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List of abbreviations

V	schematic short vowel
VV	schematic long vowel or diphthong
C	schematic consonant
C_{SON}	sonorant
σ	syllable
$	syllable boundary
φ	phonological foot
( )	foot boundary

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1. Introduction

The sound structure of a language is no less a
'cognitive' phenomenon than semantic structure.
Taylor (2002:79)

Cognitive linguistics, an approach typically concerned with semantic phenomena, has long relegated phonology to its periphery. In fact, on average fewer than one article per year is published on phonological issues in one of the major journals of the field, viz. *Cognitive Linguistics* (Nathan 2015: 253). Naturally, this raises the question as to why phonology takes such a marginal role within an otherwise quite successful research paradigm. Taylor (2002: 79) suggests that one of the reasons for the rather tentative treatment of phonology stems from "a widespread misconception about the scope of Cognitive Linguistics in general" (2002: 79), which essentially equates the term *cognitive* with *conceptual* and *conceptual* with *semantic*. Even some remarks by Langacker (1987: 12) seem to support the view that meaning is central: "From the symbolic nature of language follows the centrality of meaning to virtually all linguistic concerns. Meaning is what language is all about" (1987: 12). This seemingly strong emphasis on semantics, in combination with the fact that most of the work within Cognitive Grammar (henceforth CG) deals with semantic phenomena, appears to reinforce the view that phonology is simply not of importance in the framework. However, excluding phonology from the scope of CG raises several issues troublesome to the theory on the whole (cf. Taylor 2002: 79f.). A comprehensive linguistic theory needs to be able to account for all aspects of language and not restrict itself to semantics only. If it fails in doing so, it "is only half a theory of language" (2002: 79). Furthermore, phonology is as much a cognitive phenomenon as any other aspect of linguistic structure. Thus, phonological units (e.g. feet, syllables or phonemes) are conceptual in so far, as they can be understood as concepts in the minds of speakers (2002: 80).

Phonology in CG takes a radically different perspective on grammar than the traditionally dominant Generative Grammar and its offsprings. While the present thesis will not put forward a detailed comparison of the two frameworks, a brief comparison of the two approaches may be appropriate at this point. The primary benefit of adopting a usage-based theory such as CG lies in the central role of phonotactics (Kumashiro 2000: 1). In other words, constraints are captured using cognitive schemas that are abstracted from actually occurring expressions. In contrast, such a theoretical restriction does not exist in Generative

Phonology (and Optimality Theory; cf. Prince & Smolensky 2004). Rather, Kumashiro (2000: 1) argues that in such approaches "constrains/rules can be posited arbitrarily and independently of actually-occurring expressions" (2000: 1). Conversely, as a non-reductionist and maximalist framework, CG takes as its starting point expressions found in language use, from which generalisations, i.e. schemas, are abstracted bottom-up (cf. section 2.1.1). Conversely, Generative Grammar is reductionist in nature (2000: 2). Surface forms are understood to be the product of underlying forms to which certain rules and constraints have been applied top-down. In contrast, these constraints and rules are typically put forward without any consideration of actually occurring expressions (2000: 2). CG, taking a usage-based approach (cf. section 2.1), provides a principled manner of establishing constraints as schemas (based on actual utterances) and thus does not have to fall back on arbitrary decisions made by the researcher.

Couched in a CG framework, the present thesis will provide an analysis of vowel reduction in British English. More specifically, it will explore ways in which generally known cognitive mechanisms, i.e. schema formation and categorising relationships, used in the traditional areas of cognitive grammar, i.e. semantics, can explain unstressed vowel reduction in Standard Southern British (SSB). The version of CG adopted in this thesis assumes that language users can "employ [alternative strategies] when activating schemas in categorization networks" (Nesset 2008: 14). These strategies will be modelled in the proposed analysis. Moreover, it will be shown that reduction processes in Russian can be accounted for by the same theoretical constructs developed for English and that no arbitrary mechanisms are needed to cover for the data in Russian. Unstressed vowel reduction is a pervasive phenomenon influencing the development of a variety of languages. Consequently, it has been investigated from various theoretical standpoints, such as, for example, generative phonology (Chomsky & Halle 1991 [1968]), Optimality Theory (Crosswhite 2001) or Government Phonology (Pöchtrager 2018). Even though studied extensively in various languages (especially in Romance and Slavic; cf. Barnes 2006), the term *vowel reduction* is often used to describe an array of different linguistic phenomena (Crosswhite 2001: 3). Extreme definitions range from "the wholesale deletion of unstressed vowels" (2001: 3) to "non-neutralizing changes in the pronunciation of both stressed *and* unstressed vowels" [original emphasis] (2001: 3). In this thesis, *vowel reduction* is defined as the neutralisation of “two or more […] vowel qualities [...] in a stress-dependent fashion” (2001: 3).

Relatively little has been published on the topic so far with respect to British English. Most discussions of unstressed vowel reduction either take an American English perspective (e.g. Flemming & Johnson 2007) or seem to be unconcerned about the variety used (Burzio 1994, Chomsky & Halle 1991 [1968], Crosswhite 2001 and others).[1] Moreover, due to the rather limited body of work on phonological phenomena within Cognitive Linguistics in general and CG in particular, accounts of vowel reduction within the framework are practically absent in the relevant literature (with the exception of Nesset 2006 on Russian). Thus, this thesis will prove useful in several ways. It will not only contribute to the rather scarce literature in the field, but also provide a cognitively plausible account of the phenomenon within cognitive grammar. A framework of phonology within cognitive grammar is necessary in so far, as a theory of language such as cognitive linguistics needs to be able to deal with all aspects of language. As pointed out by Taylor (2002: 79), “the exclusion of phonology would mean that Cognitive Grammar could not lay claim to being a comprehensive theory of language” (2002: 79).

The remainder of this thesis is organised as follows. Section 2 will outline the core assumptions of cognitive grammar, viz. its usage-based approach to the study of language. In section 3, the present thesis will explore how CG can be applied to phonology. In order to do so, some basic phonological concepts and how they may be accounted for in CG will be discussed. Following this, the foundations of the theory used in the analysis of vowel reduction will be examined. Section 4 will outline the variety of English chosen for the analysis. Standard Southern British deviates from classical RP in several important ways, which need to be defined prior to the analysis. Section 5 will introduce some of the methodological aspects underlying the present study. This is followed by a detailed exploration of the data set in section 6. Each set of vowels, viz. short vowels, long monophthongs and diphthongs, will be discussed on the basis of selected examples (see appendix for the full data set). Having considered all the relevant aspects of the data set, the thesis will move on to the analysis proposed in this thesis in section 7. The final section of this thesis, section 8, presents an analysis of vowel reduction in Contemporary Standard

[1] Even though it can reasonably be assumed that they take some American variety as their reference.

Russian (CSR). It will be shown that the theoretical assumptions used in the analysis of English reduction can successfully be applied to Russian as well.

2. Cognitive Grammar and its usage-based nature

This section will consider some fundamental assumptions made in CG. A number of principles important to usage-based models in general will be explored in section 2.1. Section 2.2 will build on this foundation and outline how grammar can be understood as a network of categories.

2.1. Principles of usage-based approaches

2.1.1. The content requirement

As a usage-based model, CG puts its central emphasis on language use. This is particularly evident in the content requirement, postulated by Langacker (1987: 53): "The only structures permitted in the grammar of a language […] are (1) phonological, semantic or symbolic structures that actually occur in linguistic expressions; (2) schemas for such structures; and (3) categorizing relationships involving the elements in (1) and (2)" (1987: 53). It follows that CG does not allow any underlying representations or empty elements lacking both phonological and semantic content. Nor does it allow any theoretical tools "valid only in a particular subdomain of linguistics (e.g. phonology, syntax)" (Kumashiro 2000: 11). Consequently, any analysis of linguistic phenomena couched in a CG framework needs to employ the same (general) cognitive mechanisms allowed by the content requirement, i.e. schemas and categorising relationships (cf. section 2.2). The content requirement has important implications as to how the grammar of a language is conceptualised. At this point, it suffices to briefly return to the "'maximalist', 'non-reductive' [and] 'bottom-up'" (Langacker 1999: 91) nature of the approach (cf. section 2.1.3). It is maximalist in so far as every conventional linguistic unit such as, for example, any word, is assumed to be contained in the mental grammar of a speaker. Moreover, as a non-reductive approach, CG does not reduce surface variety to a set of underlying representations but takes "the entire inventory of actually-occurring expressions [as the starting point]" (Kumashiro 2000: 13), from which constraints and generalisations are drawn in a bottom-up fashion. The content requirement stated above is in agreement with the larger usage-based model developed. Bybee (2001: 6-8) proposes a number of principles of such approaches of which some match or advance CG's content requirement. These will be discussed in the following.

2.1.2. The status of cognition, categorisation and the role of experience

An important aspect of usage-based approaches is the assumption that the human linguistic faculty "is part of the more general human cognitive faculty" (Kumashiro 2000: 7). This is to say that there is, in principle, no difference in properties between linguistic and non-linguistic mental representations (Bybee 2001: 7). Put differently, for cognitive linguistics, "linguistic cognition simply is cognition" (Janda 2015: 132). A psychological phenomenon crucial in cognition in general and in language use in particular is, for instance, *categorisation*. According to Bybee (2001: 7), categorisation is heavily grounded in similarity or identity. It should be emphasised again that there are no theoretical mechanisms which are only relevant to particular subdomains of linguistics. Consequently, categorisation not only plays a crucial role in semantic phenomena, but also in phonology. For instance, it can be assumed that categorisation regulates "the storage of phonological percepts" (2001: 7). Thus, two different tokens of the same phoneme (i.e. allophones) may be subsumed under the same category. This is to say that speakers form categories over sets of sounds based on their experience of language. As categorisation is substantial in the analytical part of this thesis, it will be taken up again in some detail in section 2.2 below.[2]

Usage-based models place special emphasis on the role of linguistic experience, which affects the way language is represented in the speaker's memory. Such approaches view grammar as "the cognitive organization of one's experience with language" (Bybee 2006: 711). As a result of the continuous exposure to language, grammar is a dynamic system constantly shaped anew (Dąbrowska 2004: 213). In other words, the structure of language changes or remains constant because of the way it is used by speakers (Bybee 2001: 5-6). This view is supported by Langacker (2010: 109), who claims that "[linguistic] structure emerges from usage, is immanent in usage, and is influenced by usage on an ongoing basis" (2010: 109). What follows from the focus on experience is that frequency is taken to have a strong effect on how a linguistic unit is represented in the speaker's memory (Bybee 2001, 2006; Dąbrowska 2004). The more frequent a particular linguistic unit is, i.e. the more often it is accessed, the stronger its representation in the mental grammar becomes and the more easily it is activated (Dąbrowska 2004: 213). While Bybee (2001: 6-7) does not use any specific term for this psychological phenomenon, Langacker (2000: 3) refers to the effect

[2] Categorisation is a cognitive mechanism which is not only explored in linguistics. An overview of some of the evidence for the importance of categorisation in cognition in general can be found in Harnad (2017).

frequency has on the mental grammar as *entrenchment*.[3] Moreover, in a similar way to Langacker (1987; cf. section 2.1.1), Bybee (2001: 35) rejects underlying representations in her conceptualisation of usage-based linguistics (Bybee 2001: 35). Rather, each individual token is stored in the speakers' mental grammar and categorised. In contrast to generative approaches, redundancies are not considered problematic (cf. the rule/list fallacy in section 2.1.3). In fact, redundant storage is one of the core assumptions of usage-based linguistics in general and CG in particular. This will be taken up in the following section again, which will consider the rule/list fallacy in more detail.

2.1.3. The rule/list fallacy

Usage-based approaches do not subscribe to the so-called rule/list separation (or, from a CG perspective, fallacy) typically assumed in generative linguistics (Bybee 2001: 7). The rule/list fallacy stems from the "assumption that rules and lists are mutually exclusive (Langacker 2000: 2). In other words, for reasons of economy, generative accounts do not allow lists of concrete expressions in the mental grammar if there exists a rule that can be used to derive those expressions. Thus, for instance, plural forms such as *tables, glasses* or *books* would not be represented in the grammar as lists, as there exists a general rule N + *-s* from which such items can be generated (Langacker 1987: 29). Usage-based approaches, however, reject this assumption and claim that generalisations are abstracted from stored, concrete expressions (Bybee 2001: 7). While including both schemas (i.e. generalisations) and instantiations (i.e. concrete expressions) (cf. redundant storage; section 2.1.2) in the grammar may not be especially economical, it generally provides a more psychologically accurate view of linguistic knowledge (Langacker 2000: 2); hence the maximalist, non-reductive and bottom-up nature of CG. This is further substantiated by research in exemplar theory (e.g. Pierrehumbert 2001), which suggests that speakers of a language categorise and store every token they experience in large networks (Bybee 2006: 716). Moreover, it is assumed that from these stored tokens, generalisations of "various degrees of abstraction" (Bybee 2001: 7) are established. Put differently, the linguistic knowledge of a speaker consists of both concrete expressions as well as schematic units generalising over these expressions (Dąbrowska 2004: 213). As was mentioned before, linguistic storage is considered "highly

[3] As will be shown in later sections of this thesis, frequency effects prove pivotal in accounting for certain atypical patterns found in English vowel reduction.

redundant” (Langacker 2000: 2). Different schemas may describe the same structures at different levels of abstraction. Thus, CG acknowledges that “linguistic patterns occupy the entire spectrum ranging from the wholly idiosyncratic to the maximally general” (Langacker 1991: 263). The following section will look more closely at CG and lay out the theoretical foundations of the analysis that follows in subsequent sections.

2.2. Grammar as a network of categories

The content requirement briefly discussed in the previous section has fundamental effects on the way grammar is conceptualised in CG. In the words of Langacker (1991: 263-264), grammar is defined as “a structured inventory of conventional linguistic units” (1991: 263-264). Since the rule/list separation is denied in CG, this structured inventory consists of both every concrete expression, i.e. instantiation, and generalisations, i.e. schemas, which have been abstracted from actually occurring expressions (Kumashiro & Kumashiro 2006: 80). Moreover, language, as emphasised by Langacker (2010: 108), is organised in complex, overlapping networks of different elements. A simple example of such a network-like structure is outlined in Figure 1 below:

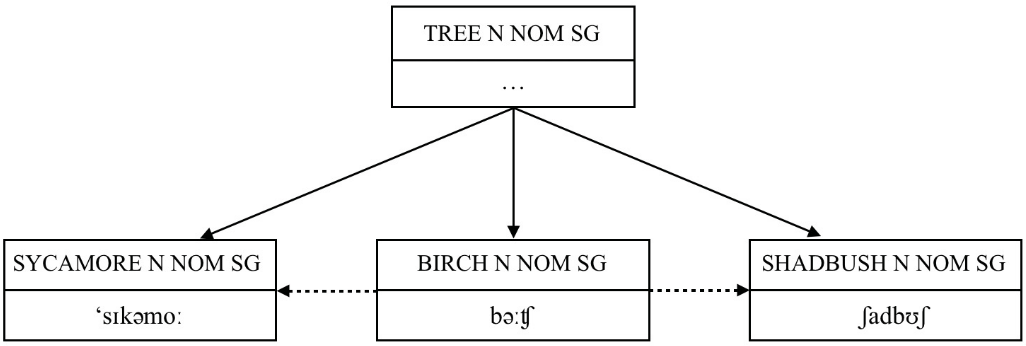

Figure 1 Grammar as a network (based on Nesset (2008: 12))[4]

The boxes in Figure 1 symbolise cognitive schemas. Schemas are “the commonalities that [emerge] from distinct structures when one abstracts away from their points of difference […]” (Langacker 2000: 4). A speaker may, for instance, experience many different utterances including different expressions for trees (cf. Nesset 2008). On the basis of his or her experience, a schema capturing the commonalities between these actually occurring utterances may then be abstracted, i.e. a schema stating that all of the instances in Figure 1

[4] It may be reasonably objected that English does not have a nominative. However, it has been argued that English has a nominative-accusative alignment system (Keizer 2015: 195). While full noun phrases are not marked for either nominative or accusative, the distinction emerges with respect to pronouns (e.g. *He hit the man* vs. *The man hit him*). Consequently, the feature NOM is included in the the semantic poles of Figure 1.

refer to different types of trees. As a result, a network-like structure showing how the different schemas are related to each other emerges. The upper portion of the boxes in Figure 1 contain the semantic component of each unit, while the lower portion of the boxes specify the phonological form (2008: 11-12). The phonological form should not be understood as representing sound in the real world. Rather, as Langacker (1987: 79) puts it, it is an "auditory image" (1987: 79) and thus should be seen as a mental concept that summarises what many utterances of the word have in common (for discussion see Nesset 2008: 12). Schemas involving both a semantic and a formal component are Saussurean signs and called symbolic. It should again be noted at this point that CG does not subscribe to the rule/list separation mentioned in section 2.1. Thus, while schemas represent generalisations over actual occurrences, they are not independent from the units they are abstracted from (cf. Bybee 2001).

An important aspect of schemas that becomes evident in the discussion of Figure 1 is that they do not exist in an empty space in the mental grammar. Rather, schemas form networks and are connected to each other by categorising relationships. These are represented in Figure 1 above as arrows. In principle, there are two different types of such relationships, viz. *instantiations* and *extensions* (cf. Langacker 1987: 371; see also Langacker 2000: 4). The solid arrows are of the former type, the dashed arrows of the latter. Instantiations are characterised as a relation between two compatible schemas of which one shows a greater degree of specificity. Such a relation can be captured by the formula A → B. It shows that the more specific schema B instantiates or elaborates the general schema A (Langacker 2000: 4). With respect to Figure 1, each of the bottom three schemas is more specific than that for 'tree'. It can easily be seen that all types of birches are also trees, but not all trees are birches. Hence, there are solid arrows from the top schema to each of the lower schemas. Moreover, note that the phonological pole of the top schema has to be empty, since "no salient phonological properties […] recur in all the names of" trees (Nesset 2008: 13). The second type of relation, viz. extensions, describes a relation between two similar, yet to some degree conflicting schemas (Langacker 1987: 371; see also Langacker 2000: 4). The formula [A] --> (B) indicates that while (B) does not instantiate [A], it is nevertheless categorised by it. In Figure 1, there are two dashed arrows ranging from the BIRCH schema to the SYCAMORE and SHADBUSH schemas respectively. Birches can be considered relatively prototypical trees, but not so much sycamores or shadbushes, which may be seen as rather peripheral. Thus, extensions always involve some kind of prototype against which other members of a category are compared (Langacker 2000: 4). As will be shown in later sections, both types of categorising relationships prove necessary in the proposed analysis of vowel reduction in SSB and Russian. The following section will address phonology in more detail and lays out the framework in which the subsequent analysis is couched.

3. Cognitive Grammar and phonology

The aim of this section is to discuss some critical concepts in phonology and demonstrate how they can be explained in a CG framework. At this point it is necessary to return once more to the content requirement and its implications for the theory. One of the major advantages of cognitive linguistic approaches to language is their restrictiveness in terms of theoretical constructs (Nesset 2008: 13). Thus, only concepts not in disagreement with the content requirement (cf. section 2.1), e.g. cognitive schemas and categorising relationships, are allowed in CG. Moreover, these constructs are all cognitively motivated in so far as they are not restricted to linguistic phenomena, but instead are, as already emphasised, aspects of human cognition as a whole (Nesset 2008: 13; see also Bybee 2001). Consequently, the phonological theory outlined in this thesis requires a radically new way of thinking about phonology. Notions traditionally used in phonological analysis such as underlying representations or rules are prohibited by the theory through the content requirement (Nesset 2008: 13). Section 3.1 will briefly consider some basic notions in phonology, i.e. phonemes and phonological features. Section 3.2 will focus on issues crucial in the remainder of the thesis, viz. second-order schemas, schema interaction, well-formedness principles and the actualisation of candidate expression. The final subsection will outline some obvious parallels to another framework, viz. Optimality Theory.

3.1. Some basic phonological concepts in CG

3.1.1. Phonemes and allophones

Schema and network formation as outlined in the previous section is not limited to symbolic units. In order to perceive speech, it is necessary that "categories of acoustic events" (Taylor 2006: 21) are established which consider certain sounds to be identical in the phonological system.[5] In accordance with its usage-based nature, CG assumes that exposure to usage-events allows language users to create phonological schemas capturing the commonalities of the sounds they hear (Nesset 2008: 31).[6] In this sense, phonemes are treated as conceptual categories that generalise over groups of phonetically similar but different sounds (Bybee 2001: 53). The act of categorising certain phonetic variants into one phoneme category hinges on phonetic similarity. Thus, two tokens may be classified as instantiating the same phoneme if they are sufficiently "similar in their acoustic (and articulatory) properties" (2001: 53). Figure 2 below illustrates such a network for the vowel /iː/ and three of its allophones. The diagram also includes four exemplary English words, i.e. conventional linguistic units, from which the schemas may be abstracted:

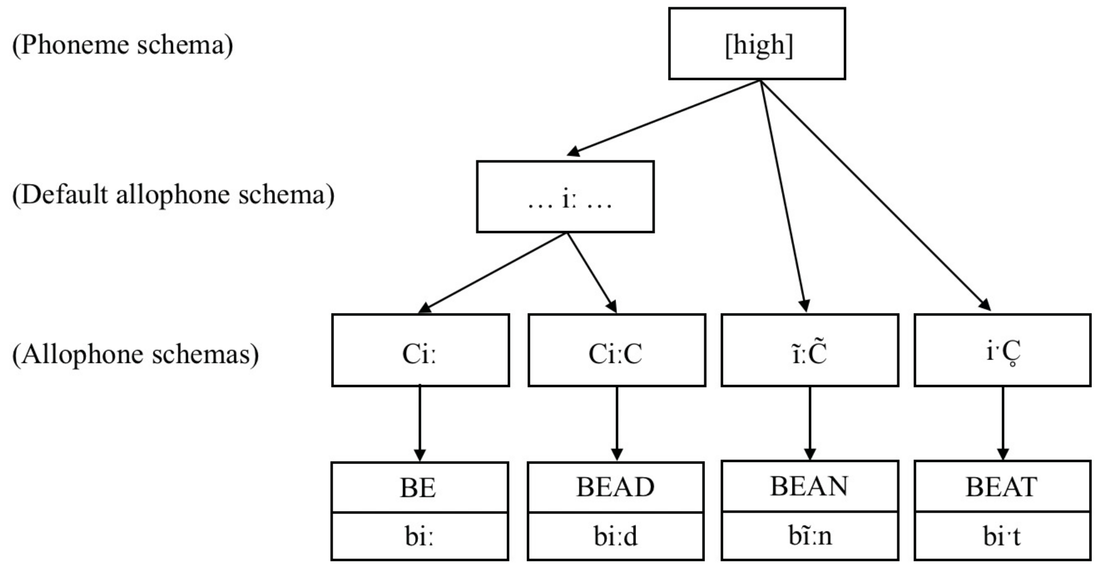

Figure 2 The phoneme as a complex category (based on Nesset's account of Russian vowels (2008: 32))

Figure 2 indicates how allophonic variation can be understood within a CG framework. Although this is a simplified representation, it can be seen that a nasalised [ĩː] occurs immediately before nasalised consonants, while a slightly shortened [iˑ] appears before voiceless consonants (pre-fortis clipping; see Roach 2009: 28). The default allophone schema [iː] occurs elsewhere. Moreover, Figure 2 makes assumptions as to the status of the individual sounds in the phonemic system, viz. that [iː], [iˑ] and [ĩː] are in complementary distribution.

[5] The formation of phonological categories is supported by research in cognitive sciences. See, for example, Goudbeek et al. (2017). For a (linguistic) discussion of the concept of the phoneme as a conceptual category, see Mompeán-Gonzáles (2004).

[6] While phonological schemas do not necessarily contain a semantic pole, they are not at variance with the content requirement. Phonological structures are one of the three types of structures allowed in CG (cf. section 2.1).

They never occur in the same context and therefore cannot change meanings in minimal pairs. Thus, they can be considered allophones (cf. Nesset 2008: 32-33).

Figure 2 also exemplifies the bottom-up approach of cognitive grammar mentioned in section 2.1.1. The concrete instantiations experienced by language users on a daily basis give rise to allophone schemas. However, speakers may also generalise over the allophone schemas including the high front vowel [iː] and form a more abstract schema, viz. the default allophone schema (Nesset 2008: 32). As can be seen, [iː] appears in all contexts except before nasalised and voiceless consonants, which is indicated in Figure 2 above by the suspension points. Consequently, it can be regarded as the elsewhere case. Moreover, speakers may generalise over all three allophones and form a schema on a higher degree of abstraction, i.e. the phoneme schema, which captures the fact that [iː], [iˑ] and [ĩː] are all high vowels. This is in line with the assumption discussed in section 2.1 that "linguistic knowledge is represented at varying degrees of abstraction" (Dąbrowska 2004: 213) and storage is highly redundant (cf. Bybee 2001; Langacker 2000). As Langacker (1987: 389) puts it, "the emergence of a phoneme […] is […] a process of decontextualization" (Langacker 1987: 389). High vowels can occur in all environments and form minimal pairs with low and mid vowels. It follows that phoneme schemas have to be specified in a context-free manner (as opposed to allophone schemas, which are generally specified in terms of context). Nesset (2008: 33) stresses that the view of phonemes as "categories of related sounds" (2008: 33) is compatible with traditional notions of the phoneme as a psychological unit (cf. Anderson 1985). Figure 2 makes use of the phonological schema [high]. Since features may be considered problematic in usage-based approaches, they will be discussed in the following section in more detail.

3.1.2. Phonological features in CG

The use of phonological features in CG may seem controversial at first, as they have been traditionally employed in generative approaches to phonology (e.g. Chomsky & Halle 1991 [1968]). In such frameworks, phonological features are taken to be part of Universal Grammar: "[T]hey represent the phonetic capabilities of man and, we would assume, are therefore the same for all languages" (1991 [1968]: 295). This innate and universal set of features is used to describe all patterns and structures found in phonology, such as, for example, natural classes (Cohn 2011: 19-20). Moreover, generative approaches characterise each feature by its binary nature. Put differently, to define phonological inventories of various languages, features can either be positively or negatively specified (Cohn 2011: 20; cf. Chomsky & Halle 1991 [1968]). However, this conception of features is inherently at variance with the content requirement stated in section 2.1 above, which only allows phonological structures that occur in language use. In other words, features as conceptualised by generative phonology are precluded by the theory and consequently cannot be part of a CG analysis of phonological phenomena. This naturally raises the question as to how natural classes or other groups of sounds that behave alike are dealt with in CG. Regarding phonological features as generalisations speakers make over usage-events resolves this issue.

In line with more recent frameworks emphasising the emergent nature of language (e.g. Blevins 2004; Mielke 2008 and others), CG views phonological features to emerge from actual usage (cf. Langacker 2000; Nathan 1996; Nesset 2008). Thus, features are conceptualised as "abstract categories based on generalizations that emerge from phonological patterns (Mielke 2008: 9) or, as Langacker (2000: 44) puts it, as "schematic characterisations of 'natural classes' of sounds" (2000: 44). As can be seen in Figure 2 in section 3.1 above, it may be said that speakers form a schema [high] to generalise over the three high vowels [iː], [iˑ] and [ĩː] (of course, other vowels such as /uː/ may be subsumed under the same general schema [high]). Furthermore, as phonological features are generalisations grounded in language use, it follows that they must be positively specified. Put differently, schemas do only exist for structures that can be found in language use. Since speakers do not experience [-high] vowels, such a schema can logically not be established (cf. Nesset 2008: 36).[7] Moreover, treating features as schemas allows for redundancy, which, as already mentioned, is one of the core assumptions of CG (cf. Bybee 2001; Dąbrowska 2004). Furthermore, it should be pointed out that the theory does not rule out the possibility that a particular sound is categorised by more than one schema. The three allophones in Figure 2 may not only be subsumed under the schema [high], but presumably also under [front] or [unrounded].[8] What becomes apparent in this discussion is that phonological

[7] Underspecification theory offers a possible alternative to negatively specified features. As pointed out by Nesset (2008: 36), treating certain vowels as not specified for a particular feature, e.g. frontness, is not at odds with the content requirement. For instance, instead of using the feature [-front], it may be said that the English short vowels /ʊ ɒ ʌ/ are not specified for frontness at all. This, however, is not accepted by all scholars in the field. Nathan (1996: 109), for instance, argues against underspecification theory in CG by claiming it is fundamentally at odds with its principles.

[8] The feature [unrounded] should not be understood as a negatively specified feature. Rather, it stands for a spread lip position (cf. Nesset 2008: 36).

categories or schemas form similar networks such as those outlined in section 2.2 for the mental grammar as a whole. This once more underlines the non-modular approach CG takes (cf. section 2.1). Phonology is not taken care of by a particular phonological component of the grammar, but rather is part of wider linguistic and non-linguistic cognition. Having outlined fundamental phonological issues in CG terms, the thesis will now move to the discussion of core concepts in CG needed in the analysis of English vowel reduction.

3.2. Key concepts in CG phonology

3.2.1. First- and second-order schemas

First- and second-order schemas are crucial in a CG analysis of phonological phenomena, as they allow for generalisations covering (morpho)phonological alternations (cf. Nesset 2008: 20). Consider Figure 3 below, which shows two first-order schemas (left) and a second-order schema (right) for a hypothetical language in which vowels preceded by a palatalised consonant reduce to [ɪ] in unstressed syllables:

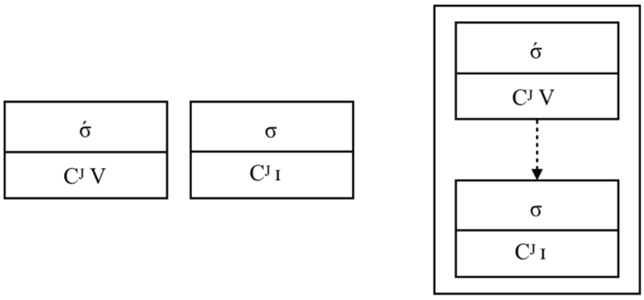

Figure 3 First and second-order schemas exemplified

First-order schemas can most adequately be characterised as generalisations over actually occurring utterances. For instance, as shown in the two left boxes in Figure 3, speakers may form first-order schemas over vowels in stressed and unstressed syllables. Nesset (2006: 56) further stresses that “language users may compare vowels in stressed and unstressed syllables and connect them by means of categorizing relationships” (2006: 56). Since the two first-order schemas in Figure 3 are partly compatible with each other, they can be connected using an extension relation symbolised by the dashed arrow (cf. section 2.2). If such relations between stressed and unstressed vowels recur in systematic ways, speakers may form larger schemas, i.e. second-order schemas, capturing these relationships (2006: 56). In other words, second-order schemas can be understood as “schemas over schemas that are connected via categorizing relationships” (Nesset 2008: 19).

The two terms *product-oriented* and *source-oriented generalisations* further illustrate the difference between first- and second-order schemas. First-order schemas, i.e. the two schemas to the left in Figure 3, capture what is commonly referred to as *product-oriented generalisations* (Nesset 2008: 20). Product-oriented schemas do not relate the structures to any underlying source. Rather, as Bybee (2001: 126) puts it, they "[generalize] over forms of a specific category, but [do] not specify how to derive that category from some other" (2001: 126). Thus, the first-order schemas in Figure 3 only generalise over the quality of a vowel in stressed and unstressed syllables, but do not state that reduced vowels are derived from full vowels. By contrast, source-oriented generalisations focus on the source to which particular rules are applied to create certain well-formed surface structures (Nesset 2008: 20). Accordingly, source-oriented generalisations (e.g. rules) enjoyed great popularity in rule-based frameworks in which underlying representations play an important role (e.g. Chomsky & Halle (1991 [1968]). In CG, it is second-order schemas which enable source-oriented generalisations to be captured without employing underlying representations. Thus, the second-order schema to the right in Figure 3, for instance, takes the fully realised vowel in stressed syllables as the source, which is then related to the reduced vowel in unstressed syllables. Put differently, two actually-occurring structures are related to each other by means of categorising relationships. It should further be noted that product-oriented schemas precede source-oriented generalisations (Bybee & Slobin 1982: 288). In order to establish relations between stressed and unstressed syllables (and hence source-oriented schemas), a speaker must have formed generalisations over stressed and unstressed syllables in isolation first. Having established the schema types needed in the analysis, the thesis will now examine schema interaction in more detail.

3.2.2.Schema interaction and well-formedness principles

The different ways in which schemas can interact with each other are crucial in CG. The version of CG (cf. Kumashiro 2000; Nesset 2008) used in the present thesis assumes that speakers can "employ [alternative strategies] when activating schemas in categorization networks" (Nesset 2008: 14).[9] The analysis to be presented in later sections of this thesis

[9] This refers to the assumption that speakers may actualise a variety of candidate expressions (based on the cognitive schemas they extract from language use) from which one is chosen as the winning candidate. Thus, the theory presented here models the sanctioning of possible alternatives and how cognitive principles may solve the resulting competition.

models these strategies. However, since the phenomena examined are relatively complex, the theoretical aspects concerning schema interaction are illustrated using a simple, hypothetical example. Consider a language in which all vowels reduce to [ɪ] after palatalised consonants, while in all other contexts, they reduce to [ə]. With respect to this rather simple vowel reduction pattern, two possible schemas can be established. These are shown in Figure 4 below:

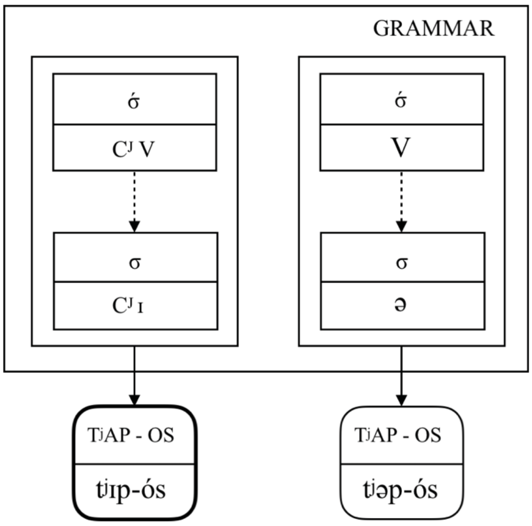

Figure 4 Schema interaction exemplified

Figure 4 presents an illustration of schema interaction in CG. In this hypothetical example, two different schemas are contained in the mental grammar. The left second-order schema captures reduction to [ɪ], the right second-order schema reduction to [ə]. A speaker may wonder about the pronunciation of the hypothetical word *tʲap* once a stress-shifting suffix (*-ós* in the present example) is added to the stem. Since there are two schemas in the mental grammar, two competing candidate expressions, i.e. alternatives, can reasonably be given. They are illustrated in round boxes in Figure 4. Candidate expressions in CG are “hypotheses that speakers and hearers can make about their native language” (Nesset 2008: 14). Moreover, it should be mentioned that the set of candidate expressions is in theory infinite and thus may include structures which are in conflict with the grammar of a particular language. This is, however, not at odds with the content requirement, since the candidates in Figure 4 are actualised outside the mental grammar (symbolised by the large box). It follows that the content requirement, pertaining only to structures in the grammar, does not preclude them (2008: 14).

To resolve the competition between candidate expressions, language users compare the alternatives to the schemas in their mental grammar (Nesset 2008: 15). Each candidate expression in Figure 4 instantiates one schema. The left candidate is categorised by the schema that states that vowels after palatalised consonants reduce to [ɪ] when stress is lost. By contrast, the right candidate expression instantiates the reduction schema generalising over reduction to [ə]. It should be emphasised, however, that, the candidates differ with respect to the degree to which they fit their respective schemas. In other words, the left candidate is categorised by the schema which states the context of reduction, while the candidate to the right instantiates the less specific, more general schema. The competition in simple examples such as these is decided on the basis of the notion of *conceptual overlap* (Langacker 1999: 106). Langacker (1999: 106) explains the concept as follows:

> [One] factor [in how such competitions can be resolved] is the amount of overlap between the target and a potential categorizing structure. We can reasonably assume that the sharing of features is what enables the target to stimulate members of the activation set in the first place, and that the degree of stimulation is roughly proportional to the number of features shared. [L]ower-level Schemas, i.e. structures with greater specificity, have a built-in advantage in the competition with respect to higher-level Schemas. Other things being equal, the finer-grained detail of a low-level schema affords it a larger number of features potentially shared by the target.[10]

As can be seen in Figure 4 above, the left candidate complies with the more specific schema. Consequently, it conceptually overlaps with its schema to a higher degree than the other candidate (i.e. it instantiates the more specific schema) and is chosen as the winner.[11]

Although conceptual overlap is a pivotal concept in schema interaction, it does not suffice in more complex reduction patterns. Consequently, other criteria need to be added to account for the phenomena analysed in this thesis. Based on a working hypothesis suggested by Langacker (1991), Kumashiro (2000: 25) proposes four principles, which govern the well-formedness of candidate expressions. They are given in (1) below:

(1) Well-formedness principles (Kumashiro 2000: 25)

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[10] Langacker (1999: 105) also discusses two additional factors, viz. entrenchment and contextual priming. Entrenchment will be taken up again when discussing exceptions to the patterns found in the data set. Contextual priming, i.e. cues in the discourse context, is not of relevance to the issues discussed in the thesis.

[11] It is interesting to point out that such situations are well-known in linguistics. Within generative frameworks, such situations have typically been dealt with by the *Elsewhere Condition* (cf. Kiparsky 1982), which guarantees that more specific rules prevail over general rules.

a. Access

When a given candidate expression is assessed relative to a certain subpart of the grammar, i.e. a function, categorizing units (from the network representing the subpart) that are schematic to, or are elaborated by, the expression are activated and sanction the expression.

b. Activation

The total ‘activation’, i.e. conventional motivation/sanction, of a candidate expression is the sum of the activation values obtained from all of the categorizing units. Each such value correlates positively with the expression’s ‘distance’ from the unit, i.e. how far it diverges from its categorizing unit by elaboration.

c. Uniqueness

When there are multiple candidate expressions, all but the one with the highest activation value are deactivated.

d. Well-formedness

The degree of well-formedness of a candidate expression correlates with its final activation value.

These well-formedness principles determine the winning candidate expression in cases in which conceptual overlap alone fails to do so. Principle (1a) assures the actualisation of candidate expressions outside the grammar. It follows that the two candidates in Figure 4 are by no means arbitrarily postulated. Rather, they emerge from core principles in CG and are sanctioned by categorising units in the grammar. The second principle (1b) concerns the activation, i.e. conventional motivation, of candidate expressions. The total activation of a candidate refers to its likelihood of winning the competition. A high total activation greatly enhances the chances of an expression to be selected as the winner.[12] A candidate expression obtains activation value from each categorising unit it is categorised by. In other words, the more schemas an expression instantiates, the higher its activation value. Moreover, Langacker’s notion of conceptual overlap (1999: 106) is implied in (1b) as well. A candidate that exhibits a higher degree of overlap with a unit (i.e. a low-level schema) can be assumed to be ‘closer’ to that categorising unit than to a highly abstract schema. Thus, additional activation value is added to a candidate that way. The third principle in (1c) guarantees that

[12] The notion of activation value is relative. What constitutes high activation value always depends on the activation values of other candidates in the competition.

only one of the actualised candidates, viz. the expression with the highest activation value, is activated, while all others are deactivated.[13] The last principle in (1d) is a rather general statement on the gradient nature of well-formedness in linguistics and its positive correlation with the total activation value.[14] At this point, certain similarities to Optimality Theory (OT) become apparent. While section 3.2.3 is not meant to discuss these in any detailed way, a short overview of OT's basic principles will prove useful.

3.2.3. Some parallels to Optimality Theory

In the previous subsection, a number of parallels between the model of CG used in this thesis and Optimality Theory (OT) have become evident. In both theories, candidate expressions are compared to the mental grammar a speaker holds. While in OT the candidates are evaluated with respect to well-formedness constraints (cf. Kager 1999; Prince & Smolensky 2004), CG captures constraints in cognitive schemas. Moreover, in both approaches, candidate expressions are compared to the entire grammar simultaneously (Nesset 2008: 17). Despite points of similarities, however, a number of fundamental differences can be identified. In OT, there are two types of constraints, viz. markedness and faithfulness constraints (Kager 1999: 9). Markedness constraints are needed in the framework to assure that the output is well-formed in terms of structure. Faithfulness constraints regulate that input and output forms remain to some degree similar (1999: 9). All constraints are universal in that they are part of Universal Grammar, but, at the same time, they are ranked in language-specific ways (1999: 11). Such constraints do not exist in CG. In CG, schemas are considered to be generalisations that speakers form on the basis of exposure to language. Consequently, they have to be language-specific and cannot be universal.

Further differences can be found in connection with CG's commitment to the content requirement. In OT, faithfulness constraints require some underlying representation against which the surface form is evaluated (Kager 1999: 9). However, as CG is a usage-based approach, it does not recognise any structures not attested in actual speech. As discussed in section 3.2.1, source-oriented generalisations are captured in CG by second-order schemas relating two actually-occurring structures to each other. Furthermore, constraints in OT are

[13] (1c) should by no means be considered an absolute principle (Kumashiro 2000: 25). In some cases, two alternative ways of pronunciation exist (e.g. *garage* /ˈɡarɪdʒ/ vs. /ˈɡarɑː(d)ʒ/).

[14] Kumashiro argues that these principles are essentially compatible with connectionist approaches to language. For an overview of connectionist models, see Pulvermüller (2001).

often negatively stated (e.g. Vowels must not be nasal; Kager 1999: 1). In CG, however, schemas must be specified positively, since they cannot be abstracted from something that does not occur in actual utterances (cf. section 3.2.1). Differences can also be found in the way the winning candidate expression is selected. As already mentioned, universal constraints in OT are hierarchically ranked in a language-specific manner. The phonological framework outlined in the previous sections, however, selects the winning candidates based on rather general cognitive principles such as categorisation relationships and schema interaction. Having discussed the the theoretical underpinnings of the subsequent analysis, the thesis will now turn to the variety studied.

4. The sound system of Standard Southern British

This section will discuss the variety of British English analysed in the present thesis, viz. Standard Southern British (SSB). Section 4.1 will define SSB in contrast to the traditional standard Received Pronunciation (RP). In section 4.2 the sound system will be examined in more detail and some of the major contrasts to RP will be outlined.

4.1. RP and Standard Southern British

Received Pronunciation has a long history in Great Britain. Starting in the 19th century in the area of London, RP's rise continued until the 20th century (cf. Lindsey 2019). It is defined as the variety traditionally spoken by the upper and upper-middle classes of British society or, more precisely, "as the educated pronunciation of the metropolis, of the court, the pulpit, and the bar" (Ellis 1869: 23). The invention of mass communication in the first half of the 20th century advanced the spread of RP throughout the United Kingdom (2019: 3). However, from the 1960s onwards, RP started losing much of its formerly prestigious status. This development, as Lindsey (2019: 3) points out, was closely connected to the democratisation of British society. Moreover, already in the 1980s, Wells (1982, 1: 118) speculated that "[w]ith the loosening of social stratification and the recent trend for people of working-class or lower middle-class origins to set the fashion in many areas of life, it may be that RP is on the way out" (1982, 1: 118). While this prognosis has proved to be true in the long run, the south of England and especially London remain the centre of power and wealth (Lindsey 2019: 4). A variety of different accents can be heard in the media in present-day Britain, but accents of the South, especially spoken by the middle and upper-middle classes, are still dominant. It is accents of this sort that are typically referred to as British English or Standard Southern British (SSB) (2019: 4).

Standard Southern British is a variety "characteristic of university-educated young adults from the south of England" (Lindsey & Szigetvári 2013).[15] While it cannot be considered a majority accent in the UK, SSB certainly is one of the accents English speakers all around the globe are most familiar with. It is frequently used by presenters on British TV channels and can also be heard in Hollywood films. Thus, in the minds of many, SSB is closely linked to Britain internationally (Lindsey & Szigetvári 2013).[16] Some general features of SSB include a tendency towards converging spelling and pronunciation and towards making the pronunciation of many words more similar to American English (Lindsey 2019: 9-12). The former can again be understood with respect to the democratisation of British society. For instance, *interest* was pronounced as /íntrɪst/ in RP, but nowadays the DRESS vowel /ɛ/ in the second syllable can be found in the pronunciation of most speakers (2019: 10). The latter is a direct consequence of the cultural influence of the US. Among such changes there are unstressed yod coalescence (cf. section 4.2.2), weak vowel merger or vocal fry. It should be noted though that SSB retains many of its distinct British characteristics such as, for example, non-rhoticity or the LOT vowel (2019: 11). The sound system of SSB will examined in more detail in the following section.

4.2. The sound system of SSB

4.2.1. Vowels

Many of the changes that occurred in SSB can be found in its vowels. In fact, Lindsey (2019: 18) argues for "a large-scale 'anti-clockwise' shift in the vowel system" (2019: 18), which moved the RP vowels to different positions in the vowel space. While the number of contrasts largely remained identical, the observed shifts mostly concern vowel quality. They are illustrated in Figure 5 below (based on Lindsey 2019: 18):

[15] See http://cube.elte.hu/accent.html (1 Dec. 2019).

[16] See http://cube.elte.hu/accent.html (1 Dec. 2019).

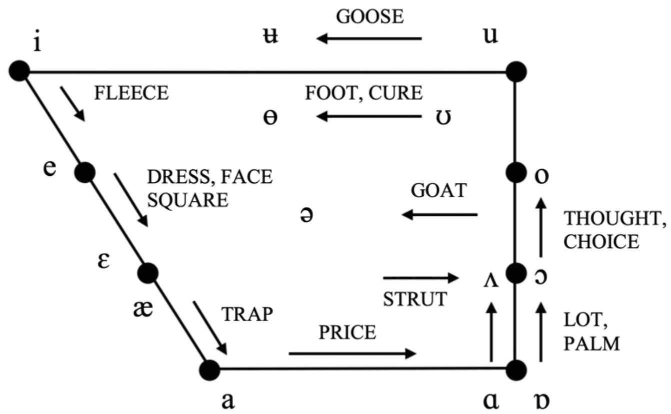


Figure 5 Anti-clockwise vowel shift in SSB (based on Lindsey 2019: 18)

Figure 5 shows the changes in vowel quality that can be observed in SSB with respect to their traditional RP pronunciation. As can be seen, all front vowels were lowered as a consequence of the vowel shift. This can most clearly be observed in the lexical sets DRESS and TRAP, which show the more open [ɛ] and [a] rather than the RP vowels [e] and [æ]. Lindsey (2019: 19) further notes that the starting points of the diphthongs in FLEECE[17] and FACE have moved to a lower position in the vowel space closer to [ɪ] and [ɛ]. Moreover, the diphthong of PRICE has a starting point further back in SSB, which can be transcribed as [ɑ].

Back vowels have experienced two different types of changes, viz. raising and centralisation (cf. Lindsey 2019: 20-21). The LOT and THOUGHT vowel have been raised and are pronounced with a vowel closer to [ɔ] and [o] respectively in SSB. It should also be mentioned that the vowel in THOUGHT, NORTH, and FORCE are identical in southern Britain. Thus, *saw* and *sore*, as well as *caught* and *court* are pronounced in the same manner, i.e. [soː] and [koːt] (2019: 20). With respect to centralisation, Figure 5 shows that the lexical sets FOOT and CURE are nowadays pronounced with a more central vowel [ɵ]. The starting points of the diphthongs in GOAT and GOOSE have also been centralised (2019: 20).[18] What should be noted at this point is that, as a result of vowel shifts, the vowel system as presented in this section suggests seven different diphthongs in SSB in contrast to the traditional eight in RP.

[17] The vowel in FLEECE has traditionally been described as a close monophthong /iː/ (Lindsey 2019: 23). Gimson (1974 [1970]: 99), however, already indicates a noticeable diphthongisation of /iː/ in RP. In SSB, it is typically pronounced as a diphthong [ɪi] or [ɪj] (Lindsey & Szigetvári 2013; see http://cube.elte.hu/accent.html (1 Dec. 2019)).

[18] Similar to FLEECE, GOOSE has traditionally been treated as a close monophthong /uː/ (Lindsey 2019: 23). Gimson. (1974 [1970]: 120) indicates diphthongisation for /uː/ as well. In SSB, it is pronounced as a diphthong [ʉu] or [ʉw] (Lindsey & Szigetvári 2013; see http://cube.elte.hu/accent.html (1 Dec. 2019)).

They can be grouped into two categories, i.e. those ending in the glide [j] and those ending in the approximant [w] (Lindsay 2019: 24):

Table 1 Diphthongs in SSB

Diphthongs ending in [j]		Diphthongs ending in [w]	
FLEECE	/ɪj/	GOOSE	/ʉw/
FACE	/ɛj/	GOAT	/əw/
PRICE	/ɑj/	MOUTH	/aw/
CHOICE	/oj/		

The vowels in Table 1 form a natural class. They behave alike in various phonological processes, such as smoothing or pre-fortis clipping. Moreover, as opposed to monophthongs, they can directly precede other vowels (e.g. *chaos* /kɛ́jɔs/ or *flower* /fláwə/) (2019: 24). A systematic chart of the vowel system of SSB, juxtaposed with its RP equivalents, will be given in section 5.1 when discussing transcription practices for SSB. The following section will consider some aspects of the consonant system of SSB. However, since consonants are not crucial to the phenomena analysed in this thesis, only an overview is given.

4.2.2. Consonants

Most differences in the sound systems of SSB and RP can be found in the vowels. However, a brief examination of some of the major changes in the consonant system will prove useful as well. One of the tendencies found in SSB is strong aspiration of /p t k/ in stressed and unstressed syllables (Lindsey 2019: 55). This stands in contrast to RP, where aspiration of these plosives traditionally only occurred in stressed syllables. Another difference worth mentioning is the palatalisation (or yod-coalescence) of RP's consonant clusters /tj/ and /dj/ resulting in SSB in /tʃ/ and /dʒ/ respectively. Although more frequently found in weak syllables (e.g. *e<u>du</u>cation*), Lindsey (2019: 59) argues that it can increasingly be heard in stressed syllables as well (e.g. *<u>Tues</u>day*). It should be mentioned that palatalisation can also be found in some words in RP (e.g. *cul<u>ture</u>* and *fu<u>ture</u>*). However, as Wells (1982, 1: 247) puts it, the sound /tʃ/ in words like *si<u>tu</u>ation* in RP sounds "rather vulgar" (1982, 1: 247). Nevertheless, coalescence is widespread in SSB nowadays and not negatively connotated anymore (Lindsey 2019: 59). A final note on consonants in SSB concerns the use of the syllabic consonants /l/ and /n/. These are less frequent in the speech of speakers of SSB than in traditional RP. While words such as *bottle* or *curtain* were pronounce*d* [bɒtl̩] and [kəːtn̩] in RP, a weak vowel frequently follows the plosive in SSB, e.g. [bɔtəl] and [kəːtən] (2019: 65). Having presented the sound system of SSB, the thesis will now move on to a number of methodological aspects to be considered.

5. Methodological aspects

The aim of this section is to discuss all the aspects of the study related to data and data collection. Since the dictionary that was used in the present study uses of a modified IPA system, section 5.1 will briefly discuss the transcription conventions applied in the remainder of the thesis. In section 4.2, the data collection process will be outlined in detail.

5.1. Dictionary and transcription symbols

The dictionary used to gather the data analysed in the subsequent study is called *CUBE: Current British English searchable transcriptions* (Lindsey & Szigetvári 2013). As discussed in section 4, the pronunciation of SSB has changed in many aspects in comparison to traditional standard RP. However, although most commonly found in the dictionaries on the market (e.g. Wells 2008), the traditional transcription system introduced by Gimson (1974 [1970]) for RP does not accurately represent 21st century SSB and its changes (Lindsey & Szigetvári 2013).[19] This is particularly evident in the choice of symbols for vowels, which have arguably undergone the most radical changes, viz. the anti-clockwise vowel shift (cf. section 4.2.1). As a result, the accent described by the traditional vowel symbols "now sounds to native speakers old-fashioned, 'posh' and even amusing" (Lindsey & Szigetvári 2013).[20] To reflect contemporary changes in the pronunciation of British English, the transcriptions used by CUBE differ from classical RP in several ways. These are shown in Table 2 below. Since the consonant system essentially remains the same, only the vowel symbols and their RP equivalents for comparison (given in grey) are shown (based on Lindsey 2019: 146):

[19] See http://cube.elte.hu/accent.html (1. Dec. 2019)

[20] See http://cube.elte.hu/accent.html (1. Dec. 2019)

Table 2 Transcription system for vowels in SSB (based on Lindsey 2019: 146)

short vowels			long vowels								
			long monophthongs			diphthongs					
KIT	ɪ		NEAR	ɪː	ɪə	FLEECE	ɪj	iː			
DRESS	ɛ	e	SQUARE	ɛː	eə	FACE	ɛj	eɪ			
LOT	ɔ	ɒ	THOUGHT	oː	ɔː	CHOICE	oj	ɔɪ			
TRAP	a	æ	PALM	ɑː		PRICE	ɑj	aɪ	MOUTH	aw	aʊ
FOOT	ɵ	ʊ	(CURE	ɵː	ʊə)				GOOSE	ʉw	uː
STRUT	ʌ		NURSE	əː	ɜː				GOAT	əw	əʊ
comm*a* ə											

Table 2 briefly summarises the major shifts in the vowel system already discussed in section 4.2.1. As can be seen, the symbols of all but three vowels differ from their RP equivalents. The centring diphthongs (NEAR, SQUARE, CURE) in RP are pronounced as long monophthongs in SBB (Lindsey & Szigetvári 2013).[21] It should be noted though that the vowel in CURE is frequently pronounced with the vowel used in THOUGHT (e.g. *pour* /póː/), hence the brackets in Table 2. The following section considers the type of data collected.

5.2. Type of data

Words were collected on the basis of two criteria, viz. word length and derivational morphology. In other words, the present thesis examines word pairs that consist of a base word in which a given syllable is stressed and a derivative in which stress moves to a different syllable as a result of affixation (e.g. *able – ability*). While the number of syllables for base words was not significant, the length of the derivatives was a deciding factor, viz. derivatives had to have at least two syllables. Collecting word pairs allowed for not having to stipulate underlying representations, which are not compatible with the principles of usage-based approaches and the content requirement. Rather, by comparing base words and their respective derivatives, vowel reduction processes could be directly observed without resorting to underlying representations. The affixes selected to collect the derivatives are based on Giegerich's (1999) distinction between stress-neutral and stress-shifting affixes.

[21] See http://cube.elte.hu/accent.html (1. Dec. 2019)

Apart from stress-shifting behaviour, no selection criteria were employed in choosing the affixes.

During the data collection process, some problems concerning the transcription system used by CUBE arose. A first glance at the original data did not show any systematic distribution of the reduced vowels [ə] and [ɪ] for the vowels /ɛ/ and /ɑj/. At a later stage of the research, the transcriptions were checked once again. At this point, CUBE had changed the [ə] in most of the words to [ɪ]. These changes were incorporated in the data set. However, other issues such as differences in the unstressed vowel between the singular and plural of the same word, e.g. [kɔ́mpjʉwtɛ́jʃən] vs. [kɔ́mpjətɛ́jʃənz], still remain. Where necessary, these issues will be discussed in the sections examining the data in more detail. As of now, it suffices to note that, while carefully compiled, the data set may still contain items that strike the reader as inconsistently transcribed. CUBE is continually updating and correcting its transcriptions. Nevertheless, changes incorporated into the dictionary only recently may not be reflected in the data set considered in the analysis. Having discussed some of the methodological issues, the thesis will now move on to a discussion of vowel reduction in SSB and introduce the data set in more detail.

6. Vowel reduction in SSB

Before the data can be adequately discussed, stress and vowel reduction in general will have to be examined in section 6.1. Section 6.2 will present the data set and discuss exceptions to the patterns identified.

6.1. Stress and vowel reduction

Since vowel reduction only occurs in unstressed syllables, a brief look at stress proves necessary. The languages of the world broadly fall into two groups with respect to stress placement, viz. fixed-stress languages and variable-stress languages (van der Hulst 2010: 33; see also Beckman 1986). In fixed-stress languages, primary stress is always placed on the same syllable in the word (e.g. on the first syllable in Slovak). By contrast, the position of the stressed syllable in variable-stress languages is not fixed and depends on a variety of other factors (2010: 33). Contemporary English belongs to the latter of the two groups and has further been termed a stress-accented language (Tokar 2017: 37). In stress-accented languages, the position of the accented syllable is typically determined on the basis of a variety of cues such as vowel quality, intensity and duration (2017: 37).[22] Thus, according to Gussenhoven (2006: 216), “the most prominent syllable in [an English] word is longer than other syllables and has a less reduced vowel […]” (2006: 216). An additional factor in the placement of stress in languages such as English or Modern High German is syllable weight (Tokar 2017: 38). While syllables are traditionally divided into heavy and light syllables, what counts as heavy or light (and therefore stressable) is often language-specific (2017: 38). For English, CV can be considered light, while all other syllable templates, i.e. CVC, CVV, CVVC and CVCC, are heavy, i.e. they show a branching rhyme (Wenszky 2004: 11-12). Quite generally, stress in English may in principle either fall on the penultimate or antepenultimate syllable in nouns and on the final or penultimate syllable in verbs (cf. Chomsky & Halle 1991 [1968]).

The quality of vowels is typically connected to stress placement. Many languages do not sustain the full vowel inventory in all possible contexts (Harris & Lindsey 2000: 190). Rather, stress-timed languages, e.g. English, tend to neutralise vowel contrasts in unstressed positions (cf. Crosswhite 2001). In stress-timed languages, the time intervals between stressed syllables tend to be equally long (Fox 2000: 88). What follows is that this necessarily results in the reduction of unstressed syllables to keep the length of the time intervals roughly the same. Consequently, unstressed syllables are typically shorter than their stressed counterparts, have a lower amplitude and do not show any notable pitch contour (Walker 2011: 16). Furthermore, with respect to positional neutralisation, two patterns can be identified, viz. prominence-reducing and contrast-enhancing vowel reduction (2001: 21). Prominence-reducing, i.e. centripetal, vowel reduction draws vowels into a more central position in the vowel space, e.g. vowel reduction in Romance languages (Harris & Lindsey 2000: 190). Conversely, contrast-enhancing, i.e. centrifugal, vowel reduction reduces the contrasts found in unstressed positions by dispersing vowels to the corners of the vowel space, e.g. vowel reduction in Russian. The reduction processes in SSB to be presented in section 6.2 and analysed in section 7 mostly conform to the centripetal reduction pattern, i.e. vowels reduce to a schwa-like quality (cf. Crosswhite 2001: 205 for English in general). However, Harris & Lindsey (2000: 190) note that languages characterised by centripetal reduction frequently also show aspects of centrifugal patterns (see also Harris 2005). As will

[22] This stands in opposition to pitch-accent languages like Japanese, in which pitch is taken as the primary cue for accent (Tokar 2017: 37; see also van der Hulst 2010: 11-12).

be shown in the following section, SSB not only exhibits reduction to [ə] (cf. Crosswhite 2001 on English), but in some cases also to [ɪ], viz. it also shows centrifugal patterns.

6.2. Data and discussion

This section will introduce the data considered in the analysis. However, since the data set is relatively large, only a subset will be shown at this point. The entire data set collected for the present thesis can be found in section 11 (appendix A). In order to make the presentation of the data easier, each subsection will focus on one type of vowel found in SSB, viz. short vowels (section 6.2.1), long monophthongs (section 6.2.2) and diphthongs (6.2.3). The final subsection will give a brief overview of the different patterns identified.

6.2.1. Short vowels

6.2.1.1. The data

The examples in Table 3 illustrate the reduction of each of the six short vowels in SSB. First, two examples each are given in which reduction occurs, followed by instances in which the full quality of the vowel is retained.

Table 3 Reduction of short vowels

ɔ → ə	**ɔ**	**ɛ → ə**	**ɛ → ɪ**	**ɛ**
pɔ́zɪt pəzíʃən	tɔ́ksɪk tɔksísətɪj	əpɛ́lət ápəlɛ́jʃən	ɛ́dɪt ɪdíʃən	fɛ́stɪv fɛstívətɪj
əbɔ́lɪʃ ábəlíʃən	hɔ́stɑjl hɔstílətɪj	sɛgmɛ́nt sɛ́gməntɛ́jʃən	trɛ́pɪd trɪpídɪtɪj	ɪkspɛ́kt ɛ́kspɛktɛ́jʃən
ʌ → ə	**ʌ**	**a → ə**	**a**	
kʌ́rɪʤ kərɛ́jʤəs	abdʌ́kt ábdʌktíj	rápɪd rəpídətɪj	káptɪv kaptívətɪj	
kənsʌ́lt kɔ́nsəltɛ́jʃən	pʌ́blɪk pʌblísətɪj	ád ədíʃən	áktɪv aktívətɪj	
ɪ		**ɵ**		
áktɪv aktívətɪj		fɵl fɵlfílmənt		

Table 3 shows that full vowels may occur in both stressed and unstressed syllables. Moreover, it can be seen that vowel reduction in SSB is a relatively strong centripetal, prominence-reducing process, as a result of which the vowels are drawn to a more central position in the vowel space. Note, however, that /ɛ/ exhibits two different outcomes, viz. [ə] and [ɪ]. As already mentioned in the previous section, languages following a centripetal pattern often show centrifugal, or contrast-enhancing, reduction as well. What can further be seen in Table 3 is that /ɪ/ and /ɵ/ do not reduce. While no data was found to substantiate the claim for /ɵ/ (i.e. only one word were found for /ɵ/), it is nevertheless assumed on the basis of Crosswhite's survey of vowel reduction in English (2001: 205). In her analysis, she argues that English exhibits two variants in reduction: either all unstressed vowels or all but /ɪ/ and /ɵ/ reduce to [ə] (2001: 205). This view is further supported by cross-linguistic tendencies for /ɪ/ and /ɵ/ not to reduce, such as can be found in Russian (cf. section 8), Brazilian Portuguese (Pöchtrager 2018) or Eastern Catalan (Harris 2005). The data set clearly shows that /ɪ/ does not reduce in SSB.[23] Consequently, the present thesis assumes that /ɵ/ does not reduce either. The data in Table 3 further show that full vowels can also occur in unstressed syllables. The factors that condition the retention of the full vowel quality in unstressed position will be discussed in the following section.

6.2.1.2. Open vs. closed syllables

The data presented in section 6.2.1.1 suggest that lack of stress is not the only factor governing the reduction of vowels in SSB. A clear distinction exists between open and closed syllables. Several authors (Burzio 1994: 112-126; Fudge 1984: 200; Marchand 1969: 222-225) conclude that unstressed short vowels in open syllables generally reduce, while unstressed short vowels in closed syllables do not. This is exemplified in the following four examples in (2) taken from Table 3:

(2) a. pɔ́zɪt – pəzíʃən
b. rápɪd – rəpídətɪj
c. hɔ́stɑjl – hɔstílətɪj
d. káptɪv – kaptívətɪj

As can be seen in (2), the open syllables in (2ab) allow for reduction. By contrast, the closed syllables (2cd) do not. The word pairs in (2a-d) raise the question as to why closed syllables do not allow for the reduction of short vowels. Burzio (1994: 114-115; cf. Burzio 2007) argues that this distinction is quite natural in the sense that consonants "can in general be

[23] One example was found in which /ɪ/ alternates with [ə] (see appendix A). Nevertheless, it clearly does not follow the general pattern and can thus be considered an exception.

articulated only as transitions between openings and closures of the vocal tract, hence in this sense needing a vocalic 'support'" (1994: 114-115). Consequently, the reduction of short vowels in a closed syllable (VC$C) would reduce the vocalic support of the first consonant to some degree and hence is not permitted. Conversely, open syllables do not face any similar restrictions. The vowel in a syllable sequence such as V$CV can be reduced as the consonant in the onset of the following syllable receives the needed support from the nucleus it precedes (1994: 115).[24]

The distinction between open and closed syllables is a useful generalisation to capture the facts found in SSB. However, there is a set of consonants that, when in coda position, allows for vowel reduction. Consider the examples in (3) below:

(3)	a. sɛgmɛ́nt	–	sɛ́gməntɛ́jʃən
	b. kɔ́mplɛks	–	kəmplɛ́ksətɪj
	c. mɛ́ntəl	–	mɛntálətɪj
	d. kənfrʌ́nt	–	kɔ́nfrʌntɛ́jʃən

The data in (3ab) suggest that sonorants in coda position do not necessarily block vowel reduction. It is generally assumed that sonorants exhibit high sonority (cf. Clements 2009; Martinez-Gil 2001) and can thus more easily stand on their own. Put differently, they do not seem to require vocalic support to the same extent as other consonants (Burzio 1994: 115). This is further supported by the fact that sonorants in English can also occur in the nuclear position in syllables, i.e. they can be syllabic (e.g. RP [kəːtn̩]).[25] What needs to be pointed out here is that while reduction is possible in syllables closed by a sonorant, it is by no means obligatory (1994: 116). This is exemplified in the word pairs in (3cd), which, as opposed to (3ab), show unreduced vowels in unstressed position. Consequently, syllables closed by sonorants may be reduced by some speakers, but not by all. Possible factors influencing whether such syllables reduce or not are, for instance, word-frequency and semantic transparency (to be discussed in later sections of this thesis).

What remains to be briefly discussed is the reduction of syllables closed by *s*. While Burzio (1994: 115) argues that syllables closed by *s* reduce as well, the data set collected for

[24] As noted by Burzio (1994: 115), this view is supported by cross-linguistic evidence from French (cf. Jacobs 1989) and Palestinian Arabic (Halle & Kenstowicz 1991).

[25] It should be noted though that in SSB, syllabic consonants are less frequently used than in RP. See section 4.2.2 above.

the present study does not support this generalisation. Rather, *s* quite generally seems to block reduction similar to any other consonant in coda position, e.g. /hɔ̱́stɑjl/ - /hɔ̱stílətɪj/. The non-reduction of /ɔ/ in *hostility* suggests that *s* is syllabified as part of the coda of the first syllable. However, it should be noted that *s* may in principle also be considered to belong to the onset of the second syllable. Consequently, there are two possibly syllable structures, i.e. *hos$tility* vs. *ho$stility*. Fudge (1984: 198) provides independent evidence for the former syllable structure, namely that open syllables tend to be more frequent if a word has a prefix (e.g. *a-* in *astronomy*). It follows that words such as *hostility* or *festivity*, which do not show any prefixation, are most probably syllabified as /hɔs$tílətɪj/ and /fɛs$tívətɪj/. This is further substantiated by Goad (2012), who argues that s-clusters should be cross-linguistically analysed as coda+onset. This is the approach followed in the present thesis, since syllabifying words such as *hostility* and *festivity* according to the Maximal Onset Principle (MOP), i.e. *ho$stility* and *fe$stivity*, cannot account for the regular non-reduction of short vowels preceding s-clusters. The following subsection considers a special case of reduction, viz. the [ə] and [ɪ] alternation found for /ɛ/.

6.2.1.3. /ɛ/: [ə] and [ɪ] alternation

While the distinction between open and closed syllables proves to be a useful generalisation, not all aspects of the data can be explained solely in that way. This becomes evident with respect to the vowel /ɛ/, which reduces in two different ways, viz. to [ə] and [ɪ] respectively (cf. Table 3 in section 6.2.1.1). A close examination of the data reveals a clear distribution of both reduced vowels. Consider the word pairs in (4), which illustrate this phenomenon:

(4) a. ɛ́dɪt – ɪdíʃən
b. trɛ́pɪd – trípɪdɪtɪj
c. əpɛ́lət – ápəlɛ́jʃən
d. sɛgmɛ́nt – sɛ́gməntɛ́jʃən

These word pairs clearly indicate that [ɪ] predominantly occurs in word-initial open syllables (examples (4ab)), while [ə] occurs elsewhere ((4cd)). Even though only three instances where found in which /ɛ/ reduces to [ə], no particular phonotactic context can be identified in those examples that might trigger its occurrence. This stands in stark contrast to the distribution found for [ɪ], which are almost exclusively found in word-initial position. This claim is further substantiated by the fact that the strengthening of [ɪ], i.e. its stressing, quite regularly results in the vowel /ɛ/ in word-initial syllables. For instance, if, as a consequence of affixation, stress falls on the first syllable of *explain* /ɪksplɛ́jn/, [ɪ] changes its quality and becomes [ɛ] as in *explanation* /ɛ́ksplənɛ́jʃən/. Similar changes can be found in the word pairs *expect – expectation, reveal – revelation* or *present – presentation* (cf. appendix A in section 11). By and large, [ɪ] was not found word-medially in unstressed syllables. Thus, the word pairs *perpetuate* /pəpɛ́ʧʉwɛjt/ – *perpetuity* /pə́ːpɪtjʉ́wətɪj/ and allege /əlɛ́ʤ/ – allegation / álɪgɛ́jʃən/ may be considered exceptions, since on the basis of the collected data, no definite explanation can be given for the occurrence of [ɪ] word-medially. A possible reason may be the nature of the following consonant, i.e. /ʧ/ and /g/, which may trigger the vowel [ɪ]. However, a larger amount of data would be needed to ascertain this hypothesis. The next section moves to some of the exceptions identified in the data set.

6.2.1.4. Exceptions

Exceptions can be found in both unstressed open and closed syllables. A thorough discussion of all exceptions would go beyond the scope of this thesis. Therefore, only three examples will be given in (5) below:

(5) a. áksɛs – əksɛ́səbíl ətɪj
b. mɛ́təl – mɛtálɪk
c. pásɪv – pasívətɪj

What all the exceptions have in common is that they do not follow the otherwise quite regular patterns of reduction in English. (5a) reduces even though the syllable is clearly closed by the velar stop [k]. The examples in (5b-c) both show open syllables in unstressed position that do not reduce. It should be emphasised that no systematic distribution emerges from the exceptions found in the data set. However, some possible explanations will be discussed in the following.

Quite generally, exceptions do not pose a major problem to the approach followed in the present thesis, as one of its corner stones is the emphasis of language use. As already discussed in section 2.2, each linguistic unit is considered part of the mental grammar of native speakers. In other words, CG is a maximalist, bottom-up and non-reductionist approach. Consequently, like any other conventionalised expression in a language, exceptions are included in the grammar as concrete instantiations (see section 2.1.3). Moreover, vowel reduction is a gradual phenomenon influenced by many factors among which frequency may take a pivotal role. Highly frequent words are commonly assumed to resist regularisation and consequently often reduce (Bybee 2001: 28) and may thus exhibit reduced vowels even though the phonotactic context would normally block reduction. At the same time, as will be shown, items showing a low token frequency tend to show full vowels in unstressed syllables. For instance, the derivatives given in (5bc) above both show a rather low frequency, which might explain the non-reduction of the first syllable. Furthermore, this may also be related to issues of semantic transparency, i.e. how transparent the meanings of two related words are. How such factors may be related to the unexpected retention or reduction of a particular full vowel will be explored in later sections of this thesis. Having discussed short vowels, the thesis will now move on to long monophthongs.

6.2.2. Long monophthongs

6.2.2.1. The data

The reduction of the six long monophthongs in SSB is illustrated in Table 4 below. Similar to the examples in Table 3 above, the first column of each vowel gives the context in which reduction occurs, the second the context in which the full vowel is retained:

Table 4 Reduction of long monophthongs

ɪː → ə	**ɪː**	**ɛː → ə**	**ɛː**
əpíː ápəríʃən	antíːrɪjə ántɪːrɪjɔ́rətɪj	dəklɛ́ː dɛ́klərɛ́jʃən	ɛ́ːrɪst ɛːrístɪk
ɑː → ə	**ɑː**	**əː → ə**	**əː**
pɑ́ːtɪkəl pətíkjələ	ɪmbɑ́ːk ɛ́mbɑːkɛ́jʃən	kənsə́ːv kɔ́nsəvɛ́jʃən	ə́ːbən əːbánətɪj
ədvɑ́ːntɪʤ ádvəntɛ́jʤəs	ɑ́ːtɪst ɑːtístɪk	pə́ːfɪkt pəfɛ́kʃən	ɪkstə́ːnəl ɛ́kstəːnálətɪj
oː → ə	**oː**	**ɵː → ə**	
ɪnfóːm ínfəmɛ́jʃən	kóːz koːzɛ́jʃən	bjɵ́ːrəw bjərɔ́krəsɪj	
ɪksplóː ɛ́ksplərɛ́jʃən	óːθə oːθɔ́rətɪj	əʤɵ́ː áʤərɛ́jʃən	

As can be seen in the examples given in Table 4, long monophthongs in SSB reduce to [ə] in unstressed syllables. Thus, with respect to long monophthongs, only prominence-reducing, or centripetal, vowel reduction can be found. For the final vowel /ɵː/, no context could be identified in which reduction does not occur. Based on the data set, it may be stipulated that /ɵː/ reduces whenever stress is lost. Moreover, it should be emphasised that for the monophthongs /ɪː/, /ɛː/ and /ɵː/, only a limited number of word pairs was found in the data collection process. Their restricted occurrence may be due to the fact that these vowels were originally pronounced as diphthongs in RP but have undergone monophthongisation in SSB.

As was mentioned with respect to short vowels, lack of stress is not the only factor governing vowel quality. However, the picture presented by long monophthongs is somewhat more complex than that of short vowels. In the literature, there are different perspectives on the behaviour of long monophthongs in unstressed positions. While Burzio (2007: 162) argues that long vowels are immune to reduction due to their longer duration, Crosswhite (2001: 205) notes that long vowels reduce via laxing. Considering the data presented in Table 4, it can clearly be seen that long monophthongs often do undergo changes in unstressed syllables. Moreover, long vowels can be found in both stressed and unstressed syllables. Unlike with short vowels, the changes in the vowel quality of long monophthongs cannot be attributed to syllable structure. Rather, a number of other factors such as foot structure, frequency effects and semantic transparency may influence whether a given long monophthong reduces or not. The most important of these factors, viz. foot structure, will be discussed in the following subsection.

6.2.2.2. Reduction of long monophthongs and foot structure

In many cases, reduction of long monophthongs in SSB seems to be conditioned by foot structure. In principle, unfooted syllables do not reduce in SSB. This is to say that a word-initial long vowel which loses stress as a result of affixation is typically not reduced if it is directly followed by a stressed syllable, i.e. the head of the following foot. Put differently, the word-initial syllable is not integrated into the foot structure of the word and thus retains its full quality. Conversely, if a formerly stressed syllable becomes an unstressed syllable in a foot, it is reduced. Some examples are given in (6) below:

(6) a. ɑ́ːtɪst – ɑː(tístɪk)
b. kóːz – koː(zɛ́jʃən)
c. əbzə́ːv – (ɔ́bzə)(vɛ́jʃən)
d. dəklɛ́ː – (dɛ́klə)(rɛ́jʃən)

The word pairs in (6) illustrate the sensitivity of vowel quality to foot structure. This observation is congruent with the results of a cross-linguistic study conducted by Wedel et al. (2019) that suggests that segments at the beginning of words contribute a larger amount of information on word identity than segments occurring towards the end of words. What follows is that due to their greater importance in word identification word-initial segments are less likely to undergo reduction processes than word-final segments (2019: 245).

The latter two examples in (6) above indicate that long monophthongs reduce if they are integrated into the foot structure of a word. In the derivatives in (6cd), secondary stress is placed on the first syllable of the respective derivative.[26] Wenszky (2004: 11) argues that this is due to the alternating rhythm of English, which disfavours more than two adjacent unstressed syllables (particularly in word-initial position). For example, since main stress is moved from the second syllable in *observe* /əbzə́ːv/ to the affix /-ɛ́jʃən/ in /ɔ́bzəvɛ́jʃən/, secondary stress is placed on the first syllable to avoid two consecutive unstressed syllables. The secondarily stressed syllable and any unstressed syllable following it constitute feet by themselves. The data collected suggest that if such a foot occurs, the unstressed syllable undergoes reduction to [ə]. As can be seen in the derivatives (6cd), each word is prosodically structured into two feet, the first of which is weak, i.e. secondarily stressed, and the second of which is strong, i.e. primarily stressed. Since SSB exhibits foot-based vowel reduction, unstressed syllables in feet reduce. However, not all the word pairs collected can be explained that way. As already mentioned, the reduction of long monophthongs is an interplay of different factors all of which contribute to their behaviour in unstressed positions. These will be looked at in more detail in the following section.

6.2.2.3. Other factors influencing (non-)reduction of long vowels

The tendencies outlined above for long monophthongs are valid generalisations made on the basis of the data set. However, these generalisations are by no means as regular as those established for short vowels. Other factors such as the frequency of a particular item or its semantic transparency may notably influence the reducibility of a long monophthong in SSB. Frequency can generally have two seemingly contradictory effects on linguistic patterns. On the one hand, highly frequent items tend to undergo phonetic changes (particularly in the

[26] Note that secondary stress is not transcribed with a different symbol in CUBE. The right-most stress is primary, while any stress mark to the left of it necessarily indicates a secondarily stressed syllable.

process of grammaticalisation) more easily (Bybee 2001: 11). On the other, high frequency items also resist regularisation in many cases, as can be observed, for example, in the irregular past tense forms in English (2001: 12). With respect to the data analysed in the present thesis, frequency effects seem to result in the preservation of full vowels in items of low frequency. Compare the examples given in (7). The first two are relatively frequent items, the latter two are not:[27]

(7) a. drɑ́ːmə – drə(mátɪk)

b. pɑ́ːtɪkəl – pə(tíkjələ)

c. dəfróːd – (dífroː)(dɛ́jʃən)

d. ɪkstə́ːnəl – (ɛ́kstəː)(nálətɪj)

The items in (7) are all exceptions to the generalisations discussed in the previous section. What can be seen is that the first vowels in the highly frequent items in (7a) and (7b) reduce even though they are not integrated into the foot structure in the derivatives. By contrast, the vowels in (7c) and (7d) do not reduce in unstressed position. A possible reason for the non-reduction is their comparably low frequency. However, no statistical analysis was carried out as part of this thesis. Thus, no definite claims on the effect frequency has on vowel reduction in English can be made at this point. Nevertheless, the data collected suggests a tendency for less frequent items to resist reduction in SSB.

Apart from frequency, semantic transparency may similarly have an effect on whether unstressed long monophthongs reduce. Semantic transparency is generally defined in rather vague terms as "how transparent the end product of a morphological process is with regard to its meaning" (Bell & Schäfer 2016: 158). Put differently, if the meaning of a word can be predicted based on the word-formation processes it was formed by, it is said to be semantically transparent (cf. Plag 2003: 46). Other definitions take meaning-relatedness between two items as the central factor governing semantic transparency (e.g. Zwitserlood 1994). Whatever definition is taken, the effects of semantic transparency on vowel reduction are relatively hard to ascertain. It seems to be the case that highly non-transparent words such as *particular* /pətíkjələ/ are more likely to show reduction than semantically more transparent words, e.g. *embarkation* /ɛ́mbɑːkɛ́jʃən/, in which the meaning is predictable on the basis of

[25] The frequencies of the respective items were checked using CELEX. Since the size of the corpus is not immediately clear, no token counts will be given in the thesis. Put differently, the derivatives in (7ab) are frequent compared to those in (7cd). However, no claim as to the overall frequency of the items in English can be made.

embark. This, however, may also be attributed to the former's relatively high frequency. Consequently, what becomes evident is that semantic transparency and frequency correlate with each other to some extent. In many cases, the degree of semantic transparency alone does not suffice to explain the (non-)reduction of a given item in the data set. At this point it is simply important to note that many of the exceptions found in the data on long monophthongs may be attributable to factors other than foot structure such as, for example, said semantic transparency. A possible analysis of those effects on vowel reduction will be proposed in section 7.4.

Another factor that may be of importance in the behaviour of unstressed vowels in SSB is the position a particular unit takes in the linguistic system. For example, the derivatives in the word pairs *conform* /kənfóːm/ – *conformation* /kɔ́nfoːmɛ́jʃən/ and *confirm /* kənfə́ːm/ – *confirmation* /kɔ́nfəmɛ́jʃən/ differ with respect to the vowel quality with the former showing no reduction of /oː/ and the latter reduction to [ə]. Since the vowel quality is what differentiates both derivatives from each other, reducing /oː/ in *conformation* would presumably lead to difficulties in word recognition. As a consequence, it may well be assumed that the full vowel in *conformation* is retained to maintain their difference in the linguistic system. The analysis presented in section 7.4 will propose how frequency effects and semantic transparency may be accounted for in CG. It remains to be emphasised that the aim of the present thesis is not to once and for all solve all issues concerning vowel reduction. Vowel reduction in English is an intricate phenomenon in which an array of different factors interplay in different ways. A thorough treatise of how item frequency, semantic transparency and vowel reduction correlate with each other would go beyond the scope of this thesis. Rather, the thesis aims at outlining a CG framework that principally allows for accounting for phonological phenomena and will show possible ways of explaining exceptions related to frequency effects and semantic transparency in section 7.4. The following section introduces the data on diphthongs considered in the subsequent analysis.

6.2.3. Diphthongs

6.2.3.1. The data

The final set of vowels not yet introduced is the seven diphthongs found in SSB. The behaviour of diphthongs in vowel reduction is shown in Table 5 below. As with short vowels and long monophthongs, the last column for each vowel gives the context in which no reduction takes place:

Table 5 Reduction of diphthongs

ɪj → ə	**ɪj → ɪ**	**ɪj**	**ɛj → ə**	**ɛj → ɪ**	**ɛj**
kəmpíjt kɔ́mpətíʃən	íjkwəl ɪkwɔ́lətɪj	líjgəl lɪjgálətɪj	ɪksplɛ́jn ɛ́ksplənɛ́jʃən	əbstɛ́jn ábstɪnəns	nɛ́jzəl nɛjzálətɪj
əpíjl ápəlɛ́jʃən	síjkwəns sɪkwɛ́nʃəl	íjsθɪjt ɪjsθɛ́tɪk	ɛ́jbəl əbílətɪj	pətɛ́jn pə́ːtɪnəns	ɛ́jʤənt ɛjʤɛ́nʃəl

ɑj → ə	**ɑj → ɪ**	**ɑj**	**əw → ə**	**əw**
ədmájə ádmərɛ́jʃən	dəzájn dɛ́zɪgnɛ́jʃən	fájnəl fɑjnálətɪj	pə́wlə pəlárətɪj	ɪvə́wk íjvəwkɛ́jʃən
sátɑjə sátərɑjz	əblájʤ ɔ́blɪgɛ́jʃən	sájt sɑjtɛ́jʃən	əpə́wz ɔ́pəzíʃən	mə́wdəl məwdálətɪj

ʉw → ə	**ʉw**	**oj**	**aw**
əkjʉ́wz ákjəzɛ́jʃən	brʉ́wtəl brʉwtálətɪj	ɪmplój ɛ́mplojíj	fáwnd fawndɛ́jʃən
rɪpjʉ́wt rɛ́pjətəbəl	ɪksklʉ́wsɪv ɛ́ksklʉwsívətɪj	ɪksplójt ɛ́ksplojtɛ́jʃən	áwtrɛjʤ awtrɛ́jʤəs

The reduction processes of diphthongs in SSB appears to be somewhat more complex than that of short vowels and long monophthongs. Three out of the seven diphthongs reduce to either [ə] or [ɪ], i.e. exhibit centripetal, i.e. contrast-reducing, and centrifugal, i.e. contrast-enhancing, patterns. Of the remaining four diphthongs, two, i.e. /oj/ and /aw/, do not reduce at all, while the diphthongs /əw/ and /ʉw/ only reduce to [ə]. A note is due on the vowel /ɛj/. Only two examples were found in which /ɛj/ reduces to [ɪ]. Additionally, both words seem to have been borrowed directly from French (OED 2019: s.v. *pertinence*; *abstinence*). Based on the data set, it may be said that reduction of /ɛj/ to [ɪ] does not seem to be productive in SSB, but rather is a result from items being borrowed from French directly. Consequently, they will not be considered in the present thesis. The following two subsections will examine possible reasons behind the patterns observable in Table 5.

6.2.3.2. Reduction of diphthongs and foot structure

Similar to long monophthongs, the picture presented by the behaviour of diphthongs in unstressed position seems rather intricate and complex. By and large, the generalisations outlined for long monophthongs hold for most diphthongs as well. For the vowels /ɑj əw ʉw/, foot structure appears to be one of the factors conditioning reduction. Consider the word pairs in (8) below:

(8) a. əpə́wz – (ɔ́pə)zíʃən

b. ɪmplɑ́j – (ímplɪ)kɛ́jʃən

c. brʉ́wtəl – brʉw(tálətɪj)

d. mə́wdəl – məwdálətɪj

The examples in (8a) and (8b) illustrate that SSB exhibits a tendency for reducing unstressed diphthongs if they are integrated into the foot structure of the derivative, i.e. if, together with a secondarily stressed syllable, they form a weak foot. The last two items in (8) show that unfooted initial diphthongs tend to retain their full vowel quality. The remaining four diphthongs exhibit different behavioural patterns in unstressed syllables. Unlike the previous three diphthongs, /ɪj/ reduces more or less regularly in footed and unfooted syllables. The vowel /ɛj/ takes a similar position in the diphthongal system of SSB and reduces irrespective of foot structure. Nevertheless, exceptions to these generalisations do exist as well and will be discussed in section 6.2.3.3 below. At this point it suffices to note that for many of the counterexamples, frequency effects can offer a plausible explanation. Moreover, the data in Table 5 also indicate that /oj aw/ do not reduce at all. A possible reason will be suggested below.

While foot structure is without doubt one of the conditioning factors of the reduction of diphthongs, it does not explain the [ə]/[ɪ] alternation found in the data on the vowels /ɪj/ and /ɑj/. Consider the word pairs given in (9) below. (9a-d) illustrate the patterns of /ɪj/ and (9e-h) those of /ɑj/:

(9) a. íjkwəl	–	ɪ(kwɔ́lətɪj)	e. ɪmplɑ́j)	–	(ímplɪ)(kɛ́jʃən)
b. skíjmə	–	skɪ(mátɪk)	f. fɑ́jnɑjt	–	(ínfɪnət)
c. kəmpíjt	–	kɔ́m(pətíʃən)	g. ədmɑ́jə	–	(ádmə)(rɛ́jʃən)
d. rɪvíjl	–	rɛ́və(lɛ́jʃən)	h. sátɑjə	–	(sátərɑjz)

The data in (9a-d) clearly show that /ɪj/ reduces to [ɪ] in word-initial syllables, whereas [ə] occurs in all other footed contexts. The data set exhibits one exception to that pattern, viz. the word pair *repeat* /rɪpíjt/ – *repetition* /rɛ̀pɪtíʃən/ in which [ɪ] is found in footed, non-initial position. The generalisations that can be established for /ɑj/ differ. In principle, /ɑj/ only reduces if it is integrated into the foot structure of a word. With respect to the data in (9e-h), it can be observed that reduction to [ɪ] generally does not follow a clear pattern. Consequently, [ɪ] may be regarded as the elsewhere case. By contrast, the occurrence of [ə] seems to be restricted. In all word pairs collected for the reduction pattern /ɑj/ → [ə], the base word of the derivative ends in the triphthong /ɑjə/ resulting from the vocalisation of /r/ in word-final position (as typical for non-rhotic varieties of English). When stress shifts away from /ɑj/ as a result of affixation, the vowel reduces to [ə], which is directly followed by /r/. The occurrence of /r/ in those contexts can be treated as a word-medial sandhi phenomenon linking the reduced vowel and a suffix beginning with another vowel. Consequently, [ə] only occurs in a phonotactically restricted environment, viz. if it directly precedes /r/-sandhi in the derivative. However, it should be mentioned that the data on diphthongs considered here is limited to some extent. A larger data set would yield more conclusive evidence for the generalisations established. Nevertheless, clear patterns for the reduction of diphthongs do emerge. The subsequent section moves to the discussion of examples that deviate from the general patterns discussed here.

6.2.3.3. Other factors influencing (non-)reduction of diphthongs

Similar to long monophthongs, frequency effects may also significantly influence whether a given diphthong reduces or not. Atypical reduction patterns can be found for all diphthongs in the data set. A particularly evident case in which frequency influences the quality of diphthongs concerns the reduction of /ɛj/. The only two instances found in which the diphthong retains its original vowel quality in the derivative are two low frequency items, viz. *nasality* /nɛjzálətɪj/ and *agential* /ɛjʤɛ́nʃəl/. In all other cases, /ɛj/ regularly reduces to either [ə]. Another set of exceptions to the tendencies identified can be found in the word pairs of /əw/. It appears to be the case that in a number of derivatives /əw/ reduces to [ə] in unstressed word-initial, and thus unfooted, position, such as *photography* /fə(tɔ́grəfɪj)/ and *momentous* /mə(mɛ́ntəs)/. These two examples show reduced vowels in a context which usually does not allow reduction, i.e. unfooted syllables. While frequency effects may account for some of the cases found in the data set (*photography* is arguably relatively frequent), others are more likely to be the result of a complex interplay between frequency, semantic transparency and other factors. The derivative *momentous*, for instance, can be considered semantically intransparent. Put differently, its meaning cannot be arrived at by simply resorting to the meaning of the base word. For now, it should only be mentioned that semantically intransparent items may allow for reduction in unfooted syllables. A possible analysis taking semantic transparency into consideration and possible reasons for this behaviour will be presented in section 7.4.

An additional question raised by the data set is the non-reduction of /oj aw/ raises the. Even though the data collected is limited, it does not suggest any particular phonotactic reasons which would justify the retention of their full quality. It may be argued that the diphthong /aw/ was only found in word-initial, unfooted position and accordingly is not reduced, e.g. *outrageous* /awtrɛ́jʤəs/. In other words, /aw/ was not found in any context in which it would be expected to undergo reduction. However, a potentially more powerful explanation for the non-reduction of /oj aw/ is the fact that both diphthongs are usually analysed as consisting of three morae (Hammond 1999: 205). A mora is typically defined as "a unit of quantity for syllables" (1999: 40). While mora-based generalisations have deliberately not been employed in the generalisations established in the previous sections as they do not provide any advantages to the proposed analysis, they may shed light on the behaviour of /oj/ and /aw/ in unstressed position. In moraic theory, it is generally accepted that lax vowels are monomoraic, while tense vowels and all other diphthongs are bimoraic (1999: 205). Moreover, reduced vowels are taken to be nonmoraic in nature. It follows that vowel reduction can then be described as a loss of morae in unstressed position (Hammond 1997: 3). What seems to be the case for the diphthongs /oj aw/ is that, due to their trimoraic character, they do not undergo any reduction. A loss of one mora results in a bimoraic and therefore still long vowel.[28] However, while useful in the analysis of other languages such as Japanese, the mora does not appear to be of immediate relevance for the phonology of English. Starting from a usage-based perspective, speakers are assumed to form schemas over

[28] It should just be mentioned at this point that the theory outlined in this thesis does not proscribe morae. Moreover, the proposed moraic analysis of /oj aw/ is a tentative one which requires more detailed analysis. Moraic theory is a popular approach to linguistic phenomena in many different languages and cannot be adequately discussed in this thesis. See Hyman (1985) for a comprehensive treatise of the theory.

the behaviour of /oj/ and /aw/ that specify their non-reduction. Consequently, none of the schemas developed in the analysis will resort to the concept of the mora.

A number of atypical patterns still remain to be discussed. However, not all exceptions found in the data set can be considered in this section. While it should be emphasised again that such exceptions do not pose a problem for an analysis couched in CG, it is important to note that in principle, word frequency and semantic transparency provide means of accounting for most exceptions. Moreover, according to CG's commitment to usage-based approaches, each conventionalised linguistic unit is contained in the grammar. Thus, even though such exceptions do not follow the higher-level schemas for vowel reduction in English, they are stored as concrete instantiations, i.e. highly specific schemas, in the speakers' mental grammar. How exceptions can be treated in a CG framework will be explored in section 7.4 below. Since the reduction patterns discussed in this section are relatively complex, the following section briefly summarises the generalisations established so far.

6.2.4. Reduction in SSB: a brief summary

For ease of reference, the (regular) vowel reduction patterns are briefly summarised for each set of vowels in Table 6 below. Additionally, the relevant conditioning factor is indicated:

Table 6 Reduction patterns in SSB summarised

		Conditioning factor
Short vowels		
V	→ [ə]	in open syllables
/ɛ/	→ [ɪ]	in word-initial open syllables
Long monophthongs		
VV	→ [ə]	if footed
Diphthongs		
VV	→ [ə]	if footed
ɪj	→ [ɪ]	in word-initial, unfooted syllables
	→ [ə]	elsewhere
ɛj	→ [ə]	irrespective of foot structure

ɑj	→ [ə]	if footed
	→ [ɪ]	in r-sandhi contexts
oj		does not reduce
aw		does not reduce

Having explored the major tendencies for and possible reasons behind the reduction patterns in SSB, the thesis now will move on to the analysis of the phenomenon.

7. A CG analysis of vowel reduction in SSB

In this section, an analysis of vowel reduction in SSB couched in CG will be proposed . Since the motivating factors behind the reduction of short vowels, long monophthongs and diphthongs are disparate , they will be dealt with in separate sections. Section 7.1 will present an analysis of short vowel reduction, section 7.2 will consider long monophthongs and section 7.3 will examine diphthongs in more detail. The final section, 7.4, will show how frequency effects and semantic transparency may be accounted for in the framework.

7.1. Reduction of short vowels

7.1.1. The schemas

The reduction of short vowels in SSB critically hinges on the nature of the syllable it occurs in, viz. whether it is open or closed. As was outlined in the previous sections, CG emphasises the importance of the formation of cognitive schemas based on speakers' experience with language. Consequently, a number of schemas emerge from exposure to utterances. Considering that vowel reduction is conditioned by the structure of the syllable, it becomes evident that two different types of schemas are needed in the analysis. These include, on the one hand, schemas capturing syllabification in English and, on the other, schemas generalising over changes in vowel quality. Furthermore, it should be emphasised once again hat schemas do not exist in an empty space in the mental grammar but rather form network-like structures by interacting and competing with each other. Vowel quality and syllable structure are closely related to each other and consequently form such a network of schemas themselves. The diagrams illustrating the interaction of those schemas presented below are relatively complex. In order to make the presentation of the analysis more accessible, each type of schema will be considered in isolation first.

Three different types of syllables relevant with respect to the reduction of short vowels can be identified (cf. section 6.2.1.2). The first two types, i.e. open and closed syllables, have already been mentioned above. The third type can be found in words exhibiting s-clusters. As a consequence of exposure to language, speakers may be expected to form systematic relationships between sequences of sounds and syllable structure. These relationships can be captured in second-order schemas, which relate schematic sound sequences and possible (schematic) syllable structures. The diagram in Figure 6 below shows three second-order schemas for the three types of syllables found in the data and their respective first-order schemas:

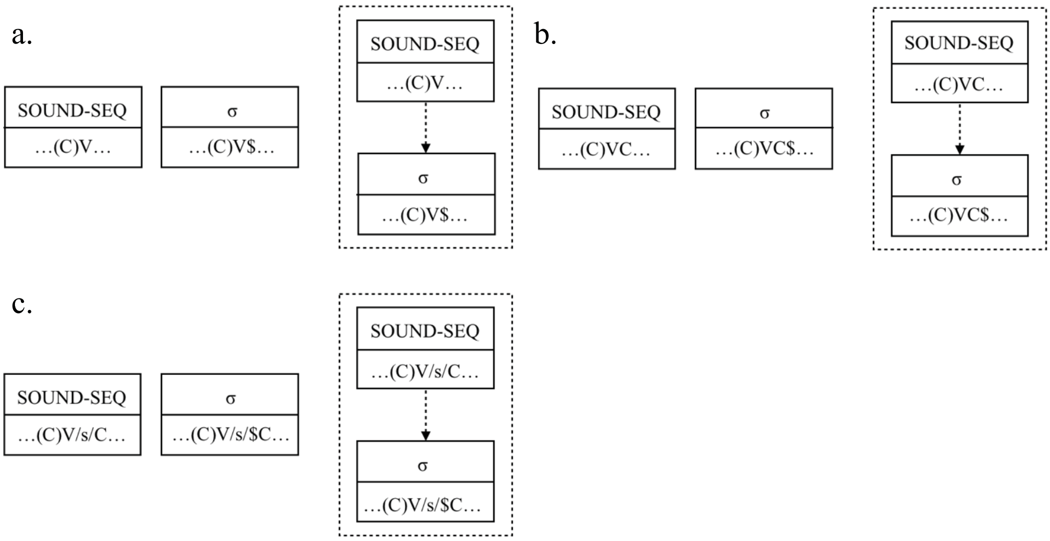


Figure 6 Syllable schemas[29]

Each second-order schema in Figure 6 is built from the two first-order schemas to the left of it. Since language users encounter different types of sound sequences, they can form abstract schemas generalising over them, i.e. they can establish schemas capturing particular sequences of consonants and vowels. This is shown in each of the left-most first-order schemas in Figure 6. Moreover, while the first-order schema in 6a and 6b show highly schematic sequences of sounds, the schema in 6c is more specific, viz. it specifies the type of consonant, i.e. /s/, in the sound sequence. Additionally, possible syllable structures in English are captured by the right first-order schemas, viz. open syllables (in 6a), closed syllables (in

[29] The dotted boxes around the second-order schemas are meant to illustrate that syllable schemas are high-level, i.e. very abstract, schemas.

6b) and syllables closed by /s/ (in 6c).[30] Considering the non-reduction of vowels immediately preceding an s-cluster (cf. section 6.2.1.2), /s/ should be analysed as part of the coda and not of a complex onset (cf. Goad 2012). Note, however, that the first-order schemas do not say anything about syllabification yet. They only capture generalisations over utterances, but do not spell out how they are related.

The second-order schemas in Figure 6 capture systematic relationships between first-order schemas or, put differently, between sound sequences and possible syllable structures. Consequently, speakers may hold phonological schemas in their mental grammar that specify that the syllable boundary of a sequence such as (C)V is typically placed after the vowel, i.e. (C)V$ (cf. 6a in Figure 6). In other words, it can be assumed that speakers recognise systematic relationships between the sound sequence CV and open syllables CV$. Accordingly, they can generalise over this relationship and form second-order schemas. In a similar fashion, speakers may also form second-order schemas for closed syllables as shown in 6b above. However, it should be mentioned that (C)VC$ is not the only way in which a sequence such as (C)VCCV can be syllabified. Rather, depending on the type of consonant cluster involved, other syllable structures are possible as well. This, however, is not an issue for the theory outlined in this thesis, since specific schemas take priority over more general schemas (cf. conceptual overlap; Langacker 1999). Put differently, low-level schemas for particular consonant clusters and their syllabification are abstracted from utterances as well and may then cover for more specific cases of syllabification. The final second-order schema in 6c generalises over the syllabification of s-clusters. It states that a sequence of sounds that contains an s-cluster SC is typically separated into coda+onset (cf. Goad 2012).

In addition to syllable schemas, the analysis presented below would be incomplete without establishing schemas capturing the changes in vowel quality. As a general rule, all vowels in open syllables reduce to [ə] when stress moves from the syllable with the exception of /ɛ/, which reduces to either [ə] or [ɪ]. Furthermore, vowels in syllables closed by a sonorant may reduce as well in SSB. Similar to the relations between sound-sequences and syllable structures, speakers may also capture the relations between stressed and unstressed vowels in

[30] It should be emphasised that only the syllable structures encountered in the data set are given as schemas here. The aim of this thesis is not to develop a framework of syllabification in CG. Rather, syllable schemas are only used where needed to account for vowel reduction. Moreover, no analysis will be presented for the non-reduction of syllables closed by /s/. It is nevertheless given in Figure 7c in order to account for the syllabification of words such as *festivity* or *hostility*.

second-order schemas. Figure 7 below introduces the second-order schemas and the first-order schemas they are constructed from:

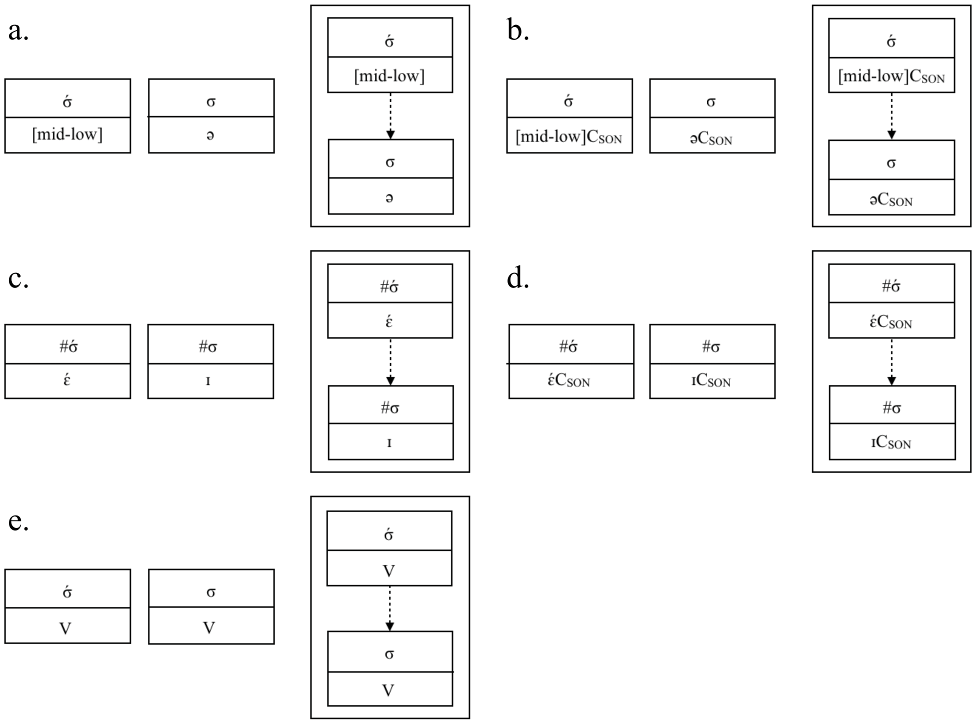


Figure 7 Reduction schemas for short vowels

The reduction patterns identified in section 6.2.1 above are presented in schematic terms in Figure 7 above. It should be emphasised again that first-order schemas are merely generalisations over actually occurring utterances. They do not show how they are connected to each other in the mental grammar of speakers. These relations are indicated in the second-order schemas in Figure 7. The second-order schemas in 7a and 7b specify that any mid or low vowel, i.e. /a ɛ ɔ ʌ/, reduces to [ə] when stress is lost. Figure 7a can be considered the elsewhere case, since it does not specify any context. By contrast, Figure 7b gives the phonotactic context of reduction, viz. syllables closed by sonorants. The two schemas in Figure 7c and 7d capture the behaviour of the vowel /ɛ/ in stressed and unstressed position. As can be seen, both define a concrete environment in which reduction to [ɪ] occurs, viz. in word-initial syllables. Moreover, Figure 7d covers the reduction of closed syllables exhibiting a sonorant in coda position. The schemas for reduction to [ɪ] are necessarily more specific than the schemas established for mid-low vowels in general. This has important consequences for the analysis presented below, since more specific schemas add additional activation value to their respective candidate expressions (cf. conceptual overlap). The second-order schema in Figure 7e captures the non-reduction of unstressed vowels.

Moreover, note that none of the schemas in Figure 7 specify that reduction only occurs in open syllables. This is captured by the syllable structure schemas presented in Figure 6. The schemas established thus far in isolation suffice to analyse the reduction of short vowels within the framework developed in the previous chapters. The following section will bring them together and present the analysis.

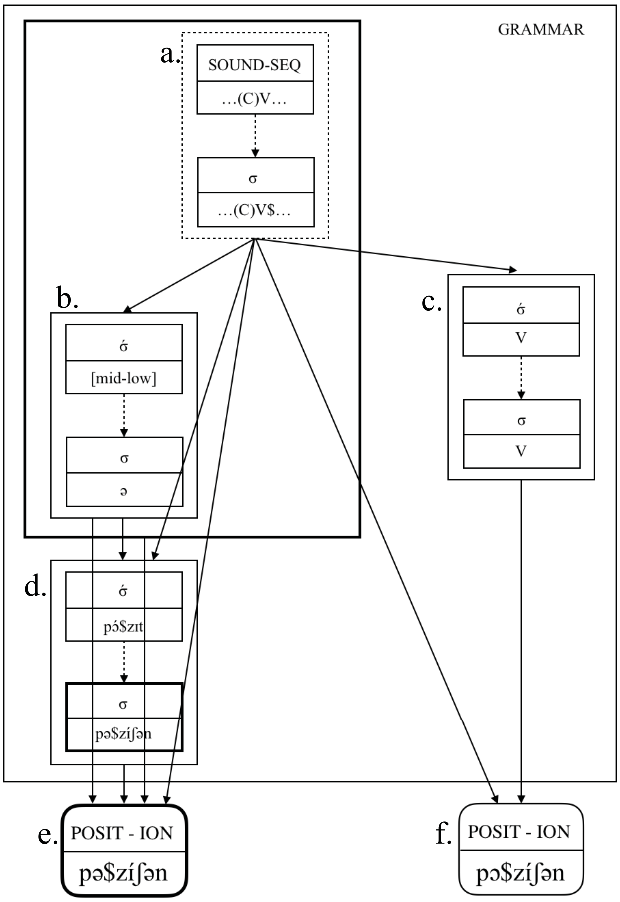
7.1.2. Analysis

Before discussing the analysis, a number of technical comments are needed to make the presentation more comprehensible. Since the analysis presented in this section is rather complex, it will only be shown on the example of selected words. It is important to understand, however, that the analysis applies to all the words collected in the data set. Thus, in principle any word following the same pattern can be substituted for the items used below. Moreover, to make the graphical representation of the analysis easier, schemas that do not apply to the example discussed will not be given in the diagram. For example, if reduction in open syllables of mid-low vowels is discussed, the schemas for reduction of vowels closed by sonorants will be omitted. Nevertheless, in theory all schemas are assumed to interact with each other. This section will first discuss reduction in open syllables and then move on to the reduction of /ɛ/ and the reduction of syllables closed by sonorants.

7.1.2.1. Reduction in open syllables

The simplest case of vowel reduction can be found in open syllables. In order to account for this, several schemas are needed. First, the syllabification schema introduced in Figure 6a above is necessary to make sure vowels only reduce in open syllables. Moreover, two reduction schemas, viz. the ones in Figures 7a and 7e, are also required. As a connectionist model, CG assumes that the schemas in a speaker's mental grammar form complex networks. Consequently, the analysis proposed critically hinges on categorisation relationships between those schemas, which are indicated by arrows. In other words, an arrow between a schema A and a schema B indicates that B elaborates, i.e. is compatible with, A (cf. categorisation relationships in section 2.2). The diagram in (13) shows the analysis of open syllable reduction on the example of the word pair *posit* /pɔ́zɪt/ – *position* /pəzíʃən/:

(13) Reduction in open syllables



The network-like structure briefly mentioned above is graphically represented in (13). The schemas in (13a) and (13b) interact with each other, i.e. (13a) specifies syllable structure, while (13b) captures the quality of mid-low vowels if stress is moved. Note that the bold box around the two schemas indicates that open syllables and vowel reduction are closely related. Put differently, it captures the tendency observed in SSB that open syllables typically reduce, while closed syllables do not. In contrast, the schemas in (13b) and (13c) compete against each other. What this means is that the conventionalised linguistic unit (13d) in the mental grammar of a speaker cannot be categorised by both. Either the vowel in question is reduced or it is not. Moreover, note (13b)'s lower graphical position in the diagram, which indicates its higher degree of specificity, i.e. its closer cognitive distance to the candidate expression. Furthermore, the linguistic unit in (13d) relates the phonological poles of the two words *posit* and *position*. Since it specifies the concrete lexical entries in their phonological form, the two first-order schemas can be regarded as conventional linguistic units. The lower box is given in bold to indicate the additional activation value that is added to a candidate expression by linguistic units. Note that (13d) instantiates or, in other words, is categorised by both (13a) and (13b).

The candidate expressions actualised by the schemas contained in a speaker's mental grammar are given in (13e) and (13f). The expression in (13e) shows a reduced vowel in the first syllable. It is categorised by the syllable schema in (13a) and the reduction schema in (13b). Moreover, (13e) is also categorised by the conventional linguistic expression given in bold in (13d). (13f) presents a candidate expression, the first vowel of which, while showing the correct syllable structure, is not reduced. The candidate in (13f) is categorised by the syllable schema in (13a) and reduction schema in (13c). It should be stressed once again that the number of candidates is theoretically infinite. In other words, it may well be that other expressions, such as wrongly syllabified candidates, are actualised in the process of retrieving the correct form. In the analyses to follow, not all logically possible candidate expressions will be given. Rather, in most cases, two or three alternatives suffices to show how schemas interact to select the correct winner. As a final note on candidate expressions, it is crucial to understand that the sanctioning of the candidates in (13) is not arbitrary, but rather emerges from the well-formedness principle *access* (cf. section 3.2.2).

In order to solve the competition between (13e) and (13f), the speaker compares the candidate expressions to the schemas they hold in their mental grammar. The well-formedness principles provide a means of "[determining] the well-formedness of [a candidate]" (Kumashiro 2000: 24) and are consequently necessary to select the correct winner. The calculation of the total activation value of each candidate is based on the second well-formedness principle *activation* (cf. principle (1b) in section 3.2.2). According to (1b), each categorising unit, i.e. schema, which an expression is categorised by, adds to the final activation value of the candidate. It is generally assumed that the closer the cognitive distance of a candidate to the schema it instantiates, the higher the activation value obtained (cf. Kumashiro 2000: 25). Close cognitive distance positively correlates with the degree of conceptual overlap. Put differently, if a candidate conceptually overlaps with a schema to a high degree, the cognitive distance between them is relatively close. Consequently, candidates in close cognitive distance to their categorising unit, i.e. those which exhibit high conceptual overlap, obtain a higher amount of activation value than candidates showing a greater distance to their respective schemas.

The competition between the candidates in (13e) and (13f) can be resolved as follows. Considering the diagram presented in (13), it can be seen that the schema in (13e) is categorised by two schemas, i.e. (13a) and (13b). The schema in (13b) is relatively specific as it determines the type of vowel, viz. mid-low, that it applies to. Moreover, the syllable schema (13a) and the reduction schema (13b) are closely related to each other, which is represented by the bold box.[31] It follows that the candidate expression obtains additional activation value from both the close relation between (13ab) and from conceptually overlapping with (13b) to a higher degree. Additionally, the schema in (13d) also contains the conventional linguistic unit *position* [pəzíʃən] in bold, which further increases the activation value of the candidate in (13e).[32] By contrast, the expression in (13f) is categorised by two schemas, i.e. (13a) and (13c) only. Moreover, since (13c) is less specific than (13b), the cognitive distance to the candidate is greater. Hence, the total activation of (13f) can reasonably be considered lower than that of (13e). The principle in (1c) (section 3.2.2), i.e. *uniqueness*, ensures that only one candidate, namely the expression having obtained the highest activation value, is selected as the winner of the competition. Thus, the model developed in this thesis correctly predicts the winning candidate, viz. (13e) in bold. The other candidate expression (13f) is deactivated as a result of (1c).

The last principle (1d), i.e. *well-formedness*, deserves a number of comments at this point. It should be noted that, in principle, it is not necessary in resolving the competition. Rather, it makes predictions about the extent to which a candidate expression can be considered well-formed. In other words, a candidate exhibiting a high amount of total activation value is more well-formed than a candidate showing a low amount of activation value regardless of it being selected as the winning candidate. This has interesting implications as to the historical development of languages. It was briefly mentioned above that the *uniqueness* principle is not absolute. In the process of historical change, two candidate expressions may be activated and realised by speakers in utterances. In such cases, the model developed in this thesis would predict that, if no other factors such as frequency or semantic transparency intervene, the candidate with the higher degree of well-formedness,

[31] Even though in principle possible, the bold box will not be treated as a schema in its own right. However, it should be mentioned that this relationship influences the analysis considerably. Thus, an arrow can be found ranging from the bold box to the candidate expression in (13e).

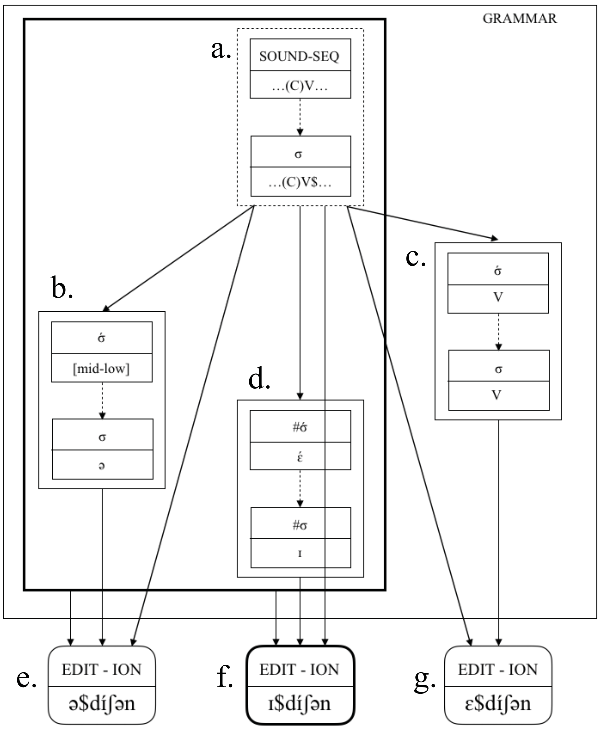
[32] It should be emphasised that the correct winner is predicted regardless of the conventional linguistic unit. It is given only for reasons of clarity and will be left out in the subsequent analyses.

i.e. the higher amount of total activation value, eventually wins the competition. What follows is that the other candidate, which at the beginning of the competition is used by speakers as well, is predicted to be lost over time. Having discussed the most prototypical cases of reduction, this thesis will consider more specific patterns of short vowel reduction in the following two subsections, starting with the reduction of /ɛ/.

7.1.2.2. The reduction of /ɛ/ in open syllables

The analysis presented in (13) above covers the facts of all short vowels found in SSB. However, it does not capture the reduction of /ɛ/ in word-initial open syllables, in which it reduces to [ɪ] rather than [ə]. Consider the diagram in (13) once again. It can be seen that it does not have any means of ensuring correct predictions for word pairs such as *edit* [ɛ́dɪt] – *edition* [ɪdíʃən]. To solve this problem, a new schema generalising over the vowel /ɛ/ in word-initial syllables may be established (cf. Figure 7c in section 7.1.1). The diagram in (14) below illustrates the analysis on the example of *edit* /ɛ́dɪt/– *edition* /ɪdíʃən/:

(14) Reduction of /ɛ/



As can be seen, the diagram in (14) is similar to the analysis presented in (13). The first three second-order schemas, i.e. (14a-c), have already been employed in the previous analysis. In order to make correct predictions about the grammar of SSB, however, the schema in (14d) is necessary. Categorisation relationships are again indicated by arrows ranging from one second-order schema to another second-order schema or candidate expression. Moreover, the bold box around the schemas in (14a), (14b) and (14d) indicates that vowel reduction and open syllables are closely related. Note further that no conventional linguistic unit is given in (14). While it can reasonably be assumed that such a unit exits, it is not needed to resolve the competition between candidates.

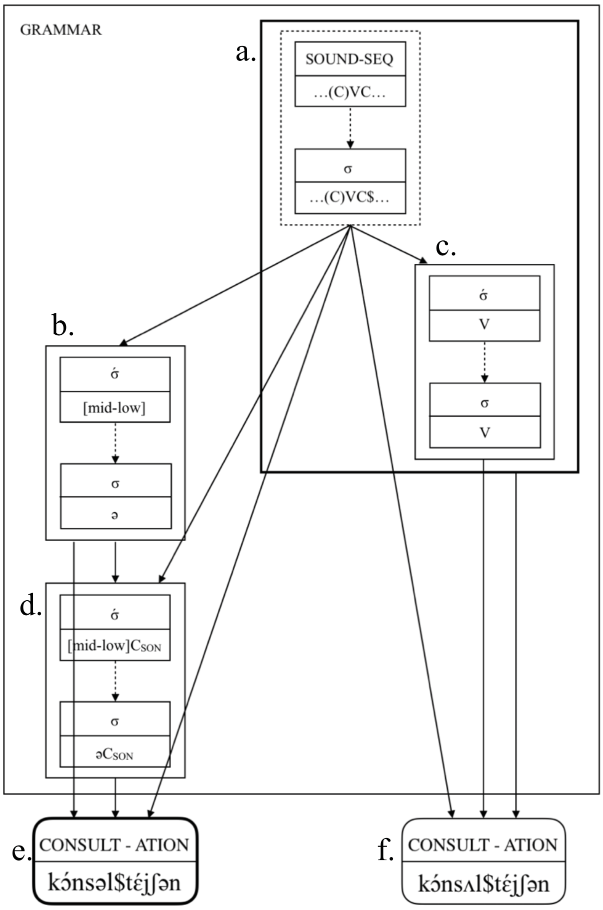
The candidate expressions, which are sanctioned by the categorising units in (14), are given in (14e-g). The candidate in (14e) instantiates the general reduction schemas for open syllables in English, viz. the syllabification schema in (14a) and the reduction schema in (14b). Thus, it is actualised with the reduced vowel [ə] in the first syllable. The second expression in (14f) is categorised by the syllable schema (14a) and the reduction schema in (14d). Consequently, it is sanctioned with the vowel [ɪ] in word-initial position. The final candidate in (14g) instantiates the syllable schema in (14a) and the reduction schema in (14c). However, although correctly syllabified, it does not show a reduced vowel in the first syllable. It should be noted that the reduction schemas in (14b), (14c) and (14d) stand in competition to each other. However, the schema in (14d) is most specific since it specifies the context in which reduction to [ɪ] occurs. Moreover, what needs to be emphasised again is that the set of candidates is in theory infinite. In principle, other schemas could be added to those given in (14), which then would give rise to further candidates. For reasons of readability, however, only the schemas pertinent to the analysis presented are illustrated graphically.

Selecting the winning candidate out of the expressions in (14e-g) is handled by the well-formedness principles introduced in section 3.2.2. The sanctioning of the candidate expressions is motivated by principle (1a), i.e. *access*. Principle (1b), i.e. *activation,* considers the sum of all activation values obtained from the schemas in a speaker's mental grammar. Looking at the diagram in (14), it can be seen that the candidate in (14e) instantiates the two schemas in (14a) and (14b). The expression given in (14f) is categorised by (14a) and (14d). Note that the schema in (14d) gives the context of reduction, i.e. the candidate (14f), which meets the context, conceptually overlaps with the schema to a high degree. As a consequence, its cognitive distance to the schema in (14d) is relatively close. Thus, the candidate in (14f) obtains additional activation value. Moreover, both candidates, (14e) and (14f), also receive activation value from the close relationship of the reduction schemas to the syllable schema. Nevertheless, the total activation value of (14f) is higher than that of (14e) due to the more specific reduction schema it instantiates (cf. conceptual overlap). The final candidate in (14g) receives activation value from the schemas in (14a) and (14c). However, the reduction schema in (14c) is less specific than any of the other schemas. In other words, it exhibits a greater cognitive distance to the candidate and hence a lower degree of conceptual overlap. Therefore, the total activation value of (14g) is the lowest of all three. Since the *uniqueness* principle (1c) states that only the expression exhibiting the highest activation value is selected, (14e) and (14g) are deactivated and (14f) is correctly predicted as the winner. What remains to be discussed with respect to short vowels is reduction in syllables closed by sonorants. This will be considered in the following section.

7.1.2.3. Reduction in syllables closed by a sonorant

The patterns of vowel reduction in syllables closed by sonorants differs from the generalisations made above. Since reduction in such syllables is optional, a number of exceptions can be identified in the data set. However, exceptions to any of the generalisations established do not pose a problem to the theory as such and will be discussed in more detail in section 7.4. In order to cover for vowel reduction in word pairs such as *consult* /kənsʌ́lt/ – *consultation* /kɔ́nsəltɛ́jʃən/ *consultation*, the analysis presented thus far needs to be expanded by a new schema. This is exemplified in the diagram in (15), which presents a sample analysis of the word /kɔ́nsəltɛ́jʃən/:

(15) Reduction in syllables closed by sonorants



The analysis presented in (15) shows four schemas in (15a-d). The first second-order schema in (15a) is a syllable schema specifying that sound strings such as (C)VC may be syllabified as closed syllables (cf. section 7.1.1). The schemas in (15b) and (15c) are two reduction schemas. While the former captures reduction to [ə], the latter states that a full vowel may retain its quality when stress is lost. The schema in (15d) ensures the reduction of mid-low vowels in syllables closed by sonorants. It is more specific than (15b) since it specifies the context to which it applies. Therefore, (15d) is compatible with and, in fact, even elaborates the higher-level schema (15b). As a result, it may also be referred to as a subschema of (15b) (cf. Nesset 2006; cf. section 7.3). Additionally, the box around (15a) and (15c) indicates that short vowels typically do not reduce in closed syllables.

Two candidate expressions, viz. [kɔ́nsəltɛ́ɪ̯ʃən] and [kɔ́nsʌltɛ́ɪ̯ʃən], are given in (15e) and (15f) respectively. The first candidate instantiates the syllable schema (15a), the reduction schema in (15b) and the reduction schema for closed syllables in (15d). By contrast, the second expression only instantiates two schemas, i.e. the closed syllable schema

(15a) and the reduction schema (15c). The competition between the two candidates is resolved in the same way as with the previous examples. Both candidate expressions are sanctioned by the first well-formedness principle (1a) *access*. The second principle, *activation*, allows for calculating the activation value of the candidates. The diagram clearly shows that the total activation value of (15e) is higher than that of the competing candidate (15f). On a simple schema count, the left candidate instantiates more schemas that the right expression. Furthermore, both schemas in (15b) and (15d) are more specific than (15c) and thus conceptually overlap with the candidate in (15e) to a higher degree. This, as was already mentioned, correlates with the close cognitive distance between the candidate (15e) and its categorising units. In contrast, the cognitive distance between (15f) to its schema (15c) is greater. What needs to be clarified at this point is the activation value added by the close connection between closed syllables and non-reduction indicated by the bold box. While the candidate in (15f) obtains additional activation value from this relation, it does not compensate for the lack of activation value resulting from the low degree of conceptual overlap. The schema in (15d) is a low-level schema, which, as a result of its high specificity, outweighs the effects of the close relationship.[33] It follows that (15e) obtains a higher amount of activation values from its categorising units and is correctly selected as the winning expression in the competition.

It remains without saying that the rather general analysis presented here for syllables closed by sonorants also applies to the vowel /ɛ/ in word-initial syllables. In principle, the resulting analysis looks similar to the diagrams that have been discussed in this and the previous subsection and will thus not be considered in any more detail at this point. The additional schema that is needed to account for such cases is given in Figure 7d above. The model developed so far is capable of accounting for these word pairs in the data set as well. Another aspect worth emphasising is that while presented in isolation, the schemas in the diagrams should not to be understood as existing in a vacuum. As already mentioned, for reasons of simplicity, only the schemas relevant to the particular examples are represented in the diagrams. However, it should be emphasised that CG assumes that schemas form vast networks in which all of the schemas discussed interact with each other. Thus, even though

[33] Remember that low-level schemas are given special importance in the approach, since they are directly abstracted from utterances. Thus, they can be assumed to contribute to a higher extent in the selection of the winning candidate.

separately introduced in the previous chapters, they should more aptly be represented together to emphasise the network-like structure they form. Having considered the reduction of short vowels in SSB, the thesis now moves on to the discussion of long monophthongs.

7.2. Reduction of long monophthongs

7.2.1. The schemas

Unlike short vowels, long monophthongs in unstressed position are indifferent to the type of syllable they occur in. Rather, reduction is sensitive to foot structure, viz. whether the unstressed syllable is footed or not (cf. section 6.2.2). Figure 8 below introduces two second-order schemas capturing foot structure in English. Since first-order schemas have been discussed in great detail in the previous section, they will be omitted from now on:

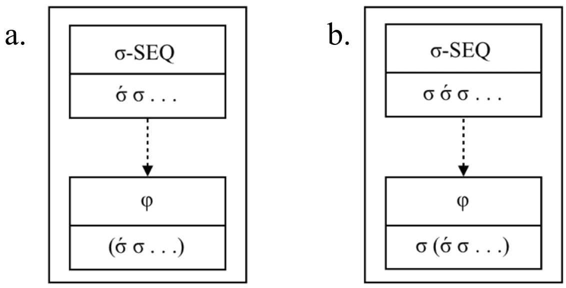


Figure 8 Foot-structure in English

The second-order schemas given in Figure 8 capture the generalisations speakers can make over sequences of stressed and unstressed syllables and possible foot structures. Put differently, speakers may form first-order schemas over sequences of stressed and unstressed syllables. This is shown in the upper boxes of Figure 8ab. They may also establish abstract schemas for how those syllables a grouped into feet, which is given in the lower boxes. Since English shows a systematic relationship between sequences of syllables and foot structure, language users may form second-order schemas over such relations. It should be emphasised that, as with syllable structure, foot structure in English is more complex than the relatively simple statements made by the schemas in Figure 8 above. However, the proposed schemas do not lay claim to giving a comprehensive account of footing in English. Rather, they are used to account for vowel reduction in SSB.

To capture the reduction of long monophthongs accurately, the reduction schemas suggested in section 7.1.1 need to be modified slightly. Due to their longer duration, long monophthongs (and diphthongs; cf. section 7.3) are schematically represented as VV. Figure

9 introduces the two different reduction schemas needed in the analysis presented below. First-order schemas are again deliberately omitted:

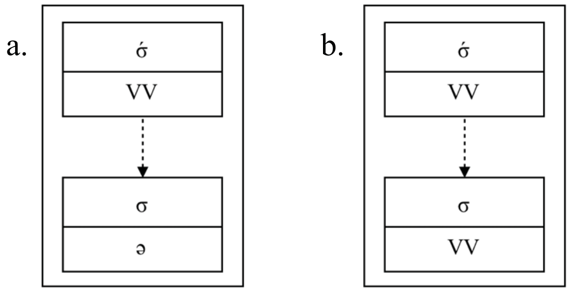


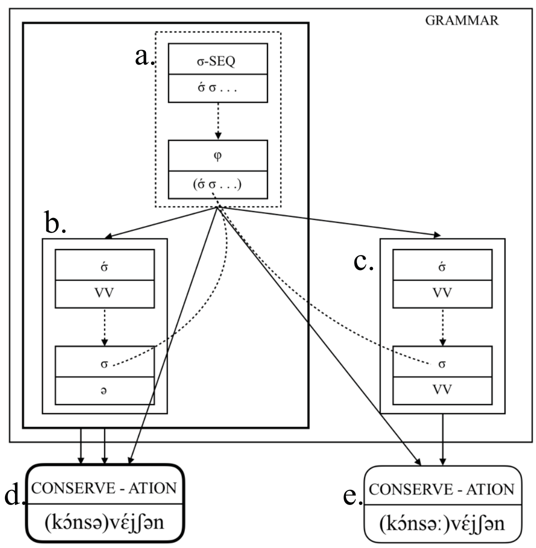
Figure 9 Reduction schemas for long vowels

As can be seen in Figure 9, two different schemas are necessary to account for the reduction behaviour of long monophthongs. The schema in Figure 9a generalises over all long vowels reducing to [ə] in SSB. However, since long monophthongs can also retain their full quality in unstressed position, an additional generalisation, viz. the schema in Figure 9b, is necessary. Note that second-order schemas are established on the basis of first-order generalisations over actual utterances and that no context is given as to where reduction occurs. The context of reduction, viz. footing, is taken care of by the foot structure schemas proposed in Figure 8 above. Having established the schemas needed, the thesis will now turn to the analysis.

7.2.2. Analysis

The diagram in (16) below presents an analysis of the reduction of long monophthongs in SSB. Since foot structure and reduction crucially dependent on each other, the foot structure schema in Figure 8a and the two reduction schemas in Figure 9 are necessary. The diagram in (16) presents an analysis for the word pair *conserve* /kənsə́:v/ – *conservation* /kɔ́nsəvɛ́ɪ̯ʃən/:

(16) Reduction of long monophthongs

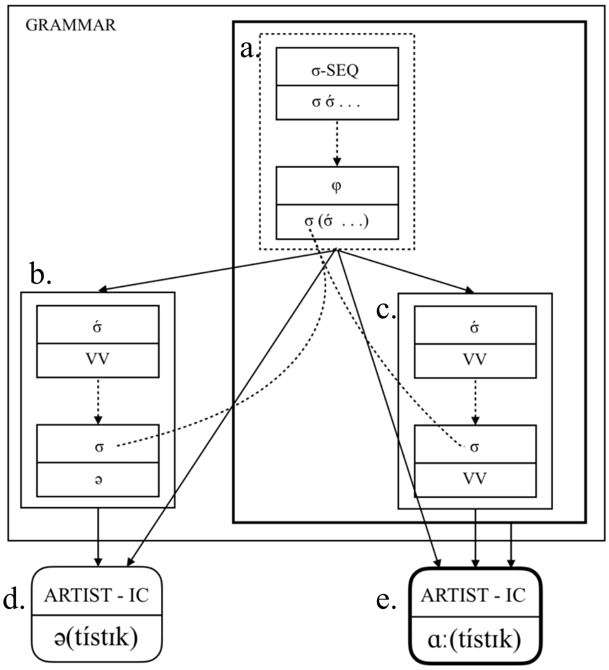


The diagram in (16) contains three second-order schemas. The first well-formedness principle, i.e. *access* (cf. section 3.2.2), sanctions the actualisation of two candidate expressions, viz. (16d) and (16e). As was done in the analysis of short vowel reduction, a bold box is added to indicate closely related schemas. In other words, the bold box around the foot schema in (16a) and the reduction schema in (16b) graphically represents the fact that long monophthongs typically reduce when they occur inside a phonological foot. Moreover, dashed lines range from the unstressed syllable in the lower part of (16a) to the lower boxes of (16b) and (16c). This is needed to spell out the relation between those schemas more directly, thus specifying the position of the unstressed syllable in the foot.

The calculation of the respective activation values of each candidate in (16) is relatively straightforward. Consider the candidate in (16d) first. Since it is categorised by two schemas, i.e. (16a) and (16b), it receives activation value from each. Moreover, the relatively strong relation between (16a) and (16b) further increases the activation value of the candidate expression. The candidate in (16e) also instantiates two schemas, viz. (16a) and (16c). However, these are not in any special relationship to each other. Thus, (16e) exhibits a relatively low total activation value. Consequently, the well-formedness principles in (1) correctly select the candidate in (16d) as the winner of the competition. It should be mentioned that the proposed analysis for long monophthongs in principle does not differ from the analysis of short vowels discussed in section 7.1. Rather, all that is needed to account for the difference observed in the reduction patterns is a different set of schemas generalising over the relevant factors. Moreover, this also demonstrates one of the advantages of CG, namely that no ad-hoc mechanisms are needed to propose a principled theory of vowel reduction.

What is left to be accounted for with respect to long monophthongs is the retention of full vowel quality in syllables not integrated into the foot-structure of a word. In order to capture this fact of the phonology of SSB, another foot schema, viz. the schema given in Figure 8b, is needed. The diagram in (17) below exemplifies how this issue can be dealt with in CG:

(17) Non-reduction of unfooted syllables



In principle, the analysis proposed in (17) does not differ from (16) above. The only difference can be found in the foot schema in (17a) and the bold box surrounding it and the reduction schema in (17c). The dashed lines connect the unstressed syllables and specify their position in the foot. In terms of activation value, the calculation largely follows the calculation discussed for the diagram in (16). The two schemas in (17a) and (17c) and the box indicating the strong relation between quality retention and the unfootedness of a syllable add activation value to the candidate in (17e). Since the total activation value obtained by the expression given in (17d) is lower than that of (17e), it is consequently deactivated. Thus, the model predicts the correct winner (17e), which is given in bold. Note that in the diagrams in (16) and (17), the reduction schemas are equally specific. Therefore, the decisive factor in the reduction or non-reduction of long monophthongs lies in the interaction of the second-order schemas, viz. the strong relation between foot structure and vowel reduction. The following section will now turn to the analysis of diphthongs.

7.3. Reduction of diphthongs

7.3.1. The schemas

Only few straightforward generalisations such as those presented in the previous sections can be made for the reduction of diphthongs in SSB. In principle, foot structure is one of the conditioning factors necessary to account for the phenomenon. Thus, the foot schemas established in Figure 8 in section 7.2.1 also apply to diphthongs and will not be discussed in this section anymore. However, the reduction processes that can be observed for diphthongs are extremely complicated. While two reduction schemas have already been discussed with respect to the reduction of long monophthongs, viz. Figure 9, a number of additional lower-level, i.e. more specific, schemas are required to cover the facts discussed in section 6.2.3. These are given in Figure 10 below. Note, again, that no first-order schemas are given:[34]

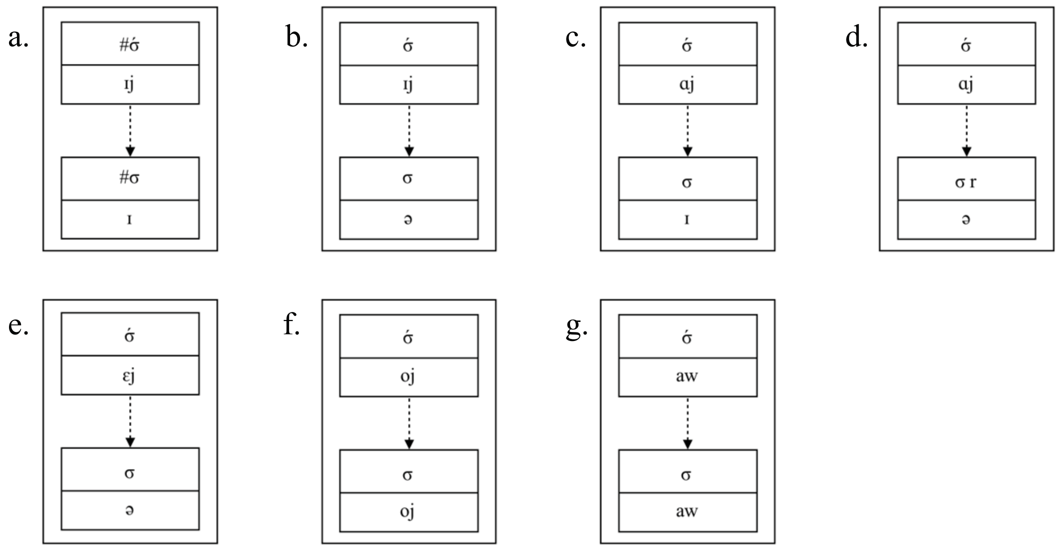


Figure 10 Reduction schemas for diphthongs

In total, Figure 10 shows seven different lower-level schemas. Moreover, all of these schemas are relatively specific, as they determine the kind of vowel they refer to and, in some cases, also the context. While not economical, proposing such schemas is in agreement with the maximalist nature of CG and the importance that low-level schemas are given in the approach. Consider the schemas in Figure 10ab first. They capture the fact that /ɪj/ reduces to either [ɪ] (in word-initial position) or [ə] (elsewhere). The two schemas in Figure 10c and 10d capture the alternation between [ə] and [ɪ] for the diphthong /ɑj/, i.e. that [ɪ] occurs as the elsewhere case as opposed to [ə], which is only found in sandhi contexts. The schema in Figure 10e generalises over the reduction of the vowel /ɛj/ to [ə] in all environments when stress is lost. The final two schemas in Figure 10f and 10g are needed to prevent the diphthongs /oj/ and /aw/ from reducing. The thesis will now turn to the analysis of diphthongs.

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34 In principle, a global schema VV → [ɪ] may be added to Figure 10. However, since it is not necessary to predict the correct outcome of each competition, it is not used in the analyses. The relatively specific low-level schemas given suffice in the analyses to follow.

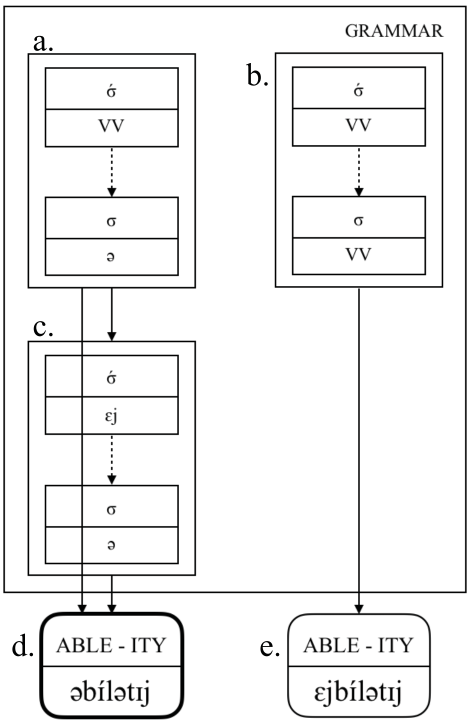
7.3.2. Analysis

Since the reduction patterns of diphthongs are relatively complex, not all relevant diagrams can be given in this section. However, each type of reduction, viz. reduction to [ə], reduction to [ɪ], [ə]/[ɪ] alternation and the non-reduction of /oj/ and /aw/ will be discussed in turns. An analysis of the vowels /ʉw/ and /əw/ will not be presented in this section. In principle, the behaviour of /ʉw/ and /əw/ in unstressed position does not differ from the reduction patters analysed with respect to long monophthongs. Consequently, graphical representations would be identical and only restate the aforementioned analysis, but not yield any more insight into the phenomenon. The following section will focus on the reduction of the most straightforward diphthong, viz. /ɛj/.

7.3.2.1. The diphthong /ɛj/

A diagram exemplifying the reduction of /ɛj/ for the word pair *able* /ɛ́jbəl/ – *ability* /əbílətɪj/ is given in (18) below. Note that no foot schemas are included, since /ɛj/ reduces in unstressed syllables regardless of whether the syllable is footed or not:

(18) Reduction of /ɛj/



The diagram in (18) is comparably simple. It contains three schemas, two of which are rather abstract reduction schemas, i.e. (18a) and (18b). Moreover, a more specific schema is given in (18c). (18c) is a type of schema that Nesset (2006) refers to as a *subschema*. To clarify what subschemas are, it should be emphasised again that CG is a bottom-up approach. Speakers of a particular language form low-level schemas, i.e. schemas that are specific and generalise over a small set of utterances. On basis of such “local schemas” (2006: 59), more abstract schemas capturing a wider range of data, also called “global schemas” (2006: 59), are established. Consequently, the schema in (18c) is a local subschema from which the schema in (18a) is abstracted.[35]

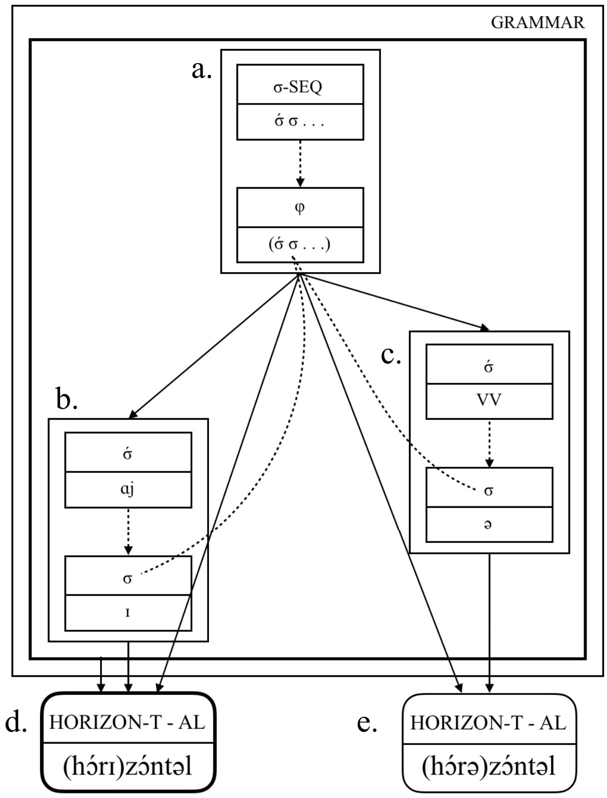
The competition between the two candidate expressions given in (18d) and (18e) is resolved by the well-formedness principles. The reduction schemas in (18a) and (18b) may be considered global schemas. Neither of them specifies the context in which reduction takes place. Calculating the activation value of each candidate is simple. The expression in (18d) instantiates both the global schema in (18a) and the local subschema in (18c). Consequently, this candidate conceptually overlaps with its categorising unit to a high degree, i.e. the cognitive distance is rather close. By contrast, since the cognitive distance between the expression in (18e) and its categorising unit (18b) is relatively long, the total activation value of (18e) can be considered low. It follows that the model correctly predicts the winning candidate (18e), which is given in bold. The following subsection will turn to the reduction of the diphthong /ɑj/.

7.3.2.2. The diphthong /ɑj/

The reduction patterns of /ɑj/ in unstressed positions are more complex than those of /ɛj/. The diagram in (19) below exemplifies the reduction of /ɑj/ to [ɪ] on the word pair *horizon* /hərájzən/ – *horizontal* /hɔ́rɪzɔ́ntəl/:

[35] In principle, subschemas could have been used in any of the analyses presented before. However, they have been omitted as they are, strictly speaking, not necessary to determine the winning candidate in the aforementioned analyses.

(19) /ɑj/→ [ɪ]

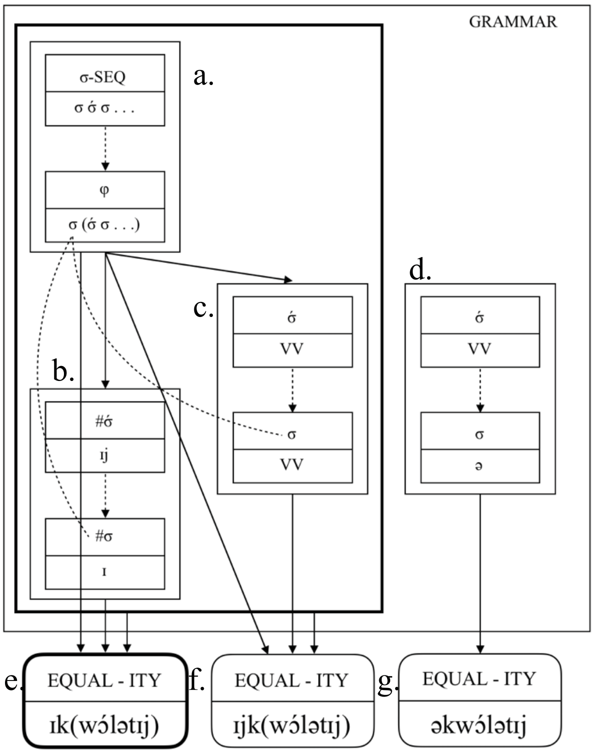


Since the reduction of /ɑj/ depends on whether it is integrated into the foot structure of a word or not, the graphical representation in (19) contains three schemas, i.e. a foot structure schema in (19a) and two reduction schemas in (19b) and (19c). Additionally, two candidate expressions (19d) and (19e) are given. Considering the well-formedness principles, it follows that the candidate in (19d) is selected as the winning expression. It not only instantiates the schemas in (19a) and (19b), but also conceptually overlaps with (19b) to a high degree. Thus, it obtains a higher amount of activation value than its competing expression (19e). In addition to reduction to [ɪ] in context not specified any further, /ɑj/ also reduces to [ə] in the environment of r-sandhi in words such as /ədmɑ́jə/ – /ǽdmərɛ́jʃən/ (cf. section 6.2.3). A possible analysis of this pattern will not be presented separately at this point, as the only difference to the analysis presented above lies in the additional schema, i.e. Figure 10d. Figure 10d presents a subschema of the general reduction schema VV → [ə], viz. /aj/ → [ə]. Since it not only states the outcome, but also the context of the reduction process (r-sandhi), it is more specific than the schema capturing reduction to [ɪ]. Consequently, the activation value obtained by a potential candidate exhibiting [ə] outweighs the total activation value of the wrongly reduced expression. The model thus also correctly predicts the reduction of /ɑj/ to [ə]. The subsequent section will turn to the analysis of the diphthong /ɪj/.

7.3.2.3. The diphthong /ɪj/

The diagram in (20) below captures the reduction patterns for /ɪj/ in unstressed position on the example of *equal* /ɪ́jkwəl/ – *equality* /ɪkwɔ́lətɪj/:

(20) /ɪj/ → [ɪ]



The representation in (20) contains two different types of schemas. One the one hand, a foot-structure schema, i.e. (20a) is given since the outcome of the reduction process relies on whether the vowel occurs in footed or unfooted position. On the other hand, three competing reduction schemas, i.e. (20b), (20c) and (20d) are found as well. They cover the different vowel qualities in unstressed syllables. In addition to these schemas, three candidate expressions, viz. (20e), (20f) and (20g) are actualised outside the grammar. The competition between the candidates is resolved in a relatively straightforward way. The candidate expression in (20g) obtains the lowest amount of activation value from its categorising unit. It only instantiates the relatively global reduction schema in (20d). What is more interesting to consider is the competition between the two candidates in (20e) and (20f). While the number of schemas categorising them is identical (including the strong relationship between reduction and foot structure indicated by the bold box), they considerably differ with respect to the degree of conceptual overlap. In other words, the schema in (20b) is more specific than the schema in (20c) (indicated by the graphical position in the diagram). Therefore, its candidate (20e) conceptually overlaps with it to a high degree, i.e. shows a close cognitive distance to its categorising unit. What follows is that it obtains a higher amount of activation value than any of the other candidates and is correctly selected as the winning candidate.

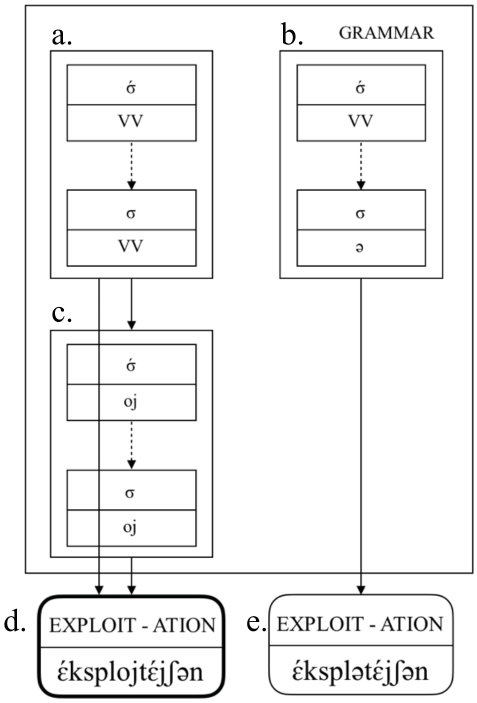
Although no diagram will be presented for the reduction to [ə], a number of comments on how it can be accounted for in CG are useful. It was established in section 6.2.3 that [ə] only occurs word-medially (or, put differently, as part of a foot). As its distribution is not further restricted (unlike that of [ɪ], which only occurs in word-initial unstressed syllables), it may be considered the elsewhere case. In principle, the analysis of reduction to [ə] is identical to the analysis of long monophthongs presented in section 7.2. The schemas needed are the foot structure schema in Figure 8a and the two reduction schemas in Figure 9a and 9b. Consequently, competition only exists between a candidate showing a full vowel and a candidate exhibiting [ə]. A candidate showing reduction to [ɪ] is logically not possible in this case, since it only applies to the phonotactic environment #σ (which is not given in words reducing to [ə]). As vowel reduction and foot structure are closely related to each other, the reduced candidate wins the competition. Having discussed the prototypical cases of diphthong reduction, the thesis now moves on the non-reduction of /oj/ and /aw/.

7.3.2.4. The diphthongs /oj/ and /aw/

The diphthongs /oj/ and /aw/ retain their full quality irrespective of foot structure. How this can be dealt with in CG is exemplified in (21) below on the word pair *exploit* /ɪksplójt/ – *exploitation* /ɛ́ksplojtɛ́jʃən/:[36]

[36] Since foot structure does not influence the reduction of /oj/ and /aw/, foot structure schemas have been excluded to make the representation simpler. It should be emphasised, however, that foot structure schemas may be added to the diagram to give a more comprehensive picture of the phenomenon.

(21) Non-reduction of /oj/



The analysis presented in (21) is essentially identical to the analysis given in (18) above. It contains two reduction schemas, i.e. (21a) and (21b), and one subschema, (20c). Moreover, two candidate expressions are given in (21d) and (21e). The calculation of the activation value is yet again relatively simple. The schemas in (21a) and (21b) are identical with respect to their respective degrees of specificity. Consequently, they cannot decide the competition. However, a more specific, local subschema (21c) is contained in the mental grammar as well, which elaborates the reduction schema in (21a) further. Consequently, the activation value obtained by the candidate in (21d) is higher. The expression conceptually overlaps with the more specific subschema to a higher degree, i.e. shows a closer cognitive distance to the categorising unit than its competing candidate and is thus selected as the winner of the competition. Thus far, regular cases of vowel reduction have been accounted for. It was shown that no ad-hoc mechanisms are necessary to propose a unified analysis of vowel reduction in SSB. What remains to be discussed is how frequency effects and semantic transparency can be incorporated into the theory developed here. In the following section, some exceptions will be considered in more detail.

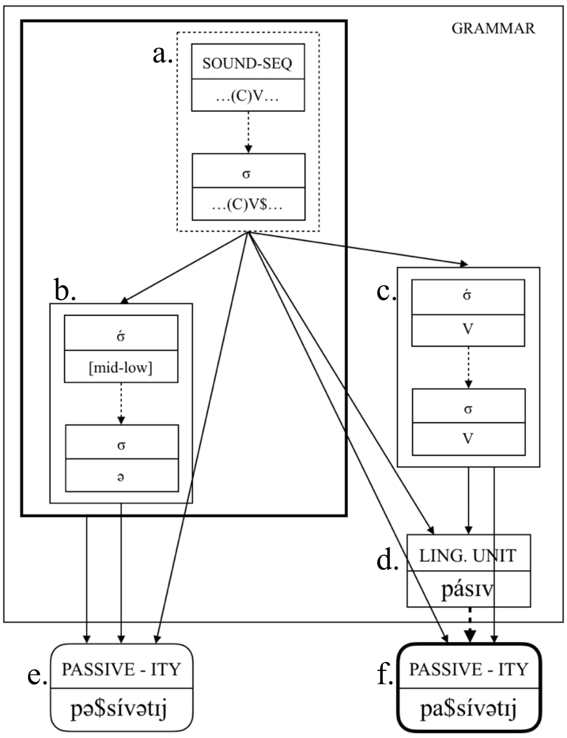
7.4. Exceptions: Frequency effects in CG

While not all factors influencing the unexpected (non-)reduction of vowels can be discussed in this thesis, a possible analysis of frequency effects and semantic transparency within the framework developed here will be proposed. First, the non-reduction of low frequency items will be considered in section 7.4.1. Section 7.4.2 will then examine how high frequency items can be accounted for in CG.

7.4.1. Non-reduction of low frequency items

Frequency effects have a considerable effect on whether a given vowel reduces in unstressed position or not. The data set suggests that infrequent words tend to preserve the quality of vowels in contexts in which they would otherwise be expected to reduce. As discussed in section 2.2, CG assumes that each conventional linguistic unit, i.e. instantiation, is listed in the grammar of native speakers of a particular language. Conventional linguistic units have not been employed in the analysis so far to show that in principle, they are not needed to predict the correct winning candidate. However, in order to explain the non-reduction of particularly infrequent items (checked using CELEX), reference has to be made to units contained in the grammar. The diagram in (22) below illustrates how the non-reduction of low frequency items may be accounted for in the framework developed in this thesis on the example of the word-pair *passiv* /pásɪv/– *passivity* /pasívətɪj/:

(22) Non-reduction of low frequency items



The diagram in (22) contains three schemas, viz. a syllable schema in (22a) and two reduction schemas in (22b) and (22c). Moreover, a conventional linguistic unit, i.e. /pásɪv/, in

(22d) and two candidate expressions in (22e) and (22f) are given as well. The bold box around (22a) and (22b) indicates that short vowels in open syllables typically reduce in English. Note that the categorisation relationship between the unit in (22d) and the candidate in (22f) is of the type extension, which is indicated by the dashed arrow in bold. Put differently, they do not fully instantiate each other, but rather are only compatible to a certain degree (since there is a change in the stress pattern due to affixation).

The question raised by the diagram in (22) is how the competition between the two candidate expressions is resolved to give the correct prediction. On the one hand, the candidate in (22e) obtains activation value from both the syllable schema in (22a) and the reduction schema in (22b). Furthermore, it should be noted that that the relationship between those two schemas is relatively strong, since vowel reduction typically occurs in open syllables. Additional activation value is added by the fact that the schema in (22b) is more specific than its competing reduction schema in (22c). On the other hand, the candidate expression in (22f) instantiates the syllable schema (22a) and the less specific schema in (22c). In addition, the conventional linguistic unit adds activation value to the candidate (22f). In the light of this, the calculation of the total activation value of each candidate proves to be somewhat more complicated, since the well-formedness principles on their own do not suffice. Rather, semantic transparency needs to be taken into account to solve the competition.

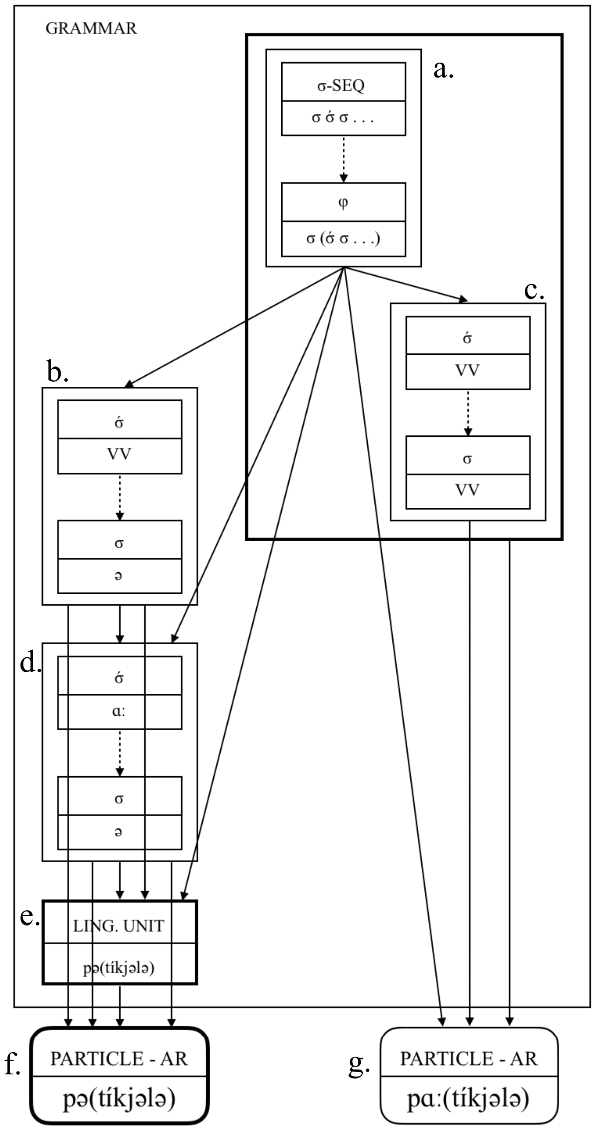
When comparing the candidates to the schemas in their mental grammar, speakers may refer to the base word *passive* for reference (indicated by the dotted bold arrow ranging from (22d) to (22f)), from which additional activation value is obtained. Consequently, the activation value needed for the selection of (22f) as the winner is obtained from the fact that the word pair *passive* – *passivity* is semantically highly transparent (note the dashed arrow in bold). Since the meaning of the derivative can be arrived at by the meaning of the base, the relation between the two words is highly present in the minds of speakers. In other words, the close interlexical relation to the base word *passive* may explain the retention of the full vowel in the first syllable of *passivity* (cf. Kumashiro & Kumashiro 2006 on interlexical relation and stress). The candidate in (22e) does not refer to any conventional linguistic expression and hence is reduced as expected. It should be noted that what has been discussed here on the example of the word-pair *passive* – *passivity* in principle applies to any word-pair with a comparable frequency count. The following section will discuss vowel reduction in high frequency derivatives.

7.4.2. Reduction of high frequency items

The unexpected reduction of highly frequent words cannot be accounted for by assuming interlexical relations. Rather, the notion of entrenchment, which was briefly discussed in section 2.1.2 becomes pivotal in this respect. In principle, entrenchment can be thought of as an effect of frequency. In usage-based approaches, it is generally assumed that frequency positively correlates with the degree of entrenchment of a particular linguistic unit (cf. Dąbrowska 2004). Another factor possibly influencing vowel reduction of highly frequent words is semantic transparency. Many of the words that show reduction in contexts that usually do not allow for it may be considered relatively opaque in terms of their semantics. Since the meaning of semantically intransparent derivatives is hardly to be arrived at by simply looking at the base and the added affix, it may well be assumed that these items behave somewhat more independently from their base than highly transparent words. Put differently, speakers may not be consciously aware of the interlexical relation to the base, which may then increase the likelihood of reduction of unstressed syllables. Moreover, together with high frequency, this may then result in the tendency for reducing syllables in context that usually would block reduction.

The diagram in (23) below proposes a possible analysis of the word pair *particle* /pɑ́ːtɪkəl/ – *particular* /pətíkjələ/. Note that *particular* is not only highly frequent in use (CELEX), but semantically opaque in relation to its base *particle*:

(23) Reduction of high frequency items



A number of different schemas is shown in the diagram in (23). Except for the subschema in (23d), all of them have been discussed in section 7.2 on long monophthongs. The box around schemas (23a) and (23c) graphically expresses the tendency for unfooted syllables not to reduce. Moreover, a conventional linguistic unit, viz. /pətíkjələ/, is contained in the grammar as well. Since /pətíkjələ/ is a highly frequent and thus entrenched unit, it is represented in bold. Furthermore, two candidate expressions are given outside the grammar.

Calculating the activation value of each candidate is trivial with respect to (23). The highly entrenched linguistic unit given in (23e) directly licences the candidate in (23f) and selects it as the winning candidate. It is important to note that the competition can only be solved with reference to the unit (23e), since the activation value obtained by the candidates from their respective schemas may be considered equal. To spell it out more precisely, the candidate in (23f) receives activation value from (23a), (23b) and (23d). Its competing expression, however, instantiates the schemas in (23a) and (23c). Additionally, it also obtains activation value from the large box around those schemas. It may be true that the schemas in (23b) and (23d) are more specific and hence contribute to the total activation value to a larger extent that the remaining two schemas. Nevertheless, such an analysis would then not take into account the high frequency of the item *particular* and thus fail to account for frequency effects in the framework. Frequency is a property of the item itself and therefore cannot be accounted for without referring to the word in question. It is crucial to understand that only exceptions based on high frequency are explained that way. None of the analyses presented in the previous sections depends on linguistic units listed in the grammar. Rather, the selection of the winning candidate is entirely based on categorising relationships and conceptual overlap.

At this point, it should be mentioned that it is not possible to discuss all the relevant exceptions as part of this thesis. The diagrams presented in this section only present two cases in which interlexical relations, i.e. the relationships between individual linguistic units, and frequency effects can be said to influence atypical reduction patterns. In principle, however, all items in the data set showing similar patterns, viz. high or low frequency, may be analysed in much the same way. If a particular derivative is infrequent but semantically transparent with respect to its base, it may be assumed that speakers refer to the base when retrieving the unit. By contrast, a highly frequent and semantically opaque derivative is less strongly related to its source and may consequently be more likely do undergo reduction. It remains without saying that counterexamples to the analyses of exceptions presented here do exist. As was mentioned in the introduction to this thesis, phonological work within CG is still in its beginning phase. Consequently, many issues remain to be discussed in the literature. Nevertheless, it was shown so far that CG does possess the needed theoretical constructs to account for phonological phenomena. Thus far, only vowel reduction in English was examined. The next section will turn to an analysis of Russian and show that it can be straightforwardly handled by CG by the same theoretical constructs used in the previous sections on English.

8. Vowel reduction in Russian: a brief sketch

The aim of this section is to provide an analysis of Russian vowel reduction in the framework developed in this thesis. Moreover, it will be shown that the same theoretical constructs developed in the previous sections can successfully be applied to Russian as well. The structure of this section is as follows. Section 8.1 will briefly introduce the variety of Russian, viz. Contemporary Standard Russian (CSR), and discuss the type of data collected. Section 8.2 will examine those aspects of the phonology of Russian which are crucial for an understanding of vowel reduction. This will be followed by the presentation and discussion of the data in section 8.3. The final section of this part of the thesis proposes an analysis of vowel reduction in Russian couched in CG.

8.1. Contemporary Standard Russian

The language variety studied in what is to follow is commonly referred to as *Contemporary Standard Russian* (CSR) in the English-speaking literature (cf. Comrie, Stone & Polinsky 1979). By and large, the term CSR is used to refer to "the standardized language whose norms started to form in the late 1800s and stabilized by the middle of the twentieth century." (1979: 3). The data considered in this section was collected on the basis of the most contemporary pronunciation dictionary available for Russian, viz. *Bolʹshoĭ orfoėpicheskiĭ slovarʹ russkogo i͡azyka. Literaturnoe proiznoshenie i udarenie nachala XXI veka: norma i eë varianty* [Large pronunciation dictionary of the Russian language. Standard pronunciation and stress at the beginning of the 21st century: the norm and its variants] (Kalenchuk, Kasatkin & Kasatikina 2017). However, it should be noted that the dictionary does not give complete transcriptions of each entry. Rather, only segments deviating from the norm are explicitly transcribed. Therefore, the data used in this section was transcribed manually according to the rules of CSR.[37] The following section will now introduce the sound system of Russian.

8.2. The Russian sound system

8.2.1. Vowel system

Standard Russian has five different vowel phonemes in stressed position, viz. /a e i o u/ (cf. Jones & Wand 1969; Jaworski 2010; Iosad 2012 and others). A sixth vowel, i.e. [ɨ], has been

[37] This may be considered problematic in a usage-based approach. However, the focus of the present thesis is on vowel reduction in SSB. Russian is only included to show that no ad-hoc mechanisms are needed to account for the same phenomenon in a different language.

subject to longstanding discussions with respect to its status in the vowel system of Russian. While regarded as a distinct phoneme by some researchers working on Russian (e.g. Mołczanow 2008; Kasatkin 2003), others treat [ɨ] as an allophone of the phoneme /i/ (e.g. Crosswhite 2001/2001; Padgett & Tabain 2005; Jaworski 2010; Iosad 2012). Figure 11 illustrates the vowel system found in Russian:

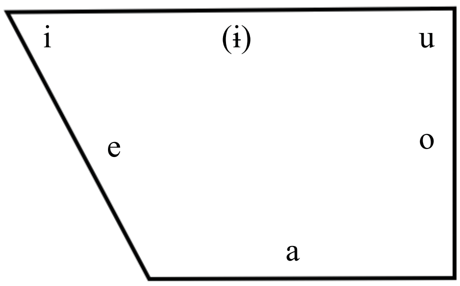


Figure 11 The vowel system in Russian (based on Akišina & Baranovskaya 1980: 86)

The vowel chart in Figure 11 shows the five vowels found in Russian. Since many scholars (e.g. Akišina & Baranovskaya 1980; Kasatkin 2003 and others) take [ɨ] to be phonemic, it is included in the vowel chart in brackets. This, however, is not the approach followed here. The decision to treat [ɨ] as an allophone of /i/ is based on the fact that both [i] and [ɨ] are in complementary distribution: "[T]here is one phoneme *i*, which is realized as ɨ after plain (non-palatalized) consonants, so long as no pause intervenes, that is, within something like the phonological phrase" [original emphasis] (Padgett 2001: 191). What follows from this definition is that [ɨ] can never appear in word-initial syllables, unless /i/ is immediately preceded by a plain, i.e. non-palatalised, consonant. Two examples supporting this view may be given. First, *čital im* 'he read to them' is pronounced [tʃɪˈtal ɨm] and not *[tʃɪˈtal ɪm] (Timberlake 2004: 40), as it is directly preceded by a plain /l/.[38] Another piece of evidence for the allophonic status of [ɨ] is the alternation *Ivan* 'Ivan' [ɪˈvan] – *k Ivanu* 'to Ivan' [k ɨˈvanʊ]. Many more examples of that sort can be found in Russian. Since the evidence for the allophonic status of [ɨ] in Russian is relatively strong and counterexamples rare, [ɨ] will be considered an allophone of /i/.

[38] While Timberlake (2004: 40) does not explicitly mention it, it should be noted that *im* 'them' in isolation is pronounced [im]. Thus, a clear [i]/[ɨ] alternation can be observed.

8.2.2. Consonant system

The inventory of consonants in Russian is relatively complex. A basic dichotomy can be identified between palatalised and non-palatalised consonants, which typically occur in pairs (Kasatkin 2003: 47). Table 7 below outlines the consonant system of CSR:

Table 7 The Russian consonant inventory (based on Akišina & Baranovskaya 1980: 57)

	paired/mutable	**not paired/immutable**
non-palatalised	p b v f t d m n l r s z k g x	ʃ ʒ ts
palatalised	pʲ bʲ vʲ fʲ tʲ dʲ mʲ nʲ lʲ rʲ sʲ zʲ kʲ gʲ xʲ	tʃ j ʃː ʒː

In Table 7, it can be seen that the majority of consonants in Russian are paired, i.e. they occur both in non-palatalised and palatalised forms. Seven consonants appear in one form only. It should be emphasised that palatalisation is regarded a feature which is intrinsic to consonants and not to vowels (Timberlake 2004: 57).[39] This assumption is based on the fact that palatalisation has a contrastive function in word-final position where no vowel follows, e.g. [gɐtov] ‘ready’ vs. [gɐtovʲ] ‘prepare’ and [ˈvɨpʲɪt] ‘drunk down‘ vs. [ˈvɨpʲɪtʲ] ‘to drink down’ (2004: 57). Having discussed the basics of Russian phonology, the thesis will now move on to present the data considered in the analysis.

8.3. Vowel reduction in Russian: the data

Vowel reduction in Russian is determined by three factors, viz. “the identity of the underlying segment, its position within the word and the palatalization or lack thereof of the consonant preceding the vowel” (Iosad 2012: 522). No need for underlying segments arises, if word pairs consisting of a base word and a derivative (or inflected word form) in which stress changes are considered. Thus, the present thesis takes the identity of the vowel in the base word as one of the factors influencing the outcome of reduction in Russian. Out of the five stressed vowels, only /a o e/ reduce in Russian (cf. Iosad 2012). The vowels /i u/ do not undergo any phonological changes in unstressed syllables but are strongly centralised (Iosad 2012: 524). Moreover, Russian is traditionally considered a language exhibiting two degrees of qualitative reduction, which are termed *moderate* and *radical reduction* (Crosswhite 2000: 109). The degree to which a vowel is reduced depends on the distance of the unstressed

[39] Other approaches (see, for example, Lighter 1972) consider consonants intrinsically hard. Palatalisation is consequently treated as an effect of front vowels on consonants. However, such approaches seem to be generally rejected nowadays and will not be considered any further.

vowel from the stressed syllable. Moderate reduction occurs in the first pretonic syllable and in any onsetless syllable regardless of its position (Iosad: 2012: 524). Radical reduction can most successfully be considered the elsewhere case. It occurs in syllables with an onset not directly preceding the stressed syllable (2012: 524). The last factor mentioned in the quote above is the palatalisation of the preceding consonant. Palatalisation further divides the reduction patterns into two subgroups, which are outlined in (24) below:

(24) a. *Moderate Reduction* b. *Radical Reduction*

(24) a.	*Moderate Reduction*	b.	*Radical Reduction*
	Cʲ_ /a o e/ → [ɪ]		Cʲ_ /a o e/ → [ɪ]
	C_ /a o/ → [ɐ]		C_ /a o/ → [ə]

As can be seen in 24, /a o e/ reduce to [ɪ] after palatalised consonants irrespective of their position. After non-palatalised consonants, only /a o/ reduce; to [ɐ] in moderate and to [ə] in radical reduction (cf. Iosad 2012; Padgett & Tabain 2005).[40] Consequently, Russian exhibits both centripetal, i.e. contrast-reducing, and centrifugal, i.e. contrast-enhancing reduction, patterns.

The word pairs in Table 7 below illustrate vowel reduction in Russian in both contexts, viz. Cʲ_ and C_ for all three vowels qualified for reduction. Since the aim of this section is simply to demonstrate the potential of the approach outlined in the previous section, a comprehensive data set was not collected. Rather, the word pairs given in Table 8 below may be considered representative for the reduction processes in Russian:

Table 8 Vowel reduction in Russian

Moderate reduction Cʲ_		**Radical Reduction Cʲ_**	
ˈpʲatʲ	‘five‘	ˈpʲatʲ	‘five‘
pʲɪˈtʲi	‘five (gen.sg.)‘	pʲɪtɐˈtʃok	‘five-kopeck piece‘
ˈlʲes	‘forest‘	ˈdʲesʲɪtʲ	‘ten‘
lʲɪˈsa	‘forest (gen.sg.)‘	dʲɪsʲɪˈtʲi	‘ten (gen.sg.)
ˈnʲos	‘he carried‘		
nʲɪsˈla	‘she carried‘		

[40] A note on Russian stress placement is required at this point. Stress is Russian is considered free and not predictable on basis of any rules (cf. Thelin 1971). In principle, stress can be placed on any syllable and any morpheme in a word, i.e. it can fall on prefixes, roots, suffixes or endings (Kasatkin 2003: 67). Hence, it is assumed that “Russian morphemes are stored in the lexicon along with the corresponding information about their ‘accented’ (i.e. stressed) or ‘unaccented’ (i.e. unstressed) status” (Jouravlev & Lupker 2015: 945).

Moderate reduction C_		Radical reduction C_	
ˈkot	‘male cat‘	stɐˈrʲik	‘old man‘
kɐˈta	‘male cat (gen.sg.)‘	stərʲɪˈka	‘old man (gen.sg.)‘
ˈdavnʲɪj	‘old‘	ˈgorət	‘city‘
dɐvˈno	‘long ago (adv.)‘	gərɐˈdok	‘small city‘

Having briefly presented the main facts of Russian vowel reduction, the thesis will now show how these facts can be accommodated in a CG framework.

8.3.4. Analysis of Russian vowel reduction

An analysis of vowel reduction in Russian from the perspective of CG can already be found in Nesset (2006). However, the analysis presented in this thesis differs in two ways. The first difference concerns the use of moraic theory. In order to explain the reduction patterns in Russian, Nesset (2006) uses the concept of the mora, but gives no arguments for the benefits of such an analysis. Rather, while morae are included in the schematic representations, their use remains uncommented. Since vowel reduction in Russian neither depends on syllable weight nor on vowel length (in fact, long vowels do not exist in Russian at all), the analysis proposed in this section does not refer to the morae. The second difference relates to the facts of reduction as presented by Nesset (2006). As was discussed in section 8.2 above, the vowels /i/ and /u/ are assumed not to reduce. Nesset (2006), however, takes a different position and argues for the reduction of /i/. In the light of more recent studies on the vowel system of Russian (e.g. Iosad 2012), the approach taken here acknowledges the strong centralisation of /i/ and /u/ in unstressed position, but does not propose the reduction of /i/. In the next section, the schemas underlying the subsequent analysis will be presented.

8.3.5. The schemas

The reduction patterns found in Russian are less complex than those for English. Reduction neither depends on syllable structure nor on foot structure. Hence, the schemas proposed in this section are comparably simple. Figure 12 below introduces the schemas used in the subsequent analysis. As first-order schemas have been discussed in detail with respect to reduction in English, only the second-order schemas are given:

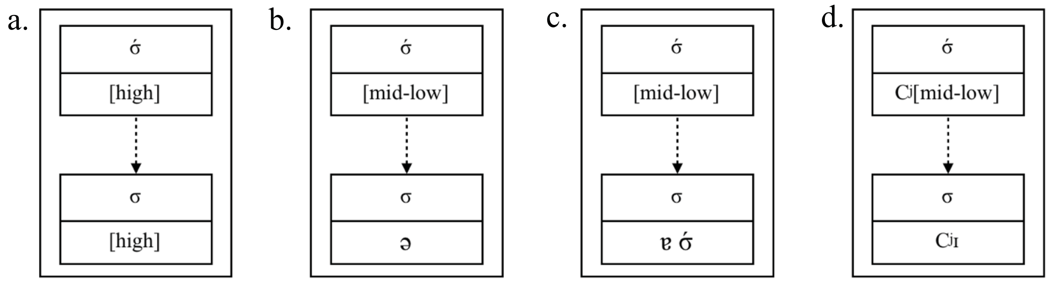


Figure 12 Reduction schemas for Russian

Figure 12 above captures the facts of vowel reduction presented in section 8.3 in four different second-order schemas. The schema in Figure 12a covers the fact that high vowels in Russian, viz. /i/ and /u/, do not reduce. The remaining three schemas in Figure 12b-d cover mid-low vowels. Figure 12b and 12c generalise over moderate and radical reduction in non-palatalised contexts. Note that the schema in Figure 12c is necessarily more specific as it specifies the position of the stressed syllable as immediately following the reduced syllable. [41]The final second-order schema Figure 12d generalises over moderate and radical reduction in palatalised contexts. Since the outcome of reduction is identical irrespective of the distance to the stressed syllable, only one schema is needed to accommodate the phenomenon. It should be noted, however, that the reduction patterns in Russian are more intricate than can be discussed in this thesis. Only the prototypical patterns are covered for by the schemas in Figure 12. The following section will discuss how Russian vowel reduction can be explained in a CG framework.

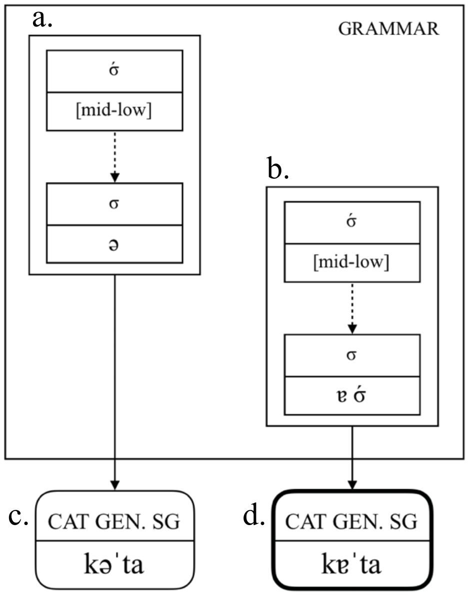
8.3.6. Analysis

8.3.6.1. Moderate and radical reduction in non-palatalised contexts

Moderate reduction, i.e. the reduction of vowels in pretonic position, in contexts where no palatalised consonants are found can be accounted for by means of the diagram in (25) below. Since neither foot-structure nor syllable structure are relevant, the diagram is relatively simple:

[41] Note that this necessarily also includes the vowel /e/, which does actually not reduce in non-palatalised contex

(25) Moderate reduction in C_



As can be seen in (25), only two schemas are needed in the analysis of moderate reduction. The schema in (25a) specifies that mid-low vowels, i.e. /a o e/, reduce to [ə] when stress is lost. By contrast, the second-order schema in (25b) states the reduction of mid-low vowels to [ɐ] if the tonic syllable immediately follows. Two candidate expressions are actualised in (25c) and (25d). Note that they differ with respect to the reduced vowel, viz. [ə] in (25c) and [ɐ] in (25d). Moreover, it should be emphasised that the two schemas in the grammar are not equally specific. Rather, (25a) represents what is often referred to as the elsewhere case. Since there is no context that would restrict the application of the schema, it applies whenever there is no other more specific schema present. (25b), however, states the context and is thus considered more specific.

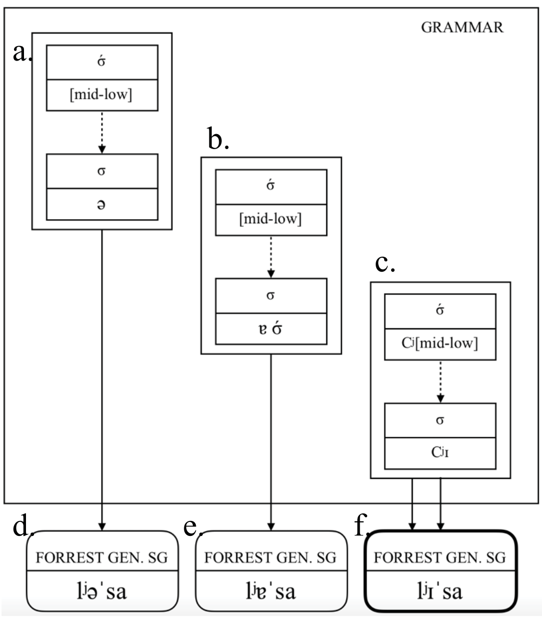
The calculation of the activation value of each candidate crucially depends on the recognition of the elsewhere case. Each of the candidates instantiates one schema in the mental grammar. However, they do not do so equally well. While (25c) instantiates the elsewhere case, the expression in (25d) is categorised by the more specific schema. Consequently, the latter conceptually overlaps with its schema to a higher degree. As a result, the cognitive distance between (25d) and its categorising unit is considered relatively close. By contrast, the candidate in (25c) instantiates the elsewhere schema in (25a). What follows from this is that the activation value of (25d) is necessarily higher than that of (25c) and thus is correctly selected as the winning candidate. An important point of the analysis presented here is that it also makes predictions as to radical reduction in non-palatalised contexts. As (25b) specifies the context, it does not sanction the actualisation of a candidate expression not immediately followed by a stressed syllable. Thus, with respect to radical reduction, no competition emerges in the first place. Rather, as there is no more specific schema in the grammar that could give rise to a candidate, the candidate instantiating the elsewhere schema is automatically chosen as the winning expression.

One issue not yet resolved is moderate reduction in onsetless syllables. In order to cover for this, the schemas given in Figure 12 require some modification. For instance, an additional schema specifying that [ɐ] is the outcome of reduction in such environments may be added to Figure 12. Moreover, the schema in Figure 12b may then be specified further to only cover syllables in which the onset slot is filled. There are other possibilities for capturing this aspect of vowel reduction in Russian as well. However, the data set collected for this part of the thesis does not yield conclusive evidence for this phenomenon. Therefore, it is not included in the analysis. Moreover, since the aim of this section is not to provide a detailed analysis, but rather to show that the framework developed in this thesis can straightforwardly explain phenomena in other languages, not all relevant facts were taken into the analysis. The next section will move on to reduction in palatalised contexts.

8.3.6.2. Moderate and radical reduction in palatalised contexts

Mid-low vowels directly preceded by a palatalised consonant reduce to [ɪ]. An analysis of moderate reduction in palatalised contexts is given in (26) below:

(26) Moderate reduction in C^j_



The diagram in (26) contains three schemas, each of which sanctions the actualisation of one candidate expression. The schema in (26a) covers the elsewhere case mentioned in the previous section. Consequently, the candidate expression in (26d) shows the reduced vowel [ə]. (26b) gives the schema for moderate reduction after non-palatalised consonants. It categorises a candidate expression (26e) in which the vowel in question is reduced to [ɐ]. The final schema in (26c) captures reduction after palatalised consonants. Thus, the candidate in (26f) contains [ɪ] in unstressed position. Note that the schemas also differ with respect to their position in the mental grammar, i.e. they range from graphically furthest to graphically closest to the candidate expression. In other words, while the schema in (26a), i.e. the elsewhere schema, is the most general one and therefore exhibiting the highest distance from its candidate, the schema in (26c) can be considered most specific. Seeing that both (26b) and (26c) state the context of the reduced vowel in the lower box of the second-order schema, it may be asked as to why (26c) shows a higher degree of specificity. The answer to that question is found in the top box of (26c), which identifies the context needed in the base word. Put differently, while the upper box in (26b) applies to any unit with a mid-low vowel, the upper first-order schema in (26c) is more restrictive in that it allows for mid-low vowels in palatalised contexts only.

Calculating the activation value of each candidate expression requires Langacker's (1999) notion of conceptual overlap. As was mentioned, the schemas in (26) increase in specificity from left to right. Hence, (26d) conceptually overlaps with its schema to a relatively low degree, while (26f) shows a comparably high degree of overlap. What follows from this is that the expression in (26f) necessarily obtains the highest amount of activation value, i.e. the cognitive distance between the candidate and the schema is relatively close, and thus (26f) is correctly selected as the winning candidate in the competition. In addition to covering for moderate reduction in CSR, the diagram presented in (26) has implications for radical reduction in palatalised contexts as well. Since the outcome of moderate and radical reduction after palatalised consonants is identical, the schema in (26c) does not specify the position of the following stressed syllable. Consequently, it applies to both types of reduction. Thus, a diagram for radical reduction will not be given at this point. It suffices to mention that the elsewhere schema in (26a) and the palatalised reduction schema in (26c) stand in competition with respect to radical reduction.[42] Conceptual overlap solves the arising conflict between the candidates in favour of the expression showing reduction to [ɪ].

9. Conclusion

The aim of the present thesis was to propose a non-reductive analysis of vowel reduction in both Standard Southern British (SSB) and Contemporary Standard Russian (CSR) couched in the framework of cognitive grammar. Vowel reduction is understood as the neutralisation of "two or more […] vowel qualities […] in a stress-dependent fashion" (Crosswhite 2001: 3). Since underlying representations are prohibited by the content requirement, word pairs consisting of a base and a derivative with differing stress patterns were collected in both SSB and CSR. Thus, reduction processes could be observed by comparing the respective syllables to each other. The data set collected suggests that vowel reduction in English depends on syllable structure (short vowels) and foot structure (long monophthongs and diphthongs). While short vowels generally reduce in open syllables, closed syllables seem to block vowel reduction in unstressed positions. Long monophthongs and diphthongs undergo reduction when integrated into the food structure of the derivative. Consequently, vowels in word-initial unstressed syllables tend to retain their full quality. Both centripetal and centrifugal patterns, i.e. reduction to [ə] and to [ɪ], were identified. Particularly for diphthongs, many counterexamples to the foot-based generalisations can be found. The thesis suggests that frequency effects and semantic transparency may explain the unexpected behaviour of vowels in unstressed syllables. The Russian data allow for more straightforward generalisations. Generally, Russian exhibits two degrees of reduction, viz. *moderate* and *radical reduction* (Crosswhite 2000: 109). Following a palatalised consonant, mid-low vowels in Russian reduce to [ɪ] in both moderate and radical reduction. In non-palatalised contexts /a/ and /o/ reduce to [ɐ] in pretonic position and to [ə] elsewhere.

Having collected the respective data set, it was possible to establish generalisations and translate these into cognitive schemas. The competition between schemas and their candidate expressions was solved by a set of four well-formedness principles, calculating the total activation value of each expression. The candidate showing the highest amount of activation is selected as the winner of the competition. Moreover, it was shown that the same

[42] As the schema in (26b) states that a stressed syllable immediately follows the reduced vowel, it does not give rise to any candidate expression in this case.

theoretical constructs, viz. categorising relationships and cognitive schemas, are able to account for reduction phenomena in two distinct languages without employing any ad-hoc mechanisms. Another objective of the present thesis was to make a case for including phonology in cognitive linguistic approaches. Phonological work has long been ignored within cognitive linguistics at large and cognitive grammar in particular. This exclusion of phonology from the realm of CG is mostly due to its long-standing emphasis on semantics. However, phonological phenomena are slowly beginning to be explored from a cognitive linguistic perspective (e.g. Kumashiro 2000; Kumashiro & Kumashiro 2006; Nesset 2006 and 2008 and others). Consequently, the present thesis also contributes to the rather scarce literature in the field.

The phonological framework proposed in the present thesis heavily relies on two cognitive processes, viz. schema formation and categorisation relationships. Schemas take in a prominent position in the analysis presented in this thesis. While speakers form first-order schemas over utterances they experience, they may also connect those first-order schemas and thus establish second-order schemas. Second-order schemas are indispensable in a CG account of phonological phenomena (cf. Nesset 2008). They capture so-called source-oriented generalisations, i.e. they relate the outcome of a process to its source (e.g. stressed and unstressed syllables in related words). Moreover, it was repeatedly emphasised that schemas do not exist in a vacuum in the mental grammar of speakers. Rather, they form complex networks, in which they interact with, but also contradict each other. Schemas are related to other schemas by categorisation relationships. In principle, there are two different types, viz. *instantiations* and *extensions* (Langacker 1987: 371). Instantiations refer to situations in which one schema showing a greater degree of specificity is connected to a more general schema. Put differently, both are compatible and the more specific schema elaborates the less specific schema further. By contrast, extension describes a relationship between two schemas which are only partly compatible. For instance, second-order schemas typically connect two first-order schemas via extension, since they are not completely compatible. Schema formation and categorisation relationships are generally known cognitive mechanism not limited to phonological phenomena or linguistic cognition in general. (cf. Janda 2015).

The analysis presented in this thesis is grounded in usage-based linguistics (cf. Bybee 2001). Therefore, it does not assume the existence of underlying representations, but only allows structures which are directly observable in language use. In this sense, the analysis takes a maximalist, non-reductive and bottom-up approach. Instantiations, i.e. concrete linguistic items, are stored in the grammar and function as the basis on which abstract schemas are established bottom-up. While such an approach may not be economical, studies (e.g. Pierrehumbert 2001, Bybee 2006) have shown that the human mind has an immense capacity for lexical storage. Moreover, usage-based approaches emphasise the impact frequency has on the mental representation of language (Bybee 2001: 6-7). Grammar is not a static entity in the minds of speakers, but instead is constantly being reshaped by the experiences speakers have with language. For instance, high frequency strengthens the representations of items in the speakers' minds, which are then more easily activated (Dąbrowska 2004: 213). Consequently, highly frequent items are strongly represented in language users' mental grammar and can thus be assumed to licence themselves. By contrast, low frequency items are harder to retrieve since their representation is comparably weak. It was shown that lexical relations and semantic transparency may explain why a particular vowel does not reduce in low frequency items. In retrieving an infrequent derivative, speakers may have to refer to the base word and do consequently not reduce the unstressed vowel to keep the derivative close to the base form.

While the theoretical constructs proposed by Kumashiro (2000) and Nesset (2006, 2008) provide valuable starting points for studies into the matter, issues remain that call for further research. For instance, vowel reduction in English is closely related to the phonological structure of the word, i.e. open or closed syllables for short vowels and foot structure for long monophthongs and diphthongs. Consequently, the thesis proposes that this close relationship has an influence on the total activation value of a candidate expression. However, it is not yet clear whether such relationships can be treated as a third type of schema next to first- and second-order schemas. More research into how second-order schemas interact is needed to clarify the theoretical status of such relationships. Moreover, the study presented in this thesis is purely theoretical. It would be interesting to see how the theoretical claims put forward in this thesis could be tested empirically. A lack of empirical hypothesis testing is characteristic of cognitive linguistics in general (Dąbrowska 2016: 483). Thus, developing means of empirical testing in cognitive linguistics would provide an extremely fruitful area for investigations. Furthermore, testing claims about schema formation would yield empirical support for a more cognitively oriented phonology. Nevertheless, the present thesis has shown possible ways in which phonological phenomena can be accounted for in CG. While much remains to be explored, it has been shown that CG provides the needed theoretical constructs for a unified theory of phonology.

10. References

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11. Appendix A

The data considered in the study is presented in Tables 9 – 11 below. The grey rows indicate the vowel phoneme. The outcome of reduction is given to the left of the words. First, the words reducing to [ə] are given, followed by those showing reduction to [ɪ]. The final set of words for each vowel gives examples in which no vowel reduction is found.

Table 9 Data on short vowels

		/ɪ/		
[ɪ]	áktɪv aktívətɪj	rídʒɪd rɪdʒídətɪj	ɪmplísɪt ímplɪkɛ́jʃən	místɪk mɪstísətɪj
	índəstrɪj ɪndʌ́strɪjəs	místrɪj mɪstíːrɪjəs	lívɪd lɪvídətɪj	prəhíbɪt prə́wɪbíʃən
	ɪnsɛkt ɪnsɛ́ktɪsɑjd			
[ə]	nə́wbəl nəwbílətɪj			
		/ɵ/		
[ɵ]	fɵ́l fɵlfílmənt			
		/ɛ/		
[ə]	mɛ́dsən mədísənəl	sɛgmɛ́nt sɛgməntɛ́jʃən	əpɛ́lət ápəlɛ́jʃən	
[ɪ]	ɛ́dɪt ɪdíʃən	ɛ́səns ɪsɛ́nʃəl	tɛ́lɪgrɑːf tɪlɛ́grəfɪj	sɛ́ləbrɛjt sɪlɛ́brətɪj
	əlɛ́dʒ álɪgɛ́jʃən	pəpɛ́tʃʉwɛjt pə́ːpɪtjʉ́wətɪj	mɪkánɪk mɛ́kəníʃən	spəsífɪk spɛ́sɪfísətɪj
	ɪkspɛ́kt ɛ́kspɛktɛ́jʃən	rɪvíjl rɛ́vəlɛ́jʃən	ɪksplɛ́jn ɛ́ksplənɛ́jʃən	prɪpɛ́ː prɛ́pərɛ́jʃən

	télɪpáθɪk tɪlépəθɪj	prɪzént prézəntéjʃən	rɪpéː répəréjʃən	
[ɛ]	mɛ́təl mɛtálɪk	əksɛ́ntrɪk ɛ́ksɛntrísətɪj	mɛ́ntəl mɛntálətɪj	fɛ́stɪv fɛstívətɪj
	ɪkspɛ́kt ɛ́kspɛktéjʃən	kəndɛ́ns kɔ́ndɛnsɛ́jʃən	áksɛs əksɛ́səbílətɪj	tɛ́pɪd tɛpídətɪj
	əksɛ́ntrɪk ɛ́ksɛntrísətɪj	əfɛ́kt áfɛktéjʃən	ləmɛ́nt lámɛntéjʃən	dájəlɛ́ktɪks dájəlɛktíʃən
	səmɛ́nt síjmɛntéjʃən	oːgmɛ́nt óːgmɛntéjʃən	dətɛ́st díjtɛstéjʃən	
		/a/		
[ə]	frátənɑjz frətə́ːnətɪj	válɪd vəlídətɪj	ád ədíʃən	rápɪd rəpídətɪj
	káθlɪk kəθɔ́ləsɑjz	ávɪd əvídətɪj	áʤɑjl əʤílətɪj	fráʤɑjl frəʤílətɪj
	mɪkánɪk mékəníʃən	hábɪt həbíʧʉwəl	ásɪd əsídətɪj	ʤəpán ʤápəníjz
	plásɪd pləsídətɪj	fráʤɑjl frəʤílətɪj	áksɛs əksɛ́səbílətɪj	árɪd ərídətɪj
	máθəmátɪks máθəmətíʃən			
[a]	transpóːt tránspoːtéjʃən	káptɪv kaptívətɪj	áktɪv aktívətɪj	pásɪv pasívətɪj
	flásɪd flasídətɪj	ɪlástɪk ɛ́lastísətɪj	árəmátɪk árəmatísətɪj	ɪlástɪk ɛ́lastísətɪj

/ɔ/				
[ə]	pɔ́zɪt pəzíʃən	kɔ́məːs kəmə́ːʃəl	mɔ́dən mədə́ːnətɪj	sɔ́lɪd səlídətɪj
	bɔ́tənɪj bətánɪkəl	sɑjkɔ́lədʒɪj sájkəlɔ́dʒɪklɪj	prɔ́djʉws prədʌ́kʃən	ɪvɔ́lv íjvəlʉ́wʃən
	ənɔ́nəməs ánənímətɪj	kɔ́mplɛks kəmplɛ́ksətɪj	pɔ́lɪtɪks pəlítɪkəl	dɔ́mɛstísətɪj dəmɛ́stɪk
	hɔ́rəbəl hərífɪk	hɪstɔ́rɪk hístərísətɪj	sɔ́ləm səlɛ́mnətɪj	kəndɛ́ns kɔ́ndɛnsɛ́jʃən
	əbɔ́lɪʃ ábəlíʃən	ɪkɔ́nəmɪj íjkənɔ́mɪkəl	mɔ́rəl mərálətɪj	
[ɔ]	ɔ́ltənɛjt ɔltə́ːnətɪv	hɔ́stɑjl hɔstílətɪj	flɔ́rɪd flɔrídətɪj	prɔ́spərəs prɔspɛ́rətɪj
	tɔ́ksɪk tɔksísətɪj	skwɔ́lɪd skwɔlídətɪj		
/ʌ/				
[ə]	kʌ́rɪdʒ kərɛ́jdʒəs	sʌ́bstəns səbstánʃəl	kənsʌ́lt kɔ́nsəltɛ́jʃən	
[ʌ]	kənfrʌ́nt kɔ́nfrʌntɛ́jʃən	vʌ́lgə vʌlgárətɪj	abdʌ́kt ábdʌktíj	rʌ́stɪk rʌstísətɪj
	ɪgzʌ́lt ɛ́gzʌltɛ́jʃən	pʌ́blɪk pʌblísətɪj		

Table 10 Data on long monophthongs

/ɪː/	
[ə]	əpíː ápəríʃən

[ɪː]	antíːrɪjə ántɪːrɪjɔ́rətɪj	díjmətíːrɪjəlɑjz díjmətɪːrɪjəlɑjzɛ́jʃən		
/ɵː/				
[ə]	bjɵ́ːrəw bjərɔ́krəsɪj	əbskjɵ́ː ɔ́bskjərɛ́jʃən	əʤɵ́ː áʤərɛ́jʃən	məʧɵ́ː máʧərɛjt
/ɛː/				
[ə]	dəklɛ́ː dɛ́klərɛ́jʃən	prɪpɛ́ː prɛ́pərɛ́jʃən	dəspɛ́ː dɛ́spərɛ́jʃən	rɪpɛ́ː rɛ́pərɛ́jʃən
	pɛ́ːrənt pərɛ́ntəl			
[ɛː]	ɛ́ːrɪst ɛːrístɪk			
/ɑː/				
[ə]	pɑ́ːtɪkəl pətíkjələ	ədvɑ́ːntɪʤ ádvəntɛ́jʤəs	sɪgɑ́ː sígərɛ́t	drɑ́ːmə drəmátɪk
[ɑː]	ɪmbɑ́ːk ɛ́mbɑːkɛ́jʃən	kɑ́ːnəvoː kɑːnívərəs	kɑ́ːnəl kɑːnálətɪj	ɑ́ːtɪst ɑːtístɪk
	sɑ́ːkazəm sɑːkástɪk	rɪtɑ́ːd ríjtɑːdɛ́jʃən	stɑ́ːv stɑːvɛ́jʃən	pɑ́ːʃəl pɑ́ːʃɪjálətɪj
	bɑ́ːbərəs bɑːbárətɪj			
/əː/				
[ə]	kənfə́ːm kɔ́nfəmɛ́jʃən	və́ːʤɪn vəʤínətɪj	əbzə́ːv ɔ́bzəvɛ́jʃən	kɔ́nvəːs kɔ́nvəsɛ́jʃən
	fə́ːtɑjl fətílətɪj	əfə́ːm áfəmɛ́jʃən	pə́ːfɪkt pəfɛ́kʃən	transfə́ː tránsfərəns
	prɪzə́ːv prɛ́zəvɛ́jʃən	rɪfə́ː rɛ́fərɪj	pətɛ́jn pə́ːtɪnəns	prɪfə́ː prɛ́fərɛ́nʃəl

	sə:kʌ́mfərəns səkʌ́mfərɛ́nʃəl	ɪnfə́: ínfərəns	rɪzə́:v rɛ́zəvɛ́jʃən	
[ə:]	ə́:bən ə:bánətɪj	tə́:bɪd tə:bídətɪj	jʉwzə́:p jʉ́wzə:pɛ́jʃən	ɪkstə́:nəl ɛ́kstə:nálətɪj
/o:/				
[ə]	ɪnfó:m ínfəmɛ́jʃən	ɪkspló: ɛ́ksplərɛ́jʃən	ɪnstó:l ínstəlɛ́jʃən	transfó:m tránsfəmɛ́jʃən
	rɪstó: rɛ́stərɛ́jʃən	ədó: ádərɛ́jʃən		
[o:]	kó:z ko:zɛ́jʃən	ó:θə o:θɔ́rətɪj	ó:dɪt o:díʃən	ɪmpó:t ímpo:tɛ́jʃən
	kənfó:m kɔ́nfo:mɛ́jʃən	nó:məl no:málətɪj	dəfó:m díjfo:mɛ́jʃən	fó:mat fo:mɛ́jʃən
	kjo: kjo:rəbílətɪj	dəfró:d dífro:dɛ́jʃən	dəpó:t díjpo:tɛ́jʃən	ɛ́kspo:t ɛ́kspo:tɛ́jʃən
	tó:rɪst to:rístɪk	mó:bɪd mo:bídətɪj	ó:gən o:gánɪk	mó:təl mo:tálətɪj
	pjo: pjo:rístɪk			

Table 11 Data on diphthongs

/ɪj/				
[ɪ]	rɪpíjt rɛ́pɪtíʃən	íjkwəl ɪkwɔ́lətɪj	ríjgəl rɪgɛ́jlɪjə	síjkwəns sɪkwɛ́nʃəl
	skíjmə skɪmátɪk			

[ə]	kəmpíjt kə́mpətíʃən	əpíjl ápəlɛ́jʃən	rɪvíjl rɛ́vəlɛ́jʃən	
[ɪj]	líjgəl lɪjgálətɪj	íjsθɪjt ɪjsθɛ́tɪk		
/ɛj/				
[ə]	ɪksplɛ́jn ɛ́ksplənɛ́jʃən	ɪksklɛ́jm ɛ́kskləmɛ́jʃən	ɛ́jbəl əbílətɪj	sɛ́jtən sətánɪk
	rəwtɛ́jt rə́wtərɪj	fɛ́jtəl fətálətɪj	stɛ́jbəl stəbílətɪj	krəmɛ́jt krɛ́mətó:rɪjəm
	əklɛ́jm ákləmɛ́jʃən	grɛ́jd grədɛ́jʃən	dəklɛ́jm dɛ́kləmɛ́jʃən	ɛkshɛ́jl ɛ́kshəlɛ́jʃən
	nɛ́jtɪv nətívətɪj	mɛ́jʤə məʤə́rətɪj	sɛ́jlɑjn səlínətɪj	lɛ́jbə ləbó:rɪjəs
	prɪvɛ́jl prɛ́vələnt			
[ɪ]	əbstɛ́jn ábstɪnəns	pətɛ́jn pə́:tɪnəns		
[ɛj]	nɛ́jzəl nɛjzálətɪj	ɛ́jʤənt ɛjʤɛ́nʃəl		
/ɑj/				
[ə]	ədmɑ́jə ádmərəbəl	ədmɑ́jə ádmərɛ́jʃən	rɪspɑ́jə résрərɛ́jʃən	sátɑjə sátərɑjz
[ɪ]	dəzɑ́jn dɛ́zɪgnɛ́jʃən	ɪmplɑ́j ímplɪkɛ́jʃən	mʌ́ltəplɑj mʌ́ltəplɪkɛ́jʃən	əblɑ́jʤ ə́blɪgɛ́jʃən
	rɪzɑ́jn rɛ́zɪgnɛ́jʃən	prɪzɑ́jd prɛ́zɪdənt	rɪzɑ́jd rɛ́zɪdənt	əplɑ́j áplɪkɛ́jʃən

	dəprájv dɛ́prɪvɛ́jʃən	dərájv dɛ́rɪvɛ́jʃən	dəklájn dɛ́klɪnɛ́jʃən	dəfájn dɛ́fɪníʃən
	hərájzən hɔ́rɪzɔ́ntəl	əkwájə ákwɪzíʃən	səlájvə sálɪvɛjt	fájnɑjt ínfɪnət
	əpláj áplɪkənt			
[ɑj]	fájnəl fɑjnálətɪj	sájt sɑjtɛ́jʃən	májnə mɑjnɔ́rətɪj	
/əw/				
[ə]	ʤʌ́kstəpə́wz ʤʌ́kstəpəzíʃən	fə́wtəgrɑːf fətɔ́grəfɪj	pə́wlə pəlárətɪj	əpə́wz ɔ́pəzíʃən
	dəpə́wz dɛ́pəzíʃən	ɪkspə́wz ɛ́kspəzíʃən	ɪmə́wbɑjl íməbílətɪj	mə́wmənt məmɛ́ntəs
	fə́wn fənɔ́ləʤɪj	pə́wtənt ímpətənt	prə́wɪbíʃən prəhíbɪt	
[əw]	ɪvə́wk íjvəwkɛ́jʃən	dənə́wt díjnəwtɛ́jʃən	mə́wdəl məwdálətɪj	nə́wbəl nəwbílətɪj
	tə́wtəl təwtálətɪj	rəwtɛ́jt rə́wtərɪj	mə́wbɑjl məwbílətɪj	
/ʉw/				
[ə]	əkjʉ́wz ákjəzɛ́jʃən	rɪpjʉ́wt rɛ́pjətəbəl	rɪpjʉ́wt rɛ́pjətɛ́jʃən	ɪmjʉ́wn ímjənɑjz
[ʉw]	brʉ́wtəl brʉwtálətɪj	tjʉ́wtə tjʉwtóːrɪjəl	kjʉ́wpɪd kjʉwpídətɪj	flʉ́woː flʉwɔ́rɪk
	hjʉ́wmɪd hjʉwmídətɪj	njʉ́wtrəl njʉwtrálətɪj	ɪksklʉ́wsɪv ɛ́ksklʉwsívətɪj	stjʉ́wpɪd stjʉwpídətɪj

	hjʉ́wmən hjʉwmánətɪj	dɪspjʉ́wt dɪ́spjʉwtɛ́jʃən	njʉ́wtrəl njʉwtrálətɪj	rʉ́wmətɪzəm rʉwmátɪk
	rɪfjʉ́wt rɛ́fjʉwtɛ́jʃən	kəmpjʉ́wt kɔ́mpjʉwtɛ́jʃən		
/oj/				
[oj]	ɪmplój ɛ́mplojɪ́j	ɪksplójt ɛ́ksplojtɛ́jʃən	ʌ́nəvójdəbəl ʌ́nəvojdəbɪlətj	
/aw/				
[aw]	fáwnd fawndɛ́jʃən	áwtrɛjʤ awtrɛ́jʤəs		

12. Appendix B

12.1. English abstract

The present thesis outlines how phonology can be dealt with from a usage-based cognitive grammar perspective by focusing on vowel reduction in Standard Southern British (SSB). In particular, the thesis proposes a way of accounting for vowel reduction using concepts such as schemas, schema interaction and categorisation relationships. The data considered in the study are taken from CUBE (Current British English searchable transcriptions) and chosen on the basis of two criteria, viz. word length (i.e. at least two syllables) and derivational morphology (i.e. a base word in which a given syllable is stressed and its derivative in which the same syllable is unstressed). Consequently, reduction processes could be observed without having to resort to underlying representations (which are, in fact, not allowed in CG). It is shown that no "ad-hoc mechanisms" (Kumashiro & Kumashiro 2006: 80) typically assumed in generative phonology and its off-shoots are needed to give a unified account of phonological phenomena. Rather, the present thesis shows that cognitive processes investigated in the field of cognitive science (e.g. schema formation) can successfully account for phonological phenomena. Additionally, the theoretical constructs developed in the analysis of English were then tested on vowel reduction in Contemporary Standard Russian (CSR). The analysis of Russian further demonstrates the promising nature of the approach.

12.2. German abstract

Die Studie, welche in der vorliegenden Masterarbeit vorgestellt wird, befasst sich mit einem bis heute wenig untersuchten Teilgebiet der Kognitiven Grammatik, der Phonologie. Insbesondere wird untersucht, inwieweit die gebrauchsbasierte kognitive Linguistik in der Lage ist, für Phänomene außerhalb ihrer üblichen Schwerpunkte, d.h. der Semantik und Syntax, Analysen und Lösungen aufzuzeigen. Das Phänomen, das in der Arbeit näher untersucht wird, ist die Vokalreduktion in Standard Southern British. Die Daten wurden dem Aussprachewörterbuch CUBE entnommen und anhand von zwei Kriterien ausgewählt. Da man in der Kognitiven Grammatik die Existenz von zugrundeliegenden Repräsentationen verneint, wurden Wortpaare gesammelt, die aus einem Grundwort und einem Derivativ bestehen. Ein Derivativ musste mehr als zwei Silben und einen durch Affigierung ausgelösten Betonungswechsel aufweisen. Auf diese Weise konnten Vokale in betonter und unbetonter Position direkt verglichen und Reduktionprozesse ohne Bezugnahme auf zugrundeliegendenRepräsentationen beobachtet werden. Für die Analyse der Vokalreduktion wurden kognitive Prozesse, welche für andere Teilbereiche der Linguistik (z.B. der Semantik) und der gesamten menschlichen Kognition entwickelt wurden, d.h. kognitive Schemata, Kategorisierungsbeziehungen und dergleichen, verwendet. In der vorliegenden Masterarbeit wird gezeigt, dass keine arbiträren Mechanismen nötig sind um phonologische Phänomene zu erklären. Die Grundlagen der Theorie der Kognitiven Grammatik, welche in der Semantik und Syntax zum Einsatz kommen, ermöglichen auch eine Analyse phonologischer Probleme. Abschließend umreißt die vorliegende Arbeit eine Analyse der Reduktionsphänomene im Russischen und zeigt, dass dieselben theoretischen Annahmen ohne grundlegende Abwandlungen auch für Prozesse in der russischen Sprache angewendet werden können.