containing indexicals for a truth value, one must appeal to (at least) two parameters. The job of the first parameter is to assign semantic values to indexicals, while the job of the second parameter is to tell us what is and isn't the case in a given world or state of affairs. To illustrate the idea, consider the following sentence:

- (1) I live here now.

How do we decide whether (1) is true? First of all, we need to figure out who is speaking, where, and when. Suppose that (1) is uttered by Kamal in Bamako on July 27, 2017. Then (1) expresses that on July 27, 2017, Kamal lives in Bamako. Second, we need to check whether Kamal lives indeed in Bamako at that time. To check this, we need to know what the actual world is like; we need to know whether the state of affairs at which we evaluate (1) for its truth value is one in which Kamal lives in Bamako on July 27, 2017.

This is, of course, a simplification. A large part of this chapter aims at fleshing out this core idea in due detail. We will see that for David Kaplan, whose work on indexicality has been particularly influential, there are fundamental differences between the two parameters, as much in their nature as in their function. We will also see how some of these differences may be, and have been, challenged. The aim of the present section is to present the basics of the Kaplanian semantics, which constitutes the mainstream approach to indexicals.

2.1 The basics, part one: relativization to worlds and times

David Kaplan's "On Demonstratives," written in the 1970s and circulated for one and half decades as a manuscript until its publication in 1989, is composed of a theoretical discussion of indexicality, as well as a formal theory, the so-called Logic of Demonstratives, which spells out a semantics for a formal language that contains indexicals and is cast within a standard model-theoretic approach to semantics. In this chapter, we will try to present this semantic framework in a fairly informal manner. Consider the following sentence:

- (2) Bamako is larger than Dakar.

While (2) is true in the world and the time that we live in, it is easy to imagine a counterfactual situation in which (2) is false. For instance, had history taken a different turn, it might have happened that Dakar ended up being larger than Bamako. Evaluated with respect to such a counterfactual history, (2) is false rather than true. Using w_0 for the actual world and w_1 for the counterfactual world, we can write this somewhat more formally as follows:²

$\llbracket \text{Bamako is larger than Dakar} \rrbracket (w_0) = \text{T}$.

$\llbracket \text{Bamako is larger than Dakar} \rrbracket (w_1) = \text{F}$.

Relativization to possible worlds is standard and widespread. Somewhat less standard is the relativization of truth value to times. Reconsider (2). Just as we can think

of counterfactual worlds in which Dakar is larger than Bamako, we can think of *times* at which Dakar is larger than Bamako. Let us suppose that in the actual world Dakar will so develop by the end of this century that it will outgrow Bamako. Then we can say that (2) is true when evaluated at the present time, but false when evaluated at the year 2100:

$\llbracket \text{Bamako is larger than Dakar} \rrbracket (w_0, 2018) = \text{T}$.

$\llbracket \text{Bamako is larger than Dakar} \rrbracket (w_0, 2100) = \text{F}$.

The structures of interpretation for such modal and temporal languages, unlike the more classical ones, do not directly map expressions such as *is larger than* to their extensions, traditionally thought of as sets of pairs of individuals such that the first is larger than the second. Rather, they map them to their **intensions**, where intensions themselves are seen as mappings. The intension of the predicate *is larger than* is a mapping that, given a world–time pair, returns the extension of the predicate, that is, a set of pairs of individuals (or places) such that in that world and at that time, the first is larger than the second. For instance, (Bamako, Dakar) belongs to the value of $I(\text{is larger than})(w_0, 2018)$, but does not belong to $I(\text{is larger than})(w_1, 2018)$, nor does it belong to $I(\text{is larger than})(w_0, 2100)$, where I stands for the interpretation function. The intension of the sentence in (2) is, in turn, a mapping from world–time pairs to truth values; namely, the one that maps a world–time pair to truth if and only if in that world and at that time, Bamako is larger than Dakar.

In modal and temporal frameworks, the parameters of world and time play another key role: they allow for recursive definitions of the meanings of modal and temporal operators. The basic modal operators are *necessarily* and *possibly*, while the basic temporal operators are *it will always be the case that*, *it has always been the case that*, *it will once be the case that*, and *it has once been the case that*. Let us take this last one for illustration. Its meaning may be captured by means of the following recursive truth clause:

$\llbracket \text{it has once been the case that } (\varphi) \rrbracket (w, t) = \text{T}$ iff there was some time t' before t such that $\llbracket \varphi \rrbracket (w, t') = \text{T}$.

2.2 The basics, part two: double-indexing

In early Montague grammar (Montague 1970a; 1970b; Lewis 1970), semantic interpretation was defined with respect to a single world coordinate and a single time coordinate. In the early 1970s, Kaplan's contemporaries Hans Kamp and Frank Vlach pointed out that indexicals required amending the Montagovian framework by adding additional coordinates (Kamp 1971; Vlach 1973). This strategy is often referred to as "double indexing" or "multiple indexing."

One motivation for introducing an additional time coordinate is that when the temporal indexical *now* occurs in the scope of a temporal operator, it always looks back at the actual time, rather than the times to which the interpretation of the temporal operator may have taken us. To see the problem, consider the following two, both uttered on Monday July 24, 2017:

- (3) In 2010, Yumi believed that she would be living in Bamako.
 (4) In 2010, Yumi believed that she would be *now* living in Bamako.

For (3) to be true, Yumi's belief in 2010 must have been that at some point after 2010, she would be living in Bamako, whereas for (4) to be true, that *on July 24, 2017* she would be living in Bamako. Temporal frameworks with a single time coordinate fail to make room for the difference between (3) and (4). However, the difference can be captured if we introduce a second time coordinate, a coordinate that stands for the present time and that does not get shifted by temporal operators.³

In a double-indexed framework, the semantic interpretation function is thus relativized to a pair of time coordinates as well as to a pair of world coordinates. While the recursive truth clauses for non-indexical temporal and modal operators remain as before, the truth clauses for the temporal indexical *now* and the modal indexical *actually* are as follows:

$$\begin{aligned} \llbracket \mathbf{now}(\varphi) \rrbracket (w, t, w_{@}, t_{@}) &= T \text{ iff } \llbracket \varphi \rrbracket (w, t_{@}, w_{@}, t_{@}) = T. \\ \llbracket \mathbf{actually}(\varphi) \rrbracket (w, t, w_{@}, t_{@}) &= T \text{ iff } \llbracket \varphi \rrbracket (w_{@}, t, w_{@}, t_{@}) = T. \end{aligned}$$

In other words, the indexical *now* tells you that the sentence that it embeds must be evaluated at the present time. Similarly, the indexical *actually* tells you that the embedded sentence must be evaluated at the actual world.

With such a truth clause for *now* in place, we are able to derive the desired difference between (3) and (4). Let *p* stand for the temporal proposition *Yumi is living in Bamako*, and BEL_{Yumi} for the doxastic operator *Yumi believes that*. Then (3) and (4) may be given the following recursive derivations:

- (3') $\llbracket \text{In 2010 } (BEL_{Yumi} (FUT (p))) \rrbracket (w, t, w_{@}, t_{@}) = T$
 iff $\llbracket BEL_{Yumi} (FUT (p)) \rrbracket (w, 2010, w_{@}, t_{@}) = T$
 iff for every w' that in 2010 belonged among Yumi's doxastic alternatives
 for w , $\llbracket FUT (p) \rrbracket (w', 2010, w_{@}, t_{@}) = T$
 iff for every such w' , there is a time t' later than 2010 such that
 $\llbracket p \rrbracket (w', t', w_{@}, t_{@}) = T$.
- (4') $\llbracket \text{In 2010 } (BEL_{Yumi} (FUT (NOW(p)))) \rrbracket (w, t, w_{@}, t_{@}) = T$
 iff $\llbracket BEL_{Yumi} (FUT (NOW(p))) \rrbracket (w, 2010, w_{@}, t_{@}) = T$
 iff for every w' that in 2010 belonged among Yumi's doxastic alternatives
 for w , $\llbracket FUT (NOW(p)) \rrbracket (w', 2010, w_{@}, t_{@}) = T$
 iff for every such w' , there is a time t' later than 2010 such that
 $\llbracket NOW(p) \rrbracket (w', t', w_{@}, t_{@}) = T$
 iff for every such w' , $\llbracket p \rrbracket (w', t_{@}, w_{@}, t_{@}) = T$.

The upshot of double indexing is that no matter how deep one embeds a sentence under temporal operators such as *in 2010*, *it will be the case that*, or *it has always been the case that*, the truth clause of the indexical *now* will reset the **time** of evaluation to the present time. Similarly, no matter how deep one embeds a sentence under modal operators, the truth clause of *actually* will reset the **world** of evaluation to the actual world.

2.3 Contexts versus circumstances of evaluation

The formal framework in Kaplan (1989) is a double-indexed framework of the kind just presented, except that the time and world coordinates required for the interpretation of temporal and modal indexicals do not figure as stand-alone coordinates but are derived from the **context** parameter. For Kaplan, a context is a sequence of coordinates, namely, a quadruple that consists of an agent, which interprets the first person pronoun *I*, a place, which interprets the indexical *here*, and, as in section 2.2, a time and a world, which interpret the indexicals *now* and *actually*. Let c be the quadruple (a_c, l_c, w_c, t_c) . Then the truth clauses for *now* and *actually* may be rephrased as follows:

$$\llbracket \mathbf{now}(\varphi) \rrbracket(w, t, c) = T \text{ iff } \llbracket \varphi \rrbracket(w, t_c, c) = T.$$

$$\llbracket \mathbf{actually}(\varphi) \rrbracket(w, t, c) = T \text{ iff } \llbracket \varphi \rrbracket(w_c, t, c) = T.$$

The indexicals *now* and *actually* are handled as sentential operators. Their truth clauses provide a method for determining the truth value of the main sentence based on the truth value that the embedded sentence has with respect to the time and the world of the context. By contrast, the first person pronoun *I* and the locational adverb *here* are handled as referential expressions and are respectively assigned individuals and places as semantic values:

$$\llbracket \mathbf{I} \rrbracket(w, t, c) = a_c$$

$$\llbracket \mathbf{here} \rrbracket(w, t, c) = p_c.$$

In Kaplan's terminology, the world and the time of evaluation together form the "circumstances" of evaluation; in the terminology of Montague and Lewis, they are the coordinates of the "index" of evaluation. Both terms have remained in usage.

Kaplan's framework, as presented thus far, may look like a mere extension of the early index theory. In addition to the world and the time of evaluation, we have a new pair of world and time coordinates, needed to formulate the semantic clauses for the modal and temporal indexicals, as well as another pair of coordinates: an agent coordinate, needed for the interpretation of the indexical *I*, and a place coordinate, needed for the interpretation of *here*. There is also a terminological twist of grouping those four coordinates under a "context" parameter, and calling the other two coordinates "the circumstances of evaluation." In fact, it may be argued, and it has been argued (e.g., Stojanovic 2008; Santorio 2019), that a relatively simple framework of this sort is all that we need in order to provide an accurate semantics for the indexical fragment of English (or any relevantly similar language). This, however, was not Kaplan's view. Kaplan believed that there were fundamental differences between contexts and circumstances of evaluation, differences that were echoed by a distinction between two levels of meaning: what he called **character** and **content**.⁴ In Kaplan's view, contexts have the following distinctive properties:

- (i) Contexts are **content-determining**: the parameter of the context supplies the necessary elements that make it possible to determine the **content** that a token of a sentence expresses on a specific occasion, or **what is said**. For example, for the sentence *I live here* to be endowed with a content,

the indexicals *I* and *here* must be assigned specific contextual values. In a context, say, where Kamal is speaking in Bamako, the content of an utterance of this sentence will be *that Kamal lives in Bamako*.

- (ii) Contexts are **truth-determining**: the parameter of the context supplies the necessary elements that make it possible to evaluate the content expressed by a sentence for its truth value. While the temporal proposition *that Kamal lives in Bamako* may be true at some times and in some worlds and false at other times or worlds, any given token of a sentence that expresses this content will have a determinate truth value: it will be true if and only if Kamal lives in Bamako **at the time and in the world of the context in which the sentence is tokened**.
- (iii) Contexts are **proper**: they are not just arbitrary sequences of agent, place, time, and world coordinates, but are intended to represent concrete situations in which a linguistic or mental token of a sentence is taking place. Only when the agent is at the given place, at the given time, and in the given world may the corresponding quadruple qualify as a “context.”
- (iv) Contexts are **unshiftable**: there are no operators that shift the context in the way in which modal and temporal operators shift the coordinates of the circumstances of evaluation.

Each of these properties has been subject to controversy and deserves discussion. Section 3 is devoted to the notion of content and to the idea that indexicals contribute contextually specified values to the content expressed. Section 4 is devoted to the **logic** of indexicals, in relation to which properties (ii) and (iii), that is, truth determination and propriety, were originally introduced. The question of whether there are natural language operators that can shift the context, called “monsters,” will be tackled in section 5. But before that, let us take a closer look at contexts and circumstances.

2.4 Some choice-points regarding contexts and circumstances: Kaplan versus Lewis

As we have seen, Kaplan takes circumstances of evaluation to consist of two coordinates – a time and a world – and contexts to consist of four coordinates – an agent, a place, a time, and a world. Kaplan’s choice is driven partly by the assumption that contexts have the distinctive properties given in the previous section, partly by considerations of language engineering (Kaplan 1989, 504). In this section, we will look at some of these choice-points, and briefly compare Kaplan’s approach to that of his contemporary David Lewis.

2.4.1 First choice-point: deciding on the coordinates of the context parameter

The reasons for introducing a coordinate for an agent appear to be straightforward (in fact, so straightforward that Kaplan himself never bothers to spell them out): we need to be able to interpret the first person indexical *I*. First personhood is a core phenomenon not only in language, but also in thought. The pronoun *I* is even considered to be an **essential** indexical (Perry 1979). In modern parlance, sequences

that consist of an agent, a time, and a world are called **centered worlds** (Lewis 1979) and have found further applications in philosophy of language and mind and in epistemology (see Torre 2016 for an overview).

Kaplan also posits a place coordinate, which provides the interpretation of the indexical *here*. On the other hand, he does not posit any coordinate for the hearer. Yet that would seem a natural move: if we had such a coordinate y_c , we could give the following semantic clause for the second person indexical *you*:

$$\llbracket \text{you} \rrbracket (w, t, c) = y_c$$

Natural as it may be, the move of introducing a hearer coordinate does not seem to be required, given that the semantic value for *you* may be determined on the basis of the remaining contextual coordinates. Namely, the semantic value of *you* is whoever the agent of the context is addressing at the time and in the world of the context. But while this move dispenses with the need for a separate hearer coordinate, it dispenses equally well with the need for a separate place coordinate: the semantic value for *here* is, similarly, wherever the agent is located at the time and in the world of the context.⁵ Whether or not coordinates such as the place and the hearer are posited as separate coordinates or are derived from the existing contextual coordinates seems to be largely a matter of choice.

More interestingly, one can give up altogether representing contexts as sequences of coordinates. David Lewis, among others, does so, in Lewis (1980), where he opts for a view on which the parameter of context is a semantic primitive. Prior to 1980, Lewis was one of the main proponents of the index theory (Lewis 1970), but he revised it substantially in response to the problems raised by Kaplan and others (Lewis 1980). Lewis, like Kaplan, believed that there were fundamental differences between contexts and circumstances – or in his own terminology, **indices**. He wrote:

Since we are unlikely to think of all the features of context on which truth sometimes depends, and hence unlikely to construct adequately rich indices, we cannot get by without context-dependence as well as index-dependence. Since indices but not contexts can be shifted one feature at a time, we cannot get by without index-dependence as well as context-dependence. (1980, 79)

In relation to the distinctive properties of contexts listed in section 2.3, Lewis would agree with Kaplan on all except the idea that contexts are content-determining; as we shall see in section 3, Lewis was one of the first to reject the Kaplanian notion of content. While there is, then, a considerable agreement between them, Lewis, unlike Kaplan, does not try to break down the context parameter into a sequence of coordinates, of which he suspects that there could be countless many; instead, he treats it as a primitive parameter.

2.4.2 *Second choice-point: deciding on the coordinates of the circumstances of evaluation*

Kaplan writes:

By [possible circumstances of evaluation] I mean both actual and counterfactual situations with respect to which it is appropriate to ask for the extensions of

a given well-formed expression. A circumstance will usually include a possible state or history of the world, a time, and perhaps other features as well. (1989, 502)

Kaplan's idea is that a circumstance of evaluation is something of which we could ask: what does that need to be like for the proposition expressed to be true? For many authors working nowadays in formal semantics, a circumstance of evaluation is, simply, a possible world. What is more, Kaplan himself, in his informal writings, tends to talk of circumstances as if they were worlds, rather than worlds-**at-a-time**.⁶ In his formal framework, however, Kaplan represents circumstances as world–time pairs. Applying Kaplan's intuitive criterion, take an utterance of *I live here* by Kamal in Bamako on July 27, 2017. After all, we could ask whether that is still the case, or whether that will be the case two years from now. The demonstrative pronoun *that* refers to the temporally neutral content *that Kamal lives in Bamako*, rather than the proposition that he lives there on July 27, 2017.

While Kaplan's choice of the coordinates of the circumstances of evaluation was driven by such an intuitive criterion, David Lewis sought one that would be empirically more robust, and came up with what has come to be called the **shiftability** (or **shiftiness**) criterion. Roughly, the idea is that whenever we can isolate a natural language expression that syntactically behaves as a sentential operator, and that semantically tells us how to determine the truth value of the main sentence based on the truth value(s) of the embedded sentence with respect to a set of values appropriately related to the value of a certain coordinate, then we should include this coordinate among the coordinates of the circumstances of evaluation. The expression *it has once been the case that* looks like such an operator: it takes a sentence to form another sentence, and it tells us that the main sentence is true at some time *t* if and only if there is some time before *t* at which the embedded sentence was true. Lewis proposed that the coordinates of circumstances (or indices) include a world and a time (as in Kaplan's framework), as well as a place (shifted by expressions such as *somewhere* [*it is the case that*]) and a standard of precision (shifted by expressions such as *strictly speaking* [*it is the case that*]). While Lewis' criterion remains a rule of thumb, Zimmermann (2012, 2400) proposed a more precise formulation of what it takes for an operator to "shift" the relevant coordinate.

It is worth noting that adding novel coordinates to the circumstances of evaluation has been taken up again in recent semantic literature, although for reasons not related to Lewis' shiftability criterion. In particular, Lasersohn (2005) and Stephenson (2007) use frameworks that posit a so-called **judge** parameter, along with the possible world parameter. Their idea is that a sentence containing a predicate of personal taste, such as *Licorice is tasty*, expresses a content whose truth value depends on **who** is judging its truth. Thus if Kamal likes licorice, then the content *that licorice is tasty* will be true when evaluated at him, but false when evaluated at Yumi who doesn't like licorice. For overview, see "Evaluative Predicates: Beyond *Fun* and *Tasty*."

3 Contents: what they are, and what they are for

This section sets out to explain Kaplan's distinction between characters and contents, two theoretically important notions that are defined within Kaplan's semantic framework. The basic idea behind the character/content distinction is that languages that contain indexicals display two levels of meaning. The first level, **character**, corresponds to the stable, context-invariant meaning that an expression possesses in virtue of its lexical meaning (or, if complex, the lexical meaning of its components). For example, the character of the pronoun *you* indicates that the semantic value of a given occurrence of *you* is the hearer, while the character of the sentence *you are late* indicates that the sentence, as uttered in a given context, is true if and only if the hearer is late. The second level, **content**, corresponds to the meaning that a given expression, as used in some specific context, acquires in that context. If Yumi tells Kamal *You are late*, then the content of *you*, in that context, is Kamal himself, and the content of the sentence is that Kamal is late.

This section has two parts. The first explains the notions of characters and contents, and discusses the motivations for distinguishing them; the second assesses those motivations critically.

3.1 Characters map contexts to contents, contents map circumstances to extensions

More than a century ago, Frege observed:

The sentence "I am cold" expresses a different thought in the mouth of one person from what it expresses in the mouth of another. ... It is not necessary that the person who feels cold should himself give utterance to the thought that he feels cold. Another person can do this by using a name to designate the one who feels cold. (1917, 236)

Frege's observation is central to Kaplan's enterprise: the notion of content is meant to capture Frege's notion of thought, of what we express and communicate.

Recall that in a Kaplanian framework, sentences are evaluated for their truth value at two parameters: contexts and circumstances of evaluation. With the help of these, we can capture the notions of character and content as follows. Let *E* be an expression; then:

- (i) The *character* of *E* is that function which for any context *c* returns *E*'s content (in *c*).
- (ii) The *content* of *E* is that function which for any circumstance (*w,t*) returns the extension of *E* relative to (*w,t*).

If *E* is a context-sensitive expression, then its content will vary from one context to another. Note that expressions of any syntactic type can be associated with a character and a content. The content of a singular term, such as a pronoun or a proper name, is a function that maps circumstances to individuals; of a one-place predicate, to sets of individuals; and of a sentence, to truth values.

The notion of content accounts for the intuitive notion of truth conditions. It tells us what the world needs to be like for a sentence, interpreted in the context of its utterance, to come out true. The notion of content thus allows us to account for what the sentence *I live here*, as uttered by Kamal in Bamako, has in common with the sentence *He lives there*, as uttered by me in Paris while talking about Kamal and the city of Bamako. Both utterances are true in the same conditions, namely, at those worlds and times at which Kamal lives in Bamako. On the other hand, the notion of content obliterates what different utterances of one and the same indexical sentence have in common. We still need to capture the idea that the sentence *I live here* has a certain stable meaning, regardless of whether Kamal utters it in Bamako, or Yumi in Tehran, or Armstrong after landing on the moon. It means, roughly, that the speaker lives at the place where they are at the moment of speaking. This is what the notion of character is meant to capture.⁷

To illustrate the way in which contents are used in an account of assertion and of “what is said,” consider the following sentences:

- (5) [Kamal, in Bamako, on July 27, 2017]: I am here today.
- (6) [Yumi, in Dakar, on December 31, 2017]: Je suis ici aujourd’hui.
- (7) [Zvetlana, talking to Kamal, on July 28, 2017]: You were in Bamako yesterday.

Pairwise, these sentences have various things in common. For one, (5) and (6) are synonymous sentences. True enough, (5) is in English and (6) is in French, but the sentences in (5) and (6) have the same stable meaning: they both mean that the speaker is at the place of utterance on the day of utterance. For another, (5) and (7) may be said to mean the same thing, but in a very different sense: they both serve to assert that Kamal was in Bamako on July 27, 2017. It takes little to realize that the sense in which these sentences “have the same meaning” pairwise had better not be conflated. From the observation that (5) and (6) have the same meaning, that (5) and (7) have the same meaning, and that sameness of meaning is transitive, we would be able to conclude that (6) and (7) also have the same meaning. And yet, (6) and (7) do not seem to have anything interesting in common.

Kaplan’s proposal accounts for these intuitions elegantly. His idea is that there are two different notions of meaning. What (5) and (6) have in common is their character: if the context is the same (except for the language spoken), then the two sentences will coincide on what they express. To determine the content expressed, we “resolve” the expressions whose semantic clauses require contextual parameters for their interpretation. By resolving the first person pronoun in (5) to Kamal, the indexical *here* to Bamako and the indexical *today* to July 27, 2017, (5) has the content that maps any circumstance to truth if and only if, in that circumstance, Kamal is in Bamako on July 27, 2017. Analogously, (6) has the content that Yumi is in Dakar on December 31, 2017; and (7) has the content that Kamal is in Bamako on July 27, 2017 – the same content as (5). The two-level picture of meaning thus accounts for the idea that we can express the same content by means of sentences that are not synonymous and that, conversely, synonymous

sentences used in different contexts may express different contents, the way (5) and (6) do.

3.2 Challenging the primacy and the usefulness of contents

Among contemporary semanticists, there is a certain tendency to think that the primary goal of Kaplan's work on indexicals was to devise a semantic framework for indexicals along the lines of his *Logic of Demonstratives*, and that his theory of content only came as a secondary goal; that is, that once the semantic framework was in place, he saw that he could suitably define a notion of content and then give it some useful applications. This tendency turns out to be misleading. For Kaplan, the notion of content was central, just as the notion of thought was for Frege. Kaplan saw contents as the objects of attitudes and speech acts, crucial to explaining further phenomena in cognition, communication, and logic. Providing a formal framework was not the main goal but merely served as a road to a clearer and more articulate theory of content. It is worth stressing that many among Kaplan's followers still endorse this "primacy of contents."⁸

Be that as it may, there are also reasons to simply want to retain the formal framework, without taking on board Kaplan's theory of content. There are two sets of reasons:

- (i) **Contents are not needed in semantics.** Whatever the merits of contents in their application to the theory of assertion and communication or elsewhere, they are a notion that, true enough, can be defined with the help of the semantic framework, but is not itself part and parcel of that framework.
- (ii) **Contents fail to deliver the applications that Kaplan sought.** Contents, as Kaplan defines them, fall short of satisfying the desiderata that were supposed to make them useful tools for a theory of assertion and communication.

Considerations of space do not allow us to go deeper into these reasons here. Briefly, both sets of reasons may be traced back to Lewis (1980), although he was happy enough to merely question Kaplan's appeal to contents (and replicate his worry for Robert Stalnaker's approach), without raising deeper issues about their putative semantic role. More recently, however, several authors have argued that contents not only aren't needed in semantics, but become a troublesome element if one turns them into a building block of a semantic theory. One line of argument targets the idea that contents have a role to play in compositional semantics (see Ninan 2010; Rabern 2012; Yalcin 2014). In particular, it has been argued that identifying semantic value, *qua* that which enters the compositional, recursive computation of truth conditions, with assertoric content, *qua* that which is believed and asserted, leads to highly undesirable consequences. Another line of argument targets the idea that contents constitute a theoretical notion by means of which we can draw a line between recursive, truth-conditional semantics that mirrors syntactic composition, and pragmatics that involves syntactically unconstrained, higher-level inferential processes (see Stojanovic 2009; 2014).

Lewis (1980) was also critical of the idea that contents correspond to "what is said." He wrote:

Unless we give it some special technical meaning, the locution “what is said” is very far from univocal. It can mean the propositional content, in Stalnaker’s sense (horizontal or diagonal). It can mean the exact words. I suspect that it can mean almost anything in between. (1980, 97)

Lewis’ worry was that the intuitive notion of “what is said” was far too versatile to be captured by means of a formally robust notion such as that of content. In raising his worry, Lewis pointed to a series of cases in which speakers are perceived and reported as “saying the same thing” even though the contents that the semantic theory assigns to their utterances were different. A similar objection to the notion of **the proposition expressed** in Kripke (1972) is raised in Dummett (1981, 565–566). Before Lewis and Dummett, Ziff (1972) had already hinted at the instability of our intuitions regarding “what is said.” While these and other authors advocate a kind of “anything-goes” approach to what is said, in Stojanovic (2012a; 2016), I argue that the notion is not as unconstrained and unstable as those authors think. On the contrary, there are robust and systematic patterns of perceiving and correctly reporting same-saying. The bad news for Kaplan, however, is that those patterns do not square very well with his identification of what is said with content.

4 The logic of indexicals

In this section, we turn to the interface between semantics and logic, as it arises in languages containing indexicals. As previously noted, the context dependence characteristic of indexicals is peculiar in that the way in which the semantic value of an indexical depends on the context is recorded in the indexical’s stable meaning (or character). The meaning of the word *now* tells us that the time referred to by a given occurrence of *now* is the time at which this occurrence occurs. Similarly, *today* means that the day that it picks out is the day of the context. Indexicality is, then, that sort of context dependence which is constitutive of the expression’s stable, context-invariant meaning. Now, if we think of **logical truth** as truth **in virtue of meaning**, as has long been a tradition in philosophical logic, then we may wonder whether there are any logical truths that involve indexicals and that are not already obtainable from standard logic.

David Kaplan famously held that there is indeed an interesting, nonstandard logic of indexicals.⁹ His interest in logic was one of his driving motivations. It shaped his theory in important ways, and, in particular, led to the view that contexts have two of the distinctive properties introduced in section 2.3, namely, that they are truth-determining and proper. This section explains how Kaplan was led to this view, and assesses it critically.

4.1 *I am here now* and other indexical logical truths

The sentence *I am here now* is one of the most famous but at the same time most controversial examples of what Kaplan thought was a logical truth. The sentence raises something of a puzzle. As Richmond Thomason puts it: “in virtue of its form [*I am here now*] must be true on any occasion on which [it is] asserted, and yet the

proposition it expresses on each occasion [is] contingent" (1976, 121). Kaplan makes a similar point. Consider:

(8) [Kaplan, on April 23, 1973 in Los Angeles]: I am here now.

Kaplan remarks that (8) is "deeply, and somehow universally true" (unlike the sentence *Kaplan is in Los Angeles on April 23, 1973*), because we "need only understand [its] meaning to know that it cannot be uttered falsely" (1989, 509).

There are many other sentences involving indexicals that are relevantly similar to (8), in that, to echo Kaplan's words, one only needs to understand their meaning to know that they cannot be uttered falsely. Consider the following sentence:

(9) If it is actually raining now in Mumbai, then it is raining in Mumbai.

To the extent that we have any pre-theoretic intuitions as to which natural language sentences are **logically** true, or valid, (9) is an excellent candidate. More generally, **any** sentence of the form *if actually now P, then P* seems to qualify for the status of a logical truth.

Both (8) and (9) are puzzling: although they cannot be uttered falsely, they express **contingent** truths. As for (8), it was a contingent fact that David Kaplan was in Los Angeles on that day. As for (9), it is logically equivalent to the proposition that at a given time, it is raining in Mumbai; again, a deeply contingent fact. To Kaplan, this was evidence that there can be **contingent** logical truths. Let us see, however, how (8) and (9) came to be seen as logical truths in the first place.

Recall from section 2 that sentences are evaluated at a series of coordinates: a quadruple of agent–place–time–world coordinates (which form the context parameter) and a pair of time–world coordinates (which form the circumstances of evaluation); hence, a series of six coordinates (a_c, p_c, w_c, t_c, w, t).

A natural thought would be to consider as logically true those and only those sentences that come out true **at every possible sequence of coordinates** at which we may evaluate them.¹⁰ However, this would fail to predict that either (8) or (9) comes out as a logical truth. Consider sequence s as follows: (Kamal, Vienna, w_1 , July 27, 2017, w_2 , December 31, 2017). Suppose that on July 27, 2017, Kamal is in Mumbai. Evaluated with respect to s , (8) comes out false. Suppose furthermore that in w_1 it is raining in Mumbai on July 27, 2017, and that in w_2 , it is not raining in Mumbai on December 31, 2017. Then again, evaluated at s , the antecedent of the conditional in (9) comes out true and the consequent false; hence (9) as a whole comes out false at s .

These problems can be fixed in three steps; the first two are required to derive the validity of (9), the third is further required to derive the validity of (8). They are discussed in the next section.

4.2 Logical truth as truth at every context

Given that semantics assigns truth values to sentences with respect to a number of parameters (worlds, times, various context coordinates), the notion of truth that is being used for the purposes of recursive semantics is, then, a **many-place** notion

of truth. It is not that sentences are true (or false) *simpliciter*, but rather, a sentence is true with respect to w , t , a_c , and so on.

A logic of indexicals in which sentences such as (8) or (9) are to come out as logical truths will require reducing the number of argument places in the truth predicate. By grouping the world and the time of evaluation coordinates under a single parameter of circumstances of evaluation, and the remaining four coordinates under a single context parameter, we have a three-place truth predicate:

Definition 1: truth at a context and a circumstance

Sentence φ is true at context c and circumstance (w,t) if and only if $\llbracket\varphi\rrbracket(w,t,c) = T$.

The first step toward the logic of indexicals is to suppress one more argument place in the truth predicate, turning it into a two-place predicate. Let c stand for the quadruple (a_c, l_c, w_c, t_c) . Then:

Definition 2: truth at a context

Sentence φ is true at context c if and only if $\llbracket\varphi\rrbracket(w_c, t_c, c) = T$.

What Definition 2 does is take the world and the time of the context and select them as **the** world and time at which a sentence, as used in a context, ought to be evaluated for its truth value. In other words, truth-at-a-context is truth-at-a-context-*at-the-circumstances-of-the-context*. This conversion is sometimes referred to as **diagonalization**.¹¹

The notion of truth-at-a-context is idle in the compositional semantics itself: it only comes at a “post-semantic” stage, to use a term from MacFarlane (2014). There are substantive philosophical questions that arise when we ask ourselves how the notion, or notions, of truth that are used in semantics relate to the very notion of truth that has occupied philosophers for centuries. As Kölbel notes: “semantic theories for natural languages define a three-place truth-predicate applicable to sentences, and ... some extra-semantic principles are needed in order to relate this semantic truth-predicate to truth in any pre-theoretic sense” (2008, 5). Which motivations lead to which principles is a highly debated question; see Stojanovic (2012b, 629–633) for discussion.

For Kaplan, what justifies Definition 2 is that it leads to what he takes to be the correct notion of **logical** truth. Kaplan’s second step toward the logic of indexicals is this:

Definition 3: logical truth and logical consequence

Sentence φ is logically true (or valid) if and only if φ is true at every context.

Sentence φ is a logical consequence of sentences $\varphi_1, \dots, \varphi_n$ if and only if every context at which $\varphi_1, \dots, \varphi_n$ are true is also such that φ is true at that context.

Let us now see how Definition 3 predicts the validity of sentences of the form *If actually now φ , then φ* . Arguing by reductio, suppose that there is some context c such that *If actually now φ , then φ* is false in c ; that is, $\llbracket\text{if actually now } \varphi, \text{ then } \varphi\rrbracket(w_c, t_c, c) = F$. Given the semantic clause for *if ... then*, this gives us $\llbracket\text{actually now } \varphi\rrbracket(w_c, t_c, c) = T$ and $\llbracket\varphi\rrbracket(w_c, t_c, c) = F$. But given the clauses for *actually* and *now*, $\llbracket\text{actually now } \varphi\rrbracket(w_c, t_c, c) = T$ entails $\llbracket\varphi\rrbracket(w_c, t_c, c) = T$. Since supposing that

there is a context for which (9) is false leads to contradiction, (9) must be true at every context.

The definition of truth-at-a-context and the definition of logical truth as truth-at-every-context give us the logical truth of (9) – but not yet of (8). For consider again, as in section 4.1, the quadruple (Kamal, Vienna, w_1 , July 27, 2017), and suppose that on July 27, 2017, Kamal is in Mumbai. Interpreted with respect to that quadruple, *I am here now* comes out false, not true.

The last, third step toward securing logical validity for (8) is to say that not just any old quadruple is a context. The way in which this gets cashed out in Kaplan's logic is through a constraint on admissible contexts. Let S be a structure of interpretation, and I^S the associated interpretation function; that is, the function that maps the nonlogical vocabulary to suitable elements of S . Let C^S stand for the set of all contexts in S ; then:

Definition 4: propriety of contexts

$(a,l,w,t) \in C^S$ only if $(a,l) \in I^S(\text{"IS_LOCATED_AT"})(w,t)$

Definition 4 yields the result that a structure of interpretation may admit among its contexts only those quadruples in which the agent is located at the place of the context at the time and in the world of the context. With this constraint in place, the validity of (8) can be easily derived.

4.3 Methodological principles and answering machines

Let us take stock. Kaplan wants the sentence *I am here now* to come out as a logical truth in a logic of indexicals. He wants the same for *It is actually raining in Mumbai now only if it is raining in Mumbai*. More generally, he wants any sentence to be logically equivalent to the same sentence prefixed by the indexical operators *actually* or *now*. Kaplan's motivations rely on the intuitive observation that such sentences seem "deeply, and somehow universally true" and that we "need only understand their meaning to know that they cannot be uttered falsely." However, to obtain these logical truths and logical equivalence, Kaplan also needs to posit several substantive theoretical principles. One such principle is that **contexts are truth-determining**; that is to say, that it is always the context in which the sentence is used that determines the values of the coordinates of the circumstances at which the sentence is to be evaluated for its truth value. This principle may be questioned on both methodological and empirical grounds. On the methodological side, it has been argued (e.g., Predelli and Stojanovic 2008; Stojanovic 2011) that Kaplan does not provide any solid motivation for postulating such a principle; rather, he relies on others sharing his intuition that "if you try out the notion of truth on a few examples, you will see that it is correct" (Kaplan 1989, 523). On the empirical side, the principle has been put in question by a growing body of phenomena discussed in the literature on relativist semantics, concerning topics such as predicates of personal taste, epistemic modals, normative language, and other areas of discourse in which it does not seem correct to postulate that the context in which a given sentence was used must also be the one relative to which it is to be evaluated for truth (see MacFarlane 2014).

What is more, in order for *I am here now* to come out as a logical truth, Kaplan needs to posit yet another principle, namely that **contexts are proper**, that is to say, that only those quadruples in which the speaker is located at a given place at a given time and in a given world may represent contexts. This principle, too, has been challenged on both theoretical and empirical grounds. Recall that logical truth was supposed to be **truth in virtue of meaning**. However, for (8) to come out true, its meaning alone, even granting that the relevant truth is truth-at-a-context, will not suffice. What is further needed is the constraint in Definition 4. That constraint, however, relies on a largely empirical question. For to know which quadruples count as admissible contexts, we need to look at how a given structure of interpretation interprets the nonlogical predicate `IS_LOCATED_AT`. If one is required to settle this kind of empirical issue before being able to interpret a given sentence, then that sentence can hardly be a convincing candidate for **logical** truth (see Stojanovic 2011).

On empirical grounds, it has been pointed out that, *pace* Kaplan, there can be false utterances of the sentence *I am here now* and, conversely, true utterances of its negation, *I am not here now*. Imagine that Kamal wants to deceive his boss into thinking that he is at work, while he is actually away. Using a remote speech device, Kamal produces an utterance of *I am here now* in his office, addressing it to his boss, leading him to believe that he is in his office. Intuitively, Kamal lied, and Kamal's utterance is false. One way of accounting for this intuition is to say that Kamal is the speaker of the utterance (hence the referent of *I*), but that the place of the utterance is not where Kamal actually is, but rather, Kamal's office. There are many other examples of such "improper" contexts. Recording a message that says *I am not here now* on one's answering machine is an often-discussed case; so often, in fact, that it has come to be known as "the answering machine paradox" (see, e.g., Sidelle 1991; Briciu 2018). Although there have been attempts to explain away such cases, the ever more pervasive sophistication of communication means casts doubt on the idea that propriety is a constitutive property of contexts.¹²

5 Alternative accounts

This chapter has been focusing on David Kaplan's account because of its prominent place in the semantics not only of indexicals but of context dependence more generally. Nevertheless, many other accounts have been proposed ever since. Some of them, such as Lewis (1980), largely agree with the main tenets of Kaplan's view, while others depart from it more significantly. The aim of this section is to briefly gesture toward several alternative accounts, grouped in three families. "Token-reflexive" accounts (section 5.1) hold that a crucial feature of indexicals is that they make reference to the **token** of production of an expression in a context. "Presuppositional" accounts (section 5.2) take indexicals to belong in a much broader class of presupposition triggers (albeit of a special kind). "Monster-friendly" accounts (section 5.3) reject Kaplan's contention that no operator can shift the context parameter.

5.1 Token-reflexive accounts

Token reflexivity, first introduced in Reichenbach (1947), is the idea that the interpretation of a token of an expression makes reference, reflexively, to that token itself. One way of implementing this idea is to say that a token u of the sentence *I live here* is true if and only if the speaker of u lives at the place at which u is produced. This kind of approach is at odds with Kaplan's view, which makes no room for reference to tokens or utterances. In this section, we will only look at two influential views that endorse some form of token reflexivity: Robert Stalnaker's (section 5.1.1) and John Perry's (section 5.1.2). For reasons of space, we will leave aside the closely related **occurrence-dependent** views (von Stechow 1979; Kupffer 2001; on the distinction between token reflexivity and occurrence dependence, see Kupffer 2014).

5.1.1 Stalnaker's two-dimensional account

Robert Stalnaker's view is often assimilated to Kaplan's view. While there are similarities, there are important differences, too. Stalnaker is famous for having proposed a theory that uses two-dimensional matrices (Stalnaker 1978; 1999; 2004), which are tantamount to propositional functions. They map the parameter values along the one dimension to propositions, which, in turn, map the parameter values along the other dimension to truth values. For Stalnaker, the parameters on each dimension are possible worlds. His overall picture thus resembles Kaplan's, if one thinks of the worlds along the one dimension as contexts and the worlds along the other dimension as circumstances of evaluation. Propositional matrices thus mirror Kaplanian *characters*. For illustration, consider the following sentence:

(10) I am an actress.

Consider four possible worlds, α , β , γ , and δ , that are as follows. In α and β , the utterance in (10) is produced by Greta Gerwig, while in γ and δ , the very same utterance is produced by Angelika Kratzer. In α and γ , Greta Gerwig is indeed an actress, while in β and δ , she is something else (say, an architect). In all four worlds, Angelika Kratzer is a semanticist. The propositional matrix that we get for (10), with respect to those four worlds, is shown in Table 1.

Note that the matrix in Table 1 does not yet correspond to a full-fledged Kaplanian character. That is because the matrix is construed over a limited set of words. So, for example, the proposition that (10) expresses with respect to worlds γ and δ

Table 1 The propositional matrix for (10) in the context restricted to $\{\alpha, \beta, \gamma, \delta\}$.

	α	β	γ	δ
α	T	F	T	F
β	T	F	T	F
γ	F	F	F	F
δ	F	F	F	F

is, according to this matrix, a **necessarily false** proposition: throughout the entire row it gets False. But of course, one would not want to say that it is a necessary truth that Angelika Kratzer is not an actress, as she might have well chosen that career instead of semantics. To get to a full-fledged character, one would need to construe the propositional matrix over the entire set of **all** the possible worlds.

Stalnakerian propositional concepts are typically construed upon a **restricted** set of possible worlds, namely, those that constitute what he calls the **context set**. All the worlds in the context set satisfy the propositions whose truth is taken for granted by the speaker and the hearer, and are such that both the speaker and the hearer assume that the other is taking their truth for granted, and so on. In other words, the context set consists of those worlds that correspond to the common ground that speaker and the hearer share within a conversation.¹³

An utterance is conversationally successful if it leads to the elimination of epistemic alternatives that constituted live options up to then. Suppose that you meet Greta Gerwig, whom you've never seen before, and that she utters (10). Here, your epistemic set (that is, the set of possible worlds that, for all you know, might turn out to be the actual world) includes only the worlds in which (10) is *de facto* uttered by Greta Gerwig, but in some of those worlds she is an actress, in others she is an architect, in others, a truck driver, and so on. Simplifying considerably, let us narrow your epistemic set to the worlds α and β introduced above. The propositional matrix that (10) generates over this pair of worlds is simply that in Table 2.

The upshot of Greta's utterance of (10) is, then, to enable you to narrow down the set of your epistemic alternatives, which you do by eliminating all those worlds in which the proposition expressed is false (so here, you would simply drop out β , in which she is an architect).

Inspired by Grice, Stalnaker (1978) further proposes three principles that govern conversation:

- (i) A proposition asserted is always true in some but not all of the possible worlds in the context set.
- (ii) Any assertive utterance should express a proposition, relative to each possible world in the context set, and that proposition should have a truth value in each possible world in the context set.
- (iii) The same proposition is expressed relative to each possible world in the context set.

Principle 1 says that the asserted proposition should be neither trivially true nor trivially false, combining the ideas from Grice's maxims of quantity and quality. Principle 2 commands us not to use empty terms, such as a name without a bearer

Table 2 The propositional matrix for (10) in the context restricted to $\{\alpha, \beta\}$.

	α	β
α	T	F
β	T	F

Table 3 The matrix that corresponds to the diagonalization on Table 1.

	α	β	γ	δ
α	T	F	F	F
β	T	F	F	F
γ	T	F	F	F
δ	T	F	F	F

or a demonstrative without a demonstratum, and not to presuppose things that aren't the case. Principle 3 tells us to avoid ambiguity.

When a principle is violated, there are two main repair strategies. One is to conclude that the context set is different from what one thought it was. The other is to conclude that "what is said," or the asserted proposition, is different from what one thought it was. Stalnaker suggests that the second strategy is best achieved by projecting the **diagonal** proposition over the matrix, so that it is actually the diagonal proposition that gets expressed relative to every world along the first (vertical) dimension. Let us see how this works. Suppose that you are at a small party, attended by two women; you know that Angelika Kratzer, a famous semanticist, is there, though you don't know what she looks like, nor do you know anything about Greta Gerwig. In other words, your epistemic set is pretty much like the set $\{\alpha, \beta, \gamma, \delta\}$ from Table 1. Looking back at the matrix in Table 1, we see that it does not conform to the above conversational principles: it is not the case that the same proposition is expressed in the four worlds (*contra* Principle 3) and the proposition expressed in γ and δ is always false (*contra* Principle 1). Following Stalnaker's strategy, we may take (10) to express the diagonal proposition, so that the propositional matrix over your epistemic set becomes as shown in Table 3.

An interesting outcome of the diagonalization strategy is that in the context at stake, one learns from (10) that its speaker is not Angelika Kratzer, and one learns it **directly from the proposition expressed by (10)**. This contrasts with Kaplan's view, in which the proposition expressed by (10) is, simply, that Greta Gerwig is an actress, so that it is only through a metalinguistic reasoning that one can infer that the speaker can't be Angelika Kratzer.

To conclude this short presentation, let us observe that for Stalnaker, indexicality gets subsumed under a much more general phenomenon of context dependence. The latter, in turn, crucially depends on a double function that possible worlds have: they determine which proposition an utterance expresses and whether the proposition is true. Pragmatic factors driven by conversational goals and the resulting diagonalization strategy are a key component of Stalnaker's picture.

5.1.2 Perry's reflexive-referential account

John Perry's view is also often assimilated to Kaplan's view. One reason for this is that at about the same time when Kaplan wrote "On Demonstratives" and published "On the Logic of Demonstratives" (1979), Perry published two articles, "Frege on Demonstratives" (1977) and "The Problem of the Essential Indexical" (1979), advocating a distinction between the **content** of propositional

attitudes (such as beliefs or desires) and what he called their **role** (or the **state** of the holder of the attitude). Perry's focus was on indexicality at the level of **thought** rather than language. He noted that having a thought about oneself as **oneself** is importantly different from having a thought that simply happens to be about oneself. A famous example from Perry (1979) involves a shopper in a supermarket who is following a trail of sugar, trying to catch up with the person who is making the mess to warn them about a torn bag in their cart. At some point, the shopper realizes that **he** is the one making the mess, and acts accordingly. Perry's proposal, in a nutshell, was that both when the shopper believed *That guy is making a mess* and when he later believed *I am making the mess*, the **content** of the two beliefs was the same, namely, the proposition that he, the shopper, is making a mess. What was different was the **role**, or the **belief state**: only the latter involved a first-personal way of thinking, a mental correlate of the first person pronoun *I*. Using Kaplan's vocabulary, one could say that the shopper believed the proposition that he was making a mess **under different characters**. And although the relationship between Perry's roles and Kaplan's characters is not as straightforward as one might have thought, there is at least a superficial similarity between the two views.

Perry's views have evolved considerably over time, and since the late 1990s, he has been developing the **reflexive-referential** theory (Perry 2001), which concerns language as much as thought. One of Perry's main insights is that it is misleading to talk of **the** proposition expressed or **the** truth-conditional content of an utterance. Rather, there are a wide array of propositions that may be associated with any given utterance, all of which provide, in one way or another, a necessary and sufficient condition for the utterance to be true. To see how this works, let's take up our initial example (1), repeated below as (11):

(11) I live here now.

Suppose that Kamal utters (1) on July 27, 2017, in Bamako. Recall that on Kaplan's view, the semantic or truth-conditional content of (11) is the proposition that Kamal lives in Bamako on July 27, 2017. In Perry's view, this proposition is only one among the many contents associated with the utterance. Another content – one of its “reflexive” contents – captures the truth conditions that any competent speaker is able to associate with (11) independently of any further knowledge about the context of utterance. In virtue of what the words uttered mean in English, (11) is true if and only if the person who utters (11) lives in the place where (11) is uttered at the time at which (11) is uttered. Here, “(11)” refers to a specific **token** of the sentence in (11), which makes Perry's account a token-reflexive account par excellence.

So far, we have seen how Perry's account can recover levels akin to both character and content. But Perry notes that “the binary distinction ... is too simple” and adds:

An utterance has as wide a variety of contents as we may find useful to isolate, for particular purposes of description and explanation. We can say that in at least the vast majority of cases, the common sense concept of “what is said” corresponds to [the Kaplanian content]. This is a good reason for an account of content

to recognize this concept, but not a good reason to expect it to be the only or even the most theoretically fruitful kind of content. (1997, 17)

To illustrate Perry's point, suppose that you know that (11) is uttered in Bamako, but you don't know by whom or on which day. Then you know that (11) is true if and only if the person who utters (11) lives in Bamako at the time at which (11) is uttered. Or suppose that you know that the speaker of (11) is Kamal, but you don't know which place *here* in (11) is meant to pick up. Then you know that (11) is true if and only if Kamal lives at the place referred to by (11) at the time at which (11) is uttered. Or suppose that you know that (11) is uttered on July 27, 2017, but you don't know by whom or where. Then (11) is true if and only if on July 27, 2017, the person who utters (11) lives at the place where (11) is uttered. And so on.

In Perry's view, all these *reflexive* contents are ways of specifying the truth conditions of (11). They admit of an ordering, though, since the (more) referential contents are obtained from the (more) reflexive ones by incorporating information about different facts about the utterance, such as who is producing it, where, or what they are talking about.

5.2 Presuppositional accounts

The main gist of presuppositional accounts is to explain the semantic behavior of indexicals by relating them to a familiar mechanism: that of presupposition (see "Presuppositional Binding"). Indexicals and presupposition triggers behave in similar ways when it comes to embedding them under modal, doxastic, and other operators. Recall this example from section 2.2:

(12) In 2010, Yumi thought that she would be now living in Bamako.

As we saw, the indexical *now* scopes out of temporal operators: it refers to the time of the context rather than the time introduced by the expression *in 2010* or by the past tense. Similarly, consider an occurrence of the first person pronoun *I* in such an embedding. Suppose that Kamal utters the following:

(13) Yumi thinks that I am silly.

The truth value of (13) depends only on whether Yumi thinks that Kamal is silly, regardless of her beliefs as to whether Kamal has ever spoken such a sentence as the one in (13). The constraint that the referent of *I* in (13) must be the speaker scopes out of the doxastic operator *Yumi thinks that*. Presuppositions do the same. Consider:

(14) Yumi thinks that it was Wittgenstein who introduced Peter Geach to Elizabeth Anscombe.

The cleft construction *it was X who F-ed* triggers the presupposition that someone F-ed. That somebody introduced Geach to Anscombe scopes out of the doxastic operator. If Yumi has no belief whatsoever on who may have introduced Geach

to Anscombe, then (14) is false, but the presupposition that someone introduced them will still go through.

Another feature that presupposition triggers share with indexicals and demonstratives is that they can easily lead to truth-value failure. Consider a variant of (14):

- (15) Yumi thinks that it was Wittgenstein who introduced Mao Tse Tung to Elizabeth Anscombe.

Since no one ever introduced Mao to Anscombe, (15) cannot be true, and yet, we don't perceive it as **false** either. For if we did, then we could say that Yumi doesn't think that it was Wittgenstein who introduced them, which would again presuppose that someone did! Similarly, if an utterance contains an indexical such that the constraints that come with its lexical meaning fail to obtain, then the utterance will lack a truth value. Suppose that Kamal utters the following without talking to anyone (and without talking to himself either):

- (16) Yumi thinks that you are silly.

Intuitively, (16) lacks a truth value; it is deficient because the context fails to provide any suitable value that may be assigned as a semantic value for *you*.

Given the robust similarities in the projective behavior between indexicals and (other) presupposition triggers, it is only natural to look for an account of indexicality that makes the connection explicit. Several such presuppositional accounts have been proposed (Zeevat 1999; Hunter and Asher 2005; Stojanovic 2008; Maier 2009; 2014; Sudo 2012; Hunter 2013; 2014). All of these accounts recognize an important difference between indexicals and the more familiar presupposition triggers, such as clefts or manner verbs like *stop*. The presuppositional contents that the latter project are truth-evaluable; that is to say, they are propositions (e.g., in (14) and (15) that somebody introduced Geach or Mao to Anscombe). When the projected proposition is false, the utterance as a whole lacks a truth value. Indexicals, on the other hand, project a presuppositional content that imposes a constraint on the kind of value that the indexical may take as its referent. Roughly, the first person pronoun *I* presupposes that an individual may serve as a referent of the pronoun only if the individual is a speaker (in the relevant context). This leaves it open how a given referent of *I* actually gets to be picked out. There are different ways of implementing this idea. A straightforward one is to follow the way in which phi-features of pronouns, such as gender, person, and number, have been treated in mainstream semantic frameworks such as Heim and Kratzer (1998).¹⁴ They propose that phi-features have suitable lexical entries and give the following example for the feminine gender (1998, 244):

[[**feminine**]] = $\lambda x : x$ is female. x

For those unfamiliar with the lambda notation, what the proposed lexical entry amounts to is constraining the denotation of the pronoun *she* to be included in the denotation of *female*. Another way of implementing this idea is to think of pronouns

as typed free variables, where the type triggers the relevant presuppositional constraint. For instance:

$$\llbracket \varphi(x_{\text{she}}) \rrbracket (w, t, c, f) = \begin{cases} \text{T if } f(x_{\text{she}}) \in I^S(\text{"female"})(w_c, t_c) \text{ and } \llbracket \varphi(f(x_{\text{she}})) \rrbracket (w, t, c, f) = \text{T} \\ \text{F if } f(x_{\text{she}}) \in I^S(\text{"female"})(w_c, t_c) \text{ and } \llbracket \varphi(f(x_{\text{she}})) \rrbracket (w, t, c, f) = \text{F} \\ \text{undefined otherwise.} \end{cases}$$

In other words, pronouns will work like free variables and will get their referent from the function f that assigns values to the free variables (the same as the one required for the interpretation of quantifiers). At the same time, any assignment function that assigns a value that does not satisfy the associated constraint will lead to a truth-value failure.

However well-motivated, theoretically and intuitively, presuppositional accounts also face problems. Some of the problems may stem from the more general concerns that surround the notions of presupposition and projective content (see Tonhauser et al. 2013). We have already noted that indexicals, unlike most other triggers, project nonpropositional presuppositions. There is also some disparity in their patterns of projection. Most familiar presuppositions can, in suitable constructions, be accommodated locally. Thus the presupposition triggered by the cleft construction that we have seen in the case of (15) will not lead to a truth-value failure in (17), because it is accommodated within the antecedent:

- (17) If anyone ever introduced Mao Tse Tung to Elizabeth Anscombe, then it was Wittgenstein who did so.

The presuppositional constraints triggered by indexicals, on the other hand, do not seem to exhibit any such clear pattern of local accommodation. It would take us astray to go deeper into this problem here or discuss the different solutions that have been proposed. Suffice it to note that Maier (2009), for instance, whose presuppositional account is set within Discourse Representation Theory (DRT) (Kamp and Reyle 1993), avoids the problem by reinstating within that framework a distinction analogous to Kaplan's context/circumstance distinction. Other presuppositional accounts, such as Hunter (2013), who also uses DRT, or Stojanovic (2008), who uses a more traditional framework, aim to account for such projective disparities without resorting to such a distinction.

To close this excursion into presuppositional accounts, note that we have only looked at personal pronouns, such as *I* and *she*, which correspond to free variables (albeit variables with presupposed constraints on the assignable values). One may wonder how such a presuppositional account would work for indexicals such as *now* and *actually*, which, as one may recall from section 2.3, motivated the idea of double indexing in the first place. A straightforward move would be to treat temporal pronouns such as *now* by analogy with personal pronouns, following Partee (1973), and to represent them by free variables; similarly for modal adverbs such as *actually*, following Stone (1997). However, there are also reasons for resisting a uniform analysis of personal pronouns and temporal and modal expressions (see Rey 2018). Alternatively, one can maintain a multiple-indexing strategy for sentential

operators such as *now* and *actually*, but pursue a presuppositional account for personal pronouns (see Stojanovic 2008).

5.3 Monster-friendly accounts

By way of closing this chapter, let us turn to what may be currently one of the most fertile areas of research regarding indexicality: namely, context-shifting operators, also known as **monsters**, and indexicals that take their reference not in the context of utterance but in a shifted context. As pointed out in section 2.3, Kaplan held that one of the distinguishing properties of contexts, as opposed to circumstances, was that they were **unshiftable**. Here is an often-cited passage from Kaplan (1989, 510; Kaplan's italics):

Are there such operators as "In some contexts it is true that," which when prefixed to a sentence yields a truth if and only if in some context the contained *sentence* (not the content expressed by it) expresses a content that is true in the circumstances of that context? ... No operator can control the character of the indexicals within its scope, because they will simply leap out of its scope to the front of the operator. I am not saying we could not construct a language with such operators, just that English is not one. And such operators *could not be added to it*.

The idea that, at least in English, there are not and cannot be such operators is also known in the literature as a **prohibition against monsters** (Schlenker 2003) or **ban on monsters**. This idea is controversial, to say the least. Part of the controversy stems from a lack of agreement on how such a prohibition against monsters should be interpreted. Here are three immediate candidates:

- (i) as an empirical claim regarding English;
- (ii) as an empirical claim that may be generalized to any natural languages;
- (iii) as a theoretical claim, according to which the existence of monsters would simply be incompatible with the notions of context and indexicality.

Kaplan's emphasis that monsters could not be added to a language like English suggests that he had in mind a stronger claim along the lines of (iii). While there is some debate in philosophy on whether the case against monsters can be made on theoretical grounds, most of the action in semantics is on the empirical side. For reasons of space, let us set aside the theoretical arguments for and against monsters (see, e.g., Rabern 2013; Santorio 2019 for a recent overview). Let us also grant to Kaplan that English does not, or does not seem to, contain monsters.¹⁵ The aim of the remainder of this section is to point to some crosslinguistic research that casts serious doubt on Kaplan's ban on monsters interpreted along the lines of (ii).

One of the first and most influential works that, on empirical grounds, rejects Kaplan's prohibition against monsters and the related thesis that contexts are unshiftable is Schlenker (2003). Schlenker draws his main examples from Amharic, a Semitic language spoken in Ethiopia, in which the first person pronoun, as used in indirect discourse reports, may refer to the reportee (that is, the person whose

speech is being reported) rather than the reporter (that is, the speaker in the context in which the report is being made). Schlenker (2003, 31) invites us to observe the following contrast:

- (18) *Situation to be reported: John says: "I am a hero"*
 Amharic (lit.): John_i says that I_i am a hero.
 English: John_i says that he_i is a hero/* John_i says that I_i am a hero.

In other words, where the English must use the third person pronoun to refer to the speaker of the reported speech, the Amharic uses the first person pronoun. One way of explaining what happens here is to say that in Amharic, unlike English, the phrase *X says that* shifts the context, so that the embedded *I* no longer receives its referent from the actual context, but rather, from the context to which the interpretation of the monstrous indirect discourse operator has taken us.

Shortly after Schlenker, Anand and Nevins (2004) brought up into discussion data from two more languages: Zazaki, an Indo-European language spoken in East Turkey, and Slave, an Athabaskan language spoken in Canada's Northwest Territories, that similarly show evidence of monstrous context shifting. Interestingly, although Amharic, Zazaki, and Slave all appear to provide evidence of monstrous operators, the operators and the associated indexicals in the three languages do not behave completely alike. While in Amharic only the first person pronoun shifts, in the other two so does the second person pronoun. What is more, in Zazaki, the locational indexical *here* can also get a shifted interpretation. On the other hand, while Zazaki and Amharic are alike in that only indirect discourse verbs, such as *says that*, behave like monsters, Slave's doxastic operators, such as *thinks that*, are also context shifters.

Since those early works, the number of natural languages that have been claimed to contain monsters has gone over twenty, including various sign languages; for details and for the references, see Deal (2017, fn. 2). But, as already mentioned with respect to Amharic, Zazaki, and Slave, there appears to be considerable variation among such monstrous languages. Taking stock of the ever growing literature on languages that allow for indexical shifting, Amy Rose Deal proposes isolating the following dimensions of variability (2017, 5):¹⁶

1. which verbs are involved in shifting;
2. which indexicals shift (with which verbs);
3. how much optionality is permitted in indexical shift.

Deal observes that despite considerable variation, a number of insightful generalizations may be made. Regarding point 1, she notes that "verbs of speech are more likely to allow indexical shift in their complement than are verbs of thought, which in turn are more likely to allow indexical shift in their complement than are verbs of knowledge" (2017, 6). Regarding point 2, she establishes a hierarchy among indexical pronouns. Namely, a language will allow the second person pronoun to shift only if it allows the first person pronoun to shift in the first place. Furthermore, the indexical *here* will shift only in languages

that allow shifted interpretations for both the first and the second person pronouns.

Regarding Deal's point 3, let us first stress that in some languages, a shifted interpretation of the indexical is optional. The following example from Zazaki (Anand and Nevins 2004, 13) illustrates the point:

(19) Vizeri Rojda Bill-ra va [ke ez to-ra miradiša]
 Yesterday Rojda Bill-to said [that I you-to angry.be-PRS]

(20) Yesterday Rojda_i said to Bill_j that she_i is angry at him_j.

(21) Yesterday Rojda_i said to Bill_j that I am angry at you.

The Zazaki discourse report in (19) is ambiguous between (20), in which *says that* behaves like a monster and the indexicals get a shifted interpretation, and (21), in which the sentence behaves just as it would in English. However, for such languages, a generalization may also be made that respects the same hierarchy as pointed out in relation to Deal's point 2. In such a language, on any given occasion, the second person pronoun may receive a shifted interpretation only if the first person pronoun does so; similarly, *here* may receive a shifted interpretation only if the personal pronouns do so. As Deal (2017, 12) puts it, "languages allowing multiple patterns of indexical shift still remain within the overall class of possibilities attested on a crosslinguistic basis. The patterns that hold for whole languages also hold for individual verbal complements."

A crosslinguistic study of indexicality raises novel challenges for the semantics of indexicals. Spelling out the semantic clauses for indexicals that provide the right predictions when combined with context-shifting operators may be done in a way that endorses Kaplan's core contention that there are fundamental differences between contexts and circumstances (as in Schlenker 2003), but also in a way that rejects the context/circumstance distinction altogether (as in Santorio 2019). What is more, while providing a semantics that will work for particular languages, on a case-to-case basis, is relatively easy, spelling out a broader semantic framework for indexicals that makes room for crosslinguistic variations is a more ambitious task, one precisely that Deal (2017) undertakes. It is beyond the scope of this chapter to delve deeper into it here. Let us simply end by noting that indexicality remains a particularly lively area of research, both theoretical and empirical.

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Notes

1. Throughout this chapter, the pronoun *you* will be used for the second person **singular**. Plural indexicals *we* and *you* raise additional issues that need not concern us in this chapter; see, e.g., Wechsler (2010).
2. Double brackets are standardly used for the semantic interpretation function. In the case of sentences, this function maps parameters of evaluation (at this stage, possible worlds) to truth values. Instead of putting the world parameters into brackets, they are often noted as superscripts to the semantic interpretation: $\llbracket \dots \rrbracket^w$. Also, the truth values are often denoted by 1 and 0 instead of T(true) and F(false).
3. An analogous argument, based on the behavior of the modal indexical *actually* embedded under modal operators, will motivate the introduction of an additional world coordinate; see, e.g., Crossley and Humberstone (1977).
4. Contents are also commonly referred to as **intensions**, as well as **what is said**; see section 3.
5. This will not be an accurate clause for the deictic uses of *here*, in which the speaker is, say, pointing to a location on a map. Such uses, though, do not conform to the original semantic clause proposed for *here* either and need to be handled apart. Also, it is arguable whether the semantics for the second person pronoun is derivable from the semantics of the first person pronoun. For discussion, see, e.g., Wechsler (2010) and Heal (2014).
6. The reason why circumstances are so often thought of as possible worlds is a philosophical inheritance. Circumstances are that with respect to which one evaluates a content, or a **proposition**, for its truth value. In turn, it is customary to think that the truth of a proposition does not change over time: a proposition that is true has always been true and will always be true; one that is false has always been false and will always be false. This conception of propositions has been inherited from Frege, who wrote: "But are there not thoughts which are true today but false in six months' time? The thought, for example, that the tree there is covered with green leaves, will surely be false in six months' time. No, for it is not the same thought at all. The words 'This tree is covered with green leaves' are not sufficient by themselves to constitute the expression of thought, for the time of utterance is involved as well" (Frege 1917, 343).
7. Braun (1995) points out certain inconsistencies in Kaplan's characterization of characters; however, the problems that he identifies concern the individuation of characters at word level and may be ignored for the purposes of the present discussion.
8. A lot of recent work on contextuality concerns expressions that depend on the context but that cannot be straightforwardly treated as indexicals: predicates of personal taste, epistemic modals, vague predicates, and so on. A family of "contextualist" views try to apply the Kaplanian model of indexicals to those expressions. In doing so, they most often endorse the primacy of contents, as this quote from Alex Silk, who defends contextualism for normative expressions, illustrates: "the distinctive claim of contextualism is that a specific body of norms from the context of utterance *figures in the conventional content* of normative uses of language" (2017, 102; my italics).
9. Approaching the question from a slightly different angle, Russell (2011) also defends the view that there are logical truths involving indexicals that cannot be derived from indexical-free logical principles.
10. The reason why this would be a natural thought is that we have something analogous in first-order logic, in which a sentence is logically true if and only if it is true at every structure of interpretation and every assignment of values to the variables at which

we may evaluate it. Note that in the logic of indexicals, we will also need structures of interpretation as well as assignments of values to the variables.

11. The term comes from the notion of a **diagonal** in the matrices of two-dimensional semantics (Stalnaker 1978; 1999), to be discussed further in section 5.1. For a comparison between Kaplan's logic of indexicals and the diagonals in two-dimensional semantics, see Schröter (2017, section 1.3.).
12. There are also other reasons to be unhappy with the logic put forward in Kaplan's "On Demonstratives." One is, as Alexandru Radulescu puts it, "that Kaplan's logic, and hence the whole tradition that grew out of it, is too limited: it only deals with monologues in a single context" (2015, 1839). Radulescu's project is to extend the Kaplanian notions of logical validity and consequence to sentences that need not be evaluated in the same context.
13. For example, if we have been talking to each other in English, those possible worlds in which neither of us speaks any English – worlds that are metaphysically possible – will be excluded from the context set. Or, if we both take it for granted that Paris is the capital of France, then no world in which it isn't will figure in the context set. So the context set is relatively narrow, but it still contains incredibly many possible worlds: all the issues that have not been settled, perhaps because they belong to the future (such as whether it will rain tomorrow) or because the speaker and the hearer have different opinions (such as whether Pilates is healthier than yoga) or because they have never given the matter any thought (such as what Angelika Kratzer's favorite dish is) will keep generating possible worlds that will all belong in the context set.
14. The idea is only sketched in Heim and Kratzer (1998). For a more developed account, see, e.g., Sudo (2012).
15. Claims to the contrary have been made a number of times (Israel and Perry 1996; Schlenker 2003; Bezuidenhout 2005; Santorio 2012; Zakkou 2017). However, one should not conflate the idea that there can be nonstandard uses of indexicals with the idea that English contains monster-like operators and shiftable indexicals. Such nonstandard uses are discussed by Geoffrey Nunberg, one of whose famous examples is a prisoner who says: "I am traditionally allowed to order whatever I like for my last meal" (1993, 20). The fact that indexicals, just as any other word, may be used in ways that do not neatly conform to their literal meaning is not controversial. But there may be a pragmatic explanation for such "shifted" uses of indexicals. As Maier (2016a) convincingly argues, we should not be too quick to consider all such nonstandard uses as providing instances of monsters. Also, as Aloni (2016) argues, many of those uses can actually be handled without departing from Kaplan's main insights; she does so by enriching Kaplan's semantics with the notion of conceptual cover developed in Aloni (2001).
16. Deal proposes yet a fourth dimension of variability, namely, **which indexicals must be read *de se* when shifted**. We are leaving this dimension out in part because it would lead us astray to explain what *de se* readings amount to, and in part because the data on obligatory *de se* readings turn out to be less robust than they were initially taken to be in the literature (see Pearson and Dery 2014).

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