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Gricean Theories of Reference

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Abstract Gricean theories of reference define what it is for a speaker to refer to an item in terms of the speaker meaning something about that item. This raises a question posed by Stephen Schiffer. "What could be the point of trading in facts about meaning for facts about the content of beliefs if one ends up with nothing to say about the latter?" In the case of reference in particular, what do we gain when we explain a speaker's referring to a particular thing by appealing to beliefs that in some unexplained way refer to that thing? Building on the work of Stephen Neale and Schiffer, I offer a Gricean account of reference and then show what the account explains, even though it assumes referential beliefs.

Keywords Speaker reference. Speaker meaning. Grice. Schiffer. Neale. Common knowledge. Pragmatics.

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1 Introduction

As we are standing together at a party, I ask whether your brother, whom I do not know, is present. You respond by pointing in the direction of a man while uttering, 'The man with the martini in his hand is my brother'.[1] In uttering the sentence, you refer to your brother. As Neale and Schiffer emphasize, what a speaker refers to "on a particular occasion of use is determined by the speaker's referential intentions" (Neale, Schiffer 2020). Referential intentions are intentions to produce beliefs that uniquely designate items. They note that the link between intentions and reference "isn't new, but it's insufficiently appreciated" (Neale, Schiffer 2020), and they increase appreciation by offering a Gricean account of what it is for a speaker to refer. They do not, however, address a question that Schiffer raises elsewhere. "What could be the point of trading in facts about meaning for facts about the content of beliefs if one ends up with nothing to say about the latter?" (Schiffer 1989, 2). This is not a criticism of Neale and Schiffer. They had other theoretical axes to grind. The question is however well worth asking, especially for Gricean theories of reference. What do we gain when we explain a speaker's referring to a particular thing by appealing to beliefs that in some unexplained way refer to that thing? My answer begins with speaker meaning since, following Neale and Schiffer, I define speaker reference as a species of speaker meaning. From there, I turn to common knowledge, and then to the fact that in communication we may reveal ourselves as occupying various social roles. I argue that an important explanatory gain of a Gricean account of reference is that it highlights how our interactions in social roles generate the common knowledge critical to successful communication.

2 Speaker Meaning and Speaker Reference

I divide the account of speaker meaning into two parts. The first is a definition of M-intending, which characterizes the intention a speaker must have to qualify as meaning that p. The reason for separately defining M-intending is that I use the notion later to characterize a key speaker meaning pattern that conforms to Grice's Cooperative Principle. The exact characterization of M-intending is controversial. A definition adapted from Grice's early work on meaning serves our purposes even though the definition is only appropriate for cases of asserting that p. Later work refines the analysis to meet a variety

1 The example is adapted from Donnellan 1968, 287.

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of counterexamples, and it extends the analysis to the full range of speech acts.

> A speaker S *M-intends that p* for an audience A by uttering U if and only if S utters U intending (1) that A believe that p; (2) that A recognize S's intention (1); (3) that this recognition be part of A's reason for believing p.[2]

Griceans differ on what the exact account should be, but, as Neale and Schiffer note, they typically require, as the above definition does, that the speaker intend to produce a belief in the audience (in the case of assertion, and an appropriate psychological attitude in the case of other speech acts). All of the discussion that follows concerns that condition. Departing from Grice and following Schiffer (Schiffer 1973), I define speaker meaning by adding a common knowledge requirement to the definition of M-intending:

> A speaker S means that p by uttering U for an audience A if and only if uttering U ensures that it is *common knowledge* between S and A that S M-intends that p by uttering U.

Schiffer appeals to common knowledge to rule out counterexamples he raises to Grice's definition of speaker meaning. Explanatory demands provide a second reason. As illustrated below in the discussion of Assurance Games, common knowledge plays a critical role in explaining speaker-meaning interactions.

Following Neale and Schiffer, I define initially speaker reference as follows. I offer two refinements below.

> S refers to x in uttering U if and only if in uttering U, S meant an x-dependent proposition.[3]

2 Adapted from Grice 1957, 337. Compare Neale, Schiffer 2020: "For any person S, proposition p, and utterance u, S meant p in uttering u iff for some person A and feature φ, S intended it to be common ground between S and A that u has φ and at least partly on that basis that S uttered u intending her utterance of u to result in A's actively believing p". I appeal to common *knowledge* instead of common *belief*. We commonly believe that p when and only when we believe that p, believe that we believe we believe, and so on. In a more detailed treatment development of Gricean approaches to meaning, appealing to common belief would be more useful. For our purposes, however, talk of common knowledge is sufficient and has the virtue of being consistent with Grice and Schiffer's 1960-70s discussions of meaning.

3 Compare Neale and Schiffer: "We take the foundational case of speaker reference, which we'll call primary speaker reference (speaker reference$_p$) to be a species of speaker meaning: (F) S referred$_p$ to x in (the course of) uttering u iff in uttering u, S meant an x-dependent proposition". Neale and Schiffer, "How Demonstratives and Indexicals Really Work". (Neale, Schiffer 2020). I dropped the reference to a *primary* speaker reference. Neale and Schiffer explain the idea using the following example.

Neale and Schiffer explain that an "x-dependent proposition is a proposition that is individuated partly in terms of x and that wouldn't exist if x didn't exist" (Neale, Schiffer 2020). To illustrate, suppose we are looking at the racehorses in the paddock. I know you want to bet on the longshot, so, pointing at a particular horse, I refer to that horse when I utter, "The longshot is wearing number six". The proposition that I speaker-mean is individuated partly in terms of that particular horse and would not exist if the horse did not. Compare Alice, who believes – truly, let us suppose – that there are spies, and she infers on general principles about the distribution of heights, that one of them is shorter than the rest. Assume her inference is correct: there is a shortest spy.[4] Alice, who happens to believe that short people generally have good posture, utters 'The shortest spy has good posture' to mean for Bob that the shortest spy has good posture. There is no particular person in terms of which the proposition she means is individuated. Indeed, she could have uttered ''The shortest spy – whoever that is – has good posture" without essentially changing what she means. The proposition she means is that there is a unique person who is a spy and shorter than all other spies, and that person has good posture.

The appeal to x-dependent propositions in the account of reference makes a "reference version" of Schiffer's "What do we gain?" question particularly pressing. What could be the point of trading in facts about how speakers refer for facts about how beliefs refer if one ends if one ends up with nothing to say about the latter?

At a general, abstract level, we know the outline of the account of how beliefs refer. I take it for granted that, in some yet unexplained way, information processing in the brain combines semantically interpreted lexical representations into complex structures in ways that underlie thought and language. We can distinguish two types of components in those structures. Contextually invariant components, and components whose full specification is contextually dependent,

Suppose Alice says "That woman next to that boy patting that dog is French" referring to the woman to mean that she is French. They claim that Alice does not mean anything of the boy (or the dog). They contend that "In primary speaker reference, S refers to a thing in order to mean something about it. In non-primary speaker reference S refers to a thing not in order to mean something about it, but in order to identify the thing to which S is making a primary reference". But surely Alice does mean something about the boy: namely, that he is next to the woman and is petting a dog. She M-intends that, and her utterance makes that intention common knowledge. One can mean this without meaning that the boy has the property specified by the verb phrase 'is French'.

4 If one is worried about ensuring the definite description applies uniquely, assume some tie-breaking procedure if two or more spies are shorter than all the rest. For example, sort the spies' names alphabetically and designate the alphabetically first spy as the shortest, or some more elaborate procedure (if, for example, one is worried about ties in the alphabetical ranking).

such as the mental counterparts of indexicals, proper names, definite descriptions like "The [contextually definite] boy", grammatical mood, and tense. We can identify those structures, or some subset of them, with propositions. Some propositions contain no contextually invariant components, e.g., the proposition that snow is (timelessly) white, while others contain contextually specified components, e.g., the proposition that the-contextually-specified-item belongs in the contextually-specified place. In identifying and explaining how the components of propositions work, the theory would explain how beliefs and other psychological attitudes refer to things. Our current talk of propositions is a promissory note drawn on such a theory.[5]

The initial definition of speaker reference needs refinement. To see why, suppose Bob utters 'The woman next to the boy petting the dog is French' to refer thereby to a certain woman, boy, and dog. What woman-boy-dog proposition does Bob mean?[6] To answer, we

5 This is not to deny that there has been a great deal of insightful work on propositions. See, for example, Schiffer 2003 and Jaszczolt 2023.

6 Neale and Schiffer address this issue in their definition of referring in (referring$_n$). A key point of the definition is to accommodate Neale and Schiffer's claim that, for example, that a speaker can use a belief *about* Ralph to enable reference to Roger, without thereby referring to Ralph. 'S referred$_n$ to x' in uttering u iff for some person A, thing x and relation R, S utters u intending it to be common ground between S and A that R(x', x) and primarily on that basis common ground between them that S referred$_p$ to x in uttering u'. I note in passing that there appear to be counterexamples. Suppose Roger and Ralph are nearly identical twins except for Roger being four inches taller than Ralph. Bob utters 'The twin is drinking white wine'. He intends it to be common ground between them that Roger is four inches taller than Ralph and primarily on that basis that he refers$_p$ to Roger. It follows from the definition that Bob refers$_n$ to Ralph in uttering 'The twin is drinking white wine', but surely this is not the case. The common ground background belief about an individual – in this case about Ralph's being shorter that Roger – can enable reference without involving reference to that individual.

The problem relevant to the text is that it is not clear how to fill out the definition in particular cases. To begin, simplify what Bob utters. Suppose he utters 'The woman next to the boy is French' to refer thereby to a certain woman and boy. Then Bob intends it to be common ground between him and Alice that the boy stands in the relation *next-to* to the woman, and primarily on that basis common ground between them that Bob referred$_p$ to the woman in uttering u. But how do you handle Bob's uttering 'The woman next to the boy petting the dog is French' to refer thereby to a certain woman, boy, and dog? The natural idea is to see the boy as identified by standing in the relation *petting* to the dog and then see the woman as identified by standing in the relation *next-to* to the boy. But it is not possible to fill the definition out this way since it requires separate instances for each referred$_n$ item. Thus, for the boy: 'Bob intends it to be common ground between him and Alice that the boy stands in the relation *next-to while petting a certain dog* to the woman, and primarily on that basis for it to be common ground between them that Bob referred$_p$ to the woman in uttering u'.

And for the dog: 'Bob intends it to be common ground between him and Alice that the dog stands in the relation *being petted by a boy next-to* the woman and primarily that basis for it to be common ground between them that Bob referred$_p$ to the woman in uttering u'.

It is implausible however that Bob intends the common ground about the boy and the common ground about the dog to both *primarily* be the basis for it being common

need a sufficiently perspicuous way to describe the propositions that figure in the account of speaker reference. To the end, begin with an example in which there is a single item of reference. Pointing at a particular horse, I refer to that horse when I utter, "The longshot is wearing number six". Given the context, my utterance uniquely identifies the horse and represents it as an item to which I ascribe the property *being the longshot*. I will express this by saying that I believe, of the horse, under the property *being the longshot*, that it is number six.[7] For our purposes, we need to extend this form of description to beliefs about multiple items, for example, your belief that the long shot is taller than the favorite. We can express this by saying that you believe, of the long shot, and the favorite, under respectively, *being the long shot*, and *being the favorite*, that the one is taller than other. Generally, given a belief about $x_1,..., x_n$, items, I assume we can represent it as a belief of $x_1,..., x_n$, under some relevant sequence of features $F_1,..., F_n$, and some appropriate relation R, that $R(x_1,..., x_n)$. I leave open the question of whether there will always be a relevant feature F for each item of reference x.[8] (For example, if I believe that I think, do we represent me as believing, of me, under some feature F, that I think? Or do we drop the "under F"?).

We can now define the notion of speaker reference as follows:

> A speaker S refers to items $x_1,..., x_n$ in uttering U if and only if producing U ensures that, for some relation R, and for some features $F_1,..., F_n$, it is common knowledge between S and A that S M-intends of $x_1,..., x_n$, under $F_1,..., F_n$, that $R(x_1,..., x_n)$.

In the examples, I read off the "under F" features from the speaker's utterance – *being the longshot* from 'the longshot', and *being the favorite* from 'the favorite'. Expressions and properties need not always match in this way. When you refer to your brother by uttering 'The man with the martini in his hand', your brother need not have a martini in his hand. As you know, but your audience does not, it is water in a martini glass. Your audience, believing it is a martini,

ground that Bob $referred_p$ to the woman. One could try seeing the sentence uttered as specifying a relation on all the items of reference. Thus, where y is the primary item of reference and $x_1,..., x_n$ are the "referred to in uttering" items: 'S $referred_n$ to $x_1,..., x_n$ in uttering u iff for some person A, thing y S utters u intending it to be common ground between S and A that $R(y, x_1,... x_n)$ and primarily on that basis common ground between them that S $referred_p$ to y in uttering u'.

7 More technically, I adopt the following Quinean convention. Where '[' and ']' are the left and right Quinean corner quotes, a singular term [t] may be substituted *salva veritate* for a term [t'] in the context [... believes, of t, that...] given the true identity [t = t'].

8 See, for example Jaszczolt 2023.

readily identifies your brother. There is an apparent problem, however. The above definition requires that you make it *common knowledge* between you and your audience that you M-intend of the individual in question, under some appropriate F, that he is your brother. What is F? It cannot be *holding a martini* since you know that your brother is not holding one. The relevant F is *holding a drink that looks like a martini*. Both you and your audience know that is true of your brother. Your audience just does not realize that it *only looks* like a martini.

Neale and Schiffer also offer a definition of referring *by an expression*. For example, I refer to a certain horse by the expression 'the longshot'. The above definition does not match expressions to items of reference. Neale and Schiffer's insightful idea is that an expression refers to an item when the expression makes a certain sort of contribution to common knowledge. Adapting their suggestion, I propose:

> For x_i in x_1,..., x_n, in uttering U, S referred to with e to x_i if and only if for some audience A and property φ, S intended it to be common knowledge between S and A that the occurrence of e in U has φ and, at least partly on that basis, that it is common knowledge between S and A, for some features F_1,..., F_n, and relation R, that S M-intends of x_1,..., x_n, under F_1,..., F_n, that R(x_1,..., x_n).[9]

One comment suffices for our purposes. Recall Bob uttering 'The woman next to the boy patting the dog is French' to refer by 'The woman next to the boy patting the dog' to a particular woman. What is the relevant property φ that he relies on in part to generate the common knowledge that he referring to the woman in question? Typically, it will be a competent English speaker's grasp of the fact that, on the occasion of utterance, 'The woman next to the boy patting the dog' is associated with a contextually semantically interpreted structure where that structure assigns to the phrase the property of being a contextually definite woman next to a contextually definite boy who is petting a contextually definite dog.

The account of referring by an expression is a striking illustration of how a Gricean explanation of reference depends on an account of beliefs referring. So, what is the explanatory gain of explaining a speaker reference in terms of beliefs that, in a yet to be explained way, refer to things? The answer lies ultimately in the part social roles play in generating the common knowledge speaker meaning requires. The first step is to explain how common knowledge arises.

9 Compare Neale and Schiffer: "In uttering u, S referred$_p$ to x with e, relative to its i-th occurrence in u, if for some person A and property φ, S intended it to be common ground between S and A that the i-th occurrence of e in u has φ and, at least partly on that basis, that S referred$_p$ to x in uttering u".

3 Common Knowledge

Common knowledge among members of a group is the recursive belief state of members knowing, knowing that they know, knowing that they know that they know, and so on potentially ad infinitum. Having common knowledge does not require an infinite number of beliefs.[10] As explained below, common knowledge in a group that p requires the capacity to generate (under ideal conditions) the following finite sequence for any number *n* (using subscripts to track knowledge levels): group members know$_n$ that group members know$_{n-1}$ that... group members know$_1$ that p. The "ideal conditions only" matters. Practical limitations of memory, time, and concentration will ensure that the number *n* is relatively small in practice.[11]

How does a group acquire common knowledge? Consider the following example. During a baseball game in 1996

> baseball fans at Cleveland's Jacobs Field [looked] up to see an airplane pulling a banner advertising anonymous HIV testing... [The underlying purpose is that] I would be more likely to get an HIV test if I knew that doing so was not unusual, but I wouldn't find this out through everyday conversation; at the ballpark, looking up at the plane, however, it is obvious to all that everyone is seeing the same thing. (Chwe 2013, 41)

The display of the banner creates common knowledge that anonymous testing is available. It does so because the display meets two conditions. *First*: Anyone (anyone with normal perceptual and intellectual abilities) who sees the banner knows$_1$ that anonymous testing is available. *Second*: Anyone who sees the banner knows$_2$ that anyone who sees the banner knows$_1$ that anonymous testing is available. Those conditions ensure that anyone in the group who sees the banner can – ideally – generate the following finite sequence for any number *n*: group members know$_n$ that... group members know$_1$ that anonymous testing is available (Warner 2019). To generalize, let us say that a *common knowledge generator* in a group G for the proposition that p is a process meeting these two conditions: (1) the process results in all members of G knowing that p, and (2) the process ensures that all members of G know (1). It is common knowledge that p in G if and only if there is a common knowledge generator in G for the proposition that p.

10 Some object that having common knowledge requires that one have an infinite number of beliefs, as in Jankovic, 2020, 186.

11 But not as small as one might think. See the remarkable examples of iterated attitudes in Laing 1970.

Common knowledge facilitates speaker-meaning interactions. To illustrate this, I borrow the notion of an Assurance Game from game theory to model a significant subset of those interactions. The choice of model reflects Grice's focus on "the rationality or irrationality of conversational conduct", which, as he notes, he has "been concerned to track down rather than any more general characterization of conversational adequacy" (Grice 1991, 369). When used as a model of speaker meaning interactions, the Assurance Game model exhibits a key pattern of rationality or irrationality of conversational conduct.[12]

The Assurance Game gets its name from the fact that its outcome depends on what each player thinks the other will do, which depends on what each thinks that the other thinks that the other will do, which depends... and so on. To illustrate the game, suppose that Victor and Victoria are discussing by cell phone whether to meet at the opera later in the evening or whether each will stay home alone. Their batteries run out before they decide, and they have no other way to communicate. They both have, and know they both have, the following preferences in the following order. (1) Attend the opera together. There is a benefit they hope to achieve thereby: namely, the pleasure of each other's company. (2) Stay home alone when the other does too. (3) Stay home alone when the other goes to the opera. (4) Go to the opera when the other does not. What Victor or Victoria does depends on what each thinks the other will do, and that depends on what each thinks that the other thinks that the other will do, and so on. Focus on Victor. Similar remarks hold for Victoria. Victor will go to the opera if he thinks Victoria will go. She will go if she thinks Victor will go, so he will go if he thinks Victoria thinks he will go, and so on. An Assurance Game consists of two players with some version of the preferences (1) – (4).[13]

Let us say that Victor and Victoria solve their Assurance game if they coordinate by each going to the opera, or each staying home. Common knowledge is not *necessary* to solve Assurance Games (Sloan, Warner 2020), but it greatly facilitates doing so by making the parties' preferences *transparent* to them. It eliminates misunderstanding, misinterpretation, doubt, or deception. Imagine that Victor and Victoria have a standing agreement that they will

12 Assurance Games are two-player games, so the use to model speaker-meaning interactions ultimately requires generalization to multi-party situations. One possibility is to think of parties as the speaker and a group of individuals comprising the audience. One problem is that Assurance Games are built around the assumption that each party reasons about what the other party thinks, and there may be no clear sense in which a group has a collective expectation about another party. One can generalize to multi-party coordination games.

13 In addition, the parties are unable to communicate, and each chooses without observing or otherwise learning about the choice of the other. These assumptions, and the joint knowledge of one another's preferences, are the classic assumptions of game theory. See, for example, Leyton-Brown 2008.

go to the opera if, when, during the discussion whether to do so, communication is cut off before they reach a decision. When their batteries die, it is common knowledge that they will both go to the opera and hence they coordinate by both going.

Common knowledge created by acts of speaker meaning facilitates coordination in a type of Assurance Game that models a central form of speaker meaning interactions. The interactions are those conforming to Grice's Cooperative Principle. He introduces the principle as follows:

> Our talk exchanges do not normally consist of a succession of disconnected remarks, and would not be rational if they did. They are characteristically, to some degree at least, cooperative efforts; and each participant recognizes in them, to some extent, a common purpose or set of purposes, or at least a mutually accepted direction. This purpose or direction may be fixed from the start (e.g., by an initial proposal of a question for discussion), or it may evolve during the exchange; it may be fairly definite, or it may be so indefinite as to leave very considerable latitude to the participants (as in a casual conversation). But at each stage, some possible conversational moves would be excluded as conversationally unsuitable. We might then formulate a rough general principle which participants will be expected (ceteris paribus) to observe, namely: Make your conversational contribution such as is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged. One might label this the Cooperative Principle. (Grice 1991, 26)

Conversational partners who adhere to the Cooperative Principle have Assurance Game preferences. I characterize the Assurance Game in terms of preferences about M-intentions.[14] It is solved by speaker meaning, that is, by ensuring *common knowledge* of an M-intention.

Suppose that Alice's car, in which Stan is a passenger, is low on gas. Alice says that she is very low on gas and afraid she will run out. The following is common knowledge between them: they share the goal of not running out of gas; there are gas stations nearby; Alice does not know exactly where they are; Stan does know the location of at least one. Stan and Alice have the following preferences.

> Stan's M-intends that there is a gas station at a certain location, and Alice believes that he so M-intends.

14 The attribution of such preferences is an idealization. Conversing partners may only have a disposition to form such preferences on reflection.

This is the most preferred option since it realizes the shared goal of not running out of gas. Alice responds to Stan's M-intention by believing there is a gas station in a certain place and driving to it.

> Stan does not M-intend that there is a gas station at a certain location, and Alice does not think Stan does.

Note that (2) ranks above (3) and (4) because it avoids the costs of trying but failing to coordinate as will happen in (3) and (4).

> Stan M-intends that there is a gas station in a certain location, but Alice does not realize that.

When Alice expresses concern about being low on gas, Stan utters 'Bob's Hardware is nearby' to M-intend that the gas station, Bob's Hardware and Gas, is nearby. Contrary to what Stan assumed, Alice has never heard of Bob's Hardware and Gas. When Stan utters 'Bob's Hardware is nearby', she thinks Stan did not hear what she said and is just expressing a desire to go to Bob's Hardware.

> Stan does not M-intend that there is a gas station in a certain location, but Alice thinks S does.

As above, Alice expresses concern about being low on gas, and Stan utters 'Bob's Hardware is nearby'. This time Stan does *not* M-intend that there is a gas station near Bob's. He did not hear what Alice said and is just expressing his desire to go to Bob's. Alice, however, believes he M-intends that there is a gas station near Bob's. She heads in there and eventually runs out of gas.

Speaker meaning solves the Assurance Game by ensuring *common knowledge* of an M-intention. In the "gas on the corner" example, Stan and Alice will coordinate easily as long as Stan's utterance makes it common knowledge between them that Stan M-intends that Alice can get gas nearby at Bob's. The role of common knowledge in facilitating coordination provides a strong rationale for defining speaker meaning in terms of common knowledge of M-intentions.

Call Assurance Games with versions of the preferences (1) – (4) *Communication* Assurance Games, and let us say that parties *solve* the game when, they achieve what they most prefer: namely that, for some relevant proposition p, the speaker M-intends that p and the audience believes that they so M-intend.

4 An Explanatory Benefit

Consider an example of a Communication Assurance Game that explicitly involves speaker reference. The example raises a question about reference. It helps by raising a question about reference that a Gricean theory can answer, even though the theory assumes without explanation that beliefs can refer. The answer illustrates a distinctive explanatory benefit of Gricean theories of reference.

The example concerns Frank Close's book, *Elusive: How Peter Higgs Solved the Mystery of Mass*. The first mention of the Higgs Field is on page 14: "Higgs bosons condense to produce a weird substance—today known as the Higgs field—that fills the universe" (Higgs 2023). Can we subsume Close and his readers under the explanatory model of a Communication Assurance Game? Describing the game raises the question about reference. To describe the game, assume Close and his readers share the goal of the readers acquiring at least a basic understanding of what the Higgs field is. Given this goal, Close and the audience have the following Communication Assurance Game preferences: (1) Close M-intends, of the Higgs field, under *condensed bosons*, that it fills the universe, and the audience believes that he so M-intends. (2) Close does not M-intend, of the Higgs field, under *condensed bosons*, that it fills the universe, and the audience does not believe that he does. (3) Close M-intends, of the Higgs field, under *condensed bosons*, that it fills the universe, but the audience does not believe that he does. (4) Close does not M-intend, of the Higgs field, under *condensed bosons*, that it fills the universe, but the audience believes that he does.

To see the problem, focus on Rachel, who has just read 'Higgs bosons condense to produce a weird substance—today known as the Higgs field—that fills the universe'. All that Rachel knows about the Higgs field is captured by that sentence plus her knowing that Close wrote a book about the field. Can we see Close as solving the Communication Assurance Game by speaker meaning, of the Higgs field, under *condensed bosons*, that it fills the universe? To speaker mean that is, in part, for his utterance to make it common knowledge between him and Rachel that he intends her to believe, of the Higgs field, under *condensed bosons*, that it fills the universe. The problem is to explain how Rachel counts as having that belief. Why isn't her belief like Alice's belief that the shortest spy has good posture? Alice knows that there are spies and that among them there is a shortest, but her belief does not refer to a particular individual. Instead, she believes that there is a unique person (whoever it is) who is a spy and shorter than all other spies, and that person has good posture. Why is Rachel's knowing there is a unique something called the Higgs field sufficient for her belief to refer to that entity?

The answer lies in social roles – in particular, in the fact that communicating parties create common knowledge essential to speaker meaning by presenting themselves in social roles. To understand their function as common knowledge generators some preliminary comments about social roles generally are in order. After a brief consideration, I return to the Higgs field example.

Social roles are socially recognized patterns of thought and action associated with standards of permitted, expected, or required behavior (Parsons 2012). As the sociologists Peter Berger and Thomas Luckmann note "[i]n the common stock of knowledge there are standards of role performance that are accessible to all members of a society, or at least to those who are potential performers of the roles in question" (Berger, Luckmann 1966, 73). They add, "not only are the standards of role X generally known, but it is known that these standards are known" (Berger, Luckmann 1966, 73). To put the point in our terms, social roles are common knowledge generators. The process of acquiring a social role through instruction and acculturation meets the conditions for a common knowledge generator: (1) the process of acquiring a social role through instruction and acculturation ensures that people who undergo or are aware of the process know the associated standards of proper performance, and (2) the process ensures that those people know that those people know the standards.

As the author of *Elusive: How Peter Higgs Solved the Mystery of Mass*, the particle physicist Frank Close presents himself in the social role of a recognized expert. When Rachel reads "Higgs bosons condense to produce a weird substance—today known as the Higgs field—that fills the universe", it is common knowledge between her (as a reader) and Close that Close is qualified to make assertions about particle physics, and that gives Rachel something Alice does not have – a connection to someone who knows a great deal about the Higgs field including how to experimentally verify its existence. This is sufficient to give her the ability to have a referential belief about the Higgs field. She inherits that ability from Close.

More generally, I also take it for granted that – at least for speakers and audiences coordinating in regard to speaker meaning – proper performance requires observing the Cooperative Principle. To illustrate the relevance to reference, consider the following variant of the Stan and Alice example. When Alice expresses her concern about running out of gas, Stan utters 'Bob's Gas and Hardware is nearest'. Alice has never heard of Bob's Gas and Hardware, but, like Rachel from Close, she inherits from Stan the ability to have a referential belief about it. Alice reasons (could on reflection reason) as follows. "It is common knowledge between us that Stan adheres to the Cooperative Principle, so the best explanation of his utterance is that he is trying to make it common knowledge that he M-intends,

of a particular gas station, under *Bob's Gas and Hardware*, that it is nearby.

For a non-inherited-reference example, imagine, for example, the five-years olds Alice and Jake at the airport meeting their respective grandmothers – call them Abby (for Alice) and Joyce (for Jake) (Capone 2023). Alice and Jake are not biologically related and do not know each other. When they simultaneously see their grandmothers, each calls out, "Grandma!" Alice succeeds in referring to Abby and Jake, to Joyce in part because each speaks in the social role of grandchild. The reference in each case is to the grandmother associated with that role.

5 Conclusion

Gricean theories of reference provide the framework of a rich field of investigation about how social roles create common-knowledge-mediated reference.[15] As the psychologists Thomas et al. (2014) note, given that "much of social life is affected by common-knowledge generators, [it is] surprising that the psychology of common knowledge has apparently had so little visibility either in psychology or in everyday life" (Thomas 2014, 671). They urge that "an acknowledgement of the role of common knowledge in enabling coordination can unify and explain a variety of seemingly unrelated and puzzling phenomena", (Thomas 2014, 671) and they note that

> In recent decades, psychologists have recognized that cooperation is one of the hallmarks of the human species, and that its game-theoretic demands have shaped our emotions, our morality, our social relationships, and our language. Much has been learned about these domains of psychology from a focus on the problem of altruistic cooperation and the mechanisms of reciprocity. We hope that comparable insights are waiting to be discovered by psychologists as they investigate the problem of mutualistic cooperation, and the mechanisms of common knowledge are – as we might say – put out there. (Thomas 2014, 657)

I hope for the same with regard to reference.

15 A linguistic division of labor has long been recognized. See Putnam 1973. The role of common knowledge has not, however, been adequately investigated.

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