Indexicals*

Philippe Schlenker[a,b]

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Abstract: Indexicals are context-dependent expressions such as *I*, *you*, *here* and *now*, whose semantic value depends on the context in which they are uttered. They raise two kinds of questions. First, they are often thought to be scopeless – e.g. with *I* rigidly referring to the speaker – and to give rise to non-trivial patterns of inference – e.g. *I exist* seems to be *a priori* true despite the fact that *I necessarily exist* isn't. Second, indexicals may play a crucial role in the expression of irreducibly De Se thoughts, and both the existence of such thoughts and the ways in which they can be reported in indirect discourse must be elucidated. The Kaplanian picture posits that indexicals take their value from a distinguished context parameter, whose very nature is responsible for some entailments, and which remains fixed – hence the apparent scopelessness of indexicals. It further posits that while indexicals may serve to express irreducibly De Se thoughts, these may not be reported as such in indirect discourse (no 'De Se readings'). Both tenets have been criticized in recent research: there are a variety of constructions across languages in which the context parameter appears to be shifted; and several types of indirect discourse (some of them involving context shift) do give rise to De Se readings.

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Indexicals are context-dependent expressions such as *I*, *you*, *here* and *now*, whose semantic value depends on the context in which they are uttered (e.g. *I* denotes John if uttered by John, and Mary if uttered by Mary).[1] Indexicals in the strict sense (e.g. *I*, *here*, *now*) can be interpreted on the sole basis of the spatio-temporal properties of the speech act – in particular who is talking to whom, where and at what time. Demonstratives (e.g. uses of *he* or *she* without antecedent in the discourse, *that*) require in addition that one have access to the *referential intentions* of the speaker and/or to a notion of *salience*. In this chapter, we will focus on indexicals in the strict sense.

1. Foundational questions

Indexicals raise several foundational questions for natural language semantics. For the sake of concreteness, we will start from a modal analysis in which the meaning of a sentence is assimilated to a function from world-time pairs to truth values. Thus a sentence *S* is evaluated relative to a an interpretation function ⟦ . ⟧ which takes as parameters a time t, a world w,

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* The initial version of this chapter was completed in 2010, and revised in 2014. It thus fails to take into account the most recent developments in indexical semantics; see Deal 2017 for an up-to-date discussion.

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[a] Institut Jean-Nicod (ENS - EHESS - CNRS), Département d'Etudes Cognitives, Ecole Normale Supérieure, Paris, France; PSL Research University.

[b] Department of Linguistics, New York University, New York, New York.

[1] Here and throughout, italicization is used in the text for emphasis, or for quotation or quasi-quotation (but italicization is not used within formulas).

and also an assignment function s (for individual variables), with $[\![S]\!]^{s,t,w} = 1$ (for 'true') or 0 (for 'false'). We will see how this architecture must be modified to handle indexicals. But we start by stating five foundational questions that are raised by indexical expressions (see for instance Zimmermann 1991, Braun 2001, Maier 2006 and Schlenker 2011 for other surveys, and Deal 2017 for a far-reaching synthesis of recent theoretical and empirical insights into shifted indexicals across languages).

1.1 Semantics and Logic: context dependency and scopelessness.

Intuitively, the semantic value of an indexical is determined relative to the *context of a speech act*. But different speech acts – and hence different contexts - may co-occur in the same world and at the same time, hence world-time parameters as usually construed are insufficiently fine-grained to provide the value of indexicals. This immediately leads to a question about the general format of our semantic analysis:

Q1. Which parameters should be added to the interpretation function to handle indexicals?

There is another side to this problem. Whichever answer is given to *Q1*, indexicals often seem to be special because they are 'scopeless', in the sense that they fail to interact scopally with other operators. To make the point concrete, let us compare the behavior of the word *I* to the apparently synonymous expression *the speaker*:

(1) a. The speaker is always boring.
a'. I am always boring.
b. The speaker is necessarily boring.
b'. I am necessarily boring.

Uttered by myself (= PS) at a conference, (1)a and (1)b have, among others, readings on which *the speaker* is semantically dependent on the operators *always* and *necessarily*, and thus need not refer to me, PS. Things are entirely different with (1)a'-b': *I* denotes ('rigidly') the speaker of the actual speech act, rather than whoever might be the speaker at other times or in other worlds. So our second question is:

Q2. Why do indexicals seem to be scopeless?

Indexicals give rise to *valid inferences* which are non-trivial to explain in logic. *I exist* or *I am here now* would seem to be *a priori* true, in the sense that *whenever these sentences are uttered they cannot fail to be true*. But these validities differ from 'normal' ones. In particular, it does not follow from their *a priori* status that the corresponding sentences prefixed with *necessarily* are true: *Necessarily, I exist* and *Necessarily, I am here now* are usually quite false (similar facts hold when *necessarily* is replaced with *always*). Tautologies, by contrast, are *a priori* true and remain so when they are prefixed with *necessarily* (e.g. *Necessarily, p or not p*). This leads to our third question:

Q3. How can indexicals give rise to a priori *true sentences which, when preceded by 'necessarily', can become false?*

1.2 Attitudes and Attitude Reports

What is the 'cognitive significance' of a sentence? Or to put it differently, what is the contribution of a sentence to the belief state of an agent who holds it to be true? A simple-

minded view would take this cognitive significance to be given by the *information it provides about the world and time at which it is uttered*. This would make for an elegant connection with a semantic theory that countenances world and times. Let us call the *intension* or *content* of a sentence *S* the function given by:

(2) Content(S) = λt, w $[\![S]\!]^{s, t, w}$

Here $\lambda t, w$ abbreviates $\lambda t\ \lambda w$, and thus Content(S) is a function which (given an assignment function s) associates to times t and worlds w the value that *S* has at t in w – namely $[\![S]\!]^{s, t, w}$ (we abbreviate $\lambda t\ \lambda w$ as $\lambda t, w$ when we want to think of the arguments, which technically are taken 'one at a time', as pairs; here we think of this function as taking a pair of arguments <t, w> and returning the value the value that *S* has at t in w).

Here too, however, our initial picture is too simple. To take a well-known example, if David sees himself through a mirror, the cognitive significance of the sentence (A) *My pants are on fire* will be very different from that of (B) *His pants are on fire* – despite the fact that both sentences are about him, David, and are presumably true in the same world-time pairs (note that David is likely to take immediate action in (A), but not necessarily in (B)). A simpler case to analyze is provided by Perry's amnesiac example (Perry 1993, Lewis 1979). Rudolf Lingens, an amnesiac, might have access to all available knowledge about the world (for instance because he is in a *very* well-furnished library at Stanford). He might know lots of things about Lingens, but he would still not be in a position to assert (A') *I am Rudolf Lingens* - though he would definitely be able to claim (B') *Rudolf Lingens is Rudolf Lingens*. Hence our fourth question:

Q4: What determines the cognitive significance of sentences with indexicals?

There is another side to this question. If we ask how thoughts are *reported* in language, it often seems that the distinction between the two direct discourse sentences (A) and (B) gets lost in the report. For instance, the report in (3) is made equally true if David asserted (A) or if he asserted (B):

(3) David says that his pants are on fire.

It seems that the fine-grained semantic difference between (A) and (B) is not preserved in the report (note that it will not do to report (A) by saying: *David says that my pants are on fire*, which makes a claim about the speaker rather than about David). This observation is particularly important from the standpoint of a Fregean analysis of meaning. For Frege (1892), the same notion of Sense (or *Sinn*) accounts for (i) the cognitive significance of a sentence *and also* for (ii) its truth-conditional contribution in attitude reports (in possible worlds treatments, a Sense is reinterpreted as an intension, or function from world-time pairs to truth values). But in these examples the two roles ((i) and (ii)) seem to be fulfilled by different objects: the cognitive significance of a sentence with indexicals is directly tied to their context-dependency, whereas the truth-conditional contribution of a clause in an attitude report seems *not* to report the precise contribution of the indexicals that appeared in the original statement. This leads us to our fifth question:

Q5: Can the cognitive significance of thoughts expressed with indexicals be fully captured in attitude reports? If not, why is this not the case?

2. The Kaplanian Picture

2.1 Basic Analysis

Kaplan (1977/1989; 1978) offered a unified answer to these questions, one that has proven very influential in the last thirty years. Technically, the basic idea is that expressions of a language are evaluated with respect to a *context* parameters in addition to whatever other parameters are needed for semantic evaluation. Contexts may be taken as primitive, in which case one must define various functions that output the agent [= speaker], hearer [= addressee], location, time and world of a context c, henceforth written as c_a, c_h, c_l, c_t and c_w.[2] Alternatively, contexts may be identified with tuples of the form <speaker, (addressee), time of utterance, world of utterance, etc>. The speaker, addressee, time and world of the context are sometimes called its 'coordinates'.[3]

To make things concrete, we assume – following Kaplan – that the form of the interpretation function is $[\![.]\!]^{c, s, t, w}$: given a context of utterance c, an assignment function s, a time of evaluation t, and a world of evaluation w, an expression filling the slot of . receives a certain value. Concretely, we can provide the reference rules in (4) and the rules of composition in (5). The former indicate that when evaluated under a context c the words *I*, *you*, and *here* respectively denote the agent, hearer and location of c; the latter specify that *now* and *actually* have the effect of shifting the time and world of evaluation to the time and world of the context.[4]

(4) a. $[\![\text{I}]\!]^{c, s, t, w} = c_a$
b. $[\![\text{you}]\!]^{c, s, t, w} = c_h$
c. $[\![\text{here}]\!]^{c, s, t, w} = c_l$

(5) For any formula *F*,
a. $[\![\text{now F}]\!]^{c, s, t, w} = [\![\text{F}]\!]^{c, s, c_t, w}$
b. $[\![\text{actually F}]\!]^{c, s, t, w} = [\![\text{F}]\!]^{c, s, t, c_w}$

With these tools in hand, we can give the definition of truth in (6). It says roughly that a sentence *S* uttered in a context c is true if *S* is true according to our interpretation function, setting the context parameter to c *and the time and world parameters to the time and world of c* respectively.

(6) Truth
If a root sentence *F* is uttered in a context c, and if the assignment function s adequately

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[2] Here and throughout, we will make the simplifying assumption that all contexts are contexts of *utterance*. As I. Stojanovic reminds us, Kaplan (1977/1989) was more careful and for this reason used the term *agent* rather than *speaker* of a context.

[3] The two approaches – primitive contexts, or contexts *qua* tuples – are semantically equivalent if there is an appropriate mapping between primitive contexts and the relevant tuples. For concreteness, assume that (i) each context c determines an agent c_a, a time c_t and a world c_w; and that (ii) for every triple of the form <x, t, w> comprising an individual x, a time t, and world w, there is at most one speech act that corresponds to it. Then we can equate the set {c: c is a context} with the set {<x, t, w>: x is an individual who is the agent of a speech act at time t in world w}. Note, however, that if the object language is endowed with context-denoting expressions, there might be important *syntactic* differences between context-denoting variables (e.g. c_1, c_2, etc) and syntactically represented triples (e.g. $<x_1, t_1, w_1>$, $<x_2, t_2, w_2>$, etc). See for instance Schlenker 1999, 2003 and Stechow 2002, 2003 for different representational choices in the syntax (e.g. with context variables in Schlenker 2003, and triples in Schlenker 1999 and Stechow 2002, 2003).

[4] For readability, we give *now* and *actually* a syncategorematic treatment. Note that there are arguments in the literature that show that *actually* is not a *bona fide* indexical (Cresswell 1990). In fact, we do not know of a single case of a clear world indexical; we disregard this (potentially important) fact in this chapter.

represents the intentions of the speech act participants for the demonstratively used pronouns that appear in *F* (treated as free variables), then:

F is true in c just in case $[\![F]\!]^{c, s, c_t, c_w} = 1$ (where c_t and c_w are the time and world of c respectively).

With this background in mind, we can proceed to answer the five questions we raised at the outset.

Q1. Which parameter should be added to the interpretation function to handle indexicals?

Clearly, this has to be a *context parameter*. In Kaplan's analysis, contexts are ontologically distinct from other parameters, and strictly more finely individuated than times or worlds (because distinct contexts can exist at the same time and in the same world).[5]

Q2. Why do indexicals seem to be scopeless?

There are two answers to this question in Kaplan's analysis. On a *technical level*, Kaplan's idea was that we happen to find in natural language operators that manipulate the various parameters, *except* the context parameter. In (7), we provide by way of example semantic rules for the operators *always* and *necessarily*, which shift the time and world parameters respectively.

(7) Let *F* be a clause.
a. $[\![\text{always F}]\!]^{c, s, t, w} = 1$ iff for every time t' accessible from t in w, $[\![F]\!]^{c, s, t', w} = 1$
b. $[\![\text{necessarily F}]\!]^{c, s, t, w} = 1$ iff for every world w'accessible from w at t, $[\![F]\!]^{c, s, t, w'} = 1$

The crucial observation is that in each case the context parameter remains unchanged. Thus if the sentences in (1)a-a' have the Logical Forms (i.e. the abstract syntactic representations) in (8)a-b respectively, we will obtain different truth conditions for them.

(8) a. Always [the speaker is boring]
b. Always [I am boring]

In both cases, we start by writing that $[\![\text{always F}]\!]^{c, s, c_t, c_w} = 1$ iff for every time t', $[\![F]\!]^{c, s, t', c_w} = 1$. In the case of (8)a, the latter condition becomes: ... $[\![\text{the speaker is boring}]\!]^{c, s, t', c_w} = 1$; in (8)b, it becomes: ... $[\![\text{I am boring}]\!]^{c, s, t', c_w} = 1$. Noun phrases may depend on the time of evaluation, which is why $[\![\text{the speaker}]\!]^{c, s, t', c_w}$ denotes in this case the person who is speaking **at t'** in c_w. By contrast, in accordance with (4)a, $[\![I]\!]^{c, s, t', w}$ always denotes the agent of c (= c_a), which is why the two claims end up making assertions about different people.

This explains why *always* fails to affect the interpretation of the indexical *I*. But couldn't one define other operators that manipulate the context parameter? Kaplan grants that his semantic framework makes it possible to define such operators, but he claims that they are never found in natural language (see also Lewis 1980). For this reason, he calls such

[5] Other authors adopt frameworks in which at least one other parameter is of the same ontological type as contexts. This happens in particular if worlds are replaced with situations or events; in such a case, contexts can be taken to be situations or events of a particular sort, which blurs the ontological distinction between the two parameters – but does not make it unnecessary: for reasons discussed below, double indexing is crucial to obtain the right behavior for indexicals. As we emphasize below, when such a move is made one must give independent criteria for what counts as the context parameter, lest the discussion about 'context shift' should become rather confused.

operators 'monsters', and his empirical claim has come to be known as the 'Prohibition Against Monsters':

(9) Prohibition Against Monsters: No natural language operator manipulates the context parameter.

This empirical claim has been disputed in recent semantic research; we come back to this point in Section 3.2. But as we have presented things, the stipulation in (9) is needed to explain why indexicals fails to interact scopally with operators.

While the Prohibition Against Monsters is often taken as primitive (e.g. in standard linguistic accounts of indexicals), for Kaplan it was a derived property. His main philosophical claim was that indexicals display their unusual scopal behavior because they are expressions of 'direct reference'; it was direct reference, not the Prohibition Against Monsters, which motivated his account. In Kaplan's words, "directly referential expressions are said to refer directly without the mediation of a Fregean *Sinn*", which means that "the relation between the linguistic expression and the referent is not mediated by the corresponding propositional component, the content or what-is-said" (Kaplan 1977/1989 p. 568). Kaplan did not mean by this that *nothing* mediates the relation between the linguistic expression and the individual. In fact, indexicals come with rules of use that establish a dependency between contexts and denotations. But these rules are, for him, quite different from *semantic contents*, which are just functions from world-time pairs (rather than contexts) to individuals or truth values. On the assumption that various operators (e.g. *necessarily* and *always*) only have access to the *content* of an expression, we derive the fact that indexicals cannot interact scopally with them. Importantly, however, Kaplan's formal framework can be adopted without accepting his views on direct reference; in such a case, the Prohibition Against Monsters needs to be taken as primitive if one wishes to derive the same predictions as Kaplan – unless one just abandons the Prohibition, as is now often been done on empirical grounds – a point we will revisit in Section 3.2.

Let us turn to the question of *a priori* true vs. necessarily true sentences:

Q3. How can indexicals give rise to a priori *true sentences which, when preceded by 'necessarily', can become false?*

Given the definition of truth in (6), it seems natural to posit that a sentence is *a priori* true just in case it is true in every conceivable context:

(10) A sentence *F* is *a priori* true iff for each context c, *F* is true in the context c, i.e. (given (6)) iff $[\![F]\!]^{c, s, c_t, c_w} = 1$.

Let us apply this definition to *I exist*. We assume, as is standard, that *exist* evaluated at a time t and a world w is true of precisely those individuals that exist at t in w. So to determine whether *I exist* is *a priori* true, we ask whether:

(11) for each context c, $[\![\text{I exist}]\!]^{c, s, c_t, c_w} = 1$, i.e. c_a exists at c_t in c_w

Kaplan claims that the condition in (11) is satisfied *because of what contexts are*. Specifically, contexts obey (among others) the two conditions in (12):

(12) For any context c:
a. the agent c_a of c exists at the time c_t of c in the world c_w of c.
b. the agent c_a of c is at the location c_l of c at the time c_t of c and in the world c_w of c.

Thanks to (12)a, the condition in (11) is always met – which guarantees that *I exist* is indeed *a priori* true.

To obtain this result, we considered the value of our sentence in different contexts c - while setting the time and world parameters to the corresponding coordinates of c. But when we consider the sentence *Necessarily, I exist*, we only vary the world parameter. Thus (13) follows from the rule we posited for *necessarily* in (7)b.

(13) Uttered in a context c, *Necessarily I exist* is true iff $[\![\text{necessarily I exist}]\!]^{c, s, c_t, c_w} = 1$, iff for every world w' accessible from c_w at c_t, $[\![\text{I exist}]\!]^{c, s, c_t, w'} = 1$, iff for every world w' accessible from c_w at c_t, c_a exists at c_t in w'.

The latter condition has no reason to be satisfied, because for most relevant values of w', w' is not the world of the context c. Thus we have explained how a sentence can be *a priori* true even though it becomes false when prefixed with *necessarily*.

Let us turn to our questions about attitudes and attitude reports.

Q4: What determines the cognitive significance of sentences with indexicals?

We will start with a perspective which is in part foreign to Kaplan's analysis, but is standard in the semantic literature (e.g. Haas-Spohn 1994, Zimmermann 1991, Schlenker 2011). Under what conditions does one believe that a sentence *S* is true? Just in case one believes that one is in a context in which *S* is true. In standard epistemic logic, an individual x is taken to believe that a sentence *S* is true just in case each world compatible with what x believes in one in which *S* is true. It is easy to adapt this analysis to the present case by replacing worlds with contexts:

(14) An individual x believes that a sentence *S* is true just in case each context compatible with what x believes is one in which *S* is true.

Given our definition of truth in (6), this condition can be rewritten as (15):

(15) An individual x believes a sentence *S* is true just in case for each context c compatible with what x believes, $[\![S]\!]^{c, s, c_t, c_w} = 1$.

With this definition in hand, it can be seen that a sentence *S* is *a priori* true just in case it can be believed no matter what one's beliefs are – which seems intuitively reasonable. Thus there is both a conceptual and a technical connection between the analysis of belief and the analysis of *a priori* knowledge.

The condition in (15) immediately explains why (16)a has a very different cognitive significance from (16)b for the amnesiac Rudolf Lingens.

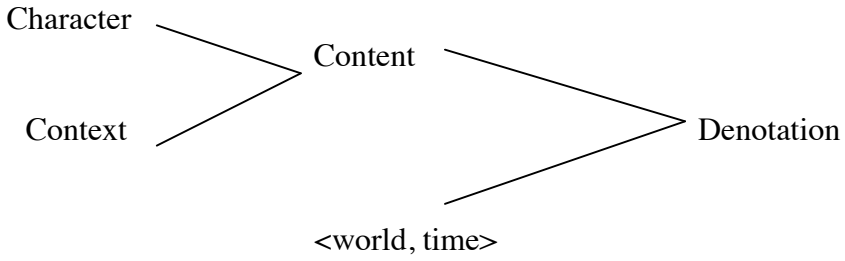
(16) a. I am Rudolf Lingens.
b. Rudolf Lingens is Rudolf Lingens.

According to our analysis, Lingens believes (16)a just in case each context c compatible with what he believes is one for which c_a = Rudolf Lingens – which is precisely not the case here, since he does not know which individual he is. By contrast, (16)b is trivial for him just as it is for everybody else, since for every such context c, Rudolf Lingens = Rudolf Lingens.

Kaplan develops a slightly different analysis. As we saw, it is crucial that expressions be evaluated with respect to a context parameter *in addition* to the 'usual' parameters – notably, the time and world parameters. Now Kaplan's idea is that an expression is *first* evaluated with respect to a context, which yields the *semantic content* of that expression. the content is *then* fed a world and time of evaluation to yield the denotation of the expression

(for a referential expression, its denotation is an individual; for a sentence, it is a truth value). In this *façon de parler*, the meaning of an expression, called by Kaplan a 'character', is a function from contexts to contents; and a 'content' is just a function from world-time pairs to denotations (individuals or truth values).

(17) Character and Content



In this picture, what provides the cognitive significance of an expression is its *character*: it is because 'Lingens is at Stanford' and 'I am at Stanford' have different characters that Lingens can believe the former (because he has complete knowledge of the world he is in) without thereby believing the latter (because he does not know in which context he is located). By contrast, what provides the closest Kaplanian equivalent of Frege's notion of sense is the *content* of the sentence. The Prohibition Against Monsters entails that modal operators may only be sensitive to the content of an expression, not to its full character (more precisely: for any operator *Op* that is not monstrous, if *F* and *F'* have the same content but possibly different characters in a context c, *Op F* and *Op F'* must have the same value when evaluated in c). To take an example, on the assumption that the proper name *Lingens* is rigid and thus denotes the same individual in all possible worlds, the character of the sentence S = *I am Lingens* can be characterized as follows (using the notation $\lambda c\ \lambda t, w\ \ F$ in the meta-language to define a function from contexts to a function from world and times to truth values; as before, $\lambda t, w$ can be taken to abbreviate $\lambda t\ \lambda w$).

(18) $\text{Character}(S) = \lambda c\ \lambda t, w\ [c_a = \text{Lingens}]$

On the assumption that c* is a context whose agent is Lingens, the content of S in c* is:

(19) $\text{Content}_{c^*}(S) = \text{Character}(S)(c^*) = [\lambda c\ \lambda t, w\ c_a = \text{Lingens}](c^*) = \lambda t, w\ [\text{Lingens} = \text{Lingens}]$

Kaplan's analysis is compatible with the analysis we developed in (15), but it is not equivalent with it. It is *compatible* with it because it is possible to state (15) within a Kaplanian framework. To this end, an auxiliary notion is helpful, that of the *diagonal* $\delta(\chi)$ of a character χ, defined as follows:

(20) $\delta(\chi) = \lambda c\ \chi(c)(c_t)(c_w)$

If χ is the character of a clause *F*, the diagonal of χ can be identified with *the set of contexts c such that F uttered in c is true* according to the definition in (6). In effect, $\delta(\chi)$ is a proposition-like object – with the only difference that it corresponds to a set of contexts rather than to a set of worlds or world-time pairs. So we can refine Kaplan's analysis by granting that the cognitive significance of a sentence is provided by its character, but that the only thing that matters is whether the agent believes the *diagonal* of this character. Still, our initial theory is *not equivalent* to Kaplan's, because the latter does not provide a reductive analysis of what it means for someone to 'believe' a character; it leaves open the possibility that an agent x might believe a sentence *F* and disbelieve a sentence *F'* as long as they have

different characters, *even if their diagonals* are identical. Our initial analysis precluded this possibility.

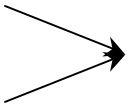
In order to determine whether an individual believes a sentence *S*, we must have access to the character (or at least to the diagonal of the character of *S*), rather than just to its content. But as we noted at the outset, attitude reports often seem to 'lose' the precise indexical nature of the attitudes they report, hence the question:

Q5: Can the cognitive significance of thoughts expressed with indexicals be fully captured in attitude reports? If not, why is this not the case?

As we had noted, there is an important difference between thinking *My pants are on fire* or *His pants are on fire*, even in case both possessive pronouns refer to the same individual. Still, in indirect discourse both situations can be reported by saying: *John thinks that his pants are on fire* (where *his* refers to John):

(21) John says: 'My pants are on fire'

John says: 'His pants are on fire'
(where 'his' refers to John)



John says that his pants are on fire

Kaplan accounts for this observation by positing a semantics in which *John thinks that his pants are on fire* is true just in case there is *some* character which John asserts, and whose content in the context of John's thought act is that John's pants are on fire:

(22) *John says that his pants are on fire* (where *his* denotes John) is true at c*, t*, w* iff
there is a character χ such that:
(i) the content of χ given the context of John's speech act (call it *c*) is that John's pants are on fire: $\chi(c) = \lambda t,w$ John's pants are on fire at t,w [= the content of the embedded clause], and
(ii) John asserts χ at t*, w*.

This analysis is of course compatible with Kaplan's two main claims: (i) the cognitive significance of sentences is given by their character; but (ii) attitude operators, like all other natural language operators, are only sensitive to the content of their argument. It immediately follows from (22) that two clauses that have the same content at the context utterance can be substituted *salva veritate* under *John says that* __.

There are two ways in which Kaplan's analysis could be extended: first, it could presumably be applied to other attitude verbs, such as *believe*, rather than just to verbs of saying; second, one may wish to give a reductive analysis of what it means to 'assert' or to 'believe' a character, using the diagonal operator defined above. Applied to belief reports, this extension leads to the following analysis:

(23) *John believes that his pants are on fire* (where *his* denotes John) is true c*, t* , w* iff
there is a character χ such that:
(i) the content of χ given the context of John's thought act (call it *c*) is that John's pants are on fire: $\chi(c) = \lambda t, w$ John's pants are on fire at t in w, and
(ii) for each context c' compatible with what John believes at t* in w*, $[\delta(\chi)](c') = \text{true}$, i.e. $\chi(c')(c'_t)(c'_w) = 1$.

Technical note. This analysis is not without problems. As Stechow and Zimmermann 2005 show (following Crimmins 1998), this semantics makes the unfortunate prediction that *John believes that his pants are on fire* should be true as soon as John's pants really are on fire. Consider (24), calling its Character χ* (where *actually* has the semantics defined in (5)b):

(24) It is either not so that John's pants are actually on fire now, or else John's pants are on fire.

The problem is that any rational individual can realize that (24) uttered in a context c and evaluated at the time c_t and in the world c_w of c is true. This is because $\chi^*(c)(c_t)(c_w)$ is true just in case: John's pants are not on fire at c_t in c_w, or John's pants are on fire at c_t in c_w - which is a tautology. Thanks to the *actually* and *now* operators, however, the *content* of χ^* in c is $\chi^*(c) = \lambda t, w$ [John's pants are not on fire at c_t in c_w or John's pants are on fire at t in w]. With the assumption that John's pants are in fact on fire at c_t in c_w, the first disjunct must be false, and thus we get: $\chi^*(c) = \lambda t, w$ [John's pants are on fire at t in w]. But this means that there *is* a character whose content is that John's pants are on fire, which is believed by John - χ^* is such a character. So the sentence *John thinks that his pants are on fire* should be true. But to reach this conclusion, we did not make reference to any non-trivial beliefs on John's parts! The analysis has gone wrong (but see Section 3 for an analysis of attitude reports that does *not* rely on quantification over characters).

2.2 Qualifications

While the technical picture we offered above is simple and appealing, not all of its components are essential – or empirically correct, for that matter. There is at least one important insight that should be preserved by any theory:[6]

(25) Double indexing
The semantic procedure must make it possible to evaluate expressions under at least two kinds of parameters: the context parameter, and whatever time and world parameters are otherwise necessary to deal with modal and temporal operators. Keeping the distinction is essential to capture the fact that time and world operators need not shift the context of evaluation of indexicals.

What about the other components of the Kaplanian picture? Their status is considerably less clear.

2.2.1 Direct Reference

As we saw at the outset, Direct Reference has the advantage of explaining why indexicals do not usually seem to interact scopally with other operators. But the Prohibition Against Monsters can derive (or rather stipulate) this fact within frameworks that accept Double Indexing but not Direct Reference. Furthermore, we will see in Section 3.2 that there are cases in which indexicals do in fact interact scopally with other operators, which casts doubt on a directly referential analysis.

2.2.2 Modal Logic

A relatively inessential property of the Kaplanian picture is that it involves an intensional system with one world parameter, one time parameter, and an assignment function that provides values to individual variables – with the crucial addition of a context parameter. As it happens, there is considerable evidence in semantics for the view that *independently of issues of indexicality* one needs to have simultaneously access to several world and time parameters (Cresswell 1990; note that event/situation parameters could replace time or world parameters, but we would still need to have several of them). One way to implement the resulting system is to take the object language to include time and world variables, and to relativize the interpretation function to an assignment function that provides values not just to individual variables, but also to time and world (or situation/event) variables. When this step

[6] See Stojanovic 2008 for a discussion of the minimal requirements on theories that aim to handle Kaplan's indexical examples.

is taken, and combined with Kaplan's addition of a context parameter, the interpretation function takes the form $[\![.]\!]^{c, s}$ rather than $[\![.]\!]^{c, s, t, w}$ – with the important difference that in the first case the assignment function s provides values to individual as well as time and world variables, whereas in the second case it is only responsible for individual variables.

This technical refinement also opens a further technical possibility: we could postulate that the object language contains a distinguished context variable – call it *c** - whose value is also provided by the assignment function s. In effect, the interpretation function would then simply have the form $[\![.]\!]^{s}$, and the word *I* would be represented as I_{c^*} to guarantee that its value depends on the context s(c*).[7] In order to obtain an adequate definition of truth, we would need to stipulate that s(c*) denotes the context of the actual speech act. But stipulations of this sort are needed in any event for demonstratively used pronouns – when we analyze the sentence *He$_1$ [pointing] is smart but he$_2$ [pointing] is not*, we need to stipulate that the pronouns *he$_1$* and *he$_2$* refer to the 'right' individuals. This is the reason our definition of truth in (6) made explicit reference to "the intentions of the speech act participants"; in the case at hand, we would require that $s(x_1)$ and $s(x_2)$ be the individuals intended by the speaker when he uttered *he$_1$* and *he$_2$*.

Note that since assignment functions are just functions from variables (distinguished by integers) to objects, we can also write $[\![.]\!]^{s}$ as in (26), where we have a long sequence with the value of *c**, followed by the values of the individual variables x_1, x_2,..., time variables t_1, t_2,..., and world variables w_1, w_2,... .

(26) $[\![.]\!]^{s(c^*), s(x_1), s(x_2),..., (t_1), s(t_2), ..., s(w_1), s(w_2), ...}$

Thus an assignment function essentially makes it possible to relativize the interpretation function to an arbitrary number of individual, time, and world parameters – in addition to a context parameter.

2.2.3 Contexts

In Kaplan's analysis, contexts are primitive. This view contrasts with 'index theory', according to which an arbitrary number of *independently varying* parameters might become necessary when we analyze the semantics of more complex expressions (this view originated in Scott 1970; see Kaplan 1977/1989 and Israel and Perry 1996 for discussion). According to index theory, then, the interpretation function could take a form like $[\![.]\!]^{x, x', x'', ..., t, t', t'', ..., w, w', w'', ...}$, which is immediately analogous to what we had in (26), except that no context parameter is present. We could add parameters for the agent, time and world of utterance, e.g. as *x*, t*, w**, thus yielding:

(27) $[\![.]\!]^{x^*, t^*, w^*, x, x', x'', ..., t, t', t'', ..., w, w', w'', ...}$

Kaplan's objection against this implementation is that it misses some validities. The argument is as follows:
(i) A sentence is *valid* just in case it is true under all values of the parameters.
(ii) If x*, t* and w* are treated as *separate* parameters, in order to determine whether *I exist* is true we will have to evaluate it under values of these parameters that do *not* guarantee that x* exists at t* in w*; hence the sentence will not come out as valid.
(iii) Treating contexts as primitive avoids this problem – as long as we stipulate that: (a) for any context c*, *the agent of c* exists at the time of c* in the world of c** (in accordance with (12)a); (b) to determine whether a sentence is valid, we only evaluate it at parameters that are

[7] Alternatively, we could state a rule such as: $[\![I]\!]^{s} = s(c^*)_a$ – which is the counterpart in this system of the Kaplanian rule $[\![I]\!]^{c, s, t, w} = c_a$.

coordinates of the context parameter (in accordance with (6); this was precisely what we did for *I exist* in (11)).

A minimally different implementation of Kaplan's ideas would *reduce* contexts to triples of the form <x*, t*, w*>, with x* the agent of the speech act, t* its time, and w* its world. The interpretation function would then take the form $[\![\, . \,]\!]^{<x^*, t^*, w^*>, x, x', x'', ..., t, t', t'', ..., w, w', w'', ...}$, which would avoid the problem faced by 'index theory' if (a) only triples <x*, t*, w*> that correspond to possible contexts are considered, and (b) we only evaluate the sentence at parameters that are coordinates of <x*, t*, w*>.[8]

But this raises a *further* possibility, which is to *stick to 'index theory', while revising our notion of validity*. Let us say that a sentence is *Kaplan-valid* for the interpretation function represented in (27) just in case it is valid for all values of the parameters for which (a) *<x*, t*, w*> is a possible context*, and (b) all other parameters are coordinates of <x*, t*, w*>. It is immediate that this would yield something equivalent to the preceding theory. In Kaplan's original analysis, we partly placed in the ontology – in what contexts *are* – the stipulations necessary to ensure that the correct inferences come out as valid. In the present reformulation, we directly define a notion of validity that captures the desired inferences.

Even within Kaplan's original framework, a non-standard notion of validity might be needed anyway. We already noted that when testing for validity, we must restrict attention to time and worlds parameters that are coordinates of the context (or else *I exist* and *I am here now* would not come out as valid). But there is a further problem that concerns contexts themselves. The argument is in two steps. First, we note with Predelli 1998 that Kaplan's original analysis incorrectly predicts that (28) should be a contradiction.

(28) I am not here right now. (... Please leave a message after the tone.)

Since this sentence is perfectly coherent (e.g. as produced by an answering machine), there must be 'improper contexts', ones whose author is *not* located at the time of the context in the world of the context. We must thus enlarge Kaplan's original set to include improper contexts. Second, we note that once this step is taken we are left with the task of deriving Kaplan's original inferences: if there are improper contexts, how can *I am here now* come out as being 'normally' valid? The natural way to regain these inferences is to take (Kaplan-)valid sentences to be those that are true *with respect to the set of proper contexts*. But once this move is made, we can of course ask whether we couldn't just as well have started with index theory to define Kaplan-validity.

More generally, Kaplan sought to derive certain *a priori* inferences by devising a system in which they came out as logical truths. But what counts as a logical inference is by no means a clear or settled question. Distinguishing between those inferences that are true by virtue of the meaning of the words from those that are true by virtue of world knowledge is, in this case as in others, a very difficult question, as Predelli's example makes clear.

2.2.4 Character and Content

As we showed in our discussion in Section 2.1, it is not the full character of a clause that is needed to assess its cognitive significance, but just its *diagonal*. But it is also unclear whether the notion of content as defined serves a useful purpose. As argued by various authors (see for instance Perry 1997, 2001, and also Stojanovic 2008, 2009), there are a variety of notions of 'content' that could be argued to play a linguistic role, and Kaplan's notion is just one of them (we will see in the next section that Kaplanian contents are often inadequate to fulfill one of their main roles, which was to account for attitude reports).

[8] See fn. 3 for further technical remarks.

Furthermore, as shown by Ninan 2010, a Kaplanian content can be defined on the basis of a semantics that is not based on Kaplan's parameters (for instance, within a semantics with time and world variables one can abstract over these variables to obtain the appropriate notion of content); and conversely, a semantics based on Kaplan's parameters need not give rise to Kaplan's notion of content (some of these parameters may be given the same status as the context parameter in Kaplan's analysis, so that they are not abstracted over in the computation of content).

3. De Se Reports and Shifted Indexicals

We will now show that there are quite a few cases across languages in which attitude operators manipulate the context of evaluation of indexicals. For all theories, this suggests that the Prohibition Against Monsters must be relaxed; in addition, these data pose a serious problem for the claim that indexicals are 'directly referential'.

3.1 De Se Reports

We start by showing that it is possible, contrary to the predictions of Kaplan's theory of indirect discourse, to preserve in indirect discourse the cognitive significance of indexicals. This is just a prelude, however, because the construction we consider does not use indexicals in the report; but in Section 3.2 we will show that the same semantic effect can in some languages be obtained by using in the report indexicals whose context of evaluation is 'shifted'.

The first observation is that what syntacticians call 'PRO', the unpronounced subject of an infinitive, is always understood to report a first person (or in some cases second person) thought when it is immediately embedded under an attitude verb (Morgan 1970, Chierchia 1987). This is illustrated by the following scenario, in which *PRO* is inappropriate to report a third-person thought – by contrast with *he*, which is acceptable whether the thought to be reported was first- or third-personal.

(29) John is so drunk that he has forgotten that he is a candidate in the election. He watches someone on TV and finds that this person is a terrific candidate, and thinks: 'This guy should be elected'. Unbeknownst to John, the candidate he is watching on TV is John himself.
a. True: John hopes that he will be elected
b. False: John hopes PRO to be elected (Schlenker 2003)
(by contrast, b. this is ok in a scenario in which the thought was: 'I should be elected')

Following the terminology of Lewis 1979 and Chierchia 1987, semanticists say that (29)b is a 'De Se' report because it is true only in case the agent has a first person thought. Interestingly, an artificial pronoun very much like *PRO*, called *he**, was posited by the philosopher Castañeda for purely conceptual reasons (Castañeda 1966, 1967, 1968). In effect, *PRO* embedded under an attitude verb is an English realization of Catañeda's *he**.[9]

Since Kaplan's analysis of indirect discourse was designed to *predict* that such distinctions cannot be drawn in indirect discourse, it is ill-suited to account for these contrasts. Inspired by Lewis 1979, Chierchia1987 suggested that the semantics of attitude reports is more fine-grained than usually thought in possible worlds semantics. In essence, his idea was that the value of a clause embedded under an attitude verb may be as fine-grained as a set of triples of the form <individual, time, world>. It is immediate that such triples are

[9]So-called 'logophoric' person markers can also be seen as natural language realizations of Castañeda's *he**. See for Schlenker 2011 for discussion, and Pearson 2012 for a contrary view.

homologous to contexts. Technically, however, no syntactic or morphological connection to indexicality was posited in Chierchia's treatment. Rather, it was assumed that a λ-operator could appear at the 'top' of the embedded clause to bind an individual variable. For simplicity, we represent this operator above an empty complementizer *C*, though this is just for notational convenience:

(30) John hopes λi C PRO_i to be elected

A crucial assumption is that, in attitude reports, *PRO* must always be bound by the closest λ-operator. To obtain an interpretable structure, we must still say what the role of the complementizer is. We will assume that it simply returns a proposition when applied to a clause (the same measure can be applied to the word *that*).

(31) a. $[\![C\ F]\!]^{c,s,t,w} = [\![that\ F]\!]^{c,s,t,w} = \lambda t' \lambda w' [\![F]\!]^{c,s,t',w'}$

b. From (a), it follows that

$[\![\lambda i\ C\ PRO_i\ be\text{-}elected]\!]^{c,s,t,w} = \lambda x' [\![C\ PRO_i\ be\text{-}elected]\!]^{c,s[i \rightarrow x']^{10},t,w}$

$= \lambda x' \lambda t' \lambda w' [\![PRO_i\ be\text{-}elected]\!]^{c,s[i \rightarrow x'],t',w'} = \lambda x' \lambda t' \lambda w'$ x' is elected at t' in w'.

We can think of the function defined in (31)b as associating truth values to sets of triples of the form <individual, time, world>. Since the latter are context-like objects, we can extend to the object-language operators *believe*, *hope*, etc., a homologue of the rule we used in Section 2.1 to explicate under what conditions an individual x believes that a sentence *S* is true. In (14)-(15), we had suggested that this is the case precisely if each context compatible with x's belief makes *S* true. Similarly, we will say that an individual x stands in the 'believe' relation to the denotation of an embedded clause just in case each context compatible with what x believes satisfies the embedded clause. Given the kind of denotation we have in (31)b, the rule must state that the *coordinates* of all such contexts make the embedded clause true.

(32) a. $[\![believes^{De\ Se}]\!]^{c,s,t,w}(F)(x) = true$
iff for each context c' compatible with what x believes at t in w, $F(c'_a)(c'_t)(c'_w) = true$

b. $[\![hope^{De\ Se}]\!]^{c,s,t,w}(F)(x) = true$
iff for each context c' compatible with what x hopes at t in w, $F(c'_a)(c'_t)(c'_w) = true$

The same semantics can be extended to the verb *hope,* as shown in (32)b.

An important consequence of this analysis is that *John hopes to be elected* is true just in case each context compatible with John's hope is one in which he could utter truly: 'I am elected'. Equivalently, *John hopes to be elected* is true just in case he stands in the 'hope' relation to the *diagonal* Δ of the character of *I am elected*. This result is just what is needed to account for the falsity of (29)b, since in our scenario John does *not* have a first person hope. The equivalence between *John hopes to be elected* and *John stands in the 'hope' relation to the diagonal of 'I am elected'* is stated in (33)[11], where we have assumed for convenience that *δ* was part of the object language.

(33) a. $[\![John\ hopes^{De\ Se}\ \lambda i\ C\ PRO_i$ to be elected$]\!]^{c,s,t,w}$ = true iff for each context c' compatible with what John hopes at t in w, c'_a is elected at c'_t in c'_w.

b. Suppose that *δ* is part of the object language, with $[\![\delta\ [I\ be\text{-}elected]\ ]\!]^{c,s,t,w} = \lambda c' [\![I\ be\text{-}elected]\!]^{c',s,c'_t,c'_w}$ – which we call Δ. Then John stands in the 'hope' relation to *Δ* iff for

[10] s[i → x'] is that assignment function which is identical to s, with the possible exception that it assigns x' to *i*.

[11] For simplicity, we consider a variant of (29) in which John's first person hope is of the form 'I am elected' rather than 'I should be elected'.

each context c' compatible with what John hopes at t in w, $\Delta(c') = 1$, iff for each context c' compatible with what John hopes at t in w, c'_a is elected at c'_t in c'_w.

Of course in English δ does not seem to be part of the object language: *John hopes that I am elected* clearly does not allow the word *I* to be shifted (for if so it would intuively denote John). But things are different in other languages, as we will now see.

3.2 Shifted Indexicals in Indirect Discourse

We now suggest that there are constructions in which the diagonal δ does in fact appear in the object language. This will show that Kaplan's analysis was not just wrong about De Se readings, but also about monsters: sometimes attitude operators are Kaplanian monsters (a conclusion anticipated in Israel and Perry 1996; see Deal 2017 for a distinct, and far more systematic, view of the cross-linguistic typology).

How can we establish the existence of monsters? We will discuss examples that have the form of (34), where <I> and <here> are indexicals:

(34) John says that ... <I> ... <here> ...

The argument has three steps.

(i) First, we argue that the presence of the diagonal operator in the embedded clause is *compatible* with the semantics of the sentence – in particular <*I*> should intuitively denote John, and <*here*> should intuitively denote John's location.[12]

(ii) Second, we exclude the possibility that the embedded clause is quoted. This is an essential step because on any theory it is unsurprising that *John says: 'I am a hero'* should attribute to John a claim about John himself (because in this case *say* establishes a relation between John and a string of words rather than with a proposition). In English, the presence of the word *that* rules out a quotative reading, but other languages could have quotative complementizers. Still, one can block quotative readings by observing that grammatical dependencies cannot normally 'cross' quotation marks. To illustrate, let us note that without explicit quotation marks *John says I like Mary* is ambiguous between *John says that I like Mary* and *John says 'I like Mary'*. But the second reading disappears in the more complex sentence *This is the person who [John says I like _]:* it cannot be interpreted as *this is the person who John says ['I like _']*, with a dependency between *who* and the object position of the most deeply embedded clause, marked as _. In technical syntax, *who* is said to be 'extracted' from this object position; and we see here that extraction cannot cross quotation marks. In this case, *I* behaves like a *bona fide* Kaplanian indexical: when quotation is excluded, *I* unambiguously refers to the actual speaker. As we will see, the facts are different in other languages.

(iii) Third, we want to exclude the possibility that the purported indexicals are in fact anaphoric elements. This is no trivial matter: anaphoric expressions can often have, among others, a deictic reading, whereby they pick their denotation from the context. What distinguishes such anaphoric elements from *bona fide* indexicals is that the latter can never have unambiguously anaphoric readings. For instance, the word *later* in *I will go for a walk later* may *appear* to be an indexical, because it can be understood to mean *later than now*. But other examples suggest that it is anaphoric – e.g. in *I met John yesterday morning; later*

[12] It follows from the semantic analysis that both expressions are predicted to be read De Se.

he went for a walk, later is understood as *later than the salient time* at which I met him at which I met John.

Following precisely this logic, Anand and Nevins 2004 and Anand 2006 conclude that there are clear cases of shifted indexicals in Zazaki. They show in particular that Zazaki indexicals can optionally shift in some constructions that rule out quotation – for instance (35), a Zazaki version of the English examples we just discussed.

(35) Extraction in Zazaki

i. čɛnɛkɛ [kɛ Hɛseni va **mi** *t* paci kɛrda] rindɛka
girl that Hesen said I *t* kiss did pretty.be-PRES
'The girl that Hesen said {Hesen, I} kissed is pretty.' (Anand and Nevins, 2004)

ii. Piyaa-o [kɛ Rojda va kɛ **mi** *t* paci kɛrd] Ali biyo
Person that Rojda said that I *t* kiss did Ali was
'Ali was the person that Rojda said {Rojda, I} kissed.' (Anand and Nevins, 2004)

Following the spirit of their proposal, we can handle these data within Kaplan's logic by postulating that the diagonal operator δ used in (33)b can optionally be found in the embedded clause, as shown in (36).

(36) John say δ I be a hero.

When this operator is present, it establishes a relation between John and the *diagonal* of the character of *I am a hero*, and thus attributes to him a claim that every context c compatible with his claim is one in which c_a is a hero at c_t in c_w. This result is derived using the techniques we saw at work in (33)b.

Anand and Nevins's analysis makes interesting fine-grained predictions. In particular, they predict that in Zazaki indirect discourse, *if one indexical is shifted under an attitude reports, then all the other indexicals are shifted as well* ('Shift Together'). The reason for this is that if one indexical gets shifted, then the δ operator must be present, and must thus shift the context parameter. Because there is a single context parameter, once it is shifted, the value of the original context is lost, and thus all indexicals in the same clause must be shifted as well. They show in detail that this and related predictions are borne out in Zazaki (see Deal 2017 for a cross-linguistic analysis that makes systematic use of 'Shift Together').

Several other cases of shifting under attitude reports have been discussed in the literature. For instance, it was suggested in Schlenker 2003 that sentences very much like (36) can be found in Amharic indirect discourse; and it was also claimed that in English *two days ago* is a shiftable indexical, while *the day before yesterday* is an unshiftable one (these data have been debated, however; see Anand 2006 for a contrary view). One salient question in the literature is whether Anand and Nevins's treatment with a single context parameter is sufficient. Several examples have been discussed in which 'Shift Together' *fails* to hold (but see Deal 2017 for a contrary view); in fact, data of precisely this type led Schlenker 2003 to adopt a more expressive system in which there are *context variables* in the object language, which makes it possible to analyze many more readings than are predicted by Anand and Nevins. Such a system must still be able to account for the fact that in English *I* cannot be shifted; this was done by having a distinguished variable *c** which always denotes the actual speech act (as was done above in Section 2.2). As things stand, it would seem that 'Shift Together' holds true in some languages but not in others. Clearly, however, more research is needed to obtain a deeper understanding of this debate (see Schlenker 2011 for further remarks, and Anand 2006 and Deal 2017 for an in-depth discussion).

What is clear, however, is that these data on indexical shift suggest that Kaplan's Prohibition Against Monsters needs to be revisited, and that theories of direct reference have serious challenges to address.

3.3 Shifted Indexicals in Free Indirect Discourse

Free Indirect Discourse is a type of reported speech, found primarily in literature, in which different indexicals are evaluated with respect to different contexts, *even in the absence of any (overt) attitude operator* (we use the sign # to mark semantic infelicity).

(37) a. Tomorrow was Monday, Monday, the beginning of another school week! (Lawrence, *Women in Love*; cited in Banfield 1982)
b. #He thought: 'Tomorrow was Monday, Monday, the beginning of another school week!'
c. #He thought that tomorrow was Monday, Monday, the beginning of another school week!

The thought expressed in (37) is attributed to the character whose attitude is described rather than to the narrator; it can optionally be followed by a post-posed parenthetical, such as ... , *he thought* or ... , *he said*. Descriptively, Free Indirect Discourse behaves as a mix of direct and of indirect discourse: tenses and pronouns take the form that they would have in a standard attitude report (e.g. *She wondered where he was that morning*), while everything else – including *here, now, today, yesterday* and the demonstratives (e.g. *this*) – behaves as in direct discourse. In other words, a passage in Free Indirect Discourse may be obtained by changing the person and tense markers of a quotation to those of an indirect discourse embedded under an attitude verb in the desired person and tense.

Importantly, the indexicals that 'shift' in Free Indirect Discourse in English do not do so in standard indirect discourse. This fact alone shows that shifting in Free Indirect Discourse is not entirely reducible to the issues discussed in Section 3.2. There are two main types of extant analyses: some try to treat Free Indirect Discourse as a non-standard form of direct discourse (e.g. Schlenker 2004); while others treat it as a form of indirect discourse with a non-standard attitude operator (e.g. Sharvit 2004, 2008). As things stand, the debate is wide open (see Eckardt 2014 for a recent analysis).

4. Conclusion

We can now go back to the five questions we asked at the outset.

Q1 (Parameters). On most theories, indexicals are handled by relativizing semantic interpretation to a context-like parameter in addition to the parameters that are otherwise necessary to handle temporal and modal constructions. There are many options in the implementation, however (contexts can be taken as primitive, as in Kaplan's work; or they can be seen as tuples of coordinates; and there are even versions of 'index theory' that can emulate the results of context-based analyses).

Q2 (Scopelessness). The impression that indexicals are scopeless is in some cases incorrect: there are natural language constructions in which indexicals can be 'shifted' in attitude reports. Why does this rarely or never happen in English? For some theorists (Anand and Nevins 2004), this is simply because in English attitude verbs fail to embed the diagonal operator. For other theorists (Schlenker 2003), this is because most English indexicals are specified as depending on a distinguished context variable which never gets bound. In either case, scopelessness is *not* invariably a property of expressions whose value is intuitively determined by a context of speech. We could *redefine* the terms 'indexical' and 'context' to ensure that (i) a context is, *by definition*, a parameter which is not manipulated by any

operator; and (ii) an indexical (i.e. an expression whose value is determined by the context) can *by definition* never be monstrous (see Zimmermann 1991 and Stalnaker 1981, 1999).[13] But Kaplan's analysis should not be equated with this definitional move; it had some empirical 'bite' – part of which seems to have been refuted.

Q3. (A priority and necessity). The fact that a sentence *S* can be *a priori* true while *Necessarily S* is false becomes unsurprising once the two notions are adequately explicated. The key is to ensure that *S* comes out as *a priori* true just in case for any context c, *S* is true in c, i.e. true when evaluated with respect to c and the corresponding coordinates of c. By contrast, *Necessarily S* is true at c just in case it is true when evaluated with respect to c and different values of the world parameter.

Q4 (Cognitive significance). The cognitive significance of a sentence *S* with indexicals is determined by the information it contains about the context in which it was uttered – it must be one of the contexts c such that *S* is true in c. Within post-Kaplanian frameworks, the cognitive significance of a sentence is given by the *diagonal* of its character, but here too there are many options for the implementation.

Q5 (Attitude reports). Contrary to what was predicted by Kaplan's theory of indirect discourse, the precise cognitive significance of sentences with indexicals can in some cases be faithfully reported in indirect discourse, thanks to expressions that are unambiguously De Se. *PRO*, the unpronounced subject of English infinitives, is a case in point. Shifted indexicals in constructions that allow them are another.

[13] Note that a consequence of this definitional move is that there is no context parameter, and hence no indexicals, in Zazaki as studied by Anand and Nevins. The reason is that according to them *all* parameters can in principle be shifted in that language (in particular, what we would otherwise call the context parameter is shifted by the diagonal operator).

Biography: Philippe Schlenker is a Senior Researcher at Institut Jean-Nicod (CNRS, Paris) and a Global Distinguished Professor at New York University. He was the Managing Editor of *Journal of Semantics* between 2009 and 2012 and currently heads its Advisory Board. His research has been devoted to formal semantics and pragmatics (indexicality, intensionality, anaphora, presupposition, supplements), to philosophical logic (self-reference, liars, strengthened liars), and to sign language semantics (with special reference to anaphora and iconicity). Some of his recent research pertains to the formal analysis of alarm calls in some non-human primates, to gesture semantics, and to music semantics. His research has been supported by grants from the NSF, the European Science Foundation (Euryi award, 2007) and the European Research Council (Advanced Grant, 2013-2018).

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