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Character study:
A *de se* semantics for indexicals

Claim:

> For indexicals, both the classical directly referential semantics of Kaplan (1977) and more recent anaphoric accounts offer a picture of indexicality which is empirically and conceptually inadequate. They fail to capture this fact: Indexicals are essentially perspectival, as reflected in the fact that 1st and 2nd person indexicals are always *de se*.

Why hasn't this been evident before?

Here is something important that compositional semantics has taught us: You cannot properly assess the meaning of an expression without considering its use and meaning in embedded contexts. But, as Kaplan drove home, the English 1st and 2nd person pronouns never seem to vary in interpretation in embedded contexts. So for the past fifty years, most embedded uses of indexicals have been overlooked or ignored, or when such examples were pointed out, for example involving apparently bound demonstratives, shifted uses of *here* or *now*, and the like, they were claimed to involve another, non-deictic sense. But the current body of evidence in the linguistic study of indexicality makes it clear that both cross-linguistically and in English, indexicals are quite regularly intended by the speaker to be anaphorically bound under quantification, and hence used in cases where their intended referents are not specific real entities but the arbitrary instantiations of bound variables. We see this in the bound demonstrative *that dog* in (1), denoting the arbitrary dog in the speaker's neighborhood; in the donkey demonstrative *that injury* (also involving bridging) in (2), and in the second *we* in (3), which is understood to denote the arbitrary member of the group (containing the speaker) denoted by the subject:

(1)   Every dog in my neighborhood, even the meanest, has an owner who thinks that <u>that dog</u> is a sweetie.   [Roberts 2002]
(2)   If a professional athlete sprains an ankle, <u>that injury</u> usually gets special treatment.
(3)   We're all experts on women until we marry one.   [after Rullmann 2010]
          'each of us x is s.t. x is an expert on women until x marries a woman'

Moreover, in a wide range of unrelated languages, 1st person indexicals get shifted interpretations when embedded under attitude predicates, where they may take as antecedent the 3rd person agent of the attitude. This is illustrated by the schematic example (4), comparing the Amharic 1st person pronoun to English *I*. A crucial piece of evidence is that in (4a) and other languages with shifted indexicals, the shifted 1st person receives a *de se* interpretation, wherein John is aware of self-ascribing being a hero.

(4)   Situation to be reported: John says: "I am a hero".
          a. *Amharic*: $John_i$ says that $-ññ_i$ am a hero   [$-ññ$ the Amharic 1st person pronoun]
          b. *English*: $John_i$ says that he_i is a hero/*$John_i$ says that I_i am a hero

Even some English indexicals shift under attitudes, including *now* and *here*, as we see in (5), where we observe both binding of *now* and shifting under an attitude predicate:

(5)   [John has applied to several medical schools and is waiting to hear if he's been accepted:]
        Whenever John got a letter, he excitedly tore it open, thinking that **now** at last his acceptance had
        arrived, and that what he held **here** was his ticket to success.

This *now* is bound by the event quantifier *whenever*, and both *now* and *here* are shifted to reflect the time
and place of the agent John in the circumstance of his receipt of the arbitrary letter. Their denotations
under any given instantiation of the events in the domain of *whenever* are the time and place of that
arbitrary event. And, of course, these indexicals are also *de se*: in the reported situations, John was
reportedly aware of self-attributing, as part of what he was thinking, location at the time of receipt of
acceptance and at the place of holding his ticket to success.

Two theses underpin the current proposal, which is intended to account for such examples and more
besides. First, indexicals of all types are anaphoric, and can indeed, in certain circumstances, be
quantificationally bound, something that direct reference theories cannot account for. But if they aren't
directly referential, what *do* indexicals have in common which differentiates them from other anaphoric
expressions? This is to be explained by our second thesis, the claim above, that indexicals always receive
a *de se* interpretation. But this only becomes apparent in embedded contexts, such as in the complements
of attitude predicates or in counterfactuals. If you only consider a narrow range of uses of indexicals, you
won't find the *de se*. This is because this aspect of their meanings is not part of their proffered content—
that which they contribute to the compositional calculation of the meaning of an utterance in which they
occur. Rather, like their anaphoricity, the *de se* is fundamentally presuppositional.

Accordingly, I offer here the basic elements of a *de se* account of indexicality. One central feature of such
an account, of course, is a semantics of the *de se*, and for that I borrow a version of the centered worlds
approach due to Stalnaker (2008). But another important requirement is a means of predicting and
constraining the anaphoric behavior of indexicals. We need to be able to generalize over the full range of
uses of these indexical anaphoric triggers—including
   1)   those in which the anaphor is bound: (1) (3), and
   2)   others in which it is free in discourse, among these:
           (a) some which are used to refer to a specific individual, either
                 (i) mentioned previously: (4) (5), or
                 (ii) not mentioned at all but indicated with a demonstration: the purportedly canonical
                      use of indexicals, and
           (b) others where the indexical's non-binding antecedent is itself under the scope of an
               operator, as in donkey anaphora, so that the "reference" of the anaphor is to an arbitrary
               entity (2).

It is to permit generalizations across just such a range of types of anaphora resolution that the notion of a
discourse referent was introduced by Karttunen (1976) and most clearly developed in formal semantics by
Heim (1982). A discourse referent isn't an entity in the world or in a model, but an address for
information about some individual, real or arbitrary; it is part of the information that interlocutors track
across discourse and use in interpretation—both inter- and intra-utterance, including under quantification.
Once one accepts the independently motivated use of discourse referents to track anaphoric reference
across discourse, the addition of a distinguished subset of discourse referents—the discourse centers—to
anchor indexicals and satisfy their *de se* anaphoric presuppositions yields a simple, empirically superior
account of indexicality across both the direct and arbitrary uses, one that can regularly capture their *de se*
character.

Thus, indexical reference is indirect, always mediated by the information that interlocutors share about
the context of utterance. Moreover, as we see in anaphora more generally, to account for the range of
interpretations of indexicals sketched above we need a dynamic pragmatics, wherein the local context of

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interpretation for a sub-constituent of an utterance may differ from the global context of utterance. Crucially, an indexical depends for its interpretation on the perspective of some agent whose doxastic state is currently under consideration in the local context in which the indexical occurs, as we see in (4) and (5) above. In the canonical uses, the local context is the global context, and the anchoring agent is the speaker.

In what follows, I begin in §1 by sketching the standard Kaplanian characterization of indexicals and the more recent accounts that take them to be anaphoric. In §2 I argue that there are problems for both these approaches as they stand. Then I present the basic tools that will be used in the present account: a way of modeling the *de se* and tracking potential *de se* anchors across discourse contexts (§3), and how to use those tools for deriving *de se* interpretations in compositional semantics (§4). In §5 I present the proposed analysis for English *I* and *we*, as well as preliminary analyses for the 1st person pronouns in two shifting indexical languages and for English shifting *now*. §6 presents conclusions and prospects, including a sketch of English *this*.

1.   **The standard account and the presuppositional upstarts**

1.1   **Kaplan's framework**

Here are the basic elements of Kaplan's (1977) framework for the semantic analysis of indexicals:
    context *c*:   a specification of the linguistically relevant parameters of a context of utterance, in particular yielding values for Speaker(c), Addressees(c), Location(c), Time(c), and Demonstratum(c)
    Character: a function from contexts to Content
    Content: a function from worlds to values

Character of *I*:   a function from a context *c* to a Content *C* s.t. for all worlds *w*, C(w) = speaker(c)
Character of *you*: a function from a context *c* to a Content *C* s.t. for all worlds *w*, C(w) = addressees(c)
Character of *here*: a function from a context *c* to a Content *C* s.t. for all worlds *w*, C(w) = location(c)
        etc.

A proper context of utterance *c* is one in which speaker(c) is at location(c) at time(c), guaranteeing that for any context *c*, *I am here now* will always be true at *c*, though certainly things might have been otherwise. Thus the contrast between (6) and (7):

(6)   [Always true:] I am here now.
            [spoken today: 'CR is in New York City on 3/19/20']
(7)   [Not true:] Necessarily, I am here now.
            [CR could have been elsewhere]

Moreover, the Kaplanian account lets us understand why indexicals behave differently in embedded contexts than non-indexicals. Take the context at the time a sentence is uttered to be the **global context** for that utterance; this is the type of context assumed by Kaplan. In Heim (1982), a constituent is interpreted in its **local context**: In an unembedded clause without quantification, the local context is the global context. But the local context for content in the scope of a quantificational operator, including the complement of an attitude predicate or the main clause of a conditional, is not the global context; for example, the local context for the main clause of a conditional is the global context updated with the information in the *if*-clause, as we know from the study of donkey sentences. Then there are two ways in which a presupposition in an embedded context can be satisfied—either by the local context or the global context, as in (8) and (9):

(8)   Mr. Smith has decided to give Josiane a raise. If he has spilled the beans,[1] she should be happy.
(9)   Mr. Smith doesn't consider gender equity in determining what to pay his employees. If a woman gets any raise at all, she should be happy.

In (8), the anaphoric presupposition of *she* is satisfied globally, by earlier mention of Josiane. But in (9), the only possible antecedent is merely locally available—the hypothetical woman introduced in the *if*-clause. Thus, an anaphoric presupposition may be *merely locally satisfied*.

On Kaplan's account, since the global context of utterance fixes the value of an indexical for all possible worlds, this guarantees that its value will not vary even in intensional contexts—those in which the values of expressions typically *do* vary across possibilities. This explains the difference between pairs like the following, each involving the modal auxiliary *might*, which takes wide scope over *someone else*:

(10)   I might have been someone else.
(11)   The speaker might have been someone else.

(10) and (11) are non-synonymous. (11) says that the context of utterance might have featured a different speaker from the actual one. (10) says that someone—who happens to be the actual speaker—might have been someone other than she is. That is, the semantic content of the subject of (10), unlike that of the subject of (11), isn't *about* the context of utterance at all. We just use the context of utterance as an argument of the Character of *I* to yield that particular individual, who, it is said, might have been otherwise. Another way of saying this is that the descriptive content of a description like *the speaker* or *the addressee* may be merely locally satisfied under the scope of the modal, yielding someone who isn't the actual speaker or addressee; but this is not possible with *I* or *you*. Thus, (12) and (14) are true, while (13) and (15) are not:

(12)   [spoken by Laura, a woman:] If Calvin were speaking now, the speaker would be a man.
(13)   [spoken by Laura, a woman:] If Calvin were speaking, I would be a man.
(14)   [addressed to John, a man:] If I were talking to Josiane, the addressee would be a woman.
(15)   [addressed to John, a man:] If I were talking to Josiane, you would be a woman.

We might say that the fact that the interpretation of *I* always makes it coreferential with the actual speaker has **no local effect**—it is not itself part of the compositionally determined truth conditional content of the clause in which it occurs. In this respect, indexicals are like the *phi*-features of anaphoric pronouns (see Heim 2008, den Dikken 2011 and articles in that collection; Sudo 2012), including person, gender and number: playing a role in retrieving the intended antecedent, but not contributing to the interpretation of the expression in which the pronoun occurs. This explains the felicity of *she* in (16), which bears feminine grammatical gender because its NP antecedent *this woman* is feminine, despite a local context (the global context plus the content of the *if*-clause) in which the individual denoted is not female:

(16)   If this woman were male instead of female, she would have gotten a higher salary.

Kaplan's account captures the insensitivity of English indexicals like *I* and *you* to local context, including their behavior under the scope of the modal auxiliaries, in conditionals, etc., explaining contrasts like those in (6)/(7), (10)/(11) and (12)/(13), and explains similar contrasts involving demonstratives and temporal and locative indexicals.

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[1] To spill the beans is to convey some contextually relevant, heretofore secret news. It is used here to avoid making reference to Josiane in the *if*-clause.

1.2   **The anaphoric approach**

In more recent work (e.g., Zeevat 1999, Roberts 2002),[2] it has been argued that the proffered content of a demonstrative is anaphoric, a **free variable**; for example, on Roberts' account the denotation of a demonstrative is technically the value under an assignment function of a familiar discourse referent. Roberts argues that the antecedent of a demonstrative needn't be referential, but may itself be the arbitrary instantiation of a bound variable or narrow scope indefinite, as we saw in (1) and (2) above and also in (17)-(19):

Bound Variable:
(17)   On every team there is one player who is not as strong as the rest. <u>That weakest member</u> is the one to play hardest against. [Maclaran 1982]
            'weakest member of the arbitrary team', a reading involving telescoping (Roberts 1989)

Narrow Scope:
(18)   Every father dreads <u>that moment when his oldest child leaves home</u>. [King:10]
            'the moment when the arbitrary father's oldest child leave home'
(19)   Michelin is hoping to find ten more tyre inspectors. <u>These new employees</u> would be required to work the night shift for the first three weeks. [Roberts 2002 after Maclaran 1982]
            'if more tyre inspectors were hired, they would be required to work the night shift. . .', involving modal subordination (Roberts 1989)

Such examples argue that the English demonstratives are anaphoric in the sense of Heim (1982), i.e. they trigger **a presupposition of familiarity**, requiring for felicity a discourse referent antecedent. A **discourse referent** is (intuitively) the address of a body of information, purportedly about a single individual, which may or may not correlate with an individual in the actual world. In a dynamic pragmatics (more in §3.2 below), this information about individuals under discussion is tracked in parallel with the Common Ground. The presupposed familiarity is weak in the sense of Roberts (2003) because this discourse referent needn't have been introduced by an explicit utterance, but might instead correlate with some entity whose existence is simply evident to all: As we saw in (2) above, if one sprains an ankle, this entails that one has an injury, so the demonstrative is felicitous despite the fact that the arbitrary injury *per se* had not been previously mentioned (bridging). The beauty of using discourse referents for anaphora, rather than NP-tokens (as in the classic understanding of anaphora) or actual referents (as in direct reference), is that this kind of "antecedent" may be merely weakly familiar, and may be arbitrary rather than singular, permitting a unitary account of anaphora across different types of licensing contexts. As we'll see, both these features of discourse referents will be useful here. For the moment, take discourse referents to be of type *e*, denoting individuals, as in Heim (1982).

Similarly, we can account for the usual attested interpretations of English 1st and 2nd person indexical pronouns without a Kaplanian Character by anchoring them presuppositionally to the actual speaker or addressee, as in the informal sketch for *I* in (20), where *g* is the arbitrary assignment function reflecting the contextually available information about the corresponding discourse referent d_i:

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[2] Elbourne (2008) argues that demonstratives are disguised definite descriptions, not simply free variables. However, presumably his account would, like that of the account of D-type pronouns in Elbourne (2005:59-63), have to concede that demonstratives are also anaphoric, in order to differentiate them from indefinite descriptions. This important feature of Elbourne's account should not be overlooked. Roberts' and Elbourne's work is related to that of King (2001), who, however, takes demonstratives to be quantificational, not anaphoric.

(20)   **Anaphoric English *I***:   [strawman version]

           Presupposed Content of I_i (informal):

                    Use of I_i presupposes that there is a weakly familiar discourse referent d_i such that in all the worlds w in the Common Ground, the value assigned to d_i, $g(d_i)$, is the actual speaker in w at the time of utterance.

           Proffered Content of I_i:[3]

                    The semantic content of I_i is the value assigned to d_i, $g(d_i)$, the assignment g constrained so as to admit only values that reflect all information about d_i in the Common Ground.

The use of discourse referents to satisfy the anaphoric presuppositions of indexical pronouns is useful here to express the presupposed familiarity. Speaker and addressee are always weakly familiar in this abstract sense, but, of course, this doesn't mean that we know who they are in other terms. Consider a scenario with a message in a bottle or one where a speaker uses *you* to address a disembodied voice. All that familiarity requires is that the interlocutors' Common Ground entails that there is some singular individual speaking or being addressed, as reflected in the existence in their shared context of a corresponding discourse referent.

The treatment of the proffered content of personal indexicals, including 1st and 2nd person pronouns, as variables is now quite common in linguistics (see for instance Heim & Kratzer 1998, Heim 2008; Schlenker 2000, 2003; von Stechow 2003; Sauerland 2003; Büring 2005; Hunter & Asher 2005, Hunter 2013; Maier 2006,2009). While these accounts vary in other respects, all share the assumption that indexicals are anaphoric, contributing only the value of the variable, as given by its antecedent, to the proffered content of the utterance in which they occur.

As we saw for the presupposition associated with pronominal anaphora in (8) and (9) above, there are two ways in which a presupposition in an embedded context can generally be satisfied: globally vs. merely locally (non-globally). We also see this with anaphoric definite descriptions. In (21) and (22) *the emergency brake* is taken to be anaphoric via bridging, understood to be 'the emergency brake of the car':

(21)   The gears on this car tend to slip. If you park on a hill, engage <u>the emergency brake</u>.
(22)   If you park a car on a steep hill, engage <u>the emergency brake</u>.

In (9) and (22) the bridging required to resolve the anaphoric pronoun/description is satisfied merely locally—by *a woman* or *a car* (respectively) in the antecedent of the conditional. In (8) and (21) the pronoun *she* and the description *the emergency brake* might at one time have been said to take wide scope. But now it is generally agreed that the appearance of wide scope in such examples is actually the result of **global presupposition satisfaction**. The definite doesn't need to move to take wide scope in linguistic LF (the level of representation capturing the logical form of the utterance). I call this **pseudo-scope**—an effect of global presupposition satisfaction.

Pseudo-scope is a term introduced (so far as I know) in Kratzer (1998), who uses it in a somewhat different sense. Here I mean that the apparent wide scope of the anaphor (definite description) relative to some operator in the utterance (the conditional in (21)) is explained by presupposition satisfaction at a level of context less local than that in which the operator occurs. In (21) the description occurs in the consequent of a conditional, but its presupposition is satisfied in the global context resulting from utterance of the first sentence—so that the definite seems to take wide scope, whereas in (22) it is satisfied only locally: the local context consists of the global context enriched by the content of the *if*-clause—an example of donkey anaphora.

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[3] I use the term *proffered* instead of *asserted* so that this characterization covers uses in non-declarative mood—questions, imperatives, etc.—as well as in the declarative.

The presuppositional semantics for English *I* in (20) guarantees that it will always seem to take widest scope:

- The presupposition of English *I* (*we, you*) is always satisfied globally.
- Operators in proffered content only interact semantically (hence logically) with proffered content. But anaphora is presuppositional, and so not proffered. Hence, because of the presuppositional character of the anchoring of *I* to the speaker, which presupposition can only and always be globally satisfied, the pronoun always takes wide pseudo-scope over any operators in the proffered content of an utterance in which it occurs.

Thus, the anaphoric account retains the empirically motivated features of the direct reference account:

- For *I am here now*, **truth at all circumstances of utterance, without necessity** results from the pragmatics of what it is to be an embodied speaker at a given time and place of utterance, just as for Kaplan.
- **Fixed reference under modality**: presuppositional anchoring to the actual speaker or addressee yields pseudo-scope effect**s**. We see this in other indexicals and demonstratives as well, so that, e.g., like (13) from above, (23) makes an absurd assertion:

(13)   [spoken by Laura, a woman:] If Calvin were speaking now, I would be a man.
(23)   [Stalnaker and Chomsky are sitting at opposite ends of a long table on a stage at MIT. One audience member says to another:]
        If he had changed places with Noam, that guy [pointing to Stalnaker] would be a linguist.

2.   **Some problems for previous theories of indexicality**

2.1 **Contingency**

Maier (2006,2009) and Hunter (2013) argue that there is a problem for simple anaphoric accounts of indexicals, one pointed out by Kripke (1972) for many accounts of the semantics of proper names. Maier (2009) spells it out with respect to the example in (24):

(24)   a. Mary is called Mary
        b. The person called Mary is called Mary

The difference Kripke notices is that while (24a) is merely contingently true, on at least one reading of (24b) it is analytic, a tautology, "on a par with *bachelors are unmarried* or *Mary = Mary*" (2009:257). "The individual referred to in (24a) may in fact have a scar on her left arm and bear the name 'Mary', but we can easily imagine her without the scar and with a different name." Similarly for indexicals, those authors might argue, merely giving *I* wide pseudo-scope via global anaphoric presupposition satisfaction fails to capture the sense in which an example like (25a) is contingent, while (25b) is not:

(25)   a. I am speaking.
        b. The speaker is speaking.

To address this, Maier re-creates Kaplan's two-stage interpretation in a version of Kamp's (1981) D(iscourse)R(epresentation)T(heory), while Hunter offers a different kind of additional level of structure in DRT. This is an issue that any anaphoric account must address.

2.2 **Shifted indexicals**

It has recently emerged that many languages have what are called *shifted indexicals*. One such language is Amharic (Leslau 1995, Schlenker 2003), as we saw in the schematic example (4) above. The actual Amharic usage is illustrated in (26) and (27):

(26)   *Situation reported*: John says: "I am a hero"   (D. Petros, p.c. to Schlenker)
       jˇon   jˇ_gna n_-ñṉ̃   y_l-all
       John   hero   be.PF-1SO   3M.say-AUX.3M
       'John says that he is a hero'

(27)   m_n amt'-a̱   _nd-al-_-ñṉ̃   al-s_mma-hu-mm
       what bring.IMPER-2M   COMP-say.PF-3M-1SO   NEG-hear.PF-1S-NEG
       'I didn't hear what he told me to bring.'
       (lit. I didn't hear that he said to me bring what.) (Leslau 1995, p. 779)

As we see in (26), the (underlined) Amharic 1st person *-ññ* may be shifted to refer not to the actual speaker (the global context) but to the speaker in the reported context (the merely local context). (27) shows that the (underlined) 2nd person pronoun *-a* may similarly shift to refer to the addressee in the reported, merely local context. Crucially, Schlenker (2003:67-69) offers strong evidence that these embedded clauses are not direct quotations. Moreover, "it is *only* in attitude reports that Amharic 1st and 2nd person pronouns can be shifted." Shifting is optional in Amharic, so that *–ññ* could refer to the speaker in (26) instead of to John.

There are many otherwise unrelated languages displaying, with minor variations, shifting indexicals. The growing list of such languages includes Aghem (Hyman 1979), American Sign Language (ASL: Lillo-Martin 1995, Koulidobrova & Davidson 2014, Schlenker 2014), Amharic (Leslau 1995, Schlenker 2003), Gebärdensprache (DGS, a signed language: Hermann & Steinbach 2012; Hübl 2013), Japanese (Sudo 2012), Llengua de Signes Catalana (LSC: Quer 2005,2011,2013), Langues des Signes Française (LSF: Schlenker 2014), Lingua dei Segni Italiana (LSI: Zucchi 2004), Navaho (Speas 2000), Nez Perze (Deal 2014), Slave (Rice 1986, Anand & Nevins 2004), Uyghur (Sudo 2012), and Zazaki (Anand & Nevins 2004). There are interesting differences between these languages (Sudo 2012, Roberts 2014, Deal 2017, to appear), but all have non-quotational counterparts of examples like (26) under verbs of saying. Some also shift 2nd person, for example under the language's equivalent of 'tell', and some also shift locatives like 'here'.

The shift to anchor an indexical to the agent of a reported attitude is something that Kaplan (1977) predicted could not occur given the purported direct reference of indexicals. The possibility of such local anchoring of indexical pronouns argues that we need to recognize the anaphoric, presuppositional nature of indexical pronouns, and the (limited) way in which that anaphoric presupposition can be locally, as opposed to only globally, satisfied.

2.3 **Even 1st person indexicals may be bound**

There is at least one language, Llengua de Signes Catalana (Quer 2005, 2011, 2013) where a shifted 1st person pronoun may denote the arbitrary instantiation of the quantificational subject of an embedding attitude verb. But even in English we find bound uses of plural 1st and 2nd person indexicals bound under distributivity. Consider:

(28)   [Sally and I]$_7$ each promised ourselves$_7$ that we$_7$ would be nice to the other.
         logical form:[4] 'each $x \in |Sally|$(w*)$\oplus$g($|I|$)(w*) is s.t. for all $y \in |Sally|$(w*)$\oplus$g($|I|$)(w*)
         s.t. $y \neq x$: x promised x that x would be nice to y'

(28) says that each atomic member of the group consisting of Sally and the speaker has the property of promising herself that she would be nice to the other atom of that group—I'm determined to be nice to Sally and she's determined to be nice to me. On this interpretation of the subject, distributive over the property denoted by the VP, both *ourselves*$_7$ and *we*$_7$ have a syntactically plural antecedent—the conjoined subject—but a singular interpretation in any instantiation of the atomic i-parts of the subject: *each* of Sally and the speaker is nice to the other element of the pair. So *ourselves* and *we* are effectively quantificationally bound by *each*.

Kratzer (2009) might treat *ourselves* and *we* in (28) as what she calls "fake" indexicals; she posits two types of fakes, each instantiated here: *ourselves* would be a syntactically local fake, *we* a long-distance fake, with quite different accounts for the two types. Given her assumptions, this would work for (28), where crucially the long-distance *we* is under the scope of the attitude predicate *promised*, triggering in her account a crucial type of context-shifting under the attitude. I'll have more to say about so-called fake indexicals in §5.2 below. But here I note that that approach cannot account for (3), repeated from above, or for the related example in (29), which involves what Collins & Postal (2012) call an *imposter*: the 1st person singular subject (its person reflected in obligatory agreement with singular *is*) binding a 1st person plural *we*.

(3)   We're all experts on women until we marry one.
        'each of us x is s.t. x is an expert on women until x marries a woman'
(29)   Each of us men is an expert on women until we marry one.
        'each of us men x is s.t. x is an expert on women until x marries one'

In (3), adverbial *all* is distributive, and hence the embedded subject of *marry* is semantically singular—an arbitrary instantiation of the main clause subject under the scope of distributive *all*. In (29) the subject *each of us men* is an imposter in the sense defined in Collins & Postal (2012)—a 3rd person singular subject (as indicated by agreement with *is*) apparently binding 1st person plural *we*, the anaphoric binding apparently licensed by the partitive quantifier's 1st person plural domain complement *us*. Again, the interpretation of *we* is as the arbitrary single exemplar of the relevant set of men. In neither (3) nor (29) is the *we* in the predicate either syntactically local in the sense Kratzer requires to be a local fake, or under the scope of an attitude, as required for her long-distance fakes.

Hence, none of the extant theories accounts for all these uses.

2.4 **The *de se* character of indexicals**

There is another feature of indexicals that isn't captured by either the direct reference or simple anaphoric theories: they always yield self-ascriptive, or *de se* interpretations (Geach 1957; Casteneda 1966,1968; Morgan 1970; Lewis 1979b; Richard 1983; Perry 1993; Maier 2009; Pearson 2012,2018; Ninan 2010, etc.). Consider how this works with the 3rd person pronouns reported in that literature, as in this example after Morgan (1970):

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[4] For any individuals *a*, *b* in a model, a$\oplus$b is the join of *a* and *b*, intuitively the group consisting of *a* and *b*. See Link (1983) and the large body of subsequent literature which adopts his basic lattice-theoretic approach to plurals and distributivity.

(30)   [Context: The baseball player Ernie Banks gets hit on the head and develops total amnesia. He doesn't know his name or remember anything about his past, though he is lucid. During his long recuperation, he reads in the newspapers about a baseball player named Ernie Banks, and becomes fascinated with the guy's career. His social worker reports to a nurse:]
        <u>Ernie Banks</u> thinks <u>he</u> is one of the greatest shortstops of all time.
      non-*de se*:   'Banks believes that that guy Ernie Banks is a great shortstop'
      de se: 'Banks believes of himself that he's a great shortstop'

In the context given in (30), the amnesiac, non-*de se* version is true, while the *de se* version is false. But in both interpretations the NPs *Ernie Banks* and *he* are coreferential, and both interlocutors know this. Consider these variations:

(31)   [spoken by the nurse in the context described in (30):]
        Ernie Banks believes that what he would mean if he now said "I am one of the greatest shortstops of all time" is true.
(32)   Ernie Banks believes that what he would mean if he now said "Ernie Banks is one of the greatest shortstops of all time" is true.

(32) is clearly true, but (31) is not. But direct reference predicts (31) to be true as well, because the Kaplanian semantics for *I* makes it denote the actual speaker in the speech situation reported—here, the counterfactual situation where Banks utters (33).

(33)   [Bank's counterfactual utterance:] I am one of the greatest shortstops of all time.

Here is a technical explanation of why:

direct speech report **say_q**:   [modified from Potts 2007]
an utterance of the form **say_q** $(\alpha, \text{"[}_S \varphi])$ has two proffered implications:
- a speech act report: 'the subject uttered the complement verbatim'
- an attitude report: 'the subject sincerely proffered the meaning of what she uttered, as determined by its conventional content and the context c of the reported utterance'.
  What is it to **sincerely proffer**?:
    - S is declarative: proposes addition of the proposition denoted by φ in c to the interlocutors' common ground
    - S is interrogative: poses the question denoted by φ in c for addition to the set of questions under discussion
    - S is imperative: suggests the modal property denoted by φ in c, directed at the addressee, for addition to the relevant interlocutor's ideals (goals for directive, wishes for desiderative, etc.)
  Thus, e.g., sincerely proffering a declarative involves a commitment on the part of the speaker to the truth of the proposition denoted.

Spelling this out formally:

(34)   **Formal semantics and pragmatics of saying**:   [modified from Potts 2007]
- **"[_S φ]"** denotes the conventional content of sentential [_S φ], a triple including its phonological content, syntactic structure, and conventional proffered semantic content.
    E.g.:   "[_S (33)]" = >]ɑ^y æm ðə gre^ytəs ʃɝtstɑp] ; S ; **greatest-shortstop(I)** : t>
- **utter**(e,α,"[_S φ]",c) is true in a context c just in case *e* is an event of α uttering PHON("[_S φ]") at Time(c), in such a way (including prosody, gesture, etc.) as to convey SYN("[_S φ]") and SEM("[_S φ]").

- **mean$_{nn}$**(e,α,‖SEM([$_S$ φ]‖^c) is true in context c just in case *e* is an utterance by α at Time(c) in which α sincerely proffers to her interlocutors in c the semantic content of φ as interpreted in c, *thereby conveying that so far as the speaker is concerned φ's propositional presupposed content is true, as well.*
- **say$_q$**(α,"[$_S$ φ]") is true in a context c just in case there is an event e occurring in context c′, s.t. Speaker(c′) = α, UtteranceTime(c′) = the EventTime of e, and
  ‖**utter**(e,α,"[$_S$ φ]")‖$^{c′}$ = 1 & ‖**mean$_{nn}$**(e,α,‖SEM[$_S$ φ]‖$^{c′}$)‖$^{c′}$ = 1

I take it that the compositional determination of the truth of ‖SEM([$_S$ φ]‖^c in *c* involves resolving any anaphoric triggers in φ, including the standard nominal cases, Reference Time determination (Partee 1984), domain restriction (von Fintel 1994, Roberts 1995), and the identification of relevant focus alternatives (Rooth 1992), as necessary to guarantee that the result is a proposition, question, etc. I have added the clause in italics as part of what it is to **mean$_{nn}$**, to guarantee that the regular presuppositional content of φ is also understood to be part of what the speaker means in sincerely uttering φ. This will guarantee, in Stalnakerian terms, that the speaker assumes that the presupposed content is either already part of the CG or will be readily added to the CG. In other words, the presupposed content of an utterance, such as the truth of the complement of a factive verb, isn't part of what the speaker proffers in uttering φ, but it is part of what she means$_{nn}$. Since the presupposed content of an expression is part of its regular meaning, this seems like a reasonable assumption.

The interpretation of (33) in (33′) follows from the standard Kaplanian semantics for *I*, the speaker in the given context of utterance, here c′:

(33)   [Bank's counterfactual utterance:] I am one of the greatest shortstops of all time.
(33′)   where Speaker(c′) = EB: ‖**greatest-shortstop**(**I**)‖$^{c′}$ = ‖**greatest-shortstop**‖$^{c′}$(‖**I**‖$^{c′}$) = ‖**greatest-shortstop**‖$^{c′}$(Speaker(c′)) = ‖**greatest-shortstop**‖$^{c′}$(EB)

To determine the proposition Banks would express if he uttered (33) in counterfactual context *c*:

> **say$_q$**(EB,"[$_S$*I am the greatest shortstop*]") is true in context c iff there is an event e occurring in context c′, s.t. Speaker(c′) = EB, Time(c′) = ET(e), &
> > ‖**utter**(e,EB,"[$_S$*I am the greatest shortstop*]")‖$^{c′}$ = 1 &
> > ‖**mean$_{nn}$**(e,EB,‖**greatest-shortstop(I)**‖$^{c′}$)‖$^{c′}$ = 1
> where (by (33′)):
> > ‖**mean$_{nn}$**(e,EB,‖**greatest-shortstop(I)**‖$^{c′}$)‖$^{c′}$ = 1 iff ‖**greatest-shortstop**‖$^{c′}$(EB)
> the proposition counterfactually expressed: 'Ernie Banks is the greatest shortstop'

(31) asserts that Banks believes (33′). Since we know from the scenario described that Banks *does* believe (33′), (31) is incorrectly predicted to be true.

Direct reference fails to get at the *de se* character of indexicals. In uttering (33), Banks would self-locate as the great shortstop; and mere coreference does not suffice to capture this self-location.

A pragmatic fix?:
Egan (2009) offers what I call a **Speech Act account** of the self-ascriptive properties of *I*. Paraphrasing:

> A competent speaker, who knows the Character of *I*, in using it consciously knows that it will directly refer to the actual speaker. Moreover, he knows that he is that speaker. Hence, he knows that in using *I* he self-ascribes whatever properties are predicated of that subject.

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One might somehow extend the speech-act based story for direct speech to account for direct quotation: If he actually uttered (33), Banks would mean more than he said: the pragmatic self-ascription of a competent speaker would enrich that proposition, inappropriately in the case at hand, yielding an implausible counterfactual claim.

Notice that the anaphoric account of English *I* in (20) accounts for the difference between (31) and (32). If the presupposition is part of what Ernie would mean$_{nn}$ in counterfactually uttering (33), then presuming he knew he was the speaker uttering *I*, he would mean$_{nn}$ that he himself was the great shortstop.

But the problem goes deeper:
In almost all of the many languages which have shifted indexicals, use of an embedded shifted indexical always yields a *de se* interpretation, wherein the embedding agent self-ascribes the properties predicated of the indexical.[5] In the Amharic translation of (35) *he$_i$* may be replaced with 1st person singular *–ññ*, and the result is *de se*:

(35)   Ernie Banks$_i$ told me that he$_i$ is one of the greatest shortstops of all time.

But:
- (35) does not involve direct quotation, so doesn't entail that Ernie said *I/-ññ*.
- Moreover, in several languages, the embedding verbs are not all verbs of saying, but include the translation counterparts of other attitude predicates; these predicates include 'think' (Nez Perze, Slave, Uyghur), 'want' (Slave), 'consider' (Japanese), and other attitudes (ASL, Gebärdensprache/DSG, and Llengua de Signes Catalana/LSC). In none of those cases is an extended Speech Act account plausible. Nonetheless, the resulting attributions are always *de se*.

And there is more linguistic evidence that indexical pronouns are lexically self-ascriptive:

> **Wechsler's (2010) associative universal**:[6]
> It is a language universal that 1st and 2nd person plural pronouns are **associative**: Across all languages studied the counterparts of *we* or plural *you* are never to be understood as coreferential with a plural group of speakers or addressees, but instead only as including the indicated discourse participant (e.g. a singular speaker or hearer).

Wechsler argues that the explanation for this striking language universal is that "reference to 'addressee' and 'speaker' is not directly distinguished at all within pronoun systems." Instead, "the value of the person feature (1st /2nd /inclusive) indicates which speech-act participant self-ascribes, instead of indicating which speech-act participant the pronoun refers to" so that "self-ascription exhausts the person semantics of [*you* and *I*]" (2010:348).

In support of Wechsler's thesis:

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[5] Deal (to appear) cites two languages in which shift of a personal indexical need not result in a *de se* reading: In the Afro-Asiatic language Dhaasanac 1st and 2nd person indexicals both shift but need not yield *de se* (Nishiguchi 2012,2017), and Uyghur 1st and 2nd person indexicals both shift but only the 1st person yields *de se* (Sudo 2012). Deal cites 32 languages in which indexical shift has been carefully studied, 13 more with preliminary results, and a few others that should bear investigation. So far, in all of those languages except Dhaasanac and Uyghur 2nd person, a shift under embedding results in a *de se* reading.

[6] According to Kratzer (2009) this has been observed by Moravcsik (1978), Zwicky (1977), Greenberg (1988), Noyer (1992), Cysouw (2003), and Siewierska (2004), as well.

(36)   [Context: In real life, Ernie Banks was a shortstop for the Chicago Cubs from 1953 to 1971. Leo Durocher was the Manager of the Cubs from 1966 to 1972. In the amnesia scenario, suppose that Banks' injury occurs while Durocher is Manager. Durocher visits him in his hospital room, but has been warned by the doctors not to tell Banks that he is in fact Banks (for fear it would overly disturb him). However, Banks knows who Durocher is, and they talk about the Cubs and about Banks' admiration for the great shortstop. Durocher comes out and says to the nurse:]
Ernie thinks that we work well together.

Durocher's *we* is intended to denote Durocher⊕Banks (the join of Durocher and Banks, in a Link-style (1983) semantics for plurals), so that it overlaps in reference with the subject *Ernie*. This statement is *de se* with respect to Durocher, but *not* with respect to Banks. So given an attitude report with a 3rd person subject/agent and a plural 1st-person indexical in the complement, only the anchoring speaker need be *de se*, in keeping with Wechsler's thesis and the relationship of self-ascription to *de se* interpretation.

Conclusion: in order to capture the meaning of indexicals, we have to capture their *de se* semantics.

3   Modeling and tracking doxastic perspectives: Centered worlds and discourse centers

In this section, I develop some of the tools I will use in the proposed *de se* semantics for indexicals presented in §5 below.

Central here is the notion of a *de se* perspective. Consider the arbitrary agent *a* in the actual world *w**. We can think of *a*'s doxastic perspective in *w** as the way things seem to be from *a*'s point of view in *w**, given her beliefs. In standard formal semantic terms, this is modeled using a modal accessibility relation, call it DOX, a function which maps a world (the world in which the agent holds this point of view) to a set of worlds (the worlds consistent with the agent's beliefs in the base world). But as we just saw in §2, an agent's doxastic perspective is richer than this—it also includes information about where the agent takes herself to be situated in this how-things-are. To model this, I follow the approach to modeling the *de se* of David Lewis, as modified by Robert Stalnaker.

In §3.1, I review the Lewis/Stalnaker approach to *de se* interpretation. But to show how an indexical is anchored to a particular doxastic perspective in a given context of utterance, especially in the case of languages with shifting indexicals, we need a way to track which doxastic perspectives are relevant and salient at a given point in discourse. Accordingly, in §3.2, I introduce the notion of a discourse center in a dynamic pragmatics, where it is modeled as a distinguished type of discourse referent. The dynamic pragmatics tracks the information available to the interlocutors at a given point in discourse, showing how this may be brought to bear in interpretation.

3.1   Centered worlds and *de se* doxastic perspective

Following a suggestion due to Quine (1969), Lewis (1979b) developed a semantics for the *de se* based on centered worlds. A centered world is an ordered pair consisting of a possible world and an individual in that world, the latter the *center*; Ninan summarizes the general approach:

Centered worlds:
        A centered world $\langle w_0; x_0 \rangle$ is compatible with what an agent *x* believes in a world *w* iff *x* thinks in *w* that she might be x_0 in w_0 (*x*'s beliefs do not exclude the possibility that she is x_0 in w_0). An agent *x* believes *de se* in *w* that she is F iff every $\langle w_0; x_0 \rangle$ compatible with what she believes in *w*

is such that x_0 is F in w_0. To believe a centered proposition (set of centered worlds) p is for every centered world compatible with what one believes to be contained in p. [Ninan 2010]

For simplicity here, Ninan ignores the fact that a given individual's beliefs may change over time, so that individuals hold their beliefs in a world *at a time*. His characterization can be revised to take the world element of a centered world to be a world-time pair, or, as we will do following Stalnaker (below), by taking a center to be an agent-time pair.[7] For convenience, when we want to refer to the first element of a center alone, without the time, we will call it the *agentive center*.

A Hintikkan doxastic accessibility relation takes an agent and a world, and yields a set of worlds, those in which every proposition that the agent believes in that world is true. Here, instead, the relata will be centered worlds:

DOX: For a given agent a at time t in world w, DOX($<<a,t>,w>$) = $\{<<b,t'>,w'>|$ w' at t' is a world that is consistent with what a believes at t in w, and b is the individual a takes herself to be at t' in $w'\}$.

A **belief state** is a pair consisting of a centered world and its Dox-related belief set:
- the **base (centered) world**: an ordered pair $<<a,t>,w>$ consisting of (i) the center $<a,t>$: the person a whose beliefs at t are being represented, and (ii) the possible world w in which the center has those beliefs at t
- the **belief set**: the set of centered worlds DOX($<<a,t>,w>$).
  For convenience, we can talk about a's **belief worlds** at t in the base world w—those worlds w' such that for some b, t' $<b,t'>,w'> \in$ DOX($<<a,t>,w>$).

Stalnaker (2008) offers a modified theory of centered worlds, using a model <W, S, T, ≥, E, R> where:
1. W is a nonempty set of possible worlds
2. S is a set of *subjects* or believers
3. T is a set of times
4. ≥ is a binary, transitive, connected, anti-symmetric relation on T, a relation that determines a linear order of the times.
5. E is the set of centered worlds meeting the condition that the subject of the center exists in the world at the time of the center, where
   - A **center** is a pair, $<a, t>$, where a ∈ S and t ∈ T. Subjects may exist at some times at some worlds, and not at others.
   - A **centered world** is a pair $<c,w>$, where c is a center and w ∈ W.
6. R is a binary relation on E that is transitive, Euclidean and serial. R must also satisfy condition (*), below. To say that $<<a,t>, w> R <<b,t*>,w'>$ is to say that it is compatible with what a believes at time t in world w that she is in world w', that she is person b, and that the time is time $t*$.
(*) For any centers, c*, c′ and c″, and worlds w and w': if $<c*,w> R <c',w'>$ and $<c*,w> R <c'',w'>$, then c′ = c″.

The difference between these is non-trivial. If we introduce times via world-time pairs, then these pairs—and not worlds *simpliciter*—are the objects of beliefs. Do we want to say that for a given world w some times-in-w are part of agent a's belief set, and others not? See Stalnaker's approach below, which precludes that: Sets of worlds as-a-whole are the objects of belief. If one assumes a situation semantics (Kratzer 1989), the world-time pairs might just be types of situation, and hence the objects of belief. Here we will be agnostic on these important, subtle issues. I take the time to be part of the specification for a center since the notion of a Discourse Center, to be defined below, involves a time, making for a convenient parallel with the semantic notion of center in a centered world.

The main difference from Lewis' model is Stalnaker's condition (*), which tells us that "ignorance or uncertainty about where one is in the world is always also ignorance or uncertainty about what world one is in" [2012:70]. This is unlike Lewis' model, where a belief state can contain two centered worlds which share the same world but have different centers. Among other virtues, Stalnaker claims that (*) permits us to:

- model the denotations of the complements of attitude predicates as simple propositions, and thus straightforwardly:
- compare the beliefs of different subjects (whether self-locating or "boring"), and of a single believer at different times, something not possible in the Lewis model (where two sets of centered worlds with distinct centers were not comparable),
- model the way assertions change the context, as in Stalnaker (1979), and
- model the dynamics of belief for a single agent, using standard belief revision theory.

Because I find these improvements to be important, Stalnaker's is the notion of (purported) doxastic state we will assume henceforth. The agents of such a state is a **doxastic center**. And we'll talk about the state as reflecting the center's **doxastic perspective**—'the way they see things'.

3.2   **Discourse centers**

In order to capture constraints on how shifting indexicals may be anchored, we need to be able to track which doxastic perspectives are available, in a sense to be defined, to serve as anaphoric anchors for indexicals at a given time in discourse. In contemporary formal pragmatics, it is now standardly assumed that interlocutors track a variety of types of information that they assume is available to all interlocutors throughout discourse, that information both updated and (in case of content limited to the scope of an operator) down-dated as the conversation proceeds. Often, this kind of dynamic information update is modeled in a dynamic semantics (Kamp 1981, Heim 1982, and much subsequent literature),[8] wherein the meaning of an expression is treated as a function from contexts to contexts, the latter the result of updating the former with the meaning of the expression. However, I agree with Stalnaker (2014) that it's preferable instead to use a dynamic *pragmatics*: Essentially the compositional semantics for an expression is given in standard, static terms (so that, e.g., the meaning of an indicative clause is simply a set of possible worlds), but the interpretation of a given sub-constituent of the expression takes place with respect to a dynamically updated **local context of utterance**, which may differ from the global context given at the outset. The context is dynamic because the local context of utterance for a given constituent of an utterance is the global context plus possibly information about the interpretation of other subconstituents, typically under the scope of some type of operator. Hence, as in dynamic semantics, the consequent of a conditional or the second conjunct of a conjoined sentence are interpreted relative to a local context in which the information in the global context has been temporarily updated with the information given by the interpretation of the *if*-clause or the first conjunct, respectively. The difference between the two constructions is that local update with the *if*-clause is only temporary—down-dated after the entire conditional has been interpreted (as in Geach's (1962) donkey sentences), whereas local update with a first conjunct is permanent, directly contributing to the global context that results after the whole conjunction has been interpreted. But in both constructions, the first clause potentially offers information crucial for interpretation of the second, so that the interpretation of the second relies on more information than is available in the global context for interpretation of the whole.

But what is a context? Work on formal pragmatics since the 1980s argues strongly that, as proposed in Lewis (1979a), and as partly realized in Heim (1982) and Kamp & Reyle (1993), a context is a body of information tracking the content gleaned across the preceding discourse, including both the interlocutors'

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[8] For a good introduction to the literature on such theories, see Geurts, Beaver & Maier (2020). But Heim (1982) is still the best introduction to the motivation for and formal content of discourse referents.

Common Ground (in the guise of their C(ontext)S(et)—the worlds consistent with all the propositions in the CG) and a set of discourse referents (dRefs) corresponding to all the entities they're jointly familiar with, whether by direct acquaintance (say, in the actual world or the situation of utterance) or by virtue of utterance of a NP. It is standard in DRT to include dRefs not only for individuals, but for times and/or events as well, for example (Partee 1984) to model Reichenbach's (1947) notion of Reference Time and its effect on the interpretation of tense.

It may be useful to understand dRefs as hyperlinks in a complex hypertext: The hypertext (our context) contains propositional and other information in the CG, and the dRef indices are addresses that permit one to cross-reference all the bits of information that pertain to that given dRef. Then dRefs are interpreted by assignment functions, as if they were variables in the logical form of an independent sentence. A dRef d bears an index i, corresponding to the referential index on any NPs correlated with it in utterances in the discourse: the NP—if any—that leads to its introduction and any anaphoric NPs which take it as co-construed antecedent or deictic indicatum (Roberts 2002, 2003, 2005). We track the information shared about dRef d_i (its "file" in Heim's metaphor) by requiring that the only admissible assignment functions for interpretation in the given context of interpretation give values to d_i which verify all the information about d_i in that context. If the global context—the Common Ground—reflects the fact that d_i is an aardvark and lives in the Cincinnati zoo, then all **CS-consistent assignments** must assign some aardvark or other in the Cincinnati zoo as the value of d_i in all worlds in the C(ontext)S(et). If d_i is introduced by a deictic gesture accompanying the utterance of a demonstrative, all admissible assignment functions must assign it as value the *res* so-indicated. And as with Tarskian truth evaluation, a dRef need not always be construed as referring to a specific entity, and may even be bound, any values assigned being arbitrary instantiations of the domain of the binding operator. More generally, at any given point in discourse the context only admits assignment functions that reflect all the information the interlocutors have shared up to that point—the information in their Common Ground plus local context, where (as in the interpretation of donkey sentences) the latter may include information serving to restrict the domain an operator, and hence not in the global context prior to utterance.

In Heim (1982) context consists of a set of familiar dRefs and a set of admissible world/assignment pairs, such that the worlds in those pairs represent the CS (are compatible with the interlocutors' CG), and the values the assignments yield for any given dRef in a given world respect all the information the interlocutors' share about that dRef at that point in discourse. That information is given both by the descriptive content of any NPs taken to correspond to/coindexed with the dRef, as well as by what is explicitly predicated of them, plus any real world knowledge that the interlocutors commonly take to hold of that specific *res* or (in the case of an arbitrary object) that type of entity.

Here, for simplicity and in view of space constraints, I forego spelling out all the details of a dynamic pragmatic framework. Technically, we need a bookkeeping mechanism to model the contextual information as something like Heim's assignment/world pairs in order to link the indices on particular dRefs—their addresses—to particular information in the Common Ground. Instead, I simply talk of the set of contextually-admissible assignments—those that respect all the information in the context of interpretation, and in particular the information linked with the relevant dRefs. When the context is global, containing just the information in the CG, we talk about CS-consistent assignments. When the context of interpretation is local to some operator, we talk about the locally-consistent assignments.[9]

What is crucial for our purposes is that in the interpretation of a given indexical, its semantic value will be given by one of these locally-consistent assignments, using the referential index on the indexical as the

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[9] For a formal, compositional dynamic semantics which also offers a static interpretation for individual utterances, see Martin (2016). The account proposed here could be spelled out in Martin's framework, with the addition of a dynamically updated set of discourse centers, as described just below.

address for the relevant dRef. To interpret he_i we appeal to a locally consistent assignment g for the value it would assign to the corresponding dRef d_i.

Crucially for what follows, we will need to track information about which doxastic centers' belief states are relevant at any given point in discourse. To do so, we introduce a set of distinguished discourse referents, the **discourse centers**. A discourse center is a dRef corresponding to a doxastic center whose (purported) belief state is currently under discussion. At any given time in discourse, this is a restricted set, including at most:

- the speaker and hearer at speech time (always in the set of discourse centers);
- in the interpretation of the complement of an attitude predicate, the agent of the attitude at the event time associated with the embedding predicate; this discourse center is only available under the scope of the modal associated with the attitude predicate; and
- in a passage of Free Indirect Discourse (FID) (Sharvit 2008, Eckardt 2014, Maier 2015), the agent whose point of view is being represented in the passage at the time at which that agent's perspective is purportedly held.

The set of discourse centers is updated dynamically in a way that parallels the update of Reference Times in Partee (1984). Speakers change, we pass out of the scope of an attitude predicate, or of a passage of FID, etc., and the set of discourse centers is updated/downdated accordingly.

Somewhat more formally, I assume that the dynamically updated context of utterance at any point contains at least the following information:[10]

(37) **Context of utterance in a discourse D**: $<CS_D, DR_D, ©_D>$, consisting of

- CS: the interlocutors' Context Set, the set of worlds compatible with their CG, updated with any additional local information
- DR: the set of Discourse Referents (dRefs), a set of variables of type $<s,e>$
- ©: the set of salient discourse centers, each the ordered pair of a dRef and a time: $<d,t>$.

A local context is of the same type as a global context, just possibly updated with information given under the scope of some operator (e.g., the content of the antecedent of a conditional). In specifying a local context, I'll use the same abbreviation CS_D for the set of worlds in which all that local information is true, though of course that may exclude worlds that are consistent with the CG, as under the scope of a conditional where the antecedent's content is hypothetically assumed.[11] Note that the local context for a constituent which is not embedded under an operator or in FID just *is* the global context.

As in Elbourne (2013), I assume that dRefs are of type $<s,e>$, i.e. correspond to individual concepts. This will prove important in modeling the notion of a guise, defined in §4 below. Then we can specify:

(38) The set of **discourse centers at a given time t in a discourse context** D, is the set $©_D$ such that:
$©_D \subseteq \{<d_i,t_j> \mid d_i, t_j \in DR \ \& \ d_i$ is a doxastic agent whose purported beliefs at t_j are under discussion at t in D$\}$. Given indices i, j, k, l, m for familiar dRefs in DR:

- $©_D$ always includes a distinguished center $©_{i,j}*$, corresponding to the speaker(s) d_i at the time of utterance $t_j = t$, and another $©_{k,j}@$ corresponding to the addressee(s) at that time.

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[10] A discourse context contains more types of information besides, including at least a Question Under Discussion (Roberts 1996/2012), and interlocutors' evident goals (or their ToDo lists, as in Portner 2007). But those are not directly relevant here.

[11] Of course, local context update may be more complex than this, partly because in counterfactuals and some attitude contexts, like the complement of *wish*, update involves the usual "removal" of incompatible information. I ignore that here for simplicity.

- additional centers $©_{k,m}$ may be introduced in conjunction with the interlocutors' consideration of alternative doxastic states, triggered in a constrained fashion either by lexical semantics or in accordance with the conventions of discourse styles like FID. In particular:
  - dynamic compositional interpretation of an attitude predicate regularly triggers the introduction of a discourse center $©^P = <a,t>$, a the agent of the attitude, t the event time of the holding of the attitude; and
  - discourse conventions associated with FID trigger introduction of a center corresponding to the agent whose perspective at a given time is adopted by the author.

  In addition, like other components of the discourse scoreboard, $©_D$ is updated as the speaker changes, or when leaving the scope of a doxastic operator or FID.

For convenience, we define for all agents a, times t, centers $© = <a,t>$, Agent($©$) = a, Time($©$) = t.

4. Modeling the *de se*: self-attributive guises

How do we represent the difference between a *de se* and a non-*de se* interpretation of a given utterance? Consider the two readings of (30) represented with centered worlds:

(30)   Ernie Banks thinks he is one of the greatest shortstops of all time.
            Let $©$ stand for the arbitrary center. Then we have:
            non *de se*:   believe($<eb,w>$) $\subseteq$ {$<©,w'>$| eb is a great shortstop in w'}
            de se: believe($<eb,w>$) $\subseteq$ {$<©,w'>$| $©$ is a great shortstop in w'}

The verb *thinks* denotes a centered attitude: it relates a base centered world to the set of centered worlds that constitute her belief set at that time, in each of which the center is who the agent of the attitude (the base center) takes herself to be in that world. If the subject of the embedding predicate is taken to be the center in those worlds, we get the *de se* interpretation; otherwise not.

We saw in (30) that coreference did not suffice to guarantee *de se* interpretations. More generally, the classical puzzles about *de re* attitude ascription all argue that relying solely on co-reference with a given *res* to characterize what it is for an agent to hold an attitude toward that *res* is too coarse-grained. We only ever hold an attitude toward an entity under some (more or less complex) guise. To explain *de re* belief, we must consider not just reference, but the finer-grained notion of reference under a guise. A guise is always and only a guise in relation to some singular entity, the *res* who bears it in a given world.

Think of a guise as a function that individuates the *res* in the world of interpretation. We will develop an analysis of this notion, and of what it is to be a guise *de se*, using Aloní's (2001) notion of a conceptual cover, a way of individuating each member of a given set of entities (the domain) across a given set of possible worlds.[12] A conceptual cover is a set of individual concepts (ICs, type <s,e>) defined over that domain such that in each of the possible worlds each member of the set of entities is the value of exactly one IC, and no more than one entity is the value of any IC in any given world. This is a way of technically guaranteeing that all the individual concepts in a conceptual cover are ways of individuating the relevant entities—uniquely identifying each in any given world in the (possibly restricted) domain. Here is Aloní's definition, assuming a single domain of individuals across the worlds in a model:[13]

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[12] Discussion of the importance of the individuating nature of guises for *de re* ascription goes beyond the purview of this paper. See Aloní (2001) and the pedagogical introduction to conceptual covers in Roberts (2014) for definitions and fuller explication.

[13] As Aloní (2001; Chapter 4) discusses, the assumption of single domains across worlds is not essential. What is crucial for her account is that in each world the cardinality of the domain is the same, so that there can be a 1:1

Given a set of possible worlds W and a domain of individuals D, a **conceptual cover** CC based on (W,D) is a set of functions W → D such that:

$$\forall w \in W \; \forall d \in D: \exists! \text{IC} \in CC: \text{IC}(w) = d$$

Then we can formally define the notion of a guise as follows, where in the cases of interest this will be the denotation of an anaphoric NP, of type <s,e>, so a function from worlds to individuals. We could take the type *s* to actually be a pair of world and time, so that a guise holds of some entity in some world at a given time, but I will sometimes ignore the time for simplicity:

A **guise** γ of entity *a* in world *w* is an individual concept such that there is a CC s.t. γ∈CC and γ(w) = *a*.

In other words, a guise of *a* in *w* is a way of individuating *a* in *w*. So each IC in a conceptual cover is an individuating guise in this sense, individuating all the entities in the domain of entities in each of the possible worlds.

In describing an agent's relationship to some particular *res*, a speaker can only use one noun phrase at a time to denote that *res*. The chosen NP—a proper name or the content of a description, for example—can only evoke one way of being familiar with that *res*. The speaker may chose a descriptive content that reflects a way she believes the addressee will most reliably recognize the intended denotatum (*de re*). Or, in the complement of an attitude predicate, especially if there's an apparent failure of the agent of the attitude to recognize some actual guise of the *res*, the speaker may choose a descriptive content that reflects a guise which (the interlocutors have reason to believe that) the agent believes the *res* to bear (*de dicto*). If the descriptive content is *de re* (true of the *res* from the interlocutors' point of view), it is left open whether the agent in question grasps the *res* under the corresponding guise (at least, in connection with the role that's predicated of it). And if so far as they know s/he does not, it is left open just how s/he *is* familiar with that *res*. Thus if, in Quine's (1956) example, we claim that Ralph believes that Ortcutt is a spy, the name *Ortcutt* can be understood to reflect a guise ('bearing the name Ortcutt') under which Ralph would not recognize the *res* in question as a spy, so that he would not assent to the assertion *Ortcutt is a spy*, even though under some other contextually salient guise of that *res*—say, 'the man in the brown hat in the rough part of town last night'—the belief attribution is true, as in Quine's story.

Aloní represents *de re* readings using a perspective operator ℘ which takes the triggering NP (or as I'll assume, its corresponding dRef) as argument and yields a possibly shifted interpretation. ℘ is a guise-shifter, a more constrained version of Percus & Sauerland's (2003a,2003b) concept generators; Aloní takes ℘ to be assigned pragmatically, not in syntax.

Following Boer & Lycan (1980), I take it that the *de se* puzzle is a special instance of the *de re*: Ernie Banks displays many guises: In Ernie's case (let's suppose) these include not only bearing the proper name *Ernie Banks*, but also being the greatest Chicago shortstop of his day; and being the patient in bed 20F, ward 3 of Massachusetts General Hospital on the day in question. Another guise of the *res* Ernie Banks, from his own perspective, is that of being himself. Ernie Banks is familiar in one sense both with the amnesiac lying in the hospital in bed 20F—which he identifies with his own self as presently embodied—and with the famous baseball player by the name of Ernie Banks. The description *the*

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cross-world mapping. With domain restriction, this is quite plausible. Then one is free to assume that different worlds have different domains (Lewis' 1986), with counterpart relations between individuals in distinct worlds. Aloní emphasizes that Lewis' insistence on such relations is based on "a metaphysical notion and not an epistemic or doxastic one" (p.136). But Aloní's cardinality constraint results in a more restrictive class of counterpart relations than Lewis', requiring symmetry and transitivity.

amnesiac lying in the hospital in bed 20F and the name *Ernie Banks* pick out the same *res* in the actual world of the story, and both are ways of uniquely picking out, i.e. individuating that *res*. But we can readily imagine that at least the definite description has different values in other possible worlds. So the denotata of these expressions—the two individual concepts which both yield Banks as sole value in the actual world—are two distinct guises of the actual Banks. Though Ernie's belief set may include the actual world, as described in Morgan's story it includes others where the two NPs pick out different individuals, and he probably gives greater credence to those worlds than to the actual one. In fact though Ernie may eventually come to understand that these are both guises of the same *res*, there will still be many guises under which he doesn't recognize himself. For example, even if in fact on June 21st 1965 he is the patient in Mass General with the highest metabolism, or is the Chicagoan who will be buried with highest honors in January, 2015, he will probably never know those things about himself. Nonetheless, they are guises of Banks from our broader perspective.

More generally, no agent may ever know any *res* completely, and in particular may ever know all its individuating properties, even if that *res* is himself. Hence, knowing who someone is in a given world doesn't entail recognizing that entity under all the guises which are true of it (Aloní 2001). This, of course, is just what we expect given the classical puzzles about what it means to know who someone is, including the puzzles about *de se* belief attribution discussed above. Hence, recognizing an entity as oneself requires recognizing it under a particular kind of guise, a self-attributive guise:

> An individual concept γ is a **self-attributive guise** of agent *a* at time *t* in world *w* just in case for all worlds *w'* in a's belief-set at *t*, *w*, γ(w′) = the agentive center of *w′*, i.e.:
> $\forall x, t', w'[<<x,t'>,w'> \in \text{Dox}(<a,t>)(w) \rightarrow \gamma(w') = x]$

Guises are more fine-grained than mere extensional reference: Just because two guises have the same value in the world of evaluation, this doesn't entail that they have the same value in a given agent's belief worlds. For Ernie Banks, 'the amnesiac in bed 20F' and 'the guy talking with Nurse Williams' are self-attributive guises, while 'the guy named *Ernie Banks*' is not.

In 3rd person *de se* examples like (30), there are various mechanisms one might explore to derive the *de se* interpretation. One might assume that it involves a self-ascription operator in syntactic LF in the COMP immediately dominating the anaphoric trigger (see the treatment of PRO in Chierchia 1990, Pearson 2012, 2018, and of course Percus & Sauerland 2003a,b). Or one might take the *de se* in such examples to instead be a species of *de re* interpretation, captured pragmatically (see Roberts forthcoming b). Below I will characterize the personal indexicals as *lexically* entailing the *de se*. For this, we will use a perspective shifting operator 𝒟𝑒𝒮𝑒 which takes a dRef argument to assure that the dRef's interpretation is a self-attributive guise of the anchoring discourse center:[14]

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[14] 𝒟𝑒𝒮𝑒 defined here differs from Aloní's more general perspective shifting operator ℘ in several respects. Her operator applies to variables in an intuitively (not compositionally) derived logical form, using special perspective indices on the variables, while this one applies to dRefs and is relativized to a discourse center in order to constrain its application; see Roberts (in preparation a) for more discussion. Moreover, Aloní's ℘ is a function which yields a (contextually salient) conceptual cover CC and then indirectly assigns an IC in CC, while the operator defined here directly yields an individual concept, presupposing that it is an element of a CC. As Aloní notes, it seems that what interlocutors actually take to be familiar is the individual concept that is the value of the variable under the referential index—my guise, and not the CC itself.

(39)   **The self-ascription operator $\mathcal{DeSe}$**

Given local context D = <CS_D, DR_D, $©_D$>, $© \in ©_D$, and world of interpretation w, time of interpretation t, then for all CS_D-consistent assignments g, $\mathcal{DeSe}^{(©)}(\mathbf{d_i})$:

<u>Presupposes:</u>   for some $d_k \in DR_D$, $© = <d_k,t>$, and $g(d_i)(w) = g(d_k)(w)$
<u>Proffers:</u> $g(\mathcal{DeSe}^{(©)}(d_i)) = $ a guise $\gamma_{<s,e>}$ s.t.

        (a) for all $<<a,t'>,w'> \in \text{DOX}(©)(w)$: $\gamma(w') = a$, and
        (b) for all $<<b,t''>,w''> \notin \text{DOX}(©)(w)$: $\gamma(w'') = g(d_i)(w'')$.

$\mathcal{DeSe}$ is a guise-shifter, relativized to a contextually available discourse center $©$. It takes as its argument a familiar dRef d_i to yield a self-ascriptive guise of the *res* denoted by d_i (under any given CS-consistent assignments g in a given world of interpretation—e.g., any CS-world).[15] Its presupposition is like a selectional restriction, a constraint on the applicability of $\mathcal{DeSe}$: the operator's argument dRef d_i (and hence the corresponding NP) has to be coreferential in the world of interpretation with the agent of the attitude which licenses addition of $©$ to $©_D$. Call this the **de re grounding** of the pronoun's shifted interpretation to the anchoring *res*. So if the world of interpretation is the actual world, and the antecedent NP_1 (say, the agent of an embedding attitude) as a singular interpretation, the dRef corresponding to the embedded pronoun has to have the same singular value in the actual world.

In the proffered content, given the definition of *guise*, the specification that γ is a guise entails that it's a member of some salient CC; so the shifted guise is one way of individuating the anchoring *res* from the doxastic perspective of the discourse center $©$. Then clause (a) tells us that it's a self-ascriptive guise—its value in all the agent's belief worlds is the center. Clause (b) guarantees that in the *de se* shift induced by $\mathcal{DeSe}^{(©)}$ all previous information the interlocutors shared about d_i is retained, so that it works the same way in counterfactuals, etc., except where the belief state of d_k is relevant.

In (30), as we've seen, co-indexation of *he* with the matrix subject *Ernie Banks* merely guarantees coreference, and is not sufficient to guarantee the *de se*. Then a *de se* attitude on Banks' part can be captured by applying $\mathcal{DeSe}$ to *he* to entail that the anchoring antecedent Banks self-ascribes whatever is predicated of the pronoun. Coindexation isn't even necessary to guarantee the *de se*, as we see in (30′), where the pronoun's index differs from that on *Ernie Banks*, so that *he* and the subject *Ernie Banks* are only accidentally coreferential (i.e. for all CS-consistent g, $g(d_7) = g(d_9)$). What matters here is that the doxastic center corresponding to the agent of the attitude, Banks, available in the embedded local context, anchors the $\mathcal{DeSe}$ operator applied to the dRef for *he*:[16]

(30′) Ernie Banks$_7$ thinks he$_9$ is one of the greatest shortstops of all time.
non *de se*: $\text{DOX}(<<g(d_7),t>,w>) \subseteq \{<<a,t'>,w'>|\ g(d_9)$ is a great shortstop in $w'\}$
de se: $\text{DOX}(<<g(d_7),t>,w>) \subseteq \{<<a,t'>,w'>|\ g(\mathcal{DeSe}^{(<d7,t*>)}(d_9))(w')$ is a great shortstop in $w'\}$

Assuming that $g(d_7)$ is the rigid designator denoted by the name *Ernie Banks*, ordinary processes of interpretation will yield the non-*de se* interpretation, where $g(d_9)$ denotes the great shortstop in any world in the interlocutors' CS, though it is a function that is not necessarily rigid, it's value being distinct from that of the proper name in some of Banks' belief worlds. So the non-*de se* may be true if the interlocutors

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[15] I note that the fact that $\mathcal{DeSe}$ only applies to familiar dRefs guarantees that it only applies to the interpretation of definite NPs, deriving Aloní's constraint on NPs to which her $\wp$ is applicable to yield the *de re*.

[16] This is an important feature of the way $\mathcal{DeSe}$ works for the following reason: When (30) is the first conjunct of a conjunction, the *de se* reading is compatible with a strict reading of an elided second conjunct. But to derive the strict reading, the two NPs should be merely accidentally coreferential (Reinhard 1983 and much subsequent literature). We haven't space to explore that here, but see Roberts (forthcoming b).

know they are one and the same individual but Banks himself does not. Only if the self ascription operator is applied to the dRef for he_9, anchored by the discourse center introduced by the embedding subject *Ernie Banks$_7$*, $\mathcal{DeSe}^{(<d7,t*>)}(d_9)$, do we guarantee the *de se* interpretation: Since in the CS-consistent assignments g $g(d_7) = g(d_9)$, the presupposition of $\mathcal{DeSe}$ is satisfied, and the resulting interpretation guarantees that in all Banks' belief worlds the value of d_9 is the center of that world, so that Banks self-ascribes being one of the greatest shortstops. Hence, the *de se* interpretation is logically equivalent to:

$\quad\quad\quad$ *de se*: $\quad$ DOX($<<g(d_7),t>,w>$) $\subseteq$ $\{<<a,t'>,w'>|$ a is a great shortstop in w'$\}$

Note that the $\mathcal{DeSe}$ operator applies to individual occurrences of dRefs, and not, say, to all dRefs within a certain scope. This raises the possibility of deriving mixed *de se*/non-*de se* readings when two pronouns occur in an attitude complement clause. These are well-attested; see Roberts (in preparation b) for exemplification and discussion of patterns. This is why we treat $\mathcal{DeSe}$ not as a context shifter—a Kaplanian Monster, but an operator pragmatically shifting the meanings of particular arguments.

With the tools defined here, let us turn to the semantics and pragmatics of 1st person indexicals and *now*.

5. Indexicals, fixed, fake and shifting

Indexicals differ from non-indexicals in how they yield *de se* implications: the *de se* is optional with the 3rd person non-indexicals, given by context, but indexicals are always self-ascriptive relative to a presupposed discourse center. So self-ascription is part of the lexical content associated with an indexical, making the personal indexicals rather like instances of Casteñeda's (1968) quasi-indicator *he**. However, here the self-ascription presupposed rather than proffered, a possibility which, so far as I know, has not been explored in the literature on quasi-indicators.

In this section I offer a semantics for 1st person indexicals, both for the fixed English *I* and *we* (§5.1), and for two unrelated languages with shifted 1st person indexicals, Athabaskan Slave and Semitic Amharic (§5.3). The 1st person indexicals are considered by Kaplan to be among the *pure indexicals*, those making the strongest case for direct reference. I take it that the superior empirical predictions made by the alternatives proposed here, successfully meeting the challenges for previous accounts laid out in §2, constitute the strongest argument for the proposed new approach to indexicality generally. I also take a quick look at English *now*, and how it shifts in a way fully parallel to the shifting of 1st person in Amharic or Slave. In §5.2 I briefly discuss the so-called "fake" indexicals widely discussed in the linguistics literature, as well as examples arguably involving *de re* interpretations of indexicals, and argue that none of these pose problems for the present account.

5.1. Fixed indexicals: English *I* and *we*

I adopt the term CHARACTER as a cover term for the regular contributions of a linguistic constituent to the meaning of the larger expression in which it occurs. The pragmatic and semantic CHARACTER of an expression includes both its presupposed content (which we might take, following Heim 1983, to consist of conditions on its felicitous use in a given context) and its proffered content—its compositional contribution to what is asserted, asked or suggested (Roberts 1996). But unlike Kaplanian Character, CHARACTER is designed to interact with a dynamically changing context, facilitating an adequate account of those uses of indexicals whose meaning can only be determined in merely local context, not global.

CHARACTER is always defined relative to an assumed context of utterance. For our purposes we'll take the context to be the triple D defined above: $<CS_D, DR_D, ©_D>$. Since the set of discourse centers $©_D$

always includes a center corresponding to the speaker and one for the addressee, those will serve the purpose of Kaplan's speaker and addressee indices. Ultimately, of course, we need a richer notion of context, one more like Lewis' (1979a) scoreboard for a language game (see Roberts 2015), including information about the Question Under Discussion, interlocutors' evident goals and intentions or their ToDo lists (Portner 2007), and additional information about the structure of the discourse itself (e.g. Asher & Lascarides 2003). But we'll ignore those factors in the discussion and definitions below.

Here is the proposed *de se* CHARACTER of English *I*:

(40)   **CHARACTER of English *I***:
         Given a local context $D = \langle CS_D, DR_D, \copyright_D \rangle$, with $\copyright^* = \langle d_{sp}, t^* \rangle$, t^* and w^* the time and world of utterance:
         Presupposed content: Use of I_i is felicitous in D at t^* in w^* just in case:
         (i) $d_i \in DR_D$,   '
                  and for all local-CS_D-consistent assignments g:
         (ii)   for all worlds w: $g(d_i)(w) = g(d_{sp})(w^*)$, and
         (iii) $g(d_i) = \mathcal{DeSe}^{\copyright^*}(d_i)$.
         Proffered content: Where felicitous, for all CS-consistent assignments g, $|I_i|^{D,g} = g(d_i)$.

The first conjunct of the presupposed content requires that the denotation of *I* be familiar, corresponding to a dRef already in the context of utterance—that is, it is anaphoric. (40ii) says that for all CS-consistent g, in all worlds the IC value of d_i is the actual speaker, i.e. the denotation of *I* is a constant function anchored to the *res* $g(d_{sp})(w^*)$, which is its value in any given world of interpretation (even counterfactual worlds, as below). This presuppositional anchoring guarantees the invariability under modals that Kaplan captured by direct reference. And as in both Kaplan's theory and the simple anaphoric accounts, there is no trace of indexicality in the proffered content of the utterance. Recall (13) from above:

(13)   [spoken by Laura, a woman:] If Calvin$_7$ were speaking now, I$_{11}$ would be a man.

Laura assumes that Calvin is familiar under that name to her interlocutors, so that d_7 is familiar; the proper name guise 'Calvin' is constant, and presumably its value is a man. The speaker Laura is also familiar in the context of utterance, at least as speaker though not necessarily under the name *Laura*, and is associated with a dRef d_{11}. The *if*-clause of (13) tells us that in the counterfactual circumstances *w* of interest $g(d_7)(w) =$ Calvin is the speaker. Then we check to see if the consequent is true in all those counterfactual worlds in which Calvin is speaking instead of Laura (and which are otherwise appropriately similar to the actual speech situation). The use of I_{11} triggers the presupposition in (40ii), which requires that it denote a constant guise whose value is always the *res* which is the actual speaker, Laura. By thus presuppositionally anchoring *I* to the value of the current speaker in the actual world of utterance, the presupposition satisfaction is global, as required, giving d_{11} wide pseudo-scope. Then this *de re* anchoring prevents the pronoun from being influenced by the change in local context: all that matters is who's actually speaking, no matter how deeply embedded the instance of *I*, and (13) is false.

(40iii) says that $g(d_i)$ is a self-ascriptive guise, its value in all the speaker's belief worlds being the center. It thus guarantees the observed *de se* character of *I*.[17] But is presupposition (iii) really necessary? Because *I* is globally anchored under (40ii), and hence the CS is based on the interlocutors' Common Ground, and because the speaker is one of the interlocutors, there's a special relationship between the CS-

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[17] Note that we could state (40) without the use of $\mathcal{DeSe}$, which is used as an abbreviation to clarify what the different indexicals have in common and what they have in common with *de se* readings in general, even though in the indexicals the *de se* is lexically given, as a presupposition, rather than pragmatically assigned.

consistent assignments and the speaker's doxastic state: As the interlocutors know, $\text{DOX}(©^*)$ should (purportedly) be a (probably proper) subset of CS. That being the case, the fact that the context entails that $\text{Agent}(©^*) = d_{sp}$, the actual value of the latter giving the constant value of d_i (under presupposition (40ii)) should guarantee that the speaker believes that she's speaking. This is what Egan observed.

But as in the previous anaphoric account, we see the virtue of including (iii) as part of the presupposed content of I in how it allows us to account for our intuitions about the counterfactual example (31) considered earlier:

(31)   [spoken by the nurse in the context described in (30), where Ernie is still an amnesiac:] Ernie Banks believes that <u>what he would mean if he now said "I am one of the greatest shortstops of all time"</u> is true.

(33)   [Bank's counterfactual utterance:] I_7 am one of the greatest shortstops of all time.

Assume that in the counterfactual circumstance which serves as the local context for interpretation of (33), at the counterfactual time of utterance t^* the discourse center $©^* = \langle d_7, t^* \rangle$, where d_7 is the dRef corresponding to the amnesiac Banks. Then calculating the contribution of I_7 to the meaning of the counterfactual utterance, we see that its presuppositions are satisfied in the counterfactual context, because Banks is familiar, is speaking (and knows it), and so self-identifies as the actual speaker. The resulting proffered content of I is simply $g(d_7)$, i.e. the rigid designator denoted by *Ernie Banks*. Banks' resulting proffered statement

$$g(d_7)(w^*) \text{ is one of the greatest shortstops.}$$

is true in the counterfactual worlds (which are presumably just like the actual world except that Banks utters (33))—Banks is a great shortstop. In fact, of course, that proffered content is true in the actual world as well. But it would be infelicitous for Ernie to utter (33) in the actual world, because Banks cannot truthfully mean$_{nn}$ that the guy he recognizes as his speaking self is the great ball player. I.e., if the proffered content is true and the presupposition (ii) is satisfied, then Ernie would purport to believe the proposition under the self-ascriptive guise; since this is inconsistent with the assumed context, the utterance would be pragmatically anomalous, infelicitous.

The problem is compounded when in (31) we embed (33) under *Ernie Banks believes what he would mean if he now said*. Recall the definition of **mean$_{nn}$** in (34):

> **mean$_{nn}$**$(e, \alpha, \|\text{SEM}([_S \varphi]\|^c)$ is true in context c just in case *e* is an utterance by α at Time(c) in which α sincerely proffers to her interlocutors in c the semantic content of φ as interpreted in c, *thereby conveying that so far as the speaker is concerned φ's propositional presupposed content is true, as well*.

Then what Banks means in the counterfactual discourse includes not only the proffered content as above, but also that Banks would take the presuppositional content of his counterfactual utterance to be true as well. Since the counterfactual utterance is made at the utterance time in (33) (given *now*), and since Banks is still an amnesiac at that time and doesn't sincerely subscribe to the belief in (iii), this is false, according with our intuitions, and hence (31) is false.

One still might have reservations about clause (iii) because it seems to be pragmatically redundant. That is, since a conscious speaker is aware that s/he is the speaker, he presumably is aware that for all CS-

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consistent assignments g, $g(d_i) = \mathcal{DeSe}^{(<d\_sp,t^*>)}(d_i)$, Egan's observation. Doesn't that preclude its inclusion in the CHARACTER of *I*?

Note that I did not say that the CHARACTER of an expression is its conventional content. Certainly, we take the proffered content of an expression to be conventionally associated with its form (*l'arbitraire du signe*, Saussure 1959), in the sense of convention due to Lewis (1969). And one might take the anaphoric presupposition of pronouns, etc., to be conventionally associated with them. But is an expression's presupposed content more generally always associated with its proffered content merely by arbitrary convention?

Here is a thought experiment: Imagine that God has designed a human language, along with its entire vocabulary and grammar—of just the sort that linguists observe, reflecting Universal Grammar. Just before releasing it for beta testing, God turns to the assembled vocabulary and says "OK, you, you and you [pointing to particular words], you're going to trigger presuppositions. Follow Michael for your assigned presupposed content. The rest of you, you're proffered-only." This little story is ludicrous precisely because it seems that quite often the presupposed content of expressions in a language is non-arbitrarily related to their proffered content.

Put another way: Almost surely, most (if not all) non-anaphoric presuppositions arise naturally as a function of the conceptual content of the words that trigger them. This is reflected in the apparent non-detachability of these presuppositions in translation counterparts of the relevant triggering expressions, viewed cross-linguistically. To cite just a couple of well-researched examples:
- Across languages the translation counterparts of English factive verbs are themselves factive, and similarly with the presuppositions triggered by change of state verbs across languages (see Tonhauser et al. 2013, Tonhauser to appear, Jordan 2017, and Stout 2017; and for related cross-linguistic investigation Kierstead 2015, Yasavul 2017, and Barlew 2017).
- Cross-categorial expressions which associate with focus (e.g. *only*, *even*, *but*, *let alone*) also trigger presuppositions, again across languages (e.g. see Toosarvandani 2010).

Just so, Egan's explanation for the *de se* character of *I* suggests that the self-attributive $\mathcal{DeSe}$ presupposition is related to the indexical's function and the pragmatics of what it is to be the speaker, instead of purely arbitrarily associated with the form.[18] We want to capture the fact that one central feature of indexicals cross-linguistically, including shiftable first person indexicals, is that they always receive a *de se* interpretation anchored to the agent of an attitude, even when the agent is not implied to be a speaker, as under predicates like 'think', 'want', or 'hope'. The use of $\mathcal{DeSe}$ in the CHARACTER of *I* serves both as a recognition of Egan's pragmatic fact about the use of *I* and as a foreshadowing of what we now expect across the range of indexicals: that some element of their denotation will be anchored by $\mathcal{DeSe}$ to an anchoring agent's doxastic center.

This approach to indexicality also naturally addresses the problem of contingency, from §2.1:

(25)   a. I am speaking.
        b. The speaker is speaking.

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[18] Simons & Zollman (2019) rigorously define, in game-theoretic terms, a notion of *natural convention* and defend its utility as a more flexible and appropriate notion of linguistic convention than the sense usually attributed to Lewis (1969)—though it turns out their notion is more compatible with Lewis' than one might at first think. One could characterize the *de se* presupposition of *I* as such a natural convention, but I won't explore that here.

The CHARACTER of *I* defined in (40) predicts the observed distinction between (25a) and (25b): On a non-*de re* interpretation of its subject, (25b) is necessarily true by virtue of the relationship between the meanings of *speaker* and *speaking*: in any world in which there is a unique individual who is the speaker, that individual is speaking. But (25a) is only contingently true: In any given world, *I* picks out the *res* which happens to be the speaker (and hence speaking) in the actual world (so far as the interlocutors know it to be), but that does not entail that that individual will be speaking in all, possibly counterfactual worlds, as we saw in both (13) and (31) above. So this anaphoric account of *I* does not encounter the problem noted for accounts like that of Hunter & Asher (2005), while also avoiding the otherwise unmotivated complications in the DRT theories of Maier (2009) and Hunter (2013).

Now we turn to consider the CHARACTER of *we*:

(41)　　**CHARACTER of English *we*:**　　　　[preliminary version]
　　　　Given a local context $D = \langle CS_D, DR_D, \copyright_D \rangle$, with $\copyright^* = \langle d_{sp}, t^* \rangle$, t^* and w^* the time and world of utterance:
　　　　Presupposed content: Use of we_i is felicitous in D at t^* in w^* just in case:
　　　　　　(i)　there are $d_i, d_j, d_k \in DR_D$, with d_i maximally salient, s.t. $d_i = d_k \oplus d_j$,
　　　　　　and for all local-CS_D-consistent assignments g:
　　　　　　(ii)　for all worlds w: $g(d_k)(w) = g(d_{sp})(w^*)$, and
　　　　　　(iii)　$g(d_k) = \mathcal{D}e\mathcal{S}e^{\copyright^*}(d_k)$.
　　　　Proffered content: Where felicitous, for all CS-consistent assignments g: $|we_i|^{D,g} = g(d_i)$.

(41) has the same familiarity presupposition as for *I*, complicated by the requirement that (i) both the speaker and some possibly distinct entity/entities are mereological i(ndividual)-parts constituting the denotation of d_i. We do not require that these parts be distinct, taking the non-singleton implication of *we* to be pragmatic (consider the royal *we*). Hence, the proffered content of *we* needn't be semantically plural, as we will also see in its distributive use. Presupposition (ii) corresponds with (40ii) for *I*, requiring that the denotation of one i-part, $g(d_k)$, be a constant function always yielding the *res* who is speaker in the actual world. Thus, *we* is *de re* anchored to that *res*. But should the presupposed i-parts be distinct, only the i-part corresponding to the speaker is required to be *de se*, via (iii), in keeping with Wechsler's observation as reflected in (36):

(36)　　[Context: In the amnesia scenario, suppose that Banks' injury occurs while Durocher is Manager. Durocher visits him in his hospital room, but has been warned by the doctors not to tell Banks that he is in fact Banks (for fear it would overly disturb him). However, Banks knows who Durocher is, and they talk about the Cubs and about Banks' admiration for the great shortstop. Durocher comes out and says to the nurse:]
　　　　Ernie thinks that we work well together.

Assuming that *we* is understood to denote ErnieBanks⊕Durocher, then (36) is correctly predicted by (41) to be felicitous and true, since presupposition (iii) only requires that the i-part of the denotation of *we* corresponding to the speaker, Durocher, be understood *de se*, not attributing to his join Banks the view that he himself works well with Durocher.

(41) also correctly captures the sense of *we* in the counterfactual (42):

(42)　　[Context: Barbara is playing a duet with Craige:] If I_7 were playing a duet with a more experienced pianist$_{11}$ right now, we$_{12}$'d be playing Bach instead of Satie.　　[modified from an example due to Partee 1984]

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Because of presuppositions (40ii) and (41ii), the value of *I* and its part in the join composing *we* does not change across possible worlds, denoting Barbara in the counterfactual world. But here the local context consisting of the CG plus the information contained in the *if*-clause makes available a dRef d_{11} for the arbitrary more experienced pianist. Then the locally available dRef for we_{12} is $d_7 \oplus d_{11}$.

But because of difficulties with distributivity, (41) cannot account for examples like (28) – (29) from §2.3 above:

(28)   [Sally and I]$_7$ each promised ourselves$_7$ that $\underline{we}_7$ would be nice to the other.[19]
                logical form: 'each $x \in |Sally|(w^*) \oplus g(|I|)(w^*)$ is s.t. for all $y \in |Sally|(w^*) \oplus g(|I|)(w^*)$
                s.t. $y \neq x$: x promised x that x would be nice to y'
(3)   We're all experts on women until $\underline{we}$ marry one.
                'each of us x is s.t. x is an expert on women until x marries a woman'
(29)   Each of us men is an expert on women until $\underline{we}$ marry one.
                'each of us men x is s.t. x is an expert on women until x marries one'

In each of these, there is an instance of *we* either bound in a predicate under the scope of distributive *each* or *all* or somehow quantificationally bound by *each of us*. But one instance of the bound variable is a non-speaker, so that when *we* is instantiated by Sally in (28), the denotation in the embedded clause does not include the subject: 'sally promised sally that she would be nice to the speaker'. Hence, the presupposition in the CHARACTER of *we* in (41ii) that the speaker is a part of that instantiation fails for bound *we* (and for the corresponding 1st person plural reflexive *ourselves*) in (28). The same problem arises for bound embedded $\underline{we}$ in (3) and (29).

Rullmann (2010) makes a proposal for the semantics of *we* which we can use to account for examples like these. The intuitive idea is that the use of *we* presupposes the existence of a group containing the actual speaker and (possibly) at least one other (possibly arbitrary) individual. Then its proffered content is always some (possibly singleton) subpart of that group—not necessarily including the speaker. Modifying Rullmann's proposal to reflect the self-ascriptive character of this essential indexical, we get:

(43)   **CHARACTER of English *we***:   [final version]
         Given a local context D = $\langle CS_D, DR_D, \copyright_D \rangle$, with $\copyright^* = \langle d_{sp}, t^* \rangle$, t^* and w^* the time and world of utterance:
         Presupposed content: Use of we_i is felicitous in D at t^* in w^* just in case:
                (i)   there are $d_i, d_k, d_g \in DR_D$, with d_i maximally salient, s.t. $d_i \leq_i d_g$ and $d_k \leq_i d_g$, and for all local-CS_D-consistent assignments g:
                (ii) for all worlds w: $g(d_k)(w) = g(d_{sp})(w^*)$, and
                (iii) $g(d_k) = \mathcal{DeSe}^{\copyright^*}(d_k)$.
         Proffered content: Where felicitous, for all CS-consistent assignments g: $|we_i|^{D,g} = g(d_i)$.

Under (43), the use of we presupposes three familiar dRefs, where (i) two of them—d_i (the dRef corresponding to the referential index on *we*) and d_k—are individual parts of a familiar group d_g, and d_i is maximally salient (the value of the latter assumption illustrated below). Nothing requires that d_i be a proper sub-part of d_g, nor that these parts be distinct; hence, the royal *we* is felicitously semantically "singular", and under a distributive adverbial like *each* or *all* as in (28), we_i/d_i may denote a singular arbitrary member of the group. Also, (ii) one of these parts d_k rigidly denotes the speaker. And as with *I*, (iii) tells us that the speaker/d_k is *de se*. Hence, when *we* is instantiated under distributivity by the actual

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speaker, it will have a *de se* interpretation. Since any element of the type of lattice used to model groups in Link (1983) is an i-part of itself, this means that d_i may be d_g, as in the earlier definition.

In the partitive imposter (Collins & Postal 2012) in (29), us_g is associated with a non-atomic dRef d_g denoting a group including the speaker d_k and some other men; the quantificational NP headed by *each* introduces the dRef d_i, which then ranges over all atomic i-parts of that group. The subject *each of us*$_i$ binds *we*$_i$, as usual under coindexation, and since each arbitrary member of d_i is a member of a group containing the speaker, this satisfies the presupposed content in (43i). Rullmann's modification leads as well to a satisfactory interpretation of the simpler (3), which merely lacks the partitive structure of (29), and of (28). In the latter, each part of the group including the speaker promises herself that she will be nice to the other member of the group. There is no need here to assume that the indexical is "fake".

The modification in (41) leaves open one question: Given that *we* may have a singular interpretation and need only be a member of a group including the speaker, why can't *we* in (44) denote the speaker, instead of the group consisting of Mark and the speaker?

(44)   Mark and I went to the movies. We$_i$ lost our glasses.

One might take it that in such cases, grammatical factors like the number and gender of a pronoun come to bear on its resolution, so that, unless the speaker is royal, grammatically plural *we* strongly prefers a semantically plural antecedent. Moreover, the presupposed content in (43) requires two familiar dRefs. One is a familiar non-atomic group; this is satisfied here by the discourse referent corresponding to the subject of the first sentence, d_g s.t. for any world w $g(d_g)(w) = [[Mark]](w) \oplus g(I)(w)$. But d_i is presupposed by (43) to be *the* maximally salient dRef which is an individual-part of that group. Here, neither Mark nor the speaker is more salient than the other, or than the group as a whole. Hence, the only potential antecedent for *we* satisfying this presupposition is the denotation of the whole conjunction, so that $d_i = d_g$.

Thus all the examples considered here can be handled on the present account, without stipulation.

English number-neutral *you* raises even more interesting issues. But for space reasons, I cannot consider it here. For a proposal and extended discussion, see Roberts (forthcoming a).

5.2   **"Fake" indexicals and other *prima facie* problems for this analysis**

Partee (1989) noticed an apparently bound use of *I* in examples like (45):

(45)   Only I called my mother.
        'among all the relevant individuals, the only one who called their mother is the speaker'

It seems that both *I* and *my* are bound by the tacit universal associated with *only*. But in the paraphrase, under the scope of *all*, 1st person *my* is replaced by *their*, losing its indexical character. How can the analysis of 1st person English pronouns in (40) explain this interpretation?

There is a growing literature on such uses of indexicals, now commonly called "fake indexicals" after Kratzer (2009).[20] Notably, except for what Kratzer calls the long-distance fake indexicals (which can be handled like (28) above in the present account), the examples of interest all essentially involve an operator that is sensitive to focus, like *only* in (45). The analysis I take to be most convincing is that

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[20] See, e.g., Partee (1989), Timmermans et al. (2004), Rullmann (2004), Heim (2008), Maier (2008), Kratzer (2009), Spathas (2009), Jacobson (2012), Smith (2015), Wurmbrand (2017), Elbourne (2019), among others.

proposed (in various technical realizations) in Rullmann (2004), Spathas (2007), Heim (2008) and especially Jacobson (2012), whose consideration of the data and compositional analysis are the most detailed and satisfying. Underlying this approach is a well-accepted analysis of the semantics of prosodic focus, deriving from Rooth (1985,1992), according to which it triggers the presupposition of focus-derived semantic content, calculated compositionally in parallel with the ordinary semantic content of the utterance. In (45), *I* is prosodically prominent, or focused, and assuming that *I* and *my* are coindexed as in the rough logical form (45′), this yields two types of content according to Rooth, ignoring *only* for the moment. The prosodic prominence displayed in the subject is marked in the logical form with the feature FOC, 'prosodically focused':

(45′)   Only $[I_7]_{Foc}$ called my_7 mother.
         ordinary semantic content $|(45)|^O$:   'the speaker called the speaker's mother'
         focus semantic content $|(45)|^F$:   the set of propositions of the form
                                                                       $\underline{\lambda x_7.x_7\text{ called }x_7\text{'s mother}}(y)$, for some $y \in$ Domain

The focus semantic content is derived via abstraction on the focused constituent in logical form, thereby binding any coindexed arguments to yield the underlined lambda expression, then letting their values range over the relevant individuals in the model to yield a set of propositions, those of the form 'y called y's mother' for some relevant *y*.

It is now generally agreed (see earlier work summarized in Beaver & Clark 2008, Roberts 2011) that the interpretation of (45′) is roughly as in (45″):

(45″)   (a) [Prejacent:]   'the speaker called the speaker's mother',
           and
           (b) [Exclusive clause:]   'for all p, if p $\in |(45)|^F$, then p is logically equivalent to the prejacent'
                                            i.e., those where y = the speaker

The proffered content of (45′) is the conjunction of (a) and (b) in (45″). The prejacent (45″a) is the proffered content of the complement of *only* in (45), $|(45)|^O$. In it, both 1st person pronouns are treated as simple free variables that are contextually assigned to the speaker via resolution of the pronouns' presuppositions. The same prejacent would be derived were the two *I*'s not coindexed; but the coindexation matters in the derivation from the prejacent of the focus-semantic value $|(45′)|^F$. The Exclusive clause of *only* is derived by taking the presupposed focus semantic value shown in (45′) to be the domain of the universal.[21] Then (45′) proffers that both (a) and (b) are true. Note that in (a), *my* does denote the speaker, with the indexical's presupposed content, given by the CHARACTER in (40), guaranteeing such resolution.

According to Rullmann, Spathas, Heim and Jacobson, the focus semantic content is calculated in such a way as to ignore the presupposed content of the constituents making up the utterance. As Jacobson (2012:22) summarizes it, "the crux of the proposal is that there is a domain restriction on the regular value but not on the focus value of expressions containing unbound pronouns," where I take her *domain restriction* to be something like the presuppositions on the 1st person indexical in (40). Hence, in (45′) the argument corresponding to the possessive *my* is only "bound" in the focus-derived Exclusive clause, and then only because (i) it is coindexed with the focused matrix subject and (ii) focus-semantic values only attend to the proffered content of the constituent in question, including the covariance indicated by

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[21] or somewhat less directly, by taking the domain to be given by the focus-associated Question Under Discussion (Roberts 1996), as per Beaver & Clark (2008), which in most examples amounts to the same thing.

referential indices, without reference to its presupposed content. In other words, the only thing that FOC sees is that *my* in the relative clause denotes a free variable covarying with the focused constituent *I*.

One virtue of such an account is that it explains the limited kinds of contexts in which we see these "fake" indexical readings: just those involving a focus-sensitive operator like *only*, something which most of the other accounts of the fakes cannot do. Then if we adopt a focus-based account like this, the apparent binding in cases like (45) is not a problem for the present analysis.

Note that, as Jacobson (2012) emphasizes, the same problem that the fake indexical cases illustrate for person features arises for gender features as well. Consider:

(46)   Only [Sue$_7$]$_{FOC}$ called her$_7$ mother.
          where the focus-semantic value $|(46)|^F$ = the set of propositions of the form
                              $\lambda x_7.x_7$ called x_7's mother(y), for some $y \in$ Domain

The gender of *her* triggers a presupposition that the antecedent is (reasonably characterized as) female, useful in finding the intended antecedent. But just like indexical pronouns, 3rd person pronouns' presuppositions don't enter into their proffered content, which is also a simple free variable. Then when focus-semantic value is calculated over the proffered content, the coindexed *Sue* and *her* will both be bound by the abstraction operator, yielding a restriction of the form shown, in which gender is irrelevant. So we correctly predict that (46) is false if Steve called his own mother, as well.

Jacobson also shows that the same analysis accounts for the unproblematic satisfaction of the presupposition triggered by *too* in (47) (in both (a) and (b), that someone other than the focused *I* or *Mary* loves their mother). The indexical in (47a) has its usual proffered content, derived via its indexical presuppositions. But the presupposition of *too* is standardly understood to be resolved via the focus semantic value of the clause which it modifies, and again here it is crucial that the focus semantic value make no reference to the indexical anchoring of *my* or the gender presupposition of *her*.

(47)   a. John loves his mother, and [I$_7$]$_{FOC}$ love my$_7$ mother too.
          b. John loves his mother, and [Mary$_7$]$_{FOC}$ loves her$_7$ mother too.

Thus, the insight underlying this explanation of the so-called fake indexical examples is actually much more general, applying to pronominal presuppositions generally, not just the indexicals, and occurring in a range of types of examples involving focus sensitivity. In (45) and (47a), there is nothing fake about the indexicals, as we see in the proffered contents. Something similar can be said about the so-called *super-sloppy* readings analyzed in Charnavel (2019), but space precludes exploring that more here.

Of course, on the present proposal, two 1st person singular pronouns need not be coindexed in order to both refer to the actual speaker. If the two instances of *I* in (45$'$) are not coindexed, the proffered content will remain the same, but the focus semantic content $|(45)|^F$ will be as follows:

          focus semantic content $|(45)|^F$:   the set of propositions of the form
                              $\lambda x_7.x_7$ called x_{11}'s mother(y), for some $y \in$ Domain

Plugging this into the Exclusive clause of (45$''$) yields the so-called *strict* interpretation of (45), also widely attested, where no one else called the speaker's mother (but they may have called their own).

In any case, examples like (3), (28) and (29) above, involving a distributive interpretation of the predicate containing a plural indexical, do not display any evidence of focus-sensitivity and (so far as I know) none

of the extant accounts of fake indexicals can account for the readings of (3) or (29). As we saw, all these were accounted for simply and without stipulation in the semantics developed here.

I'll briefly mention here one other type of *prima facie* counterexample to the anaphoric account, using an example due to Stalnaker (2014):

> I [Stalnaker] am talking with John Perry at an APA meeting, but he is not wearing his nametag, and I am not sure who he is. I know Perry's work, but (let's suppose) I had never before met him. I am pretty sure the guy I am talking with is either John Perry or Fred Dretske, but I am not sure which. He is telling me what a fantastic book *Knowledge and the Flow of Information* is, and I am wondering whether he is bragging or praising the work of a colleague. I believe that the person with whom I am talking thinks that *Knowledge and the Flow of Information* is an excellent book, and I also of course believe that he believes that he is telling this to me (though he may not know who I am, since I am not wearing my nametag either). . . .Suppose John comes to realize that I am not sure whether he is Perry or Dretske.

In this context, Stalnaker claims that Perry might utter (48):

(48)   [Perry to bystander:] This guy thinks I̲ might be Fred Dretske.

We assume that both Perry and Stalnaker know that Perry and Dretske are distinct philosophers, and that they take it that any reasonably well-informed contemporary American philosopher knows this. If we take *I* in (48) to denote a constant function picking out the actual speaker, Perry, in every world, then *This guy thinks I might be Fred Dretske* would be attributing to Stalnaker an irrational belief. But that doesn't seem to be the case. Instead there are some worlds in Perry's conception of Stalnaker's belief state in which Perry *qua the guy Stalnaker is speaking with* is the philosopher known as John Perry, but others in that state in which Perry *under that same guise* is the philosopher known as Fred Dretske. This seems to be behind the intuitively correct understanding of (48).

I would argue that in this type of case an indexical is given a *de re* interpretation, shifting it to a guise (in our earlier sense) which is non-constant, so that it may be Perry in some of the worlds consistent with the speaker's beliefs, Dretske in others, just like *Ortcutt* in Quine's example. Note that an amused bystander, acquainted with both Stalnaker and Perry, might utter (49), while Stalnaker himself might utter (50):

(49)   [spoken *sotto voice* by an amused savvy bystander to someone who joins the group:] Stalnaker thinks Perry̲ might be Dretske.
(50)   [aside by Stalnaker to someone else standing nearby:] This guy̲ [indicating Perry] might be Dretske, or he might be Perry.

The same problem arises for *Perry* in (49) and for *this guy* in (50) as for *I* in (48). In all these cases we have *de re* interpretations of the underlined expressions: For example, the understood issue in (49) isn't whether Stalnaker thinks the individual named *John Perry* is the same individual as the one named *Fred Dretske*, but whether the particular individual in front of Stalnaker is or is not Fred Dretske. Hence, (48) – (50) illustrate how the classic problem about identity in *de re* belief contexts arises not only for proper names, but for indexicals and demonstratives as well. This problem arises whenever a doxastic operator like epistemic *might* or a doxastic attitude predicate like *thinks* takes in its syntactic scope an NP of a type usually taken to denote (in a context) a constant intensional concept, i.e. a function from worlds to individuals whose value is the same individual in each world. In these doxastic contexts, taking such NPs to be constant functions doesn't yield the intuitive interpretation. See also Nunberg (1993) for a range of fascinating uses of both personal indexicals and demonstratives which seem to be of this general character.

Such examples present serious difficulties for a direct reference account of indexicals. But on the present account, whatever approach one takes to *de re* attributions generally ought to work perfectly well in these uses of indexicals, as well. See Roberts (2014), Aloni (2016) who analyze such examples in terms of Aloní's (2001) pragmatic account of the *de re*.

5.3 Shifting indexicals: Outline of an approach

How might we model the CHARACTER of a 1st person indexical in a language which permits them to shift under attitudes? Consider two languages which have been well-studied in this respect by linguists, Amharic (Leslau 1995, Schlenker 2003, Anand 2006) and Slave (Rice 1986, 1989; Anand & Nevins 2004). I am not a native speaker of either language, nor have I had the opportunity to pose to native speakers questions which the present approach raises but which previous field workers might not have entertained. Hence, the following proposals should be considered as very preliminary. I present them here merely to illustrate the flexibility of the current general theory of indexicality and its ability to model a wide variety of types of indexicals found in the worlds' natural human languages.

First, consider the Semitic language Amharic, as in (26) from above:

(26) *Situation reported*: John says: "I am a hero"   (D. Petros, p.c. to Schlenker)
 jˇon   jˇ_gna   n_-ñṉ̱̃   y_l-all
 John   hero   be.PF-1SO   3M.say-AUX.3M
 'John says that he is a hero'

As we see in (26), when embedded under the verb meaning 'say', the Amharic 1st person pronoun –*ññ* may shift to denote the agent of that predicate, here John. It may also shift when embedded under the verb meaning 'tell'. But even when so embedded, this shift is optional, so that –*ññ* embedded under 'say' or 'tell' may be understood to refer to the speaker. These are not reports involving direct quotation. Based on the body of work on that language cited above, I hypothesize the following:

(51) **CHARACTER of Amharic 1st person singular indexical -*ññ***:   [preliminary]
 Given a local context $D = \langle CS_D, DR_D, ©_D \rangle$, with t^* and w^* the time and world of utterance:
 Presupposed content: Use of -$ññ_i$ is felicitous in D at t^* in w^* just in case:
 (i)   there is some $© \in \{©^*, ©^{say}, ©^{tell}\}$ s.t. $© \in ©_D$ and s.t. $Agent(©) = d_k$,
 and for all CS_D-consistent assignments *g*:
 (ii)   for all worlds *w*: $g(d_i)(w) = g(d_k)(w^*)$, and
 (iii) $g(d_i) = \mathcal{DeSe}^©(d_i)$.
 Proffered content: Where felicitous, for all CS-consistent assignments *g*, $|\text{-}ññ_i|^{D,g} = g(d_i)$.

The limited shiftability of the Amharic 1st person indexical is captured in (51i). It tells us that the anchoring center may be either the speaker at utterance time or the agent of one of the attitudes 'say' or 'tell' at the event time of the attitude, if such non-speaker centers are available in $©_D$. According to the literature on Amharic, no other embedding predicates license shifted interpretations of –*ññ*, and when one of these attitude centers is available, the interpretation may be anchored either to that center or to that of the speaker, $©^*$.[22]

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[22] Presumably in multiple embeddings involving both 'say' and 'tell', all three centers are available, though I have no data about such examples. Moreover, I suspect that the agent of the most deeply embedded attitude would be the most locally salient, leading to greater likelihood of anchoring to it.

To appreciate the import of Amharic (51ii) and (51iii), it is useful to compare them with their counterpart presuppositions for English *I*. English (40ii) tells us that the value of the guise $g(d_i)$ is a constant function always yielding the individual who is the speaker in the actual world of utterance. In Amharic (51ii) we do not assume that the anchoring agent is the actual speaker, but just that in any given world of interpretation w the guise $g(d_i)$ has the same value as it does in w^*, i.e. it is a constant function picking out the same actual *res*, the agent of the anchoring center.[23] English (40iii) requires that for all local CS_D-consistent assignments g, $g(d_i) = \mathcal{DeSe}^{(©^*)}(d_i)$; and given the meaning of $\mathcal{DeSe}$ in (39), this tells us that the denotation of I_i in $w = g(d_{\backslash sp})(w^*)$—always the *res* who is actually speaking—self-ascribes having the property predicated of *I*. In Amharic, the indexical's anchor can shift when-*ññ* is embedded to $©^{say}$ or $©^{tell}$, and in those cases it is the agent denoted by the embedding attitude verb's subject, Agent($©^{say/tell}$) who self-ascribes at Time($©^{say/tell}$) (the event time of the embedding predicate) the property predicated of the indexical in the reported attitude. Hence, unlike English, where the speaker always self-ascribes the property at speech time, in Amharic the self-ascription is attributed to the anchoring Agent($©$) at the Time($©$) of the attitude introducing $©$.

Take Amharic indirect (non-quotative) 'say' to be as in Potts' definition (34) above. Recall that that characterization entails that the speaker both proffers, and hence commits to the truth of, the proffered content of what is said and takes its presuppositions to be true as well, and thus that insofar as the speaker is sincere in the Gricean sense, they presumably purport to believe in the truth of both the presupposed and proffered content. I will assume without argument that something similar holds for 'tell'. Thus, together (51) and (34) predict that the Amharic translation of counterfactuals like 'The nurse thinks that Ernie₇ could truthfully tell her that *ññ₇* is a great shortstop' will be false in the situation described in (31). However, I don't have access to data that would test this prediction.

Athabaskan Slave differs from Semitic Amharic in that:
(a)   more predicates license shifting, and not all of these are verbs of saying, and
(b)   one predicate, Slave 'tell', makes shifting obligatory; the others leave it optional as in Amharic.

We capture these differences by:
(a)   expanding the set of possible anchoring centers for Slave 1st singular, and
(b)   taking Slave $©_D$ to be ordered s.t. if $©^{tell} \in ©_D$ then $©^{tell}$ is more highly ranked than any other elements of $©_D$, other centers unranked relative to each other. Thus, if $©^{tell}$ is one of the available centers we have the maximal possible ordered set $<\{©^{tell}\},\{©^*,©^{say},©^{ask},©^{think},©^{want}\}>$; otherwise $<\{©^*,©^{say},©^{ask},©^{think},©^{want}\}>$. Then we require that the Slave 1st singular be anchored to some element of the most highly ranked set of centers in $©_D$

We see these features in (52):

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[23]Suppose we have a subject that has no realis instantiations in w^*, as in the Amharic translation of (i):
(i)   Suppose that in a dream you met a unicorn$_i$. The unicorn$_i$ might say that -*ññ$_i$* have the most beautiful horn. Presumably in the irrealis world w of the dream there is a given set of unicorns. For the first sentence to be true, we must find at least one arbitrary instantiation of this set in w s.t. the addressee meets it in w. Then we want the value of d_i in w under locally-consistent g to be constantly that individual across all worlds in which it exists (remembering that we've assumed a fixed domain across worlds). In the second sentence, we want the value of $g(d_i)$, the guise of the arbitrary unicorn, to be constant across the dream worlds that *might* ranges over (via modal subordination, Roberts 1989), always yielding its value in w, rather than w^*.
         I have no idea of what Amharic speakers might make of such an utterance, and for simplicity haven't incorporated such counterfactual considerations into (51). Hence, (51ii) presupposes that the anchoring agent is a real entity, existing in w^*.

(52)   **CHARACTER of Slave 1ˢᵗ singular**:   [preliminary]
Given a local context $D = <CS_D, DR_D, ©_D>$, with t* and w* the time and world of utterance:
Presupposed content: Use of 1ˢᵗ sg$_i$ is felicitous in D at time t* in w* just in case:

(i)   there is some $© \in \{©_D, ©^{say}, ©^{tell}, ©^{ask}, ©^{think}, ©^{want}\}$ s.t. © is in the most highly ranked set of $©_D$ and s.t. Agent(©) = d_k,

and for all CS_D-consistent assignments g:

(ii)   for all worlds w: $g(d_i)(w) = g(d_k)(w^*)$, and

(iii) $g(d_i) = \mathcal{DeSe}^©(d_i)$.

Proffered content: Where felicitous, for all CS-consistent assignments g, $|1^{st}sg_i|^{D,g} = g(d_i)$.

Since 'think' and 'want' are not verbs of saying, (52) involves an essential use of the requirement imposed via $\mathcal{DeSe}$ in (52iii) that the anchoring agent be *de se*. That is, though one might extend Egan's pragmatic account to indirect speech reports (as in Amharic), this would not plausibly extend to all the embedding predicates in Slave and other similar languages which license shifting in indexicals.

But this raises another question: How would indexicals behave in Slave translations of counterfactuals like (31) with 'want' instead of 'say'? Our explanation of the falsity of (31) used the characterization of indirect speech in (34), making it appropriate for a similar story about 'say' and 'tell', but not all the rest of the shifting predicates in Slave and other similar languages. The real intuitive basis for (34) is the fact that in saying something the speaker makes commitments about her purported beliefs; that is, what one means is fundamentally about consistency of beliefs. Arguments have been made (e.g. see Heim 1992) that many of the embedding attitude predicates are circumstantial or belief based. For example, Thomason (1981) showed for deontic modality that the modals have what Kratzer (1980) would call a circumstantial modal base, which we might say is ordered by a Kratzerian deontic ordering source; and Heim argued for predicates like *want*, *wish* and *intend* that the underlying modals have a doxastic modal base and buletic or *teleological* ordering source. So what one must do in a given circumstance is partly a function of how things are, at least so far as one can tell (and hence, of what it is possible to do). For example, one may find oneself wanting something inherently distasteful in a difficult circumstance where one believes that that is the best outcome possible. But again, we need much more evidence about Slave before we can test this hypothesis.

Anand & Nevins (2004) talk about Shift Together effects in Slave, requiring that if one indexical shifts in a given context, then all shift to the same anchor. For example, 'ask' in that language has both an asker (presumably the speaker) and an addressee of the reported query; if in its complement one uses both 1ˢᵗ and 2ⁿᵈ person arguments, then if one of those shifts, say 1ˢᵗ person being anchored to the subject of 'tell', then the other must as well, so that 2ⁿᵈ person is anchored to the reported rather than the actual addressee. These effects can be modeled by introducing pragmatically-induced orders over the available centers in a given context, so that whichever one is the understood perspective adopted by interlocutors, that perspective will dominate as preferred anchor for any shiftable indexicals. If the dominant perspective is that of the actual speaker, not only will that be the preferred anchor for 1ˢᵗ singular, but the addressee from that speaker's perspective, i.e. the actual addressee, will be the preferred anchor for 2ⁿᵈ person. Under Slave 'tell', since the preferred perspective is obligatorily that of the agent of 'tell', $©^{tell}$, and from the perspective of $©^{tell}$ the addressee is the one addressed in the telling event, the shiftable 2ⁿᵈ person will always be that shifted addressee.

Moreover, the presupposition of a discourse referent of the appropriate sort, instead of a referent in the world, permits the anchoring agent in some languages to be quantificational, which has been attested in Llengua de Signes Catalana (LSC: Quer 2005,2011,2013). *de se* anchoring to the arbitrary instantiation of the quantifier's domain is no more problematic on the present approach than it is in the shifted indexical languages.

See Sudo (2012), Roberts (2014, forthcoming a), and especially Deal (2017,to appear) for extended discussion of the differences between shifted indexicals in a wide variety of languages.

Finally, note that English is actually a shifting indexical language, even though its 1st and 2nd person indexicals do not themselves shift. The English indexicals that shift include *here* and *now*, which may be anchored by the agent of FID or the agent of an embedding attitude. We'll briefly consider *now*, by way of illustration. Consider not only (5) from above, but its counterfactual counterpart (53):

(5)   [John has applied to several medical schools and is waiting to hear if he's been accepted:] Whenever John got a letter, he excitedly tore it open, thinking that **now** at last his acceptance had arrived, and that what he had **here** was his ticket to success.

(53)   Had John gotten a letter, he would have torn it open thinking that **now** at last his acceptance had arrived and that what he had **here** was his ticket to success.

In (53), *now* is understood to be the event time of the counterfactual receipt and opening of the letter, and not the speech time. Keeping this in mind, we offer (54):

(54)   **CHARACTER of English *now***:   [preliminary]
        Given a local context $D = <CS_D, DR_D, ©_D>$, with t^* and w^* the time and world of utterance:
        Presupposed content: Use of now_i is felicitous in D at t^* in w^* just in case:
        (i)   there is some $© \in ©_D$ s.t. Agent$(©) = d_k$ and Time$(©) = d_i$,
        for all CS_D-consistent assignments g:
        (ii)   given world of evaluation w, for all worlds w': $g(d_i)(w') = $Time$(©)(w)$, and
        (iii)   for all $<<a,t'>,w'> \in DOX(©,w)$: $g(d_i)(w) = t'$
        Proffered content: Where felicitous, for all CS-consistent assignments g, $|\text{-}ññ_i|^{D,g} = g(d_i)$.

Now takes as its antecedent the time of its anchoring center ©, which is the time at which Agent(©) holds the relevant attitude. Like the Amharic and Slave 1st persons, English *now* can be anchored by discourse centers other than those corresponding to the interlocutors. In fact, the evidence is that *now* can be anchored by the center introduced by any belief-based propositional attitude, including that introduced by FID, so that it is even freer than the shiftable 1st person indexicals. (54i) tells us that its use presupposes some discourse center anchor ©, whose time d_i is co-indexed with *now*. (ii) tells us that the value of d_i in the local context, $g(d_i)$ is a constant function which always gives as value the event time at which the agent holds that attitude in the world of evaluation. If the world of evaluation is the actual world w^* and the anchor is $©^*$, $g(d_i)$ will be a constant function yielding the actual utterance time t^*. If the world is, say, the counterfactual world in (53), this will be the time of the counterfactual receipt and opening of the letter. Then (iii) tells us that the anchoring agent Agent(©) self-locates at this time, so that it serves as the time of the center in all the centered worlds in her belief state. Finally, as in Kaplan, the CHARACTER of *now* (and a similar characterization of *here*) plus real world knowledge tells us that (6) is always true, while (7) may be false. But moreover, the present approach tells us that *she was here now* in FID uses like that (55) will also always be true.

(6)   [Always true:] I am here now.
                [spoken today: 'CR is in New York City on 1/7/20']
(7)   [Not true:] Necessarily, I am here now.
                [CR could have been elsewhere]
(55)   [A passage in FID, adopting the character Alissa's perspective during a crisis in which she's reluctantly involved:] At the command center, Alissa found things in a terrible mess. But well, she was here now. So she might as well pitch in and try to help.

Thus, on this account, we expect *now* to be *de se* from the perspective of the anchoring agent, so that in (55) Alissa takes herself to be at the command center at the time of her arrival.

There is much more to be said about *now*; hence, the "preliminary" aspect of this CHARACTER. For example, what if the anchoring Agent(©) doesn't know what time it is? On the usual understanding of that question, it misses the point: knowing what time it is by the clock is only one way to know what time it is, only one guise of *now*. One is also, and (if conscious) always directly familiar with that time *qua* experienced eventuality. In that sense, the Agent may not know the time by the clock, but they are appropriately familiar with the event time of the attitude in another, more direct and perceptual guise. So in (54) anchoring to the world of evaluation is appropriate, the guise $g(d_i)$ properly understood as direct familiarity. This explains Pooh's annoyance in the internet meme at the end of this article, given that *today* works much like *now*. But I leave this and other considerations for another occasion.

Similarly, I refrain from offering a semantics for *here*. See Barlew (2017) for cross-linguistic arguments that with deictic motion verbs like *come*, which have been assumed to be indexical since Fillmore (1975), their anchor is not the actual location of the speaker or other anchor, but the location where they believe themselves to be. I assume that *here* is similarly doxastically anchored, either to the actual speaker (her location) or to that of some other available discourse center.

6.   Conclusions and Prospects

In this study of the character of indexicals, departing from Kaplan's static notion, we've offered a revised notion of CHARACTER wherein for any given expression it has two dimensions, its presupposed and its proffered content. In particular, anaphoric presuppositional content places conditions on felicitous utterance: the interlocutors must be able to retrieve from the context of interpretation antecedent information crucial for the resolution of the anaphora. Those features of indexicals which varied as a function of the context of utterance in Kaplan are now understood to be presuppositional.

Besides presupposing the discourse familiarity of its denotation, each indexical is also presuppositionally anchored to the doxastic perspective of some contextually salient agent, a discourse center, predicting that from the doxastic perspective of that anchoring agent the resulting *de re* interpretation is constant and *de se*. But still, as with Character, the presupposed content of an indexical's CHARACTER plays no direct role in the proffered content.

Moreover, unlike Kaplan's Character, which appealed solely to the global context of utterance, the context available for the satisfaction of the presupposed content of an expression's CHARACTER is local: dynamically updated in a regular fashion, it may differ from the context of utterance in the addition of the proffered content of other constituents in the same utterance. So the CHARACTER of an indexical permits a possible interpretation wherein it is anchored to some merely locally available antecedent, as we see in shifted indexicals and those with arbitrary antecedents. Where an indexical, like English *I* or *you*, can only be globally retrieved, that is lexically encoded.

The account is simple, and all the elements of the CHARACTERs proposed for indexicals are independently motivated by their utility in accounts of other, prima facie unrelated semantic phenomena. And the account is arguably superior both empirically and theoretically to other theories of indexicality on offer. I'll elaborate on these points in turn.

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<u>Simple and independently motivated</u>:

First, the idea of a dynamic pragmatics and its utility in the resolution of anaphora is well-established, with a large, substantial literature developed since the pioneering work of Kamp and Heim. The present account needs to introduce no ad hoc complications into the basic representation of contextual information in that work in order to address problems with contingency, unlike the approaches of Maier (2009) and Hunter (2013), as discussed in §5.1.

The notion of doxastic perspective is a metaphorical extension of the notion of spatial perspective. The way that physical space is modeled for the semantic analysis of natural language locatives in Barlew (2016, 2017) draws on the work on vector space semantics of Zwarts & Winter (2000) and Bohnemeyer (2011). We model physical space as a three-dimensional Cartesian grid. An origin in that space is a point on the grid. The origin plus an orientation, the latter modeled as a vector starting from the origin, serves as a point of view; informally, think of this as an agent perceptually oriented from the origin in the direction of the vector. Then a spatial perspective is that sub-space of the grid which is perceptually accessible to the agent so-oriented. This is summarized in the first and second columns of Table 1:

General	Spatial	Doxastic
a space	physical space, modelled as a 3-D Cartesian grid	the doxastic possibilities, modelled as the set of all centered worlds
an origin	a location (point) on the grid	base centered world: $((a, t), w)$
a point of view	anchor's location, with a perceptual orientation (modeled as a vector)	base world + Dox: $(((a, t), w), \text{Dox})$
a perspective	the sub-space perceptually accessible to the anchor from the pov	the belief set of a at t in w: $\text{Dox}(((a, t), w))$
examples	spatial expressions in English, Mushunguli, and Bulu (Barlew 2016,2017)	epistemic modals (Roberts 2019) English and Bulu deictic motion verbs (Barlew 2017)

Table 1: Spatial and Doxastic Perspective

Similarly, think of the "space" in which an epistemic agent holds a doxastic perspective as the space of all possibilities, the latter modeled by the set of all centered possible worlds. The centers permit us to model how the agent holds a view about their own situation in those doxastic possibilities. An origin in such a space is a base centered world in the Lewis/Stalnaker sense: an agent at a time in a world. The agent at the time in an origin is its doxastic center. A doxastic point of view is a doxastic origin plus the doxastic accessibility relation Dox, the latter representing a way of orienting oneself in doxastic space. Then a doxastic perspective is the set of worlds in the origin's belief set. This approach to the notion of doxastic perspective has been used by Roberts (2019) to model aspects of the semantics of epistemic modals, and by Barlew (2017) to model deictic motion verbs like *come* in both English and the Bantu language Bulu. The deictic motion verbs have long been recognized as perspectival, but generally treated as simple locatives anchored to a spatial perspective. But Barlew offers strong empirical evidence that such verbs are essentially doxastic in their orientation; the successful use of this notion of doxastic perspective to capture their behavior argues for the metaphorical extension summarized in the third column of Table 1.

The *DeSe* operator used in characterizing the *de se* presupposition associated with indexicals is developed here in terms of Aloní's perspective operator for *de re* interpretation, but it is closely related to the *de se* operator introduced into LF by Chierchia (1990) and Pearson (2012,2018), so that presumably something along these lines is independently needed to characterize *de se* readings of 3rd person definite NPs. Here I have brought these pieces to bear on the lexical analysis of indexicals.

When the denotation of an indexical is arbitrary, as in the use of *now* in (5), then for any given instantiation *t* of the times when John received a letter, the *de re* anchoring presupposition of *here* (54ii) yields a constant function whose value is always the arbitrary *t*; as the counterfactual (53) shows, the arbitrary instances may even be irrealis. In a case like this where the *res* is arbitrary, the constancy of the function cannot depend on information given non-linguistically, as in direct reference. Moreover, FID shows that the relevant perspective shifts occur across discourse, and not just intra-sententially:

(56)   [Context: The interlocutors know that John didn't receive any responses to his applications.] Imagine that poor John finally got a letter. He tore it open, thinking that now at last his acceptance had arrived.

But all these types of cases are straightforwardly predicted when we bring the independently motivated tools for the analysis of discourse anaphora to bear on the analysis of indexicality: Discourse referents and the dynamic conception of context were developed nearly forty years ago to deal with just this type of variation in where anaphoric triggers find the antecedents which satisfy their familiarity presupposition.

Similarly for the analysis of focal presuppositions and focus-sensitive operators which underlies the account of "fake" indexicals in Jacobson, discussed in §5.2. The only new feature of Jacobson's proposal is to treat the calculation of focus semantic values of a constituent as insensitive to its presupposed content, something independently motivated by the similar behavior of gender features.

Thus, all the pieces of the present account of personal indexicals are independently motivated. These expressions do not directly refer, but only find their intended interpretation anaphorically. The discourse centers to which they are anchored are just a distinguished sub-type of the dRefs, and the way that they are tracked dynamically is closely related to the way that reference times are tracked across discourse (Partee 1984). The only innovation here is to use presupposed *de re* grounding (presuppositions (ii) in these CHARACTERS) and *de se* anchoring to a discourse center (presuppositions (iii)) to give a unified, consistent semantics for the indexicals, distinguishing them from other anaphoric triggers.

Empirically superior: The account successfully accounts for the following phenomena, those in (iii) – (v) impossible under Kaplan's account and challenging for other previous approaches:

i.   Kaplan's wide scope effects for indexicals and their constancy under modality;
ii.   the necessary truth of *I am here now* and its ilk, and the facts about contingency vs. necessity;
iii.   an explanation for the *de se* truth conditional effects observed in indexicals, including demonstratives and *now*, especially evident in cases where the anchor is shifted to an embedding agent;
iv.   the constrained possibility of shifted indexicals under attitudes and in FID, treated here as a function of how the lexical CHARACTER of the relevant indexicals specifies (or "selects") certain types of discourse center as possible anchors, and constrained by the availability of discourse centers at the time of utterance. This gives us the tools we need to predict how the lexical constraints can differ from language to language.
v.   bound and arbitrary uses of indexicals, including those under distributivity.

Theoretically superior: The account is theoretically superior to others on offer for several reasons.

First, despite the fact that this theory gives us a way of accounting for shifted indexicals in English and other languages, it involves no monsters specifically designed to shift the global context of utterance. We merely assume the regular independently-motivated mechanisms of dynamic context update.

Second, we have captured two (near) universals:

Wechsler's associative universal is captured in the *de se* presupposition taken to characterize indexicality on this account. In each of the indexical CHARACTERs considered above, only that i-part of the indexical's denotation which is its doxastic anchor is presupposed to have a *de se* interpretation. This *de se* anchoring is the function of the grammatical person feature, which behaves quite differently from number or gender features. The 1st or 2nd person are not used to characterize the entire denotation of *we* or plural *you*: the denotation needn't be a group made up solely of speakers or addressees. Instead, the person just tells us who the *de se* anchor for that group is.

The near universality of the *de se* character of indexicals is captured by the pragmatically motivated *de se* presupposition ((iii) in each of the CHARACTERs above). Arising from what a competent speaker knows in uttering the 1st person pronoun in the usual case, the *de se* presupposition is regularly associated with all uses of that person, and then becomes part of what it is to adopt a doxastic point of view generally, extending to those shifted uses where the self-ascriptive entailment fails to arise purely pragmatically.

And here is a third way in which the approach is conceptually superior: Work by Reimer (1991) and others (e.g., Nowak 2020) argues that simply taking the denotation of a demonstrative to be given by the associated ostensive gesture makes the wrong predictions. If I'm pointing at *x* but just as I utter *that* another object *y* suddenly intervenes between my hand and *x*, then we don't want to predict that I have thereby referred to *y*. Nowak considers as well an alternative adopted by King (2014:102), wherein it is the referential intentions of the speaker, insofar as they are reasonably retrievable by a competent addressee, which determine the denotation. He offers as a purported counterexample a variation on Kaplan's (1970) famous example:

(57) [Context: The speaker utters the following while pointing above and behind him to a picture that he believes to be that of Rudolf Carnap, but which has been replaced without his knowledge by a picture of Spiro Agnew, the US Vice President under Richard Nixon:]
      That is a picture of the greatest philosopher of the twentieth century.

Nowak claims that the ostensive-gesture and the speaker's-intention views force us to choose between these two statements:

(58) The speaker said that Agnew was the greatest philosopher of the twentieth century.
(59) The speaker said that Carnap was the greatest philosopher of the twentieth century.

and argues that (54) is a better conclusion to draw in such a case:

(60) The speaker failed to say anything at all.

He takes it that this means that use of a demonstrative does not determine a unique demonstratum, and hence doesn't contribute to a singular proposition. But the present approach to indexicality offers a different analysis while, I think, capturing the intuition behind Nowak's claim that (60) is better than the choice between (58) and (59). Consider the account of demonstratives from Roberts (2002), slightly re-organized and modified with the addition of a *de se* presupposition:[24]

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[24] Demonstratives have a broader variety of uses than I can do justice to in the present paper, including uses where they are quantificationally bound and arbitrary under operators. See Roberts (2002) for a summary and discussion of how the different uses arise metaphorically and are captured formally. (54) is a preliminary characterization of the canonical use—that accompanied by a demonstration of the intended denotation.

(61)   **CHARACTER of English demonstrative *this***:   [modified from Roberts 2002]
Given a context of evaluation D $= <CS_D,DR_D,©_D>$, with t* and w* the time and world of
utterance, and $©* = <d_{sp},t*>$:
Presupposed content: Use of *this*$_i$ with accompanying demonstration is felicitous in D just in
case:
(i) $d_i \in DR_D$ and $g(d_i)(w*)$ is an entity located proximally along a vector in real
space, with the vector's origin at the spatial location of d_{sp} and the vector's
orientation given by the angle of the arm moving out from that origin;
(ii)   for all CS_D-consistent assignments *g*, all worlds *w*: $g(d_i)(w) = g(d_i)(w*)$, and
(iii)   for all $<<a,t'>,w'> \in DOX(©*,w*)$: a's demonstratum at t' is $g(d_i)(w')$.
Proffered content: $g(d_i)$

Presupposition (i) says that the speaker in using *this* presupposes that the CG makes available a spatial
perspective associated with the spatial location of the anchoring doxastic agent d_{sp} (the origin) and her
orientation in space (the vector), and that given that perspective, at a distance along the vector proximal to
the origin (on the appropriate scale of proximity), one finds the demonstratum, which will be the
demonstrative's denotation. The *de re* anchoring presupposition (ii) says that the guise assigned to the
dRef for *this* is constant, the actual demonstratum in the world of utterance; this makes the right
predictions for the use of ostensive demonstratives in counterfactuals like (23) above. And the *de se*
clause (iii) says that the anchoring agent believes that $g(d_i)(w*)$ is her own demonstratum, and hence is
the denotation of *this*$_i$.

In the context given for (57), presupposition (61iii) fails: The picture that the speaker is pointing at is not
what he believes it to be, so this is a defective context. This presupposition failure yields infelicity, and
that, in turn, means that the proffered content has no truth value (Heim 1983). It's not that the speaker has
failed to say anything at all, but that since his presuppositions fail, he has failed to convey the proposition
that he presumably intended to convey. This defect may be evident to the addressee (if she has a
sufficiently rich CG with the speaker, knowing that he knows that Agnew wasn't a philosopher)—leading
either to a *Huh?!* or a laugh. But even if the interlocutors fail to recognize the problem—taking the
speaker at his word and assuming the picture is that of a philosopher—the mix-up explains the general
oddness of the example as described. Note that to derive this result, we did not need to assume an anti-
contextualist stance, as does Nowak (2020), who concludes that "a single demonstrative sentence, used in
a context, might express more than one proposition". Nor do we need to adopt an error-theory based
account of such examples. When the presuppositions in (61) are satisfied, the resulting proffered content
yields a singular denotation for *this*. Otherwise, we predict the attested infelicity.

So on this approach, though *this* and *that* accompanied by a demonstration fundamentally depend on a
spatial location—that of the anchoring agent—plus the indicated vector towards the demonstratum, in the
end they are also doxastic, carrying a *de se* presupposition that entails something about the speaker's
intentions. This is consistent with Barlew's (2017) analysis of the English and Bulu deictic motion verbs
meaning 'come'.

Finally, the present approach extends to a broader view of indexicality, related to the old idea of Localism
(Fillmore 1975, Jackendoff 1976, Lyons 1977, Mitchell 1986).The idea is that the basic structure of
spatial perspective is reflected metaphorically in the underlying semantics of a range of other, intuitively
perspectival expressions. In Table 1, we see how the tools developed in doxastic modal logic with
centered worlds can be understood as a metaphorical extension of the way that space is modelled in
vector semantics. In the present paper we have applied this to capture the perspectival, *de se* character of a
range of indexicals. But, as mentioned, it is also useful in the semantics of epistemic modals and deictic
motion verbs. Further, it has a natural application to the kind of puzzle about tense and time reflected in

this famous example due to Prior (1959), brought to my attention by Richmond Thomason (p.c.) and discussed in Szabó & Thomason (2019):

(61)   [Uttered by Prior who doesn't know the date, after a dentist appointment at 3pm on June 15, 1954:] Thank goodness that's over!

(61) doesn't mean that the speaker is glad that the visit ended before 3pm on June 15, 1954, and this presents a puzzle for standard tense logics. Thomason notes its *de se* character—the speaker is relieved that *from her perspective in time* the appointment is in the past, and shows that if we model tenses as anchored to something like centered worlds, where the center is a time, then Prior's puzzle does not arise. In other words, this is evidence that tense is perspectival.

Moreover, in many languages, unlike English, tense is shiftable, so that, e.g., in Korean (Yoon 1996) present tense embedded under a past tense attitude verb will be taken to mean that the embedded event occurs at the same time as the past event denoted by the main clause—the time of holding of the attitude; while past under past is roughly equivalent to English past perfect.

And there are other perspectival semantic phenomena for which the present general approach to perspective shows promise, including
- conjunct-disjunct person marking in Tibeto-Burman languages, including Newari (Delancey 1992; Hargreaves 2005; Zu 2015, to appear; Coppock & Wechsler 2016) and a range of others, wherein with verbs of intentional action, 1st person in assertions has the same form as 2nd person in questions. Wechsler argues that this is a function of self-ascription.
- the Conventional Implicatures (CIs) of Potts (2005). Amaral et al. (2008) argued that these need not always be attributed to the speaker, but may be anchored to a shifted point of view, a hypothesis subsequently supported experimentally by Harris & Potts (2009).
- predicates of personal taste. There is reason to think that these are amenable to a related perspectival analysis, wherein they presuppose a buletic point of view: based on one's experience (a circumstantial modal base), one's preferences can be modelled with a Kratzerian buletic ordering source over the range of those experiences, a corresponding scale of (un)desirability thereby established over the experientially accessible domain. The modal accessibility relation which models this thus reflects one's experiential perspective. Then predicates of personal taste are perspectival and scalar, any use presuppositionally anchored by an available experiential center. On this approach, no Relativist judge is required. For a proposal related to this, see Coppock (2018), and see Ninan (2014) for a number of implications of the experiential base, which he calls an *acquaintance inference*.

It is theoretically interesting to find a way of modelling quite generally the abstract notion of perspective that seems to be so widely reflected in natural languages. To the extent that the tools developed here prove valuable across a wide range of *prima facie* unrelated phenomena, this offers us a formal pragmatic realization of the basic intuition underlying localism.

Finally, a terminological note. I have noticed that in the philosophy of language, the term *indexical* is used quite broadly of any expression which essentially depends on context for its interpretation. But under the present account, its extension is much more limited. For the essential character of an indexical lies not in its context-sensitivity, certainly not in direct referentiality, nor even in its constancy under modality (which arguably follows from the characterization I'm about to give), but in its perspectival CHARACTER:

> An **indexical** is an anaphoric expression whose denotation is presupposed by the speaker to bear a particular type of guise from the doxastic perspective of its anaphoric anchor, a contextually

available doxastic center: from that perspective, the denotation is a singular *res* which bears a *de se* relation to the center.

As we saw with *we* and *now*, the *de se* relation to the presupposed doxastic anchor is not always one of identity. One might say, quite generally, it is more a question of self-location.

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"WHAT DAY IS IT?" ASKED POOH.
"IT'S TODAY," SQUEAKED PIGLET.
"YOU KNOW WHAT THE FUCK I MEAN" SAID POOH.