

Common ground: *In sensu composito* or *in sensu diviso* *

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Abstract

Traditional definitions of common ground in terms of iterative de re attitudes do not apply to conversations where at least one conversational participant is not acquainted with the other(s). I propose and compare two potential refinements of traditional definitions based on Abelard's distinction between generality *in sensu composito* and *in sensu diviso*.

1 Introduction: de re common ground

Stalnaker's [12] widely adopted notion of the 'common ground' of a conversation (i.e. the set of presuppositions mutually shared by conversational participants) has a dual function: First, assertions are analysed as proposals to update the common ground. Second, the notion of common ground is used to explain how a shared background can guide the production and interpretation of speech acts. For instance, I can say (and you can interpret) "Bob is coming back next week" because it is common ground between us who Bob is. Standard Stalnakerian common ground definitions are based on 'face-to-face'¹ conversations where speaker a and addressee b have iterative attitudes towards one another. For instance, common ground can be defined as common belief: p is common ground between a and b iff (where $\mathbf{B}_x\phi$ means x believes that ϕ):

$$\begin{array}{c} \mathbf{B}_a p \quad \mathbf{B}_b p \\ \hline \mathbf{B}_b \mathbf{B}_a p \quad \mathbf{B}_a \mathbf{B}_b p \\ \hline \mathbf{B}_a \mathbf{B}_b \mathbf{B}_a p \quad \mathbf{B}_b \mathbf{B}_a \mathbf{B}_b p \\ \vdots \quad \vdots \end{array}$$

In words, speaker and addressee both believe p ; both believe that the other believes p ; etc.² Alternatively, common ground can be defined in terms of common acceptance (i.e. $\mathbf{A}_a p$, $\mathbf{A}_b p$, $\mathbf{B}_b \mathbf{A}_a p$, $\mathbf{B}_a \mathbf{A}_b p$, etc. where $\mathbf{A}_x\phi$ means x accepts that ϕ in a doxastically neutral sense. e.g. Stalnaker [13], Stokke [14]) or in terms of common commitments (i.e. $\mathbf{C}_{a,b} p$, $\mathbf{C}_{b,a} p$, $\mathbf{C}_{b,a} \mathbf{C}_{a,b} p$, $\mathbf{C}_{a,b} \mathbf{C}_{b,a} p$, etc. where $\mathbf{C}_{x,y}\phi$ means x is committed to y to act on ϕ . e.g. Geurts [3]). Moreover, these iterative structures can be extended to common grounds between more than two participants (e.g. Stalnaker [13], Lewis [6], Schiffer [11]): p is common ground between all conversational participants in some community iff (where Cx means x is a conversational participant):

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¹Here 'face-to-face' conversations do not require conversational participants to actually be in front of each other. It is sufficient if they know who they are talking to (e.g. an online chat conversation with a friend).

²Of course actual people don't form infinitely many beliefs about each other's mental state and will usually not come further than third or fourth order beliefs. This does not entail that there never exists common ground. Rather, these infinite structures represent "a chain of implications [that follow from our beliefs], not of steps in anyone's actual reasoning. Therefore there is nothing improper about its infinite length." (Lewis, [6, p.53]).

$$\begin{array}{c}
 \frac{\forall x(Cx \rightarrow \mathbf{B}_x p)}{\forall x \forall y(Cx \wedge Cy \rightarrow \mathbf{B}_x \mathbf{B}_y p)} \\
 \hline
 \forall x \forall y \forall z(Cx \wedge Cy \wedge Cz \rightarrow \mathbf{B}_x \mathbf{B}_y \mathbf{B}_z p) \\
 \vdots
 \end{array}$$

In words, everyone in the community believes that p ; everyone in the community believes that everyone in the community believes that p ; etc.

Note that if a believes about b that he has a certain belief, this means that a has a *de re* belief about b . Closer inspection reveals that the iterative structures of traditional common ground definitions are all comprised of *de re* attitudes. This is problematic because the concept of common ground has – without much hesitation – been extended to non-face-to-face communication (e.g. Stokke [14]; Schiffer [11]) in which the speaker is known to the addressee but the addressee is not known to the speaker, such as books, broadcasted speeches or blogposts. For instance, it is common ground between biographer Ray Monk and myself that Wittgenstein was Austrian. However, definitions of common ground in terms of *de re* attitudes do not apply to this type of communication; I may have *de re* beliefs about Monk but obviously Monk does not have *de re* beliefs about me. Monk merely has beliefs about the mental state of ‘the reader(s)’, whoever that may be. Hence there can actually never be any common ground between Monk and his readership. This is unsatisfactory since Monk and myself *do* seem to respectively produce and interpret the biographical text against a background of shared assumptions.

In this paper, I spell out the challenge to traditional common ground definitions posed by non-face-to-face communication using a relational analysis of *de re* belief (Section 2) that makes explicit the acquaintance relations involved in *de re* beliefs. In this paper I focus on belief based common ground definitions but the discussed issues and solutions extend to common ground definitions in terms of other *de re* attitudes. Next, I introduce Abelard’s distinction between generality *in sensu composito* and *in sensu diviso* (Section 3) and, in line with this distinction, propose two novel refinements of common ground definitions (Section 3.1 and 3.2). I show how from both definitions we can derive the original iteration of *de re* beliefs of face-to-face communication as a limit case (Section 4). Finally, I show how the case of an acquaintance that hasn’t revealed themselves as a conversational participant may aid us in deciding between the two definitions (Section 5).

2 Non-face-to-face communication

In the relational analysis of *de re* belief (See Kaplan [5], Lewis [7]) if a believes *de re* of b that he is Q this means that there is an acquaintance relation between a and b , and that a believes that the person he knows through this acquaintance relation is Q . This analysis implies that a has a *de se* belief (e.g. a has a belief about “the person that I saw on the beach”). I follow Lewis [7] in analysing all attitudes (including *de re* attitudes) as essentially *de se* attitudes, i.e. as self-ascription of a property. So if a believes *de re* of b that he is Q , then a is acquainted with b , and a self-ascrives the property of being such that “the person that I am acquainted with is Q ”. This is represented as $\exists R_1[R_1(a, b) \wedge \mathbf{B}_a^* \lambda i [Q(w[R_1(i, v)])]]$, where $\exists R_n[R_n(x, y)]$ means there is an acquaintance relation R_n such that x is acquainted with y through R_n and $\mathbf{B}_x^* \phi$ means x self-ascrives the property ϕ . Here and henceforth I assume that everyone is acquainted with themselves (i.e. $\forall x \exists R_1[R_1(x, x)]$) and that all relevant acquaintance relations with oneself are of identity (i.e. thoughts about oneself relevant for common ground are *de se*). *De se* belief is denoted as being about i , i' , i'' etc. In the rest of this paper I will abbreviate $w[R_1(i, v)]$ (i.e. “the person that I am acquainted with”) as ιR_1^i .

Iterative *de re* beliefs further complicate this picture. I adopt Maier's [8] analysis of iterative *de re* attitudes where if *a* believes *de re* of *b* that *b* believes *de re* of *c* that she is *Q* (i.e. in the earlier notation $\mathbf{B}_a \mathbf{B}_b Qc$) then this entails that *a* is acquainted with both *b* and *c* and that *a* self-ascrives the property of being such that *b* is acquainted with *c* and that the former self-ascrives the property of being such that "the person I am acquainted with is *Q*" (i.e. $\exists R_1[R_1(a, b) \wedge \exists R_2[R_2(a, c) \wedge \mathbf{B}_a^* \lambda i[\exists R_3[R_3(\iota R_1^i, \iota R_2^i)] \wedge \mathbf{B}_{\iota R_1^i}^* \lambda i'[Q(\iota R_3^{i'})]]]]$).

We can thus rewrite the common ground definition in terms of *de re* beliefs as follows (making the required acquaintance relations explicit): *p* is common ground between speaker *a* and addressee *b* iff:

$$\begin{array}{c}
 \frac{\mathbf{B}_a^* \lambda i[p] \quad \mathbf{B}_b^* \lambda i[p]}{\exists R_1[R_1(b, a) \wedge \mathbf{B}_b^* \lambda i[\mathbf{B}_{\iota R_1^i}^* \lambda i'[p]]] \quad \exists R_1[R_1(a, b) \wedge \mathbf{B}_a^* \lambda i[\mathbf{B}_{\iota R_1^i}^* \lambda i'[p]]]} \\
 \frac{\exists R_1[R_1(a, b) \wedge \mathbf{B}_a^* \lambda i[\exists R_2[R_2(\iota R_1^i, i) \wedge \mathbf{B}_{\iota R_1^i}^* \lambda i'[\mathbf{B}_{\iota R_2^i}^* \lambda i''[p]]]]] \quad \exists R_1[R_1(b, a) \wedge \mathbf{B}_b^* \lambda i[\exists R_2[R_2(\iota R_1^i, i) \wedge \mathbf{B}_{\iota R_1^i}^* \lambda i'[\mathbf{B}_{\iota R_2^i}^* \lambda i''[p]]]]]}{\wedge \mathbf{B}_{\iota R_1^i}^* \lambda i'[\mathbf{B}_{\iota R_2^i}^* \lambda i''[p]]] \quad \wedge \mathbf{B}_{\iota R_1^i}^* \lambda i'[\mathbf{B}_{\iota R_2^i}^* \lambda i''[p]]]} \\
 \vdots \quad \vdots
 \end{array}$$

So, both speaker and addressee self-ascrives the property of being such that *p*; both are acquainted with the other and self-ascrives the property of being such that the person they are acquainted with self-ascrives the property of being such that *p*, etc.

The above reformulation of the traditional definition makes explicit why *de re* common ground definitions do not apply to non-face-to-face communication. I suggest that there are three distinct types of non-face-to-face communication that we do intuitively describe in common ground terminology but that traditional definitions do not apply to. Namely, non-face-to-face conversations where [1] the speaker is known to the addressee but the addressee is not known to the speaker (e.g. Intuitively, it is common ground between Monk and myself that Wittgenstein was Austrian). Here the speaker *a* is not acquainted with the addressee *b* (i.e. $\neg \exists R_1[R_1(a, b)]$). In a similar vein, traditional definitions do not apply to communication where [2] the addressee is known to the speaker but the speaker is not known to the addressee (e.g. Intuitively, it is common ground between you and the writer of the anonymous love letter that your voice is like the morning sun). Here the addressee is not acquainted with the speaker (i.e. $\neg \exists R_1[R_1(b, a)]$). Nor do *de re* common ground definitions apply to communication where [3] neither conversational participant is known to the other (e.g. Intuitively, it is common ground between reviewer and author in a double blind peer review process that the submitted paper should not exceed 10,000 words).³ In these cases neither speaker nor addressee is acquainted with the other (i.e. $\neg \exists R_1[R_1(a, b)] \wedge \neg \exists R_2[R_2(b, a)]$). Hence the above iteration of *de re* beliefs cannot materialize in these cases and so there can exist no common ground between speaker and addressee (i.e. between Monk and his readership, between you and your admirer or between anonymous author and reviewer). This is unsatisfactory since these conversations *do* seem to involve producing and interpreting the relevant texts against a shared background.

The same problem arises in a generalized definition of common ground in terms of *de re* beliefs. If we make all acquaintance relations explicit such definitions would be rewritten as follows: *p* is common ground between all conversational participants in some community iff:

³Actually, these distinctions raise questions about what constitutes an acquaintance relation. Intuitively, I am acquainted with Monk, but not with the writer of the anonymous love letter because – even though I've never met either – I know Monk through his book, reading about him on Wikipedia, someone referring to him etc. and this is not true for the anonymous admirer. However, am I not in (an impoverished sense but in) essentially the same way also acquainted with the anonymous admirer (or with the anonymous reviewer) *through* the love-letter (or the review)? (See e.g. Jeshion [4], Recanati [10]) Maybe conversations of type [2] and [3] (where the addressee is not acquainted with the speaker) are in fact not possible. However, such a concession would not dissolve the problem with *de re* common ground; Discourse where the addressee is unknown (type [1]) is still possible.

$$\begin{array}{c}
 \frac{\forall x(Cx \rightarrow \mathbf{B}_x^* \lambda i[p])}{\forall x \forall y(Cx \wedge Cy \rightarrow (\exists R_1[R_1(x, y) \wedge \mathbf{B}_x^* \lambda i[\mathbf{B}_{\iota R_1^i}^* \lambda i'[p]]]))} \\
 \hline
 \frac{\forall x \forall y \forall z(Cx \wedge Cy \wedge Cz \rightarrow (\exists R_1[R_1(x, y) \wedge \exists R_2[R_2(x, z) \wedge \mathbf{B}_x^* \lambda i[\exists R_3[R_3(\iota R_1^i, \iota R_2^i) \wedge \mathbf{B}_{\iota R_1^i}^* \lambda i'[\mathbf{B}_{R_3^i}^* \lambda i''[p]]]]])))}{\vdots}
 \end{array}$$

In words, everyone in the community self-ascrives the property of being such that p ; everyone in the community is acquainted with everyone in the community and self-ascrives the property of being such that the person they are acquainted with self-ascrives the property of being such that p ; etc. Here in conversations of type [1], [2] or [3] at least one of the conversational participants (speaker or one of the addressees) is not acquainted with at least one of the other conversational participants (i.e. $Cx \wedge Cy \wedge \neg \exists R_1[R_1(x, y)]$) and hence there can be no common ground in the relevant community.

3 Redefining common ground

In this section I propose two potential fixes to make traditional common ground definitions applicable to both face-to-face conversations and conversations of types [1], [2] and [3]. They fall in line with Abelard's distinction between two types of generality (as discussed by Lewis [6]): *in sensu composito* or 'collective' (Section 3.1) and *in sensu diviso* or 'distributive' (Section 3.2).⁴ If I believe a general rule *in sensu composito* then I have a general *de dicto* belief. For instance, if a considers all flowers to be pretty *in sensu composito*, then she believes 'that all flowers are pretty' (i.e. $\mathbf{B}_a \forall x(Fx \rightarrow Px)$ where Fx and Px respectively mean x is a flower and x is pretty). This means that there may be flowers that a does not believe to be pretty (for instance because she fails to realize that they are flowers). Conversely, if I believe a general rule *in sensu diviso* then I have a general disposition to form singular *de re* beliefs in every relevant situation. For instance, if a considers all flowers to be pretty *in sensu diviso*, then she believes of every flower, if she sees it, that it is pretty (i.e. $\forall x((Fx \wedge Sxy) \rightarrow \mathbf{B}_a Px)$ where Sxy means x sees y)⁵. This means that a might not recognize every flower as a flower (might even lack the concept of 'flower' altogether) but still believe of every flower that she comes across that it is pretty.

3.1 *In sensu composito* common ground

First, I will present the *in sensu composito* definition of common ground. An *in sensu composito* understanding of general thought by a about the mental states of conversational partners would be as follows: a believes (or self-ascrives the property of being such) that 'all conversational partners in the community believe that p ' (i.e. in our earlier notation: $\mathbf{B}_a \forall x(Cx \rightarrow \mathbf{B}_x p)$, in the present notation: $\mathbf{B}_a^* \lambda i[\forall x(Cx \rightarrow \mathbf{B}_x^* \lambda i'[p])]$). This leads to the following definition of generalized common ground in terms of general *de dicto* belief: p is common ground between all conversational participants in some community iff:

⁴Bermúdez [1] construes from Braithwaite's [2] account of generality the following intermediate concept of general belief: if a believes that flowers are beautiful then a believes of every flower that she sees and considers to be a flower, that it is pretty (i.e. $\forall x((Fx \wedge Sxy) \rightarrow \mathbf{B}_a Px)$). I leave exploration into the merits of extending this notion to a common ground definition for future research.

⁵Contrary to Bermúdez [1] and Meggle [9]), I represent the fact that a has a *disposition* to form *de re* beliefs by a conditional: if a is in the relevant situation (e.g. sees a flower), then a forms the appropriate beliefs.

$$\frac{\frac{\frac{\forall x(Cx \rightarrow \mathbf{B}_x^* \lambda i[p])}{\forall y(Cy \rightarrow \mathbf{B}_y^* \lambda i[\forall x(Cx \rightarrow \mathbf{B}_x^* \lambda i'[p])])}}{\forall z(Cz \rightarrow \mathbf{B}_z^* \lambda i[\forall y(Cy \rightarrow \mathbf{B}_y^* \lambda i'[\forall x(Cx \rightarrow \mathbf{B}_x^* \lambda i''[p])])])}}{\vdots}$$

In words, everyone in the community believes that p ; everyone in the community believes that everyone in the community believes that p ; etc. Hence p can be common ground in a community even though nobody has any de re beliefs about anyone. All that is required is that people have appropriate beliefs about what ‘everyone in the community’ believes.

Likewise, an *in sensu composito* understanding of general thought about conversational participants would lead to the following definition of common ground between one speaker and one addressee in terms of singular de dicto belief:⁶ p is common ground between speaker a and addressee b iff (where Sx means x is a speaker and Ax means x is an addressee):

$$\frac{\frac{\frac{\mathbf{B}_a^* \lambda i[p] \quad \mathbf{B}_b^* \lambda i[p]}{\mathbf{B}_b^* \lambda i[\mathbf{B}_{lx[Sx]}^* \lambda i'[p]] \quad \mathbf{B}_a^* \lambda i[\mathbf{B}_{lx[Ax]}^* \lambda i'[p]]}}{\mathbf{B}_a^* \lambda i[\mathbf{B}_{lx[Ax]}^* \lambda i'[\mathbf{B}_{lx[Sx]}^* \lambda i''[p]]] \quad \mathbf{B}_b^* \lambda i[\mathbf{B}_{lx[Sx]}^* \lambda i[\mathbf{B}_{lx[Ax]}^* \lambda i''[p]]]}}{\vdots \quad \vdots}$$

So, both speaker and addressee believe that p ; the addressee believes that ‘the speaker’ believes that p ; the speaker believes that ‘the addressee’ believes that p ; etc. Again, p can be common ground without addressee or speaker forming any de re beliefs. All that is required is that they have the appropriate beliefs about what ‘the speaker’ or ‘the addressee’ believes.

3.2 *In sensu diviso* common ground

Next, I turn to the *in sensu diviso* version of a common ground definition. To formulate the *in sensu diviso* definition we need to rewrite in conditional (or *in sensu diviso*) form the relational analysis of de re attitudes. In words, if a believes *in sensu diviso* of b that he is Q , then *if* there is an acquaintance relation from a to b , then a believes (or self-ascrives the property of being such) that the person he knows through this acquaintance relation is Q . As a type of donkey sentence this is translated as $\forall R_1[R_1(a, b) \rightarrow \mathbf{B}_a^* \lambda i[Q_1 R_1^i]]$. An *in sensu diviso* understanding of a general thought by a about the mental states of conversational partners would be as follows: It is true of all conversational partners in some community that if a is in a relevant situation with a conversational participant, then a believes of this person that he believes that p (i.e. in our earlier notation: $\forall x(Cx \wedge Rax \rightarrow \mathbf{B}_a \mathbf{B}_x p)$ where Rxy means x is in a relevant situation with y). I assume that ‘the relevant situations’ are situations where an acquaintance relation obtains⁷ so that it is true of all conversational partners in some community that if there is an acquaintance relation from a to the conversational participant, then a believes that the person she is acquainted with believes that p . As a type of donkey sentence this gets translated as $\forall x(Cx \rightarrow \forall R_1[R_1(a, x) \rightarrow \mathbf{B}_a^* \lambda i[\mathbf{B}_{R_1^i}^* \lambda i'[p]]])$. This leads to the following definition of generalized common ground in terms of conditional de re belief:⁸ p is common ground between all conversational participants in some community iff:

⁶We derive these iterations from the general common ground definition because a and b are conversational participants (i.e. Ca and Cb), a believes that ‘the addressee’ is a conversational participant (i.e. $\mathbf{B}_a^* \lambda i[C_{lx[Ax]}]$), b believes that ‘the speaker’ is a conversational participant (i.e. $\mathbf{B}_b^* \lambda i[C_{lx[Sx]}]$), etc.

⁷Arguably, one can put constraints on the relevant types of acquaintance relations (e.g. a is acquainted with a conversational participant ‘in the context of conversation’). I leave this to further research.

⁸Meggle [9] alludes to an alternative ‘*in sensu diviso*’ version of a generalized common ground definition that boils down to the original definition in terms of de re beliefs. This version does not seem to do justice to the

$$\begin{array}{c}
 \frac{\forall x(Cx \rightarrow \mathbf{B}_x^* \lambda i[p])}{\forall x, y((Cx \wedge Cy) \rightarrow \forall R_1[R_1(x, y) \rightarrow \mathbf{B}_x^* \lambda i[\mathbf{B}_{\gamma R_1^i}^* \lambda i'[p]]])} \\
 \frac{\forall x, y, z((Cx \wedge Cy \wedge Cz) \rightarrow \forall R_1, R_2[R_1(x, y) \wedge R_2(y, z) \rightarrow \mathbf{B}_x^* \lambda i[\forall R_3[R_3(\gamma R_1^i, \gamma R_2^i) \rightarrow \mathbf{B}_{\gamma R_1^i}^* \lambda i'[\mathbf{B}_{\gamma R_3^i}^* \lambda i''[p]]]]])}{\vdots}
 \end{array}$$

So, everyone in the community believes that p ; for everyone in the community it is true that for everyone in the community, if the one were acquainted with the other, then the one would believe that the person they are acquainted with believes that p ; etc. So, again, no de re beliefs are required for p to be common ground in a community, merely that people would form the appropriate de re beliefs about one another if they were acquainted (and would believe that the others would do as well).

Alternatively, common ground between speaker s and addressee a is defined as follows:⁹ p is common ground between speaker a and addressee b iff:

$$\begin{array}{c}
 \frac{\mathbf{B}_a^* \lambda i[p] \quad \mathbf{B}_b^* \lambda i[p]}{\forall R_1[R_1(b, a) \rightarrow \mathbf{B}_b^* \lambda i[\mathbf{B}_{\gamma R_1^i}^* \lambda i'[p]]] \quad \forall R_1[R_1(a, b) \rightarrow \mathbf{B}_a^* \lambda i[\mathbf{B}_{\gamma R_1^i}^* \lambda i'[p]]]} \\
 \frac{\forall R_1[R_1(a, b) \rightarrow \mathbf{B}_a^* \lambda i[\forall R_2[R_2(\gamma R_1^i, b) \rightarrow \mathbf{B}_b^* \lambda i[\forall R_2[R_2(\gamma R_1^i, b) \rightarrow \mathbf{B}_{\gamma R_2^i}^* \lambda i'[\mathbf{B}_{\gamma R_1^i}^* \lambda i''[p]]]]]]]}{\vdots \quad \vdots}
 \end{array}$$

So, both speaker and addressee believe that p ; if the addressee were acquainted with the speaker, then the addressee would believe that the person he is acquainted with believes that p ; if the speaker were acquainted with the addressee, then the speaker would believe that the person he is acquainted with believes that p ; etc. So p can be common ground between speaker and addressee even though neither has any de re beliefs about the other. All that is required is that they would form the right de re beliefs about each other if they were acquainted (and would believe the other would do so as well).

4 Deriving de re beliefs

The above definitions are supposed to be general definitions of common ground that apply to all four types of communication (i.e. [1], [2], [3] and face-to-face communication) where one or more conversational participants may form iterative de re beliefs about the other. In the following two subsections I explore whether we can derive the appropriate de re beliefs in all four types of communication from the *in sensu composito* and from the *in sensu diviso* definition. I show that we *can* (albeit in slightly different ways for the two definitions) if we assume that in case a conversational participants is ‘known’, this party’s identity is common ground (e.g. It is common ground between speaker a and addressee b that $a = \iota x[Sx]$). Since this is a de re belief about a that requires an acquaintance relation (i.e. $\exists R_1[R_1(b, a)]$), we can derive the appropriate iterative de re beliefs. The iteration of de re beliefs of face-to-face communication (See p. 3) turns out to be a limit case where the identities of both conversational participants is known. For reasons of space I only show how this works for definitions of common ground between an addressee and a speaker.

fact that a general *in sensu diviso* belief involves a *disposition* to form de re beliefs. Moreover, it suffers from the problems described in section 2 and is hence not the most useful version of an *in sensu diviso* definition.

⁹We arrive at these iterations from the general common ground definition because a and b are conversational participants (i.e. Ca and Cb)

4.1 *In sensu composito*

First, I will show how the different types of communication fit in the *in sensu composito* definition of common ground. In communication of type [3], where neither conversational participant is known (e.g. double blind peer review), I take the beliefs of the participants to be properly described by the ‘bare’ iteration of de dicto beliefs of the *in sensu composito* definition on p. 5, i.e. neither addressee nor speaker has any de re beliefs about the other, nor believes the other to have these. Addressee and speaker merely have beliefs about the mental state of ‘the speaker’ or ‘the addressee’.

Conversations of type [1] and [2] are different because the identity of either the speaker or the addressee is known. Below I focus on conversations of type [1] (where the speaker is known) but since conversations of type [2] are the exact mirror image of these conversations, the discussion applies to both. For instance, in the case of me (Semeijn) reading Monk’s biography it is common ground between Monk m and Semeijn s that Monk is the speaker (i.e. $m = \iota x[Sx]$). For this de re belief to be *in sensu composito* common ground there must be an appropriate acquaintance relation between addressee and speaker (i.e. Semeijn must be acquainted with Monk to have a de re belief about him: $\exists R_1[R_1(s, m) \wedge \mathbf{B}_s^* \lambda i[\iota R_1^i = \iota x[Sx]]]$) and conversational participants must believe that ‘the speaker’ and ‘the addressee’ have the appropriate acquaintance relations in order to have this de re belief about the speaker (e.g. Monk believes that ‘the addressee’ is acquainted with him and that ‘the addressee’ believes that the person she is acquainted with is ‘the speaker’: $\mathbf{B}_m^* \lambda i[\exists R_1[R_1(\iota x[Ax], i) \wedge \mathbf{B}_{\iota x[Ax]}^* \lambda i'[\iota R_1^i = \iota x[Sx]]]]$). See appendix A for details. If we assume that we believe the logical consequences of our beliefs we can from this, and the information that some proposition p is *in sensu composito* common ground, derive the following iteration of beliefs that incorporates de re beliefs about the speaker Monk (but not about the addressee Semeijn):

$$\begin{array}{c}
 \begin{array}{c}
 \mathbf{B}_m^* \lambda i[p] \quad \mathbf{B}_s^* \lambda i[p] \\
 \hline
 \exists R_1[R_1(s, m) \wedge \mathbf{B}_s^* \lambda i[\mathbf{B}_{\iota R_1^i}^* \lambda i'[p]]] \quad \mathbf{B}_m^* \lambda i[\mathbf{B}_{\iota x[Ax]}^* \lambda i'[p]] \\
 \hline
 \mathbf{B}_m^* \lambda i[\exists R_1[R_1(\iota x[Ax], i) \wedge \\
 \mathbf{B}_{\iota x[Ax]}^* \lambda i'[\mathbf{B}_{\iota R_1^i}^* \lambda i''[p]]]] \quad \exists R_1[R_1(s, m) \wedge \\
 \mathbf{B}_s^* \lambda i[\mathbf{B}_{\iota R_1^i}^* \lambda i'[\mathbf{B}_{\iota x[Ax]}^* \lambda i''[p]]]] \\
 \vdots \quad \vdots
 \end{array}
 \end{array}$$

The above iterations represent the mental states of Monk and myself, i.e. speaker and addressee in conversations of type [1]; both Monk and Semeijn believe that p ; Semeijn is acquainted with Monk and believes that the person she is acquainted with believes that p ; Monk believes that ‘the addressee’ believes that p , etc. So, I do have de re beliefs about Monk’s beliefs (and Monk believes that ‘the addressee’ has these) but Monk only has beliefs about ‘the addressee’s’ beliefs.

Lastly, to arrive from this at the original iteration of de re beliefs that properly describes the mental states of people in face-to-face communication (See p. 3), we only need to assume that it is also *in sensu composito* common ground that I am the addressee (i.e. $s = \iota x[Ax]$).

4.2 *In sensu diviso*

Now that I have shown how conversations of type [1], [2], [3] and face-to-face conversations fit into the *in sensu composito* definition of common ground, I will show how they fit into the *in sensu diviso* common ground definition. As in the *in sensu composito* definition, I take the mental states of people engaging in communication of type [3] (where neither conversational participant is known) to be properly described by the ‘bare’ iteration of dispositions to form de re beliefs of the *in sensu diviso* definition on p. 6, i.e. neither addressee nor speaker has any de re

beliefs about the other, nor believes the other to have these. Contrary to the *in sensu composito* definition, the *in sensu diviso* definition also doesn't require the conversational participants to have any *de dicto* beliefs about 'the speaker's' or 'the addressee's' mental state but instead requires them to have the proper dispositions to form *de re* beliefs about each other.

As for the other types of communication, in the case of me reading Monk's biography (type [1]) it is again common ground that Monk is the speaker (i.e. $m = \iota x[Sx]$). In order for this *de re* belief to be *in sensu diviso* common ground there must be an appropriate acquaintance relation between Semeijn and Monk (i.e. $\exists R_1[R_1(s, m) \wedge \mathbf{B}_s^* \lambda i[\iota R_1^i = \iota x[Sx]]]$) and Semeijn and Monk must have the appropriate dispositions to form *de re* beliefs about the other being appropriately acquainted (e.g. If Monk were acquainted with Semeijn, then Monk would believe that this person is acquainted with him and that this person believes that the person that she is acquainted with is 'the speaker': $\forall R_1[R_1(m, s) \rightarrow \mathbf{B}_m^* \lambda i[\exists R_2[R_2(\iota R_1^i, i) \wedge \mathbf{B}_{\iota R_1^i}^* \lambda i'[\iota R_2^i = \iota x[Sx]]]]]$). See appendix A for details. From this, and the information that some proposition p is *in sensu diviso* common ground, we can derive the following iteration of beliefs that incorporates *de re* beliefs about the speaker Monk (but not about the addressee Semeijn):

$$\begin{array}{c}
 \dfrac{\mathbf{B}_m^* \lambda i[p] \quad \mathbf{B}_s^* \lambda i[p]}{\exists R_1[R_1(s, m) \wedge \mathbf{B}_s^* \lambda i[\mathbf{B}_{\iota R_1^i}^* \lambda i'[p]]]} \quad \forall R_1[R_1(m, s) \rightarrow \mathbf{B}_m^* \lambda i[\mathbf{B}_{\iota R_1^i}^* \lambda i''[p]]] \\
 \hline
 \forall R_1[R_1(m, s) \rightarrow \mathbf{B}_m^* \lambda i[\forall R_2[R_2(\iota R_1^i, i) \rightarrow \mathbf{B}_{\iota R_1^i}^* \lambda i'[\mathbf{B}_{\iota R_2^i}^* \lambda i''[p]]]]] \quad \exists R_1[R_1(s, m) \wedge \mathbf{B}_s^* \lambda i[\forall R_2[R_2(\iota R_1^i, i) \rightarrow \mathbf{B}_{\iota R_2^i}^* \lambda i'[\mathbf{B}_{\iota R_2^i}^* \lambda i''[p]]]]] \\
 \mathbf{B}_{\iota R_1^i}^* \lambda i'[\mathbf{B}_{\iota R_2^i}^* \lambda i''[p]]] \\
 \vdots \quad \vdots
 \end{array}$$

In words, both Monk and Semeijn believe that p ; Semeijn is acquainted with Monk and believes of the person she is acquainted with that he believes that p ; if Monk were acquainted with Semeijn, then Monk would believe that the person he is acquainted with believes that p ; etc. So, I do have *de re* beliefs about Monk's beliefs (and Monk would believe that I have these if he knew me) but Monk only has a disposition to form *de re* beliefs about me.

Again, to arrive from this at the original iteration of *de re* beliefs (See p. 3) we only need to assume that it is also *in sensu diviso* common ground that I am the addressee (i.e. $s = \iota x[Ax]$). In fact – unlike in the *in sensu composito* definition where it needs to be common ground who 'the addressee' and 'the speaker' are – it is enough to assume that a *de re* belief about speaker and addressee is common ground to arrive at the original iteration of *de re* beliefs; This ensures that speaker and addressee are acquainted with each other and have the appropriate dispositions to form beliefs about conversational participants being acquainted with each other. This contrast in derivations reflects the central difference between the two notions of common ground relevant for deciding between the definitions in the next section.

5 The shy acquaintance

Now that I have presented two possible strategies to improve upon traditional definitions of common ground, we can try to decide between them. Most importantly, we can compare how well they fit our intuitive understanding of common ground. Lewis [6] has argued that a general rule is convention only if people believe it *in sensu diviso*, i.e. only if people respond in accordance with the rule in all relevant instances (whether they are aware of this or not). Similarly, one could argue that q is only truly common ground when people form the appropriate *de re* beliefs about conversational participants whenever they are acquainted with them. However, it is not obvious that Lewis' reasoning extends to the concept of common ground.

To clearly see the difference between the two definitions suppose Thea has a weekly blog on architecture that her favourite nephew Nick is an avid reader of. However, afraid of being asked for his opinion, Thea's nephew has not yet revealed to his aunt that he is a reader of her blog, i.e. a conversational participant. Suppose Thea's latest blogpost contained the information that *The Sims* was originally designed as an architecture simulator (q). According to the *in sensu diviso* definition of common ground it is *not* common ground between Thea t and her nephew n that q – Thea is acquainted with the addressee but does not believe of him that he believes that q (i.e. $\exists R_1[R_1(t, n) \wedge \neg \mathbf{B}_t^* \lambda i[\mathbf{B}_{\gamma R_1^i}^* \lambda i'[q]]]$). According to the *in sensu composito* definition, it *is* common ground between Thea and her nephew that q – Thea has the appropriate beliefs about what ‘the addressee’ believes (i.e. $\mathbf{B}_t^* \lambda i[\mathbf{B}_{\gamma x[4x]}^* \lambda i'[q]]$) and in this situation the addressee is her nephew (even though Thea does not recognize him as such).

An anonymous reviewer has judged a comparable case to form an argument in favour of the *in sensu diviso* definition; If Thea would meet her nephew at her husband's birthday party, surely she would not base the production of her speech acts on the assumption that q is shared background knowledge. For instance, she would not say something like “I gave my husband that architecture simulation game” since she would not expect her nephew to understand what game she is talking about. Similarly, the linguistic behaviour of the nephew will be as if he has no idea what game Thea is talking about (since he does not want to expose himself as a reader).

I agree with the reviewer's judgement of the above example conversation but argue that in this conversation it would also not be common ground that q on an *in sensu composito* understanding, i.e. during the birthday conversation Thea does not believe that ‘the addressee’ (of that conversation) believes that q . The difference between the *in sensu composito* and the *in sensu diviso* definition in fact only comes out in conversations where Thea believes that ‘the addressee’ (of that conversation) believes that q . So the relevant situation to consider is one where Thea is writing another blogpost; Here Thea believes that ‘the addressee’ believes that q (because the previous post contained this information) and she is acquainted with one of her readers (i.e. her nephew) but does not believe of him that he believes that q . Although intuitions may vary concerning this and related cases, I take these considerations to form a *prima facie* argument for the *in sensu composito* definition of common ground, i.e. in this situation it *is* common ground between Thea and her nephew that q . For instance, Thea could write “I gave my husband that architecture simulation game” in such a situation since she expects ‘the reader’ to understand what she is talking about. Intuitively, people's linguistic behaviour will depend on their beliefs about ‘the speaker's’ or ‘the addressee's’ beliefs, not on what they *would* believe about conversational participants if they were acquainted with them.

6 Conclusions

This paper proposes two novel refinements of traditional definitions of common ground in terms of *de re* attitudes in order to make them applicable to non-face-to-face communication. These fall in line with Abelard's distinction between generality *in sensu composito* (i.e. speaker and addressee have iterative beliefs about the mental states of ‘the speaker’ and ‘the addressee’) and *in sensu diviso* (i.e. speaker and addressee would form iterative *de re* beliefs about the mental states of speaker and addressee if they were acquainted with them). I have shown how the four distinguished types of communication fit in either definition taking face-to-face communication as a limit case. Lastly, I have argued that the case of the shy acquaintance forms a *prima facie* argument in favour of an *in sensu composito* definition.

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A Appendix

It is *in sensu composito* common ground between m and s that $m = \iota x[Sx]$ iff

$$\begin{array}{c}
 \frac{\mathbf{B}_m^* \lambda i[i = \iota x[Sx]] \quad \exists R_1[R_1(s, m) \wedge \mathbf{B}_s^* \lambda i[\iota R_1^i = \iota x[Sx]]]}{\exists R_1[R_1(s, m) \wedge \mathbf{B}_s^* \lambda i[\exists R_2[R_2(\iota x[Sx], \iota R_1^i) \wedge \mathbf{B}_m^* \lambda i[\exists R_1[R_1(\iota x[Ax], i) \wedge \mathbf{B}_{\iota x[Sx]}^* \lambda i'[\iota R_2^i = \iota x[Sx]]]]]]]} \\
 \hline
 \frac{\mathbf{B}_{\iota x[Ax]}^* \lambda i'[\exists R_2[R_2(\iota x[Sx], \iota R_1^i) \wedge \mathbf{B}_{\iota x[Sx]}^* \lambda i'[\exists R_3[R_3(\iota x[Ax], \iota R_2^i) \wedge \mathbf{B}_{\iota x[Ax]}^* \lambda i''[\iota R_2^{i''} = \iota x[Sx]]]]]]]}{\vdots \quad \vdots}
 \end{array}$$

It is *in sensu diviso* common ground between m and s that $m = \iota x[Sx]$ iff

$$\begin{array}{c}
 \frac{\mathbf{B}_m^* \lambda i[i = \iota x[Sx]] \quad \exists R_1[R_1(s, m) \wedge \mathbf{B}_s^* \lambda i[\iota R_1^i = \iota x[Sx]]]}{\forall R_1[R_1(s, m) \rightarrow \mathbf{B}_s^* \lambda i[\mathbf{B}_{\iota R_1^i}^* \lambda i'[\iota' = \iota x[Sx]]]]} \\
 \hline
 \frac{\forall R_1[R_1(s, m) \rightarrow \mathbf{B}_s^* \lambda i[\mathbf{B}_{\iota R_1^i}^* \lambda i'[\iota' = \iota x[Sx]]]] \quad \forall R_1[R_1(m, s) \rightarrow \mathbf{B}_m^* \lambda i[\exists R_2[R_2(\iota R_1^i, i) \wedge \mathbf{B}_{\iota R_1^i}^* \lambda i'[\iota R_2^i = \iota x[Sx]]]]]}{\forall R_1[R_1(m, s) \wedge \mathbf{B}_m^* \lambda i[\forall R_2[R_2(\iota R_1^i, i) \rightarrow \mathbf{B}_{\iota R_1^i}^* \lambda i'[\exists R_3[R_3(\iota R_2^i, i) \wedge \mathbf{B}_{\iota R_2^i}^* \lambda i''[\iota R_3^{i''} = \iota x[Sx]]]]]]]} \\
 \hline
 \frac{\forall R_1[R_1(m, s) \wedge \mathbf{B}_m^* \lambda i[\forall R_2[R_2(\iota R_1^i, i) \rightarrow \mathbf{B}_{\iota R_1^i}^* \lambda i'[\mathbf{B}_{\iota R_2^i}^* \lambda i''[\iota'' = \iota x[Sx]]]]]]]}{\vdots \quad \vdots}
 \end{array}$$