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MENTAL REPRESENTATIONS: REFERENCE AND DEFINITENESS, PART 1: the basic communicative act. Action of Discourse on expressions. Reference

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Abbreviated Title: Reference and Definiteness

## ABSTRACT

If  $D$  denotes a discourse, and  $p$  an expression in an utterance  $u$  of  $D$ , the action,  $D(p)$ , of  $D$  on  $p$ , is the set of mental representations of the interpretations of  $p$  in  $D$ , and corresponds to the discourse 'meaning' of  $p$  in  $D$ . The correspondence  $p \dashrightarrow D(p)$  is called the reference of the speaker. The domain,  $\text{dom}(p)$ , is defined, and it is shown that the set  $i(D(p))$  of underlying entities of  $D(p)$  is contained in or equal to  $\text{dom}(p)$ . A reference is inclusive if  $i(D(p)) = \text{dom}(p)$ ; exclusive otherwise. If  $\text{dom}(p)$  (resp.  $i(D(p))$ ) consists of a single entity, the reference is said to be unique (resp. unambiguous). Definite reference is defined as unambiguous and inclusive. It is shown that definite reference is unique in the classical sense, and it is conjectured that a generalization of the notion of 'familiarity' holds. A number of putative counterexamples to the classical definition are shown to satisfy the more general definition. Other application is made to specificity, predicate nominals, and parameterized nominals.

## KEYWORDS

communicative, coherent discourse, mental representation, cognitive state, frame, identifiable, reference, definite, indefinite, specific

## VITA

I received my Ph.D. in mathematics in 1964 from Brandeis University. After a number of years at Lowell Technological Institute and SUNY-Plattsburgh, I retired in 1985 and went back to school at the Monterey Institute of International Studies to study for an M.A. in TESOL. In 1991 I went to Egypt to study Arabic and teach English. In Monterey I had developed an interest in linguistics, and I continued this when I came back to the States. My current interests are in the pragmatics of pronominal reference, Arabic prosody, and more recently, preposings, definiteness and the coherence of discourse.

INTRODUCTION. (Note: the footnotes in the original word document did not transfer to the pdf version, so I have appended them at the end of the paper. The purpose of this paper is to give alternative definitions, using the notion of 'mental representation' developed in (Riley 1999, 2000), for some of the fundamental concepts of present-day linguistics: identifiability, reference, specificity and definiteness. The theory of mental representations enables us to simplify and clarify these notions, and gives, I think, a more psycholinguistically sound development of these basic ideas of linguistic communication.

The meaning of the terms identifiability, reference, specificity and definiteness is subject to considerable variation, different authors adopting one or the other of several meanings according to the purpose of their work. For identifiability and definiteness, reference may be made to (Abbott 1999, 2001a, 2001b; Chafe 1994; Hawkins 1978, 1991; Lyons 1977) for summaries of recent treatments; the concept of 'specificity' is addressed in (Cormack and Kempson 1991, Lyons 1977, Partee 1972). The notion of 'reference' itself is not usually given a precise definition, but is generally agreed to mean the pointing out of an individual by means of an expression; the predominant treatments of reference per se seem to be philosophical. Good general references for this from a linguistic point of view are (Givon 1984, Lyons 1977).

The existing treatments all have in common the fact that they define these terms as properties of the phrases used. For example in 'The sea-shells I found this morning are beautiful', the noun phrase 'the sea-shells I found this morning' is said to be 'identifiable', 'specific', and 'definite'. This phrase 'refers' to an underlying set of sea shells, which is an individual in the assumed semantics.

And the indefinite phrase 'a pretty sea shell' in 'I found a pretty sea shell on the beach this morning' is said to be 'non-identifiable' (to the hearer), and thus 'not definite', and 'non-referential' although it is usually considered to be 'specific'.

Indefinites in opaque environments such as 'a book on atomic theory' in 'I want a book on atomic theory', or 'a car' in 'I don't have a car', are also called 'non-referential', since they don't point to any existing book or car.

I want to take here a more fundamental tack: it seems to me that these terms are labels attached to one or the other parts of what could be said to be the fundamental communicative act: in discourse, in an utterance, *u*, a speaker conceives, or 'cognizes' an 'idea', or 'mental representation', *m*, 'codes' it with an expression *p*, and conveys the expression *p* to the hearer by means of *u*. The hearer, on receipt of *p*, 'cognizes' this mental representation, and 'decodes' *p*.

I also adopted in those papers the fundamental idea that 'reference' is the inverse of coding: if 'coding' means, as it does, the act whereby the speaker chooses an expression to represent the mental representation which he conceives, then 'reference' is the act of the speaker by which he uses the expression to point to the desired mr. Reference, in my view, is primarily reference to a mental representation. This is a much more general idea of reference than is usually held, but I think it captures the essence of the idea. It also frees the notion from dependence on the existence of an underlying individual for the phrase: as will be seen, in phrases like the 'I want a book on atomic theory' cited above, I am certainly referring to something, even though I am not referring to an individual

In my previous work referred to above, I defined the decoding process in the basic communicative act to be: the hearer will receive the expression, p, and will decode it to any mr which 'answers to' p. I find that this needs to be made somewhat more accurate by taking into account the effects of the discourse, D: the hearer will decode p to the mr's determined by the interpretations of p in D, i.e. the entities underlying p. This idea that D 'acts' on an expression, p, to determine the interpretations and meanings of p in D, is an all-important one, and central to our considerations here. I also say that p 'evokes' the mr's of these interpretations; I denote the collection of these mr's by  $D(p)$ <sup>1</sup>

In general, there may be more than one interpretation of a given p determined by D. The 'decoding' may not be unique, and the reference will then be 'ambiguous'. If the coding is unique, so that  $D(p)$  consists of a single mr, the reference will be said to be 'un-ambiguous'.

Now denote by  $(D, m, p, u)$  a fundamental communicative act as above, where D denotes a discourse, m an mr, p an expression such that m is one of the mr's evoked by p in D. By virtue of the cognizing of  $D(p)$  by the speaker, the conveyance of p from speaker to hearer, and of the latter's cognizing of  $D(p)$ , I take it that  $D(p)$  is mutually shared by speaker and hearer at the instant of utterance of u.<sup>2</sup>

I can then define the mr's, m, (and  $D(p)$ ), to be (mutually) identifiable, and say that speaker and hearer have (mutually) identified these mr's. I will say that the speaker refers to  $D(p)$  (using, or by means, of p), and symbolize this reference by the notation  $p \rightarrow D(p)$ . To say that the reference is un-ambiguous means that  $D(p)$  consists of a single mr.

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<sup>1</sup> The 'generalized conversational implicatures' of (Levinson 2000) can also be considered to be the result of D acting on p to give the preferred meaning of p. I will not explore this connection here.

<sup>2</sup> The assumption that these mr's are mutually shared at the instant of conveyance of u is actually an assumption of psycho-linguistics- relating to the question of time lags in the conveying of mr's. We adopt here the simplest case: no time lag. See Chafe 1994, ch. 6. It is reasonable to assume that these time lags are small in comparison with the time involved in cognizing an utterance, and may then be taken to be zero.

Thus the essence of identifiability is the mutual sharedness, and that of reference is the assignment by the speaker of  $D(p)$ .

Turning to specificity and definiteness, it seems that these too are properties of the reference as a whole, rather than of the  $mr$ 's involved. I will say that a reference is specific if there is a presupposition that the underlying entity of  $D(p)$  is a semantic individual in the domain of  $p$ . And I will define in part 2, the reference,  $p \rightarrow D(p)$ , to be definite if there is a presupposition evoked by  $D$  that  $p \rightarrow D(p)$  is inclusive. Given my definition of identifiability, this property of  $mr$ 's is the classical essence of definiteness.

The idea of familiarity that occurs in classical treatments of definiteness comes about because of the application and use of frames to cognize the  $mr$ 's of the nominals involved. This means that every definite reference involves frames; the converse is not necessarily true.

These ideas are explained and developed in sections 3, Part 1 1 and 6,

A fundamental tool I will use is the notion of frame. I borrow this idea from (Barsalou 1992) and (Epstein 1999), and use it to re-do the categories of usage of (Hawkins 1978). The latter are involved in the cognizing of nominals, and the use of referential frames is essential for this. I conjecture that definite reference always involves frames; the converse of course does not hold. The definitions are in Part 2, section 5.

Throughout the paper I will for the most part restrict my considerations to the cognizing of nominal expressions in English: these are the pronouns (and expressions containing a pronoun), and the full lexical noun phrases, comprising common nouns, proper nouns and determiner expressions (consisting of a common noun and a determiner). I believe the theory extends to other types of expression, but I will not attempt that extension here. This means that the kinds of discourse my treatment is concerned with does not include expressions of illocutionary force (including speech acts and mental states - nor does it include mood indicators, as in "John will speak, or "Speak, John, nor discourse adverbials and connectives such as in "Seriously, I'm not coming.", unfortunately, there are none left", "After all, he's not a child." and "He left because he wasn't wanted" as well as particles and interjections, such as 'Please', "alas", "Wow!" AND "hey!

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## 1. THE BASIC COMMUNICATIVE ACT. THE ACTION OF $D$ ON $p$ .

1.1 It seems to me that linguistic communication can be described, in a rather simplified way, as follows: in a discourse,  $D$ , a speaker (or writer!) conceives, or as I shall say, 'cognizes' a mental representation,  $m$ , codes it with an expression,  $p$ , and conveys it to the hearer (or reader!) by means of an

utterance,  $u$ .<sup>3</sup> The hearer, in turn, receives  $p$  as part of the utterance  $u$ <sup>3</sup> cognizes its mental representation,  $D(p)$ , and decodes  $p$  to  $D(p)$ .

This is our general, intuitive picture of what happens.<sup>4</sup> I need to explain the terms involved in this description, and make the definition more precise.

To begin with, I am going to be dealing with the mental representations of nominal expressions, and I refer to my papers cited before for more details of this theory. I want to repeat here the definition of 'discourse' that I will use.

#### DEFINITION OF COMMUNICATIVE DISCOURSE

A (communicative) discourse,  $D$ , consists of entities belonging to a) a text internal world, and b) a text external world (Lambrecht 1994; p. 36). The external world consists of the speech participants and their speech setting, and the internal world consists of 1) a set of expressions (and their constituents) from the syntax, called, for convenience, the text of the discourse, together with 2) the presuppositions evoked by these expressions, and 3) the associated meanings, from the semantics, and the associated mental representations of these expressions and presuppositions. In section 5, , I will define the two frames immediate situation and larger situation of a discourse. The totality of these two frames, taken together constitute what I may call the 'context of the discourse.'

#### Definition of context and contextually evoked

Let  $D$  denote a communicative discourse and denote by  $F$  the union of the two frames the immediate situation,  $F_i$  and  $F_l$  the larger situation, defined in ( section 5 , examples a and b). Let  $c$  denote a 'cognitive element', Then  $c$  is in the 'context' of  $D$ <sup>5</sup> if and only if either  $c$  or its

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<sup>3</sup> I will generally use the word 'utterance' in this paper, rather than the word 'sentence', in order to suggest 'real' speech instead of 'syntactic' text. I will also assume that utterances  $u$  are divided into intonation units (Chafe 1994; chapter 5). Intonation units require a certain finite amount of time for their conveyance. The expression  $p$  will be conveyed to the hearer as part of one of the intonation units making up  $u$ .

<sup>4</sup> <sup>4</sup> A referee states, referring to Akmajian et al, 1995, that the model of communication I use is essentially the "message " theory of communication . This is mistaken: My model of communication is not the 'message model' in the form presented in Akmajian, and in Wilson (Linguistic Structure and Inferential Communication, in Caron, Bernard (Ed.) (1998) Proceedings of the 16th International Congress of Linguists (Paris, 20-25 July 1997)., Oxford: Elsevier Sciences). The 'message' or 'coding' model presented in these two references is rather primitive; it uses notions of encoding and decoding which are obviously not suited to the requirements of 'real' communication. On the contrary, my model is as stipulated in the Basic Communicative Act ( section 1.11), and gives an enriched, expanded version of a 'coding' or 'message' model, which takes into account the ambient discourse, including the contextual situation. The mechanisms considered by Akmajian and Wilson to be required for the proper communication of the speaker's intention, dealing with disambiguation, under determination of reference and communicative intent, the problems of non-literal and indirect speech and the problem of non-communicative speech acts, are provided for in my model, albeit implicitly, by the use of the action,  $D(p)$ .

<sup>5</sup> The definition of context is not circular since the notion of frame is independent of it.

mental representation is in F. The context of D is the set of all such c. If c denotes a cognitive element, we say that c is contextually evoked, relative to D, if c, or its mental representation belongs to a frame triggered by an expression in the text of D

It is clear that the elements of the context are contextually evoked.

I consider that, as part of the text external world, so-called 'world knowledge' is generally excluded.<sup>6</sup> The external world consists only of the contextually evoked and mutually shared assumptions concerning the participants and their speech setting. which they are entitled to assume in the given discourse.

If p is an expression, by a presupposition evoked by p I mean a proposition situationally evoked in p which is already shared by speaker and hearer at the the time of utterance of p. The term 'situationally evoked', or equivalently here, 'formally evoked', will be taken to mean, intuitively, therefore, that any assumptions on the part of the speaker or hearer which have no formal manifestation in a sentence are irrelevant for communication (Lambrecht 1994, p. 55). This is worthwhile stating as a fundamental principle.

#### PRINCIPLE ON LEXICO-GRAMMATICAL CLOSURE OF D

Suppose that D denotes a discourse and that c denotes a cognitive element i.e an expression, an utterance, a presupposition or a mental representation. then c is in D if, and only if, . c is contextually evoked in D.

Thus, in particular, presupposed propositions must be formally evoked by the speaker. I define the notion of pragmatic presupposition used here as in (Lambrecht 1994; pp. 52, 60): If p is an expression in the syntax, by a presupposition evoked by p I mean a proposition contextually evoked in p which is knowingly shared, and taken for granted, by speaker and hearer at the the time of utterance of p.

In order to be considered as a pragmatic presupposition in the sense of our definition, "an assumption made by the speaker concerning the hearer's

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<sup>6</sup> 'Europe is a continent' or 'February usually has 28 days' are certainly general knowledge and are shared, no doubt, by the participants, but will not be in the discourse or relevant to the communication unless they are explicitly contextually evoked.

state of mind must have some actual manifestation in the grammatical or lexical structure of the sentence, i.e. the presupposed proposition must be in one way or another FORMALLY EVOKED by the speaker in the sentence" (Lambrecht 1994; p. 55).

The discourses I use in this paper will also all be assumed to be coherent:

#### DEFINITION OF COHERENT DISCOURSE

An utterance, *u*, in a discourse, *D*, will be said to be coherent with D if it is presupposed by speaker and hearer that there is a set, *V*, of utterances in *D*, such that the pair (*u*,*V*) stands in one of the basic coherence relations (Kehler 2002). *D* is coherent if each post-initial utterance in *D* is coherent with *D*.

For these coherence relations see (Kehler 2002).<sup>7</sup> The notion of coherent discourse is evidently central to the whole subject of the pragmatics of discourse, and has been investigated by many other authors (van Dijk 1997; Brown and Yule 1983). My definition of 'coherent' is new and tentative, and is not meant to be definitive. I think there is much more to be said about ways in which our speech 'hangs together' and enables us to say what we mean.

1.2 Turning to the theory of mental representations, I summarize briefly here the treatment in my previous papers, (Riley 1999, 2000). The basic idea is that, in any given discourse, *D*, we have no way of thinking of an individual or entity except under some aspect, or aspects, of that individual; when we consider an entity, and 'cognize' it, i.e. form an 'idea' of it, we cannot do so except under certain 'aspects' of the entity. The entity itself, per se, if there is any such thing, does not get involved here 'as such', but only 'the entity under some aspect'; there must always be an aspect or aspects under which we conceptualize a given entity. The set of these aspects is the same I think as what some authors have called the 'mode of presentation' of the entity.

I can point to an entity by deixis/pantomime/gesture only, or by using a linguistic expression in an utterance of *D*, and in either case I have to advert to an aspect, a mode of presentation, of the entity. In the pantomime case, the aspect is that of the entity occupying a particular space time point in the immediate situation of *D*, and in the linguistic case, the aspect is that expressed by the expression used in the utterance.

And we could assume that this mode of presentation or aspect is the same as the 'sense', a la Frege, of an expression denoting the entity. The sense

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<sup>7</sup> A rather simple example of an utterance which is not coherent with a given discourse is the following: *D*: 'Speaking of John and Mary, which one is older?' *u*: 'Peter is.' Here *u* is not coherent with *D*: there is no *v* in *D* which together with *u*, allows us to infer a 'parallel' relation (Kehler 2002, p. 16).

of an expression denoting an entity is the totality of aspects under which I am considering that entity.

If an entity is considered under two different aspects, using for example two different expressions, the senses will be different, unless the expressions are synonymous. When we say that two mental representations, or two expressions corresponding to those representations, are 'synonymous', we mean, intuitively, that they have the same 'meaning'. For our purposes here, we take them to have the same sense. We will assume therefore that there is a one-to-one correspondence between senses, or entities-cum-aspect, and equivalence classes under synonymy of nominal expressions. And of course this idea of synonymy is relative to the discourse, D.

For convenience, I extend the use of the word 'aspect' to include the aspect of 'having the name so and so'. Thus when I refer to 'John', I am referring to the individual designated by that name under the aspect of having the name 'John'.

It is an extremely important aspect of our discussion that for a given expression, p, in an utterance u of a discourse, D, it is D that determines both the entity, e, denoted by p, which I will call the entity underlying p,<sup>8</sup> and the aspects of e represented by p. It is the discourse that determines the underlying e and the sense or meaning of p. We will not always write this, in so many words, but it is always to be understood.

Now we need mental representations of expressions and their senses to use in communication. The mental representation of an entity-cum-aspect, or of an expression, is the 'idea' of it in our minds. It is the result of our 'cognizing' the entity or expression.

The mental representation of an entity-cum-aspect, and the mental representation of the sense of that entity-cum-aspect are the same, and they in turn are the same as the mental representation of any synonymous expression giving that sense.

When the speaker conveys an expression to the hearer in a discourse, D, the mental representation of the expression must, ideally, be the same for both speaker and hearer, so the mental representation must be that of the sense, determined by D, of the expression. I mean that if the speaker conveys the expression p to the hearer, and if m is the mental representation of p in the speaker's mind, and m' the mental representation of p in the hearer's mind, then  $m = m'$ .<sup>9</sup> This is what I mean when I say that the mental representation of p is 'shared' by speaker and hearer.

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<sup>8 8</sup> See the Principle on Existence of Discourse Entities, below.

<sup>9</sup> Evidently, an idea in one person's mind cannot be physically equal to an idea in another person's mind. My use of the equals sign here is meant to signify a certain relation of cognitive equivalence between the minds of speaker and hearer: I assume that speaker and hearer are each possessed of the 'same', idealized, human mind,  $M = M_{\text{speaker}} = M_{\text{hearer}}$ , and that to each class of synonymous expressions, p, there corresponds a unique mr, mr(p), in M

It follows from this that, in D, the correspondence between senses and mental representations is one-to-one.

Note that senses and mr's are not the same: if p is an expression, denoting an entity, e, the sense of p (and of e) is the totality of aspects of e determined by p; the mental representation of p (and of e) is the idea of these aspects in the speaker's and hearer's mind, the result of cognizing p (and e) in D.

NOTATION: mr's

If u is an utterance in a discourse, D, and p is an expression in u with underlying entity, e, a convenient notation for the sense of p, taking into account the aspects, 'asp p', determined by D for p, is 'e-cum-asp p', or 'e/asp p'. I use 'mr(e/asp p)', or, for short, 'e/asp p', or just 'e/p' to denote the corresponding mental representation.

By using this notation I am not suggesting that mr's are composed of entities and aspects; nor that senses are. But I use the one-to-one correspondences that I have noted to simplify my notation for these notions.

I need certain basic properties of mental representations (mr's). First of all, the mental representations in a discourse, D, are all evoked by expressions in the utterances and presuppositions of D. We need a relation of equality defined for the mr's in D, so as to be able to distinguish between them, and to tell when two mr's are the same. Thus, if  $m = e_1/asp_1$ , and  $n = e_2/asp_2$  are two mr's in D, I will say that  $m = n$  if and only if  $e_1 = e_2$  and  $asp_1 = asp_2$ ; that is,  $m = n$  if and only if they have the same underlying entities, and if I consider these entities under the same aspects.<sup>10</sup>

In particular, let  $m = e/asp_1/asp_2$ , and  $n = e/asp_1/asp_2/asp_3$ , with the same underlying entity, and with the aspect  $asp_3$  already contained in the aspects in m, say  $asp_3$  is part of  $asp_1$ . Then  $n = m$ . This idea will be involved in several of our examples.

If  $m = e/asp_1$  and  $n = e/asp_2$  are two mr's with the same underlying entity, I will say that m is 'contained in or equal to n', denoted  $m \subseteq n$ , if the aspect  $asp_2$  under which e is considered in n is 'more inclusive' than the aspect  $asp_1$  with respect to which e is considered in m. For example, in a given discourse, m might be  $mr(\text{a pretty sea-shell}) = x_0/\text{sea shell/pretty/}$ , and n might be  $mr(\text{the pretty sea-shell found on the beach this morning}) = x_0/\text{sea shell/pretty/}$  found on the beach this morning/. Here  $asp_1 = \text{'sea shell/pretty/'}$ , and  $asp_2 = \text{'sea shell/pretty/'}$  found on the beach this morning/, and  $m \subseteq n$ .

If  $m \subseteq n$  I will say that n is an enlargement of m. More generally, if the set of underlying entities of n is a subset of the set of underlying entities of m,

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<sup>10</sup> I am using the same notation for the sense,  $e_1/asp_1$ , and its mental representation  $mr(e_1/asp_1)$ .

and the set of aspects in  $n$  includes the aspects in  $m$ , then I will also say that  $n$  is an enlargement of  $m$ ,  $m \subseteq n$ .

If the  $m$ , is in  $D$ , then so is any enlargement in  $D$  of  $m$ .

1.3 Now from syntax, our 'expressions' are the well-formed words, phrases and sentences of the language used by the speaker. Their totality is a syntactic system, and we will take for granted what we need from formal syntactic structure. Throughout the paper we will have to distinguish between pronominals and non-pronominal noun phrases. The pronouns are the personal, possessive and demonstrative pronouns. The pronominal phrases are phrases containing a pronoun.

The non-pronominal noun phrases are names, common nouns, and determiner expressions, i.e. expressions consisting of common nouns plus non-pronominal determiner. A convenient terminology for these non-pronominal expressions seems to be 'full lexical'.

I will not use the current X-bar terminology for noun phrases, NP, X-bar, X', etc. The traditional terminology which I have just given, pronominal noun phrases, determiner expressions, etc. will serve us better here.

Summarizing, then, I assume pronominal expressions, and full lexical expressions. The pronominals are the pronouns, and nominal expressions containing pronouns. The full lexical nominal expressions are names, common nouns, and common nouns plus determiners.

These are the nominal expressions we assume are involved in reference and referring situations. We will not concern ourselves very much with deictic communication, since we are going to be concerned solely with the relations between mental representations and the expressions which evoke them.

1.4 In a previous paper, I proved a Principle on Existence of Discourse Entities (Riley 1999, p. 191) concerning the existence of underlying entities for full lexical expressions. I want to extend this principle to cover the case of pronominals, and I want to state the Principle here, since it is in a sense the foundation of our discussions in this paper.

Here, and throughout the paper, I will use the following notation:

NOTATION: { --- } and (---)

If  $A$  is a common noun, the type of  $A$ , i.e. the set of all entities which are  $A$ 's, will be denoted by  $\{A\}$ .

If  $a, b, \dots$  are entities, the set consisting of  $a, b, \dots$  will be denoted by  $(a, b, \dots)$ .

The singleton set consisting of  $s$  alone will be denoted by  $(s)$ .

#### PRINCIPLE OF EXISTENCE OF DISCOURSE ENTITIES

Let  $D$  denote a discourse, and  $p$  a nominal expression in an utterance of  $D$ .

i) Suppose first that  $p$  is a full lexical expression. Then  $p$  evokes the presupposition: There exists an entity,  $e$ , in  $D$ , which we will denote by  $i(p)$ ,

corresponding to which the sense of  $p$  is  $i(p)$ -cum-(aspects given by  $p$ ). We say that  $i(p)$  is an entity underlying  $p$ . ii) If  $p$  is a pronominal expression, there is a presupposition that there exists in  $D$  an entity,  $A$ , called the antecedent of  $p$ , such that the sense of  $p$  is  $A$ -cum-(aspect given by  $p$ ).<sup>11</sup>

## TERMINOLOGY

Denote by  $D$  a coherent discourse,  $u$  an utterance in  $D$  and  $p$  a nominal expression in  $D$ . If  $p$  is a pronominal, with antecedent  $A$ , I will also use the term 'antecedent' for the mental representation of  $A$ . For both pronominals and full lexicals,  $p$  denotes  $e$  (or  $A$ );  $e$  (or  $A$ ) is denoted by  $p$ , and  $e$  (or  $A$ ) is the underlying entity. The underlying entities and antecedents (and their mental representations) are called the interpretations of  $p$ . These, and their mr's are evoked by  $p$  (and  $u$ , and the ambient discourse,  $D$ ).

The Principle is somewhat non-standard: what it amounts to is that, in a discourse, all nominal expressions are 'denoting' or 'referring' expressions (although I do not use the latter terminology, and although the denoted entities are not necessarily individuals, but may be more general entities, sets or other logical constructs).<sup>12</sup> The Principle can also be expressed as: if  $p$  is a nominal in a discourse,  $D$ , the set,  $i(p)$ , of entities in  $D$  underlying  $p$ , is non-empty.

The Principle is verified essentially by an enumeration of cases and depends on the notion of discourse. Thus, if  $p$  is a pronominal expression, let  $A$  denote an antecedent of  $p$ , as usual. It is clear that the meaning of  $p$ , in  $D$ , is  $A$ -cum-(aspects given by  $p$ ).

If  $p$  is a name, its underlying entity is the individual or individuals, determined by  $D$ , whose name is  $p$ .

If  $p$  is a common noun, the underlying entity is the set, determined by  $D$ , of individuals of type  $p$ .

If  $p$  is a determiner expression, the underlying entity is of the form 'det  $A$ ', where 'det' denotes a determiner, and  $A$  denotes a common noun. The determiners, 'det' are, as usual, the terms 'a', 'the', 'some', 'every', 'most', and the like. These are discussed, and examples given, in (Riley 1999, pp. 187ff). Here, 'determiner' means, imitating current practice (Keenan 1992), a two-

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<sup>11</sup> On the surface, it seems that not all pronouns have antecedents. The 'his' in 'Everyone loves his mother', for example. But the utterance is parameterized: for 'all  $x$  in {man},  $x$  loves his( $x$ ) mother( $x$ )', and then the antecedent of his( $x$ ) is  $x$ . See also my remark immediately preceding section 4.2

<sup>12</sup> We will not be concerned here with expressions which seem to denote 'impossible' things. There are such expressions, for example, 'the largest natural number'. In the standard theory of natural numbers, the assumption that this expression denotes something, viz. that there is a largest natural number, leads to a contradiction. Again, it is well known that the expression 'the set of all sets' does not denote an existing set. These cannot, therefore, be considered to be valid expressions. We will make the blanket assumption that an expression which embodies a contradiction of some sort is not a valid member of our underlying syntactic system.

place function which associates to each pair  $(D, A)$ , consisting of a discourse,  $D$ , and common noun,  $A$ , in  $D$ , an entity 'i(det A)' formed from the determiner  $D$  and the common noun  $A$ . This entity is the underlying entity of  $p$ .<sup>13</sup>

1.5 The underlying entity need not be an ordinary semantic individual. There are two other 'individual-like' kinds of entities contained in the semantics, which can occur as the underlying entities of expressions. One of these is the parameterized entity. The other is the generic individual, which I will not discuss further here.<sup>14</sup>

#### DEFINITION OF PARAMETRIC EXPRESSION

Denote by  $D$  a coherent discourse and  $p$  an expression in  $D$ . Let  $I$  denote a set and suppose there exists a function, which we also denote by  $p$ , which associates to each  $t$  in  $I$ , an expression  $p(t)$  in  $D$ . Then  $p$  is said to be a parameterized expression. If  $p$  is a parameterized expression, with parameter set  $I$ , the underlying entity of  $p$  is that function  $i(p)$ , on  $I$  such that  $i(p)(t) = i(p(t))$ , the underlying entity of the expression  $p(t)$ . The function  $i(p)$  is called a parameterized entity.

Consider the following example: 'The students in this university are getting younger'. What is the underlying entity of 'the students' here? It can't be the set of students in the university since it doesn't make sense to say that this set is 'getting younger'. We need to pay closer attention to the meaning of the utterance.

The sentence means,  $q(t) =$  'the average age of the students at time  $t$  is a decreasing function of  $t$  ( $t$  in some time interval  $I$ )'. With  $p =$  'the students', take  $p$  to be the associated function,  $p(t) =$  'the students in the university at time  $t$ '. Then  $q(t) =$  'The average age of  $p(t)$  is a decreasing function of  $t$ ' and for each  $t$  in  $I$ , there are expressions,  $p(t)$ ,  $q(t)$ :  $p$ ,  $q$  are parameterized expressions.

Questions of reference, definiteness, indefiniteness etc are to be attached to the parameterized values  $p(t)$ . Thus, for example, I don't talk of the reference of 'the students', but rather the reference at  $t$  of 'the students( $t$ )'.

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<sup>13</sup> See below, section 1.10, for more detail and examples of the working of determiners.

<sup>14</sup> 'The lion is a friendly beast', and 'The Indian is a noble savage' are two good examples. Here 'the lion' and 'the Indian' do not refer to a particular, specific lion or indian. They refer to the 'generic' lion or Indian. Accordingly I will assume that there is such a thing as the 'generic individual', occurring side by side with the 'normal', i.e. particular or specific, individuals in the semantics. The specific individuals underlying common nouns,  $A$ , are the elements of the set  $S = \{\text{all } A\text{'s}\}$ . The generic individual associated to  $A$  is not an element of  $S$ , but is uniquely associated to it. The semantics could then be extended as follows: Let  $D$  denote a discourse, and  $A$  a common noun in  $D$ , with underlying set  $S$ ,  $S = \{\text{all } A\text{'s}\}$ . There is an individual in our semantics, denoted by ' $A^g$ ', not an element of  $S$ , called the generic individual of  $S$ . We assume that  $A^g$  is unique, given  $A$ . I will not consider this extension further here.

Similarly, we don't say that 'the students in this university' in the original utterance is definite, but rather that at each  $t$ , 'the students( $t$ )' is definite.

A similar example is: 'The president is elected every four years' = 'For all  $t$  in a suitable interval, the president( $t$ ) is elected at  $t$ '. For each  $t$ , the reference to 'the president( $t$ )' is parametric.

For an example of a parametric indefinite, consider: 'A sucker is born every minute' = 'A sucker( $t$ ) is born every  $t$ ' ( $t$  in some interval  $I$ ).

1.6 A parametric of another kind is the universal quantifier: 'Every man loves his mother' = 'for all  $x$  in {man},  $x$  loves his mother' = 'for all  $x$  in {man},  $x$  loves his( $x$ ) mother( $x$ ); and at each  $x$  in {man}, there are parametric expressions  $x$ , his( $x$ ), mother( $x$ ). I will consider that nominals with a universal quantifier are parametric<sup>15</sup>.

Thus, the following is parametric: (Burton-Roberts 1981, p. 194) 'Everyone was using a spatula and a grater, but the spatula proved the more useful in every case'. This utterance is synonymous with 'for all  $x$  in a certain set of people,  $x$  was using a spatula( $x$ ) and a grater( $x$ ), but the spatula( $x$ ) proved the more useful in every case'. The latter is parametric with parametric expressions  $x$ , spatula( $x$ ), and grater( $x$ ).

Sometimes the quantification is implicit: 'The employees there receive high salaries' = 'for all  $e$  in  $E$ ,  $e$  receives a high salary',  $E$  the set of employees there.

Another example is: 'two men each took a stone from the pile' = for each  $m$  in  $M$ ,  $m$  took a stone from the pile', where  $M$  is the set of the two men.

The so-called 'donkey-sentences' are a more complicated type: the following is based on (Chierchia 1992, p. 159): 'If a man owns a horse, he races it; if he owns a mule, he harnesses it up; but every donkey owner beats it!'. This latter means 'for every man,  $x$ , if  $x$  owns a donkey,  $y(x)$ ,  $x$  beats  $y(x)$ '.

A propos of this example, our insistence that the target of reference may be a mental representation is well illustrated by it: Chierchia claims that 'Every donkey owner beats it' is ungrammatical. He asserts that "the only possible antecedent" of 'it' is the noun phrase 'every donkey owner'. Our explanation is of course that the cited discourse contains, for each man,  $x$ , the  $mr$  of 'donkey',  $mr(y(x))$  and this is the antecedent of 'it' (see section 4.1).

1.7 (Fauconnier 1994) and (Epstein 1999) have defined the concept of role: these are expressions which do not denote a single entity, but rather in each situation<sup>16</sup> of utterance, denote a single entity. They cite examples like: 'The president is elected every four years', which I have already said is a parameterized expression assigning to each time  $t$  in a certain set  $I$  of times, the president at that time. The role is the presidency, and the values of the role are the presidents at the various times  $t$ .

Another good example, which I have used above as an example of a parametric expression, is: 'A sucker is born every minute'. Here the role is 'a sucker', and takes values 'an individual born at time t who is a sucker'.

I would define role as associating an expression to each situation of utterance; the expression then would have an underlying entity, according to our Principle on Existence of Discourse Entities.

An example using situations is (Fauconnier 1994; p. 39): 'She likes to tie her hat with a string'. This means she likes to tie whatever hat she's wearing with a string; the situations are the occasions in which she wears the different hats she owns.

In this generality, it is clear that the concepts of parameterized expression and of role are quite similar; further investigation of the connection should be fruitful.

1.8 In addition to the ordinary semantic individuals, and the parameterized and generic individuals<sup>17</sup>, a fourth type of underlying entity is what I have termed, in my previous paper (Riley 1999, p. 189), 'x modulo S'. This is the underlying entity of expressions contained in what I will call non-individualizing environments.<sup>18</sup> I have defined generally 'x modulo S' to mean an element of S considered under the sole aspect of being a member of S, and have stipulated that this is the underlying entity of the phrase, 'an arbitrary element of S' or 'any element of S whatsoever'. I summarize here the analysis given in my paper (Riley 1999; p. 189).

The expression 'an A', used in a non-individualizing environment such as 'I want an A', will only, in the absence of explicit grammatical indication to the contrary, be taken in the sense that the underlying entity is not an ordinary semantic individual. This goes contrary to current practice and is a direct reflection of my assumption that the underlying entity of p cannot be a semantic individual unless that fact is lexicogrammatically evoked in D. Since in the environment 'I want \_\_\_', for example, the verb does not require individual objects, there is no presupposition in the discourse that a specific element of A is being talked about. The only thing the hearer can reasonably be expected to infer from the speaker's conveyance is that the speaker wants an element of A, but doesn't have in mind any particular element of A that he wants. This is what I mean when I say that he's looking for an element of A solely under the aspect of belonging to A.

For example, consider a situation where I ask a librarian for a book on atomic theory; 'Do you have a book on atomic theory?' The librarian knows quite well that I might have a specific book in mind; however, she only heard my words as spoken, with no indication that I had in mind a specific book. Technically, there is nothing in the utterance to evoke a presupposition of existence of an individual book. She is entitled therefore, from a communicative stand-point, to understand only that I want a book on atomic theory, any such book. She will then take my utterance as using the expression 'a book on

atomic theory' non-specifically. She could not follow up by using a pronoun referring to an individual book, for example, with 'When was it published'?

Another example is: 'I'm looking for a big car, with plenty of room'. I am not looking for a particular car, just any big one, with plenty of room. The phrase 'a big car' is being used non-specifically.

Or again (Givon 1984, p. 390): 'If you see a man with a green hat there, tell him...'. Givon says that  $q$  = 'a man with a green hat' here may or not be referential (in his sense: i.e. there may or may not be an individual underlying  $q$ ). Well, I would suggest that unless there is some other indication of individuality in the sentence or discourse, the phrase  $q$  here is not referential, in Givon's sense. The underlying entity of  $q$  here is not an individual element of the domain {man with a green hat} of 'a man with a green hat'.<sup>19</sup>

What then are the underlying entities of  $p$  = 'a book on atomic theory' and 'a big car' and  $q$  = 'a man with a green hat' in these examples? I claim it is an arbitrary book on atomic theory, an arbitrary big car, and an arbitrary man with a green hat, respectively. If I'm looking for an 'arbitrary' element of a set  $A$ ,  $A = \{\text{book on atomic theory}\}$ , for example, then I want an element of  $A$  considering it solely under the aspect of 'being an element of  $A$ '.<sup>20</sup> That is, I want something that satisfies the requirements for membership in  $A$ . I want an element of  $A$  'qua element of  $A$ '. I'm looking for a book on atomic theory qua book on atomic theory, or a big car qua big car, or a man with a green hat qua man with a green hat. I define therefore the underlying entity,  $x$  modulo  $A$ , of 'an  $A$ ' to be a selection of one element from  $A$ , considered under the aspect 'element of  $A$  qua  $A$ '. We may take  $i(p)$  to be any one of these 'equal' elements:<sup>21</sup>  $i(p) = x$  modulo  $A$ ,  $A = \text{domain of } p$ ,  $x$  in  $A$ . This definition makes sense since if  $x, y$  are two elements of  $S$ , then  $x$  modulo  $S = y$  modulo  $S$ .

The aspect under which we consider this 'arbitrary' element of  $S$  is 'being an element of  $S$ '. In our example, 'I'm looking for a book on atomic theory',  $i(\text{a book on atomic theory}) = x$  modulo  $S$ , ( $x$  an element of  $S$ ,  $S$  the set of books on atomic theory).

Again, in 'I want to find a pretty sea-shell this morning', the phrase 'a pretty sea-shell' does not refer to an individual sea-shell, but rather to 'a sea shell qua sea shell', that is to a sea-shell considered as an element of the set of sea-shells. The underlying entity is  $x$  modulo  $S$ ,  $S = \{\text{sea shell}\}$ ,  $x$  in  $S$ .

And in 'Pick a card', the phrase 'a card' does not refer to an individual card, but to any one of the available cards, considered as 'card', qua 'card'. The underlying entity is  $x$  modulo  $S$ ,  $S = \{\text{card}\}$ ,  $x$  in  $S$ .

A similar analysis will account for the plural indefinites, 'some', for example. 'I want to collect some sea shells on the beach this morning'. Here  $i(\text{some sea shells}) = x$  modulo  $S$ ,  $x$  in  $S$ ,  $S = \text{set of subsets of } \{\text{sea shell}\}$

Other examples of such environments are: 'I want a book on atomic theory', 'I don't have a car', 'Have you seen a good movie lately?'. In these the speaker does not intend to refer to any particular concrete individual. The speaker is not referring to a

particular book, or a particular car, or movie, etc. There is no particular book that I want<sup>22</sup>, no particular car that I don't have, no particular movie to have been seen. The reference, except in the case of the negative, is to the arbitrary individual of a particular type.

1.9 Now we turn to what is probably the most fundamental concept in the paper, the concept of  $D(p)$ , the 'action' of  $D$  on  $p$ . We have said that the hearer, engaging in communication in a discourse  $D$ , and receiving an expression,  $p$ , will cognize a certain  $mr$ ,  $D(p)$ , and will decode  $p$  to  $D(p)$ . This  $D(p)$  represents the meanings or interpretations given to  $p$  by  $D$ . Thus, if  $D$  denotes a coherent discourse, and  $p$  an expression in  $D$ , contained in an utterance,  $u$ , of  $D$ , various mechanisms of discourse interpretation will determine the entities underlying  $p$  or denoted by  $p$  at that point in the discourse, i.e. will determine its interpretations in  $D$ . Among these mechanisms are those of discourse 'coherence' (Kehler 2002) and the generalized Grice implicatures of (Levinson 2000). I will not attempt to delve into these mechanisms here but refer the reader to the cited references.

Throughout the paper I will occasionally use the terminology 'entities that satisfy the description in  $p$ ', where  $p$  is an expression. I will take this to mean the entities determined by the discourse  $D$  to underly the expression  $p$ , or the entities in  $D$  denoted by  $p$ . I do not mean the entities which satisfy the expression in an abstract, semantic sense, but only the entities which the present discourse,  $D$ , in the present circumstances, assigns to  $p$ , as it is used in  $D$ .<sup>23</sup>

An example of what I mean is: (Kehler 2002, p. 6) 'The city council denied the demonstrators a permit because they feared violence'. Semantics tells us that the antecedents of 'they' are 'the city council' and 'the demonstrators'. But I claim that the action of the discourse yields here only the single meaning,  $D(\text{they}) = \text{'the city council'}$ . Kehler explains this as an application of his notion of discourse coherence.

This example is 'un-ambiguous', in the sense that there is just one  $mr$  determined for  $p$  by  $D$ . An 'ambiguous' example is: 'John and Jim played soccer all morning. The boy was very tired'. The phrase 'The boy' is ambiguous; it has two antecedents, 'John' and 'Jim'. In this case,  $D(\text{the boy}) = (mr(\text{John}), mr(\text{Jim}))$ .

Then, under the action of  $D$ ,  $D(p)$  is the set of  $mr$ 's of the interpretations of  $p$  in  $D$ , together with the set of  $mr$ 's obtained by cumulatively enlarging the  $mr$ 's of these interpretations with the aspects given by the utterances which evoke them. Each utterance evoking a given  $mr$  may 'update', and thus, 'enlarge' that  $mr$  with one or more aspects. If  $p$  is a pronoun, there will be one or more antecedents, and in this case, too,  $D(p)$  will denote the set of  $mr$ 's gotten from the antecedents by this updating. The details of this updating are given in the definition of  $D(p)$ :

## DEFINITION OF $D(p)$

Let  $D$  denote a coherent discourse,  $u$  an utterance (or presupposition) in  $D$ , and  $p$  an expression in  $u$ . Denote by  $D_{<p}$  that part of  $D$  consisting of entities occurring in  $D$  before or at the same instant as  $p$ .  $D_{<p}$  is, in other words, the truncated discourse obtained by dropping the utterances or portions of utterances following  $p$ . Let  $e$  denote an entity determined by  $D$  to underly  $p$ , and suppose that  $e$  is evoked by the utterances and/or presuppositions  $u_1, u_2, \dots, u_n = u$  in  $D_{<u}$ . Define a sequence (\*)  $m_1, \dots, m_n$  of mr's by adding successively to  $e$  the aspects given by the  $u_1, \dots, u_n$ :

$$(*) \ m_1 = e/u_1, \ m_2 = e/u_1/u_2, \ m_3 = e/u_1/u_2/u_3, \dots, \ m_{n-1} = e/u_1/u_2/\dots/u_{(n-1)}, \ m_n = e/u_1/u_2/\dots/u_n$$

Then (\*) is an ascending chain of mr's, each of which is an enlargement of the preceding, and  $m_n$  is a maximal element in  $D_{<u}$ . Denote the maximal element of the chain by  $D(e)$ . Define  $D(p)$  to be the set of maximal elements  $D(e)$  gotten by the above process by starting with the different entities  $e$  denoted by  $p$ .  $D(p)$  is called the action of  $D$  on  $p$ .

The definition takes into account the fact that  $p$  may well denote more than one underlying entity. For ease of expression, I will generally ignore this possibility and write as if there were just one element in  $D(p)$ .

A somewhat better notation for the action of  $D$  on  $p$  should perhaps be ' $D_{<p}(p)$ ', since it depends on that portion of  $D$  prior to or simultaneous with the utterance of  $u$ . The idea of defining  $D(p)$  in this manner is partially based on Webber's 'initial description' (Webber 1981; p 286) of the underlying entity of an mr. The following examples will illustrate the computation of  $D(p)$ .

'I found some sea shells on the beach this morning. They were beautifully multicolored'. Let  $p =$  'some sea shells'. The underlying entity of  $p$  is some set,  $s_0$ , of sea shells, and the first utterance is synonymous with 'I found  $s_0$  on the beach this morning. The mental representation of  $p$  is  $D(p) = s_0$ /sea shells/found/on the beach/this morning/. The mr  $D(p)$  involves the aspects given to the underlying  $s_0$  by the utterance containing  $p$ .

Also, the antecedent of 'they' is  $s_0$ , and  $D(\text{they})$  is the update of  $s_0$  given by the aspects in the second utterance:  $D(\text{they}) = s_0$ /sea shells/found/on the beach/this morning/beautifully multicolored/. Notice that in accordance with our definition the whole of 'They were beautifully multicolored' is involved in the determination of the mr of 'them'.

Consider the following, taken from a recipe (Brown and Yule 1983, p. 190): 'Wash and core six apples. Put them into a bowl'.  $D(\text{six apples})$  is the mental representation of a certain underlying set,  $s_0$ , of six apples. But because this is a recipe, there is a presupposition that each instruction is actualized before the next instruction acts. This actualization entails that 'washed and cored' can be considered to be an attribute added to the underlying individual

$s_0$ . Thus  $D(\text{six apples}) = s_0/\text{washed and cored}/$ . 'them' has antecedent  $s_0$  and  $D(\text{them})$  is the update given by the second instruction:  $s_0/\text{washed and cored}/\text{put in a bowl}/$ .

A rather striking application of the concept of the discourse acting on an expression or  $mr$  is the following, cited in (Partee 1972).  $u$ : 'John wants to catch a fish and eat it for supper'. In the abstract, this sentence is ambiguous, there being two readings; one, in which there is a certain fish  $f_1$ , that John knows about, and wants to catch and eat, and a second, in which John does not know about any particular fish ahead of time, but just wants to catch one and then eat it. The analysis of the first reading is straightforward: in a discourse  $D'$  which assigns this first reading, there is a presupposition, evoked prior to the utterance  $u$ , that there is a fish  $f_1$  that John wants to catch and eat. This presupposition must be lexico-grammatically evoked in  $D'$ .

As for the second reading, in a discourse  $D''$  in which this second reading is assigned to  $u$ , there is no presupposition ahead of time of existence of a particular fish, and 'a fish' in this utterance is, according to Partee, 'non-referential', there being no individual underlying it. Thus the pronoun 'it' has a non-referential indefinite antecedent. She finds this anomalous, and explains it by considering the first part of the sentence as describing a hypothetical state of affairs whose actualization is presupposed in the second part of the sentence. My explanation is similar; according to (Riley 2000, p. 140), we have here a case of 'consequential and'<sup>24</sup>, so that there is a presupposition, simultaneous with  $u$ , that the condition 'to catch a fish' is actualized, and because the verb 'catch' in this sentence requires an individual as object, there is a presupposition that 'a fish' is specific, with an underlying individual fish  $f_0$ . Then this individual may be referred to with the pronoun in the following sentence. If we compute the chain for  $D''(\text{it})$  we obtain:  $m_1 = D''(\text{a fish})$ ,  $m_2 = D''(\text{it})$ , and  $m_1 = f_0/\text{John wants to catch it}/$ ,  $m_2 = f_0/\text{John wants to catch it}/\text{it}/$ , and since the aspect 'it' is 'absorbed' in  $f_0/\text{John wants to catch it}/$ , it follows that  $m_2 = m_1$ , and the reference of 'it' is the  $mr$   $f_0/\text{John wants to catch it}/$ .

Notice that 'a fish' in 'John wants to catch a fish' has the underlying entity  $x$  modulo  $S$ ,  $x$  in the set  $S$  of fish, whereas the same expression in the larger sentence 'John wants to catch a fish and eat it for supper' has underlying individual  $f_0$ . This is a good example of the flow of meanings caused by the action of a discourse.

According to the definition, the set  $D(p)$  is formed by using the presuppositions in  $D$  which evoke the underlying entities  $e$ , as well as the utterances. We will use this remark below when we discuss presuppositional frames.

Another kind of example of a way in which the discourse can induce mental representations not evoked by expressions which are themselves in the discourse is given by the following kind of construction (Neale 1990, p. 188), 'Now the Mayor of Boston is a Republican, but next year he will be a Democrat.' The balanced structure, 'now...next year', between the two clauses, together

with the lexical presupposition of the word 'mayor', that it has a time reference, induce the mental representation of the 'next-year' mayor, in addition to that of the 'now' mayor. Both of these are antecedents of 'he', and the sentence is therefore ambiguous: is it the 'now' mayor who will be a Democrat next year, or is it the 'next year' mayor?

1.10 Throughout this paper, and for the definition below of inclusive and exclusive reference, we will need certain details concerning  $D(p)$ , both when  $p$  is a determiner expression, and in general.

Suppose that  $D$  denotes a coherent discourse, and  $p$  an expression in an utterance of  $D$ . I wish to define the 'domain', or 'discourse domain', of  $p$ , and see that it contains  $i(D(p))$ . I will assume that  $p$  is not a parameterized expression.

First, suppose that  $p$  is a determiner expression,  $p = \text{det } A$ . The key property of the determiners is that they presuppose, i.e. 'pick out', in a given coherent discourse,  $D$ , a certain set theoretic construct, manufactured from the set  $i(D(A))$  of interpretations, determined by  $D$ , underlying the common noun  $A$  of  $p$ . This set,  $i(D(A))$ , is the set of entities in  $D$  that 'satisfy the description in  $A$ ', i.e. the set of entities in  $D$  denoted by  $A$ . I define  $\text{dom}(p)$  to be this set:  $\text{dom}(p) = i(D(A))$ . Then the set  $i(D(p))$  is the set of entities 'picked out' from  $\text{dom } p$ .

This treatment follows the idea, connected with the modern formal semantic definition, of a determiner as a two-place function,  $\text{det } (A, B)$ , corresponding to 'det  $A$  is  $B$ ', in which  $A$  corresponds to the common noun, and  $B$  to the predicate (Keenan 1996; pp. 42-43). I have adapted this to my purposes, replacing the predicate,  $B$ , by the more general argument,  $D$ , representing the discourse, and letting the values  $\text{det}(A, D)$  lie in the collection of set-theoretic constructs made from the domain.

For example, consider the phrase 'the book', when used in a discourse,  $D$ , as in 'the book was very interesting'. The determiner 'the' evokes a presupposition that there is in  $D$  a specific book,  $b$ , which the speaker is referring to. The interpretation of 'book' in this phrase is this book,  $b$ . The domain,  $\text{dom}(\text{the book})$  is the singleton set  $(b)$ , and the underlying entity is  $i(\text{the book}) = b$ .

'I picked up a sea-shell' = 'there exists  $x$ , I picked up  $x$ ' ( $x$  in {sea-shell}). The determiner 'a' evokes a presupposition of existence of an element  $x_0$  of the set {sea-shell},  $x_0 = i(\text{a sea-shell})$ . The discourse interpretation of 'sea-shell' is {sea-shell}, the set of all sea-shells. And the determiner 'a' picks out the element  $x_0$  from {sea-shell}. The domain,  $\text{dom}(\text{a sea-shell})$ , is {sea-shell}. The sentence is synonymous with 'I picked up  $x_0$ '.

And the determiner 'some', as in 'I borrowed some books from the library', picks out in each discourse a certain set of books, an element,  $s$ , of the set of subsets of {book}, viz. the subset,  $s$ , of books the speaker borrowed. Here the domain  $\text{dom}(\text{some books}) = \{\text{books}\} = (\text{set of non-empty subsets of$

{book}), and  $i(\text{some books}) = s$ . Again, we can formulate this as: there is a presupposition that there exists a certain subset  $s$  of {books}, consisting of those the speaker is talking about.

'two winners were chosen' = 'two  $y$ ,  $y$  were chosen' ( $y$  in the collection of subsets of {winner} with just two elements). The domain is the collection  $\text{dom}(\text{two winners}) = \{\text{two winners}\} =$  the set of two-element subsets of {winner} and 'two winners' presupposes an element  $y_0$  of  $S$ ,  $i(\text{'two winners'}) = y_0$ . The sentence means ' $y_0$  were chosen'.

'No fish are fowl'. This is parametric: 'for all  $f$  in {fish},  $f$  is not fowl'. For each  $f$ , the domain is {fish}, and  $i(D(f)) = \{f\}$ .

'just one man came' = 'just one  $y$ ,  $y$  came' ( $y$  in the collection of 1-element subsets of {man}). The domain  $\text{dom}(\text{just one man})$  is the collection of 1-element subsets of {man}, and the determiner 'just one' picks out one of these,  $\{x_0\}$ , say. Then the sentence is synonymous with ' $\{x_0\}$  came'.

'fewer than five runners finished in time' = 'fewer than five  $y$ ,  $y$  finished in time' ( $y$  in the collection of subsets of {runner} with fewer than five elements). The domain is the collection of subsets of {runner} having fewer than five elements. The underlying  $i(\text{fewer than five runners})$  is one of these subsets, say  $y_0$ , with fewer than five elements. The sentence is synonymous with ' $y_0$  finished in time'.

The preceding examples illustrate 'specific' determiner phrases. My last example illustrates a non-specific one.

q: 'I'm looking for a book on atomic theory': there is no grammatical or lexical evocation of specificity here; q means 'I'm looking for  $x$  modulo  $S$ ', using the terminology of section 1.8, where  $S$  is the domain,  $\text{dom}(\text{a book on atomic theory}) = \{\text{book on atomic theory}\}$ .

1.11 Now the underlying entity of the common noun,  $A$ , is, in general, the set  $\{A\}$  of all  $A$ 's. The underlying discourse interpretations of  $A$ ,  $i(D(A))$ , may form a smaller set than this, depending on whether or not  $D$  restricts the meaning of  $A$ . I will take it that the restriction is to the subset of  $\{A\}$  belonging to whichever frame<sup>25</sup>  $F$  is involved in the cognizing of  $A$ . Now since the elements of  $F$  are  $mr$ 's, it is not strictly accurate to speak of the elements of  $\{A\}$  belonging to  $F$ ; rather, I mean the set of elements of  $\{A\}$  equal to underlying entities of  $mr$ 's in  $F$ :  $i(D(A)) = \{A\} \cap i(F)$ , in which  $i(F)$  denotes the set of entities underlying the  $mr$ 's in  $F$ .<sup>26</sup>

For example, in 'I bought a fish at that new market', there is no restriction, so the underlying entity of 'fish' is the entire set {fish}:  $i(D(A)) = \{\text{fish}\}$ . Similarly, in 'There's a stone in my shoe', there is no restriction on the set of stones, so in this case also,  $i(D(A)) =$  the set, {stone}, of all stones.

On the other hand, in 'I went to the Battle of the Bands last night. One of the bands played Beethoven's Fifth',  $A =$  'band', the interpretation of  $A$  here is restricted to the set of bands in the frame  $F$  triggered by 'battle of the bands':  $i(D(A)) = \{A\} \cap i(F) =$  the set of bands in the 'battle of the bands'.

Also, in 'My neighbor caught some fish this morning. So he gave me some fish for our dinner',  $A = \text{'fish'}$ , my neighbor caught a certain quantity,  $f_0$ , of fish this morning, and gave me a certain subset  $f_1$  and  $A$  is restricted to this quantity:  $i(D(A)) = \{A\} \cap i(F) = f_1$ .

And in 'I bought a fish at that new market'. The fish was bad', I bought a certain fish,  $f_0$ , at the new market, and the interpretation of the second 'fish' is just  $f_0$ :  $i(D(A)) = (f_0)$ .

In 'Turn on the light' (entering a room with several lights), the discourse  $D$  determines, using my analysis in section 6.7 a), that this utterance means 'Choose a light. Turn it on'. Then with  $A = \text{'light'}$ , and  $F$  the anaphoric frame involved, with link = 'it',  $i(D(A)) = D(\text{it}) = \{A\} \cap i(F) = \text{the chosen light}$ .

And in 'John was hurt on the arm', there is a generalized implicature that there is just one arm involved (section 6.7 b)).  $i(D(A)) = \text{the set consisting of this arm}$ .

I define the discourse domain,  $\text{dom}(p)$ , in  $D$  of  $p$  to be  $i(D(A))$ :  $\text{dom}(p) = i(D(A)) = \{A\} \cap i(F)$ . It is from this set that the interpretations of  $p$  are formed.

If  $p$  is a common noun, name, or pronominal phrase, I can extend the analysis and define the discourse domain of  $p$  in these cases to be  $i(D(p))$ :  $\text{dom}(p) = i(D(p))$ . In all cases I will denote this domain by  $\text{dom}(p)$ .

If the underlying entities in  $\text{dom}(p)$  are semantic individuals, then the elements of  $i(D(p))$  are also individuals, and it is clear that  $i(D(p))$  is contained in  $\text{dom}(p)$ .

If  $p$  is in an opaque environment, denote the underlying entity of  $\text{dom}(p)$  by  $e$ . Then the underlying entity of  $p$  is either  $e$ , if  $p$  is definite, or a selection of one or more from  $\text{dom}(p)$ , considered solely under the aspect of belonging to  $\text{dom}(p)$ , and so again  $D(p) \subseteq \text{dom}(p)$ .

Thus, the inequality ' $D(p) \subseteq \text{dom}(p)$ ' holds in all cases. Summarizing:

#### ADDENDUM TO THE DEFINITION OF $D(p)$

Let  $D$  denote a coherent discourse, and  $p$  an expression in an utterance of  $D$ . Define the domain, or discourse domain,  $\text{dom}(p)$ , of  $p$  by:

$\text{dom}(p) = i(D(p))$ , if  $p$  is a name or pronominal phrase,  
 $= \{A\} \cap i(F)$ , if  $p$  is a common noun,  $p = A$ , or is a determiner expression,  $p = \text{det } A$ , and  $F$  is whichever frame is involved in the cognizing of  $A$ . If there is no frame involved in the interpretation of  $p$ ,  $\text{dom}(p)$  is just  $\{A\}$ . In all cases,  $D(p) \subseteq \text{dom}(p)$ .

1.11 Summarizing the above, I can now state the specifications of the basic communicative act: for me the recognition and specification of  $D(p)$  is an integral part of the communicative process.

#### THE BASIC COMMUNICATIVE ACT

Let D denote a coherent discourse. Suppose that the speaker cognizes the mental representation, m. The speaker selects the expression p so that it evokes m. He then conveys the expression p to the hearer in an utterance, u. The hearer, in his turn, receives u, and p, and cognizes the action, D(p), of D on p. He recognizes the mr's in D(p) as being shared with the speaker. He then decodes p to D(p). The notation (D,m,u,p) will denote the collection of data constituting a basic communicative act.

## ADDENDUM

The meaning of 'cognize' is that speaker and hearer will recognize the mr as embedded in the cognitive situation of D, i.e. in the context of D. In particular, they will recognize whether the mr belongs to a 'frame' (section 5.3) or whether it is 'brand new' (section 5.7).

Occasionally, when we want to talk of the time instant at which m is evoked, we will add a symbol representing 'time' to the symbol for the basic communicative act. Thus, (D,m,u,p,t) denotes the basic communicative act with the utterance u occurring at time t.

## 2. IDENTIFIABILITY.

2.1 The usual treatments of identifiability of referents involve the idea of shared representations of the referent. For example (Chafe 1994; p 94) states that the idea of an elephant, introduced at a certain point in a discourse, is unidentifiable, but that a few moments later in the discourse, on second mention, it is identifiable. There is nothing in the example discourse given to indicate that there was any further knowledge of the elephant possessed by either speaker or hearer; the only grounds, it seems, for calling the second mention 'identifiable' then is the fact that the idea of the elephant has been shared between speaker and hearer.

Again, (Lyons 1977, p. 2) states that in the case of an indefinite noun phrase, such as 'a car' in 'I bought a car this morning', the speaker may be aware of what is being referred to, but the hearer probably not. Typically, the car in the sentence has no place yet in the hearer's experience and is being newly introduced to it. And again (Lyons 1977; p. 165): "...the "referent" of a specific indefinite is not identifiable for the hearer; since understanding the sentence I bought a car does not involve picking out the car in question, the identity of this car cannot be part of the meaning of the sentence".

(Hawkins 1991, p. 417) says similarly of 'a professor' in 'I met a professor yesterday' that "Even though the entity described by a professor may be quite 'definite' for the speaker, it does not exist in the mutual cognitive environment shared with the hearer, and as far as this latter is concerned, it may be quite arbitrary which entity is being described."

I answer that for me it is not 'quite arbitrary which entity is being described', and that the hearer is, in some sense, aware of what is being

referred to. It is clear that the entity being described is the one whose mr was just conveyed to the hearer.

If the speaker conceives, in a basic act of communication in a discourse, D, of the entity represented by the expressions 'an elephant', 'a car', 'a professor', and conveys these expressions to the hearer, then the mr's of these expressions, and therefore their underlying entities, do immediately exist in the cognitive environment of the hearer, in other words in D. These mr's are taken to be cognitively processed, in other words, cognized, and shared as part of a conveyed utterance. There is no time lag between the conveyance of an mr and its processing and sharing by speaker and hearer. As in note 2, we take this to mean that there is no time lag between conveyance of the mr and its being identified by the hearer. Thus, identifiability is present at the instant of conveyance.

In support of this, I cite the following from (Lambrecht 1994, p. 77): "The creation of ... a new discourse representation ... can be compared to the establishment of a new referential "file" in the discourse register, to which further elements of information may be added in the course of the conversation and which can be re-opened in future discourses."

"To account for the difference between entities for which the speaker assumes a file has already been opened in the discourse register and those for which such a file does not yet exist I will postulate the cognitive category of IDENTIFIABILITY, using a term once suggested by Chafe (1976). Chafe observes that to designate referents for which a representation exists in the addressee's mind the term "identifiable" is preferable to the sometimes suggested terms "known" or "familiar." As we shall see, what counts for the linguistic expression of the cognitive distinction in question is not that the addressee know or be familiar with the referent in question (a newly opened file may contain no more than a name) but that he be able to pick it out from among all those which can be designated with a particular linguistic expression and identify it as the one which the speaker has in mind.... Similarly, an identifiable referent is one for which a shared representation already exists in the speaker's and the hearer's mind at the time of utterance, while an unidentifiable referent is one for which a representation exists only in the speaker's mind."

I understand this to imply that the hearer's mutual knowledge of an mr conveyed to him in a basic communicative act constitutes his recognition of the file which has just been established, and constitutes his identifying of the mr; he need not possess it under any other aspect than simply 'conveyed by the speaker'. (Brown and Yule; p 208) echoes this idea: "It does not seem to be a necessary condition of this type of introductory reference that the hearer should be able to identify uniquely in any strict sense the individual referred to". In 'I bought a used car this morning', for example, the hearer does not 'identify' the car in any sense other than just this: that there is a car and it was bought by the speaker this morning. This is all that is conveyed to the hearer by the utterance.

(Chafe 1994; p. 94) includes two other parts in his definition of identifiability of a referent in addition to the sharedness: suitable verbalization, and contextual salience. I understand the verbalization requirement to mean that, in the example we have just given of the used car, the speaker in the basic act of communication (D,m,u,p) must convey to the hearer, an expression, p, in the utterance u, sufficient to enable the hearer to determine which car the speaker is talking about. I assume that in the cognizing of D(p), the hearer does just that. Also, as to the contextual sharedness requirement, I assume that the verbalisation in p of the referent in a basic act constitutes the activation of the mr of the referent (section 5.1), and that this can be taken to be what is meant by salience.

My definition of identifiability will therefore be more general than Chafe's, and will include only the bare bones of sharedness, leaving the cognizability of the referent as a further aspect of the communication. Thus, I will define as 'identifiable', simply, the mr's involved in a basic communicative act, including the ones evoked in presuppositions of D, as well as the utterances in D.

#### DEFINITION OF IDENTIFIABILITY

Suppose that (D,m,u,p) denotes a basic communicative act. The mr, m, and the mr's in the chains defining D(p), are said to be (mutually) identifiable. We say that speaker and hearer have (mutually) identified these mr's and that they are shared by the speaker and hearer at the instant that u is uttered.

2.2 I need to comment on the idea of 'familiarity' of an mr, which plays a large part in the 'classical' treatments of identifiability. This refers to the 'amount' of knowledge which the speaker and/or hearer has of the referent; so that even if the speaker knows a lot about the referent, the hearer may not. The hearer may in fact know only that the referent was referred to by the speaker, and nothing more. The referent in this case is classically said to be 'un-familiar', hence unidentifiable to the hearer.

I would say, however, that on the contrary, the speaker and hearer, since they share the mr of the nominal, are each aware, to his own extent, of the underlying entity. The speaker no doubt has much more knowledge of the entity, but any of that knowledge which is not lexico-grammatically evoked in the discourse, and thus not shared with the hearer, is completely irrelevant to the communication.

More generally, according to our fundamental principle On Lexico-Grammatical Closure there can be no knowledge of any sort in a discourse, D, nominals, utterances, or presuppositions, unless it is contextually evoked, by the speaker, in a basic act of communication. In particular the speaker or hearer cannot ascribe a 'reading' to an utterance unless that reading is lexico-grammatically evoked by the discourse. Thus, to say, as some authors do (for

example, Gundel et al 1993; p. 276, note 2 and Cormack and Kempson 1991; p. 547), that a sentence like 'A student in the syntax class cheated on the final exam' has two readings, one, the specific reading, for which the speaker has 'in mind' a certain student who cheated, whom he does not identify to the hearer, and the other, dubbed non-referential, reading, in which he merely asserts that the set of students who cheated is non-empty, is, to my mind, inaccurate. The utterance in the abstract is ambiguous, but in any given discourse, the speaker will intend one or the other of the two readings, according as he does or does not already have a specific student in mind.

If the speaker has in mind a certain student, whom he may or may not know by name, and with whom he may or may not be acquainted, but does not indicate this lexico-grammatically, then his knowledge is irrelevant for the communication, and that reading is irrelevant to the discourse.<sup>27</sup>

Again, to say that the set of students who cheated is non-empty is to say that there do exist students who cheated, that is, there do exist underlying entities to the expression 'a student', and this is already guaranteed by the Principle of Existence of Discourse Entities, section 1.4.

In summary, according to my approach, the utterance  $u$ : 'A student in the syntax class cheated on the final exam', in a given discourse,  $D$ , has just the one reading, either a) or b), according as the speaker has, or has not, in mind, prior to the utterance of  $u$ , a particular student who cheated on the final exam:

a) there is a presupposition, evoked prior to the utterance of  $u$ , that there is a student  $s_0$  in the syntax class, and  $s_0$  cheated on the final exam.

b) there is a presupposition, evoked at the time of utterance of  $u$ , that there is a student  $s_0$  in the syntax class, and  $s_0$  cheated on the final exam.

The speaker, using an indefinite phrase of this form  $u = \text{'an } N\text{'}$ , does two things: he picks out an  $s_0$  from  $\{N\}$  for consideration in the discourse (provided there is a presupposition of individuality),<sup>28</sup> and then asserts that  $s_0$  cheated on the exam. The two readings correspond to whether or not  $s_0$  is known to the speaker before the utterance of  $u$ .<sup>29</sup>

In the case of indefinites in non-individualizing environments, such as 'I'm looking for a pretty sea shell', the underlying entity is, as we have said (section 1.8),  $x$  modulo  $S$ ,  $S = \{\text{pretty sea shell}\}$ ,  $x$  an element of  $S$ . This underlying entity is not an individual, and 'a pretty sea shell' does not mean a particular individual sea-shell. But the hearer can 'identify' the entity referred to, he knows that there is no presupposition of individuality, that the entity referred to is  $x$  modulo  $S$ , and he knows that the speaker is referring to  $x$  modulo  $S$ .

### 3. INDIVIDUALIZING/NON-INDIVIDUALIZING ENVIRONMENTS. SPECIFICITY

3.1. (Lambrecht 1994; p. 80) gives a more or less prevalent view of specificity as: "One way of describing the specific/non-specific distinction in

pragmatic terms is to say that a "specific indefinite NP" is one whose referent is identifiable to the speaker but not to the addressee, while a "non-specific indefinite NP" is one whose referent neither the speaker nor the addressee can identify at the time of utterance."

Evidently, neither of these definitions can be satisfactory, in view of my definition of indentifiability: in my theory, the mr's in a basic act of communication are always identifiable, because they are shared (section 2.1 ).

Another approach to the question of specificity is the Quantificational vs Referential theory of Fodor and Sag. (Abbott 2001b; p. 20) quotes Fodor and Sag as saying, concerning the example considered in the previous section, (42) 'A student in the syntax class cheated on the final exam', "...someone who utters [42] might be intending to assert merely that the set of students in the syntax class who cheated on the final exam is not empty; or he might be intending to assert of some particular student, whom he does not identify, that this student cheated."

However, in light of what I have said in the previous section concerning the certain student in the class, this description is not satisfactory.

Suppose that the utterance  $u$ : 'A student in the syntax class cheated on the final exam' is conveyed in a basic act of communication  $(D, m, u, p, t)$ . If the speaker has someone particular in mind, and does not indicate this lexico-grammatically, then that knowledge is not part of the linguistic communication.<sup>30</sup> Furthermore, it isn't clear what 'some particular student' means: does it mean that prior to the act of communication in which  $u$  is conveyed, the speaker has someone in mind, or does it mean that the speaker has someone in mind at the instant,  $t$ , of communication? Remember that my analysis of the basic act, and the Principle of Existence of Discourse Entities (section 1.4), entail that, at the instant  $t$ , the set of students who cheated is, in  $D$ , non-empty. I mean that this set is presupposed by speaker and hearer to be non-empty: there is an individual,  $s_0$ , presupposed, by virtue of the determiner "a", to exist in  $D$ , who cheated on the final exam. Both speaker and hearer may be said to have this entity 'in mind'.

Therefore, in view of this, it seems that the Fodor/Sag formulation of the situation is not accurate. In the theory of the basic communicative act presented here, it is presupposed that, corresponding to  $u$ , there is a non-empty set of underlying entities, and if the speaker has one of these in mind, for some additional reason, that knowledge is not going to be part of the communication unless the speaker specifically intends it to be (and lexico-grammatically indicates it to be).

I think, then, that a correct analysis of the utterance  $u$ : 'A student in the syntax class cheated on the final exam', in a given discourse,  $D$ , is, according to my analysis in section 2.2, that speaker and hearer presuppose that there is, in the given  $D$ , an entity,  $s_0$ , underlying the nominal 'a student in the syntax class', that  $s_0$  is an individual, and that  $s_0$  cheated on the final exam. If, in

addition, the speaker has  $s_0$  in mind before the utterance of  $u$ , and wishes the hearer to understand this, he must indicate this lexico-grammatically.<sup>31</sup>

It seems that a reasonable notion of specificity lies somewhere between the two bounds of the Fodor/Sag explanation: the set of underlying entities is non-empty, and consists of individuals, so that there is an individual satisfying the predication in the utterance, but that, in addition, any knowledge concerning this individual which the speaker wishes to convey to the hearer is lexico-grammatically evoked in  $D$ .

3.2 Accordingly, I will define 'individualizing' environments, and stipulate that the reference in such environments is 'specific'.<sup>32</sup>

**DEFINITION OF INDIVIDUALIZING ENVIRONMENT AND SPECIFICITY**  
Suppose that  $D$  denotes a discourse,  $u$  an utterance in  $D$ , and  $p$  an expression in  $u$ . We say that  $u$  (or  $D$ ) is an individualizing environment of  $p$  if there is a presupposition in  $D$  that the underlying entity,  $i(D(p))$ , in our assumed semantics, is an ordinary semantic individual. In this case the reference  $p \rightarrow D(p)$ <sup>33</sup> is said to be specific.

Correspondingly, an environment is said to be non-individualizing if there is no presupposition that the underlying entity is a semantic individual.

For example, 'The seashells we found are very pretty' is an individualizing environment for 'The sea shells we found'; '    told me' is an individualizing environment for 'a man I know'; 'He gave me    ' is an individualizing environment for 'diamonds'.

In these examples there is a presupposition that the underlying entity of the nominal is a particular semantic individual, certain sea-shells, a particular man I know, a certain set of diamonds. These presuppositions are evoked by the verbs in the utterances. The nominals are specific.

If I say 'I found a book on atomic theory', then, as far as I and my hearer are concerned, there must exist an individual book on atomic theory which I found. The verb 'found' is what evokes the individualizing environment. The phrase 'a book on atomic theory' is being used specifically.

So is the phrase 'a certain book on atomic theory' in 'I'm looking for a certain book on atomic theory- the one by Bohr'. Here the use of the adjective 'certain' evokes the individualizing environment; the use of 'a certain book' is specific.

Another kind of individualizing environment is that in: (Kearns 2000; p. 120) 'Mary wants to buy a Norton<sup>34</sup>- she is negotiating with the owner'. The first part of the utterance, 'Mary wants to buy a Norton' is opaque; the underlying entity is  $x$  modulo  $S$ ,  $S$  the set of Norton's,  $x$  an element of  $S$  (section 1.8). In the complete utterance, however, the underlying entity is an individual,  $b_0$ , and the reference is specific. I note that the phrase 'she is

negotiating with the owner' is what lexico-grammatically triggers the presupposition of existence of the underlying  $b_0$ .

Another example of this kind is: 'Sarah didn't see a hanger lying on the floor, and she tripped and fell'.

On the other hand, as we have explained before, if I say simply, 'I want to catch a fish', or 'I'm looking for a book on atomic theory', with no other indication of individuality, as it were, then I am not looking for an individual book at all. There is no fish of which I can say that I am looking for it, and no book of which I can say that I am looking for it. In this case, my use of these phrases is non-specific: there is no presupposition that there is in the discourse an individual member of either {fish} or {book on atomic theory}.

A similar example is: 'Hand me one of those glasses, please'. This means: 'Hand me any one whatsoever of those glasses', there is not a particular glass that you are asking me to hand to you. The environment of 'one of those glasses' is not individualizing and  $i(\text{one of those glasses}) = g \text{ modulo } S, g \text{ in } S, S = \{\text{those glasses}\}$ . This use of 'one of those glasses' is non-specific.

On the other hand, the use of 'one of those glasses' in 'I broke one of those glasses', is specific. The verb 'broke evokes an individualizing environment for the direct object, and the use of 'one of those glasses' in this sentence is specific: there is a glass, one of those, and I broke it.

Another example, with a different syntactic structure, is 'Any one of the titles will satisfy the required reading requirement'. The phrase 'any one of the titles' is an indefinite phrase used non-specifically, since it does not point to any individual title.

It is to be noted that if a nominal is being used specifically, then the corresponding presupposition can be expressed as a quantifier phrase. Thus, 'I found a book on atomic theory' means 'there exists  $x$  in {book on atomic theory}, and I found  $x$ '.

I remark that it is not necessary for specificity that there should exist an 'actual' individual underlying the expression, but only that the speaker presuppose there to be. And, in order for an expression to be used specifically, there must, as we have said, be something in the sentence which explicitly invokes specificity; otherwise, we cannot have a presupposition that there is an underlying individual, and the expression is being used non-specifically.

Note that parameterized individuals (section 1.5), generic individuals (Note 14), and the entities of the type  $x \text{ modulo } S$  (section 1.8) are also non-specific; I do not know if these three types exhaust the set of non-specific nominals.

This analysis is basically the analysis of specificity given by (Lyons 1977, pp 187ff) and (Partee 1972, pp. 416ff), except for my insistence that without explicit provision, we cannot have an individualizing environment. There is a study of specificity by (Cormack and Kempson 1991) with conclusions which differ from ours in that indefinite expressions are always quantified with the existential quantifier, and agree with ours in that specificity per se is a

pragmatic phenomenon. This work goes much more in detail than we can here into the semantics of the situation.

And there are many other studies of 'specificity' which I have not addressed here, but which should be taken into account in a more comprehensive study of this phenomenon.

#### 4. REFERENCE. INCLUSIVITY/EXCLUSIVITY.

4.1 The notion of 'reference' is well established in the current literature (although rarely defined carefully!) as having as target the 'underlying entity' who or whatever it is, and as signalling to the hearer who or what I am speaking about. Our definition doesn't change this, but adds the requirement that the individual denoted is referred to under a certain aspect or aspects, and it is these aspects that determine the meaning of the reference. This means essentially that our idea of reference has as target the mental representation of the referent, as well as the underlying entity. And if the mental representation of the referent is different, the reference is different.

This applies as well, to the referents, i.e. antecedents, of anaphors and pronouns. Their antecedents are mental representations of entities, and not just expressions.

I am going to define 'reference' as a certain inverse of the coding function in a basic act of communication,  $(D,m,u,p)$ . The speaker's choice of  $p$  evoking  $m$ , and his conveyance of  $p$  to the hearer, essentially constitutes his 'reference' to  $m$ . The more traditional understanding of reference has it that the  $m$  occurs in  $D$  prior to the conveyance of  $p$ ; we are extending the definition of reference to include the case that  $m$  is evoked at the same instant that  $p$  is conveyed. Thus whether the  $m$  appears in  $D$  at a time prior to the instant of conveyance, or first appears on the scene in  $D$  at the very instant of conveyance makes no difference: we will say that the speaker is using  $p$  to refer to  $m$  in both cases.

Thus, let  $(D,m,u,p)$  denote a basic communicative act, with, by definition,  $p$  chosen so that  $p$  evokes  $m$  in  $D$ . What I mean by the speaker's reference to  $D(p)$  is the association or correspondence of  $D(p)$  to  $p$ . I symbolize this association by ' $p \rightarrow D(p)$ '.

#### DEFINITION OF REFERENCE

Let  $(D,m,u,p)$  denote a basic communicative act, with, by definition,  $p$  chosen so that  $p$  evokes  $m$  in  $D$ . The correspondence,  $p \rightarrow D(p)$ , is said to be the speaker's reference by means of  $p$ . We say that the speaker refers to  $D(p)$ , and to  $i(D(p))$ . The hearer recognizes this and decodes  $p$  to  $D(p)$ . The reference  $p \rightarrow D(p)$  is said to be un-ambiguous if  $D(p)$  consists of a single  $m$ , ambiguous otherwise.

'I went to the store and bought a book. Then I borrowed a book from the library. The next day I lost the book'. There are two books in the discourse:  $b_1$

and  $b_2$ , say;  $\text{dom}(p) = (b_1, b_2)$  and  $iD(\text{the book}) = \text{dom}(p)$ . It seems as if this reference can be to either of the two books  $b_1, b_2$ . The reference is ambiguous.

Reference, in its essence, in my view, is a property of the basic communicative act, and is something the speaker does: he refers, by means of  $p$ , to the mental representations of the interpretations in  $D$  of  $p$ , and he does this every time he conveys an expression to the hearer. This is a weaker definition of reference, which sidesteps the whole question in the literature of whether definites and/or indefinites refer or not. Actually, it is the speakers who refer, but we can say, in view of our Principle on Existence of Discourse Entities (section 1.4), that all nominals in discourse are referring expressions.

Our insistence that the target of reference is a mental representation is well illustrated by the following example (Chierchia 1992, p. 159): 'Every donkey owner beats it', which is claimed to be ungrammatical. However, consider the following discourse: 'If a man owns a horse he races it; if he owns a mule, he harnesses it up; but every donkey owner beats it!' Chierchia's explanation of ungrammaticality depends on his assertion, based on the syntax of the expression, that "the only possible antecedent" of 'it' is the noun phrase 'every donkey owner'. On the contrary, the sentence seems quite grammatical. My explanation is that the utterance 'every donkey owner beats it' is parametric: 'for all  $m$  in  $\{\text{man}\}$ , if  $m$  owns a donkey,  $d(m)$ , then  $m$  beats it'. And for each  $m$ , the  $\text{mr}$  of 'a donkey',  $d(m)$ , is in  $D$ . Then the antecedent of 'it' is  $d(m)$ .

In this same connection, (Sidner 1983, p. 317) has a number of examples of pronouns with no textual antecedent; she raises the question whence their interpretations. Recognizing that all of her examples involve frames enables us to apply the above theory to answer her questions: the pronouns refer to  $\text{mr}$ 's deducible from the corresponding frames (for the notion of 'frame' see the next section)..

4.2 It is a consequence of our very general Principle of Lexico-grammatical Closure (section 1.1) of a discourse,  $D$ , that we cannot conclude that two mental representations and/or their underlying entities are equal unless the equality is lexico-grammatically evoked by  $D$ . This is at the heart of our analysis of the following examples.

This first example is taken from (Fiengo and May 1994; p. 3), and discussed in my paper (Riley 2000, p. 167):

- a. 'Who is that man'?
- b. 'I don't know but he put on John's coat.'

Here the background of the discourse is that a. does not know who 'that man' is, but b. thinks it is John, and wants to convey this by his reply to a.'s question. Fiengo and May state that in b.'s mind 'he' and 'John' are co-referent,

and they mean that b. refers to the underlying individual of 'that man' by means of both expressions 'he' and 'John'. On the contrary, our analysis is as follows: 'that man' is the interpretation of the pronoun 'he', and  $D(\text{he})$  is therefore  $e/\text{asp}(\text{that man})$ , where  $e$  is the individual underlying 'that man'. On the other hand,  $m$  is not one of the meanings determined by  $D$  for the expression 'John', since the latter is a name, and is not connected to  $m$  by  $D$ . We have  $\text{mr}(\text{John}) = f/\text{John}$ ,  $f$  the underlying individual. Now, since we cannot identify  $f$  with  $e$  in the absence of any lexico-grammatical justification, this  $\text{mr}$  is different from  $m$ . Thus, 'John' is not synonymous with 'that man', and the two mental representations are different. So the references are different, and 'that man' and 'John' cannot be co-referent.

Even if 'John' is a name of the underlying individual of  $m$ , it is not connected by  $D$  to  $m$ . So 'John' does not refer to  $m$ . Even if the underlying individual of 'that man' IS John and even if moreover a. and/or b. knows this, even then the  $\text{mr}$  of 'that man' does not mean 'John'. b. does not refer to 'that man' when he says 'John'. There is nothing in the discourse which lexico-grammatically entitles us to equate 'that man' and 'John'. The expressions 'he' and 'John' have different mental representations and cannot then be co-referent.

It seems that Fiengo and May are making an unspoken assumption that if I 'refer' to the individual  $X$ , and  $X$ 's name is  $Y$ , then I can be said to refer to  $Y$ . This is of course the idea in direct reference, but I think it's not a good analysis of what's happening.

If I refer to a certain individual,  $X$ , and I don't know that his name is  $Y$ , say, then there is no way in which I can be said to be referring to  $Y$ . I can only refer to the mental representation described by the expression I use,  $X$ , for example. In my view, 'to refer' means 'to call my hearer's attention to', and I do so by conveying to the hearer a linguistic expression which describes the mental representation conveying the particular aspect of the referent I wish to advert to. This mental representation is really a mental version of the 'aspect' under which I view the entity.

This example reflects exactly our central concern with reference as purely a communicative phenomenon. The point is that 'that man' and 'John', since they are not synonymous, correspond to different aspects of an individual, and when we refer to an individual, the aspect under which we do so must be the same, or synonymous. Otherwise, the reference is different. Even if the underlying individuals were the same, the 'outside' knowledge that they are the same is irrelevant to the communication in the discourse. The coding, 'John', cannot refer to 'that man' because, and this is the essential point here, there is nothing in the discourse connecting 'John' and 'that man'. b.'s private knowledge that 'that man' and 'John' are the same individual is not grammatically manifested in the discourse. There is no indication, grammatically, that the two individuals are the same; their identity, therefore, is not in the discourse; it is irrelevant to it.

Another illustration of these ideas is in an example due to (Kripke 1991, p 73) which I also discussed in my previous paper (Riley 2000, p. 145). a. and b. are talking and spot someone in the distance. They both think it's Jones, but it's really Smith.

- a. Hey, there's Jones. What's he doing?
- b. He's raking the leaves.

Kripke has it that in some sense on this occasion both participants have referred to Smith, and the second participant has said something true about the man he was referring to if and only if Smith was raking the leaves. But I think the situation is not this at all. There is nothing in the discourse to connect Smith with anything. The first speaker a. is referring to an individual, *e*, under the aspects 'over there', and 'having the name Jones'. He presupposes that there is an individual over there, and that the individual's name is Jones.<sup>35</sup> He forms the mental representation, *m*, say,  $m = e/\text{over there}/\text{Jones}/$ , which is the idea of the individual under these two aspects, and conveys it to b. The fact that the name he attributes to the individual is objectively wrong is not really relevant to the reference. Then when he uses 'he' he is referring to the same individual under the further aspect 'doing what':  $D(\text{he}) = e/\text{over there}/\text{Jones}/\text{doing what}/$ .

The second speaker b. understands that a. is referring to that individual over 'there' under the aspect of having the name Jones, and shares with a. the mental representation *m*, i.e. its enlargement  $D(m)$ . Now b. codes  $D(m)$  as 'he', apparently acquiescing in the name Jones. b. has not said that Smith is raking his leaves; he has not referred to Smith at all. He has referred to the individual, *e*, but the aspect 'having the name Smith' does not occur in the discourse. b.'s statement is about the individual over there whose name is supposedly Jones and it is a true statement.

I say that neither of them have referred to Smith at all, that is, they have not referred to an underlying individual under the aspect of having the name Smith, but rather, have referred to *e*, under the aspect of having the name Jones. This discrepancy is irrelevant to the reference and to the discourse.

Suppose a third party comes up to them and asks who they are talking about; they will say 'Jones', or 'that man over there'. The fact that you, the reader of these remarks, who are outside the communication, know that the individual is not Jones at all but Smith, in no way impinges on or is involved in the communication between a. and b. The 'objective', 'semantic' truth or falsity of the utterances in the discourse is another matter entirely, and is not at all relevant to the 'communicative' nature of the discourse. The latter is our only concern here.

4.3 The following example is a famous one of Karttunen's, used by (Partee 1972, p. 434) as a counterexample to the use of co-reference as a

theoretical foundation for pronominalization. Partee gives a 'pronoun of laziness' analysis, in which the pronoun 'it' is substituted for an identical, but not necessarily coreferential, expression, viz. 'his paycheck'. Our analysis is completely different.

'The man who gave his paycheck to his wife was wiser than the man who gave it to his mistress'.

First of all, the first 'his' need not refer to anyone in the utterance. Consider: John and Bill are postal clerks, and part of their job is to give out paychecks belonging to people. So one day John gave Sam's paycheck to his wife, and the next week, Bill gave it to Sam's mistress.

Assume then that 'his' refers to the first man, A, say. Then the mr of 'A's paycheck' is in the discourse, and is referred to by 'it'. The pronoun 'it' will therefore refer to 'A's paycheck', and the utterance means 'The man who gave A's paycheck to his wife was wiser than the man who gave A's paycheck to his mistress. Note that both 'his' refer to A.

If we want to obtain the 'parallel' reading in which the second man, B, gives HIS, B's, paycheck to HIS, B's, mistress, we use the fact that the construction in the sentence is a balanced one, indicated by the comparison 'wiser than'. This means that, in addition to the mr's of the first man, A, and A's paycheck, the discourse also contains, by coherence, the mr's of the second man, B, and HIS paycheck. Using the parallel nature of the construction, we infer that the 'his' of 'his mistress' will refer to B. Also, for the same reason, the referent of 'it' will be the mr of the second 'his paycheck'.

I would point out that the pronoun of laziness analysis is forced if there is no other candidate for the referent of 'it' than 'A's paycheck'. Our theory on the other hand provides the missing antecedents: the mental representations of 'B' and 'B's paycheck'.

The analysis of the following sentence is similar: 'The man who takes care of his health is wiser than the man who neglects it'.

These two examples are good illustrations of coherence determining D(it).

4.4 I close this section with the notions of inclusive and exclusive, used by Hawkins in his definition of definiteness (Hawkins 1978, p. 161). In his words, inclusiveness means that "a definite NP involves reference to the totality of entities or mass that satisfy the description of the NP within a given P-set". I want to re-formulate this in our terminology, and make it more precise.

#### INCLUSIVE AND EXCLUSIVE REFERENCE

Let  $(D, m, u, p)$  denote a basic communicative act, with reference,  $p \rightarrow D(p)$ . Recall that  $i(D(p)) \subseteq \text{dom}(p)$ ,  $\text{dom}(p)$  the discourse domain of  $p$  (section 1.10). If  $i(D(p)) = \text{dom}(p)$ , we will say that the reference is inclusive; if  $i(D(p))$  is a proper subset of  $\text{dom}(p)$ , we say that the reference is exclusive.

Consider: 'I bought four new tires for my car. They were expensive'.

Here  $i(D(\text{they})) = i(D(\text{four new tires})) = (t_1, t_2, t_3, t_4)$ , and since  $\text{dom}(\text{they})$  is the same set  $(t_1, t_2, t_3, t_4)$ , the reference is inclusive.

In: 'I bought four tires for my car. Two of them were worn', the domain  $\text{dom}(\text{two of them}) = ((t_1, t_2) (t_1, t_3) (t_1, t_4) (t_2, t_3) (t_2, t_4) (t_3, t_4))$ , the set of two-element subsets of the set  $(t_1, t_2, t_3, t_4)$  of tires that were bought, and  $i(D(\text{two of them}))$  is one of these two-element subsets. The reference is exclusive.

4.5 It is a requirement of the classical theory of definite descriptions that there is just one individual in the discourse which 'satisfies' the description. In terms of our framework I translate this by: the domain,  $\text{dom}(p) = i(D(A))$  is a singleton set. On the other hand, if there is just one  $m$  referred to, i.e. if  $i(D(p))$  is a singleton set, we have said above in the definition of reference that the reference is unambiguous. I want to examine the relationship between these two forms of 'uniqueness'.

#### DEFINITION OF UNIQUE REFERENCE.

Let  $(D, m, u, p)$  denote a basic communicative act, with reference,  $p \rightarrow D(p)$ . The reference will be said to be unique if the domain  $\text{dom}(p)$  consists of a single entity.

Now uniqueness entails un-ambiguity, but not vice versa: first of all, if  $\text{dom}(p) = i(D(A))$  is a singleton, then  $i(D(p))$  is too, since  $i(D(p)) \subseteq \text{dom}(p)$ , so that 'uniqueness' entails un-ambiguity. Conversely, if a reference is un-ambiguous, then  $i(D(p))$  is a singleton, but  $\text{dom}(p)$  need not be: consider 'I found a sea shell on the beach'. Here  $\text{dom}(p) =$  the set of sea shells on the beach, and  $i(D(p)) = i(D(\text{a sea shell})) =$  a sea shell,  $s_0$ , picked out of the set  $\text{dom}(p) = i(D(A))$ .

If however we add inclusiveness to unambiguity, this does entail uniqueness.

#### UNIQUE REFERENCE

Let  $(D, m, u, p)$  denote a basic communicative act, with reference  $p \rightarrow D(p)$ . Then the reference is unique if and only if it is inclusive and unambiguous.

Proof: Assume that the reference is unambiguous, so that  $i(D(p))$  consists of a single element,  $e$ , say. Then inclusivity entails that  $i(D(A))$  likewise consists of a single element so that  $\text{dom}(p) = i(D(A)) = (e)$ . But this is uniqueness.

Conversely if  $\text{dom}(p) = (e)$ , say, then  $i(D(A)) = (e)$ , and since  $i(D(p)) \subseteq i(D(A))$ , it follows that  $i(D(p)) = (e)$ , also. Hence  $i(D(p)) = i(D(A))$ , and the reference is inclusive.

I am going to define 'definiteness' in section 6 as un-ambiguous and inclusive, hence unique, reference. The determination that a reference

$p \rightarrow D(p)$  has these properties, in any given instance, depends obviously and essentially on the calculation of the domain of  $p$ ,  $\text{dom}(p) = i(D(A))$ . And this calculation will depend on our cognizing of  $p$ , in particular our recognizing whether or not  $p$  is the link to a frame. We now turn to the theory of frames,

## 5. ACCESSIBILITY. FRAMES

5.1 There has been much discussion in the literature of the cognitive states of referents or of mental representations. I will generally follow here the accounts in (Lambrecht 1994, pp. 93ff) and (Chafe 1994); from these we need the ideas of 'accessible' and 'active' states. An identifiable (section 2) mental representation may be, relative to a speaker/hearer's memory and consciousness, and at a given instant, in one or the other of three cognitive states: active, semi-active or accessible, and inactive. Intuitively, an mr is active when it is currently 'lit up', in the center or forefront of the interlocutors' consciousness or attention. An mr is semi-active, or as we shall call it, accessible, when it is in the interlocutors' peripheral or background consciousness, not being focused on directly in the discourse. And an mr is inactive, when it is in the interlocutors' long-term memory, neither focally nor peripherally active. In order for an mr,  $m$ , in an inactive or semi-active state, to be 'lit up' or in the 'focus' of the interlocutors' consciousnesses, it must first be evoked by the speaker and conveyed to the hearer. In addition, it must be activated by the interlocutors, and brought thereby into the active state. I will take this 'activation' to be an un-defined term, intuitively representing the interlocutors' turning their attention to  $m$ . I will assume that the activation of an mr,  $m$ , takes place via the evoking of  $m$  in a basic communicative act.

Correspondingly, de-activation will be for me an undefined term representing intuitively the operation of 'turning away' their attention from  $m$ .

These states, in terms of the cost or difficulty of activating them, may be considered to lie on a continuum, the accessibility continuum, stretching between inactive on the one hand, and active, on the other. The position of a state on the continuum represents the cost or difficulty of activating and cognizing the mr, this difficulty decreasing as one moves from the inactive end to the active end of the continuum. Due to the existence of certain semantic relations within an invoked schema, due to presence in the situational context, or due to other contextual factors, it is easier to activate an accessible referent in the hearer's mind than one which is inactive (Lambrecht 1994, p. 104).

(Chafe 1994; pp 73ff) gives some useful terminology concerning the temporal organization of the states of mr's: suppose that the mr,  $m$ , is inactive at a certain instant  $t$ , marking the onset of an intonation unit<sup>36</sup>, and is activated during that unit. Then  $m$  is active at the endpoint,  $t'$ , of the intonation unit.  $m$  is said to be new at  $t'$ . If at  $t$ ,  $m$  was semi-active (accessible), it is still called accessible at  $t'$ .

If at  $t$ ,  $m$  was already active, then it need not be activated during the intonation unit, and is said to be given at  $t'$ , or in the ground<sup>37</sup> of  $D$  at  $t'$ .

These terms are applied equally to the mr's, the expressions evoking them, and to their underlying entities.

It is to be understood that the state of m, whether active, semi-active, or inactive, is recognized and shared by speaker and hearer in the basic communicative act. Suppose that (D,m,u,p,) is a basic communicative act, so that the speaker conveys the mr, m, to the hearer by verbalizing or coding m with the expression, p, in the utterance, u. In this paper so far I have taken it that the utterance will occur at a given instant of time, t. Of course this is an oversimplification, since u is composed of a number of intonation units, and m is conveyed to the hearer by being coded, as p, in an intonation unit. In any given intonation unit, the state of m at the onset of the intonation unit will influence the choice of coding p. I mean that that the speaker's coding of m, and his choice of p, in the basic communicative act, will depend on his assumptions, at the onset of the intonation unit, as to the state of m in the hearer's mind (Lambrecht 1994; pp. 94-101).

Thus, in terms of the given-accessible-new terminology introduced above, suppose that t is the time of onset of a particular intonation unit. and that the speaker assumes that m is in the inactive state in the hearer's mind at t. Then the speaker will code m as new, choosing p accordingly. The conveyance of p causes m to be activated, and to be in the active state at time t', the end of the intonation unit.

If, at t, m is in the semi-active state, the speaker will code m as accessible, again choosing p accordingly. Again, the conveyance of p will cause m to be activated, and to be in the active state at the end of the intonation unit.

If, at t, m is in the active state, the speaker will verbalize m as in the ground, choosing p accordingly. There is no necessity for further activation of m in this case.

The following example will illustrate these ideas.

'By the way, I bought a used car yesterday. Oh yeah? From where? I got it from Volvo. What kind of shape is it in? Oh it's in pretty good shape. I have to rebuild the carburetor, but everything else is fine'.

The first 'I' is probably accessible, if the speaker has not focused on himself during the previous conversation. The second and third 'I's are in the ground. 'used car' is new. The three 'it's are in the ground. 'Volvo' is new. The first 'shape' is accessible, being inferred as related to the concept of used car. The second 'shape' is in the ground. 'the carburetor' is accessible, being inferred as part of the used car; and 'everything else' is accessible, again being inferred as pertaining to the used car.

5.2 For a closer analysis of accessibility of an mr, and its cognizability, I consider the divisions defined by (Lambrecht 1994; pp 99-100; Chafe 1994; p. 86). A mental representation is textually accessible if it is de-activated from an earlier active state in the discourse. For example, the referent of Bill in the last

utterance of the following discourse is probably new at first mention, but is textually accessible at second mention since it has been de-activated by the intervening discourse: 'You remember Bill, who was at college with us? Yes, I do! and I also remember Jake, too- remember him? He was in our class. That was quite a class, wasn't it? ... Wasn't Bill the fellow who came at mid-year? Yeah, I think so'.

A referent is situationally accessible to a discourse, D, if it is salient in the text-external world of D. An example: the speaker is always situationally accessible: 'I tell you...' Time and space references are also situationally accessible: 'We went to the movies last night'; 'She sat over there'.

Finally, a referent and its mr are inferentially accessible to a discourse, D, if its presence in D is deducible from that of some other active or accessible element of D. One large class of inferentially accessible mental representations are those associated with cognitive 'schemas' or 'frames'.

Now I observe that each of these three kinds of accessibility can be considered to be instances of frame membership, not just the inferentially accessible ones. This will be clear from the examples given below. Therefore, I am going to define the notion of frame here to include these three types.

5.3 Frames provide a way of representing the cognizing of concepts by taking into account their cognitive relations with other concepts. "By the term "frame" I have in mind any system of concepts related in such a way that to understand any of them you have to understand the whole structure in which it fits; when one of the things in such a structure is introduced into a text or into a conversation, all of the others are automatically made available" (Lambrecht 1994, p. 90, quoted from Fillmore). The process of 'cognizing' the mental representation of a referent, to which I have alluded several times, takes place, in many cases, via the recognition that the mr is part of a frame.

#### DEFINITION OF FRAME

Let c denote the mr of an expression. By a frame representing c we mean a collection of mr's of full lexicals connected to c by various cognitive relations.

I will represent a frame by a finite rooted network, with root the mr, c, of an expression, and with an edge from a to b, a, b mr's in F, if there is a certain cognitive relation between a and b. These cognitive relations might be for example, 'part of', 'subset of', 'is a property of', 'is an enlargement of ' and the like.

Schematically, frames 'look like' the following, representing the frame network as a table. The entries in the table represent the mr's of the corresponding common nouns<sup>38</sup>:

	used car	
engine	transmission	.....

carburetor ignition system .....

We will not need, in most of the cases we deal with, to know with precision the exact mr's belonging to a particular frame, nor the exact cognitive relations which hold between them. It will be sufficient for our examples to know that the particular mr's under consideration are cognitively related to the root, *c*, of the frame.

#### ASSUMPTION ON EXISTENCE OF FRAMES

Suppose that *c* denotes the mr of an expression, and that  $m_1, m_2, \dots$  denote mr's cognitively related to *c*. There is a frame, *F*, with root *c*, which contains  $m_1, m_2, \dots$ .

5.4 The utility of the notion of frame lies in its connection with discourse.

#### DEFINITION OF DISCOURSE FRAME

Let *D* denote a coherent discourse. A referential frame or discourse frame in *D* is a triple, (*F*, *T*, *p*), of data in which *F* is a frame, *T* is an expression in *D*, called the trigger of *F*, whose mr,  $mr(T)$ , is the root of *F*, and *p* is a nominal expression in *D*, distinct from *T*, for which the mr,  $m = D(p)$ , is in *F*. The expression *p*, and its mr, *m* are said to be a link to *F*. The frame is evoked by the trigger, *T*. The speaker first conveys *T* to the hearer, with it, *F*, and then *p*.<sup>39</sup> The expression *p* and the mr *m* are recognized by the hearer as forming a link to *F*. We will say that *m* is cognizable, by virtue of its relation to *F*.

There are certain properties of frames on which I will lean heavily in my discussion of the examples; I assume:

#### ASSUMPTION ON CLOSURE OF FRAMES

Let *F* denote a referential frame evoked in a discourse *D*, and let *m* denote an mr in *F*. Recall that *m* has the form  $e/p$  (see NOTATION: mr's, in section 1.8) where *p* represents certain aspects of the underlying entity *e* of *m*. a) If *e'* is a subset of *e*, or a superset of *e*, then  $e'$  and  $e'/p$  are in *F*; b) If *n* is an enlargement of *m*,  $n = e/p'$ , where *p'* is a set of aspects of *e* containing *p*, then *n* is in *F*. c) If  $p = \text{det } A$  is a determiner expression with *A* a common noun, then if one of  $mr(A), mr(\text{det } A)$  is in *F*, so is the other.

The workings of frames in discourse is as follows. When a frame has been induced in a discourse by the evoking of the trigger, the mental representations of which it is composed are also in the discourse, and are at least potentially active. I say potentially since at the instant of activation of the trigger, they may themselves have not yet been activated in *D*. If they have not yet been activated, if they are inactive or inaccessible, they have however

the potential to be more or less easily activated, depending on their position on the accessibility continuum.

At the instant the trigger is uttered, F comes into existence in the discourse, and the frame and its elements are thus shared by speaker and hearer. Then, whether the mr's in the frame are active yet or not, the hearer, receiving the link, p, from the speaker, recognizes the mr, D(p), of p to be one of the elements of the frame.

This entire process, the sharing of the mr's in F, and the recognition that the mr of p is in F, are part of the 'cognizing' of p.

The following examples will illustrate the ubiquity of frames in referential situations. The examples, the types of which are not at all mutually exclusive, mirror, it seems, some of the various ways in which human cognition deals with concepts.<sup>40</sup> The examples are about referential frames, since these are the ones we are most concerned with.

a) the immediate situation: that portion of the external world, including the discourse participants, comprising the more or less immediate situation in which the discourse, D, takes place. Here the frame, F, is any set of mr's of entities in the immediate situation; the trigger is a common noun in the immediate situation itself, and the link is an expression, p, for which the mr of p is in F.

Examples: 'The butler will show you out'. 'I put some butter on my vegetables.'. 'The rain is heavy, isn't it?'. 'Deal me two cards.'

To delineate exactly the frames involved, we really need more discourse. For example, an immediate situation frame might be that of a household with servants, among whom is the butler. As shown, D(butler) is in the frame, and therefore D(the butler) is also, by the Assumption on Closure of Frames. 'the butler' is then a link to the frame.

household servants  
butler chambermaid cook

In 'I put some butter on my vegetables', the frame is the dinner table, with meat, vegetables, plates of butter, etc. The mr, D(butter) is one of the mr's in the frame. The link is 'some butter', and, as in the first example, the mr of this is just D(some butter), which then belongs to F by the Assumption on Closure.

And in 'Deal me two cards', the frame is that of a card game, with dealer, players, cards, with trigger 'cards'. D(cards) is an element in the frame, and therefore D(two cards) is also in the frame. 'two cards' is a link to the frame.

b) general knowledge, or the larger situation: the speaker's/hearer's natural universe or social universe, accounting for the (mr's of) referents of phrases like 'the stars' or 'the President', 'God', 'science'. The frame is a set of concepts of items in the universe involved, and the trigger is some particular item in the universe.

I assume that the immediate situation is part of the larger situation, it seems that the latter forms what we have called the context of D (section 1.1).

Examples: 'On a clear night you can see millions of stars'. 'Today we elected the governor of California'. 'God is great'. 'I studied science in college'. The links are: 'millions of stars', 'the governor of California', 'God', and 'science', and the frames, and their triggers, are the common nouns, 'starry heavens on a clear night', 'gubernatorial election process in California today', 'creation', and 'college subjects'. The mental representations of the links are elements of the corresponding frames.

In Lambrecht's terminology, the mr's in these first two types of frame are 'situationally accessible'.<sup>41</sup>

c) the internal world of the text of D itself: for example the mr of 'the exposition' in 'The exposition so far has dealt with the first two concepts' is cognizable by virtue of the frame of reference established by the ongoing discourse, D. This frame consists of the discourse, D, its concepts, and its parts, including 'exposition' and 'concepts', etc. The expression p = 'the first two concepts' is another link to this frame since the mr of p is D (the first two concepts), and this is an element in the frame.

Another instance of this kind of frame occurs when the mr, m, of an expression p in D is de-activated at an instant t' say, and then activated again at a later instant (without being activated at an intermediate time). The frame consists of the earlier appearance of m, together with any sub-mr's and enlargements of m in D. Lambrecht calls these 'textually accessible'.

d) anaphoric reference: my definition of frame covers situations of anaphoric reference. Suppose that p is an anaphor or pronoun and T is its antecedent. I may assume that T is a full lexical. Define a frame, F, by taking D(T) to be the root of F. Since D(p) is an enlargement of D(T), D(p) is in F, and p is a link to F. Examples: 'A huge trailer truck overturned this afternoon on Route 1. The vehicle was rounding a curve at high speed, and tipped over'. Here 'the vehicle' is anaphoric to 'a huge trailer truck'.

Take the frame F to have root concept D(a huge trailer truck). Since D(the vehicle) is an enlargement of D(a huge trailer truck), it is in F.

'Mary wrote the letter herself'. Define a frame, F, by specifying the root to be the mr, m = mr(Mary), of the antecedent, 'Mary'. Let m have underlying interpretation, Mary. The mr of 'herself' is D(herself) = Mary/wrote the letter/, and this is an enlargement of m, hence is a link to F.

e) bridging or associative frames: Lambrecht calls the mr's in this type of frame, 'inferentially accessible'. In these, the prototypical frames, the trigger is an expression in D. The frame, F, consists of the mr's of concepts "naturally" associated with the idea evoked by the trigger. The hearer cognizes this, and recognizes that the mr of the link is one of the mr's in F.

Examples: 1) 'I bought a used car yesterday. oh yeah? From where? I got it from Volvo. What kind of shape is it in? Oh it's in pretty good shape. I have to rebuild the carburetor, but everything else is fine'.

Here 'the carburetor' is inferentially accessible, its mr being part of the frame, F, associated to 'a used car'. F consists of ( the mr's of) 'used car' and its parts, evoked by the trigger, 'used car', and 'carburetor' is one of them. Then D(the carburetor) is also in F, and 'the carburetor' is a link to F.

At the instant the trigger, 'a used car', is uttered, F comes into existence in the discourse, and the frame and its elements are shared (potentially) by speaker and hearer. Then, receiving the link, 'the carburetor', from the speaker, the hearer recognizes its mr as one of the elements of the frame.

2) A second example is the following interesting one from ( Brown and Yule 1983, p. 218): '(Talking about the first world war) I used to go about with a chap- I don't know whether he's still alive now or not- but there was nine- ten- eleven in the family altogether- two girls and nine boys- and she lost eight sons one after the other...'

Brown and Yule suggest that there is here no linguistic expression which can be a direct antecedent for 'she'. If we infer that 'she' is the mother, which is the natural thing to do, then we are using 'new' information to determine a given referent... This seems contradictory, but it can, of course, be accounted for within our framework as follows: the trigger is 'family', evoking the frame consisting of the members of a family, and the concept of 'mother of the family' is easily inferred to be in the frame. The link, the pronoun 'she', is anaphoric to the antecedent, 'the mother of the family', and, as before, is in F.

The speaker is treating 'the mother' as if its mr had already been introduced, by referring to it with 'she'. He is presupposing that the hearer recognizes the mr of 'the mother' as an element of the frame 'family' and is treating the link as if it were in the ground. Since it is so readily activated from the trigger, it might as well have been uttered at the same time as the trigger, so is, as far as the speaker is concerned, in the ground. Being so, it can then be coded by a pronoun.<sup>42</sup>

Parenthetically I remark that Brown and Yule say that there is a serious problem for any analysis of pronouns as conveying given information which depends on a referential assignment via phrases in the preceding discourse. But, at bottom, reference is always to MENTAL REPRESENTATIONS, and thus

depends on INFORMATION in the preceding discourse, but not always on PHRASES in the preceding discourse (Riley 2000, p. 143).

3) 'Some of my brother's friends came to dinner'. The frame is evoked by the trigger, 'my brother's friends', and the link is  $p = \text{'some of my brother's friends'}$ .  $D(\text{my brother's friends}) = f_0/\text{my brother's friends}/$ , where  $f_0$  is a certain set of individuals, and  $D(p) = f_1/\text{my brother's friends /came to dinner}/$ , where  $f_1$  is a subset of  $f_0$ . By our Assumption on Closure, above, then,  $D(p)$  is in the frame.

4) 'On one of two chairs lay a flecked tweed skirt...'. The frame consists of 'two chairs', and associated  $mr$ 's. It is triggered by 'two chairs', and the link is  $p = \text{'one of two chairs'}$ .  $D(\text{two chairs}) = c_0/\text{two chairs}/$ , where  $c_0$  denotes a certain set of two chairs, and  $D(p) = c_1/\text{two chairs}/$ , where  $c_1$  is one of the two chairs.  $D(p)$  is in the frame.

f) presuppositional frames: the definition of these, and their use in the analysis of definites in section 6.6 is new. Here the trigger is in a presupposition, and the link is in an assertion. This kind of frame occurs, for example, with relative clauses, and with nominal modifiers. The examples of associative frames given all have the trigger evoked at an instant prior to the instant of utterance of the link. But there are examples where the link is uttered at the same instant, in the same utterance, as the trigger.

Examples: 1) 'The woman I saw you with last night called me this morning'. This is synonymous with 'I saw you with a woman last night. She called me this morning'. The presupposition is: 'I saw you with a woman last night', and this evokes a frame  $F$  with trigger, 'a woman'. The  $mr$ ,  $D(\text{a woman}) = w_0/\text{saw her with you/last night}/$ , with  $w_0$  a particular element picked out of the set  $\{\text{women I saw you with last night}\}$ . The assertion is: 'She called me', with the link  $p$ : 'she', with  $mr$ ,  $D(p) = w_0/\text{saw her with you/last night/ called me}/$ . This is an enlargement of  $D(\text{a woman})$  and thus belongs to  $F$ .

Of course the discourse  $D$  determines the meaning of the utterance; in particular it determines the presupposition. For example, we may also say, depending on  $D$ : 'A woman I saw you with last night called me this morning'. Here the presupposition is: 'I saw you with some women last night', and the assertion is synonymous with 'One of them called me this morning'.

2) 'I want to go to the library. I want to return some of the books I borrowed'. The presupposition is 'I borrowed some books from the library'; this evokes a frame  $F$  with trigger, 'some books', with  $D(\text{some books}) = b_0/\text{borrowed from library}/$ ,  $b_0$  a subset of  $\{\text{book}\}$ . The link,  $p$ , is 'some of the books I borrowed',

and  $D(p) = b_1/\text{borrowed from library}/$ , where  $b_1$  is a certain subset of  $b_0$ . Then  $D(p)$  is also in the frame, by the Assumption on Closure.

3) 'The fleas on this dog are terrible!'. The presupposition is 'There are fleas on this dog'. The frame is evoked by the trigger, 'fleas', and the link  $p$ , is 'the fleas on this dog'.  $D(p) = f_0/\text{fleas on this dog}$ , where  $f_0$  is a certain subset of {flea}, and this is in the frame.

4) 'The job I want is in the construction field'. This means 'There is a job which I want. It is in the construction field'. The presupposition is 'There is a job which I want', and the assertion is 'It is in the construction field'. There is a certain job,  $j_0$ , which I want, and  $j_0$  is the antecedent of 'it'. Define a frame with root concept  $mr(j_0)$ ; then the  $mr$  of 'it' is an enlargement of this, and is in the frame.<sup>43</sup>

5) (Abbott 2001a, p. 12) attributes the following example to Epstein: "Researchers who reported in July that family history appeared to play a slightly smaller role in breast cancer than previously believed backed off, saying they had erred.... 'We took the wrong number and multiplied it by the wrong number,' said Dr. Graham A. Colditz, a co-author of the study...Epstein argues that this shows that even roles need not be unique. However I believe this example is quite atypical, and is possible only because wrong, for some reason, licenses the definite article. Note that the doctor's remark has a slightly whimsical flavor to it".

On the contrary, I would classify this as an utterance with a presuppositional frame: presupposition: 'we took a number and multiplied it by a number'; and assertion: 'both numbers were wrong' = 'we took  $m_0$  and multiplied it by  $n_0$ '; both  $m_0$  and  $n_0$  were wrong'.

A number of Hawkins' situational types can be subsumed under the presuppositional frames, viz. his associative clauses, establishing relatives, NP complements and nominal modifiers (Hawkins 1978, pp. 138ff). Here are some examples of his illustrating these types: 'Look at the dog in my car'; 'The problem with Bill is that he's stubborn'; 'the beginning of the war'; 'The mere fact that there is life on earth proves nothing'; 'I don't like the color red', 'the blue of the sky'; 'the youth of today'; 'The history of England'.

As a final type of presuppositional frame there are the ones evoked by a lexical item (Hawkins 1978; Prince 1992): 'There were the usual objections to the procedure'. 'My wife and I share the same secrets'. The presuppositions are 'there is a procedure', and 'my wife and I have each a set of secrets', and the assertions are 'there are objections to the procedure', 'the secrets are the same'.

And 'There were the same people at both conferences'. 'There was the usual crowd at the beach.'

To delineate the frames involved: in 'My wife and I share the same secrets', the presupposition is 'My wife and I each have secrets', and the assertion is 'They are the same'. This is an anaphoric reference: let A, B denote the husband and wife's secrets, respectively. Then 'they' refers to the pair (A,B). The assertion is essentially a nominal predication (see below section 7.1) on (A,B), and evokes the equality  $A = B$ .

And  $u =$  'There was the usual crowd at the beach' is parametric (section 1.5), and entails  $u(t) =$  'at each  $t$  there is the crowd  $c(t)$  at the beach', where  $t$  ranges through some set of times. Then  $u$  means 'at a certain time,  $t_0$ , there was the crowd  $c(t_0)$  at the beach'.

Our account so far is prejudiced against so-called mass nouns, and, to a lesser extent, plurals; the theory is of course applicable in their case also. Some examples are: 'I can't find the shampoo'; 'please pass me some butter'; 'the tellers counted the votes'; 'I'd like some ginger-ale, please'; 'this is the only water for miles'.

The frame structure of a discourse is extremely rich. A cursory examination of almost any discourse will reveal that the concepts involved are related in associated frames, and frames within frames. There is a happy phrase cited by (Barsalou 1992, p. 40)<sup>44</sup> which says that "human conceptual knowledge appears to be frames all the way down".

5.5 My definition of frame is intended to model the cognizing of both accessible and given  $m$ 's. If  $p$  is accessible, it falls under one or more of the examples, a)-f), of accessibility listed above. If  $p$  is in the ground, it falls under the category, d), of anaphors. It is clear that in either case,  $p$  is a link to a frame.

#### FRAME MEMBERSHIP OF ACCESSIBLE/GIVEN

Let  $(D,m,u,p,t)$  denote a basic communicative act. Then  $p$  is accessible or in the ground if and only if there is a referential frame  $F = (F,T,p)$  to which  $p$  is linked.

5.6 It will be convenient for us to define the notions of 'prior' and 'coincident' occurrence; these give a certain detail to the notion of 'belonging to a frame'.

#### DEFINITION OF PRIOR OCCURRENCE

Suppose  $(D,m,u,p)$  is a basic communicative act, with the utterance  $u$  occurring at time  $t$ . We will say that  $D(p)$  is of prior occurrence if  $p$  is the link to a referential frame  $(F,T,p)$ , evoked at or before the instant of utterance of  $u$ . If  $F$  is evoked in  $D$  at some instant  $t'$ , prior to  $t$ , we say that  $D(p)$  is actually prior to  $u$ . If  $F$  is evoked in  $D$  at the instant  $t$ , i.e. in the utterance  $u$ , we say that  $D(p)$  is logically prior to  $u$ .

The following is clear:

#### PRIOR OCCURRENCE OF ACCESSIBLE/GIVEN.

Denote by  $(D,m,u,p,t)$  a basic communicative act. The following are equivalent:

- i)  $D(p)$  is a link to a frame  $(F,T,p)$  evoked at or before the instant  $t$ ;
- ii)  $D(p)$  is of prior occurrence;
- iii)  $D(p)$  is accessible at the instant  $t$ , or in the ground of  $D$  at  $t$ .

5.7 I close this section by defining more precisely what it means for an  $mr$  to be 'new' to a discourse. Let  $(D,m,u,p)$  denote a basic communicative act. If  $p$  is not a link to a frame, then in some sense it is not linked to anything for its identification. It is 'new' in some sense, and I want to make clear the precise meaning of this. If  $p$  is not a link to a frame, then  $m = mr(p)$  is not in any frame and so does not occur in an utterance previous to the utterance  $u$ , and also does not occur in a presupposition that occurs previous to or at the same instant as  $u$ . This means that the first time  $m$  has occurred in  $D$  is at the instant  $u$  of utterance of  $p$ . Its first activation or evocation in  $D$  is in  $u$ . Note that it could not have occurred before, then been de-activated, and then be activated again at  $p$ , because then it would have been in the discourse frame (see the example given in c) above).

Thus  $m$  is, as we may say, brand new, using Prince's term, though with a more restricted meaning. (Lambrecht 1994, p. 105).

#### DEFINITION OF BRAND NEW

Let  $(D,m,u,p,t)$  denote a basic communicative act, with reference  $p \rightarrow D(p)$ . We will say that  $p$  is brand new to  $D$  at  $t$  if  $p$  is not the link to a referential frame in  $D$ .

It should be noted that it is the  $mr$ , rather than just the expression, which has to appear for the first time, if it is to be considered brand new. For, consider the example of the family, cited above in section d), on associative frames. There, the  $mr$  of the mother was in the frame, and was evoked once, when the frame was evoked with the activation of 'family', and then again, when 'she' was activated. So even though the expression, 'she', was a new expression in  $D$ , its  $mr$  had occurred before, so it was of prior occurrence, and not 'brand new' in our sense.

But 'a thousand dollar bill' and 'a mountain lion' in 'I found a thousand dollar bill' and 'I saw a mountain lion' are brand new: they are not links to a frame. There is no intuitive sense that the hearer has 'seen' the thousand dollar bill or the the mountain lion before.

A good example of an indefinite phrase referring to something which is not new is: 'I went to the battle of the bands last night. A band played Beethoven's Fifth'. Here the frame is triggered by 'the battle of the bands', and the link is 'a band'. 'a band' is one out of many, not new to  $D$ , but being

presented to the conversation for discussion, for consideration, etc. The utterance means 'One of the bands played Beethoven's Fifth'.<sup>45</sup>

It follows from the principle, Frame Membership of Accessible/Given, that if an expression, *p*, is not a link to a frame, it must be new, in the sense of Chafe defined above (section 5.1). Thus, in view of the definition of brand new, 'new' = 'brand new'.

## 6. DEFINITENESS. THE DETERMINER 'THE'.

6.1 Definiteness is a notion for which, historically, it is difficult to give a good linguistic definition. An up to date summary is given in (Lyons 1977 and Hawkins 1978), and there are a number of problematic examples in Abbott's papers and (Birner and Ward 1994). Some current considerations and difficulties are discussed by Abbott. My treatment here is going to be a revision of that of Hawkins. The key ideas seem to me to be 'prior familiarity', or 'givenness', and inclusiveness.

First, I want to discuss some examples which seem to go contrary to the usual idea that second mention nominals are definite. They are what might be called 'repetition for rhetorical effect'. For example, 'I bought a book on atomic theory. I need to study this subject for my exams, and I need a book on atomic theory' is a repetition for rhetorical effect: the second occurrence of 'a book on atomic theory' does not here evoke a second book.

The examples 'I saw a mountain lion. A huge ferocious mountain lion!', 'I found a thousand dollar bill...while walking to work this morning, minding my own business, I found a thousand dollar bill!' are also obviously repetitions for rhetorical effect, and don't assert the existence of a second lion or thousand dollar bill.

In these examples, the underlying entity of the second expression is the same as that of the first; the *mr*'s themselves of the second expressions will be enlargements of the *mr*'s of the first.

6.2 I turn now to the definition of definiteness, and make the blanket assumption that the nominals I consider are not repetitions for rhetorical effect. I will also assume that the reference involved is un-ambiguous. Prototypical examples of definites are such utterances as: 'A car overturned. The vehicle was rounding a corner at high speed', 'The woman he was with last night followed him', and, indeed, many of the examples in my discussion of frames.

In all of these, intuitively, there is the feeling that the hearer is expected to understand what vehicle or woman the speaker is talking about. The intuitive feeling is that this vehicle or woman has been encountered before, and that the speaker is recalling it to the hearer's attention. The 'the' carries an overtone of 'familiarity' or as we shall say, 'prior occurrence'. When the speaker says 'the vehicle', 'the woman', he presupposes at the same time that the hearer already shares the *mr* of the vehicle, of the woman, prior to the instant of utterance.

But this priority need not be actual; in accordance with our notion of prior occurrence (section 5.6), it may be that the reference is to an mr logically prior to the instant of utterance. In any case, I find that in all instances of felicitous definites, a referential frame is involved, and the putative definite nominal is the link to the frame, i.e. is of prior occurrence. This is what gives the intuition of familiarity.

However, I do not include this as part of the definition of definiteness: in the situation of a basic communicative act,  $(D,m,p,u)$ , it seems to me that the use of the frame is as the cognitive mechanism by which we 'cognize', as we have said, the mr of  $p$ , and the calculation of the discourse domain  $\text{dom}(p)$ . It is the fact that  $i(D(p))$  is equal to this domain that constitutes the essence of definiteness.

In fact, there is, as part of the cognizing of  $\text{mr}(p)$ , an intuition that when we use a definite nominal, 'the A', for example, we are referring to the set of entities satisfying the description A. 'I borrowed some books from the library last week. Now I want to return the books'. Or 'I bought a used car yesterday. The carburetor needs to be rebuilt'. This reference involves just the calculation of the domain,  $\text{dom}(p)$ , and yields the inclusivity property.

#### DEFINITION OF DEFINITENESS and INDEFINITENESS

Suppose that  $(D,m,u,p)$  is a basic communicative act in which the reference  $p \rightarrow D(p)$  is un-ambiguous and not a repetition for rhetorical effect. We will say that  $D(p)$  is referred to in a definite manner or that the reference  $p \rightarrow D(p)$  is definite if the speaker presupposes that the reference  $p \rightarrow D(p)$  is inclusive:  $i(D(p)) = \text{dom}(p)$ . The reference is indefinite if the presupposition is that it is exclusive, i.e. if  $i(D(p))$  is contained in but not equal to the domain  $\text{dom}(p)$ .

Typical examples of indefinites are of course utterances such as: 'There is a stone in my shoe', and 'I borrowed some books from the library'. The domain of 'a stone' is  $i(D(\text{stone}))$ , and this is equal to the set of all stones,  $\{\text{stone}\}$ . Then 'a stone' is a selection of one from this set. The reference is exclusive.

The domain of 'some books' is the set,  $B$ , of books in the library. 'some books' is a selection of a proper subset of  $B$ . The reference is exclusive.

We have shown above (section 4.5) that inclusive, unambiguous reference is unique, and conversely. It follows immediately then from our definition that an unambiguous reference is definite if and only if it is unique.

#### UNIQUENESS OF DEFINITE REFERENCE

Suppose that  $(D,m,u,p)$  is a basic communicative act in which the reference  $p \rightarrow D(p)$  is not a repetition for rhetorical effect, and is un-ambiguous. Then the reference is definite if and only if it is unique.

This result makes precise, and extends to a necessary condition, the idea of (Birner and Ward 1994) that uniqueness is a sufficient condition for definiteness.

6.3 The generally accepted 'definite nominals' include proper names, personal pronouns, possessive nominals, nominals with demonstrative determiners, nominals with 'the' as determiner, and generics and universally quantified nominals. This kind of classification is of course traditional, but I find it more satisfactory to think of the reference as definite, as we have defined it, rather than the nominal. We will not consider demonstratives here, nor generics. Also, we consider nominals with the universal quantifier and similar determiners as so-called 'parameterized' nominals (section 1.5); we can consider that they extend the notion of definite as defined here.

That pronominal reference, and more generally, anaphoric reference, when un-ambiguous, is definite is also clear: suppose, for example, that  $p$  is a pronoun, with antecedent,  $T$ , and suppose that the reference is un-ambiguous. Then if we denote the underlying entity of  $T$  also by  $T$ , we have  $\text{dom}(p) = (T)$ . Thus the reference is inclusive and therefore definite.

Similarly it is easy to see that the reference of possessive nominals and proper names, when unambiguous, is also definite.

The bulk of our illustrations here will consist of nominals of the form, 'det  $A$ ', with det either 'the', or a possessive determiner. Many examples of definites can be found among the illustrations of the different kinds of frames given above.

6.4 Now consider: 'Last week I borrowed some books from the library. Today I returned %~!@#\$ books'. Here  $p = '%~!@#$ books'$ ,  $A = 'books'$  and the determiner 'det', = '%~!@#\$', in 'det  $A$ ' has been obscured by noise, say. Let  $F$  denote the frame triggered by 'some books'. Then the domain of  $p$ ,  $\text{dom}(p) = i(F) \cap i(D(A))$ , is a certain set,  $s_0$ , of books. The determiner 'det' picks out a certain subset  $b_0$  of  $s_0$ . If 'det' = the, 'the' picks out the whole set  $s_0$  itself, and  $i(D(p)) = (s_0)$ . The reference is inclusive, and thus definite. If 'det' = 'some', it picks out a subset  $s_1$  of  $s_0$ ;  $i(D(p)) = (s_1)$ . The reference is exclusive, and indefinite.

#### THE MEANING OF THE DEFINITE DETERMINERS

Let  $(D, m, u, p)$  denote a basic communicative act, with reference  $p \rightarrow D(p)$ , un-ambiguous, for which  $p$  is not a repetition for rhetorical effect. Suppose that  $p = 'det A'$ ,  $A$  a common noun, and that 'det' is one of the definite determiners: 'the', a demonstrative, or possessive.<sup>46</sup> Then there is a presupposition that the reference  $p \rightarrow D(p)$  is definite, i.e. that the reference is inclusive,  $i(D(p)) = \text{dom}(p)$ .

#### THE MEANING OF THE INDEFINITE DETERMINERS

Let  $(D,m,u,p)$  denote a basic communicative act, with reference  $p \rightarrow D(p)$ , for which  $p$  is not a repetition for rhetorical effect. Suppose that  $p = \text{'det' } A$ ,  $A$  a common noun, and that 'det' is one of the indefinite determiners: 'a/an', 'some', 'any', 'several' 'most', 'many', 'few'.<sup>47</sup> Then there is a presupposition that the reference  $p \rightarrow D(p)$  is indefinite, i.e. that the reference is exclusive,  $i(D(p))$  is contained in but not equal to  $\text{dom}(p)$ .

6.5 We have said above that the familiarity idea of definite reference is due to the presence of frames. That is, in the known examples of definite reference, the cognizing of the pertinent nominal is accomplished by showing that it is the link to a referential frame. I am going to conjecture that this is a general property of definite reference.

#### CONJECTURE: PRIOR OCCURRENCE OF DEFINITE REFERENCE

Let  $(D,m,u,p)$  denote a basic communicative act, with reference  $p \rightarrow D(p)$ , for which  $p$  is not a repetition for rhetorical effect. Suppose that  $p \rightarrow D(p)$  is definite. Then it is of prior occurrence.

Now we have said above, in our discussion of the working of frames, that, given a referential frame,  $(F,T,p)$ , in a basic communicative act,  $(D,m,u,p)$ , the hearer will recognize  $D(p)$  to be an  $\text{mr}$  in  $F$ . Suppose that  $F$  is evoked, that is,  $T$  occurs, at an instant  $t'$  earlier than the instant,  $t$ , of utterance of  $p$ . Then since  $D(p)$  is easily activated, because of its membership in  $F$ , the speaker and hearer may treat  $D(p)$  as if it had been already activated at  $t'$ . Then they are treating  $D(p)$  as if it were in the ground of  $D$  at  $t$  (section 5.1).<sup>48</sup> The speaker and hearer presuppose that  $D(p)$  is in the ground. This presupposition must be evoked, as is required of all presuppositions, by some trigger, i.e. by some lexico-grammatical device in  $D$ , and I take it that this is the frame itself.

If  $F$  is evoked at the same instant,  $t'$ , as  $p$ , i.e. in the utterance,  $u$ , then the activation of  $D(p)$  in  $F$  takes place simultaneously with the evocation of  $F$ .  $D(p)$  can not therefore, technically, be in the ground at  $t'$ . The speaker may, however, as above, given a trigger, presuppose that the link is in the ground at  $t'$ .

Thus the prior occurrence of an  $\text{mr}$  (equivalent to the  $\text{mr}$  belonging to a frame) entails, it seems, that the  $\text{mr}$  is either in the ground, or can be presupposed to be in the ground. It would seem possible therefore to postulate, as our formalization of the 'familiarity' idea, and as a substitute for the requirement of prior occurrence, that there is a presupposition that the nominal is (or, is presupposed to be) in the ground of  $D$ . This conclusion is born out by the comment of Levinson, that 'the  $X$ ' is felicitous only when a salient element  $X$  of the common ground has been delivered up (Levinson 2000, p. 60). In other words it would seem possible to strengthen the conjecture to read:

"if  $p \rightarrow D(p)$  is definite, then  $D(p)$  is, or is presupposed to be, in the ground of  $D$ ".

I will not do this, however, but will stick with the 'weaker' notion of prior occurrence: the ease of activation of an *mr* in a frame, and the resulting cognitive ability of the speaker and hearer to presuppose that the *mr* is in the ground, need, I think, further investigation before we can confidently claim that all links to a frame can be presupposed to be in the ground.

6.6 Now I want to turn to a number of purported counterexamples to the classical notion of definiteness, i.e. to some examples which are formally definite, but, on the face of them, contradict either the familiarity requirement or the inclusiveness requirement. The reason why, I think, on the whole, the arguments for these are mistaken is that 1) they do not take into account what it is that the utterance means, and 2) they do not allow for the -pragmatic-possibility of the speaker making different presuppositions.

To begin with, consider the two examples (Birner and Ward 1994): 'In her talk, Baldwin introduced the notion that syntactic structure is derivable from pragmatic principles', and 'If you're going into the bedroom, would you mind bringing back the big bag of potato chips I left on the bed?'. Even though familiarity, suitably defined, is not part of our definition of definiteness, I want to include these two examples here, since it is claimed that they do not satisfy 'familiarity'. Ward and Birner's definition of 'familiar' is essentially 'evoked prior to the instant of utterance', and both examples fail to satisfy this condition, since 'the notion that...' and 'the big bag...' do not occur prior to the instant of utterance. However, our idea of 'familiarity' is 'logically prior occurrence', as defined at the end of section 5.6, and the definite nominals in both of these examples are of logically prior occurrence. I suggest that, although it is unnecessary for the verification of their definiteness, both these examples satisfy our extended form of 'familiarity'.

Another interesting example is given by (Abbott 2003, p. 3): 'The new curling center at MSU, which you probably haven't heard of, is the first of its kind'. Abbott claims that here any assumption that the addressee is familiar with the curling center is explicitly denied and yet the result is perfectly felicitous. She says if familiarity or givenness were a part of the conventional meaning of definite descriptions, this example should be anomalous but it is not.

On the contrary, I answer that we have here a presuppositional frame: presupposition = 'There is a new curling center at MSU'; assertion = 'it is the first of its kind'. We see that  $p$  = 'The new curling center at MSU' is of logically prior occurrence, and is thus 'familiar' in our sense.

Next, certain examples (Burton-Roberts, 1981) show that 'the' need not be a universal quantifier, i.e. 'the A is B' need not mean 'for all  $x$  in  $i(D(A))$ ,  $x$  is B', and are therefore supposed to contradict inclusivity. 'The spotlights are

shining in my eyes'; 'The clouds are hiding the moon'; 'There are cracks in the paving stones'; 'The chickens laid three eggs this morning'.

I would answer that as a group, the spotlights are shining in my eyes. The utterance does not mean, however, that each one of them is shining in my eyes. Similarly, the moon is hidden behind the clouds as a whole, and the chickens as a group laid a total of three eggs this morning. Also, it is not necessary that each paving stone be cracked; the sentence means that considering the set of paving stones as a whole, there are cracks in some of them.

Consider, for example, 'There are cracks in the paving stones'. This might follow, for instance, 'The old walkway is overgrown with weeds and moss'. 'The old walkway' is composed of a certain set,  $s_0$ , of paving stones, and triggers a frame, to which  $p =$  'the paving stones' is a link. It is clear that  $S(p) = i(D(p)) = s_0$ , so that the reference is inclusive.

The essential point in all of these is that the reference is to the domain, the totality of  $i(D(A))$ . The predications are collective and do not distribute to the elements of  $i(D(A))$ .

In other cases, 'the' may well be synonymous with a universal quantifier: 'The men took their pay and left' = 'for each  $x$  in  $M$ ,  $x$  took his pay and left',  $M$  some set of men. I have discussed these as instances of what I called 'parameterized' nominals, in section 1.5.

6.7 Now there are a number of examples in the literature of formally definite noun phrases which seem to contradict uniqueness, or, in my approach, un-ambiguity. The following examples are taken from (Abbott, 2001a). The grouping is mine. These examples are all definite, in accordance with our definition. They are all un-ambiguous, and hence unique, in spite of the surface appearances: the key to this is the computation of the domain,  $\text{dom}(p)$ ; and for this, the underlying referential frame is crucial. In each of the examples, the action of the discourse  $D$  on the nominal,  $p$ , in question, will show that the domain,  $\text{dom}(p)$ , is a singleton, i.e. that the reference is unique.

The novelty of my treatment of these examples lies in i) the use of presuppositional frames, and ii) that I suggest an explicit mechanism which implies the required uniqueness.

a) Generalized implicature: there is a generalized implicature in each of the following examples which entails uniqueness, within a given frame, of the formally definite nominal. The idea is that if it were not unique, the speaker would have indicated so. 'Towards evening we came to the bank of a river'; 'The boy scribbled on the living-room wall'; 'John was hit on the arm'; 'My eye hurts'; 'She lost her earring'.

In these cases if the speaker had wanted to refer to both banks of the river, more than one wall, both arms, both eyes, both earrings, he would have

done so: I take it that there is a presupposition that the reference is to just one of the items referred to.

The domain of  $p$  in these examples then consists of the single item in question, and  $p$  is the link: in 'My eye hurts',  $p = \text{'my eye'}$ ,  $\text{dom}(p) = (e_0)$ ,  $e_0$  one of the two eyes, and  $i(D(p)) = (e_0)$ .

Compare the use of the indefinite article: 'Towards evening we came to a bank of a river'. In this, the domain of  $p$  is the set of the two banks of the river, and  $D(p)$  means a selection of one of them.

I believe the following examples also fit this mold: 'Shut the door, please', 'Please hand me the glass'. If there were more than one door open, or more than one glass, the utterance would be technically ambiguous. The generalized implicature is that there is just one open door, just one glass, otherwise the speaker might have said 'Shut the doors, please', or 'Hand me one of those glasses'.

b) Presuppositional frame: the given utterance evokes a presupposition of prior existence of the formally definite nominal, which is then referred to anaphorically.

i) 'He was the son of a poor farmer': the presupposition is 'There was a poor farmer who had a son'. The assertion is 'He was the son'.

ii) 'The contestant gave the wrong answer and had to be disqualified': here the presupposition is 'The contestant gave an answer'. The assertion is 'The answer was wrong'.

iii) 'We went to the same party': the presupposition is 'Some of us went to one party, and some of us went to a second'. The assertion is 'The two parties were the same'.

iv) 'We ran into the anticipated/expected difficulties': the presupposition is 'We ran into difficulties', and the assertion is 'The difficulties were anticipated/expected'.

v) 'As we approached the house we saw a child looking out of the window': the presupposition is 'As we approached the house, we noticed a window'. The assertion is 'We saw a child looking out of it'.

Another interesting type of definite with a presuppositional frame is that of the literary device whereby a new entity is introduced at the beginning of a story: a) (Louis L'Amour, Last of the Breed) 'The soldier placed the flat, skin-wrapped package on the table before Colonel Zamatev and ...'; b) (William Diehl, Reign in Hell) 'The dusty RV wailed along the flat interstate...'; c) (Frederick Forsyth, Icon) 'It was the summer when the price of a small loaf of bread topped a million rubles'.

The presuppositions in these phrases are presentational: 'There was a soldier...', 'There was a dusty RV...', 'There was a summer...'. They are evoked by the presence of a new nominal in subject position.



fleet}, not relativising it to a frame; ii) I compute  $D(p)$  using only the aspects involved in the expression  $p$  itself; and iii) I equate  $g_0$  to 'the ship' of the first utterance. The necessity for this change is shown by examples like: 'I returned the book I borrowed. It was a book on atomic theory'. The frame,  $F$ , is evoked by 'the book I borrowed', and if we compute  $D(p)$ ,  $p =$  'a book on atomic theory', as usual, we would have  $D(p) = b_0/\text{book I borrowed}/$ ,  $b_0$  in the domain,  $\text{dom}(p)$ , and  $\text{dom}(p) = \{A\} \cap F = (b_0)$ . Thus  $i(D(p))$  would be equal to  $\text{dom}(p)$ , and the reference would be inclusive. This goes contrary to the intuitive sense of the predicate nominal, which is that  $p$  involves a 'new' aspect added on to an earlier interpretation. We see that what we need to do is to treat the aspect and underlying entity of the nominal as if they were completely 'new', and then after this, to identify the nominal with a preceding entity. Some examples will illustrate our treatment.

1) In 'A huge trailer truck overturned this afternoon on Rt. 1. The truck was a thirty foot tanker', Now  $p =$  'a thirty foot tanker' is a predicate nominal, and so we take the domain,  $\text{dom}(p)$ , of  $p$  to be  $\{A\} = \{\text{thirty foot tanker}\}$ , and the underlying entity  $u_0$  of  $p$  to be a selection of one element of  $\text{dom}(p)$ . The mental representation of  $p$  is  $u_0/\text{thirty foot tanker}/$ . The reference to  $D(p)$  is exclusive. The predication then gives the equality 'the truck' =  $u_0$ .

The equation of 'the truck' to  $u_0$  is lexico-grammatically evoked by the predication in the utterance. In subsequent references to the truck, then, we can use the fact that 'the truck' and  $u_0$  are the same.

A second example: 2) (Levinson 2000, p. 63) 'The ship broke up. A fine galleon of the Spanish fleet was irretrievably lost'. This is a nominal predication, in subject position. Here,  $D(\text{a fine galleon of the Spanish fleet}) = g_0/\text{fine/galleon/spanish fleet}/$ , where  $g_0$  is an element of the set  $\text{dom}(p) = \{A\} = \{\text{fine galleon of the Spanish fleet}\}$ . The predication gives  $g_0 = i(D(\text{the ship}))$ , 'the ship' previously mentioned.<sup>15</sup>

3) In 'Rockefeller was the richest of the old millionaires' the domain of  $p =$  'the richest of the old millionaires' is the set  $\{\text{richest of the old millionaires}\}$ , and this is the singleton set  $(r_0)$ ,  $r =$  the richest of the old millionaires.  $i(D(p))$  is equal to  $r_0$ , obviously; the reference is inclusive. The predication gives 'Rockefeller' =  $r_0$ .

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<sup>15</sup> (Levinson 2000, p. 63) Levinson says that the popular theory which has it that the indefinite requires the setting up of a new discourse referent is contradicted by this example, since we identify the ship and a fine galleon. He claims that the best explanation is given by GCI theory, viz. that a speaker using an indefinite will Q-implicate that the use of the definite would be misleading; thus a speaker who said 'the fine galleon of the spanish fleet' might be thought to be communicating that there was only one fine galleon in the spanish fleet, and wishing to avoid this inference would use the indefinite even though it is to be coidentified with the immediately preceding discourse referent.

4) 'It was the flagship of the Spanish fleet'. The domain  $\text{dom}(p)$  is the set  $(f_0)$ , where  $f_0$  is 'the flagship of the Spanish fleet'. Here we assume that the speaker presupposes that there is only one flagship. And  $i(D(p))$  is the same,  $(f_0)$ . The reference is inclusive. And the predication gives  $i(\text{the flagship of the Spanish fleet}) = i(\text{it})$ .

#### ANALYSIS OF NOMINAL PREDICATIONS.

Suppose that  $(D,m,u,p)$  denotes a basic communicative act, with un-ambiguous reference  $p \rightarrow D(p)$ . Suppose that  $p$  is a nominal predication, with the utterance  $u$  of the form 'X is p', for example, with  $X$  denoting the entity of which  $p$  is predicated. If  $p$  is a name, the domain  $\text{dom}(p)$  is the singleton set  $(p)$ . If  $p$  is a pronoun, the domain is the same as the domain of the antecedent of  $p$ . If  $p = \text{det } A$ , the domain is  $\{A\}$ . The equality ' $i(X) = i(D(p))$ ' is lexico-grammatically evoked by the predication.

7.2 Utterances of the type 'there is\_\_\_\_', 'there appeared\_\_\_\_' also contain a nominal in predicate position. They are not, of course, predications, but rather, 'presentations'. The intuitive idea is that the speaker is introducing or presenting the nominal and its underlying entity to the discourse. I treat the nominal as new, taking the domain to be  $\{A\}$ . There is no identification with a preceding nominal (unless the nominal is also a predicate nominal).

Thus, in 'there is a fly in my soup',  $p = \text{'a fly'}$ ,  $D(p) = f_0/\text{fly}$ , where  $f_0$  is an arbitrary element of the domain  $\text{dom}(p) = \{\text{fly}\}$ .

And in 'Jack and Jill went up the hill to fetch a pail of water. And after a little while, there appeared at the back door a pair of thoroughly drenched children...', with  $p = \text{'a pair of thoroughly drenched children'}$ , the domain is the set  $\text{dom}(p)$  of pairs of thoroughly drenched children, and  $i(D(p)) = p_0$ , one of these pairs. Notice that in this case  $p$  is also a nominalizing predicate: the pair  $p_0$  is lexicogrammatically identified with the set (Jack, Jill).

The post-verbal nominals in the following are definite (Abbott 2001a; p. 13); these examples are presuppositional, with the presupposition containing 'there' + indefinite, and with the assertion containing a nominal anaphoric to the indefinite.

a. 'There was the smell of pot all over the apartment' = 'There was a smell all over the apartment. It was of pot'.

b. 'There was the air of the successful businessman about him' = 'There was an air about him. It was of the successful businessman'.

c. 'There is the outline of a human face hidden in this puzzle' = 'There is an outline hidden in this puzzle. It is the outline of a human face'.

The following are also from (Abbott 1999; p. 5); the first is presuppositional, like the above, and the second is another example of repetition for rhetorical effect (see section 6.1).

d. 'What can we use to hold the door open? Well, there's the encyclopedia...' = 'There is something we can use to hold the door open. It's the encyclopedia'.

e. 'I think there was one flight where we had one problem. It wasn't ours, but there was that one flight' = 'There was a flight. It was that one'.

It is an open question whether all there-presentationals with post-verbal definite<sup>50</sup> are presuppositional of the type in a.-d):

Without getting into the information theoretic aspects of these presentational sentences (Lambrecht 1994, pp. 177ff)<sup>16</sup>, we can summarize the basic referential properties of presentational sentences with indefinite post-verbal nominal. I leave aside the case in which the post-verbal nominal is definite.

#### PRESENTATIONAL UTTERANCES

Let  $(D, m, u, p)$  denote a basic communicative act, with the reference  $p \rightarrow D(p)$  un-ambiguous. Suppose that  $u$  is a presentational utterance, of the form 'there is  $p$ ' or 'there appeared  $p$ ', with the post-verbal nominal indefinite. If  $p$  is a name, the domain  $\text{dom}(p)$  is the singleton set  $\{p\}$ . If  $p$  is a pronoun, the domain is the same as the domain of the antecedent of  $p$ . If  $p = \text{det } A$ , with indefinite determiner, the domain is  $\{A\}$ .

(Levinson 2000, p. 92) a) '9 has a positive square root', and b) 'France has a capital' are examples of presentational utterances composed of presuppositions and predicate nominals. The presupposition in a) is 'there is a number', and the assertion is: 'It is a positive square root of 9'. The presupposition in b) is: 'There is a city in France'. The assertion is: 'It is the capital city'.

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<sup>16</sup>

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The 'generalized conversational implicatures' of (Levinson 2000) can also be considered to be the result of D acting on p to give the preferred meaning of p. I will not explore this connection here.

The assumption that these mr's are mutually shared at the instant of conveyance of u is actually an assumption of psycho-linguistics- relating to the question of time lags in the conveying of mr's. We adopt here the simplest case: no time lag. See Chafe 1994, ch. 6. It is reasonable to assume that these time lags are small in comparison with the time involved in cognizing an utterance, and may then be taken to be zero.

I will generally use the word 'utterance' in this paper, rather than the word 'sentence', in order to suggest 'real' speech instead of 'syntactic' text. I will also assume that utterances  $u$  are divided into intonation units (Chafe 1994; chapter 5). Intonation units require a certain finite amount of time for their conveyance. The expression  $p$  will be conveyed to the hearer as part of one of the intonation units making up  $u$ .

A referee states, referring to Akmajian et al, 1995, that the model of communication I use is essentially the "message" theory of communication. This is mistaken: My model of communication is not the 'message model' in the form presented in Akmajian, and in Wilson (Linguistic Structure and Inferential Communication, in Caron, Bernard (Ed.) (1998) Proceedings of the 16th International Congress of Linguists (Paris, 20-25 July 1997)., Oxford: Elsevier Sciences). The 'message' or 'coding' model presented in these two references is rather primitive; it uses notions of encoding and decoding which are obviously not suited to the requirements of 'real' communication. On the contrary, my model is as stipulated in the Basic Communicative Act (section 1.11), and gives an enriched, expanded version of a 'coding' or 'message' model, which takes into account the ambient discourse, including the contextual situation. The mechanisms considered by Akmajian and Wilson to be required for the proper communication of the speaker's intention, dealing with disambiguation, under determination of reference and communicative intent, the problems of non-literal and indirect speech and the problem of non-communicative speech acts, are provided for in my model, albeit implicitly, by the use of the action,  $D(p)$ .

Of course, I have restricted myself in this paper to the mental representations of nominal phrases. As I have stated, I believe the theory extends to utterances in general, but I do not attempt that extension here. If we can carry out this extension, we will have, I think, a reasonably accurate account of 'real' communication..

'Europe is a continent' or 'February usually has 28 days' are certainly general knowledge and are shared, no doubt, by the participants, but will not be in the discourse or relevant to the communication unless they are explicitly grammatically evoked.

This does not include knowledge which one partner to the communication may have about the other, but which is not shared by both. A referee suggests, to the contrary, that knowledge about a communication partner should be included as well: "Take the example "I want a book about atomic theory". Presenting a book about Democritus' physics would usually not be appropriate. Ordinarily, the Librarian would thus assume that the request asks for a book about *modern* atomic theory. If however, the librarian knows that the request is made by someone interested in ancient history, she may be justified to present a book about Democritus or to ask in return whether a book of ancient atomic theory would also be of interest." I would answer that even if the Librarian is justified in assuming that the one making the request is interested in a particular version of atomic theory, say ancient atomic theory, the Librarian, with no other indication of this fact, cannot proceed felicitously as if that were the case. The reason is that there has been no lexico-grammatical triggering of this knowledge in the discourse. See also Note 27.

A rather simple example of an utterance which is not coherent with a given discourse is the following:  $D$ : 'Speaking of John and Mary, which one is older?'  $u$ : 'Peter is.' Here  $u$  is not coherent with  $D$ : there is no  $v$  in  $D$  which together with  $u$ , allows us to infer a 'parallel' relation (Kehler 2002, p. 16).

See the Principle on Existence of Discourse Entities, below.

Evidently, an idea in one person's mind cannot be physically equal to an idea in another person's mind. My use of the equals sign here is meant to signify a certain relation of cognitive equivalence between the minds of speaker and hearer: I assume that speaker and hearer are each possessed of the 'same', idealized, human mind,  $M = M_{\text{speaker}} = M_{\text{hearer}}$ , and that to each class of synonymous expressions,  $p$ , there corresponds a unique  $mr$ ,  $mr(p)$ , in  $M$

I am using the same notation for the sense,  $e_1/asp_1$ , and its mental representation  $mr(e_1/asp_1)$ .

On the surface, it seems that not all pronouns have antecedents. The 'his' in 'Everyone loves his mother', for example. But the utterance is parameterized: for 'all  $x$  in {man},  $x$  loves his( $x$ ) mother( $x$ )', and then the antecedent of his( $x$ ) is  $x$ . See also my remark immediately preceding section 4.2.

We will not be concerned here with expressions which seem to denote 'impossible' things. There are such expressions, for example, 'the largest natural number'. In the standard theory of natural numbers, the assumption that this expression

denotes something, viz. that there is a largest natural number, leads to a contradiction. Again, it is well known that the expression 'the set of all sets' does not denote an existing set. These cannot, therefore, be considered to be valid expressions. We will make the blanket assumption that an expression which embodies a contradiction of some sort is not a valid member of our underlying syntactic system.

See below, section 1.10, for more detail and examples of the working of determiners.

'The lion is a friendly beast', and 'The Indian is a noble savage' are two good examples. Here 'the lion' and 'the Indian' do not refer to a particular, specific lion or Indian. They refer to the 'generic' lion or Indian. Accordingly I will assume that there is such a thing as the 'generic individual', occurring side by side with the 'normal', i.e. particular or specific, individuals in the semantics. The specific individuals underlying common nouns, A, are the elements of the set  $S = \{\text{all } A\text{'s}\}$ . The generic individual associated to A is not an element of S, but is uniquely associated to it. The semantics could then be extended as follows: Let D denote a discourse, and A a common noun in D, with underlying set S,  $S = \{\text{all } A\text{'s}\}$ . There is an individual in our semantics, denoted by ' $A^g$ ', not an element of S, called the generic individual of S. We assume that  $A^g$  is unique, given A. I will not consider this extension further here.

The variable symbol, 'x', in 'x loves his mother' is also an expression, and I take it that the theory is extended to include this kind of expression. Specifically, in 'Every man loves his mother' = 'for each x in {man}, x loves his mother', the mental representation of the variable symbol 'x' is x/element of {man}/, and the underlying entity is x.

I use the term 'situation' in its entirely intuitive sense of the circumstances, time, place, attitude,... etc., surrounding an utterance. A discourse, D, takes place within a certain situation, S. Expressions, which, in a given D have underlying entities, will have underlying roles, when considered as functions defined on situations, S.

In some analyses, the underlying entity is taken to be a 'kind'. In 'What kind of animals do you like? I like dogs', for example, the phrase 'dogs' may be construed to mean the kind of animals I like. I consider this as a kind of generic expression, and leave its consideration aside.

I anticipate the definition, which is given in section 3.2: If p is an expression in an utterance, u, u is said to be an individualizing environment of p if there exists a presupposition that the underlying entity is a semantic individual. The utterance u is a non-individualizing environment of p if there does not exist such a presupposition. The opaque and modal environments are non-individualizing (Givon 1984).

This is also an example of what we have called before the 'consequential and' adapted to conditionals. See section 1.9, and note 24.

This usage is different from that encountered in mathematics, where one says 'Let S denote a set, and let x denote an arbitrary element of S'. The latter means: let x denote a particular element of S, arbitrarily chosen.

I formalize this reasoning as follows: let E denote the set of individuals in our semantics, and let S denote any subset of E. Denote the characteristic function of S by f: for x in E,  $f(x) = 1$ , if x is in S, and  $f(x) = 0$ , if x is not. There is a corresponding equivalence relation, defined by  $x = y$  modulo S, if  $f(x) = f(y)$ , for all x, y in E. It is clear that this models the idea that if two individuals x, y both belong to S, then they are 'equal relative to S', or 'equal qua element of S'.

Of course if there is an explicit indication, a presupposition of individuality, there could be an individual involved. I would suggest that in a coherent discourse, the ambiguity would be resolved one way or the other.

Parenthetically I point out here that if m is one of the meanings evoked by p in D, this need not literally 'satisfy' the description in p. I have in mind the well-known example 'The ham sandwich is sitting at table 20' (in Brown and Yule 1983, p. 213). Here p = 'the ham sandwich' and its mr, m, in this discourse, is that of a certain individual sitting at table 20. The meaning of p here is m. In the context of restaurant orders, 'the ham sandwich' is a certain encoding of the individual at table 20. Another example: 'My other ride is a Harley'. Here the noun 'ride' means the underlying motorbike,  $D(\text{my other ride}) = \text{motorbike/ride/Harley}$ .

For 'consequential and' constructions see (Riley 1999; pp. 206-207).

The notion of 'frame' will be defined in section 5.3. There is no circularity involved here since the definition of 'frame' does not use the notion of 'domain'.

Cf. the notion of 'P-set' in (Hawkins 1991).

A referee remarks: "[The author] says: 'If the speaker has in mind a certain student, and does not indicate this lexico-grammatically, then his knowledge is irrelevant for the communication...' But that is not so. If an addressee assumes the specific reading of the sentence is intended, it makes sense to ask which student is it?. But not if the nonspecific reading is assumed." What I mean to say here is that if a speaker, in a particular communication, assumes in his own mind that there is a certain individual involved, but does not lexico-grammatically indicate this to the hearer, then the hearer cannot presuppose that such an individual exists. The lack, in the discourse, of the speaker's lexico-grammatical indication for such a presupposition means that the hearer also lacks such lexico-grammatical indication. In this case, the hearer could not make such a presupposition, and could not felicitously ask 'What student is it?'

More generally, an assumption on the hearer's part about the speaker's intention is not automatically part of the communication. The hearer might assume that the speaker was angry with him for some reason, but that doesn't mean that the anger was part of the communication. It has to be lexico-grammatically evoked in the discourse, conveyed by the speaker, and shared by the hearer. In fact, even shared knowledge, of a more general kind, as for example the sun rises in the east, or  $2 + 2 = 4$ , is not part of D unless it is explicitly evoked lexico-grammatically in D. This follows from the Principle on Lexicographic Closure: the only  $mr$ 's in D, and the only presuppositions, are the shared ones.

The meaning of the indefinite determiners is given in section 6.4.

I discuss this example again in the next section.

As above, Note 27.

A more complete discussion of the Fodor-Sag theory, and of the putative quantitative/referential distinction in general must be left aside here.

(Givon 1973) uses the terminology 'referential/non-referential' in connection with what I have called here 'individualizing/non-individualizing' environments. He equates the latter to the non-opaque/opaque environments, and gives a thorough discussion of these.

For this notation see the definition of reference in section 4.1.

A brand of bicycle.

The equation, in a's mind, of the individual underlying 'over there' and the individual underlying 'having the name Jones', is lexico-grammatically indicated by a's phrase 'there's Jones'.

See note 3.

The notion of ground is a discourse one and is similar to other notions of 'ground' or 'common ground' found in the literature (see for example, Vallduvi and Engdahl 1996 and Vallduvi 1993). Here my definition is for the nominal elements of the ground. The importance of these ground elements lies in two facts, i) that they may be coded with pronouns (Riley 2000, pp. 150ff): Let (D,m,u,p,t) denote a basic communicative act. If p is a pronoun, then (the presupposition is that) m is in the ground. Conversely, if m is in the ground at t, then p is, in the unmarked case, a pronoun; and ii) that it is, conjecturally, a necessary condition for definiteness (section 6.5).

It doesn't matter if we take the defining elements of a frame, F, to be common nouns or determiner expressions since, by our Assumption on Closure,  $mr(\det A)$  is in F if and only if  $mr(A)$  is in F.

It seems as though, in general, p, together with the trigger, plays a part in evoking the frame. This requires further investigation.

For a more detailed discussion of these situations, see the excellent exposition in (Hawkins 1978). The idea of the presuppositional frame is new.

In a more comprehensive presentation, I would define a new discourse element, the 'situation' of the discourse, 'immediate' and 'larger', and then take this situation to contain the trigger of a frame containing the mr of the link. See note 16.

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The job I want could here be construed as a role, assigning an expression to each of my life situations.

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See (Keenan 1996) for a detailed list of the definite determiners.

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Called 'proprietary' by (Abbott 2001a). It may be that these too are presuppositional.

(Levinson 2000, p. 63) Levinson says that the popular theory which has it that the indefinite requires the setting up of a new discourse referent is contradicted by this example, since we identify the ship and a fine galleon. He claims that the best explanation is given by GCI theory, viz. that a speaker using an indefinite will Q-implicate that the use of the definite would be misleading; thus a speaker who said 'the fine galleon of the spanish fleet' might be thought to be communicating that there was only one fine galleon in the spanish fleet, and wishing to avoid this inference would use the indefinite even though it is to be coidentified with the immediately preceding discourse referent.

and not a repetition for rhetorical effect.

The most important of which is the fact that the post verbal nominal is the focus of the utterance (Lambrecht 1994, ch. 5).

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<sup>3</sup> I will generally use the word 'utterance' in this paper, rather than the word 'sentence', in order to suggest 'real' speech instead of 'syntactic' text. I will also assume that utterances *u* are divided into intonation units (Chafe 1994; chapter 5). Intonation units require a certain finite amount of time for their conveyance. The expression *p* will be conveyed to the hearer as part of one of the intonation units making up *u*.

<sup>15</sup> The variable symbol, 'x', in 'x loves his mother' is also an expression, and I take it that the theory is extended to include this kind of expression. Specifically, in 'Every man loves his mother' = 'for each *x* in {man}, *x* loves his mother', the mental representation of the variable symbol 'x' is *x*/element of {man}/, and the underlying entity is *x*.

<sup>16</sup> I use the term 'situation' in its entirely intuitive sense of the circumstances, time, place, attitude,... etc., surrounding an utterance. A discourse, *D*, takes place within a certain situation, *S*. Expressions, which, in a given *D* have underlying entities, will have underlying roles, when considered as functions defined on situations, *S*.

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<sup>17</sup> In some analyses, the underlying entity is taken to be a 'kind'. In 'What kind of animals do you like? I like dogs', for example, the phrase 'dogs' may be construed to mean the kind of animals I like. I consider this as a kind of generic expression, and leave its consideration aside.

<sup>18</sup> I anticipate the definition, which is given in section 3.2: If  $p$  is an expression in an utterance,  $u$ ,  $u$  is said to be an individualizing environment of  $p$  if there exists a presupposition that the underlying entity is a semantic individual. The utterance  $u$  is a non-individualizing environment of  $p$  if there does not exist such a presupposition. The opaque and modal environments are non-individualizing (Givon 1984).

<sup>19</sup> This is also an example of what we have called before the 'consequential and' adapted to conditionals. See section 1.9, and note 24.

<sup>20</sup> This usage is different from that encountered in mathematics, where one says 'Let  $S$  denote a set, and let  $x$  denote an arbitrary element of  $S$ '. The latter means: let  $x$  denote a particular element of  $S$ , arbitrarily chosen.

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<sup>27</sup> A referee remarks: "[The author] says: 'If the speaker has in mind a certain student, and does not indicate this lexico-grammatically, then his knowledge is irrelevant for the communication...' But that is not so. If an addressee assumes the specific reading of the sentence is intended, it makes sense to ask which student is it?. But not if the nonspecific reading is assumed." What I mean to say here is that if a speaker, in a particular communication, assumes in his own mind that there is a certain individual involved, but does not lexico-grammatically indicate this to the hearer, then the hearer cannot presuppose that such an individual exists. The lack, in the discourse, of the speaker's lexico-grammatical indication for such a presupposition means that the hearer also lacks such lexico-grammatical indication. In this case, the hearer could not make such a presupposition, and could not felicitously ask 'What student is it?'

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