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Anaphora resolved

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Preface

Preview

One of the central questions in linguistics is how, or to what extent, the meaning of complex linguistic objects (e.g., sentences) can be derived from the meaning of their more basic constituents (e.g., words) and the way in which these basic constituents are put together.¹

A major stumbling block for this enterprise is that the meaning of certain words is highly context-dependent. For example, it is impossible to define the meaning of personal pronouns like *he*, *she*, and *it* without referring to the context in which these expressions are used. Such expressions are called *anaphoric expressions*, or simply *anaphora*, and will be the main topic of this dissertation.

Anaphoric expressions have received a great deal of attention, both from linguists and from philosophers. To illustrate why they are so fascinating, let me consider a straightforward definition of the meaning of *he* and point out several facts which it fails to capture. The following definition is probably more or less what would spring to mind first, and can indeed be found in many dictionaries:²

(0.1) *he*: male person or animal previously referred to.

This works for many cases. For instance, in (0.2a) *he* can be taken to refer to John, in (0.2b) *him* can be taken to refer to Max, and in (0.2c) *his* can be taken to refer to the lion which is also referred to by the subject noun phrase of the sentence.

¹Note that this question is not only central in linguistics, but also in other sciences. For instance, physicists try to explain how, or to what extent, the characteristics of complex physical objects (e.g., molecules) can be derived from the characteristics of their basic constituents (i.e., atoms) and the way in which these basic constituents are put together.

²This particular formulation is taken from the Oxford ESL dictionary by A.S. Hornby and C.A. Ruse, Oxford University Press, 1999, p.278.

- (0.2) a. John says that he didn't sleep.
 b. Max hopes that Mary likes him.
 c. The lion devoured his prey.

But the definition in (0.1) does certainly not capture all cases. For example, consider (0.3a) and its possible reading in (0.3b). On this reading, *he* is not interpreted as referring to someone in particular, but rather, it seems, as a variable ranging over a domain of several individuals, just as variables in logic do.

- (0.3) a. Every student hopes that he will pass the exam.
 b. Every student x hopes that x will pass the exam.

A similar interpretation is possible if *he* occurs in a question:

- (0.4) a. Which student thinks that he passed the exam?
 b. Which student x thinks that x passed the exam?

Other cases which are not captured by the definition in (0.1) are ones in which *he* does refer, but not to an individual that has been referred to *previously*. For example, in (0.5a) *he* may be taken to refer to Max, even though Max has not been referred to previously. A similar remark applies to (0.5b). Such cases are sometimes called *backward anaphora*.

- (0.5) a. When Mary finally kissed him, Max was very happy.
 b. Before he left the house, Fred closed all the windows.

Another important shortcoming of the definition in (0.1) is that it does not capture the fact that the interpretation of pronouns is systematically restricted. For example, in (0.6a) *him* cannot be taken to refer to John, even though John has been referred to previously, and a similar remark applies to (0.6b).

- (0.6) a. John hates him.
 b. John bought him a present.

There are also restrictions on the interpretation of pronouns as variables. For example, (0.7a) cannot be interpreted as in (0.7b), and (0.8a) cannot be interpreted as in (0.8b).

- (0.7) a. Every student bought him a present.
 b. Every student x bought x a present.

- (0.8) a. Which student does he like best?
 b. Which student x does x like best?

Finally, there are certain restrictions on backward anaphora. For example, in (0.9a) *he* cannot be taken to refer to Max, and in (0.9b) *he* cannot be taken to refer to Fred.

- (0.9) a. He was very happy when Mary finally kissed Max.
 b. He closed all the windows, before Fred left the house.

Pronouns are by far the most widely studied kind of anaphora. But there are other anaphoric mechanisms as well. One that will receive considerable attention in this dissertation is *verb phrase ellipsis* (VP ellipsis for short). This kind of anaphora is exemplified in (0.10).

- (0.10) a. Sue went to school after Mary did.
 b. Sue went to school after Mary went to school.

(0.10a) is most naturally interpreted as in (0.10b), i.e., the auxiliary in the subordinate clause, *did*, is interpreted as *went to school*. Of course, this interpretation is highly context-dependent, just like the interpretation of pronouns.

In fact, pronominal anaphora and VP ellipsis behave alike in many ways (and indeed, one of the claims that will be defended in this dissertation is that they should receive a unified treatment). For instance, example (0.11) shows that backward anaphora is possible with VP ellipsis, just as with pronouns, while (0.12) shows that this mechanism is restricted in certain ways, again, just as in the case of pronouns.

- (0.11) a. After Mary did, Sue went to school as well.
 b. If nobody else does, you must ask a question yourself.
- (0.12) a. Sue did after Mary went to school.
 b. You must if nobody else asks a question.

Pronominal anaphora and VP ellipsis also interact in interesting ways. For example, as illustrated in (0.13), VP ellipsis of a verb phrase which contains a pronoun often gives rise to a particular kind of ambiguity. The second clause in (0.13) can be interpreted as in (0.13a), but also as in (0.13b).

- (0.13) John talks about his children all the time, and Fred does too.
 a. Fred also talks about John's children all the time.
 b. Fred also talks about his own children all the time.

Again, there are interesting restrictions on this kind of ambiguity. For instance, if we consider a verb phrase which contains not one, but two pronouns, we would expect to get at least four possible interpretations. But example (0.14) shows that this expectation is not always born out. In particular, (0.14) cannot be interpreted as in (0.14d).

- (0.14) Max said that he called his mother, and Bob did too.
 a. Bob also said that Max called Max's mother.
 b. Bob also said that Bob called Bob's mother.
 c. Bob also said that Bob called Max's mother.
 d. Bob also said that Max called Bob's mother.

These, then, are some of the puzzling facts that have to be explained. A more systematic and comprehensive presentation of the data will follow of course. The purpose here is merely to illustrate why anaphora have fascinated so many generations of linguists and philosophers, and in particular why the present dissertation should make for interesting reading.

The dissertation is divided into two parts. The first part discusses several existing theories of anaphora. The theories are evaluated and compared, some problems are pointed out, and possible solutions are suggested, leaving the fundamental ideas of the original theories intact. In the second part, however, these fundamental ideas are reexamined in more detail. Eventually, some of them must be refuted, and a completely different theory is proposed. The most important characteristics of the new proposal are (i) that pronominal anaphora and VP ellipsis are treated in a unified way, and (ii) that the meaning of anaphora is always contextually retrieved. In particular, it is not encoded syntactically, as many current theories assume.

Intended Audience

The issues discussed in this dissertation are central in linguistic theory. They are typically discussed in a very first introductory course in linguistics, so they will be familiar, at least to some extent, to everyone in the field. Therefore, this dissertation should be accessible and of interest not only for anaphora specialists, but also for linguists specialized in other subfields, and for students.

The dissertation is intended to be self-contained, but may be a bit dense for novice students. The ideal background is provided by introductory textbooks that deal with the syntax-semantics interface, such as Heim and Kratzer (1998), and ones that deal more specifically with the logical tools used in semantics, such as Gamut (1991). Other pointers to background reading will be provided along the way.

The formal framework presented in the first chapter may be of special interest to students. This framework is assumed in most contemporary work on semantics and the syntax-semantics interface, but it is hardly ever spelled out in detail. Thus, reading this first chapter will not only help to understand the rest of this dissertation, but also to get a better grasp of the background assumptions made in other contemporary work.

Advanced students and researchers, even those who are not anaphora experts, will probably be sufficiently familiar with the framework presented in chapter 1 to merely glance through it at first and only read parts of it more carefully when needed. Chapter 2, however, will be of particular interest to this audience, as it provides a detailed overview of some of the most prominent existing analyses of pronominal anaphora. These analyses are often closely tied to very general ideas about the relation between linguistic form and meaning, which have played,

and continue to play, a major role in linguistic theorizing. Familiarity with these ideas and with the empirical findings that have been adduced as evidence for or against them will be a vital enrichment for anyone in the field.

Anaphora experts may want to proceed directly to chapters 3, 4, and 5, where the really novel ideas are presented. Again, however, it should be emphasized that these chapters are of interest not only for specialists. The arguments presented, though specifically concerned with anaphora, have immediate and significant consequences for the general conception of the relation between linguistic form and meaning.

Acknowledgments

I came to Amsterdam four years ago for two reasons. First, I wanted to learn more about logic, and second, I wanted to learn more about dance. During the first semester here, I took classes every day at the ILLC from 8:00AM till 5:00PM and at the Dance Academy from 5:00PM till 10:00PM. For the many good memories I have from that period, I am very grateful to my sister Eva, with whom I was sharing an apartment at the time, and who literally kept me alive by preparing supersized pasta meals every day when I came home after dancing; my fellow students at the ILLC, especially Yanjing, Edgar, Gustaaf, and Scott; my fellow dance students, especially Orfee; and my teachers, especially Paul Dekker, Dick de Jongh and Michiel van Lambalgen.

During the second semester I worked on my Master thesis with Johan van Benthem. Johan was excellent, and I also benefited very much from interacting with the lively dynamic logic community in- and outside of the ILLC. As part of the project, I visited Luciano Serafini in Trento for one month, and David Pearce in Madrid for two months. I am very grateful to Luciano and David for their hospitality. This was also the period during which I first got to spend some real time together with my girlfriend Ana. We had met the summer before in France, but after that we both had to go our own way, she back to Mexico, and I to Amsterdam. In Madrid, we got together again, and that was fantastic.

That Spring the University of Amsterdam announced that it would fund a PhD position at the Philosophy of Language branch of the ILLC. As the funding would not come from an external funding agency, the applicants were completely free to write their own research proposals. I am very grateful to the University for providing this exceptional opportunity, and especially to Michiel van Lambalgen, who convinced me that doing a PhD at the ILLC would make me very happy, and helped me in putting together a successful project proposal.

When applying, I knew that the project would be supervised by Jeroen Groenendijk, but for some reason, I had never met Jeroen. I had read some of his work of course, which was very impressive, but good researchers are not necessarily good supervisors. What really convinced me that Jeroen had to be an

excellent supervisor was the work of his students. I was especially impressed by the dissertations of Maria Aloni, Jelle Gerbrandy, and Balder ten Cate. Not only are these dissertations of exceptional quality, they also exhibit great versatility. Each of them makes a profound contribution to a completely different field. This means, of course, that Maria, Jelle and Balder were very talented students, but also that Jeroen granted them the freedom to develop their own independent thoughts, and successfully guided them in developing those thoughts, even though they were not (in some cases not even remotely) his own. This kind of flexibility is, for me, one of the hallmarks of true wisdom, and certainly one of the most important characteristics of a good thesis supervisor. Jeroen has completely lived up to my expectations in this respect, and I am extremely grateful for that.

During the first year of the project, Barbara Grosz invited me to spend a semester at Harvard. We taught a course on computational linguistics together, and we started working on a paper with Rebecca Nesson. I am very grateful to Barbara for inviting me, to Rebecca for our very pleasant and fruitful collaboration, and to Yonatan, Ping, Koby and the local swing and salsa community for much fun.

The paper that Barbara, Rebecca and I had started working on was about anaphora, but it was written from the perspective of computational linguistics and psycholinguistics. At the time, I didn't know much about what theoretical linguists have to say about the subject. It is remarkable how these communities lead quite separate lives. I met a psycholinguist the other day who told me that only after thirteen years of doing psycholinguistic research had he encountered the term *c-command*, which is probably the most ubiquitous term in the syntactically oriented theoretical linguistics literature.

So, when I came back from Harvard, I wanted to become acquainted with the theoretical perspective, and this is how I got to know Tanya Reinhart. We met a few times at her place in Amsterdam, which is just around the corner from my office at the Philosophy department, and talked for hours on end. It was a great shock that she suddenly passed away just a few months later. This dissertation has, in great part, been inspired by Tanya and is therefore dedicated to her memory.

Over the last two years, the dissertation has gradually taken its shape. I am very grateful to the audiences of workshops and colloquia in Szklarska Poreba, Paris, Leiden, Nijmegen, Utrecht, Amsterdam, Harvard and MIT for providing me with feedback along the way. Especially, I would like to thank Philippe Schlenker, Emmanuel Chemla, Danny Fox, Irene Heim, Kai von Fintel, Stuart Shieber, Anna Szabolcsi, Bart Geurts, Eric Reuland, Anna Chernilovskaya, Maria Aloni, Salvador Mascarenhas, Paul Dekker, and Edgar Andrade for detailed comments. I am also grateful to my colleagues at the ILLC, in particular my office mates Michael and Tikitou, for providing such a pleasant and inspiring environment to work in.

Finally, I thank Ana, my family and friends for four times five hundred twenty five thousand six hundred minutes. How do you measure the life of a man? In truths that he learned, or in times that he cried? In bridges he burned, or in the way that he died? How about lo-oo-oo-oo-oo-oo-ove?
How about lo-oo-oo-oo-oo-oo-ove?³

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³Jonathan Larson, *Rent*, 1996. www.youtube.com/watch?v=hj7LRuusFqo

