

Parsimonious Vole

A Systemic Functional Parser for English



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I would like to dedicate this thesis to my loving parents . . .

Declaration

I hereby declare that except where specific reference is made to the work of others, the contents of this dissertation are original and have not been submitted in whole or in part for consideration for any other degree or qualification in this, or any other university. This dissertation is my own work and contains nothing which is the outcome of work done in collaboration with others, except as specified in the text and Acknowledgements. This dissertation contains fewer than 65,000 words including appendices, bibliography, footnotes, tables and equations and has fewer than 150 figures.

Eugeniu Costetchi

March 2018

Acknowledgements

And I would like to acknowledge ...

Abstract

This is where you write your abstract ...

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Chapter 1

Introduction

1.1 Practical relevance

Developed over thousands and thousands of years, human language has become a nuanced form of communication that carries a wealth of meaning that by far transcends the words alone. When it comes to human-machine interaction this highly articulated communication form is deemed impractical. So far humans had to learn to interact with computers and do it in formal, strict and rigorous manner via graphical user interfaces, command line terminals and programming languages. Advancements in *Natural Language Processing* (NLP) which is a branch of *Artificial Intelligence* (AI) are a game changer in this domain. NLP starts to unlock the information treasure locked in the human speech and make it available for processing to computers. NLP becomes an important technology in bridging the gap between natural data and digital structured data.

In a world such ours, where technology is ubiquitous and pervasive in almost all aspects of our life, NLP becomes of great value and importance regardless whether it materializes as a spell-checker, intuitive recommender system, spam filter, (not so) clever machine translator or a voice controlled device.

Every time you ask Siri or Alexa for directions to the nearest Peruvian restaurant, how to cook Romanian beef stew or what is the dictionary definition for the word *germane*, a complex chain of operations is activated that allows ‘her’ to understand the question, search for the information you are looking for and respond in a human understandable language. Such tasks are possible only in the past few years thanks to advances in NLP. Until now we have been interacting with computers in a language they understand rather than us. Now they are learning our language.

1.1.1 NLP for businesses

NLP opens new and quite dramatic horizons for businesses. Navigating with limited resources stormy markets of competitors, customers and regulators and finding an optimal answer/action to a business question is not a trivial task. Markets are influenced by the information exchange and being able to process massive amounts of text and extract meaning can help assess the status of an industry and play an essential role in crafting a strategy or a tactical action. Relevant NLP tasks for gathering market intelligence are *named entity recognition* (NER), *event extraction* and *sentence classification*. With these tasks alone one can build a database about companies, people, governments, places, events together with positive or negative statements about them and run versatile analytics to audit the state of affairs.

Compliance with governmental, European or international regulations is a big issue for large corporations. One question for addressing this problem is whether a product is a liability or not and if yes then in which way. Pharma companies for example, once a drug has been released for clinical trials, need to process the unstructured clinical narratives or patient's reports about their health and gather information on the side effects. The NLP tasks needed for this applications are primarily *NER* to extract names of drugs, patients and pharma companies and *relation detection* used to identify the context in which the side effect is mentioned. NER task help transforming a sentence such as "Valium makes me sleepy" to "(drug) makes me (symptom)" and relation detection will apply patterns such as "I felt (symptom) after taking (drug)" to detect the presence of side effects.

Many customers, before buying a product, check online reviews about the company and the product whether it is pizza or a smartphone. Popular sources for such inquiry are the blogs, forums, reviews, social media, reports, news, company websites, etc. All of them contain a plethora of precious information that stays trapped in unstructured human generated text. This information if unlocked can play a great deal in company's reputation management and decisions for necessary actions to improve it. The NLP tasks sufficient to address this business required are *sentiment analysis* to identify attitude, judgement, emotions and intent of the speaker, and *co-reference resolution* which connects mentions of things to their pronominal reference in the following or preceding text. These tasks alone can extract the positive and negative attitudes from sentence "The pizza was amazing but the waiter was awful!" and connect it to the following sentence "I adore when it is topped with my favourite artichoke" about pizza and not the waiter and discover a topping preference.

NLP is heavily used in customer service in order to figure out what customer means not just what she says. Interaction of companies with their customers contain many hints pointing towards their dissatisfaction and interaction itself is often one of the causes. Companies record, transcribe and analyse large numbers of call recordings for extended insights. They deploy chat bots for increased responsiveness by providing immediate answers to simple needs and also decrease the load of the help desk staff. NLP tasks that are essential in addressing some of the customer service needs are *speech recognition* that converts speech audio signal into text and *question answering* which is a complex task of recognising the human language question, extract the meaning, searching relevant information in a knowledge base and generate an intelligible answer. Advances in deep learning allow nowadays to skip the need for searching in a knowledge base by learning from large corpora of question-answer pairs complex interrelations.

The above cases underline the increased need in NLP whereas the variation and ever increasing complexity of tasks reveal the need in deeper and richer semantic and pragmatic analysis across a broad range of domains and applications. Any analysis of text beyond the formal aspects such as morphology, lexis and syntax inevitably lead to a functional paradigm of some sort which can be applied not only at the clause level but at the discourse as a whole. This makes the text also an artefact with relation socio-cultural context where it occurs.

1.2 The linguistic framework

Any description or analysis involving language implies some theory of how language works. In this thesis I chose the Systemic Functional Linguistic (SFL) framework because of its versatility to account for the complexity and phenomenological diversity of human language providing descriptions along *multiple semiotic dimensions* (Halliday 2003) (i.e. paradigmatic, syntagmatic, meta-functional, stratification and instantiation dimensions) and at different *delicacy levels* of the *lexico-grammatical cline* (Halliday 2002; Hasan 2014).

Elaborating the foundations laid by his British teacher J. R. Firth, Hjelmslev (1953) from Copenhagen School of linguistics and a group of European linguists from Prague School, Halliday develops the beginnings of SFL in his seminal paper Halliday (1961a). This paper constitutes a response to the need for a *general theory of language* that would be holistic enough to guide empirical research in the broad discipline of linguistic science:

... the need for a *general* theory of description, as opposed to a *universal* scheme of descriptive categories, has long been apparent, if often unformulated, in the description of all languages (Halliday 1957: p.54; emphasis in original)

If we consider general linguistics to be the body of theory, which guides and controls the procedures of the various branches of linguistic science, then any linguistic study, historical or descriptive, particular or comparative, draws on and contributes to the principles of general linguistics (Halliday 1957: p.55)

With this perspective, paradigmatic organization of language received priority as the primary focus of linguistic description and subsequently the structure is analysed as a realisation of features.

SFL regards language as a social semiotic system where any act of communication is regarded as a conflation of *linguistic choices* available in a particular language. Choices are organised on a paradigmatic rather than structural axis and represented as *system networks*. Moreover, in the SFL perspective language has evolved to serve particular *functions* influencing their the structure and organisation of the language. However, their organisation around the paradigmatic dimension leads to a significantly different functional organisation than those found in several other frameworks which Butler (2003a,b) treats extensively.

Embracing the *oragnon model* formulated by Bühler (1934), Halliday refers to the language functions as metafunctions or lines of meaning offering a trinocular perspective on language through *ideational*, *interpersonal* and *textual* metafunctions. In SFL, language is first of all an interactive action serving to enact social relations under the umbrella of the *interpersonal metafunction*. Then it is a medium to express the embodied human experience of inner (mental) and outer (perceived material) worlds via *ideational metafunction*. Finally the two weave together into a coherent discourse flow whose mechanisms are characterised through the *textual metafunction*.

There are two models of SFG: the *Sydney Grammar* developed by Halliday & Matthiessen (2013), the founding fathers of *Systemic Functional Linguistics* (SFL), and *Cardiff Grammar* developed by Fawcett (2008), an extension and in a way simplification of Sydney Grammar. Each of the two grammars has advantages and shortcomings which I present in analyse and select based on theoretical soundness and suitability to the goals of the current project.

Cardiff and Sydney grammars had been used as language models in natural language generation projects within the broader contexts of social interaction. Some researchers

(Kasper 1988; O'Donoghue 1991; O'Donnell 1993; Souter 1996; Day 2007) attempted to reuse the grammars for the purpose of syntactic parsing within the borders of NL generation coverage. I come back to these works in more detail in Section ??.

As we part away from the surface form of text and aim for rich semantics or aim at analyses higher than the clause level i.e. discourse, the functional is increasingly useful and revealing of meanings in text. Such analyses have been done manually by linguists, semioticians and educators in an informal manner as there have not been any tools to automate such processes. Besides Linguistics, there is a plethora of linguistic analysis using SFL framework in other fields of research. SFL has been used extensively as a descriptive framework in Critical Discourse Analysis and in Education studies. Automatising the language analysis with SFL framework will unlock the potential of these fields. Next I provide a glimpse of what opportunities they offer.

1.3 The Opportunity

Second, a large amount of description of this kind has traditionally been done, and done a lot, in SFL. Here again you need to find a good collection of example 'applications' in SFL (not computational) where the deeper analysis has been found useful and give references: education, text/discourse analysis (critical)(Tenorio 2011) [Encarnacion Hidalgo Tenorio 2011, Critical Discourse Analysis, An overview], whatever plus references. Survey of studies in systemic functional language description (Mwinlaaru & Xuan 2016) functional information is found useful for text analysis, but this has only been done informally well, look at the education work, the typology work, the CDA work: these are the main areas where SFL appears and has papers.

Critical Discourse Analysis from its inception was designed, but is not limited to, questioning the status quo by detecting, analysing and also resisting enactments of power abuse as transmitted in private and public discourses. The philosophical and linguistic bases on which CDA is grounded are certain branches of social theory and earlier discourse analysis, text linguistics and interactional sociolinguistics. CDA seeks to expose the manipulative nature of discursive practices, and improve communication and well-being by removing the barriers of assumed beliefs legitimised through discourse(Tenorio 2011).

SFL theory of language has been widely adopted in CDA community. It comes handy when one and the same piece of reality is portrayed differently depending on the side and role of the source. For example one and the same historical event can be described as a riot, demonstration, or a protest. For the same reason various agents can be either presented as antagonists that instigate the conflict or protagonists that oppose it by simple selections of grammatical coding. Thus different linguistic descriptions lead to different constructions of the reality.

1.4 The Barrier

But, until now it has not been possible to use these detailed analysis in computational contexts: this makes them unavailable for corpus work, for training data in machine learning, etc. etc. (add as many points as occur to you).

1.5 Previous Attempts

There have been attempts to make this work (which you will come back to and describe in Chapter X in detail), however, but these have not worked. As you say you will describe in detail in Chapter X, there is however a strong diagnostic as to just why these attempts have not been successful: i.e., the lack of structural detail that SFG descriptions typically provide. This is argued in general in Bateman (2008) and Teich (1999) [and any other references you can find].

1.6 Some interesting examples

You then give EXAMPLES of some difficult cases, where you illustrate what an SFG analysis would like look and you point out the lack of structural detail, informally so that it can be understood directly without further technical detail. Preferably bringing out some cases where it is evident that there is no information, e.g., about raising and control (Teich) and anything else which would make interpretation difficult.

1.7 Proposed Solution

Your proposed solution to this problem, and the goal of the thesis, is therefore to add some more structural information to a complete augmented SFG account by drawing on frameworks which have demonstrated coverage of structural detail and which also have supported computational instantiation. This will be shown and evaluated in the thesis.

1.8 Thesis Goal

So, the thesis goal and outline will be to (and you list them explicitly like this too):

- characterise SFL in its two major variants
 - characterise the previous attempts to parse with SFL and their problems
 - set out two further linguistic frameworks which (a) have
 - strong accounts of structural relationships, (b) have shown themselves supportive of computational instantiation, and (c) can be shown to exhibit suggestive theoretical/descriptive links with SFG: in particular, DG and GB.
- Chapter X does this for DG Chapter Y does this for GB.

1.9 Provisional Thesis Structure

- 1: introduction, reasons and goals
- 2: SFG
- 3: State of the Art in approaches to Parsing with SFG and complexity
- 4: DepGrammar
- 5: GBT
- 6: Single architecture
- : : Empirical Evaluation
- : Conclusions (what has been achieved and outlook)

1.10 References

[Butler2003] Structure and Function [Hjelmslev1953] - Prolegomena-to-a-Theory-of-Language-by-Luis-Hjmeslev [Elke Teich 1999] - Systemic Functional Grammar & Natural Language Generation - Ch5

% feedback Chapter 1 + 2

Dear Eugene,

thanks for file; attached are the detailed comments and corrections and suggestions for Chapters 1 + 2. I suggest some reorganisation of the introduction and how the materials in the current chapter 2 are described, you will sense of this. But, in short, I think an organisation along the lines:

Chapter 1: introduction, reasons and goals

Chapter 2: SFG

Chapter 3: State of the Art in approaches to Parsing with SFG and complexity

Chapter 4: DepGrammar

Chapter 5: GBT (perhaps, haven't read these yet)

would get the thesis off to a better start. Also you need to think about whether all the detail of the SFG variants is important enough for your task. You will need to provide some more detail of the organisation of the actual grammars as well in any case, as otherwise you can't talk about Mood and Transitivity and the like. This is all clarified in the comments. Alternatively you say very little about these and introduce them when you get to the later chapters: that might make sense; I'll see when I get that far. If one went that road, it would mean not including comments about Mood and Transitivity in the current chapter 2 though, which might be awkward.

I'll proceed with the other chapters, but as you will see, you have a fair bit to get going with in any case.

I will not be able to work on the thesis after the end of March.

theses don't really work like that; so we'll see how far you get.
You (and I) don't want a repeat of the Daniel situation.

Let me know if anything is unclear.

Best,
John.

%feedback Chapter 1 + 2

Dear Eugene,

Comments/corrections for chapters 3 + 4 attached.

Now I'm getting more of a view of the thesis, I'd say that at present, systemicists will get confused because they'd wonder why alien things like GB and dependency grammar appear, and formal/computational linguists would get confused because they wouldn't be clear why one would want to take something like SFL. This can be managed fairly straightforwardly I suspect by setting up the argument in the Introduction in a clear way, so that everyone knows just why these things are coming together. I'd suggest the following kind of outline for the introduction to make that work, let me know if you have any problems or questions about this as it would seem (to me) to be a good way of making all the bits fits together in a reasonably convincing fashion. This would also help avoid a reoccurring problem in your text at the moment, where you frequently want to talk about things that you have not yet introduced - this just makes the text confused and impossible to follow (many examples of this are picked out explicitly in the comments).

So...

Structure the Intro to the thesis more like this:

First, point to the increasing and increasingly recognized need for deeper, richer semantic/pragmatic analyses across a broad range of applications: corpora, human-machine interaction, intelligent interfaces and assistance robotics, whatever you can find with references supporting the claim.

Second, a large amount of description of this kind has traditionally been done, and done a lot, in SFL. Here again you need to find a good collection of example 'applications' in SFL (not computational) where the deeper analysis has been found useful and give references: education, text/discourse analysis (critical), whatever plus references.

But, until now it has not been possible to use these detailed analysis in computational contexts: this makes them unavailable for corpus work, for training data in machine learning, etc. etc. (add as many points as occur to you).

There have been attempts to make this work (which you will come back to and describe in Chapter X in detail), however, but these have not worked. As you say you will describe in detail in Chapter X, there is however a strong diagnostic as to just why these attempts have not been successful: i.e., the lack of structural detail that SFG descriptions typically provide. This is argued in general in Bateman (2008) and Teich (1999) [and any other references you can find].

You then give EXAMPLES of some difficult cases, where you illustrate what an SFG analysis would like look and you point out the lack of structural detail, informally

so that it can be understood directly without further technical detail. Preferably bringing out some cases where it is evident that there is no information, e.g., about raising and control (Teich) and anything else which would make interpretation difficult.

Your proposed solution to this problem, and the goal of the thesis, is therefore to add some more structural information to a complete augmented SFG account by drawing on frameworks which have demonstrated coverage of structural detail and which also have supported computational instantiation. This will be shown and evaluated in the thesis.

So, the thesis goal and outline will be to (and you list them explicitly like this too):

- characterise SFL in its two major variants
- characterise the previous attempts to parse with SFL and their problems
- set out two further linguistic frameworks which (a) have strong accounts of structural relationships, (b) have shown themselves supportive of computational instantiation, and (c) can be shown to exhibit suggestive theoretical/descriptive links with SFG: in particular, DG and GB.

Chapter X does this for DG

Chapter Y does this for GB.

- Following this, Chapter Y+1 brings these altogether in a single architecture (can be short: material from the current introduction about the system architecture goes here, or can be longer, if you take the material about merging GB and DG and then with SFG here too: this might be best).

- rest of chapters go into details.

- Chapter \$-1 Evaluation

- Chapter \$ What has been achieved and outlook.

I think this kind of explicit form in the Introduction of the thesis would tell a convincing story that would make the most of what you currently have and simply wrap this in a structure that readers can follow and accept. Then you strengthen the existing bits of text to explicitly draw attention to these goals as you go so that the reader remembers where they are and what you are trying to do (and why). I think this is a fair bit of work still, but relatively straightforward as it is more about imposing structure and getting things in the right order. Definitely a thesis in there struggling to get out! :-)

Best,
John.

%feedback Chapter 5

Hi Eugen,

here is chapter 5 commented. In this one, there are many more comments about content that will need fixing up, so not just style of presentation. Many of the problems though come, I suspect, because you have not yet introduced the algorithm and pipeline and its datastructures sufficiently that the reader has any idea what your formalisations here are attempting to do. I think many of them can just disappear, since you certainly won't be able to use them anywhere. To define a data structure, you don't need a full first-order theory, that is overkill. You do not get any points for formalisation; you'd only get points for appropriate, necessary and well motivated formalisation, and many of the definitions in this chapter do not meet this requirement. You only need as much formalism as necessary to get the job done. And the job is the task that you need to have described as the pipeline of the system: probably best

immediately after the discussion of GB. There are many interesting decisions made in this chapter, but they are just lost in the mass of probably hardly relevant detail. So introducing the pipeline and its data structures first, would give you a better way of picking out just that which is a crucial contribution of your thesis, i.e., the stuff that makes parsing work. Providing definitions of morphisms between graphs does **not** do that; and it is hardly your job and has been done more or less completely before in appropriate formal texts in any case.

In short, you need to provide the new architecture and pipeline chapter and rewrite this one accordingly.

Let me know when that has happened, as that will be the next major version that it would be sensible for me to comment on I think. The actual details of the parsing algorithm that occurs in subsequent chapters will I hope be more straightforward, once the groundwork is out of the way.

Best,
John.

Am 08.03.18 um 22:00 schrieb Eugen Costezki:

> I wanted to say that this chapter 5 represented a special kind of struggle as I wa

yes, I noticed! :-) Fortunately, you do not need to do this...
so simplifications are ahead!

Best,
John

Chapter 2

The systemic functional theory of grammar

Any description of language requires a theory that provides the frame, scope and the necessary concepts. Having a solid theory of grammar contributes to explaining what language is and how it works. It also frames how language is ought to be analysed by either human or machines.

In his seminal paper Halliday (1961b) addresses the ardent need of the time for a general theory of language and partially answers the proposal for a universal theory of language. He sets out what was known at the time as Scale and Category Grammar. In such a model *units* are set up to account for pieces of language which carry grammatical patterns. They are seen as arranged on a hierarchical *rank* scale of words, groups and clauses. These and other foundational concepts are covered in the first part of this Chapter.

There are two variants of Systemic Functional Grammars: the *Sydney Grammar* started in 1961 by Halliday (2002) and the *Cardiff Grammar* proposed by Fawcett (2008) which is a simplification and an extension of the Sydney Grammar. To understand the underlying motives and how exactly they are different we shall start looking at the theories of grammar before we look at the grammars proposed in Sydney and Cardiff SFL schools.

This chapter first sets out the basic organisational dimensions of the theory and then discusses comparatively Halliday's (Halliday 2002) and Fawcett's (Fawcett 2000) SFL.

2.1 A word on wording

Before going into deeper discussion I first make terminological clarifications on the terms: grammar, grammatics, syntax, semantics and lexicogrammar. I start with a definitions adopted in “mainstream” generative linguistics and then present how the same terms are discussed in systemic functional linguistics.

Radford, a generative linguist, in the “Minimalist Introduction to Syntax” (1997), starts with a description of grammar as a field of study, which, in his words, is traditionally subdivided into two inter-related areas of study: syntax and morphology.

Definition 2.1.1 (Morphology (Radford)). Morphology is the study of how words are formed out of smaller units (traditionally called morphemes) (Radford 1997: p.1).

Definition 2.1.2 (Syntax (Radford)). Syntax is the study of how words can be combined together to form phrases and sentences. (Radford 1997: p.1)

Halliday, in the context of rank scale discussion (Halliday 2002: p. 51), refers to the traditional meaning of syntax as the *grammar above the word* and to morphology as *grammar below the word*. Such a distinction, he states, has no theoretical status and is deemed as unnecessary distinction. Halliday adopts this position to motivate the architecture of grammar he was developing and is inherited from his precursor, Firth, as he puts it:

... the distinction between morphology and syntax is no longer useful or convenient in descriptive linguistics. (Firth 1957: p.14)

Radford adds that, traditionally, grammar is not only concerned with the principles governing formation of words, phrases and sentences but also with principles governing their interpretation. Therefore *structural aspects of meaning* are said to be also a part of grammar.

Definition 2.1.3 (Grammar (Radford)). [Grammar is] the study of the principles which govern the formation and interpretation of words, phrases and sentences. (Radford 1997: p.1)

Interestingly enough, the Definition 2.1.3 makes no mention at all to the lexicon. This is because the formal grammars focus primarily on unit classes and how they are accommodated in various structures and so in formal linguistics the lexicon is often disconnected from the grammar. The systemic grammar, on the other hand, along with formal descriptions of grammatical categories and structures, includes the lexicon

as part of grammar to form a *lexicogrammar*. At this point I have to mention that systemic functional grammar is not the only lexicalised one and there are others taking the same approach such as Lexical Functional Grammar (LFG), Head Phrase Structure Grammar (HPSG), Combinatory Categorical Grammar (CCG) and others.

Another important aspect to notice is that the grammar is defined as a field of study rather than a set of rules. The divergence in perspective on the subject led Halliday, since his early papers, to become conscious of the difference between a study of a phenomenon with the phenomenon itself. By analogy to language as phenomenon and linguistics as the study of the phenomenon, discussed in (Halliday 1997), Halliday adopts the same wording for *grammar* as phenomenon and *grammatics* as the study of grammar; the same distinction holds for *syntax* and *syntactics*.

Definition 2.1.4 (Grammatics (Halliday)). Grammatics is a theory for explaining grammar (Halliday 2002: p.369)

Moravcsik, another generative linguist, stresses the same distinction, in her “An introduction to syntax” (Moravcsik 2006), and presents two ways in which the word *syntax* is used in the literature: (a) in reference to a particular aspect of grammatical structure and (b) in reference to a sub-field of descriptive linguistics that describes this aspect of grammar. In her words:

...syntax describes the selection and order of words that make well-formed sentences and it does so in as general a manner as possible so as to bring out similarities among different sentences of the same language and different languages and render them explainable. ... syntax rules also need to account for the relationship between string of word meanings and the entire sentence meaning, on one hand, and relationship between strings of word forms and the entire sentential phonetic form, on the other hand. (Moravcsik 2006: p.25)

In her definition of grammar she includes the lexicon and semantics which is a somewhat more explicit statement than Radford’s *interpretation*. She is also getting, in Definition 2.1.5, somewhat closer to what grammar stands for in SFL - Definition 2.1.6.

Definition 2.1.5 (Grammar (Moravcsik)). ... maximally general analytic descriptions, provided by descriptive linguistics, [are] called grammars. A grammar has five components: phonology (or, depending on the medium, its correspondent e.g. morphology), lexicon, syntax and semantics (Moravcsik 2006: pp.24–25).

Definition 2.1.6 (Grammar (Halliday)). To Halliday, lexico-grammar, or for short, simply grammar is a part of language and it means the wording system - the “lexical-grammatical stratum of natural language as traditionally understood, comprising its syntax, vocabulary together with any morphology the language may display [...]” (Halliday 2002: p.369).

The last point I want to mention is the approach to semantics. Formal grammars aim to account for the realisation variations, that is formation of words, phrases and sentences along with their arrangements and mention of semantics is often restricted to what may be termed the *formal aspect of meaning*.

By contrast, a systemic grammar is a functional grammar, which means (among other things) that it is semantically motivated, i.e. “natural”. So the fundamental distinctions between formal and functional grammars is the semantic basis for explanations of structure.

Also, in SFL, the meaning is being approached from a semiotic perspective, placing the linguistic semantics in perspective with the linguistic expression and the real world situation. In this respect, Lemke (1993) offers a well formulated theoretical foundation that “human communities are eco-social systems that persist in time through ongoing exchange with their environment; and the same holds true for any of their sub-subsystems [...]” including language. The social practices constituting such systems are both material and semiotic, with a constant dynamic interplay between the two. (Halliday 2002: p.387)

To Halliday, the term *semiotic* accounts for an orientation towards meaning rather than sign. In other words, the interaction is between *the practice of doing and the practice of meaning*. As the two sets of practices are strongly coupled, Lemke points out that there is a high degree of redundancy between the *material-semiotic interplay*. And it perfectly resonates with Firth’s idea of *mutual expectancy* between the text and the situation. This idea of interplay is incorporated in SFL as *language stratification* and is graphically represented in Figure 2.1.

Having that said, the stratification axis is a useful dimension to relate the formal and the systemic functional grammars. This is also an instrument employed by Hjelmslev (Taverniers 2011).

The SFL model defines language as a resource organised into three strata: phonology (sounding), lexicogrammar (wording) and semantics (meaning). Each is defined according to its level of abstraction on the realisation axis. The realisation axis is divided into two planes: the expression and the content planes. Although debate about the precise division continues, for current purpose it is sufficient to see the first

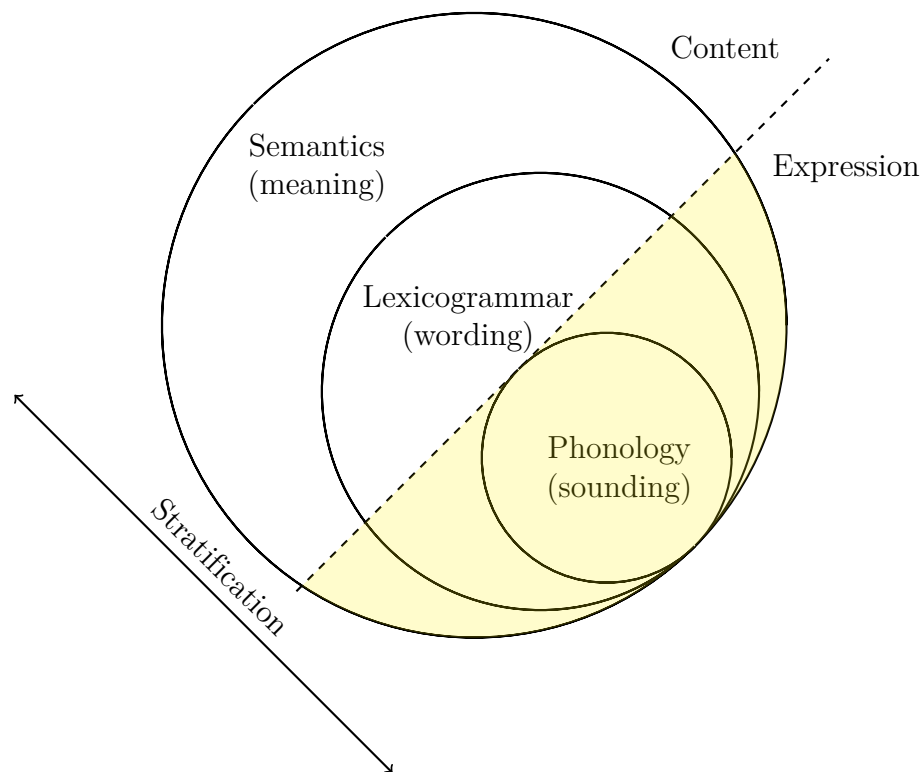


Fig. 2.1 The levels of abstraction along the realisation axis

stratum (i.e. phonology/morphology) belongs to the *expression plane* and the last two (lexicogrammar and semantics) belong to the *content plane*. In this context, the formal grammar could be localised entirely within the expression plane, including the phonology/morphology, syntax, lexicon while formal semantics, stripped of any explanations in terms of the meaning potential, belongs in the content plane.

2.2 Sydney theory of grammar

I start introducing the terms of SFL theory with the Sydney grammar as this is in accordance with the historical development originating with Halliday (2002) defining the categories of the theory of grammar. He proposes four fundamental categories: *unit*, *structure*, *class* and *system*. Each of these categories is logically derivable from and related to the other ones in a way that they mutually define each other. These categories relate to each other on three scales of abstraction: *rank*, *exponence*, *delicacy*. Halliday also uses three scale types: *hierarchy*, *taxonomy* and *cline*.

Definition 2.2.1 (Hierarchy). Hierarchy [is] a system of terms related along a single dimension which involves some sort of logical precedence. (Halliday 2002: p.42).

Definition 2.2.2 (Taxonomy). Taxonomy [is] a type of hierarchy with two characteristics:

1. the relation between terms and the immediately following and preceding one is constant
2. the degree is significant and is defined by the place in the order of a term relative to following and preceding terms. (Halliday 2002: p.42)

Definition 2.2.3 (Cline). Cline [is] a hierarchy that instead of being made of a number of discrete terms, is a continuum carrying potentially infinite gradations. (Halliday 2002: p.42).

The concept of cline may not necessarily originate in SFL but it is used and referred quite extensively in the domain literature. Next I define and introduce each category of grammar and the related concepts that constitute the theoretical foundation for the Sydney Theory of grammar.

2.2.1 Unit

Language is patterned activity of meaningful organization. The patterned organization of substance (*graphic* or *phonic*) along a linear progression is called *syntagmatic order* (or simply *order*).

Definition 2.2.4 (Unit). The unit is a grammatical category that accounts for the stretches that carry grammatical patterns. (Halliday 2002: p.42). The units carry a fundamental *class* distinction and should be fully identifiable in description. (Halliday 2002: p.45).

Generalization 2.2.1 (Constituency principles). The five principles of constituency in lexicogrammar are:

1. There is a scale or rank in the grammar of every language. That of English (typical of many) can be represented as: clause, group/phrase, word, morpheme.
2. Each unit consists of *one or more* units of rank next below.
3. Units of every rank may form complexes.

4. There is potential for rank shift, whereby a unit of one rank may be downranked to function in a structure of a unit of its own rank or of a rank below.
5. Under certain circumstances it is possible for one unit to be enclosed within another, not as a constituent but simply in such a way as to split the other one into two discrete parts. (Halliday & Matthiessen 2013: pp.9–10)

The relation between units is that of consistency for which we say that a unit *consists of* other units. The scale on which the units are ranged is the *rank scale*. The rank scale is a levelling system of units supporting unit composition regulating how units are organised at different granularity levels from clause, to groups/phrases to words and the units of a higher rank scale consist of units of the rank next below. The Table 2.1 presents a schematic representation of the rank scale and its derived complexes.

Rank scale ↓	Complexing
	Clause complex
Clause	
	Group(/phrase) complex
Group(/phrase)	
	Word complex
Word	
	(Morpheme complex)
(Morpheme)	

Table 2.1 Rank scale of the (English) lexicogrammatical constituency

Generalization 2.2.2 (Rank scale constraints). The rank relations are constrained as follows:

1. downward *rankshift* is allowed i.e. the transfer of a given unit to a lower rank.
2. upward rankshift is not allowed.
3. only whole units can enter into higher units. (Halliday 2002: p.44).

The Generalization 2.2.2 taken as a whole means that a unit can include, in what it consists of, a unit of rank higher than or equal to itself but not a unit of rank more than one degree lower than itself; and not in any case a part of any unit. (Halliday 2002: p.42).

2.2.2 Structure

Definition 2.2.5 (Structure). The structure (of a given unit) is the arrangement of *elements* that take places distinguished by order relationship (Halliday 2002: p.46).

Definition 2.2.6 (Element). The element is defined by the place stated as absolute or relative position in sequence and with the reference to the unit next below (Halliday 2002: p.47).

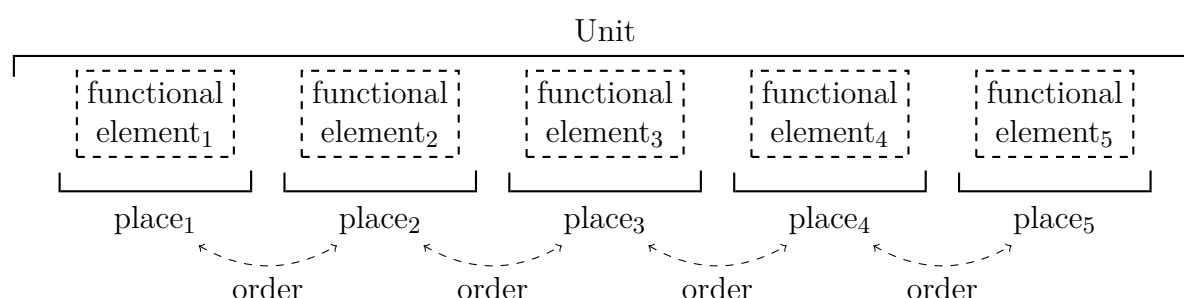


Fig. 2.2 The graphic representation of (unit) structure

We say that an unit is composed of elements located in places and that its internal structure is accounted via elements in terms of functions and places taken by the lower (constituting) units or lexical items. The graphic representation of the unit structure is depicted in Figure 2.2. The unit structure is referred in linguistic terminology as *constituency* (whose principles are enumerated in Generalization 2.2.1). In the unit structure, the elements resemble an array of empty slots that are *filled* by other units or lexical items.

2.2.3 Class

Definition 2.2.7 (Class). The class is that grouping of members of a given unit which is defined by operation in the structure of the unit next above (Halliday 2002: p.49).

Halliday defines class (Definition 2.2.7) as likeness of the same rank “phenomena” to occur together in the structure. He adopts a top-down approach stating that the class of a unit is determined by the *function* (Definition 2.2.9) it plays in the unit above and not by its internal structure of elements. In SG the structure of each class is well accounted in terms of syntactic variation recognizing six unit classes: *clause*, *prepositional phrase* and *nominal*, *verbal*, *adverbial* and *conjunction* groups. Sydney grammar is briefly summarised in the Appendix ??.

2.2.4 System

Structure is a syntagmatic ordering in language capturing regularities and patterns which can be paraphrased as *what goes together with what*. However, language is best represented as a set of system networks (Definition 2.2.8) which is a paradigmatic ordering in language describing *what could go instead of what* (Halliday & Matthiessen 2013: p. 22).

This is an essential assumption of systemicists is that the language is best represented in the form of system networks and not as an inventory of structures. The structure of course is a part of language description but it is only a syntagmatic manifestation of the systemic choices (Halliday & Matthiessen 2013: p.23).

Definition 2.2.8 (System). A system is a set of mutually exclusive set of terms referring to meaning potentials in language and are mutually defining. It always means a *closed system* and has the following characteristics:

1. the number of terms is finite,
2. each term is exclusive of all others,
3. if a new term is added to the system it changes the meaning of all other terms. (Halliday 2002: p.41)

A class is a grouping of items identified by operation in the structure. It is not a list of formal items but an abstraction from them. By increase in *delicacy* the class is broken into secondary classes which stand in the relation of exponent to an element of primary structure of the unit next above. This breakdown gives a system of classes that constitute choices implied by the nature of the class. (Halliday 2002: p.41)

2.2.5 Functions and metafunction

Definition 2.2.9 (Function). The functional categories or functions provide an interpretation of grammatical structure in terms of the overall meaning potential of the language. (Halliday & Matthiessen 2013: p.76).

Most constituents of the clause structure, however, have more than one function which is called a *conflation of elements*. For example in the sentence “Bill gave Dolly a rose”, “Bill” is the Actor doing the act of giving but also the Subject of the sentence. So we say that Actor and Subject functions are conflated in the constituent “Bill”. This is exactly the point where the concept of *metafunction* or *strand of meaning* comes into

the picture. The Subject function is said to belong to the *interpersonal metafunction* while Actor function belongs in the *experiential metafunction*.

Halliday identifies three fundamental dimensions of structure in the clause each with distinct meaning: *experiential*, *interpersonal* and *textual*. He refers to them as *metafunctions* and they account of how language meaning has evolved. Table 2.2 presents metafunctions and their reflexes in the grammar as proposed in (Halliday & Matthiessen 2013: p.85).

Metafunction	Definition(kind of meaning)	Corresponding status in clause	Favored type of structure
experiential	construing a model of experience	clause as representation	segmental (based on constituency)
interpresonal	enacting social relationship	clause as exchange	prosodic
textual	creating relevance to context	clause as message	culminative
logical	constructing logical relations	-	iterative

Table 2.2 Metafunctions and their reflexes in the grammar

Generalization 2.2.3 (Exhaustiveness principle). Everything in the wording has some function at every rank but not everything has a function in every dimension of structure. (Halliday 2002; Halliday & Matthiessen 2013)

With respect to structure and metafunctions, Halliday formulates the general principle of *exhaustiveness* (Generalization 2.2.3) saying that clause constituents have at least one and may have multiple functions in different strands of meaning, however it does not mean that it must have a function in each of them.

This principle implicitly relates to the economic property of language meaning that it naturally evolves towards the shortest and most effective way of expressing a meaning. There is nothing meaningless thus every piece of language must be explained and accounted for in the lexicogrammar.

2.2.6 Lexis and lexicogrammar

In SFL the terms *word* and *lexical item* are not really synonymous. They are strongly related but they refer to different things. The term “word” is reserved (in early Halliday) for the grammatical unit of the lowest rank whose *exponents* are lexical items.

Definition 2.2.10 (Lexical Item). In English, a lexical item may be a *morpheme*, *word* (in traditional sense) or *group (of words)* and it is assigned to no rank. (Halliday 2002: p.60)

Examples of lexical items are all of the following ones: “ ’s ” (the possessive morpheme), “house, walk, on” (words in traditional sense) and “in front of, according to, ask around, add up to, break down” (multi word prepositions and phrasal verbs)

If most linguists treat the grammar and lexis as discrete phenomena, Halliday brings them together as opposite poles of the same cline. We say that they are paradigmatically related through delicacy relation. He refers to this merge as *lexicogrammar* and he expressed his dream that one day linguists will be able to turn whole linguistic form into (lexico)grammar showing that lexis is the most delicate grammar.

Hasan (2014), explores the reality of Halliday’s dream in terms of project feasibility and exploring the implications of what would it mean to turn the “whole linguistic form into grammar”. This then implies two completely new assumptions: that lexis is not form and that its relation to semantics is unique (challenging the problems of polysemy). It would be the function of the lexicogrammar to map the multiple *meta-functional strata* into a unified structure.

2.3 Cardiff Theory of grammar

This section present the theory of grammar as conceived by Robin Fawcett at University of Cardiff. The biggest difference to Hallidayan theory is renouncing the concept of rank scale which has an impact on the whole theory. As a consequence, to accommodate the lack of rank-scale, Fawcett adapts the definitions of the fundamental concepts and slightly changes the choice of words.

In 2000, Robin Fawcett presents a theory of grammar in contrast to some aspects of Michael Halliday’s grammar 2002. One of the main differences is the rejection of the rank scale concept. Another is the bottom-up approach to unit definition as opposed to top-down one advocated by Halliday. These two and few other discrepancies have quite an important implication on the overall theory of grammar and of course the grammar itself.

Fawcett (2000) proposes three fundamental categories in the theory of grammar: *class of unit*, *element of structure* and *item*. Constituency is a relation accounting for prominent compositional dimension of language. However a unit does not function directly as a constituent of another unit but via a specialised relation. Fawcett breaks down constituency into three relations: *componence*, *filling* and *exponence*. Informally is said that a unit is composed of elements which are either filled by another unit or expounded by an item. He also proposes three secondary relations of *coordination*, *embedding* and *reiteration* to account for the full range of syntactic phenomena.

2.3.1 Class of units

Definition 2.3.1 (Class of Unit). The class of unit [...] expresses a specific array of meanings that are associated with each one of the major classes of entities in semantics [...] and] are to be identified by the elements of their internal structure (Fawcett 2000: p.195).

Class of unit is determined based on its internal structure i.e. by its elements of structure (and not by the function it plays in the parent unit).

Fawcett takes a semantic stance in classifying units which in line with Saussurean approach to language. He proposes that in English there are four major semantic classes of entities: situations, things, qualities (of situations and things) and quantities (typically of things but also of situations and qualities) corresponding to major syntactic units of *clause*, *nominal group*, *prepositional group*, *quality group* and *quantity group* (Fawcett 2000: p. 193–194) along with a set of minor classes such as *genitive cluster* and *proper name cluster*.

His classification is based on the idea that the syntactic and semantic units are mutually determined and supported by grammatical patterns. However those patterns are beyond the syntactic variations of the grammar and blend into lexical semantics.

2.3.2 Element of Structure

Definition 2.3.2 (Element of Structure). The elements of structure are immediate components of classes of units and are defined in terms of their *function* in expressing meaning and not in terms of their absolute or relative position in the unit. (Fawcett 2000: pp.213–214).

Generalization 2.3.1. Definition 2.3.2 leads to the following two principles:

1. Every element in a given class of unit serves a function in that unit different from the function of the sibling elements.
2. Every element in every class of unit will be different from every element in every other class of unit. (Fawcett 2000: p.214)

The elements (of structure) are functional slots which define the internal structure of an unit but still they are *located* in *places*. One more category that intervenes between element and unit is the concept of *place* which become essential for the generative versions of grammar.

There are two ways to approach place definition. The first, is to treat places as positions of elements relative to each other (usually previous). This leads to the need of an *anchor* or a *pivotal element* which may not always be present/realised.

The second, is to treat places as a linear sequence of locations at which elements may be located, identified by numbers “place 1”, “place 2” etc. This place assignment approach is absolute within the unit structure and makes elements independent of each other. This approach has been used in COMMUNAL and Penman projects.

2.3.3 Item

Definition 2.3.3 (Item). The item is a lexical manifestation of meaning outside syntax corresponding to both words (in the traditional sense), morphemes and either intonation or punctuation (depending whether the text is spoken or written). (Fawcett 2000: pp.226–232).

Items correspond to the leaves of syntactic trees and constitute the raw *phonetic* or *graphic* manifestation of language. The collection of items of a language is generally referred as *lexis*.

Since items and units are of different nature, the relationship between an element and a (lexical) item must be different from that to a unit. We say that items *expound* elements and not that they *fill* elements as units do.

In traditional grammar *word classes* or *parts of speech* are a commonly accepted concept. However in SFL, it plays rather an orientation or an approximation role, precisely because the word classes do not properly correspond to the elements they expound. So terms as *noun* or *adjective* are useful to denote a class of words that expound a certain element of the structure, but such word class to element correspondence shall by no means treated as definite rule.

2.3.4 Componentence

Definition 2.3.4 (Componentence). Componentence is the part-whole relationship between a unit and the elements it is composed of. (Fawcett 2000: p.244).

Note that componentence is not a relationship between a unit and its places, the latter, as discussed in Section 2.3.2, simply locationally relate elements of a unit to each other.

Componentence intuitively implies a part-whole constituency relationship between the unit and its elements. But this is not the only view. Another perspective is the concept of *dependency* or strictly speaking *sister or sibling dependency* (because the traditional concept of dependency is parent-daughter relation). However the sister dependency is not necessary in the grammar model and is a by-product or second order concept that can be deduced from the constituency structure.

The (supposed) dependency relation between a modifier and the head, in the framework of SFG is, not a direct one that form-centered linguists consider to be. They simply assume that what modifier modifies is the head. Here however the general function of the modifiers is to contribute to the meaning of the whole unit which is anchored by the head. For example, in the nominal group, the modifier contributes to the description of the referent stated by the head. So the head realises one type of meaning that relates the referent while modifier realises another one. Both of them describe the referent via different kinds of meaning, therefore they are related indirectly to each other because the modifier does not modify the head but the referent denoted by the head. (Fawcett 2000: p.216)

Moreover the dependency relations are expressed between system networks and according to Fawcett this is the true place for dependencies in SFL.

2.3.5 Filling and the role of probabilities

Definition 2.3.5 (Filling). Filling is the probabilistic relationship between a element and the unit lower in the tree that operates at that element. (Fawcett 2000: p.238, 251).

Fawcett renounces the concept of rank scale and alternatively proposed the concept of *filling probabilities*. The probabilistic predictions are made in terms of filling relationship between a unit and an element of structure in a higher unit in the tree rather than being a relationship between units of different ranks. This places focus from the fact that a unit is for example a group, to what group class it is.

In this line of thought, some elements of a clause are frequently filled by groups, but some other element almost never being rather expounded by items. The frequency

varies greatly and is an important factor for predicting or recognizing either the unit class or the element type in the filling relationship.

Filling may add a single unit to the element of structure or it can introduce multiple coordinated units. Filling also makes possible the embedding relation. Both, coordination and embedding relations makes it possible to deal without inter-clausal *hypotaxis* and *parataxis* relations described in Sydney Grammar.

Note also that filling and componence are two complementary relations that occur in the syntactic tree down to the level when the analysis moves out of abstract syntactic categories to more concrete category of items via the relationship of exponence.

2.3.6 A few more concepts

Definition 2.3.6 (Exponence). Exponence is the relation by which an element of structure is realised by a (lexical) item (Fawcett 2000: p.254).

Definition 2.3.7 (Coordination). Coordination is the relation between units that fill the same element of structure (Fawcett 2000: p.263).

Coordination is usually marked by an overt *Linker* such as *and*, *or*, *but*, etc. and sometimes it is enforced by another linker that introduces the first unit such as *both*.

Coordination is through by Fawcett as being not between syntactic units but between mental referents. It always introduces more than one unit which are syntactically and semantically in similar (somehow) resulting in a *syntactic parallelism* which often leads to *ellipsis*.

Definition 2.3.8 (Reiteration). Reiteration is the relation between successive occurrences of the same item expounding the same element of structure (Fawcett 2000: p.271).

Reiteration often is used to create the effect of emphasis such as for example “she’s very very nice!”. Like coordination, reiteration is a relation between entities that fill the same element of the unit structure which is problematic in my opinion and I further discuss it in Section 2.4.6.

Definition 2.3.9 (Embedding). Embedding is the relation that occurs when a unit fills an element of the same class of units, i.e. when a unit of the same class occurs (immediately) above it in the tree structure (Fawcett 2000: p.264).

Fawcett opens embedding as a general principle as opposed to exceptional/controlled embedding indicated by Halliday. I will further discuss it in the context of rank-scale concept in Section 2.4.1

Definition 2.3.10 (Conflation). Conflation is the relationship between two elements that are filled by the same unit having the meaning of “immediately after and fused with” and function as one element (Fawcett 2000: pp.249–250).

Conflation is useful in expressing multi-faceted nature of language when for example syntactic and semantic elements/functions are realised by the same unit for example the Subject and the Agent or Complement and Affected. Also conflation relations frequently occur between syntactic elements as well such as for example the Main Verb and Operator or Operator and Auxiliary Verb.

Definition 2.3.11 (Taxis). *Taxis* represents the degree of interdependency between units systematically arranged in a linear sequence where *parataxis* means equal and *hypotaxis* means unequal status of units forming a *nexus* together.

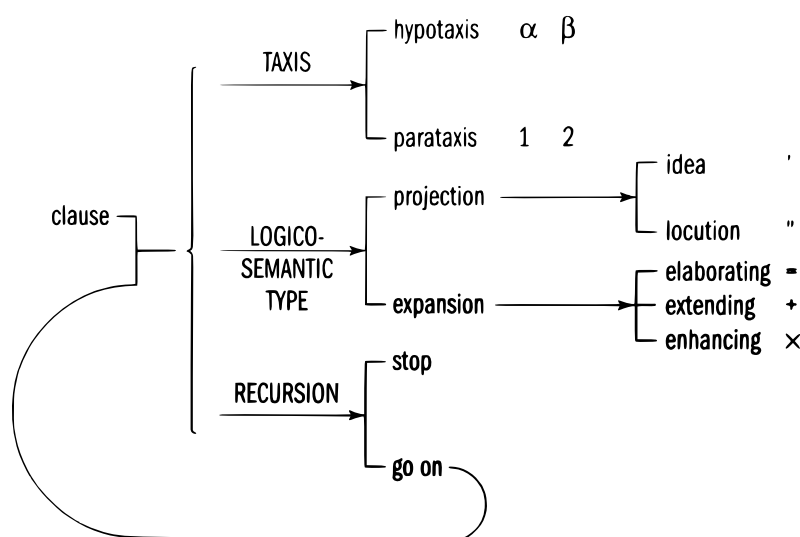


Fig. 2.3 Types of relations between clauses (Halliday & Matthiessen 2013: p.438)

Taxis play a central role in explaining the textual cohesion. Figure 2.3 depicts the Taxis and clause logico-semantic relations in a single system network. Here taxis relations are employed in explaining how clauses form a nexus with certain tactic relations to one another (Halliday & Matthiessen 2013: pp. 438 – 443). These concepts nevertheless are very useful at describing unit relations not only at the group and clause ranks but all the way down to smallest linguistic unit such as morphemes and phonemes. I will also employ the concept of taxis in the discussion of dependency relations in Section ???. Next I discuss the strengths and weaknesses of the two schools with a pragmatic goal of parsing in mind.

2.4 Critical discussion on both theories

The two sections above cover the definitions and fundamental concepts from each of the two systemic functional theories of grammar. Current work uses a mix of concepts from both theories and this section discusses in detail what and why is being adopted attempting a rather pragmatic reconciliation than a theoretical debate. Next I draw parallels and highlight correspondences between Sydney and Cardiff theories of grammar and where needed alter and present my position on the matter.

2.4.1 Relaxing the rank scale

The *rank scale* proposed by Halliday (2002) became overtime a highly controversial concept in linguistics. Whether it is a suitable for grammatical description or not still continues up to date. The historic development of this polemic is documented in (Fawcett 2000: p.309–338).

I consider rank scale a very useful dimension for unit classification and placement but the definition laid by the Sydney school is too rigid and thus I propose to relax it into a weaker version of it. The relaxation consists of dropping completely the *rank scale constraints* as enunciated in Generalization 2.2.2. An immediate consequence is that the *embedding* relation can be broadly defined as a naturally occurring phenomena in language at all ranks and not only for clauses as initially proposed.

Halliday's theory allows the downwards rank shift, forbids upwards rank shift and restricts the composition relation to engage only with whole units. Thus the unit may be composed of units of equal rank or a rank higher and cannot be composed of units that are more than one rank lower or parts of other units. The consequence of above is that each element of the clause is filled by a group which has its elements expounded by words.

- (1) some very small wooden ones

The above rules often pose analysis difficulties and complications. For example in nominal groups what seems to be an element is not a single word but a group of words. Consider example 1 where Epithet “*very small*” is not a single word but a group (Halliday & Matthiessen 2013: pp. 390–396). This kind of phenomena introduced a *substructure* of modifiers and heads (see analysis in table 2.3) which complicates the general structure of the nominal group. Accordingly, the Epithet “*very small*” is composed of a head “small” and a modifier “very”. This kind of intricate cases can be

simplified through rank-shift constraints allowing the elements of a group to be filled by other groups or expounded by words.

some	very	small	wooden	ones
<i>Deictic</i>	<i>Epithet</i>		<i>Classifier</i>	<i>Thing</i>
<i>Modifier</i>				<i>Head</i>
	<i>Sub-Modifier</i>	<i>Sub-Head</i>		

Table 2.3 Sydney analysis of Example 1

An approach to describe units outside the rank-scale was suggested by Fawcett (2000) and Butler (1985). Because units are carriers of a grammatical pattern, they can be described in terms of their internal structure instead of their potential for operation in the unit above.

Fawcett proposes complete abandonment of rank scale replaces it with the filling probabilities to guide the unit composition simply mapping elements to a set of legal unit classes that may fill it. The above example, in CG the “*very small*” is analysed as a quality group that plays the role of Modifier (CG) in the nominal group as in table 2.4.

some	very	small	wooden	ones
<i>Quantifying Determiner</i>	<i>Modifier</i>		<i>Modifier</i>	<i>Head</i>
	<i>Quality Group</i>			
	<i>Degree Tamperer</i>	<i>Apex</i>		

Table 2.4 Cardiff analysis of Example 1

I maintain the idea of ranking the syntactic units because it is a pertinent classification with a clear correspondence to the types of meaning structures in the ideational space.

However I drop the constituency constraints and hence allowing the flexibility for elements to be filled by other units or in other words allow unit embedding. This approach removes the need of sub-structures in the unit elements reducing thus the structural complexity.

The rank system constrains had consequences on the phenomena of embedding defined by Halliday in Definition 2.4.1, which I consider way too restrictive.

Definition 2.4.1 (Embedding (strict)). Embedding is the mechanism whereby a clause or phrase comes to function as a constituent within the structure of a group, which is itself a constituent of a clause. (Halliday & Matthiessen 2013: p.242)

The weakening of constituency constraints makes embedding a normal (as defined in broad sense 2.3.9 by Fawcett) rather than an exceptional (as defined in a strict sense in 2.4.1 by Halliday) phenomena. And I agree with Fawcett's definition because the human language allows construction of units that contain other units within them regardless of their class.

2.4.2 The unit classes

Fawcett drops the concept of rank system (discussed in Section 2.4.1) and through a bottom-up approach redefining the class as a "class of unit" as in 2.3.1.

He adopts Saussurean perspective on language which states that semantics and syntax are strongly intertwined with each other so major semantic classes of entities correspond to the major syntactic units. This leads Fawcett to take a semantic basis for classifying syntactic units into: clause, nominal group, prepositional group, quality group and quantity group (Fawcett 2000: p. 193–194) along with a set of minor classes such as genitive and proper name clusters.

The problem with this approach is that these classes are beyond the syntactic variations of the grammar and blend into lexical semantics which makes it difficult to apply to parsing, at least nowadays with current state of word classification.

In the current project I turn to Sydney classification of syntactic units that is close in line with traditional syntactic classification (Quirk et al. 1985). I adopt the clause as a unit plus the four group classes of Sydney grammar depicted in Figure 2.4.

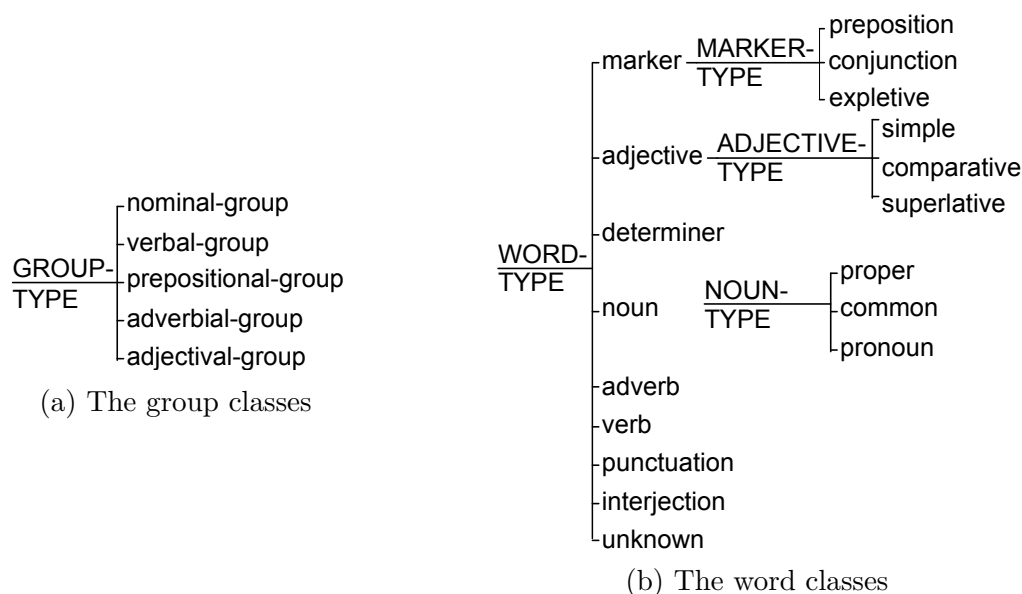


Fig. 2.4 The group and word classes

2.4.3 The structure

The *unit* and *structure* are two out of the four fundamental categories in the systemic theories of grammar. Sydney and Cardiff theories vary in their perspectives on *unit* and *structure* influencing how units are defined and identified.

For Halliday, the *structure* (Definition 2.2.5) characterises each unit as a carrier of a pattern of a particular order of *elements*. The order is not necessarily linear realisation sequence but a theoretical relation of relative or absolute placement. This perspective has been proved useful in generation exercises where unit placement evolves in the realisation process.

The Cardiff School take a bottom up approach and defines class in terms of its internal structure describing a relative or absolute order of elements. This sort of syntagmatic account is precisely what is deemed useful in parsing and is the one adopted in this thesis. It is well established algorithmically how to recognise classes and construct them bottom up. So in our case easier to let the unit class emerge from recognition of constituent part-of-speech (word classes) and dependency relations between words or sequence of lower unit classes. In other words the unit class is defined by the unit structure and not by it's function in the parent unit, as Sydney school predicates, and this is precisely the reason why creation of constituency structure is computationally accessible.

2.4.4 Syntactic and semantic Heads

In SFG the heads may be semantic or syntactic. In most cases they coincide but there are exceptions when they differ or even miss. This is especially an important topic in the discussions of the nominal group structure on which Halliday & Matthiessen (2013) offer a thorough examination but Fawcett (2000) offers us a more generic perspective on this issue.

Consider the example of nominal group “a cup of tea” analysed in three different ways in the Table 2.5. The Sydney Grammar offers two analyses in which the semantic and the syntactic heads differ. In the *experiential* analysis the head is “tea” which functions as *Thing*, while in the *interpersonal* analysis the head is “cup” which functions as *Head*.

Cardiff Grammar does not make the Head/Thing distinction because the functional elements are already established based on semantic criteria. discussed in subsection 2.5.3. Nevertheless the logical analysis of SG resonates closely with the traditional “semantically blinded” grammars because it always provides a syntactic Head even if differs from the “pivotal element” of the group.

		a	cup	of	tea
Sidney Grammar	experiential	<i>Numerative</i>			<i>Thing</i>
	interpersonal	<i>Modifier</i>	<i>Head</i>	<i>Qualifier</i>	
Cardiff Grammar		<i>Quantifying Determiner</i>		<i>Selector</i>	<i>Head</i>

Table 2.5 Example of dispersed semantic and syntactic heads

Fawcett argues that none of the constituting elements of the unit is mandatory realised even the so called “*pivotal element*” which is the group defining element. The logical structure heads are always realised and correspond dependency relations established in the DG. Depending on the unit class logical structure heads are conflated with specific functions, for instance in nominal group the Head is usually conflated with the Thing, in quality group with the Apex, in quantity group with the Amount, in clause with the Main Verb and so on. But in language it is not unusual to have nominal groups with the Thing missing or elliptic clauses with missing the Main verb so no rigid correspondence can be established between the Head, unit class and the corresponding pivotal element of the group. So because the unit class depends on its internal structure leading to a circular interdependency between the unit class and the unit structure. To solve this issue Fawcett argues for bottom-up approach where head-modifier relations are identified between lexical items and then between units (i.e. groups and clauses) serving as cues to identify elements of the higher unit and therefore

it's class. Usually the class membership of head is raised to the unit class although sometimes the presence or absence of certain elements (during the reconstruction process) may alter the unit class to a different from the logical head.

(2) The old shall pass first.

Consider the nominal group “The old” which is the subject in example 2. The head of the nominal group is the adjective “old” and not a noun as it would normally be expected. The noun modified by the adjective “old” is left covert and it shall be recoverable from the context. We can insert a generic noun “one” to form a canonical noun group: “the old one”. In such cases when the head noun is missing, the logical head is conflated with other element in this case the Epithet. The group class is not raised from the word class to quality group but is identified by internal structure of the whole group and in this case the presence of determiner signals a nominal class. I point out through this example that the class of the head is not always is raised to establish the group class but the whole underlying structure determines the group class.

2.4.5 Systems and systemic networks

Fore example consider polarity system represented in figure 2.5. It contains two choices either positive or negative. And when one says it is positive one means not negative which is obvious and self evident how the two choices are mutually exclusive.

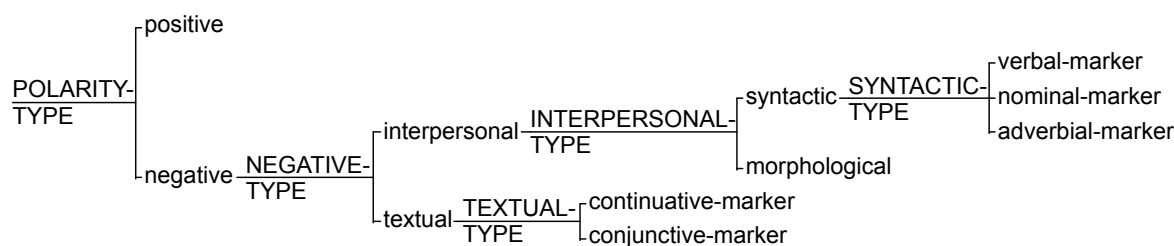


Fig. 2.5 System network of POLARITY

In language it may be often the case that a choice in a system may lead to re-entering the same system again to make another choice again forming this way recursive systems. Alternatively, we can say that a system allows multiple choices for the same unit. These perspectives are the sides of the same coin where the recursion perspective is useful for natural language generation while multiple choice perspective suits better the parsing task and next I explain why by continuing the discussion on polarity system.

The negative polarity in English clauses can be realised in several ways: via a noun group with intrinsic negative polarity feature like “*nobody*” (3), negation particle of the verb “*n’t*” (4) or adverb with intrinsic negative polarity (5).

- (3) Nobody with any sense is going.
- (4) I don’t have to mow my lawn.
- (5) Never expect her to come back.

Consider now, the cases of double negation from the example 6 where two kinds of negations are realised in the same clause: the negation by verb particle “*n’t*” and the pronoun “*nobody*”.

- (6) Nobody with any sense isn’t going.
- (7) I don’t have nobody to mow my lawn.

The systems can be recursive and thus choices are not always mutually exclusive. Even though the system network clearly distinguishes one type of negation from another multiple negations can still occurring simultaneously. Note that this more delicate distinctions in kind of negation, still is a negation and for any of them it is impossible to co-occur with positive polarity. The issue here is not semantic about whether the clause is positive or negative but what kinds of grammatical choices can be identified within the clause. The problem of whether the double negation shall be interpreted as positive is not necessarily as relevant as the task of identifying the two instances of negation.

Halliday states that the speaker makes only one choice from a system. If this rule is interpreted as two choices from the same system at a time being impossible then it clearly does not cover the recursive systems and needs weakening to accommodate border cases. I propose relaxing the constraint of *mutual exclusivity* to *disjunction*. Correspondingly, two types of systemic networks emerge differing by *the relation among choices*: the original Hallidayan XOR systems (such as POLARITY TYPE in figure 2.5) and the OR systems for accommodating cases of multiple feature selections (such as SYSTEMIC TYPE in the same figure).

As system is expanded in delicacy to forms a systemic network of choices. Choice of a feature in one system becomes the entry condition for choices in more delicate systems below. I turn now to discuss the relationship types of relationships forming entry conditions to more delicate systems. For instance, an increase in delicacy can be seen as a taxonomic “is a” relationship between features of higher systems and lower systems like in the case of POLARITY TYPE and NEGATIVE TYPE in figure 2.5.

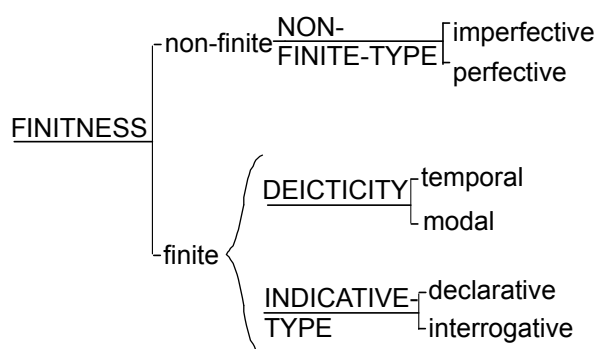


Fig. 2.6 A fraction of the finiteness system where increase of delicacy is not “is a” relation

The activation relation among systems in the cline of delicacy is not always taxonomic. Another relation is “enables selection of” without any sub-categorisation implied. For example see FINITENESS system in figure 2.6 where in case that the finite option is selected then what this choice enables are not subtypes of finite but merely other options that become available i.e. DEIXIS and INDICATIVE TYPE. The latter is there because selection of finite implies also selection of indicative feature in a FINITENESS’s sibling system MOOD-TYPE comprised of options indicative vs. imperative.

In this subsection I defined the system and systemic network, presented two system types by the relationship between their choices and distinguished two kinds of activation relations between systems on the cline of delicacy.

2.4.6 coordination as unit complexing

In SG unit complexes fill an important part of the grammar along with the *taxis relations* which express the interdependency relations in unit complexes. *Parataxis* relations bind units of equal status while the *Hypotaxis* ones bind the dominant and the dependant units. Fawcett bypasses the *taxis* relations replacing them with coordination and embedding (Fawcett 2000: p. 271) seemingly an oversimplified approach leading to abandonment of unit complexing as well. While embedding accounts for the depth and complexity of syntax his approach to coordination is problematic. I further discuss and argue for utility of unit-complexes for the coordination but this idea can be further extended to other phenomena which involve fixed idiomatic structures such as comparatives or conditionals.

Coordination is challenge not only for SFL but for other linguistic theories as well. CG treats this phenomena as two or more units filling or expounding the same element.

For example, in table 2.6 “his shirt” and “and his jeans” are two nominal groups that are siblings and both of them fill the same complement.

<i>Ike</i>	<i>washed</i>	<i>his</i>	<i>shirt</i>	<i>and</i>	<i>his</i>	<i>jeans</i>
Subject	Main Verb	Complement				
		Nominal Group		Nominal Group		
		Deictic Determiner	Head	&	Deictic Determiner	Head

Table 2.6 Coordination analysis in Cardiff Grammar

In SG the coordination is analysed as a *complex unit* held together through paratactic relations ensuring that only one unit fills an element of the parent constituent in our example the complement of the clause. The table 2.7 illustrates an example analysis involving the complex unit approach.

<i>Ike</i>	<i>washed</i>	<i>his</i>	<i>shirt</i>	<i>and</i>	<i>his</i>	<i>jeans</i>
Subject	Predicate/Finite	Complement				
		nominal group complex				
		1		+2		
		Deictic	Thing	&	Deictic	Thing

Table 2.7 Coordination analysis in Sydney Grammar

The opinions are divided by whether to invite the notion of a complex unit to handle coordination or not. If we dismiss the unit complex then an element could be filled by more than one units and if we adopt it then the complexing relations need to be accounted along with unit class and what is its structure.

I would argue for adoption of such unit type for two reasons. First, only units are accounted for structure while the elements can only be filled by an unit. Allowing multiple units to fill an element requires accounting at least for order if not also for the relation between the units. The structure as it is described in theories of grammar by Halliday (Halliday 2002) and Fawcett (Fawcett 2000) is defined in the unit and not the element. A unit has a specific possible structure in terms of places of elements however if an element is filled by two units simultaneously it constitutes a violation of the above principle as the order of those units is not accounted for but it matters.

- (8) (Both my wife and her friend) arrived late.
- (9) * (And her friend both my wife) arrived late.
- (10) I want the front wall (either in blue or in green).
- (11) * I want the front wall (or in green either in blue).

If the order would not have mattered then we could say that the conjunctions from the example 8 can be reformulated into 9 and the one from 10 into 11. But such reformulations are grammatically incorrect. Obviously the places do matter and they need to be described in the unit structure.

Secondly, the lexical items that signal the conjunction are not a part of the conjuncted units. This is contrary to what is being described in Cardiff and Sydney grammars. Fawcett presents the Linker elements (&) which are filled by conjunctions as parts of virtually any unit class placed in the first position of the unit. Halliday omits to discuss in IFG (Halliday & Matthiessen 2013) the place of Linkers but implicitly proposes the same as Fawcett through his examples of paratactic relations at various rank levels where the lexical items signalling conjunction are included in the units they precede.

For example in the “or in green” the presence of “or” signals the presence at least of one more unit of the same nature and does not contribute to the meaning of the prepositional group but to the meaning outside the group requiring presence of a sibling. Even more, the lack of a sibling most of the time would constitute an ungrammatical formulation. I say sometimes because it is perfectly acceptable to start a clause/sentence with a conjunction most often “but”. But even in those cases it still invites the presence of a sibling clause/sentence preceding the current one to be resolved at the discourse level.

So conjunctions and pre-conjunctions shall not be placed as elements of the conjuncted units because they do not contribute to their meaning.

Adopting the unit complex and in particular coordination unit requires two clarifications (1) does the unit complex carry a syntactic class, and if so according to which criteria is it established? (2) Does it have any intrinsic features or not?

Zhang states in her thesis that the coordinating constructions do not have any categorial features thus there is no need to provide a new unit type. Instead the categorial properties of the conjuncts are transferred upwards (Zhang 2010). For example if two nominal groups are conjuncted then the complex receives the nominal class. This principle holds for most of the cases however there are rare cases when the units are of different classes. Consider the example 12 where the conjuncts are a nominal group “last Monday” and a prepositional group “during the previous weekend”.

(12) I lost it (either last Monday or during the previous weekend).

In this case there are two unit types that can be raised and it is not clear how to resolve this case. Options are to leave the class unspecified, transfer the class of the first unit upwards, or semantically resolve the class as both represent temporal

circumstances even if they are realised through two different syntactic categories. Another option is to leave the class generic and assign the conjunction unit the class of “*coordination complex*” without sub-classifying it according to the constituent units below, i.e. without upward unit class transfer.

I address the second question regarding the intrinsic features of the complex unit. The coordination complex can have categorial features which none of the constituting units has. In the example 13 the conjunction of two singular noun groups requires plural agreement with the verb. Even though semantic interpretation that only one item is selected at a time, syntactically both items are listed in the clause and attempting third person singular verb forms like in 14 is grammatically incorrect.

(13) A pencil or a pen **are** equally good as a smart-phone.

(14) * A pencil or a pen **is** equally good as a smart-phone.

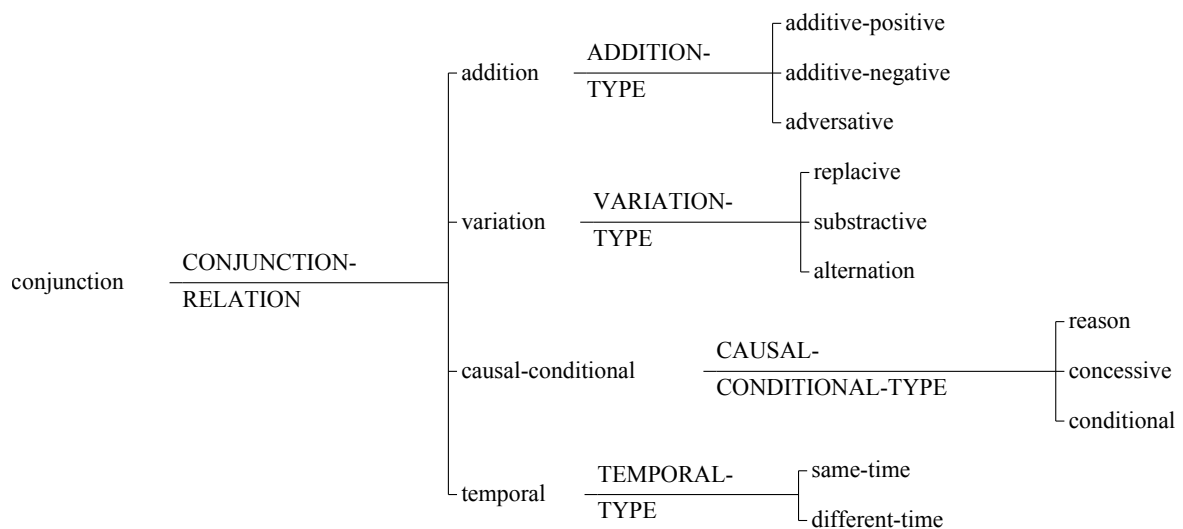


Fig. 2.7 Systemic network of coordination types

In the case of nominal group conjunction we can see that the plural feature emerges even if each individual unit is singular. For other unit classes it is not so obvious whether there are any linguistic features that emerge to the conjunction level. The meaning variation is rather semantic as for example conjunction of two verbs or clauses might mean very different things like consecutive actions, concomitant actions or presence of two states at the same time and so on. This brings us to another feature of the coordination complex - the type of the relationship it constructs. The lexical choice of head conjunct is the indicator of relationship among the conjuncts. Either *and*, *or*, *but*, *yet*, *for*, *nor* or *so* they express different meanings which are well representable as a relationship types systemic network in figure 2.7.

Adopting the unit complexing enables various kinds of constructions and coordination is only one of them. Below we discuss taxis relations and their role in unit complexing.

2.5 Critical discussion of the grammatical units

Now that the important theoretical details have been covered I would like focus on the grammars of the two schools. They have common parts and also differ in large parts on their paradigmatic and syntagmatic descriptions. This section discusses the main units considered in each of the grammars. Like in the previous section I argue on pragmatic grounds for adoption of unit structures from either grammar. This may seem like an inconsistency add below I try to convince you of the opposite below. The argument runs along the line that some unit structures are closer to the syntactic analysis and thus are easier to detect and parse and the other ones may be a level of abstraction higher falling more on the semantic grounds thus becoming more difficult to capture in structural variance and requiring lexico-semantic resources.

For the reasons of limited space I skipped introducing the Sydney and Cardiff grammars and in turn assume that the reader is familiar with the details fo both of them. And for a general overview of the unit structure in each of the grammars please refer to Appendix ???. Nevertheless, as it is a parallel contrastive discussion, even if the reader is familiar with one grammar only I hope it becomes clear how does certain phenomena are dealt with in the other one.

2.5.1 The verbal group and clause division

In SG the verbal group is described as an expansion of a verb just like the nominal group is the expansion of the noun(Halliday & Matthiessen 2013: p.396). There are certainly words that are closely related and syntactically dependent on the verb all together forming a unit that functions as a whole. For example the auxiliary verbs, adverbs or the negation particles are words that are directly linked to a lexical verb. The verb group functions as Finite + Predicator elements of the clause in mood structure and as Process in Transitivity structure.

In CG the verb group is dissolved moving the Main Verb as the pivotal element of the Clause unit. All the elements that form the clause structure and those that form the verb group structure are brought up together to the same level as elements of a clause. The clause structure in CG comprises elements with clause related functions(like

Subject, Adjunct, Complement etc.) and other elements with Main Verb related functions(Auxiliary, Negation particle, Finite operator etc.).

Regarding from the Hallidayan rank scale perspective, merging the elements of the verb group into clause structure is not permitted because the units are of different rank scales. However it is not a problem for the relaxed rank scale version presented in subsection 2.4.1. The reason for adopting such an approach is best illustrated via complex verb groups with more than one non-auxiliary verb such as in examples 15–17.

Next I address the impact of this merger on (a) the clause structure (b) the clause boundaries and (c) semantic role distribution within the clause.

- (15) (The commission **started to investigate** two cases of overfishing in Norway.)
- (16) (The commission **started (to investigate** two cases of overfishing in Norway.))
- (17) (The commission **started (to finish (investigating** two cases of overfishing in Norway.)))

In SG “started to investigate” (example 15) is considered a single predicate of investigation which has specified the aspect of event incipency despite the fact that there are two lexical verbs within the same verbal group. The “starting” doesn’t constitute any kind of process in semantic terms but rather specifies aspectual information about the investigation process. The boundaries of the clause governed by this predicate stretch to entire sentence.

Semantically it is a sound approach because despite the presence of two lexical verbs there is only one event. However allowing such compositions leads to unwanted syntactic analysis for multiple lexical verb cases like in example 17. To solve this kind of problems Fawcett dismisses the verb groups and merges their elements into clause structure. He proposes the syntactically elegant principle of “*one main verb per clause*” (Fawcett 2008). Apply this principle to the same sentence yields a structure of two clauses illustrated in example 16 where the main clause is governed by the verb “to start” and the embedded one by the verb “to investigate”. Note the conflict between “one main verb per clause” with Halliday’s principle that only whole units form the constituency of others (the (c) principle of rank scale described in subsection 2.4.1). So allowing incomplete groups into the constituency structure would breach entire idea of unit based constituency.

Semantically the clause in SFL is a description of an event or situation as a figure with a process, participants and eventually circumstances where the process is realised through a lexical verb. Looking back to our examples, does the verb “to start” really describes a process or merely an aspect of it? Halliday treats such

verbs as aspectual and when co-occurring with other lexical verbs are considered to form a single predicate. Accommodating Fawcett's stance, mentioned above and contradicting Halliday's approach, requires weakening the semantic requirement and allowing aspectual verbs to form clauses that contribute *aspectually or modally* to the embedded ones. I mention also the modal contribution because some verbs like *want, wish, hope*, etc. behave syntactically exactly like the aspectual ones. Moreover, Fawcett introduces into CG Transitivity network "influential" process type including all categories of meanings that semantically function as process modifiers: tentative, failing, starting, ending etc.

Fawcett's "one main verb per clause" principle changes the way clauses are partitioned, leads to abolition of the verbal group and introduces the "influential" process type.

2.5.2 The Clause

It is commonly agreed in linguistic communities that the unit of clause is one of the core elements in human language. It is considered the syntactic unit that expresses semantic units of a situation referring to a potentially rich array of meanings. The clause structure has been studied for long time and the main clause constituents are roughly the same in SFL as the ones in the traditional grammar (Quirk et al. 1985), transformational grammar (Chomsky 1957) and indirectly in dependency grammar (Hudson 2010).

In current work I adopt the CG Clause structure with the *Main Verb* as pivotal element. Though there is no element that is obligatorily realised in English language, the Main Verb is realised with a reliably high degree of probability. Exceptions are the minor clauses (exclamations, calls, greetings and alarms) that occur in conversational contexts and elliptical clauses Halliday & Matthiessen (2013) such as the one in example 18 which are not currently covered.

- (18) They were in the bar, *Dave in the restroom and Sarah by the bar.*

As mentioned before ?? the elements of a structure are defined in terms of their function contributing to the formation of the whole unit. The elements of an English clause are *Subject, Finite, Main Verb* (a part of the Predicator), up to two *Complements* and a various number of *Adjuncts*. All the elements of the assumed verbal group are part of the clause as well such as Auxiliary Verbs, Main Verb Extensions, Negators etc. (see Appendix ?? for a complete list).

2.5.3 The Nominal Group

The nominal group expresses things, classes of things or a selection of instances in that class. In the table 2.8 is presented an example analysis of the nominal group proposed in Sydney grammar (Halliday & Matthiessen 2013: pp. 364–369).

<i>those</i>	<i>two</i>	<i>old</i>	<i>electric</i>	<i>trains</i>	<i>from Luxembourg</i>
pre-modifier				head	post-modifier
Deictic	Numerative	Epithet	Classifier	Thing	Qualifier
determiner	numeral	adjective	adjective	noun	prepositional phrase

Table 2.8 The example of a nominal group in Sydeny Grammar

In SG it is constituted by a head nominal item modified by descriptors or selectors such as: *Deictic*, *Numerative*, *Epithet*, *Classifier*, *Thing* and *Qualifier*. Each element has a fairly stable correspondence to the word classes, expected to be expounded by lexical items. The table 2.9 presents the mappings between the functions and the word classes.

Experiential function in noun group	class (of word or unit)
Deictic	determiner, predeterminer, pronoun
Epithet	adjective
Numerative	numeral(ordinal,cardinal)
Classifier	adjective, noun
Thing	noun
Qualifier	prepositional phrase, clause

Table 2.9 The mapping of noun group elements to classes

The elements in CG differ from those of SG. The table 2.10 exemplifies a noun group analysed with CG covering all the possible elements. The table 2.11 provides a legend for CG acronyms along with mappings to unit and word classes that can fill each element.

<i>or</i>	<i>a photo</i>	<i>of</i>	<i>part</i>	<i>of</i>	<i>one</i>	<i>of</i>	<i>the best</i>	<i>of</i>	<i>the</i>	<i>fine</i>	<i>new</i>	<i>taxis</i>	<i>in Kew</i>	,
pre-modifiers												head	post-modifiers	
&	rd	v	pd	v	qd	v	sd or od	v	dd	m	m	h	q	e

Table 2.10 The example of a nominal group in Cardiff Grammar

The elements in CG have are based on semantic criteria supported by lexical and syntactic choices. Consequently some elements cannot be derived based on solely

symbol	function meaning	class (of word or unit)
rd	representational determiner	noun, noun group
v	selector “of”	preposition
pd	partitive determiner	noun, noun group
fd	fractional determiner	noun, noun group, quantity group
qd	quantifying determiner	noun, noun group, quantity group
sd	superlative determiner	noun, noun group, quality group, quantity group
od	ordinative determiner	noun, noun group, quality group
td	tipic determiner	noun, noun group
dd	deictic determiner	determiner, pronoun, genitive cluster
m	modifier	adjective, noun, quality group, genitive cluster
h	head	noun, genitive cluster
q	qualifier	prepositional phrase, clause
&	linker	conjunction
e	ender	punctuation mark

Table 2.11 The mapping of noun group elements to classes in Cardiff grammar

syntactic criteria requiring semantically motivated lexical resources. Semantically bound elements are predominantly determiners *Representational*, *Partitive*, *Fractional*, *Superlative*, *Typic Determiners* while the rest of the elements: *Head*, *Qualifier*, *Selector*, *Modifier* and *Deictic*, *Ordinative* and *Quantifying Determiners* can be determined solely on the syntactic criteria. The latter correspond fairly well to Sydney version of nominal group which is adopted in present work with the benefits of relaxed rank system replacing the sub-structures with embedded units and simplifying the syntactic structures.

Another simplification is renouncing to distinction between the Head and Thing (Halliday & Matthiessen 2013: p. 390–396) for the semantic ambiguity reasons as the determiners in CG. Thus if the logical Head of the nominal group is a noun then it is labelled as the Thing leaving the semantic discernment as a secondary process and out of the current scope. Otherwise, in cases of nominal groups without the Thing element, if the Head is pronoun (other than personal), numeral or adjective (mainly superlatives) then they function as Deictic, Numerative or Epithet. So I propose to parse the nominal groups in two steps: first determine the main constituting chunks and assign functions to the unambiguous ones and second perform a semantically driven evaluation for the less certain units.

In other cases the Thing is present but it is different from the Head. Consider example 19. In Sydney grammar they’re treated as a nominal groups with qualifiers

introduced by the “*of*” preposition. But these nominal groups are not really about the “cup”, “some” or “another one” but rather about “tea”, “youngsters” and “eruptions”.

(19) (a cup) of (tea)

(20) (some) of (those youngsters)

(21) (another one) of (those periodic eruptions)

So then the syntactic Head still remains the first noun in the nominal group, but then by a semantic evaluation the Thing is shifted into the Qualifier introduced by “*of*” preposition. Cardiff Grammar weakens the assumption that every prepositional phrase acts as Qualifier in a nominal group and it the special case of the preposition “*of*”. It is allowed to act not as the element introducing a prepositional phrase but as a end mark of a determiner-like selector. Thus making the former noun group a determiner in the latter one. This approach shifts the noun group head into the position of semantically based Thing and erases the discrepancy problem between them. Nonetheless this is not straight forward solution as it requires lexical-semantic informed decision. For example in 22 (Head/Thing marked in bold) the preposition “*of*” introduces Qualifiers.

(22) He was the **confidant** of the prime minister.

(23) It was the **clash** of two cultures.

The distinction between cases when the proposition “*of*” introduces a Qualifier or ends a Selector/Deictic requires a semantic evaluation answering the questions “what is the Thing that this nominal group is about?”. While it is easy to just assume that the first noun in the nominal group is the head.

Therefore, I propose to parse the nominal groups in two steps: first determine the main constituting chunks and assign functions to the unambiguous ones and then in the second step to perform a semantically driven evaluation for the less certain units. This evaluation can be performed by further capturing the structure of nominal groups that act as Dyslectics through their lexico-syntactic realisation patterns.

2.5.4 The Adjectival and Adverbial Groups

Following the rationale of head-modifier like in the case of nominal groups, the adjectives and adverbs function as pivotal elements to form groups. The structure of adverbial and adjectival constructions is briefly covered in Sydney grammar in terms of head-modifier logical structures without an elaborated experiential structure like in the case of nominal groups. While the adverbial group is recognised as a distinct syntactic

unit the adjectival group is treated as a special case of nominal group specifically as a sub-structure of Epithet or Classifier elements.

(24) He is *very lucky*.

For example “very lucky” in 24 is analysed as a short form of the nominal group “very lucky one” where “lucky” is the head of the nominal group with a missing Thing element “one”. In this example “very” is not nominal modifier, it does not modify the missing nominal head but the adjective “lucky” so they constitute a head-modifier structure filling the Epithet element and as the rank scale system does not allow groups to fill elements of groups then it is described as a substructure of the nominal group.

In SG “The adverbial group has an adverb as Head which may or may not be accompanied by modifying elements”(Halliday & Matthiessen 2013: p. 419). The adverbial groups may fill modal and circumstantial adjunct elements in a clause corresponding to eight semantic classes of: time, place, four types of manner and two types of assessment. The adverbial pre-modifiers express polarity, comparison and intensification along with only one comparison post-modifier (Halliday & Matthiessen 2013: p.420-421).

A thorough systemic functional examination has been provided for the first time by Tucker Tucker (1997, 1998) materialised into a lexical-grammatical systematization of adjectives and the structure of Quality Group in CG. Fawcett uses the quality group structure for Adverbials as well as they follow similar grammatical behaviour. He avoids calling the group according to the word class but rather refers to the semantic meaning of what both groups express, i.e. the quality of things, situations or qualities themselves. The qualities of things have adjectives as their head while the qualities of situations an adverb.

In Cardiff Grammar, the head of the quality group is called *Apex* while the set of modifying elements: *Quality Group Deictic*, *Quality Group Quantifier*, *Emphasizing Temperer*, *Degree Temperer*, *Adjunctival Temperer*, *Scope* and *Finisher*. The quality group most frequently fills complements and adjuncts in clauses and fill modifiers and superlative determiners in nominal groups but there are also other cases found in the data.

Just like in the case of nominal group the adverbial and adjectival groups in Cardiff grammar are semantically motivated. To automatically identify elements of the quality group requires lexico-semantic resources.

Some adverbs are different from others at least because not all of them can be heads of the adverbial group like for example *very*, *much*, *less*, *pretty* also being able

to act as adjectival modifiers whereas others cannot. So a naive attempt is to use a list of words to identify the Emphasizing and Degree Temperers.

Other elements of the quality group like the *Scoper* or *Finisher* are more difficult to identify and localize as part of the group only by syntactic cues and/or lists of words because of their inherent semantic nature. The problem is similar to detecting whether a prepositional phrase is filling a qualifier element in the preceding nominal group or it is filling a complement or adjunct in the clause. Not surprisingly the Scopers and Finishers are most of the time prepositional phrases.

Another issue is continuity. The question is whether a grammar shall allow at least at syntactic level for discontinuous constituents or not. And then if so how to detect all the parts of the group even if they do not stand in proximity of each other. For example, comparatives, a complex case of a quality group, could be realised in a continuous or discontinuous forms. Compare the analyses presented in 2.12 and 2.13. In the first case the comparative structure is a continuous quality group. In the second case the comparative is dissociated and analysed as separate adjuncts.

On one hand it is not a problem treating them as two adjuncts, because that is what they are from the syntactic point of view. However, semantically as Fawcett proposes, there is only one quality group with a discontinuous realisation whose Scope element is placed in a thematic position before the subject. For an automatic process

<i>I</i>	<i>am</i>	<i>much</i>	<i>smarter</i>	<i>today</i>	<i>than</i>	<i>yesterday</i>
Subject	Main Verb	Adjunct				
pronoun	verb	quality group				
		Emphasizing Temperer	Apex	Scope	Finisher	

Table 2.12 Comparative structure as one quality group adjunct

<i>Today</i>	<i>I</i>	<i>am</i>	<i>much</i>	<i>smarter</i>	<i>than</i>	<i>yesterday</i>
Adjunct	Subject	Main Verb	Adjunct			
adverb	pronoun	verb	quality group			
			Emphasizing Temperer	Apex	Finisher	

Table 2.13 Comparative structure split among two adjuncts

to identify a complex quality group is a difficult task. It needs to pick up queues like a comparative form of the adjective followed by the preposition “than” and then look for two terms being compared. Given some initial syntactic structure such patterns could be modelled and applied but only as a secondary semantically oriented process.

Since both the adverbial and adjectival groups have similar structures, it is syntactically feasible to automatically analyse them in terms of head-modifier structures in a first phase followed by a complementary process which assigns functional roles to the quality group components.

2.6 Discussion

This chapter introduces the fundamentals of systemic functional linguistics and presents an adaptation of Sydney and Cardiff theories of grammar to the task of parsing.

Because of bottom up approach to unit structure, rank scale relaxation and accommodation of embedding as a general principle Cardiff systemic functional theory is more suitable for parsing than Sydney one. Nonetheless the unit definitions in Cardiff grammar are deeply semantic in nature. Parsing with such units requires most of the time lexical-semantic informed decisions beyond merely syntactic variations. This is one of the reasons why the parsing attempts by O'Donoghue (1991) and others in COMMUNAL project were all based on a corpus.

As there was no corpus available and because the parsing approach is based on syntactic backbone none of the theories could be fully used as such. The second part of the chapter attempts to merge and adapt the grammars and theories of grammar to this parsing approach.

Next chapter lays the theoretical foundations of Dependency Grammar and introduces the Stanford dependency parser used as a departing point in current parsing pipeline. Because there is a transformation step from dependency to systemic functional consistency structure, next chapter also covers a theoretical compatibility analysis and how such a transformation should in principle look like.

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