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ɛmbɔ́sì Definiteness: A Pragmatic Approach

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Abstract

This contribution examines the pragmatic approaches of definiteness in ɛmbɔ́sì language. The analysis reveals that ɛmbsì definiteness interacts with the pragmatic principles of familiarity as regards the second mention of the entity in the discourse, and identifiability with the hearer ability to uniquely identify the entity. In addition, the study shows that the contextual use of ɛmbɔ́sì definite description is subject of different functions. It refers to anaphora or situational reference, including the immediate and larger situations. ɛmbɔ́sì definiteness also plays the role function and, used with a post nominal demonstrative, it expresses the discourse prominence.

1. Introduction

ɛmbɔ́sì is a Bantu language spoken in the northern part of the Republic of Congo, specifically in the department of Cuvette and a part of the department of Plateaux. Guthrie (1953) tabled it in the group C20 and is classified as C25 language. It has five dialects among which *ɛmbɔ́sì strictly speaking* which this study is based on. The work broaches the pragmatic aspects of definiteness in this language. It is motivated by both the analysis of pragmatic features of definiteness in a language without an article system and the promotion as well as the documentation of ɛmbɔ́sì. The contribution focuses on the different contextual uses of definite descriptions and addresses the following questions: 1) How do ɛmbɔ́sì definite descriptions interact with pragmatic principles to generate different interpretations? 2) To what extent the implicature of ɛmbɔ́sì definite description is prominent in the understanding of the discourse? The definiteness theories of familiarity and identifiability are used to carry out this study.

2. Theoretical Background on ɛmbɔ́sì Language and Definiteness

2.1. ɛmbɔ́sì Language

ɛmbɔ́sì is a Bantu language spoken in the northern part of the Republic of Congo. It has five dialects: Mboko, Akwa, Ngare, Koyo and ɛmbɔ́sì strictly speaking, which itself has different subdialects among which Oléé which this research work is based on (Itoua, 2007: p. 20). The classification of ɛmbɔ́sì language, as for many other Bantu languages, depends on Guthrie's (1953) work on Bantu languages. It is worthwhile specifying that ɛmbɔ́sì is simultaneously the name of the group C20 and the name of one of its languages classified as C25 and distinguished in this work by *ɛmbɔ́sì strictly speaking*.

However, there is a disagreement among researchers on ɛmbɔ́sì language about the distinction between this language and/or its dialects. ɛmbɔ́sì C25, according to Guthrie, is a language different from Mboko, Akwa, Ngare, Koyo Likwala and Likuba which are themselves considered as languages. What is accepted by almost all researchers on ɛmbɔ́sì language is the recognition that ɛmbɔ́sì C25 is different from Likwala and Likuba. But there are two main viewpoints about the distinction between ɛmbɔ́sì language and its dialects.

Indeed, some researchers such as Ollasa (1969), Kouarata (2001), Apondza Ngombe (2003) and others, guided by Guthrie classification, think that ɛmbɔ́sì language is different from Mboko, Akwa, Ngare and Koyo that they consider as different languages. However, Obenga (1976), Ndongo Ibara (2000), Itoua (2007) claim that Mboko, Akwa, Ngare and Koyo are not different languages from ɛmbɔ́sì, they are rather its dialects. As far as Kiba Ngapoula (2020: p. 79) is concerned, "Guthrie classification of languages of group C20 should be concerned with three languages: ɛmbɔ́sì, Likwala and Lukuba." Following Obenga and others, he thinks that Mboko, Akwa, Ngare and Koyo are in fact dialects of ɛmbɔ́sì C25.

Thus, ɛmbɔ́sì, Likwala and Likuba are different languages despite the fact that they have the same linguistic origin. Thus, Mboko, Akwa, Ngare and Koyo are just varieties of ɛmbɔ́sì language. In this perspective, Kiba Ngapoula (2016: p. 30) claims that "speakers of Mboko, Akwa, Ngare, Koyo and ɛmbɔ́sì strictly speaking that we all consider here as dialects of ɛmbɔ́sì C25 language do not require interpreters to understand each other".

However, ɛmbɔ́sì strictly speaking, has ten different subdialects: Mbonzi, Bonyala, Bokwele, Eboyi, Obaa, Tsambitso, *Olee*, Ondinga, Ngae and Ngilima. These subdialects refer to different geographical areas where these different speakers live. Within ɛmbɔ́sì language, this work focuses on the pragmatic aspects of definiteness.

2.2. The Definiteness

The definiteness is understood as the central referential property of the noun phrases. This term is mostly assimilated with the expression definite description.

Cruse (2006: pp. 42-43) asserts that "this term usually denotes a noun phrase which refers to a definite entity or group of entities, and which contains descriptive information necessary to identify the entity". This means that definiteness refers to specific entities which contain information that enables their identification.

As far as Brown (1973) is concerned, definiteness refers to something specific, that is, known to both participants. Thus, definiteness is based on the presuppositional information, the shared knowledge the participants have about a given referent. Indeed, the speaker, using the definite description hopes not only the referent to be known to the hearer, but also hopes this referent to be identifiable to him. When the speaker uses the definite description, he is able to pick out an individual, to distinguish it, as Lyons (1999) would say, from all other individuals in the universe of discourse.

Otherwise, talking about the relationship between demonstratives and definiteness in ɛmbɔ́sì, Kiba Ngapoula (2019: p. 122) claims that "in ɛmbɔ́sì, a Bantu language without article system, demonstratives are the main determiners which are used to express definiteness." However, the pragmatic analysis of definite descriptions is well tackled through definiteness theories of familiarity and identifiability.

2.2.1. Familiarity

The theory of familiarity usually traced to Christophersen (1939), considers that the successful use of the definite description only requires that the referent has already been introduced into the discourse. This first introduction makes the referent familiar to the participants, considering it as a shared knowledge for them. According to him (Christophersen, 1939: p. 72), "the definite article brings the referent about that to the meaning or idea of the word is attached a certain association with previous acquired knowledge". In addition, Heim (1983: p. 164) thinks that the definite description is used when the referent is familiar at the current stage of the discourse. Thus, familiarity establishes the relationship between the indefiniteness and definiteness. The sentence below illustrates this argumentation:

1) ɔmbíàlé ɔ́pɔ́ɔ́ Òyéé   mbóà yà bísì, ɔmbíàlé wàmɛ́ àbérì mwánà yà wà yà ìbàà

notable one he-come village of we, notable that   he-bring child of him of man

"A notable came at our village, that notable brought his son."

This amounts to saying that ɔmbíàlé ɔ́pɔ́ɔ́ "a notable" is an indefinite description which indicates the first mention of the referred entity. Once introduced, it becomes member of the participants shared knowledge. Thus, in the second part of the utterance, the same entity is made definite by its association with the demonstrative wàmɛ́ "that". Hence, the definite description ɔmbíàlé wàmɛ́ "that notable" is now familiar to both participants, because it has previously been in-

troduced in the same utterance. It refers to the same notable who came at the speaker's village. The difference between the indefinite description and definite description in terms of novelty and familiarity is very clear in the following examples:

2) Ìbárà   àtóngì   kásà   ìpɔ́ɔ́   ìnɛ́
   Ibara   he-build   basket   one   big
   "Ibara built a big basket."

3) Ìbárà   àtóngì   kásà   là   ìnɛ́   dì
   Ibara   he-build   basket   of   big   this
   "Ibara built this big basket."

In 2), the indefinite description kásà ìpɔ́ɔ́ ìnɛ́ "a big basket", the referent does not belong to the participants' background knowledge. With this noun, the sender may be acquainted with the referred entity, but the receiver certainly not. In contrast, in 3), the definite description kásà là ìnɛ́ dì "this big basket", the referred entity is specific, then familiar. After being member of the participants' background knowledge, the entity can then be identifiable.

2.2.2. Identifiability

The successful use of the definite description requires the referent "to be uniquely identifiable to the hearer" (Birner & Ward, 1994: p. 93). It is obvious that for the referent to be identifiable, it must be unique, that is, the only entity of this kind within the discourse pattern. For Kadmon (1990: p. 274), "the definite noun phrases refer to the unique set which is the maximal collection of things which fit their descriptive content".

In addition, Chafe (1976: p. 30) claims that the concept of identifiability has to be preferred to the concept familiarity. The difference between them is that the hearer may not necessarily know the referred entity, but the definite description signals that the participants are in the position to identify it. This is illustrated by the sentence below:

4) Mwánà   yà   ìbàà   wó   àdì   là   àyɛ́lí
   Child   of   man   this   he-be   of   intelligence
   "This boy is intelligent."

The definite description mwánà yà ìbàà wó "this boy" is uniquely identifiable. It is unique because the referred entity is the only intelligent boy in that discourse context. So, the hearer is in the position to identify this unique boy who is in their visual situation. However, in the case of associative use of definite description, the theory of identifiability may collapse. Let us examine the following sentence:

5) Ìbárà   àtóngì   ngà   kásà,   màmbì   àdí   àlá   àlà
   Ibara   he-build   me   basket, shoulder straps   are   long   long
   "Ibara built a basket for me, the shoulder straps are very long."

Indeed, despite the lack of first mention for the noun phrase màmbì "shoulder straps" in this utterance, it is definite by its association with the indefinite description kásà "a basket". It is well known that this kind of Mbɔ́sì basket always has shoulder straps, so the connection between kásà "a basket" and màmbì "shoulder straps" is obvious. Thus, the hearer presupposes that every kásà "a basket" has màmbì "shoulder straps", even if he is not in the position to identify them. Identifiability and familiarity are therefore close theories, since for an entity to be identifiable, the hearer has to be, at one point, familiar with. However, ɛmbɔ́sì definiteness has different functions.

3. Functions of ɛmbɔ́sì Definite Description

3.1. Contextual Reference

The use of the definiteness presupposes the existence of a known and/or identifiable referent in a discourse. The identification of the reference by the participants depends on the context of the discourse. Accordingly, Birner and Ward (1994) think that what is required, for the successful use of the definite description, is that the speaker has to think that the hearer is in the position of being capable of distinguishing the target reference from all other references within the discourse. The contextual reference is well understood through its key factor which is anaphora.

Anaphora

The recognition of the reference depends on the linguistic context. When a reference of a definite description refers back to an antecedent previously introduced in a discourse, this reference is said to be anaphoric. More precisely, when this relationship between the antecedent and the definite description is direct, it refers to direct anaphoric reference. The following example illustrates it:

6) Mwánà yà   bòlà   à   wà   àsóbì   búnù; búnù   bùánɛ́ òdì
   mièngè   kò.
   Child of sister/brother of he he-buy machete; machete   that   it-be
   sharp   not
   "His nephew/niece bought a machete; that machete is not sharp."

Indeed, the understanding of the definite description búnù bùánɛ́ "that machete" depends on the indefinite noun phrase búnù "a machete" introduced previously in the first part of the utterance. The indefinite description first mentions the referred entity, making it contextually known to the participants, and therefore paving the way for the definiteness. Furthermore, the indefinite noun phrase búnù "a machete", introduced previously in the utterance is the antecedent and the definite description búnù bùánɛ́ "that machete", directly derived from it, is qualified to be a direct anaphoric reference (Ngapoula, 2020: p. 271).

In addition, the second part of 6) supplies the referred entity in a direct way, what Jespersen (1949) describes as *explicit contextual basis*. The speaker using the definite description must take into consideration the fact that the referred

entity must be part of their shared background knowledge in order to help the hearer to clearly identify the reference, what Hawkins (1978) calls *hearer orientation*.

However, the anaphoric reference can also be indirect, when the definite description is not directly derived from the antecedent. The definite reference is of course associated with the first mentioned entity, but not directly. It refers to *implicit contextual basis* in Jespersen's terms. This is illustrated by the example below:

7) Mwánà yà bíní àwénà òtóngà ndáí ò mbóà yà bísì; mùándzá sàà òsíà kò.
   Child of you he-build house in village of we, roof yet it-finish not
   "Your child is building a house in our village; the roof is not finished yet."

In fact, in (7), there is no first introduction of the definite description mùándzá "the roof", it does not have an antecedent. Nonetheless, it is known that a house always has a roof, this information is stored in our background knowledge. When the speaker talks about mùándzá "the roof", the hearer has no difficulty to identify it, since he knows that mùándzá "the roof" is an associate of ndáí "a house". The indefinite noun phrase ndáí "a house" becomes now part of the hearer knowledge and mùándzá "the roof" an indirect or associative anaphoric reference. However, reference is always in a situation.

3.2. Situational Reference

Definite description may have the function of situational reference. It is important to specify that the noun phrase here, is definite despite the lack of first mention in the discourse. Then, two types of situational references are distinguished: the immediate and the larger situations.

3.2.1. Immediate Situation

It is referred to when the identification of the referred entity does not depend on the previous introduction of the reference in the discourse, but it rather depends on its visible situation. Neither the presupposition nor the participant's background knowledge is required here, the entity is simply visible. The following examples highlight it:

8) Léésà ngà ìbàà.
   Pass me knife
   "Pass me the knife."
9) Kòβá ngà èwómbò yíngì.
   Take me broom this
   "Take this broom for me."

The identification of the definite reference in these examples does not require

the previous introduction of the different noun phrases. In 8), the hearer understands that the entity being referred is just in his immediate visual situation. The only effort he does, is just to look around and identify where ìbàà "the knife" is and then pass it to the speaker. The hearer does not need to know the previous existence of a specific ìbàà "the knife", or he does not require being familiar with it in order to recognize or identify it.

In addition, in 9), the definite description èwómbò yíngì "this broom" is identified by the hearer who does not need this noun phrase to be first introduced in the discourse. The immediate visual situation is sufficient for the hearer. For Kiba Ngapoula (2020: p. 274), he has just to look around him, in order to find èwómbò yíngì "this broom" which is referred to. However, in a communication act, the understanding of each other is not considered for granted. The participants need not to flout maxims of communication (Grice, 1975). Effective communication mainly requires cooperation or joint effort between participants in order to understand each other. The hearer, in 9), may negotiate with the speaker to clearly identify the referred entity. He may ask such a question:

10) èwómbò yàmέ   èdì   màlá   pé?
    Broom   that   it -be   around   where
    "Where is that broom?"

11) èdì   ɔ   ngɔngɔ   yà   nɔ
    be-it   at   behind   of   you
    "It is behind you."

So, negotiation between participants will help the hearer to clearly identify the entity being referred, that is, the broom which is just behind him. The definite description depicted as situational reference does not only depend on the immediate situation, the referent can also be identified in a larger situational context.

3.2.2. Larger Situation

Let us consider the context of the following utterance:

12) Òkóndzì   yà   mbóà[1]   àdzùá   póró   ìbìéngì.
    Chief   of   village   he-go   Europe   tomorrow
    "The president is going to Europe tomorrow."

Indeed, the reference of Òkóndzì yà mbóà "the president" is identified due to the wider knowledge of the participants. The identity of this president depends on the environmental or outside context, or on the participants country. If this communication happens now in Congo, the reference of this president is the president of the republic of Congo, that is, Denis Sassou Nguesso. The hearer has no difficulties to clearly identify the reference of that individual even if both participants do not personally know him.

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[1]mbóà used in the context of the village, then òkóndzì yà mbóà is understood as "the chief of the village", but in the context of country "òkílì", òkóndzì yà mbóà is understood as the president of the country.

However, the situation is different if the same speaker is talking to someone from Gabon for instance. At that time, negotiation is required for the hearer to distinguish which Òkóndzì yà mbóà "the president" is about. If it is the president of Gabon, then the reference will no longer be Denis Sassou Nguesso, but rather Ali Bongo Ondimba (Ngapoula, 2020: p. 276). The definite description may also be discourse prominent.

3.3. The Discourse Prominence of ɛmbɔ́sì Definite Description Associated with a Demonstrative

As far as discourse prominence is concerned, the understanding of the referred entity depends on the hearer capacity to identify it as the main topic, and to the fact that it will play a prominent role in the next part of the conversation. So, after this first mention of the entity, there is no representation that can be derived from the memory or background knowledge. Accordingly, Epstein (2002: p. 356) claims that:

> A definite description referring to a discourse prominent entity differs from an indefinite description insofar as the definite helps create the immediate expectation on the part of the addressee that the speaker is likely to continue talking about the entity. In accordance with this expectation, the addressee constructs the discourse referent under the guise of a highly prominent entity.

It comes out from the above quotation that the distinction between the definite and indefinite descriptions is that by definite description, the receiver excepts for the sender the continuation of the topic in the subsequent part of the discourse. Thus, the sender relies on the receiver capacity to appeal the different kinds of background knowledge, that is, the semantic and pragmatic knowledge in order to be able to infer how prominent the entity being referred is. So, for the prominent referred entity to be accessible, it does not depend on the information stored in the receiver's memory, but rather on the retrieval background information or short-term memory in order to be understood.

Indeed, the definite description in ɛmbɔ́sì may be prominent when it plays a crucial role in the next part of the discourse. It is associated with a demonstrative in a pre-nominal position. The discourse prominence is then introduced by the use of a pre nominal demonstrative in order to attract the hearer's attention on the referred entity. This entity is going to be the prominent topic in the larger part of the discourse.

As far as the position of demonstratives in ɛmbɔ́sì is concerned, Kiba Ngapoula (2016: p. 41), following Ndongo Ibara (2012), claims that they are generally post nominal, that is, they occur after the noun they determine. When the speaker wants to emphasize on the noun it determines, the demonstrative is placed before the noun, and therefore this definite description becomes highly prominent in the next part of the discourse.

Furthermore, Bedrosian (1996: p. 33) says that in order to further distinguish

and emphasize a noun, the same demonstrative morpheme is placed before the noun. She provides the following example to illustrate this argumentation:

13) Mórò   wó
Person   this
"This person"
Wó mórò
This person
"This person".

Indeed, the definite description is used with the demonstrative in a pre-nominal position in the second part of 13) to indicate that the speaker performs the reference as the prominent member of some category. Instead of saying for instance:

14) Mórò   wó   àdí   là   mbɔngɔ
Person   this   he-be   of   money
"This person has money."

The speaker, to express the emphatic use of the definite description, may say:

15) Wó   mórò   àdí   là   mbɔngɔ
This   person   he-be   of   money
"This person has money."

So, in the subsequent part of the discourse, the person with money will be the main topic of the conversation. With the prominence discourse, the demonstrative is used to first introduce the entity which is then going to be the major topic of the text. Let us illustrate with the following conversation:

16) Wúngú   òyírì   tí   àdí   là   ɔnɔɔ.
That   woman   thus   she-be   of   mouth
"That woman is very talkative."
òyírì   yà   pé?
Woman   of   where
"Which woman?"
Yà   èdíí   àtsósàà   òmbíyá   yà   nɔ   Ìtúà.
Who   prog   she-insult   friend   of   you   Itoua
"The one who is insulting your friend Itoua."

This amounts to saying that the first introduction of the reference is made with the definite description wúngú òyírì "that woman" by the speaker despite the fact that it is not member of the participants' background knowledge. The choice of the previous mention of the definite description by the speaker instead of the indefinite description òyírì ìpɔ́ɔ́ "a woman" is justified by the prominent feature of this definite description. The speaker knows that it will be the main subject of their exchange. However, definite description in ɛmbɔ́sì may also play the function of role.

3.4. Role Function

Definite descriptions may function as role, they express the role's value of the referred entity. In fact, what is crucial here is not the identification of the entity, but rather the particular property of that entity. Said differently, the stress is laid on the role played by the entity. The illustration is provided with the following sentence:

17) ɔmbíàlé yà Ekolo àyéé   mbóà   yà   bísì.
    notable of Ekolo   he-come   village   of   we.
    "The notable of Ekolo came at our village."

Indeed, the role of the definite description of ɔmbíàlé yà Ekolo "the notable of Ekolo" is established taking into account some aspects such as time. If this utterance was pronounced in 1930, it would have the value of NGAPORO. The same utterance, pronounced 40 years later, would have the role value of ONDZEA, NGAPORO's son who took over the power after his father's death. So, the definite description is used in order the reach the role played by it rather than the identification of the referent (Ngapoula, 2020: p. 279).

4. Conclusion

This work has broached the pragmatic analysis of definiteness in ɛmbɔ́sì of which the definiteness is encoded in noun phrases with the precision that it is essentially expressed by the use of demonstratives. The study has proved that ɛmbɔ́sì definiteness interacts with pragmatic principles of familiarity and identifiability. The implicature of ɛmbɔ́sì definite descriptions is so crucial in the understanding of the discourse due to the different functions contextually played by it. They can refer to anaphora or express the situational reference. In ɛmbɔ́sì, the definiteness, associated with a demonstrative in a pre-nominal position, may express the discourse prominence. Finally, it also has the role function. Analysing the pragmatic features of definiteness in ɛmbɔ́sì, a Bantu language with no article system, was really a fascinating task. However, definiteness works hand in hand with indefiniteness. Future pragmatic studies on ɛmbɔ́sì indefiniteness will certainly contribute to an overall comprehension of pragmatic aspects of the noun phrase in this language.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

Apondza Gombe, G. R. (2003). *Esquisse Phonologique de Ndongonyama: Une Variété Dialectale Akwa.* M.A. Thesis, Marien Ngouabi University.

Bedrosian, P. L. (1996). Mbochi Noun Class System. *Journal of African Linguistics, 26,* 27-47.

Birner, B., & Ward, G. (1994). Uniqueness, Familiarity and the Definite Article in English. In *Proceedings of the Twentieth Annual Meeting of the Berkeley Linguistic Society* (pp. 93-102). Berkeley Linguistics Society. https://doi.org/10.3765/bls.v20i1.1479

Brown, R. (1973). *A First Language: The Early Stages*. Harvard University Press. https://doi.org/10.4159/harvard.9780674732469

Chafe, W. L. (1976). Givenness, Contrastiveness, Definiteness, Subjects, Topics and Points of View. In *Subject and Topic* (pp. 27-55). Academic Press.

Christophersen, P. (1939). *The Articles: A Study of Their Theory and Use in English*. Munksgaard.

Cruse, A. (2006). *A Glossary of Semantics and Pragmatics*. Edinburgh University Press. https://doi.org/10.1515/9780748626892

Grice, H. P. (1975). Logic and Conversation. In P. Cole, & J. L. Morgan (Eds.), *Syntax and Semantics: Speech Arts* (pp. 41-58, 3rd ed.). Academic Press. https://doi.org/10.1163/9789004368811_003

Guthrie, M. (1953). *The Bantu Languages of Western Equatorial Africa*. Oxford University Press.

Hawkins, J. A. (1978). *Definiteness and Indefiniteness: A Study in Reference and Grammaticality Prediction*. Croom Helm.

Heim, I. (1983). File Change Semantics and the Familiarity Theory of Definiteness. In P. Portner, & B. H. Partee (Eds.), *Formal Semantics: Essential Readings* (pp. 223-248). Blackwell Publishers Ltd. https://doi.org/10.1002/9780470758335.ch9

Itoua, J. (2007). *Les Mbochi au Congo: Peuple et Civilisation*. l'Harmattan.

Jespersen, O. (1949). *A Modern English Grammar on Historical Principles*. C. Winter.

Kadmon, N. (1990). Uniqueness. In *Linguistics and Philosophy* 13 (pp. 273-324). Elsevier BV. https://doi.org/10.1007/BF00627710

Ngapoula, K. (2016). *The Semantics and Pragmatics of Demonstratives in English and Embosi*. M.A. Thesis, Marien Ngouabi University.

Ngapoula, K. (2019). Embósì Demonstratives: A Semantico-Pragmatic Account. *Flaly, 7,* 116-124.

Ngapoula, K. (2020). *Semantic and Pragmatic Analysis of Definiteness and Indefiniteness in English and ɛmbósì*. Ph.D. Thesis, Marien Ngouabi University.

Kouarata, G. N. (2001). *Contribution à la Description Phonétique de Parler Mbochi de Boundji C25*. M.A. Thesis, Marien Ngouabi University.

Lyons, C. (1999). *Definiteness*. Cambridge University Press. https://doi.org/10.1017/CBO9780511605789

Ndongo Ibara, Y. P. (2000). *The Phonology of ɛmbɔ́sì: Tsambitso dialect*. M.A. Thesis, Marien Ngouabi University.

Ndongo Ibara, Y. P. (2012). *Embosi-English Dictionary*. Peter Lang.

Obenga, T. (1976). *La Cuvette Congolaise: Les hommes et les structures*. Présence Africaine.

Ollasa, P. H. (1969). *Phonologie du Mbochi*. M.A. Thesis, Bordeau University.

York Epstein, R. (2002). The Definite Article, Accessibility, and the Construction of Discourse Referent. *Cognitive Linguistics, 12,* 333-378. https://doi.org/10.1515/cogl.2002.007