1 Introduction

1.1 Aims of the study

During language production, the users of any given language produce strings of phrases, words, morphemes and, ultimately, phonemes. Mostly unaware of the process, language users master the task of ordering the building blocks of their language on the syntagmatic axis, solving what Lashley (1951: 112) referred to as the 'problem of serial order'. This linearisation process is the primary demand the syntactic system of a language must fulfil. In most constructions, these constituents are hierarchically organized (Bock 1987b: 340–2). Due to this hierarchy, the word order is relatively fixed, at least in analytic languages such as English; thus, a certain meaning can only be conveyed using one particular order. Nevertheless, there are exceptions wherein certain constituents can be ordered in more than one way without a significant change in meaning. Among the more apparent examples of these are *coordinate constructions*.[1] These are, loosely stated, constructions where two elements are conjoined in a non-hierarchical fashion and whose order is in most cases reversible. Let us look at (1a–e) for illustrative purposes, taken from corpus data:

(1) a. As a <u>singer-dancer</u>, however, she hasn't advanced much beyond the ballet. (COCA corpus, *New York Times*, 18 October 1992)
   b. ... No there's a scene in Terminator, he's like <u>wood and metal</u> in his new Terminator ... (BNC, File KE1)
   c. ... we can take over two of their sponsored events er which is <u>golf and tennis</u> and it would be something like ... (BNC, File FUG)
   d. ... the gypsies identify with <u>her nomadic existence and her life as an oppressed servant</u>. (ICE-GB:S2B-027# 116: 1 :A)
   e. ... <u>rootless populations and beleaguered minorities</u>, feel themselves and indeed are, considerably at risk. (ICE-GB:S2B-050 #79: 1:A)

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[1] The definition and thus a clarification of what is considered a coordinate construction in this book will be provided further below, in Section 1.2.

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In the examples above, speakers coordinated two elements (underlined) in a certain order whose reversal would also have been a possibility. As can be seen, these orderings take place on different linguistic levels. In (1a) the two constituents of a compound are coordinated, (1b) and (1c) are examples of coordinated lexemes, while (1d) and (1e) instantiate the coordination of complex noun phrases, which themselves consist of several words. All examples are constructions in which two conjoined elements occur in a particular order mostly conjoined by a lexical link, a so-called coordinator (except for (1a)). The most general question to be asked in this book is, what are the influences speakers are subject to when serialising elements in such constructions?

In doing so this study distinguishes itself from previous research along a number of dimensions. To begin with the most important point, the present study is different from others in highlighting the aspect of reversibility by putting clearly reversible cases such as (1a–e) at the centre of the investigation. This approach contrasts with most previous research in linguistics, which strongly focused on so-called frozen, irreversible binomials, which are coordinations of two lexemes that occur only in one particular order. Examples are *law and order*, and *house and home*. Due to the focus on these expressions, the more typical case of reversible coordination has been neglected. Even works that recognised this problem, such as Benor and Levy (2006), simply incorporated both groups into their empirical study but did not differentiate between the two categories. An explicit analysis of reversible constructions can however be considered rewarding for the following reasons. First of all, we can assume that the language producer performs an ad hoc decision on how to order the constituents in these instances. These expressions thus enable us to analyse the workings of an online ordering process, investigating what influences speakers' decisions during language use. This question cannot be addressed with irreversible binomials whose order is fixed, as these are stored as holistic units in the mental lexicon.[2] Thus, it remains unclear to what extent identified ordering factors are at work in online ordering tasks, which is an issue to be addressed in this book.

A second reason for the focus on reversible cases is their high frequency, as they greatly outnumber irreversible cases. Hence, the online ordering process I just described is much more representative of the kinds of tasks the linguistic system must perform when processing coordinate constructions and probably also of linearisation as a whole, as compared to the more marginal role of quasi-idiomatic irreversibles.

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[2] In current models, irreversible binomials are grouped with other fixed expressions for which storage as holistic units is assumed. The different models and their relevance for irreversible binomials are discussed in greater detail in Chapter 9.

Although this work thus focuses primarily on reversible coordination, it also explicitly compares ad hoc coordination to its irreversible counterpart. Such a comparison is interesting for the study of both groups: First, for reversibles, it can be tested whether the ordering constraints mentioned for irreversibles also hold for online ordering during ad hoc coordination. Secondly, for the group of irreversibles, it will be interesting to see whether these exhibit properties which render them especially suited for developing into frozen, holistically processed, multi-word units. Both of these questions will be pursued in this book.

The mentioned difference between reversibles and irreversibles with regard to processing brings us, moreover, to psycholinguistic research on the phenomenon, in particular to studies on the mechanisms underlying the linearisation of words and phrases during language production. Due to the generally larger scope of these works, which do not focus on individual syntactic phenomena, coordination has been treated only marginally in most studies. Nevertheless, their results are particularly interesting, as they are very controversial. Regarding the central question of this study, viz. which factors influence order during coordination, there is great uncertainty in the relevant literature. Some studies claim that the order of constituents is completely random, or at least that such constructions are not consistently influenced by the same factors at work in other cases of syntactic linearisation (see Branigan et al. 2008). Following these empirical uncertainties, there are widely diverging views on how coordination fits into the bigger picture of linearisation as a whole. Some view it as a construction which is particularly well suited to investigate general properties of the processing system, in particular the influence of accessibility factors on serial order (Bock 1987b: 375). Others, in contrast, argue that we cannot generalise results from coordinate constructions, as these are processed unlike any other construction in putting the usual incremental processing system to a halt (Branigan et al. 2008). These discrepancies show that the question as to how these constructions are processed is far from answered. Another aim of this book is to discuss this question in light of the results obtained and to explore which language production models are best able to explain this process. In doing so, established serial models (e.g. Bock and Levelt 1994) are compared to more interactive models. Thus, this book breaks new ground in discussing the ramifications of order in reversible coordination for language production models.

A further innovation of this study is its multilevel approach: As mentioned above, the ordering process is investigated on several linguistic levels, as coordinative compounds, the coordination of lexemes (binomials) and complex phrases are taken into account. Previous studies, in contrast, restricted themselves to the study of binomials. This book thus breaks new ground in extending the scope beyond the word level, addressing the question as to whether the factors relevant for lexical coordination are also

at work at the other two levels. Such an analysis naturally invites a compa-rative perspective. Regarding possible inter-level differences, Cooper and Ross (1975) suggest a strength hierarchy, with the morphemic level showing the strongest influence of ordering constraints, which gradually weaken towards the syntactic level. Thus the following two questions will be addressed: Do the factors and their cumulative as well as individual influence differ across the respective linguistic levels under consideration? Can a hierarchy of growing strength of constraints from the syntactic to the morphological level be found, as suggested by Cooper and Ross (1975)?

By drawing on usage data from corpora, this work taps methodological resources that have been thus far rarely used in the study of order in coordination. Previous works have been either monofactorial experimental studies (in the field of psycholinguistics), i.e. testing only one variable, or works relying on introspective methods (predominant in the studies on irreversible binomials). Only Benor and Levy (2006) is a notable exception in also using corpus data. Thus, in my opinion, the topic has not received the empirical, corpus-linguistic attention it deserves, although using corpus data comes with specific advantages.

First, regarding data sampling, corpora provide us with a wealth of natural usage data, which are more representative of the language production process than data arrived at through introspection or individual linguistic experience (cf., e.g., Sinclair 1991). Even compared to experimental studies, corpus data has certain advantages: because the data samples arrived at through the use of corpora are generally larger, they may be viewed as more representative than experimental studies with a limited number of subjects.

A second methodological selling point of this study pertains to the method of analysis. Coordinate constructions instantiate a case of grammatical variability, whereby the language user has the choice between two constr-uctions that are formally divergent but largely equivalent regarding semantics. These cases of language variation have previously been found to be difficult to investigate empirically, as researchers began to realise that not just one but a host of different factors influences the choices between alternating constructions. In recent years, however, the empirical study of such alternations has made tremendous progress through the rise of multifactorial research methods, which take into account a multitude of variables simultaneously. While a specific type of such methods has been used to investigate linguistic choices in variationist sociolinguistics since the 1970s (under the name of *Varbrul*, e.g. Cedergren and Sankoff 1974; Sankoff and Labov 1979), multifactorial methods have only recently begun to be applied to alternations in corpus-linguistic research: Gries (2003) and also Bresnan et al. (2007) point out that only through this methodo-logical resource is it possible to determine the influence of a particular variable when acting in concurrence with other factors. For example, with

a particular case of coordination, such as *apple and grapefruit*, chances are that *apple* occurs in the first position due to its being shorter than *grapefruit*. However, it could also be due to the fact that *apple* is the more prototypical fruit item. The question thus is whether only one factor or both factors influence the speaker at the same time. Monofactorial research designs in previous studies have invited conclusions of just one factor being responsible for these instances of variation. Yet only a multifactorial approach which takes into account possibly confounding factors can safely answer this question. Furthermore, it allows us to calculate the relative strengths of different influential factors.

In summary, by choosing a multifactorial approach that analyses representative corpus samples, this book aims at a more fine-grained investigation of ordering effects, which has been precluded thus far due to the predominance of introspective methods and monofactorial experimental studies.

1.2   Coordinate constructions in English

1.2.1   Definitions and general properties

In this chapter, definitions and properties of coordinate constructions will be presented, focusing on coordination in English. I will also elaborate on the syntactic analysis of coordination and the question as to which constituents can be coordinated at all. These are the two issues most widely debated in the literature on coordinate constructions.

A common formal definition of coordinate constructions is that all coordinated elements belong to the same syntactic category and together form a constituent of the same category (cf. Haspelmath 2004: 28–9). Quirk et al. (1985: 945), for instance, state that '[we] regard coordination as a type of linkage whereby the resulting conjoint construction is equivalent, structurally speaking, to each of its members'. This structure is illustrated in Figure 1.1 and the example, where the two nouns, *pizza* and *pasta* form a superordinate noun phrase.[3]

We will see later that the aforementioned definition does not capture some constructions which could be viewed as coordinate constructions. Nevertheless, in this book I shall focus on the constructions that adhere to this formal definition.

Generally, three different types of coordination are distinguished: conjunction (conjunctive coordination), disjunction (disjunctive coordination) and adversative coordination. See the examples below:

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[3] Coordinate constructions contrast with subordinate or dependency constructions because, in the latter, only one constituent (the head) must match the syntactic status of the overall phrase.
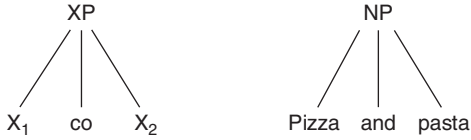
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Figure 1.1   Structure of coordinate constructions[4]

(2)   a. the tiger and the lion   *conjunctive coordination*
      b. the tiger or the lion   *disjunctive coordination*
      c. He walked fast, but he did not run.   *adversative coordination*

Since the focus of this book is on intra-phrasal phenomena, I will deal only with conjunctive and disjunctive coordination, as adversative coordination is rare outside clausal coordination (Haspelmath 2004).[5]

With regard to the structural elements of a coordinate construction, it usually consists of two (or more) connected constituents (coordinands) which can (but do not have to) be connected by coordinators (e.g. *and*, *or*, *but*) (Haspelmath 2004: 4). When occurring with a coordinator, the constructions are termed *syndetic*, while when occurring in simple juxtaposition without a coordinator they are termed *asyndetic* (Haspelmath 2004: 4; Stassen 2000: 1106). Both variants are possible in English and are instantiated by the following examples.

(3)   a. Slowly, stealthily, she crept towards her victim. (example from Haspelmath 2007: 7)
      b. Pizza, pasta and ice cream are my favourite foods.
      c. Pizza and pasta are my favourite foods.

Asyndetic coordination is a minor strategy for English, and with the conjunction of nominal elements, which I focus on in this book, it is not possible with coordinations of only two elements (compare 3b and c) (cf. Stassen 2001: 1105).

Probably the most well-known property of coordinate constructions mentioned in syntactic theory is that they adhere to the Coordinate Structure Constraint (Ross 1967), which states that no conjunct can be extracted from a coordinate construction. Most subordinate constructions, however, allow for such an extraction; the difference can be seen in the following examples by Haspelmath (2007: 5, emphasis in original).

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[4] Figure 1 implies a non-hierarchical, symmetrical view of coordinate constructions. This is merely for the purpose of exposition; it is not intended to express the author's view on the structural (a-)symmetry of these constructions. This point will be elaborated below.

[5] For examples of adversative coordination with *but*, see Quirk et al. (1985: 952).

(4) a. dependency (subordination)
     (i) (basic sentence) You talked to someone before Joan arrived.
     (ii) (*who* extraction) Who did you talk to _ before Joan arrived?

   b. coordination
     (i) (basic sentence) You talked to someone **and** then Joan arrived.
     (ii) (*who* extraction) *Who did you talk to _ **and** then Joan arrived?

While the Coordinate Structure Constraint works with English coordinate constructions, it is not clear whether it can be applied as a linguistic universal (Haspelmath 2004: 26). Thus, Haspelmath (2007: 1) offers a definition of coordinate constructions from a semantic perspective:

The term *coordination* refers to syntactic constructions in which two or more units of the same type are combined into a larger unit and still have the same semantic relations with other surrounding elements.

This can be illustrated with the following example:

(5) Juan and Pablo went to Argentina.

Both coordinands have the same semantic relations with the rest of the sentence, the VP, in that it is true that both Juan and Pablo went to Argentina.

A further, semantic definitional criterion of coordinate constructions, which is especially important for the aims of this book, is the reversibility of the conjuncts (Haspelmath 2004: 29–30). It is generally agreed that the two ordering possibilities are truth-conditionally equivalent (Blakemore and Carston 2005b), resulting in the possibility of 'meaning-preserving inversion' (Bock 1987b: 375). It is this property which renders this construction especially interesting; since it is not semantics that constrains the order of elements, the question arises as to which factors influence the order of elements. There are, however, exceptions to the reversibility criterion in English, which pertain to certain contexts featuring the coordinator *and*, where truth-conditions seem to change by a reversal. Consider the example below (from Blakemore and Carston 2005a):

(6) She handed him the key and he opened the door.

Here the interpretation seems to be not (*A and B*) but (*A and then B*), as a reversal of the two constituents results in a different interpretation. One possible explanation is that the coordinator *and* does not mean solely (*and*) anymore but conveys the meaning of temporal sequence. Another view, in contrast, is that the interpretation of a temporal sequence must be located in the realm of pragmatics and is not the result of the coordinator being polysemous (see, e.g., Quirk et al. 1985; Blakemore and Carston 2005b). According to the latter view, the interpretation of temporal sequence is due to pragmatic inference, as it is the most natural interpretation to assume a

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chronological ordering. This study follows the latter argumentation and
views the aforementioned pragmatic inferencing process as a constraint on
ordering whose influence can be empirically investigated. This issue will be
discussed in greater detail below (see Chapter 9).

Having dealt with the basic properties of English coordinate constructions,
I will now focus on more detailed issues of their analysis. The first issue to be
addressed is the syntactic analysis and constituent structure of coordinate
constructions, which is a widely debated issue in syntactic theory.

Early syntactic models assumed a flat structure, while in more recent
models they are analysed hierarchically, as the coordinator has been argued
to exhibit greater structural cohesion with the second conjunct (for an
overview, see Ross 1967; Dik 1972: 52–5;[6] Blakemore and Carston 2005a).
Hence, most current analyses assume a constituent structure of the form
[A[co B]].

One argument Ross (1967: 163) uses to prove this point is that once
coordinate clauses are broken up into two clauses, the coordinator is in the
second clause.[7] See Ross's (1967: 163) examples for an illustration:

(7)   a. John left and he didn't even say goodbye.
      b. John left. And he didn't even say goodbye.

A further argument by Ross (1967) is a phonological one, as possible
intonational pauses typically do not separate the coordinator and the second
conjunct, as in the examples below (taken from Ross 1967: 164–5).

(8)   a. (Tom (and Dick) (and Harry)) all love watermelon.
      b. ((Tom and) (Dick and) (Harry)) all love watermelon.
      c. ((Tom) (and) (Dick) (and) (Harry)) all love watermelon.

Hence the bracketing in example (8a) represents a typical intonational pause
pattern, while b and c do not. Ross's (1967) examples suggest a hierarchical,
right-branching structure, which is the most widespread analysis. It
should be noted, however, that it is not universally accepted (see Dik
1972: 25–60, who argues for a symmetrical analysis) and that in many
theories, coordinate constructions are treated as a special case due to their
controversial status (see Blakemore and Carston 2005a). In addition to these
theoretical complications, there 'remains a strong pretheoretic intuition
that coordinate structures are in some important sense symmetric'
(Blakemore and Carston 2005a: 354). Trying to resolve the conflict between
syntactic theory and intuition, Cormack and Smith (2005) assume the
simultaneous generation of two asymmetric branching structures, one
head-initial and one head-final.

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[6] An overview of the arguments is given by Dik 1972:45–52, although he himself does not
adhere to a hierarchical view.
[7] But see Dik 1972: 54 for a different interpretation.

In summary, the discussion in syntactic theory shows that the theoretical task of modelling phrase structure of coordinate structures is by no means a trivial one. However, since the question of (a-)symmetry does not interfere with the aims of this work – which rely on the observation that the constituents can be produced in either order – the current work will not take a stance on this issue.

A second widely debated issue with coordinate constructions is the question of which constituents can or cannot be coordinated, as it has been observed that the two elements that are coordinated are in some sense equal or alike (see, e.g., Blakemore and Carston 2005a). The question that still seems difficult to answer asks on which level of description the equality must be assumed and what exceptions are allowed. Schachter (1977), in propagating his Coordinate Constituent Constraint (CCC), assumes constraints on three levels: the syntactic, the semantic and, to a lesser degree, also the pragmatic level. All of these constraints are argued to apply jointly, thus no one level explains another. The syntactic constraint states that both constituents have equal syntactic status, thus both belong to the same phrasal category, which is a point I already mentioned above as a first definition of coordinate constructions. This constraint explains why example (9a), a coordination of two adverbial phrases, is grammatical and (9b), where an adjectival phrase and a noun phrase are coordinated, is not (examples taken from Schachter 1977: 87):[8]

(9)   a. John ate quickly and greedily.
      b. *John ate quickly and a grilled cheese sandwich.

There are cases, however, that defy the aforementioned syntactic properties, where two phrases that belong to different syntactic categories are coordinated, still constituting a well-formed sentence, see (10) below.

(10)   John ate quickly and with good appetite.

Here an adjectival phrase and a prepositional phrase are coordinated and still result in a well-formed sentence. This is generally not viewed as a violation of the syntactic equality criterion, but a same phrase status is assumed on an underlying level of representation (cf. Schachter 1977). In cases such as (10), the prepositional is assumed to be governed by a higher adjectival phrase node. This solution is of course not without controversy, and different suggestions have been made for how to deal with this coordination of, at least on the surface, different phrasal categories (cf. Bayer 1996).

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[8] Whether this constraint is a grammatical one or a constraint rooted in processing preferences is still being discussed (cf. Frazier et al. 2000 for an explanation from a processing perspective).

It has also been postulated that both elements must be equal on the semantic level in taking on a parallel function in the construction. Consider (11a) and (11b) for an illustration (11a found from Schachter 1977: 89).

(11)   a. John ate with his mother and with his daughter.
       b. *John ate with his mother and with good appetite.

While undoubtedly both coordinated phrases belong to the same syntactic category, the semantic functions are the same only in (11a) but not in (11b), which is why only the former sentence is grammatical. While in (11a) both phrases denote the company John had – accompaniment phrase according to Schachter (1977) – in (11b) an accompaniment and a manner phrase are coordinated, apparently resulting in a conflict, which makes the sentence ungrammatical.

Another way of dealing with the semantic equality constraint is put forward by Lang (1984, 1991) and also Blühdorn (2008), who argue that the coordinated elements have to be semantically integrated via a *common integrator*. This term refers to a superordinate conceptual category under which both coordinants can be subsumed. For sentence (11a), this common category could be 'company of people John had dinner with'. This common integrator can also be construed ad hoc in discourse, which brings pragmatic concerns into play (see Blühdorn 2008). Consider the following two sentences for illustration ((12a) from Quirk et al. 1985, (12b) my own):

(12)   a. ??The youngsters went off to a dance and the equator is equidistant
           from the two poles.
       b. ?My mum went to the mall and the carpenters fixed the stairs.

Both sentences fulfil the syntactic and the semantic criteria but still sound considerably odd, as a context in which they could be sensibly uttered seems hard to imagine. Nevertheless, appropriate pragmatic contexts can be construed. The second example could be an answer to the question 'What happened today?' And even sentence (12a), although harder to imagine, could be an appropriate answer to the question 'What are two true statements?' in a situation where the interlocutors just watched the youngsters going to a dance. These examples show that the equality of elements in coordination can also be pragmatically licensed; i.e., a common category or integrator can be construed by pragmatic context.

1.2.2   A typological perspective on coordination in English

This section will address the properties of English coordination in a typological context. In particular, I will elaborate on the major differentiating properties of coordinating constructions among the languages of the world