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The Second Language Acquisition of English Non-Finite Complement Clauses

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A Usage-Based Perspective

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Für meine Eltern

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1 Introduction

How we learn the complex system of our language as children is a fascinating phenomenon that is still not properly understood in its entirety despite decades of research and a number of theories developed to seek answers to this question. When it comes to learning an additional language (L2), even more uncertainties exist. Usage-based and constructionist approaches to language represent a flourishing new theoretical framework for the study of language, which has only recently begun to revisit and explain the processes behind first and second language acquisition. One particular strength of this framework lies in the combination of the perspectives of a range of disciplines such as psycholinguistics, cognitive linguistics, and corpus linguistics (see Ellis et al. 2016: 24) with the aim to gain a holistic picture of the complex phenomenon of language acquisition.

One of the most essential hypotheses of usage-based theories and many constructionist approaches to language is that language is learned in a piecemeal fashion based on general cognitive mechanisms and exposure to the target language in use (Ellis 2002; Tomasello 2003). Thus, the frequency with which we experience linguistic input is seen as a key factor in shaping linguistic knowledge (Behrens & Pfänder 2016; Bybee 2007; Diessel 2007; Ellis 2002; Ellis et al. 2016). Its fundamental role in language acquisition is illustrated by the following quote from Ellis' seminal paper on frequency effects in language processing and acquisition (2002: 144; italics in the original):

> [...] the acquisition of grammar is the piecemeal learning of many thousands of constructions and the frequency-biased abstraction of regularities within them. Language learning is the associative learning of representations that reflect the probabilities of occurrence of form-function mappings. Frequency is thus a key determinant of acquisition because "rules" of language, at all levels of analysis (from phonology, through syntax, to discourse), are structural regularities that emerge from learners' lifetime analysis of the distributional characteristics of the language input. Learners have to *figure* language out.

Accordingly, acquiring the system of a language can be summarised as a process that involves an implicit 'statistical' analysis of the input, which results in the detection of patterns. These emerging patterns correspond to what are called 'constructions' in this

theoretical framework. They are defined as form-meaning pairings and are seen as the most basic units of language (Goldberg 1995, 2006a; Traugott & Trousdale 2013).

Although the role of frequency in language has gained considerable attention over the last years and has been addressed in first and second language acquisition research (Abbot-Smith & Tomasello 2006; Ambridge et al. 2015b; Bybee 2008; Ellis & Ferreira-Junior 2009a; Ellis et al. 2014a; Gries & Divjak 2012; Kidd et al. 2006, 2010; Madlener 2015 to name some usage-based studies), many aspects concerning the impact of frequency in learning constructions are still unclear. In particular, in comparison to first language (L1) acquisition, there is still a lack of empirical research on the role of frequency in the emergence, organisation and mental representation of constructions in second language (L2) acquisition (see also Römer 2019: 286). In this context, one crucial question that arises is whether L2 learners' constructional knowledge corresponds to a native-like mapping of form and meaning and, if so, to what extent this representation is shaped by frequency.

As frequency can have different effects, aspects that require more research range from the phenomenon of 'entrenchment', which describes the strength with which a form-meaning pairing is represented (Blumenthal-Dramé 2012: 25; Langacker 2008), to the effects of frequency on the schematicity and productivity of constructions (Barðdal 2008; Barðdal & Gildea 2015; Schmid 2017a). In the case of L2 learners, it is not clear whether frequency leads to the entrenchment of constructions on all levels of abstraction, i.e. to a strong memory representation of exemplars (concrete instantiations of constructions), low-scope patterns as well as of more abstract schemas. In particular, in the case of constructions that are composed of multiple words, such as verb-argument constructions, it is still not fully understood which specific parts of linguistic input need to be experienced with sufficient frequency to strengthen and abstract knowledge and to ultimately reach a native-like representation of the L2 (Abbot-Smith & Tomasello 2006: 285 on similar issues raised for L1 acquisition).

In light of the many issues that still require empirical evidence, the present thesis aims to make an important contribution to the study of the representation and organisation of L2 constructions from a usage-based perspective. Furthermore, it seeks to add to the growing body of literature on the L2 acquisition of verb-argument constructions (e.g. Ellis et al. 2014a; Ellis et al. 2016; Robenalt & Goldberg 2015b; Römer 2019a; Römer & Berger 2019; Römer & Garner 2019). In order to do so, the focus of the present thesis will be on one

understudied area of L2 acquisition that is notoriously challenging, even for advanced learners of English (Mair 2018: 186; see also Bourke 2007; Petrovitz 2001): non-finite complementation or, as referred to in the present thesis, *the catenative verb construction*. This construction is comprised of a so-called 'catenative verb' (in bold in the examples below) and a 'catenative complement' (see underlined words), which is a non-finite subordinate clause functioning as the internal complement of the matrix verb (Huddleston & Pullum 2002). The catenative complement prototypically occurs in the form of a *to*-infinitival (*to*-inf. for short) or a gerund-participial (-*ing*) complement:

(1) *Her daughter* ***refused*** *<u>to do</u> her homework.*
(2) *Pia* ***managed*** *<u>to make</u> the best cookies I have ever tasted.*
(3) *He* ***enjoys*** *<u>reading</u> detective novels in German.*
(4) *Kia* ***keeps*** *<u>laughing</u> about the stupid joke he made.*

Although there are also verbs that can occur with both catenative complement types, such as *start*, *love* and *remember*, the present thesis focuses primarily on catenative verbs where either the *to*-inf. or the -*ing* complement is strongly preferred by native speakers of English. In (1), for instance, the verb *refuse* almost exclusively occurs with a *to*-inf. complement while *enjoy* in (3) predominantly takes an -*ing* complement. The fact that some verbs take a *to*-inf. while others take an -*ing* complement (cf. de Smet & Cuyckens 2005; Egan 2008) is an idiosyncratic feature of English whose explanation is elusive even to native speakers. Consequently, it comes as no surprise that second language learners often show choices of a complement type different from those of native speakers in this construction (Celce-Murcia & Larsen-Freeman 2016; Martinez-Garcia & Wulff 2012; Schwartz & Causarano 2007), as exemplified in (5) – (7) (sentences from the corpus study presented in Chapter 5):

(5) **I enjoyed <u>to teach</u> kids sports* [...] (SentID 1288)
(6) *[...] *I risked <u>to go</u> on the edge of a rock near the waves* (SentID 2013)
(7) **Then I decide <u>getting</u> in my car* [...] (SentID 516)

In (5) the verb *enjoy* almost exclusively occurs with an -*ing* complement in the catenative verb construction in British English but is here produced with the non-target-like cantenative complement that has the *to*-infinitive form by the learner. With *decide* we find the reversed

case: it prefers a *to*-inf. complement in British English, but is here produced with an *-ing* complement.

In view of these examples and the common claim that this construction is difficult to be taught on the basis of explicit rules (see e.g. Petrovitz 2001), it will be particularly interesting to see which usage-related factors, in particular frequency, can predict a native-like pairing of catenative verb and complement. The present thesis, therefore, sets out to explore empirically how the catenative verb construction is acquired by German learners of English by triangulating different types of usage data, ranging from natural corpus to elicited production data. Apart from the objective of finding support for the representation of the catenative verb construction as a form-meaning pairing, another goal will be to provide evidence of entrenched item-based knowledge as well as more schematic representations of the construction. In particular, the present study will examine whether the degree of entrenchment and schematicity differs with respect to the two subschemas of the catenative verb construction (*to*-inf. vs. *-ing* construction), which occur with different frequencies in the English language. Furthermore, the study of learners on different proficiency levels in English will allow investigating how constructional knowledge emerges and changes with experience. In sum, the data and insights gained from the present thesis can help to understand how idiosyncratic complex constructions are acquired by learners of English. On a more theoretical level, this thesis seeks to advance the understanding of second language acquisition from a usage-based perspective.

The structure of the thesis is as follows. Chapter 2 begins by laying out the theoretical foundation of the present work, namely the key assumptions of usage-based and constructionist approaches to language in general, as well as with regard to first and second language acquisition. The following chapter (Chapter 3) presents a brief overview of the characteristics of the catenative verb construction and provides a summary of (usage-based) studies on the L1 and L2 acquisition of this construction. The second half of this chapter (Sections 3.3 and 3.4) introduces the leading research questions for the empirical studies that form the main part of this thesis and gives information on a corpus study with native speaker data, on which the frequency measures for the studies presented in Chapters 4-7 are based.

Chapter 4 presents two complementary experiments with advanced German learners of English, which will investigate which parts of the catenative verb construction have to be

experienced to acquire a target-like representation of it and whether learners possess constructional knowledge at all. Another purpose will be to show differences between the two subschemas (-*ing* vs *to*-inf.) with respect to their entrenchment and schematisation. These studies are complemented in Chapter 5 by a pseudo-longitudinal corpus study with data from the *EF-Cambridge Open Language Database* (*EFCAMDAT*, Geertzen et al. 2013) by German learners of English of different proficiency levels (A1-C2). Apart from the goal of corroborating the findings from Chapter 4 by the use of more natural data, the corpus study will take a pseudo-longitudinal perspective on the development of the catenative verb construction. More specifically, it will examine whether frequency and proficiency can predict increased use of the catenative complement over other complement types the verbs can occur with.

In Chapter 6, an extensive large-scale experimental study with a heterogeneous group of learners of different proficiency levels (A1-C2) will be presented, which does not only look at the effects of different frequency-, meaning-, and usage- related factors, but seeks to provide insights into the development of constructional knowledge of the catenative verb construction across different proficiency levels. Chapter 7, finally, presents an exploratory study with so-called 'variable verbs', i.e. catenative verbs that can take an -*ing* as well as a *to*-inf. complement (e.g. *love*, *start*, *remember*) and deals with the question of what determines the learners' choice between these catenative complements. The last chapter of this thesis (Chapter 8) recapitulates the most important findings gathered from the studies and evaluates their theoretical implications for a usage-based account of second language acquisition. Finally, areas of future research are presented.

2 Usage-Based and Constructionist Approaches to Language Acquisition

This chapter begins by describing the major tenets shared by usage-based and constructionist approaches, which constitute the theoretical foundation of the present thesis. The emphasis will be on the conceptualisation of language as form-meaning pairings, i.e. *constructions*, as this has several theoretical implications for the study of (second) language acquisition. Section 2.1.2 gives an overview of how the mental representation of language is modelled by usage-based and constructionist approaches and highlights open questions that concern issues such as the levels of abstraction, or the redundancy with which language is stored. Frequency, a key factor in the organisation of language according to this theoretical framework, will be presented in Section 2.1.3. In particular, two major effects of type and token frequency, namely the entrenchment and schematisation of constructions, will be discussed. This is followed by an overview of how usage-based and constructionist approaches to language account for (second) language acquisition (Section 2.2). First, the developmental path of first language acquisition will be depicted (2.2.1), followed by an outline of how the mental language representation of a speaker of two languages can be modelled (see Section 2.2.2). Section 2.2.3 briefly discusses the notions of implicit and explicit learning in L2 acquisition. The last section deals with the role of frequency in (second language) acquisition, as well as its impact in (un-)learning (over-)generalisations.

2.1 The Theoretical Framework: Constructionist and Usage-Based Approaches to Language

2.1.1 Basic Tenets

As the term coined by Langacker (1988) already suggests, *usage-based approaches* to language assume that linguistic knowledge emerges from the use and experience with language (Barlow & Kemmer 2000; Bybee 2007; Croft & Cruse 2004; Bybee 2013; Tomasello 2003). This knowledge is acquired gradually on the basis of social-cognitive abilities of joint attention and intention reading (Tomasello 2003: 65–72), as well as on the basis of domain-general cognitive abilities, such as pattern finding, analogy, schematisation, entrenchment, generalisations and categorisation (ibid.: 297–303; see also Bybee 2006:

711). Usage-based linguistics, as Perek (2015: 8) notes, "can in theory be understood independently of particular grammatical frameworks", but is mostly compatible with cognitive-linguistic theories, in particular with construction grammar. In fact, construction grammar is often considered as an essential part of some usage-based approaches to language (Diessel 2015: 298; see Bybee 2013; Hilpert 2014; Tomasello 2003). However, it is important to note that there are different theories in construction grammar, ranging from more formal- to less formal-oriented theories (see Hoffmann & Trousdale 2013; Traugott & Trousdale 2013: 3–8 or Ziem & Lasch 2013: 38–66 for an overview), and not all of them are necessarily usage-based (e.g. Signed-based Construction Grammar, see Michaelis 2013; Sag 2012). For the present thesis, a so-called 'usage-based construction grammar' approach[1] will be adopted, covering shared tenets by 'constructionist approaches' (an umbrella term used by Goldberg 2013; see pp. 15–16 for a summary of the shared tenets) that are predominantly usage-based. The most relevant theoretical assumptions for the purpose of this thesis will be discussed in the following.

Usage-based construction grammar takes a unitary approach to language as it conceptualises linguistic knowledge as being composed of form-meaning pairings – *constructions* – which are considered the basic units of language (see e.g. Croft & Cruse 2004; Goldberg 1995, 2006a; Lakoff 1987; Langacker 1987). According to this approach, we find a highly elaborate mental network consisting of constructions of different granularity and levels of abstraction (Hoffmann & Trousdale 2013a: 3). This stands in contrast with some theories of language, such as mainstream Generative Grammar (see Chomsky 1965, 1988), that make a binary distinction between abstract grammar 'rules' and the 'lexicon'. More specifically, everything that does not underlie abstract and productive rules, i.e. displays a certain irregularity, involves pragmatics, or is an idiom, is said to be stored in the lexicon (Pinker 1991). As an answer to such phenomena like idioms or idiomatic expressions that generative approaches assume to be part of the periphery, construction grammar was developed (Barðdal & Gildea 2015: 2; see Croft & Cruse 2004: 225). This framework has extended the classical notion of 'construction' from particular clause types and phrases to all grammatical patterns (Diessel 2015: 299). Constructions can, therefore, be comprised of very concrete

[1] The theoretical approach taken in this thesis is most strongly related to *Cognitive Construction Grammar* by Goldberg (2006a) and Lakoff (1987).

elements such as the morpheme Plural {-*s*}[2], words, or more abstract patterns, such as the transitive construction S V NP as in *She had a coffee* or idioms such as *The dog days are over*. All these different forms carry a particular meaning. This is also the case for more abstract constructions, which capture a more abstract meaning that has an impact on the meaning of the lexemes occurring in this pattern (see Goldberg 1995). For instance, consider the following sentence in (1) that instantiates an example of the ditransitive construction with a non-sense verb (example from Goldberg & Casenhiser 2008: 198):

(1) *She blicked him something.*

Despite the fact that *blicked* does not exist in the English language, the sentence is approximately interpretable because the ditransitive construction carries the abstract meaning "X causes Y to receive Z" (Goldberg 2006a: 74; see also Ellis & Ogden 2017: 606). This more abstract meaning derives from the structure of the ditransitive construction, which comprises certain thematic roles (prototypically agent, patient, recipient) that are realised by a prototypical order of phrases (NP VP NP NP (X)). Consequently, grammar does not comprise any transformational or derivational processes (Goldberg 2013: 15), since meaning is directly associated with a syntactic structure (Traugott & Trousdale 2013: 3; see Goldberg 2002). The figure below illustrates this mapping (figure taken from Croft 2001: 18; see Croft & Cruse 2004: 258)[3]:

[2] Note, that in Goldberg (2013), morphemes are no longer considered to be constructions. There is generally no consensus with regard to the constructional status of (bound) morphemes among scholars working in this framework. However, I will adopt the view that morphemes can be seen as meaningful units with a specific form, which qualifies them as constructions (see also Croft 2001; Langacker 1987).

[3] Note that this figure is developed in the context of a more specific theory of construction grammar, Croft's (2001) 'Radical Construction Grammar'. However, it represents the basic assumptions about the representation of constructions by different construction grammar approaches, which is often used in the construction grammar literature to illustrate the conception of constructions.

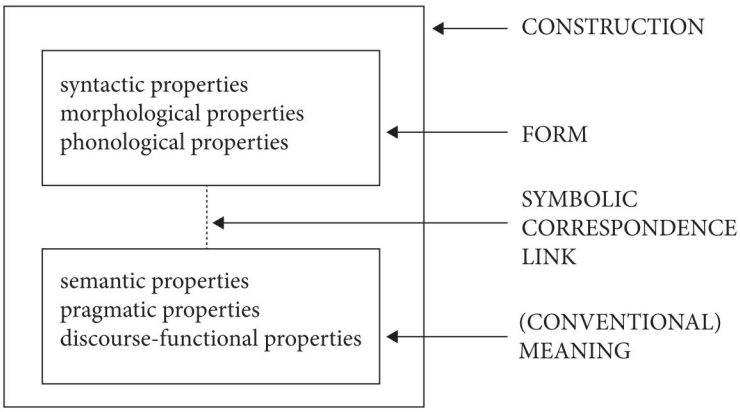

Figure 1 Mapping between Form and Meaning

A construction is comprised of formal information (syntax, morphology, phonology) on the one hand and semantic and discourse-related information[4] (semantics, pragmatics, discourse function) on the other hand. These two sides are connected via a symbolic link that maps the meaning side to the form. This, as indicated above, stands in contrast with the conceptualisation of language in formal approaches, where grammar and lexicon are two distinct entities that are separately stored and accessed[5].

However, the question arises how to establish what exactly counts as a construction and how it can be identified as such. One influential definition of the term 'construction' is given by Goldberg (1995: 4) in her seminal work *A Construction Grammar Approach to Argument Structure*:

> C is a CONSTRUCTION iffdef C is a form-meaning pair <F_i, S_i> such that some aspect of Fi or some aspect of Si is not strictly predictable from C's component parts or from other previously established constructions.

For example, a linguistic unit is considered a construction as long as something about its form (F) or meaning (S) is idiosyncratic and not fully compositional (ibid.). Idioms, for instance, often exhibit idiosyncrasies with regard to meaning and form, such as in (2):

[4] Note that Croft (2001) does not refer to the discourse context, such as the genre, but to discourse functions such as information structuring (see Traugott & Trousdale 2013: 8). In other approaches, a broader definition of discourse-related information is taken and thus contextual information on the language in use are seen as an integral part of a construction (see Östman (2005)for more information on discourse and constructions).
[5]Parallel architectures such as Jackendoff's (2002), however, constitute an exception since here grammar and the lexicon are accessed simultaneously.

(2) *He spilt the beans.*

This idiomatic expression has a non-compositional meaning because the interpretation of the whole idiom requires more than the mere combination of the semantics of the separate words. Instead, this particular form-meaning pairing has to be learned as such.

Although non-compositional meaning is seen as a key characteristic to identify a construction, such as idioms or non-canonical syntactic patterns, it is an issue of debate whether linguistic units without any idiosyncratic constraints, i.e. those that are fully predictable on the basis of their component parts, as e.g. the subject-predicate construction (*Emma is sleeping*), fall under the definition of constructions as provided above. Fillmore et al. (2012), for instance, argue that meaningless constructions exist and identify, for example, the Subject-Predicate or Modifier-Head construction as so-called 'null constructions'[6]. Others scholars, by contrast, propose that even linguistic units that are fully predictable on the basis of their component parts, and do not carry meaning in the traditional sense, can be understood as more abstract constructions since they have a more functional than semantic purpose (Ellis et al. 2016: 26; see also Goldberg 2006a). In this case, unpredictability does not arise on the basis of the meaning, but on the level of construction's functionality. To illustrate this, consider the passive construction. The passive construction does not carry semantic, but a more functional type of meaning, as it serves to defocus the agent of the action (Ellis et al. 2016: 26):

(3)

a. [*Sam*]$_{\text{agent}}$ *ate* [*the whole watermelon*]$_{\text{patient}}$.

b. [*The whole watermelon*]$_{\text{patient}}$ *was eaten (by* [*Sam*]$_{\text{agent}}$).

(4)

a. [*The police woman*]$_{\text{agent}}$ *shot* [*the suspect*]$_{\text{patient}}$.

b. [*The suspect*]$_{\text{patient}}$ *was shot.*

In (3a) the NP *Sam* is the patient, which is in initial sentence position and thus more in the focus of the parser, while in (3b) the focus is on the patient, the NP *the whole watermelon*. The agent of the active sentence, as demonstrated in the passive construction in (4b), can be

[6] For a discussion of the issue with 'meaningless' constructions, see Hilpert (2014: 50–57).

even completely omitted. Thus, the passive construction[7], in which the patient is in sentence-initial position, has the function to emphasise the patient but otherwise does not have a more concrete semantic meaning.

Furthermore, lacking idiosyncratic features such as compositionality do not mean that a construction has to be inferred from a more general construction or an abstract schema, or that it cannot be stored independently (Ellis et al. 2016: 26–27; cf. Goldberg 2006a: 166–182). To give an example, a simple declarative sentence, such as (5a) below, has a compositional meaning but is comprised of a different set of constructions, ranging from the respective words that are constructions themselves to the more abstract construction NP-VP/Subject-Predicate construction (see Ellis et al. 2016: 27 for a similar example).

(5)

a. *Linguists love language.*

b.**Linguists seem/jump/work language*

Transitive clauses, like the one above, can be assumed to be not completely free of idiosyncratic features (Taylor 2012: 144). These particular features are language-specific and need to be learned[8] (see Taylor 2003). For instance, the more abstract meaning of the transitive construction instantiates verbs that denote an action as well as an actor performing an action which affects a patient (Taylor 2012: 144), so not all verbs are compatible with this schema (e.g. some linking verbs or intransitive verbs, as in (5b)).

In order to resolve a part of the issue of whether to treat completely predictable patterns as constructions, a further criterion to identify constructions was added by Goldberg in 2006: fully compositional (semantically as well as functionally), and predictable patterns do also 'qualify' as constructions, as far as they occur with *sufficient* frequency and thus are conventionalised (ibid.: 5). Examples of phrasal patterns which are fully compositional and

[7] Note, in line with the rejection of transformational rules /derivational processes (see Goldberg 2013: 15), the active and passive construction are considered to be two related constructions, and, thus, the production of the passive construction does not underlie a transformation of the active construction.

[8] This is especially well-reflected in the case of foreign language learners of English, especially those whose L1 is typologically different, as they have to learn construction-specific information concerning the word order, the semantic roles, the agreement between subject and verb, etc.

have been conventionalised due to their high frequency of occurrence are for instance (examples adopted from Hilpert 2014: 13):

(6) *I love you.*
(7) *I don't know.*
(8) *How are you?*

In other words, the more often a construction is experienced, the more entrenched it becomes and the frequency with which it occurs can lead to independent representation, even with 'regular' and fully transparent constructional patterns as those above (see e.g. Ellis et al. 2016: 27).

To conclude, the conceptualisation of language as form-meaning pairings, i.e. constructions, has the following main implication: "[…] in many construction-based grammars, constructions perform the work which in generative theories is performed by rules" (Taylor 2012: 120). So instead of a distinction between grammar and the lexicon, linguistic knowledge is comprised of the experience with "**constructions all the way down**" (Goldberg 2006a: 18; emphasis in the original).

2.1.2 How is Language Represented in the Mind? Inside the Construct-i-con

If language equates "constructions all the way down", the question arises how these form-meaning pairings are acquired, organised, and stored. Do we find a vast unordered number of all the constructions we have ever experienced in our mind or are they organised in a specific way? Is every experience with a construction retained in our memory or do we forget concrete instances and rather rely on more abstract representations? In other words: how redundantly or efficiently is language stored? What levels of abstraction exist and are activated when processing language? The purpose of this section is to give a brief overview of different assumptions from the usage-based and constructionist literature that exists on the mental representation of language.

In the view of usage-based and constructionist approaches, linguistic knowledge is represented, comparable to other cognitive systems, as a complex network (see e.g. Traugott & Trousdale 2013: 3). Consequently, constructions do not exist as an unordered set of instances in the mind of the language user, but are rather represented as a highly organised

network, where they are interconnected by different types of links (see e.g. Bybee 2010; Croft 2001; Goldberg 1995; Langacker 1987). Since the idea of a separation of the lexicon and grammar 'rules' is rejected, this network is termed 'construct-i-con' (see e.g. Goldberg 2003; Taylor 2012).

As Barðdal & Gildea (2015: 23) point out, there are essentially three types of network models, which can be either taxonomic or meronymic: the complete inheritance model, the default inheritance model, and the full-entry model. The first two inheritance networks[9] are taxonomic networks, where information is passed from the highest node further down to lower nodes via different so-called 'inheritance links' (ibid.; see Goldberg 1995: 67 ff. for a description of the different links). Although the majority of construction grammarians agree on the importance of relational links, there is less consensus regarding the question of how exactly constructions are connected and how inheritance should be modelled (Ziem & Lasch 2013: 96).

One issue of debate, for instance, is whether the information is stored only once on an abstract level, as e.g. assumed by the Berkley Construction Grammar (Kay & Fillmore 1999). Instantiations of the abstract schema would be then processed and produced on the basis of abstract generalisations ('complete inheritance') and therefore be not stored on a more concrete level, which implies that no redundant information would be retained (see Hilpert 2014: 65–66). The advantage of a network not containing detailed and redundant information is that it would be more economical at the level of language processing. However, psycholinguistic research on different types of constructions, such as complex words, provides arguments against this type of mental representation. To give an example from morphology, there is evidence that speakers process and store certain low-frequency complex words decompositionally (i.e. base and affix separately), while for some high-frequency derivatives of the morpheme holistic (i.e. the whole word) retrieval and storage is attested (see e.g. Booij 2013: 257 ff.; Hay 2001; Plag 2018: 47 ff.). This implies that these low-frequency complex words are not stored individually, but inherit their meaning from abstract schemas, as e.g. *actable* which is likely to be processed on the basis of the schemas

[9] The difference between these two models is as follows. In contrast to the complete inheritance model, where information has to be compatible with information on the lower level, in the default inheritance model "constructions lower in the hierarchy may contain information that conflicts with the inherited information from the dominating construction" (Barðdal & Gildea (2015: 23).

act and X*able*. By contrast, a high-frequency complex word, such as *available*[10], is not accessed over the more abstract schema, but it is directly recognised/produced by the speaker since it is stored in its concrete form.

This example from processing complex words would be also in line with the third model, a non-reductionist type of network model: the so-called 'full-entry model' (see Barðdal & Gildea 2015: 23). This model, which is in line with usage-based construction grammar, allows redundancy of stored information and is meronomic, i.e. comprises part-whole-relationships, and captures information on all degrees of complexity, granularity and abstractness (see e.g. Croft 2001; Goldberg 1995; Traugott & Trousdale 2013). Consequently, information on a construction is "specified at every node in the network" (Barðdal & Gildea 2015: 23).

Table 1.1. Examples of constructions, varying in size and complexity

Morpheme	e.g. *pre-*, *-ing*
Word	e.g. *avocado, anaconda, and*
Complex word	e.g. *daredevil, shoo-in*
Complex word (partially filled)	e.g. [N-s] (for regular plurals)
Idiom (filled)	e.g. *going great guns, give the Devil his due*
Idiom (partially filled)	e.g. *jog* <someone's> *memory, send* <someone> *to the cleaners*
Covariational Conditional	The Xer the Yer (e.g. *the more you think about it, the less you understand*)
Ditransitive (double object)	Subj V Obj1 Obj2 (e.g. *he gave her a fish taco; he baked her a muffin*)
Passive	Subj aux VPpp (PP_{by}) (e.g. *the armadillo was hit by a car*)

Figure 2: Constructions of Different Levels of Abstraction (Goldberg 2006a: 5)

To illustrate the different levels of complexity and abstractness, consider Figure 2. In accordance to the full-entry model, we can assume to find a continuum, ranging from broad and more abstract generalisations, such as information on word order, partly filled / partially productive constructions up to concrete, item-specific constructions, such as words and single morphemes (Blumenthal-Dramé 2012: 9; Bybee 2013; Goldberg 2006a).

[10] *Available* has a relatively high frequency in the *British National Corpus* with a token frequency of 26,990 tokens, while *actable* occurs only once in the corpus. However, as Hay (2001) proposes, not only does the frequency of the derivative play a role but also the *relative* frequency of the derivative (e.g. *available*) with respect to that of the base word (e.g. *avail-*).

Despite the acknowledgement that item-specific, as well as item-general knowledge, co-exist, the degree of redundancy and the amount of information that is stored, especially on the level of more concrete instantiations of constructions (exemplars[11]), seems controversial. Some usage-based linguists would claim that language is stored with great redundancy, i.e. individual tokens are retained in memory. Bybee (2013: 54) presents two arguments to defend the position that information is redundantly stored. Firstly, she argues that our neural capacity is much greater than previously thought and therefore a large amount of information can be retained in memory, particularly because all information, according to this view, would be connected and efficiently stored, as e.g. "similar items are stored in proximity to one another" (ibid.). Secondly, she argues that memories can be lost and forgotten as we know from our experience "when that information is not reinforced by repetition or recency" (ibid.) leading to a representation of only relevant information. Moreover, highly frequent words, which are usually highly entrenched, can have several representations, while some infrequent ones might have no representation at all (Bybee 2007: 281).

While e.g. Bybee (2007, 2013) supports this type of model, which proceeds from maximal storage, Goldberg (2006: 62) assumes less storage of concrete examples and states:

> As was the case with non-linguistic categorization, selective encoding and imperfect memory ensure that our exemplars are somewhat abstract. We do not store an unlimited number of complete utterance representations; rather what we retain are instances at some level of abstraction. That is, we do not passively retain a huge mental corpus [...]. Instead we constantly parcel out meaning, form abstractions, and generalize over the instances we hear.

Some amount of redundancy, however, as Goldberg (2006a: 55) proposes, "comes from the fact that very typically, a fully general linguistic pattern is instantiated by a few instances that are highly conventional", which leads to the assumption that item-based knowledge, as well as generalisations, coexist. However, in order for concrete instances to be stored in memory, they usually have to be highly frequent. To illustrate what is meant, consider the following non-linguistic example: We do not need to store and recall every cat we have ever seen, in order to be able to identify a cat in real life as such. Instead, as children, we develop

[11] Note that the term 'exemplar' is used with two slightly different meanings in the usage-based literature; the first use refers to concrete instantiation of an abstract construction (e.g. *She gives her cat some meat* as an exemplar of the ditransitive construction), while the second one is used in exemplar theory as follows: "Over time, tokens with similar or identical features reinforce each other creating **clusters of overlapping tokens** known as exemplars [...]" (Diessel 2016: 222; see also Pierrehumbert (2001)). In the present thesis, I will use the term 'exemplar' in line with the first definition.

a concept of 'cat' on the basis of the experience with some concrete cats (in language these would be exemplars), which are eventually stored under one category (a schema). This category captures the most prototypical features that all the experienced exemplars have in common. Therefore, it is likely that we have a prototypical cat in mind, with which we compare other animals (whenever we encounter a new instantiation of this category). However, this does not mean that we cannot recall or identify a cat that deviates in terms of its features from our generalisations (e.g. a cat with no fur). In this case, we might refer to a specific image with a similar cat and/or identify it on the basis of other category-specific features. In more general terms, we can make sense of new stimuli by processing it via a more schematic pattern, which emerges on the basis of our ability to combine and abstract over different individual experiences.

With regard to language, this cognitive ability to form generalisations helps to efficiently comprehend and produce new linguistic items (cf. Goldberg 2006). This is a crucial cognitive feature, considering the fact that the number of linguistic tokens that we can process is almost infinite. For instance, as Ibbotson (2013: 3) explains, "[f]or a five-word string (e.g., *I like your green cheese*), with 20 words that can fill each slot, there are 3,200,000 possible five word sentences (20^5)". This illustrates that we cannot possibly have experienced *all* possibilities, but that we partially rely on more abstract knowledge (e.g. the schema Subj V DO) in order to, e.g., interpret a five-word sentence like *I like your green cheese* that has probably never been encountered in this concrete form before (cf. Langacker 2013: 168).

To summarise this section, we can affirm that it is widely agreed that the representation of constructions is organised as a highly connected network and that it is considerably influenced by different factors such as distributional information, i.e. frequency (see Section 2.1.3.2 below for more information on the role of frequency in the organisation of language). However, the modelling of these characteristics, and the structure of this network, i.e. the construct-icon, is still understudied to date. For instance, it is an empirical question when and how we find generalisations (Bybee 2013: 54), how much information is stored redundantly, and when speakers rely on more item-specific knowledge rather than on abstract schemas (see e.g. Perek 2015: 141). In the present thesis, it is attempted to address some of these issues. For instance, evidence will be presented which suggests that item-

based knowledge coexists alongside item-general schemas and that these vary in their degrees of representational strength due to their frequency of occurrence.

2.1.3 Frequency Effects

2.1.3.1 *Type and Token Frequency*

Frequency affects almost "every domain of human cognition and behavior" (Ambridge et al. 2015b: 240) and is seen as a key factor in language use, organisation, change, and acquisition according to usage-based and most constructionist approaches to language (see e.g. Behrens & Pfänder 2016; Blumenthal-Dramé 2012; Bybee & Thompson 1997 for an overview of frequency effects on different areas of language). First and foremost, the question arises how 'frequency' is defined in the theoretical framework adopted in this thesis.

A simple definition would describe frequency as "the number of times that a particular chunk of language (such as a phoneme, word, or phrase) occurs in a specified environment" (Divjak & Caldwell-Harris 2015: 54) and working with frequencies often involves the question if a linguistic item is more or less frequent in relation to another item (ibid.). Two prominent distinctions that are made in usage-based linguistics are those between 'type' and 'token' frequency. In this theoretical framework, token frequency refers to the number of occurrences of a word or a phrase within a particular text or corpus (Bybee & Thompson 1997: 378; Bybee 2013). An example of the token frequencies of e.g. *apple* or the phrase *I love you* is their respective number of occurrences in a text or corpus (for instance, such as the *British National Corpus*, Davies 2004-). Type frequency, on the other hand, "counts how many items occur in the schematic slot of constructions" (Bybee 2013: 61). An example of a construction on the word level is the English past tense inflectional morpheme *–ed*: it occurs with a high number of different verbs (e.g., *talk**ed**, cook**ed**, watch**ed**)* and has thus a higher type frequency than irregular past tense forms (ibid.: 62).

Despite the relatively straightforward concepts of type and token frequency, determining the frequency profile of a construction can be a challenging task (Bybee 2013: 60), especially in the case of multi-word constructions. To illustrate this, consider the following construction discussed by Bybee (2013) to illustrate this issue:

SUBJECT	[DRIVE]	*her*	wild
	[SEND]	*him*	mad
	[MAKE]	*me*	*crazy*
		you	*up the wall*
		them	*nuts*
		NP	*batty*
		..	
		..	

Figure 3 The Slots of the Resultative Construction (from Bybee 2013: 61)

Figure 3 shows the different slots of the resultative construction with a verb such as *drive* and an animate object followed by an adjective or prepositional phrase that has a meaning similar to *crazy* (ibid.: 60). The construction has several slots which can be filled with different lexical items. The subject slot, for instance, allows for a wide range of nouns phrases, ranging from animate, inanimate as well as abstract entities, such as *my students*, *his family*, *white old men who think they should be in charge*, *this computer*, *boredom*, *he*, *she*, *it* etc. Theoretically, the number of noun phrases to occupy this slot is almost endless and can, therefore, be said to have a very high type frequency. By contrast, the object slot has a comparatively lower type frequency than the subject slot because it is more restrictive; usually, the noun phrase here is animate (e.g. *her*, *their teacher*, *his grandparents*). The verb has the lowest type frequency in this construction because only a limited number of types can occur here. This is due to an idiomatic restriction with regard to the matrix verb. In this case, since the verb *drive* has a high token frequency in this constructional slot (i.e. we find various entries with *drive* in a corpus), it serves as a prototypical example of this resultative construction, as pointed out by Bybee (2013: 61). Finally, the last slot has a low type frequency because only a limited number of adjectives or prepositional phrases can occur in it which are in line with the meaning of this construction.

However, the question now arises how to objectively create a frequency profile for this construction. Bybee (2013: 60) suggests the following procedures to measure token frequency. First, all tokens of this construction can be counted in a corpus, i.e. all variants of the construction such as those presented in Figure 2 above. Second, if one is interested in a specific slot, e.g. *crazy* in the adjective slot, then the number of instances featuring *crazy*

can be counted in order to determine its token frequency. Third, one can be more precise and look for a particular instance of the whole construction such as *It drives me crazy* and thus determine the token frequency of this instantiation of the resultative construction. However, if one is interested in the type frequency of a specific slot, it is possible to count the number of *different* items occurring e.g. in the verb slot.

Taken together, the example of the resultative construction demonstrates that determining when and to what degree a construction is frequent is not an easy task and depends on the research objective. Also, the degree of 'how frequent' something is always relative (e.g. the type frequency of the subject slot of the resultative construction depicted above has a high type frequency *in relation to* the object slot). As it is impossible to specify the different levels of frequency (e.g. low, medium, high) solely on the basis of intuition (see Bybee 2006: 715), the use of corpora is inevitable in the quantification of frequencies.

2.1.3.2 *Frequency Effects: Entrenchment and Schematisation*

In the following, we will see how frequency affects the organisation and representation of language. Prior to that, it has to be pointed out that the effects of frequency on language use, change, and acquisition, largely take place on an implicit level, in the sense of that language users do not record the exact frequency of constructions. The statistical information on how often constructions occur, as well as their transitional probabilities, emerge on the basis of the accumulation of each (subconscious) experience with them (Ellis & Wulff 2015a: 412).

Token frequency is primarily associated with the phenomenon of 'entrenchment', which "denotes the strength or autonomy of representation of a form-meaning pairing at a given level of abstraction in the cognitive system" (Blumenthal-Dramé 2012: 25; cf. Langacker 1987, 2008, 2013). The term is not only used to refer to the different cognitive processes associated with entrenchment but also to describe their effects on the representation of language (Schmid 2017a: 10). Entrenchment-related phenomena involve, for instance, the holistic storage, ease of accessibility and also the more frequent use of a construction (Pfänder & Behrens 2016: 4; see also Bybee 2006; Divjak & Caldwell-Harris 2015; Ellis 2002; Schmid 2017b). The more frequently a construction is experienced and used, the more often its node is activated, which makes it become stronger and more connected (Barðdal &

Gildea 2015: 32). Conversely, this means that constructions that are used infrequently or rarely might not be entrenched or lose some strength if not used recently (ibid.).

Highly entrenched units, as indicated above, can become more autonomous, i.e. they are accessed holistically rather than analytically and with more ease and fluidity than less frequent constructions (Blumenthal-Dramé 2012: 187). Studies have shown that some high-frequency multi-word phrases/constructions are processed faster than less frequent expressions (e.g. Arnon & Snider 2010; Conklin & Schmitt 2012; Bod 2006; Hernández et al. 2016; Siyanova-Chanturia 2015; Siyanova-Chanturia et al. 2011). For instance, Taylor (2012: 130) exemplifies this effect by drawing on an example from Arnon & Snider's (2010) study on multi-word phrases: the highly frequent four-word string *don't have to worry* was judged faster as grammatical than the less frequent string *don't have to wait*, despite the fact that *wait* is more frequent than *worry* in the British National Corpus (Davies 2004-). Thus, as Taylor (ibid.; emphasis mine) argues, "subjects are responding according to the frequency of the four-word phrases **as a whole**, as laid down in memory on the basis of their previous experience with the language". This effect is also known as the 'development of automatised chunks', which denotes that "[l]inguistic expressions that are frequently combined […] become automatized" (Diessel 2007: 124, see also Bybee 2013: 53 ff.). For instance, in case of the highly frequent string *I love you* (see 2.1.1), it is likely to be retrieved and processed as a whole, rather than being composed on the basis of its individual parts.

Type frequency, on the other hand, is associated with cognitive and linguistic processes such as routinisation, productivity, categorisation and schematisation (Schmid 2017b: 12). Schematisation is a highly important factor in language acquisition and use. A schema is defined as "a taxonomic generalization of categories" (Traugott & Trousdale 2013: 13; see Behrens 2009; Langacker 2000). More specifically, schemas emerge as "abstractions across sets of constructions which are (unconsciously) perceived by language-users to be closely related to each other in the constructional network" (Traugott & Trousdale 2013: 14; see also Dąbrowska 2000; Langacker 1987; Tuggy 2007). As illustrated by the 'cat example' in Sections 2.1.2, "[o]nce learned, a schema serves as a template for dealing with novel expressions on the same pattern" (Langacker 2013: 168).

The degree of abstraction with which a schema is stored is said to depend on the type frequency of its slots and how open they are, i.e. how many different items can occur in the

respective slots, and how different/general they are (Blumenthal-Dramé 2012: 8; Croft 2001: 28). To provide an example, the schema for the transitive construction, i.e. [NP V_{trans} NP], such as in the concrete forms *She eats an apple* or *His uncle is reading a book*, results from a high number of different tokens that can occur in the respective slots (thus, these slots have a high type frequency, and are therefore lexically open[12]). The degree of semantic and syntactic resemblance between these exemplars leads to a generalisation, and with this an emergence of a more abstract pattern (Ziem & Lasch 2013: 103–104; Schmid 2017a: 12).

It is, thus, apparent that type and token frequency also interact. For instance, one consequence of this interaction is connected to the language users' ability to understand and produce utterances/sentences that they have never heard or used before. The sentence (9) below, for instance, has no attestation in this concrete form, neither in the Corpus of Contemporary American English (Davies 2008-), which contains 560 million words nor in the 14 billion words iWeb corpus (Davies 2018-).

(9) *Their new neighbour cuddled the dog.*

If we assume that these corpora are somehow representative for the distributions of the English language, this means that this sentence is very likely to have never been encountered by the reader before in this exact wording. Nevertheless, it does not pose a problem for a speaker of English in terms of its interpretation since not only the token frequency of the individual words are likely to be entrenched (item-based knowledge), but also the more abstract pattern that constitutes the sentence structure (NP V_{trans} NP; Subj/V/DO). This abstraction and the fairly easy processing of such a declarative sentence can, therefore, be attributed to the interaction of type and token frequency of the respective slots, i.e. the various syntactically similar items that occur in this position.

But, as already highlighted in the previous sections, several aspects remain to be addressed empirically. Firstly, the issue of which level of abstractness language users *actually* rely on; it is unclear whether concrete exemplars or more schematic patterns are entrenched or whether language users have access to different levels of abstractness when processing or

[12] Of course, the options of lexical items that can occur in these slots is not infinite but underlies certain constrains, which depended on the construction as a whole (Blumenthal-Dramé 2012: 8; see also Goldberg 1995: 180 ff. for a more detailed discussion).

retrieving language. Research suggests evidence for both. In the case of some high-frequency exemplars and low-level schemas, ease of processing and thus fast access has been shown empirically (see e.g. Perek 2015: 105–142). Other studies (e.g. Ellis et al. 2016; Perek & Goldberg 2015) indicate that access on a more abstract level is also psychologically real when the construction has a high type frequency. This suggests that, in line with Goldberg's (2006) view of the construct-i-con (see Section 2.1.2), some prototypical, high-frequency exemplars of a construction are more readily accessed and that less frequent tokens are processed on the basis of a more abstract schema.

Furthermore, it is not evident how lexically specified, i.e. how concrete, the schema for a respective construction is represented in the construct-i-con. To illustrate this, consider the different schemas for the ditransitive construction (cf. Traugott 2008):

(10)

a. Subj V_{trans} NP NP.

b. Subj *give* NP NP.

c. $Subj_{animate}$ *give* NP NP.

d. $Subj_{animate}$ *give* DET N NP.

e. ...

f. *Eva gave her friend a cup of coffee*.

(10a) represents the highest degree of abstractness (at least from a point of view of a linguist since it is an open question which levels of abstraction are psychologically real), and (10f) a lexically-filled, concrete low-scope pattern, with a number of less specified levels in between. We know that if (10f) has a very high token frequency in this concrete form, it is likely to be highly entrenched. However, in the case of this specific sentence, the probability of being stored holistically is low since it might not even occur in this exact same wording in any given corpus. Nonetheless, for a speaker of English, this sentence is maximally comprehensible; the component words and their phrase structure is relatively frequent and, what is more important, a more abstract schema for the ditransitive construction, which results from a high type and token frequency of exemplars in this construction[13], is likely to be entrenched, which would facilitate the processing of this sentence.

[13] Of course, the different slots differ in their productivity. A number of different exemplars can occur in the subject position, but most prototypically animate noun phrases (*Eva*, *he*, *her sister, the secretary*, etc.), which means that this slot has a relatively high type frequency and productivity. The verb slot, in contrast, is more

To summarise this section, it can be said that constructional knowledge constitutes a *continuum* ranging from highly entrenched item-specific exemplars to the entrenchment of highly abstract schemas. In addition, it has been shown that the effects of type and token frequency are often difficult to tease apart and that schematisation and the entrenchment of constructions are best predicted by both type and token frequency. However, even when specifying the type and token frequency of a multi-word construction such as the one above, the question remains: is it the most abstract level of representation that is accessed when interpreting this sentence or is it one of the less abstract schemas, exemplified in (10b) or (10f)? Another question that arises is which parts of a multi-word construction need to be experienced with sufficient frequency for a schema to emerge and to become entrenched in the first place (cf. Traugott & Trousdale 2013: 5).

2.2 Usage-based Construction Grammar and Language Acquisition

2.2.1 Construction Learning in First Language Acquisition

The previous chapter has introduced the basic tenets of constructionist and usage-based approaches of language as well as the question of how the mental representation of language for native speakers is modelled and what role(s) frequency plays in this. The following sections will now discuss how these approaches account for language acquisition. First and second language acquisition are not considered to be two radically different phenomena in the theoretical framework adopted here. In contrast, as they are generally assumed to have a considerable number of processes in common (see e.g. Ellis et al. 2016), we will also describe how usage-based construction grammar accounts for first language acquisition, followed by a discussion of the main hypotheses about the processes involved in second language acquisition[14]. Section 2.2.2 briefly describes how the construct-i-con can be modelled for a speaker of two languages. The concept of frequency effects, in particular, the

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restricted since not every verb can occur in it; it has to denote a meaning of transfer and therefore license an object (intransitive verbs do not fit in this construction, as e.g. *sleep*, *run,* etc.).

[14] Note, since the present thesis does not include an intervention study in, e.g. a classroom setting, it does not examine an active, ongoing learning process in a narrow sense. Rather, this project is mostly focussed on the L2 knowledge of the catenative verb construction and the impact of frequency on its mental representation. However, in line with the theoretical framework adopted in this thesis, I assume that language is dynamic, and, thus, constantly changing, which implies that every use of a construction has an impact on its representation. Therefore, it seems legit to use the terms ‘acquisition’ or ‘learning’, and not only ‘L2 knowledge’ in this research context.

role of frequency for the schematisation and entrenchment of constructions in the L2, will be explained. One aspect that will be highlighted is the issue of how (over-)generalisations are motivated and how they can be constrained.

As already stated in Section 2.1.1., usage-based construction grammar assumes that the acquisition of language results from the experience with language and is not based on an innate language-specific faculty (cf. Chomsky 1965; Hauser et al. 2002), but that "the human capacity for language is best seen as a conspiracy of many different cognitive, social-cognitive, information-processing, and learning skills […]" (Tomasello 2003: 321). The drive for acquiring the L1 is connected to different ontogenetic processes, such as intention-reading or cultural learning, which have the crucial function of survival (ibid.). Other abilities that promote the comprehension and production of language include the cognitive processes of e.g., categorisation, analogy, and schematisation (ibid.; see also Bybee 2010).

The first signs of infants understanding the concepts of joint attention and intention-reading often result in pre-linguistic and para-linguistic communicative methods, such as babbling and pointing. Before children show signs of their linguistic development in form of speech, they first have to learn to understand the communicative purpose of utterances, and more crucially, learn to divide and extract the smaller units that constitute these utterances (Tomasello 2003: 320). However, as is known from child utterances, often certain form-meaning mappings can differ from those by adult speakers of the target language at first (see Section 2.2.4.2 for more information on e.g. overgeneralisations errors). Therefore, the question arises how children learn form-meaning pairings and what type of stages they undergo in order to achieve the language competence of a native speaker.

First language acquisition is a complex process and is traditionally been described to proceed subconsciously, in an item-based, bottom-up kind of fashion (see e.g. Behrens 2009: 435; Diessel 2013: 351; Lieven & Tomasello 2008: 168–169). On a linguistic level, children start off with one-word utterances and gradually build up more complex patterns and form abstractions across related instances on the basis of analogical comparisons (Abbot-Smith & Tomasello 2006; Tomasello 2003). Consequently, children figure out more abstract constructions on the basis of already acquired, concrete linguistic items with different characteristics (e.g. in terms of complexity or abstraction) by focusing on their form and communicative function (Tomasello 2003: 307). The first utterances children make are

isolated words or simple word combinations such as holophrases (such as *All-gone*), which often represent a more complex utterance and are usually bound to a certain communicative situation (Diessel 2013: 351).

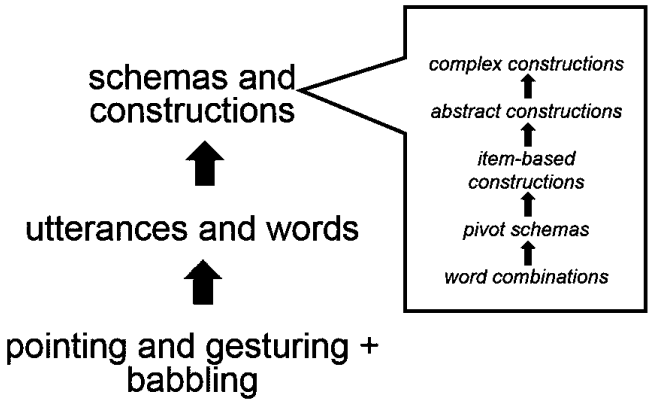

Figure 4 Language Acquisition as a Bottom-up Process (Based on Tomasello 2003; 2009)

Gradually, children's productions of multiword phrases exhibit a more systematic pattern, eventually showing some form of abstraction (Tomasello 2009: 76). According to Diessel (2013: 352), these multiword constructions are often organised around one particular lexical item and are termed 'pivot schemas' or 'pivot constructions' (Braine 1976). Children often use a relational term with an open slot filled by various lexical items that are semantically compatible, such as the schema *More* + *Noun* as in *More juice*/*cookie* (see also Diessel 2013: 352–353). In accordance with these findings, Tomasello's (1992) longitudinal study of his daughter's grammatical development has shown that the word class most frequently used in these pivot schemas were verbs, which, however, did not operate as a "coherent class" but "as individual islands of organization" (ibid. 256). This means that verbs are often only used in the framework of a specific (argument structure) construction, without extending the verb to other constructions. An example is the exclusive use of verb *want* in the transitive construction, S V DO (*I want cookie*/*milk*/*teddy*), and not in any other construction, such as in the catenative verb construction (*I want to play*). This phenomenon of using a verb conservatively in only one specific construction is termed 'verb island hypothesis' (Tomasello 1992, 2003).

A further step in the linguistic development of a child is the emergence of 'item-based constructions' (Tomasello 2009: 77), which go beyond pivot schemas since they exhibit

"syntactic marking as an integral part of the construction" (ibid.), such as morphological marking, prepositions or word order; all of which help to syntactically mark the participants' roles in a conversation or situation. With increasing experience (usually between two or three years of age), and exposure to the target language, the child develops more abstract and often more complex constructions, such simple transitive and intransitive constructions, which are not bound to specific lexical items anymore (Tomasello 2009: 78). Overall, linguistic knowledge is acquired gradually and organised in a way that it essentially agrees with that of other members of their speech community. Furthermore, we find evidence that children start with item-based knowledge and incrementally acquire more schematic representations of constructions. The role of type and token frequency, as well as of other factors, in this process will be discussed in 2.2.4.

2.2.2 The 'Bilingual' Construct-I-Con and the Role of the L1

It is undeniable that second language acquisition[15] displays a number of differences when compared to first language acquisition. One of the most obvious differences concerns the 'end-state of acquisition' as a considerable number of L2 learners do not reach a native-like level, In other words, the mental representation of the target constructions are often not the same as for native speakers. This can, for instance, be attributed to the fact that learners of a second language usually have full command of their L1 (see below for a discussion of the role of the L1), and are cognitively more mature at the point of learning the additional language (see e.g. Lightbown & Spada 2013: 36–40). Other reasons that have been discussed to account for this issue are related to general aspects concerning cognition, such as decreasing brain plasticity, working memory capacity, etc. (Madlener 2015: 45–77 for an overview of differences between L1 and L2 acquisition). Often correlating with these

[15]Note that in second language research often a distinction is made between 'learning' and 'acquisition'. More specifically, the term (instructed) **foreign language learning** is used to describe the learning of a second language in the environment where this particular language is not the dominant language, and is usually learned in an institutionalised setting (see e.g. Gass & Selinker (2008: 7). Second language acquisition, in a narrower sense, is seen as the process of learning an additional language, usually naturalistically, in an environment where the target language is the dominant language (ibid.). However, the terms 'acquisition' and 'learning' are also often used interchangeably and 'second language acquisition' is used as a cover term. In a usage-based/constructionist framework, foreign language learning and second language acquisition, are usually not seen as fundamentally different processes, especially when it comes to implicit learning mechanisms, and in particular with regard to the effects of frequency on the mental representation of the L2. This is why in the present thesis this distinction will not be made (if not indicated otherwise) and mostly the cover term 'second language acquisition' will be used.

factors, individual differences with regard to e.g. memory capacities, language aptitude, and analytical skills likewise can play a role (see e.g. Chan et al. 2012; Kidd et al. 2018; Skehan 1991). While some learners achieve a very high proficiency level in the foreign language because they, for instance, are exposed to a regular and rich input, are highly motivated, and have a high language aptitude, others who do not have these traits are likely to stay less proficient (see e.g. Dörnyei & Skehan 2003 for more information on individual differences). Nevertheless, as Ellis & Robinson (2008: 7) state, these "affective factors are subordinate to more powerful cognitive developmental and maturational factors", so it is a question of debate how these factors have to be weighed.

Despite the differences between L1 and L2 acquisition and their implications, usage-based construction grammar assumes that L2 acquisition is principally comparable to child language acquisition, and thus makes predictions that follow the basic assumptions of the framework, namely that learning proceeds on the basis of domain-general cognitive mechanisms, analogy, categorisation, schematisation, chunking, as well as on automatisation processes (Bybee 2008: 233). The other fundamental hypothesis is that the L2 is largely acquired on the basis of the input the learners receive (e.g. Ellis & Wulff 2015b: 75). Moreover, as constructions are seen as the units of language in usage-based construction grammar, second language acquisition is, too, considered to be the learning of constructions (Ellis 2013: 368). However, traditional foreign language teaching methods in institutionalised settings are often focused on the explicit teaching of vocabulary and the rule system of the target language. Thus, they take a 'dictionary-grammar-model' kind of approach, rather than proceeding from constructions as units of language (see also Herbst 2017). This is also reflected in the majority of more traditional textbooks, which often include separate sections on grammar and vocabulary, as well as in types of assessments conducted in class (e.g. vocabulary tests vs. grammar tests), especially for low and intermediate level learners.

Consequently, many usage-based studies (see e.g. Ellis & Larsen-Freeman 2009; Ellis et al. 2014a; Ellis et al. 2016; Gries & Wulff 2009) have recently begun to address the fundamental question whether L2 learners' knowledge of the target language is also comprised of form-meaning mappings as in the L1. Gries and Wulff (2005), for instance, have demonstrated by means of experimental and corpus studies that advanced German learners of English possess native-like construction-based representations of the English ditransitive construction

(double object, e.g. *give you the book* vs. prepositional construction, e.g. *give the book to you*). This evidence for constructional knowledge comes from a sentence-fragment completion study, which reveals the existence of syntactic priming effects between constructions. These priming effects are found to correlate with the verbs' constructional preference for either dative construction in native speaker data (corpus data). For instance, verbs that have a strong preference for one of the constructions are not affected by the other construction as a prime. Lastly, a semantic sorting experiment displays a constructional-based sorting effect, rather than a sorting purely based on the verbs' meaning. In all cases, there are no signs of transfer of verb-specific preferences from German. Gries and Wulff (2005:196) draw the conclusion that learners of English can form generalisations about more abstract constructions in the L2, despite a limited amount of input in the target language. This suggests that form and meaning are best acquired holistically, and not as two separate sides of the target-language (see e.g. Martinez-Garcia & Wulff 2012: 229 and Chapter 4).

Proceeding from constructions as the basic units of language, usage-based construction grammar sees language knowledge as a complex, highly organised network in which constructions are interconnected, and range from item-specific to more abstract schema knowledge, as outlined in 2.1.2 above. Thus, if we proceed from a network model of language in the form of a 'construct-i-con', the question arises whether there are one or two networks for a speaker of two languages. To my knowledge, research to date has not addressed this issue from a usage-based or constructionist view yet. However, psycholinguistic evidence from research on bilingualism (Altarriba & Heredia 2018; Heredia & Cieślicka 2018; Libben et al. 2017; Pavlenko 2009) suggests that we find a unitary mental representation[16] of both the first and second language[17], i.e. the languages are not separately represented in two lexica but in one. Furthermore, as highlighted by Saidi et al. (2017: 73), the bilingual mental lexicon "cannot be defined through categorization, but should be rather be considered on a spectrum", which suggests that there is no clear-cut border between the

[16] Although in this line of psycholinguistic research the mental representation is not modelled as a construct-i-con, i.e. as a network of form-meaning pairings, but as a 'lexicon', the evidence presented by psycholinguistics studies on the integration of two languages in one network is still applicable to a usage-based model of language representation.

[17] For reasons of simplicity, I will only discuss the mental representation of two languages. Of course, the knowledge of every additional language does also have in impact on the construct-i-con, and can be integrated in it.

two languages and the information stored about them. Evidentially, the bilingual lexicon is highly complex, which results from the fact that a considerable number of factors shape this representation, such as the amount of exposure to the target language, and use of the two languages, the age of acquisition, and many more internal, as well as external factors related to language use.

Furthermore, in line with theoretical framework adopted in this thesis, language representation is dynamic (see e.g. Langacker 2000), since it is constantly changing and directly affected by language use and perception; for a speaker of two languages, the constant change is even more pronounced, since the two languages are rarely experienced to an equally rich extent. Despite the fact that a systematic understanding of how the mental representation of language in the form of a construct-i-con is lacking in the case of monolinguals (see also 2.1.2 above for open questions), the view will be adopted that we do not find two separate construct-i-ca for the L1 and L2. Instead, postulated on the basis of the psycholinguistic evidence mentioned above, it will be presumed that we find one highly complex and dynamic construct-i-con, which will be referred to the 'bilingual[18] construct-i-con' from now on.

Another factor that has an impact on the development of the bilingual construct-i-con is the typological distance between the two languages (Saidi et al. 2017: 82). In particular, if the architecture of the L2 is similar to the L1 (i.e. they are typologically related/close), this might facilitate the acquisition process. Conversely, it can be assumed that the more distant the languages are, the more cognitive effort is involved in the organisation of the L2 constructions (see e.g. Römer et al. 2014a for a usage-based study on language typology effects in the L2 acquisition of VACs). On the other hand, it is debatable how dominant the first language is in the process of learning of L2 constructions in general as well as on different stages of proficiency. It cannot be denied that, since second language learners often have a fully developed (or at least complex) L1 construct-i-con when learning the L2, the L1 is used as a 'starting point'. With regard to the role of the L1 in the L2 acquisition process, Ellis (2013: 366, italics in the original) states that L2 acquisition "involves process of

[18] Note that 'bilingual' does not imply that the L1 and L2 are acquired simultaneously in early childhood as the conventional use of the term suggests (see e.g. Houwer (2009). Rather this notion is used to emphasise that the L1 and L2 are tightly bound and do not constitute two separate construct-i-ca.

construction and *re*construction". Bybee (2008: 232) even goes as far as claiming that a first language construct-i-con can serve as a basis for the acquisition of L2 constructions, as far as this construction resembles the target pattern. In this case, the new L2 construction would be stored "with only the particular lexical or morphological material changed" (ibid.). To illustrate this with an example, consider the Italian ditransitive construction with *dare* (also referred to as the 'benefactive construction'; see Shibatani 1999 for more information on the construction in different languages) and its equivalent in English[19]:

(11)

a. Italian: *dare* (V) *qualcosa* (Direct obj-Theme) *a qualcuno* (PP- Beneficiary)

b. English: *give* (V) *something* (Direct obj-Theme) *to someone* (PP- Beneficiary)

This would imply that an Italian learner of English would take the L1 schema as a starting point and use it as a template for the L2 construction by only filling its slots with the lexical material of the target language English. While it is clear that, as Bybee states, the knowledge of the more abstract meaning of the ditransitive construction is highly beneficial in the acquisition of the L2 construction (as it is directly applicable to the target language in a direct one-to-one mapping), this view is problematic. This type of mapping is predicted to take place at a lower proficiency level in the best case when the repertoire of L2 constructions is still scarce. It can be assumed that, with rising proficiency, the (supposed) impact of the L1 decreases, and the representation of L2 constructions are restructured, become increasingly more fine-grained and ultimately become more target-like (see 2.2.4.2 for more information; see also Madlener 2015). Therefore, the process of *re*constructing should refer not only to the reorganisation of L1 constructions but also to the restructuring of the representation of L2 constructions and schemas.

In this context, it is important to highlight that these constructionist/usage-based assumptions on the impact of the L1 on the L2 are not just a newer version of old theories in SLA, such as the Contrastive Analysis Hypothesis (CAH; see e.g. Lado 1957), which has been shown to be highly flawed since the predictions could not be confirmed (see e.g. Whitman & Jackson 1972). The strong version of the CAHs has focussed on contrasting the L1 and the L2 to point out similarities and differences which predicted whether they either facilitated

[19] Thanks to Lucia Busso (p.c.) for this example from Italian.

the acquisition of a particular feature or made it more difficult (Lado 1957: 2). Thus, positive and negative transfer was stipulated on the basis of the structure of the two languages in question. The weak version of this hypothesis, on the other hand, attempted to explain errors made by learners on the basis of differences between the L1 and the target language in retrospection. However, the distinction between 'positive' and 'negative' transfer as conceptualised by CAH is not empirically sound, and over the last decades of SLA research it has been shown that predictions about the direction of transfer are not reliable (R. Ellis 2008: 379).

What usage-based construction grammar claims is a more moderate version of these hypotheses since it does not predict 'negative' or 'positive' transfer, but rather assumes that there can be "L1-tuned expectations and selective attention" (Ellis et al. 2016: 151), which is also known as 'learned attention' (see Ellis 2006b). This means that learners might be biased with regard to their perception and the intake of the L2 because their attention has been focussed on the characteristics of the L1 since birth. One consequence of this is, for instance, that learners show difficulties in perceiving certain cues that are non-salient to them because of their selective attention. Compensation for this can be found in explicit instructions on these "unattended input cues" (Madlener 2015: 77; see Section 2.2.4.1 below for more information on salience).

It is necessary to emphasise that this does not imply that the L1 can predict the representation of the L2, let alone the success or failure of the acquisition of an L2 construction; it is generally an issue of debate how powerful the effect of the L1 can be[20]. Some theories of second language acquisition, such as Processability Theory, assign a subordinate role to transfer as an explanatory factor in the process of acquiring the L2 altogether (see e.g. Håkansson et al. 2002), and rather suggest developmental reasons for certain non-target-like features. For instance, studies have shown that learners undergo similar developmental stages in the acquisition of constructions, regardless of their L1 (e.g. Pienemann 1998; Pienemann et al. 1988). A further argument against transfer is that often other factors are responsible for non-target choices, such as markedness. Markedness, a term derived from

[20] It is widely known that the influence of the L1 with respect to pronunciation in the L2 is most prominent. However, the points made here do not refer to phonological features of constructions. For a review of transfer in L2 phonology see Major (2008).

the Markedness Differential Hypothesis, which makes predictions on phonology (Eckman 1977), is a concept that indicates the complexity of a construction, and takes cross-linguistic frequency into account (Dressler 1985). A form that is unmarked occurs more often across different languages than marked ones (Gass & Selinker 2008: 179). Furthermore, marked structures are cognitively more complex in terms of "attention, mental effort or processing time" (Givon 1990: 947), which is why the acquisition of marked structures is more demanding for learners, regardless of their L1.

This section has provided a brief discussion of the mental representation of L2 learners as well as the role of the L1. It has been suggested that speakers of two languages do not have separate, but one highly complex and dynamic construct-i-con, which is formed by (re-)constructing form-meaning pairings in the L2. Nonetheless, future research needs to provide empirical evidence whether the idea of the bilingual construct-i-con is psychologically real. Moreover, it was argued that the L1 is not a reliable and decisive factor in predicting the success or failure of learning L2 constructions. Since transfer in a 'classical' sense is a phenomenon that often correlates with other factors, such as the cognitive complexity of a construction, it will not be adopted as a major explanatory factor for the linguistic behaviour of learners in the present thesis and thus the learners' L1 is kept constant (for more information see also Sections 3.2 and 8.2). Instead, the focus will be on other factors, such as frequency, which will be shown to be robust predictors with regard to the mental representation of the catenative verb construction (see Chapters 4-7).

2.2.3 Implicit and Explicit Learning in Second Language Acquisition

Since most of the cognitive processing is unconscious, the second language acquisition of constructions – or at least some of their aspects – takes a largely implicit route as well (see e.g. Bybee 2008; Ellis et al. 2014a; Ellis & Wulff 2015b; Goldberg & Casenhiser 2008). In particular, the connection between form and meaning such as the context of usage, the communicative purpose, the detection of prototypes, and the frequency distribution of a construction are often learned implicitly and on the basis of experience (Ellis 2002; Ellis et al. 2014c). This type of implicit learning can result in so-called 'procedural knowledge', which is relatively effortless processing-wise, but at the same time hard to access consciously (Ellis 2002, 2016a; Ellis & Collins 2009; Madlener 2015: 34–35). It is,

nonetheless, undeniable that second language acquisition in an instructed learning environment is associated more with explicit learning mechanisms and declarative knowledge[21] than first language acquisition. Children learn their L1 implicitly largely on the basis of the input, but in instructed L2 acquisition, the input is often limited in richness and quantity. Additionally, due to the learners' cognitive maturity and knowledge of another language, implicit learning mechanisms have certain limits, i.e. it is problematic to learn certain constructions in the L2 solely naturalistically. To compensate for this, explicit learning and teaching are often considered necessities to accelerate the learning progress (see e.g. Ellis 2011; Roehr-Brackin 2014). The positive effects of explicit learning induced by metalinguistic rules are highlighted as follows by Roehr-Brackin (2015: 131–132):

> [t]he use of explicit knowledge allows the cognitively mature L2 learner to employ top-down processes almost from the start of learning, thus effectively taking a short-cut to comprehending and producing more diverse linguistic constructions than entirely item-based language use would allow them to do. The metalinguistic descriptions of pedagogical grammar make available to the learner explicit knowledge about schematic categories and what are essentially simplified abstract schemas.

Thus, in accordance with this view, explicit knowledge about the L2 can make the learning process more efficient by enlarging the learners' repertoire of patterns in the target language and helping to use them productively (see also Ellis 2005). In addition, the role of explicit instructions is important to help shift the learners' focus to e.g. less salient features and (thus) non-target-like uses of constructions (Roehr-Brackin 2014; see e.g. Cintrón-Valentín & Ellis 2016; for more information on salience; see Section 2.2.4.1). One challenge, however, is that turning the explicit rules about the target-language into more abstract and automatised language is "resource-intensive" (Roehr-Brackin 2015: 132), i.e. costs more processing effort. Especially at the beginning, when form-meaning pairings have not been established and/or automatised, the processing the L2 challenges the memory capacity and is cognitively more demanding. Looking for the right words, the communicative adequate construction, and paying attention towards the 'correctness' of the language cost a fair amount of resources (see also Roehr-Brackin 2014: 800). Nevertheless, this does not mean that the knowledge of the L2 is exclusively explicit, as mentioned above. In fact, any explicitly taught rule, formula

[21] Declarative knowledge can also be described as fact knowledge, such as knowing the capital of a country. Procedural knowledge is highly automatised, and is activated subconsciously, as for instance the act of walking, drinking coffee, or speaking your L1 (see also Ullman (2016) .

or pattern that the learner memorises can turn into procedural knowledge, i.e. it can become entrenched and automatised, with rising proficiency, practise/usage, and input (see Bybee 2007: 282; Ellis 2005: 305; Rebuschat & Williams 2012; 2006: 100).

What is less clear is how abstract schemas in a constructionist kind of sense differ from rules (in the sense of metalinguistic generalisations used in foreign language teaching). As mentioned above, Roehr-Brackin (2015: 132) speaks of "essentially simplified abstract schemas" in the context of grammar rules. This also shows the problem with grammar rules in teaching: Can they be regarded as *simplified*, if not underspecified, schemas? A rule can be defined as a 'manual' describing on a metalinguistic level how a specific grammatical aspect works; it is a generalisation over many exemplars with the same structure, but the focus often lies on the form (e.g. the structure of *if*-clauses, even if a generalisation on the communicative purpose is given). More precisely, a rule does not capture language structures *holistically* and takes a more restrictive perspective. It does not necessarily capture the usage-related aspects of meaning (semantic, pragmatic, and discourse-related information) as linguistic knowledge in the form a construction does. Furthermore, rules as metalinguistic 'instructions' are often taught, memorised, and practised explicitly. By contrast, as already mentioned above, a schema is a cognitive process and is defined as a taxonomic generalisation across related exemplars (Traugott & Trousdale 2013: 13), where the relatedness refers to form *and* meaning, and these can first emerge when enough instantiations of these structures are experienced. A schema, thus, possesses more fine-grained information that is deduced on the basis of the experience with a construction in the input, and is, in line with Ellis' (2015b: 3) definition, "a nonconscious and automatic abstraction of the structural nature of the material arrived from experience of instances". Generally, a rule is explicit and is part of the declarative knowledge system that can turn into procedural knowledge, while schemas can be conceptualised as self-deduced regularities (procedural knowledge) implicitly drawn from the input.

Nevertheless, how rule knowledge and schema knowledge relate to each other, and under which circumstances which type of knowledge is activated in the processing of L2 constructions is a difficult question. After all, how declarative and procedural knowledge interact is a complex phenomenon, and a constant issue of debate, since they are often difficult to disentangle (see Ellis 2005; Hulstijn 2005; Paradis 2009; Ullman 2001, 2016 for

more information). To illustrate this with an example, consider the catenative verb *refuse* that takes a *to*-inf. complement in English (*refuse to* V and not **refuse* V*ing*). When the learner encounters this verb and intends to use it in the catenative verb construction, it is difficult to say whether the learner activates explicit or implicit knowledge when choosing the complement type. It is possible that the learner relies on memorised information, i.e. declarative knowledge ('*refuse* is one of the verbs that take a *to*-inf.'), or chooses the target-like catenative complement on the basis of procedural schematic knowledge (in other words, a kind of template that captures information on form and meaning of this construction) that emerged implicitly on the basis of a subconscious 'analysis' of the input. As will be shown in this thesis, there is evidence that L2 learners' knowledge of the catenative verb construction and its subschemas (i.e. construction with *to*-inf. or -*ing*) emerges implicitly and becomes more schematic on the basis of the exposure to the target language in use (frequency).

2.2.4 The Role of Frequency in (Second) Language Acquisition

2.2.4.1 *Effects of Type and Token Frequency on the Acquisition of a Language*

This section describes the state of the art of research on frequency effects in language acquisition. In particular, it focuses on the impact of frequency[22] on the entrenchment as well as on the emergence of schematic knowledge of constructions by presenting findings from studies on the first and second language learning of (verb-argument) constructions.

Recent empirical studies have provided evidence for frequency-sensitive learning processes with respect to the following phenomena:

- Statistical learning mechanisms in the segmentation of speech in first language acquisition (see e.g. Saffran et al. 1996a; Aslin et al. 1998)
- In artificial language learning studies for adults (see e.g. Saffran et al. 1996b)
- In the acquisition of multi-word phrases, collocations, and formulaic sequences (see e.g. Alderson 2007; Arnon & Snider 2010; Arnon & Cohen Priva 2013; Christiansen & Arnon 2017; Ellis 2012a; Jiang & Nekrasova 2007; O'Donnell et al. 2013;

[22] Note that it is mostly referred to input frequency, if not specified differently.

Siyanova-Chanturia & Spina 2015; Siyanova-Chanturia et al. 2011; Wray 2005; among others)

- In the acquisition of (complex) constructions, such as verb-argument constructions by native and non-native speakers of English (see e.g. Ambridge et al. 2008; Ambridge et al. 2006; Bybee 2008; Deshors 2015; Diessel 2004; Ellis 2012b; Ellis & Ferreira-Junior 2009a; Ellis et al. 2016; Kidd et al. 2010; Lieven & Tomasello 2008; Madlener 2015; Römer 2019a; Römer et al. 2014b; Römer et al. 2017; Theakston et al. 1999; among others).

This demonstrates that frequency plays a fundamental role in language acquisition. As explained in Section 2.1.3, there are different kinds of frequency which have different effects on language and language acquisition. Type frequency is related to the variability, productivity, and extensibility of constructions. In L2 acquisition, type frequency is, for instance, beneficial for the "formation of restricted categories and of the corresponding variable slots in initial slot-and-frame patterns […]" (Madlener 2015: 97). A central effect of token frequency is entrenchment, which is associated with the strength of representation, routinisation, and automatisation of constructions.

Similarly to entrenchment in the L1, highly entrenched constructions in the L2 tend to be processed with less effort and accessed faster. A learner can use and comprehend the construction with ease. In speech production, for instance, this could correlate with faster access with little or no hesitation (see Schmid 2017: 21). Furthermore, an entrenched construction is often produced more accurately, i.e. it is used in a target-like way in terms of form and meaning, and depending on its communicative purpose, it has a higher output frequency than a less frequent/entrenched construction with the same meaning. To give an example, learners are more likely to use a target-like irregular past tense form if this form is experienced more frequently (e.g., *saw* instead of **seed*); conversely, infrequent, irregular forms are more likely to be regularised (Bybee 2008: 219, e.g., **arised* instead of *arose*). This idea is compatible with the so-called 'Prevent Error Thesis' as well as with the 'Cause Error Thesis' by Ambridge et al. (2015b) for first language acquisition. High-frequency tokens of a construction are found to prevent "errors in contexts in which they are the target" (ibid. 242), such as high-frequency third person singular forms, which are more likely to be entrenched in a target-like manner. However, high-frequency forms can also cause errors,

when a competing, lower frequency form would be target-like ('Cause Error Thesis'), e.g. when a learner uses the simple past form of a verb instead of the present perfect progressive.

Nevertheless, this means that all frequent constructions are acquired in a target-like manner from the very beginning. Some constructions can cause difficulties for learners, despite their high token frequency. This can be, for instance, attributed to their (lacking) salience, i.e. the "general strength of a stimulus" (Ellis et al. 2016: 64) in the input. Some features can go 'unnoticed', and some pronunciation and morpho-syntactic features that are less salient are hard to acquire by learners[23], both in naturalistic and institutionalised settings and are often never represented in a target-like way, even after years of exposure.

These features can become fossilised (for more information on 'fossilisation' see e.g. Han 2004; Han & Odlin 2006; Larsen-Freeman 2006; Selinker 1972), or in other terms, are negatively entrenched by own repetition. As documented in studies on uninstructed second language acquisition (e.g. Klein & Perdue's 1997 study on the Basic Variety), learners who acquire the language naturalistically without any explicit instructions acquire lexical word classes, such as nouns and verbs, better than grammatical categories (i.e. verbs are not inflected for tense, for instance), because they are usually less salient and convey substantial information (see Table 6.3 Ortega 2009: 123 for an overview of more characteristics). These non-salient features require particular attention in the form of explicit instructions and learning, as mentioned in 2.2.3 above, to be unlearned.

Despite this, more frequent exemplars generally tend to be acquired earlier and are more entrenched than less frequent exemplars, which is due to the fact that exemplars that often occur with a high token frequency in a specific construction show a high degree of semantic prototypicality (Ellis 2006a, 2006b, 2013; Taylor 2015). So in case of a complex construction, such as the motion construction, the learner is more likely to first learn a high token frequency exemplar and use it accurately (even if it is irregular), such as *go* in (12), instead of *stroll* in (13):

[23] On the other hand, there are also constructions that are low in token frequency, but are still acquired without any difficulties **because of** their salience. For instance, rare, unexpected items can be noticed by the learner and be entrenched with a low rate of exposure (Blumenthal-Dramé (2012: 61); for more information on salience see e.g. Cintrón-Valentín & Ellis (2016); Blumenthal-Dramé et al. (2017), Ellis (2006b, 2016b), Schmid (2007)).

(12) *I **went** to the supermarket*

(13) *I **strolled** to the supermarket.*

Clearly, *go/went* is not only more frequent than the verb *stroll*, but it is also more prototypical with regard to the meaning of movement and at the same time more general, while *stroll* has a more specific meaning ('walking slowly/ without hurry'). Generally, these prototypical and high token frequency exemplars in a construction are said to be path-breaking for learners (see e.g. Ellis et al. 2016: 34), which demonstrates that in terms of learning generalisations and categorisations of (complex) constructions, type and token frequency go hand in hand (Bybee 2008; Goldberg 2006a; Goldberg et al. 2004; Goldberg et al. 2007; Kay & Fillmore 1999; Taylor 2012; Tode 2012; Tomasello 2003). Usually, one type, such as *go* in the motion construction, takes the lion's share of all tokens of the respective construction (Goldberg et al. 2004). This can be attributed to the fact that language has a Zipfian distribution (see e.g. Piantadosi 2014 for more information), not only on a word-level but also, as exemplified above, with regard to verbs in a construction (Ellis 2012a; see e.g. Ellis et al. 2014b, 2014c; Ellis et al. 2016).

This phenomenon is also linked to the 'skewed frequency hypothesis' (Goldberg et al. 2004; Casenhiser & Goldberg 2005), which predicts that learning of verb-argument constructions is facilitated by presenting learners a skewed frequency distribution of verbs with one highly frequent and prototypical (or 'neutral' in the sense of general, such as *go* in the example above) type in the centre of the construction (see e.g. Casenhiser & Goldberg 2005; Madlener 2015, 2016). These high-frequency exemplars often serve as a 'cognitive anchor', i.e. as a "salient standard of comparison" (Goldberg 2006: 89). In other words, encountered utterances are compared and matched to already existing and highly entrenched exemplars (Bybee & Thompson 1997: 378), and can, therefore, help to acquire less frequent exemplars in this construction. In addition, as Goldberg (2006:99) states, constructions experienced with a high type variation are more broadly extended, and learners are "expected confidently to use a new verb in a familiar pattern when that new verb is relevantly close in meaning to verbs they have already heard used in the pattern".

The interaction of type and token frequency is also what makes learners go beyond entrenched item-based knowledge, and allows more abstract schemas to emerge and gain representational strength. The entrenchment of a schema can be shown if a learner uses it productively, i.e. s/he shows the capability to vary among the potential fillers of that slot.

Concretely, a learner would know that the ditransitive construction is not only restricted to the high-frequency verb *give* but can be also used with a variety of other verbs, such as *bring*, *show*, *tell*, *hand*, *write*, etc. These have, of course, different meanings but the more abstract meaning of transfer, or more specifically the meaning 'X causes Y to receive Z', licenses these verbs as appropriate candidates for this construction. The effect of a high type frequency is also what ultimately constitutes the extensibility of that pattern to new items (Madlener 2015: 65), and thus facilitates the creative use of language.

With increasing exposure, a learner can observe how the particular construction is varied, and knowledge is abstracted on the basis of previous utterances, which then help to interpret the new utterance. In other words, the more different tokens are experienced, the more likely it is that the similarities are recognised and united in a more abstract schema. This is, obviously, also important because learners of a second language constantly encounter new input and also have to compute new output. Novel linguistic items, thus, have to be comprehended innovatively on the grounds of an available inventory of constructions. The principle of a cognitive anchor is not only restricted to high-frequency exemplars but could also be applicable to schemas (see also Chapter 4 and 6). A highly entrenched schema, such as the one for the verb-argument structure construction, can help to comprehend and produce novel sentences (see e.g. Madlener 2015: 30) with the help of syntactic and semantic bootstrapping.

To give an example, a learner is likely to understand that the sentence *She gnubbed him the ball* involves a transfer since the more abstract meaning of the ditransitive construction is likely to be entrenched. This more abstract meaning derives from the verb *give*, as it is not only highly frequent but also semantically prototypical and thus shapes the more abstract meaning of this schema. More specifically, the learner can infer what the verb *gnubbed* approximately means based on the slot the verb occurs in, as well as the meaning associated with the schema S V NP_{theme} NP $PP_{beneficiary}$ and the other lexemes in the construction. While this is a plausible explanation of how novel items are processed, it is an empirical question which level of abstraction is activated and/or is used as a cognitive anchor in these cases. In other words, the processing of novel items can be based on different levels of abstractness with the more abstract schema (e.g. S $V_{transfer}$ NP_{theme} $NP_{beneficiary}$) at the one extreme and a more concrete/item-based entrenched exemplar (*I gave him the ball*) at the other.

Another fundamental effect tied to frequency and the acquisition of constructions is the contingency between form and meaning, which is an important part of associative learning (see e.g. Ellis 2006a; Rescorla 1968). The association between a particular form and a particular meaning or function entails the strength between a cue and an interpretation (Ellis & Wulff 2015a: 75). With regard to acquisition, this means that "[t]he more reliable the mapping between a cue and its outcome, the more readily we learn it" (Ellis et al. 2016: 79; see Ellis et al. 2014c). To exemplify this principle, consider an example presented by Ellis et al. (2015a: 169): wings are a better cue for a bird than eyes, since they are more distinct for a bird, while eyes are found with many different animals. Besides, since eyes and wings occur with the same frequency in the case of birds, this implies that "[r]aw frequency of occurrence [...] is less important than the contingency between cue and interpretation" (Ellis et al. 2016: 61), which is why it is worth investigating both.

On a linguistic level, there are different approaches to measure the contingency between form and function (see e.g. Ellis et al. 2016: 79–80; Gries & Ellis 2015). The simplest one according to Ellis et al. (2016: 79), is *faithfulness* (also known as 'reliance'; Schmid 2000; cf. Stefanowitsch & Gries 2003), which is "the proportion of tokens of total verb usage that appears in this particular construction". It is predicted that verbs that have a higher contingency for a specific construction are more readily accessed, more strongly associated with this construction, and learned more easily (Ellis et al. 2016: 79). Recent psycholinguistic studies such as verbal fluency or free association tasks on the L2 acquisition of verb-argument constructions (VACs) by Ellis et al. (2016; Ellis et al. 2014c; cf. Römer et al. 2014a) showed that the token frequency of the verb in a VAC, its faithfulness, and its semantic prototypicality for that VAC (all measures determined on the basis of native speaker usage data) are significant determinants of the verb responses by advanced learners of English. This demonstrates "that VACs are learned implicitly from usage and that language users have knowledge of these usage statistics […] " (Ellis et al. 2016: 284–285).

Taken together, it can be said that there are strong arguments that frequency has a strong impact on the mental organisation of the first or second language, in particular with regard to the phenomena of entrenchment, and schematisation. To conclude, in light of the arguments presented in this section, we can say that the learner's task in acquiring the target language can be defined as follows: The "[…] mastery of a language entails knowing

constructions at different levels of complexity and schematization, as well as knowledge of the probabilistic (as opposed to rigid) tendencies underlying their combination" (Ellis & Wulff 2015a: 410; see Ellis 2002: 144; Tomasello 2009). Thus, it is shown that the 'statistics' of language are just as important in learning an L2 as in learning the L1.

2.2.4.2 *(Un-)Learning (Over-)Generalisations*

In Section 2.2.1 we have seen that constructions in first language acquisition emerge in a bottom-up fashion (cf. Tomasello 2003). This raises the question whether L2 learners also start with item-based knowledge and gradually form more abstract schemas, or if they first form larger generalisations, refine them, and then restructure the schema (a top-down process, see e.g. Goldberg 2006; Roehr-Brackin 2014). In light of the points discussed above, it appears that second language acquisition proceeds in a bottom-up fashion as in L1 acquisition, who start with item-based exemplars, which are often unanalysed chunks, in the beginning, and then gradually form (more complex) abstractions (Tomasello 2003). Similarly, Ellis (2002: 170) proposes that second language acquisition proceeds from "formula, through low-scope pattern, to construction […]". At the initial stage of foreign language learning, learners are often taught highly frequent chunks or phrasal language/ constructions with fully fixed material (see e.g. Madlener 2015: 36), as for example, *How are you? What time is it?,* or with schemas that have some fixed material, *My name is X*, *I am from X*. These become more item-general and/or abstract when a richer variety of different lexical items occupying the slots of that construction is experienced (see e.g. Goldberg 2006b; Madlener 2016; Section 2.2.4.1 above). These high-frequency, fully transparent[24] formulaic sequences, which are easily entrenched by repetition, are especially helpful to build up an 'L2 stock'. Ellis and Wulff (2015a: 417) call these 'constructional seeds', which can provide the learners with a database of more complex units that go beyond the learner's current level of proficiency, and which can, similar as in L1 acquisition, benefit the development of the L2 (ibid.: 428). In more detail, chunking of units of different

[24] The term formulaic language also refers to, for instance, idioms and idiomatic phrases that do neither have to be necessarily frequent nor semantically transparent, as illustrated by the following idiomatic expressions: *kick the bucket*, *Don't look a gift horse in the mouth*, *pins and needles*, etc. For more information on formulaic language in L2 acquisition see e.g. Conklin & Schmitt (2012); Ellis (2012a); Myles & Cordier (2017), Wray (2013, 2017).

complexity can be a very efficient process, as "much information about how words go together, about recurrent neighbours, and about preferred contexts of specific words is available from the stored multiword chunks at later stages of comparison and analysis" (Madlener 2015: 39). In some cases, however, learners do not abstract over exemplars, and often remain conservative with the use of constructions that are highly entrenched. This is, for instance, the case with high-frequency, entrenched chunks; a high token frequency may prevent learners to abstract from these patterns, and thus they might not exceed item-based knowledge (Madlener 2015: 41).

On the other hand, with regard to some constructions, the acquisition is not clearly bottom-up. L2 learners, unlike children, have an elaborate construct-i-con for their L1, are cognitively more mature, have a fair amount of metalinguistic knowledge about their L1, and have often learned explicitly about the target language (cf. Section 2.2.3). This leads to the assumption that the processes of forming generalisations and abstracting over the input might take place faster in some cases, and are, therefore, rather top-down. Furthermore, these generalisations often do not include as much detail as recorded by a native speaker (Madlener 2015: 72) because of the more restricted input and experience with the target language. Thus, L2 learners, because of the restricted input among others, often generalise 'too broadly', and overgeneralise these schemas. When extending productive constructions to new items, the overuse or overgeneralisation of constructions can be "a temporary side effect of developing highly abstract generalized constructions" (Madlener 2015: 36).

In first language acquisition, overgeneralisations errors have been often found with low-frequency instantiations of verb-argument constructions (see e.g. Abbot-Smith & Tomasello 2006; Ambridge et al. 2014; Theakston 2004). For instance, in an experiment with children on the acquisition of verbs of fixed transitivity (exclusively intransitive or exclusively transitive), Brooks et al. (1999) have shown that children are less likely to overgeneralise highly frequent verbs in comparison to less frequent ones. More concretely, they were more likely to use verbs that exclusively occur in transitive constructions in intransitive constructions and vice versa with lower frequency verbs, such as *strike*, *remove* or *vanish* (ibid. 1333). These overgeneralisations are eventually resolved with increased exposure to the target language. More specifically, there are two basic hypotheses in language acquisition research that attempt to explain how overgeneralisation errors are unlearned. The

first one is the entrenchment hypothesis[25] (Braine & Brooks 1995), and the second one the so-called pre-emption hypothesis (Goldberg 1995, 2006a, 2016; Robenalt & Goldberg 2015b). The entrenchment hypothesis predicts that the

> repeated presentation of a verb (e.g., *fill),* regardless of construction (e.g., *The tub filled up; She filled the bowl; She filled out the form),* causes the learner to make a probabilistic inference that the use of this verb in non-attested constructions is unacceptable (e.g., **She filled the water into the tub)* (Ambridge et al. 2018: 2).[26]

Pre-emption, on the other hand, "is a communicative principle of roughly the form: if someone communicates to me using Form X, rather than Form Y, there was a reason for that choice related to the speaker's specific communicative intention" (Tomasello 2003: 300). In other words, an overgeneralisation error (e.g. **She explained him the problem.*) is not prevented by any use of the verb, but specifically by the verb in a construction that is a closely related paraphrase or, in other words, a competitor (e.g. *She explained the problem to him*) which is actually attested in the input (see Ambridge & Brandt 2013: 247).

The operationalisation of entrenchment entails the overall frequency of a verb in a given corpus (Ambridge et al. 2018: 3) and the prediction of "a negative correlation between the acceptability of a given error and *overall* verb frequency" (Ambridge & Brandt 2013: 248; italics in the original). For pre-emption this includes "the frequency of the verb in a specific competing construction" (Ambridge et al. 2018: 3), as e.g. *Daddy made the baby giggle* opposed to the unattested form **Daddy giggled the baby*, which has a frequency of zero (Ambridge et al. 2015a: 1). The frequency of the attested form is hypothesised to correlate negatively with the production of the non-target form (Ambridge & Brandt 2013: 248). Entrenchment and pre-emption, thus, can help children to unlearn overgeneralisation errors by providing indirect statistical evidence for what is not possible in the language (Goldberg 2006a: 102).

However, it has to be emphasised that pre-emption and entrenchment are often highly correlated, and difficult to disentangle because of collinearity (see e.g. Ambridge et al. 2014:

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[25] Note that the 'entrenchment hypothesis' is not the same as 'entrenchment' as explained in 2.1.3 or 2.2.4.1, and will not be used synonymously. Whenever referring to the entrenchment hypothesis, it will be named as this.

[26] In morphology, the pre-emption is also known as 'blocking', where one existing form blocks the use of an unattested form. Robenalt & Goldberg (2015a: 471) exemplify it as follows. "People learn to say *went* instead of *goed* because every time they might have expected to hear *goed*, they hear *went* instead".

238). Thus, it is a statistical problem to assess whether entrenchment effects are attested because of the verb's general frequency or its frequency in the construction under investigation, as these two measures often correlate (cf. Ambridge et al. 2018: 2; see also Chapter 4, Section 4.2.6 for more information on collinearity). Therefore, studies on these phenomena provide contradictory results in some cases (see Ambridge et al. 2018 for an analysis of the individual effects of pre-emption and entrenchment). Yet, it is clear that frequency plays a highly important role in the learning of generalisations, and in the unlearning of overgeneralisation errors in the acquisition of verb-argument structure constructions. For second language acquisition, it is harder to find supporting evidence for these two hypotheses concerning the retreatment of overgeneralisation errors (see e.g. Ambridge & Brandt 2013)[27]. After all, the exposure to the target language is often restricted and not rich enough to offer indirect negative evidence as in L1 acquisition. In addition, as highlighted above, generalisations can arise early in L2 acquisition and can stay negatively entrenched ('fossilised'). So even if there was negative indirect evidence, learners might not be attuned to it and proceed from their 'own version' of the construction. What can be shown, however, is when we find *no* overgeneralisation, and thus find support for positive evidence, as in the form of the effect of a high frequency on the target-like use of a construction (see e.g. Robenalt & Goldberg 2015b).

Another factor that comes into play in the retreat of overgeneralisation errors in acquisition is the gradual development of semantic classes. The occurrence of a verb in a particular construction is not arbitrary since it shares certain semantic features with the other verbs that are attested in that same construction (Ambridge et al. 2014: 219). And this semantic systematicity is said to be acquired by children, which then prevents or leads to the retreat from overgeneralisation errors (see Pinker's 1989 verb class hypothesis for more information). However, whether statistical information or semantics is more central in the retreat from these errors is an issue of debate. Tomasello (2003: 180), for instance, claims that entrenchment has an effect at an early stage of acquisition, while the building of semantic subclasses emerge later (for more information on the relative importance of

[27] There are, however, studies about linguistic generalisations with adult learners and novel constructions (e.g. Perek & Goldberg (2015, 2017).

statistics and semantics in the retreat of overgeneralisation errors, see Ambridge et al. 2011; Ambridge et al. 2012; Ambridge et al. 2014; Brooks & Tomasello 1999).

In sum, the discussed issues in this section indicate a need to understand whether second language acquisition is best described as a bottom-up or as a top-down process, and what kind of frequency-sensitive, semantic, and formal information learners rely on when making (over-)generalisations. In particular, it is not fully understood how more abstract schemas emerge and if and why more frequent abstract patterns are used in contexts where a less frequent schema would be the target-like one. In particular, very little is known about the restructuring of constructional schemas in relation to L2 acquisition proficiency. As mentioned above, it is plausible that many schemas are refined concerning their formal and functional features with sufficient practise and input, which also implies the emergence of subschemas. These issues will be, therefore, addressed in this thesis as well (see Chapter 6 in particular).

3 The Catenative Verb Construction

This chapter describes the most important formal and functional features of the catenative verb construction as the testbed phenomenon of the present thesis. It will also examine what characteristics point towards its classification as a form-meaning mapping in a constructionist sense. This is followed by a brief summary of previous studies on the first and second language acquisition of the construction in Section 3.2[28], with a special emphasis on studies that addressed the issue of frequency effects. In light of the key features of the construction, as well as the review of the literature, the leading research questions for this thesis will be presented in Section 3.3. The last section (Section 3.4) describes the corpus study with native speaker data, on which the frequency measures for the studies presented in Chapters 4-7 are based. More specifically, it will explain how the construction was classified and how frequencies were determined on the basis of the *British National Corpus* (Davies 2004-).

3.1 The Form and Meaning of the Catenative Verb Construction

While a variety of terms for the catenative verb construction and its elements exist, the terminology by Huddleston and Pullum (2002: 65; see Palmer 1988) will be adopted as a descriptive label in the present thesis. They apply the term 'catenative' not only to the non-finite complement clause but also to the verb[29] which licenses it, as well as to the whole construction (the matrix verb + its complement). The term 'catenative' derives from the Latin word *catena*, English 'chain', (Huddleston & Pullum 2005: 215). As illustrated in (1), the construction is recursive, in the sense that we can have a chain-like sequence of verbs (ibid.: 65):

[28] Parts of Section 3.1 and 3.2, as well as parts of Chapter 4 and 5, have been included in an article accepted for publication in *Cognitive Linguistics*. They were only minimally altered for the present thesis. The pertinent chapters and sections will be identified by a footnote.

[29] As Bruckmaier (2018: 211) points out, "[c]atenative verbs are only loosely defined in the major reference grammars of English, such as Quirk et al. (1985) or Biber et al. (1999)". For instance, there is no consensus of which verbs belong to the class of catenative verbs. Quirk et al. (1985: 146–147) have a more narrow definition of what constitutes the class of catenative verbs, while Huddleston and Pullum (2002) or Palmer (1988) classify most verbs that are followed by a *to*-infinitival or gerund-participial as catenative verbs. To give an example, the verbs *appear* and *seem* are classified as catenative verbs, but the verbs *hope* and *begin* are treated as main verbs with non-finite clauses (Quirk et al. 1985: 137). This differentiation is largely based on the function of the non-finite clause (see Quirk et al. 1985: 146–147; 1887 ff.), which is also an issue of debate (see below for more information).

(1) *She* ***seems*** *to want to stop trying to avoid meeting him.*

This thesis will, however, not deal with infrequent long chains like the one in (1), and will instead limit itself to the study of active voice catenative verbs followed by one catenative complement (see (2) and (3) for illustration)).

(2) *Lea* ***keeps*** *singing this silly song.*

(3) *Tom* ***refuses*** *to take a bath, even though he is covered in mud.*

(4) *I* ***expect*** *[her]$_{NP}$ to be on time for the meeting.*

(5) *The doctor* ***helped*** *[John]$_{NP}$ to recover from the trauma.*

(6) *The neighbour* ***helped*** *paint the house.*

(7) *The policeman* ***got*** *hit by a truck.*

Generally, the catenative verb construction can be classified on the basis of two dimensions. The first dimension deals with the complexity of the construction. There are two main types, namely the simple, and the complex catenative verb construction, which differ by an intervening element (usually a noun phrase) between matrix verb and catenative complement, as exemplified in (4) and (5). More specifically, in the simple construction, or as Egan (2008: 12) terms it, the 'same-subject' construction, the subject of the main clause is identical to the one in the catenative complement. In the case of the complex construction, the subject of the matrix and complement clause are two different entities ('different-subject' construction, ibid.). In (5) the subject of the main clause is *the doctor*, and in the catenative complement, it is *John*, who is helped to recover. By contrast, in (3) *Tom* is simultaneously the subject of the main and complement clause.

The second division concerns the form type of the catenative complement (Huddleston & Pullum 2002: 1225). The head of the catenative complement can either have the form of a gerund-participle[30], *to*-infinitive, bare infinitive as in (6), or past-participle (see (7)). Depending on the form of the verb in the complement clause, these clauses are termed '*to*-infinitival' or 'gerund-participial' complement (Huddleston & Pullum 2005: 204) or '*to*-inf.' and '-*ing*' complement for short. These complement forms in the simple/same-subject

[30]Following Huddleston and Pullum's (2002: 1220-1221) approach, gerunds (***Living*** *in Edinburgh is great.*) and present participles (*She is* ***singing***.) are summarised under the term 'gerund-participle' because gerunds and present participles underlie the same inflectional category in English.

construction, i.e. catenative verbs with a *to*-inf. or -*ing* complement, will be used as testbed phenomena in the present thesis.

In the case of verbs that are followed by a *to*-inf. clause, we can further differentiate between a *to*-inf. catenative complement and the so-called 'infinitive of purpose', where "the *to*-infinitive is totally independent of the preceding verb and it always expresses purpose" (Palmer 1988: 206). As demonstrated by (8a) and (8b), the *to*-infinitive clause has a resultative meaning (Quirk et al. 1985: 1189), or in other words, an "'in order to'-reading" (Gries & Wulff 2009: 170; see also Celce-Murcia & Larsen-Freeman 2016: 695–696):

(8)

a. *She* ***moved to have*** *more space for herself.*

b. *She* ***moved <u>in order to</u> have*** *more space for herself.*

These clauses occur after verbs that do not require any type of complement, i.e. verbs that can be used intransitively. The syntactic function of the *to*-inf. clause is, therefore, an adjunct in these cases. Since this type of clause differs from a *to*-inf. catenative complement semantically and syntactically, this construction will not be considered in the present thesis.

Concerning the functional status of the catenative complement, there are different perspectives. In some grammars, the catenative complement is considered to function as an object of the main verb (see e.g. Quirk et al. 1985: 1187–1191), especially in the case of the -*ing* complement (see e.g. Duffley 2000: 226–229 for different criteria to identify the objecthood of the -*ing* clause). With some attitude catenatives, such as *enjoy*, *hate* or *like*, an analysis of the subordinate clause as a direct object would be more appropriate than for other verbs (see Palmer 1988: 213). If we take a look at (9), which is taken from the *Corpus of Contemporary American English* (COCA, Davies 2008-), we find the catenative verb *enjoy*, which is followed by the nominal complement [*life*]. A paraphrase of this nominal complement with a catenative complement, such as [*living*] in (10), shows that we find a close resemblance between the propositions of the sentences:

(9) *We can happily enjoy [life]*$_{NP}$ *as we please.* (COCA, FIC: Alive, 2017)

(10) *We can happily enjoy [living]*$_{\text{-ing}}$ *as we please.*

(11) *We can happily enjoy [our new life]*$_{NP}$ *as we please.*

(12) $^{?}$*We can happily enjoy [our new living] as we please.*

(13) *We can happily enjoy [it]*$_{NP}$ *as we please.*

In addition, as illustrated in (13), we can pronominalise the complement by the pronoun *it* in the case of both sentences. However, on a formal level, if we treated the -*ing* complement as a noun, it would be able to occur with a determiner and adjective as in the case of *life* in (11). In principle, this is possible as demonstrated in (12), and also makes *living* more 'noun-like', but it is not the preferred or most frequent phrase structure for the -*ing* form to occur after a catenative verb[31]. Furthermore, even though a syntactic resemblance between these nominal and verbal complements exists, semantically we cannot speak of synonyms; the -*ing* complement after the catenative verb *enjoy*, for instance, describes an *action / a process* that takes place simultaneously as the action denoted by the matrix verb (Wierzbicka 1988: 60 ff.). By contrast, a noun, such as *life*, describes an *entity* that captures the state of being alive. Consequently, these two complement types reflect attributes that are distinct for verbs and nouns respectively.

In the case of *to*-infinitive clauses, the classification as objects in terms of their syntactic function is even less convincing (see Duffley 2000: 229). As shown in (14)-(16) (examples by Palmer 1988: 212), some catenative verbs that take a *to*-inf. clause (or -*ing* as in the case of *intend*) do not license a noun phrase as an object at all:

(14) *I hope to see you.* vs. **I hope a fine day.*
(15) *He decided to go.* vs. **He decided the plan*
(16) *I intend to come/coming.* vs. **I intended my arrival.*

As a consequence, a *to*-inf. complement cannot be equated with a noun phrase with object function but should rather be seen as an *internal complement* of the matrix verb (Huddleston & Pullum 2002). However, since it is problematic to draw the lines between the functions of these complement types, the complement following the catenative verb will be simply referred to as 'catenative complement' (see Huddleston & Pullum 2002: 65 & 1176-1177). In particular, with respect to the -*ing* catenative complement, this term captures the gradience

[31] To give an example from usage data, for the COCA query '[enjoy] the [vvg]', 6 hits are given, where the -*ing* form of the verb is preceded by the determiner *the* (and is not used as an adjective). Considering the size of the COCA (560 million words of text), this is a fairly small number.

between an 'object/nominal complement' and 'verbal complement' best. For a more detailed discussion of the syntactic status of the catenative complement see also Palmer (1974: 176–180).

Turning to the classification of the catenative verb and its complement as a construction from a constructionist point of view (e.g., Goldberg 1995, 2006a), it can be assumed that we find a symbolic form-meaning pairing between the matrix and the complement clause. As explained in Section 2.1, idiosyncrasy and non-compositionality were two key criteria to establish a form-meaning mapping. In the case of the catenative verb construction, we find idiosyncrasies especially with regard to the combination of the matrix verb and form of complement. As will be illustrated in Section 3.4, there are only a limited number of types that can occur in the matrix verb slot, which makes this slot comparably unproductive (see Section 2.1.3.2 for the effects of type frequency) in relation to e.g. the subject slot of this construction. Another idiosyncratic feature is found in "the outcome of the interaction between verb and complement [which] can be incompatible with the semantics of both the complement and the complement-taking verb" (de Smet & Cuyckens 2005: 4). In other words, the construction's meaning results from the elements it consists of and the symbolic link that connects their form and meaning rather than the meaning of the verb or complement alone (see also e.g. Perek 2015 for the classification of other verb-argument constructions).

Regarding its form, the more abstract schema for the catenative verb construction that is dealt with in this thesis is **S CV V (X)**, where S represents the subject of the sentence, CV the catenative verb, V the lexical verb of the complement and X a further optional or dependent element following the lexical verb of the complement clause (e.g. an object). Since there are differences in form and meaning, the catenative verb construction with a *to*-inf. and the construction with an *-ing* complement can be considered to instantiate subschemas[32] of the more abstract schema **S CV V (X)** as illustrated in Figure 5. The subschema with a *to*-inf. complement[33] will be referred to as '**target-*to***' construction and the

[32] Note that these subschemas themselves are distinct constructions as they constitute differences concerning form and meaning. Subschemas, according to Traugott and Trousdale (2013: 16-17), are a set of similarly behaving 'micro-constructions', i.e. constructions that are more lexically specified instantiations of a more abstract macro-construction.

[33] There are different approaches with regard to the treatment of *to* preceding the infinitive form. Huddleston and Pullum (2002), for example, treat it as a complementiser. In this thesis, it will be generally treated as a

verb as 'target-*to* verb' and the construction with an -*ing* complement as '**target-*ing***' accordingly.

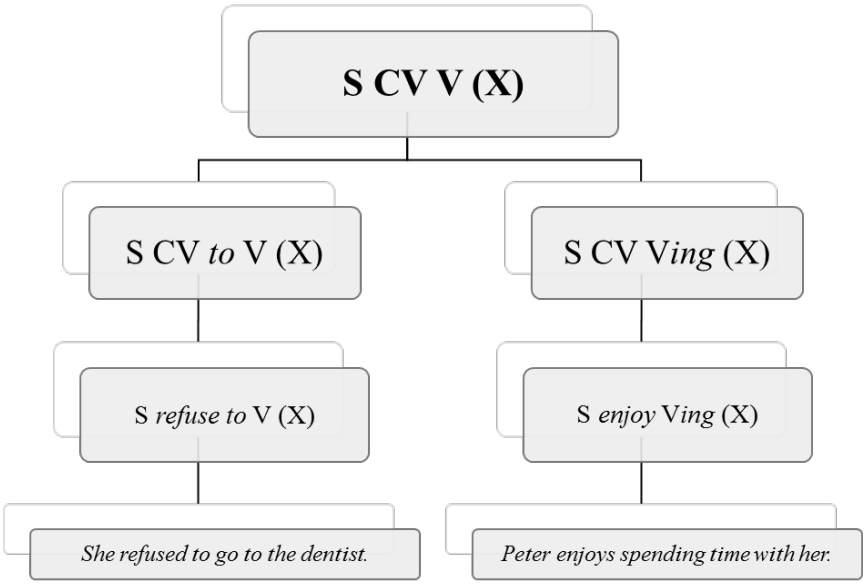

Figure 5 The Catenative Verb Construction: Exemplar to Schema

Furthermore, these subschemas take the form of low-scope patterns, such as S *refuse to* V (X), which are further instantiated by concrete exemplars as illustrated by the sentences on the lowest level in Figure 5.

However, establishing a narrowly defined one-to-one form-meaning mapping for these subschemas is more problematic since there is less consensus with regard to the correspondence between the form and the meaning of the non-finite complement clauses and their relation to the matrix verb (cf. e.g. de Smet & Cuyckens 2005; Duffley 2000). In many cases, the meaning difference between the two subschemas at hand is opaque, especially in the case of certain aspectual verbs that can occur in both subschemas such as the verb *start* (Biber et al. 1999: 758–759). In fact, several semantic interpretations have been proposed and as Egan (2008: 86) remarks, a larger disagreement concerning the classification of the -*ing* form in comparison to the *to*-infinitive exists, as shown in his summary of the different classifications:

meaningful part of the construction. For more information on its meaning and potential role in the L2 acquisition of the catenative verb construction, see also Chapter 6, Section 6.4.4.2).

Authors	*to infinitive*	*-ing*
Wood (1956)	specific	general
Dirven (1989)	a given occurrence	mere occurrence as such
Kiparsky & Kiparsky (1971)	non-factive	factive
Kempson & Quirk (1971)	non-fulfilment	fulfilment
Quirk *et al.* (1985)	potentiality	performance
Dixon (1991)	potentiality	activity extended in time
Conrad (1982)	non-referring	referring
Wierzbicka (1988)	vague futurity	vague simultaneity
Duffley (1992 + +)	future	interior
Verspoor (1997 + +)	less immediate	more immediate
Langacker (1990 + +)	holistic construal	immediate scope
Smith & Escobedo (2001)	conceptual distance	conceptual overlap

Figure 6 Different Semantic Classifications of -ing and to-inf. Complement (from Egan 2008: 86)

Regardless of these disagreements, there is a tendency to assume that the construction with the *-ing* complement expresses a certain generality and indicates a durative/simultaneous performance, in contrast to the construction with a *to*-inf. complement, which commonly denotes actuality/potentiality and non-durative aspect (see e.g. Quirk et al. 1985: 1192; Wierzbicka 1988). To illustrate this meaning difference, which is, however, often subtle in the catenative verb construction, consider the following example with the verb *remember*, which can occur with both complement types[34]:

(17)

a. *I remembered to take my pills.*

b. *I remembered taking my pills.*

In (17a) the act of remembering refers to one specific point in time (paraphrase: '*I didn't forget to take my pills*'), while in (17b) the process of taking the pills is more central and reflects a durative/simultaneous action ('*I recall how I was taking my pills*').

Despite these often opaque semantic differences between these two subschemas, there is often a correlation between the meaning of the catenative verb and the form of the catenative complement, especially in the case of verbs that take only one of the two possible non-finite

[34] Catenative verbs that can occur both with an *-ing* and a *to*-inf. complement, such as *love*, *try*, *remember* or *start* will be termed 'variable verbs' in this thesis (see also Section 3.4 and Chapter 7).

complements. Palmer (1988: 191-204), for instance, identifies several semantic subclasses of catenative verbs that are often distinct for one complement type. To give an example, verbs that express an attitude, such as *enjoy* or *dislike*, as well as verbs that denote the beginning or the ending of a process (also referred to as 'aspectual verbs', see e.g. Biber et al. 1999), as e.g. *quit* or *keep*, usually take an -*ing* complement. By contrast, verbs that refer to a future activity like *offer* or *decide* or express a certain effort or achievement, such as *struggle* or *seek*, are found to occur with a *to*-inf. complement. For more information on the different semantic subclasses and their role in the L2 acquisition of the catenative verb construction see Chapter 6.

3.2 The Acquisition of the Catenative Verb Construction

With respect to the acquisition of verbal complementation, Bourke (2007: 48) points out that it "remains a minefield for many ESL learners", especially with regard to non-finite complementation. Petrovitz (2001: 172) even claims that "[g]erunds and infinitives are among the most difficult topics to teach, and a continuing source of errors even among advanced learners". In particular, this can be attributed to the fact that the correspondence between form and meaning of catenative verb plus catenative complement is idiosyncratic, or seems even 'arbitrary' as Larsen-Freeman (2003: 55) states, and is hard to be described and taught by explicit rules (see Bourke 2007). Nevertheless, a commonly adopted approach in teaching this construction remains the treatment of the target-*ing* and target-*to* construction as structural variants of the same construction (Petrovitz 2001: 171), without differentiating between target-*ing* verbs, target-*to* verbs and verbs that show a variability with regard to the non-finite complement they can take (cf. ibid.). Even if the differentiation is made between the complementation preferences, the learners often do not get more than a list with verbs to memorise (Larsen-Freeman 2003: 55). Memorising lists, however, does not facilitate the complementation choice in actual language use, especially in light of the construction's idiosyncratic characteristics that are mainly grounded in the 'arbitrary' combination of matrix verb and non-finite complement type.

Despite these difficulties with non-finite complementation, there are surprisingly few empirical investigations of the (L2) acquisition of this construction to date. The literature so far suggests two important aspects in the L1 and L2 acquisition of non-finite complementation, which will be elaborated in the following. First, there seems to be

evidence that the *-ing* construction is less accurately or even later acquired than the *to-inf.* construction (e.g. Anderson 1983; Diessel 2004; Mazurkewich 1988; Schwartz & Causarano 2007). Gries and Wulff (2009: 166) state on this issue:

> The few contributions on this topic [the second language acquisition of non-finite complementation] tend to agree that the underlying reasons for learners' difficulties with this kind of complementation resides in the grammatical representation of the two constructions: while the *to*-construction is unmarked, the *ing*-construction is marked since it does not have a complementizer position, and the gerund is only licensed by the strict subcategorization frame of the matrix verb.

The subschema with target-*to* verbs can be considered to be less marked not only because of the explicit marking for subordination but also because it is more frequent than the subschema with an *-ing* complement in English. More specifically, it has a higher type and token frequency, i.e. there are more verbs that take a *to*-inf. complement which are also more frequently found in this construction in English in comparison to the construction with an *-ing* complement (see Section 3.4 for more information).

One early work, embedded in the discussion of the phenomenon of markedness, is by Mazurkewich (1988), who tested the production and perception of the catenative verb construction by Inuit learners of English (who have a very different complementation system in their L1) with different proficiency levels. The elicited data showed that the *to*-inf. complement had often been correctly assigned and judged with those verbs that only take a *to*-inf. complement while this was not the case with verbs that take an *-ing* complement (ibid.: 135). Especially learners who were classified as beginners often preferred the non-target like complement with verbs which can only take a *-ing* complement (e.g. **Suzie enjoys to cook for the family*; ibid.: 137).

According to Mazurkewich (1988: 137), these observations are best explained by markedness: as *to*-inf. complements are said to be less marked, she concludes that the construction with a *to*-inf. complement is acquired by Inuit learners of English before the one with an *-ing* complement and is therefore often overgeneralised and produced with verbs that only occur in the *-ing* construction (ibid.: 137). This order of acquisition has also been attested in a study with Spanish and Persian learners of English (Anderson 1983).

The findings of these studies with different groups of learners, whose L1s are not typologically related to English and have a different complementation system (i.e. Inuit,

Spanish, and Persian), further suggest that the L1 seems to play a subordinate role in explaining why the construction with a *to*-inf. complement is better acquired than the construction with an *-ing* complement. In addition, transfer is difficult to be disentangled from other factors (cf. Section 2.2.2). This is why transfer from the L1 will not be a focus of the studies presented in this thesis. For that reason, the L1 of the learners has been deliberately limited to one language, namely German. Although German is typologically related to English and has an equivalent to the target-*to* construction (*zu* + infinitive), which is prototypically built S V (*es*) (X) *zu* V (e.g. *Ich genieße es lange zu schlafen, Er übte, auf Englisch zu sprechen*), a (direct) transfer of this structure to English is not to be expected (such as **I enjoy it to sleep*). Instead, the English *to*-inf. construction is predicted to be better acquired primarily because of its less marked structure, i.e. more general processing-related factors (see e.g. Chapters 6 and 7).

The second highly relevant point that can be deduced from previous research is that there is evidence for frequency effects in the L1 and L2 acquisition of verbal complementation (Celce-Murcia & Larsen-Freeman 2016; Diessel 2004; Gries & Wulff 2009; Martinez-Garcia & Wulff 2012; Kidd et al. 2005, 2006, 2010). For example, in a study on the first language acquisition of complex sentences, Diessel (2004: 73) found a significant correlation between the token frequency of the matrix verb in the input provided by the children's caregiver and the age at which non-finite complements occurred first in the child's speech. Kidd et al. (2005) also found effects of frequency on the development of finite and non-finite clauses in L1 acquisition by means of experimental data. Verbs that had a high relative frequency in the respective complement construction (the frequency of the verb in the construction in relation to its overall use by children in the CHILDES corpus) were acquired better than low-frequency constructions (ibid.: 56). More specifically, the children produced more verbatim repetitions of sentences presented with high-frequency verbs and were more likely to correct ungrammatical sentences with high-frequency verbs than with low-frequency ones in a repetition task (ibid.).

To investigate the constructional status of the catenative verb construction for L2 learners of English, Gries & Wulff (2009) carried out a corpus study and two experimental studies with advanced German learners of English. Their data comprised verbs that occur with both complement types as well as verbs that clearly prefer one of the two types. The experimental studies showed that the complementation choice was mostly influenced by the verb's

preference for one complement pattern as determined by a so-called 'Distinctive Collexeme Analysis' (DCA; see Gries & Stefanowitsch 2004, see also Chapter 7, Section 7.1) based on native corpus data. For instance, if the verb was distinctive for the *to*-inf. complement, then the *to*-inf. complement was produced more often and rated better in the judgment task than with an *-ing* complement. Martinez-Garcia and Wulff (2012), who adopted a similar methodological approach as Gries and Wulff (2009), report a similar tendency in a learner corpus study with advanced German and Spanish learners of English. German learners often produced the catenative complement that was in line with the verb's preference for either complement type in native speaker data (also more often than the Spanish learners).

All in all, these studies strongly suggest that there is a relationship between the frequency and the target-like choice of the catenative complement by L1 and L2 learners of English. However, several aspects require further research. An important point, which has not been systematically addressed yet, but will be the focus of this thesis, is the question of which parts of the construction have to be frequent for L2 learners to acquire a native-like schema representation, since the studies reviewed above were restricted to one frequency measure only (such as one single value determined by a DCA or the matrix verb frequency) and therefore leave open the question whether it is the frequency of the matrix verb alone, the frequency of the verb together with the respective catenative complement or the frequency of the verb in the catenative verb construction in relation to its other uses (i.e. faithfulness to the construction) that shape the learners' knowledge of a construction. For instance, recent psycholinguistic studies on the L2 acquisition of verb-argument constructions (VACs) by Ellis et al. (2016a; Ellis et al. 2014c; cf. Römer et al. 2014a) showed that the token frequency of the verb in a VAC as well as its faithfulness to that VAC are significant determinants of the verb responses by learners of English, which demonstrates "that VACs are learned implicitly from usage and that language users have knowledge of these usage statistics […]" (ibid. Ellis et al. 2016a: 284–285). However, there are also several studies on the effects of frequency in L1 acquisition of constructions (Ambridge et al. 2011; Ambridge et al. 2012; Ambridge et al. 2014) that suggest that the frequency of the matrix verb is more relevant than the frequency with which the verb occurs in the respective construction for the retreat from overgeneralisation errors for children (Ambridge et al. 2015a: 6-7).

Furthermore, there is not enough evidence whether learners might have difficulties with a) less frequent catenative verb constructions and b) with verbs which exclusively take one of

the two non-finite complement types. In particular, the studies on L2 acquisition (Gries & Wulff 2009; Martinez-Garcia & Wulff 2012; Tízon-Couto 2014) focussed on verbs that have a relatively high frequency in the catenative verb construction and also included verbs that allow both complement types. However, to see whether there are any principled differences between the *to*-inf. and the -*ing* construction, this thesis will focus on those catenative verbs that occur exclusively with one of the two complement types (i.e. either with a *to*-inf. or -*ing* complement) and examine verbs that occur with different frequencies in this construction. These issues, as well as other research questions pertaining to the present thesis, will be discussed in the following section.

3.3 Research Questions

As has become evident from the preceding sections, the catenative verb construction is particularly suitable to investigate the effects of usage-related factors on the representation and organisation of L2 constructions because of two major reasons. First, it is a construction that constitutes an idiosyncratic form-meaning pairing between catenative verb and complement, which is commonly claimed to be difficult to be taught by explicit rules and might be best acquired implicitly (cf. Petrovitz 2001). Second, the catenative verb construction has two subschemas, the target-*ing* and target-*to* construction, which occur with different frequencies in English (see Section 3.4). The research questions that are addressed in a series of empirical studies on this construction in Chapters 4 to 7 will be presented as follows.

The first crucial point that is addressed empirically in the present thesis with respect to this construction is:

Do learners make a target-like choice of the catenative complement?

In Chapters 4-6 we will examine whether learners choose the target-like catenative complement after target-*ing* and target-*to* verbs. To be able to state what the 'target-like' complement is, we will first determine what the distinctive catenative complement for the catenative verbs under investigation is (i.e. either an -*ing* or *to*-inf. complement) on the basis of native speaker usage data from corpora (see Section 3.4). In the case of the variable verbs, which will be discussed in Chapter 7, we will not look at the target-likeness of the verb but

at the learners' choice between the *to*-inf. or the *-ing* complement as these verbs can occur with both of these complement types in English (e.g. *I started doing* X, *I started to do* X).

Then, in order to see what accounts for the learners' complement choices, different usage-related factors will be investigated. In all four studies presented in the present thesis (see below for an overview of the studies), the central factor that is examined is frequency, which leads to the following research question:

How does frequency affect the choice of the complement type?

Frequency is expected to shape the representation of constructions in L2 acquisition in diverse ways, as has been discussed in Chapter 2 (see Section 2.2). First and foremost, however, it is expected to promote the emergence of a target-like representation of a construction. However, in the case of idiosyncratic complex constructions, in particular, it is still not fully understood which component parts of linguistic input need to be experienced by learners to possibly strengthen and abstract knowledge and to form a target-like (i.e. native-like) schema representation of the respective construction. For this reason, the present thesis systematically examines which frequency-related information concerning the catenative verb and its occurrence in the catenative verb construction can predict the target-like complement choice of the complement.

The variables examined in the present thesis (Chapters 4-7) are narrowed down to three frequency measures. The first factor is a verb-centred measure, the matrix verb frequency (e.g., *enjoy*) or, in other words, the frequency with which the verb occurs overall in the English language (including all other types of complements it can take). The second measure is the token frequency of the verb in the catenative verb construction, i.e. the verb together with its target-like catenative complement. As explained in Chapter 2 (see Section 2.2.4.2), these two measures are also discussed in the context of the entrenchment hypothesis (Braine & Brooks 1995) and the pre-emption hypothesis (Goldberg 1995; 2006a), which make predictions for the retreat of overgeneralisation errors in the acquisition of verb-argument constructions. The third measure that will be examined is the relative frequency of the verb in the catenative verb construction ('faithfulness'; see Ellis et al. 2016). This measure, which has been identified as a reliable predictor for L2 knowledge of verb-argument constructions, provides information on the form-function contingency between verb and construction, i.e.

how often the verb occurs in the catenative verb construction in relation to its overall occurrence in the English language (see Section 2.2.4.1).

The selection of these particular frequency measures focussed on the catenative verb and complement type is also motivated by what is hypothesised to cause the most difficulties for the learners: the combination of the catenative verb with the target-like non-finite complement (S **CV + V*ing*/ *to* V** (X)). The matrix verb slot (CV) poses the highest numbers of constrains since the available verbal items, i.e. the different types, to fill the slot are very limited in the input in comparison with the items for the other slots in the construction (cf. Section 3.4). For instance, a high number of different items can be inserted into the subject (S) or lexical verb ('*to* **V**' or '**V***ing*') slot, which is why these slots are not expected to represent any challenge to the learners.

As constructions are not only shaped by frequency, another research question that is pursued in the present thesis is:

Which other usage-related factors influence the choice of the complement type?

Apart from the frequency of the catenative verb construction in native speaker data, we will also look at the impact of, for instance, the learners' proficiency (Chapters 5-7), as well as their individual linguistic backgrounds (see Chapter 6). Furthermore, as we will proceed from constructions, i.e. form-meaning mappings, as units in the L2, the meaning side of the catenative verb construction will also be addressed in Chapters 6 and 7. More specifically, the studies explore whether the different semantic subclasses of catenative verbs (see Section 3.1) yield differences in the complementation choice of the learners.

Furthermore, the studies presented in Chapters 4-7 examine the two subschemas of the catenative verb construction, which exhibit differences in form and meaning (see Section 3.1). This is why we will aim to provide an answer to the following question:

Are there principled differences in the L2 acquisition of the two subschemas of the catenative verb construction?

As the target-*to* construction has a higher type and token frequency (see Section 3.4) and is said to be generally less marked, it can be hypothesised that it is better acquired than the target-*ing* construction, as is also indicated by previous studies on this construction (see

Section 3.2). Therefore, we can expect to find more target-like complement choices after target-*to* than after target-*ing* verbs. In the case of the so-called 'variable verbs' examined in Chapter 7, i.e. verbs that allow both complement types, it can be assumed that the learners will use these verbs more often with a *to*-inf. complement than with an -*ing* complement.

On a theoretical level, all of the aspects mentioned so far will be brought together in order to yield new insights into some of the issues raised in Chapter 2. For instance, it was pointed out that much uncertainty exists about the mental organisation of constructions, e.g. with regard to their entrenchment, schematisation, the balance between item-based and item-general knowledge, etc., and ultimately the role of usage in all this – and these matters are not even fully understood for monolinguals. So on the one hand, we know little about constructional learning in general, and on the other hand, more empirical research on the emergence and mental representation of constructions in L2 acquisition is needed. This is why the present thesis (see Chapter 4 and 6 in particular) will address the following question:

Do we find evidence for item-based and schematic knowledge of the catenative verb construction?

By investigating verbs that occur with different frequencies and association strengths in the catenative verb construction, we can explore whether frequency can predict the entrenchment of exemplars (or more specifically: low-scope patterns such as S *manage to* V X). In this context, it has to be pointed out that 'entrenchment' will not be used in a narrow sense, i.e. to refer to the effects of token frequency only, but also to refer to the more general cognitive process of (increase in) representational strength of a construction on different levels of abstraction (see Schmid 2017a; see also Sections 2.1.3 and 2.2.4). One effect associated with the strength of representation is that "parts of highly entrenched entities are supposed to be combined with greater ease and fluidity than those of less entrenched strings" (Blumenthal-Dramé 2012: 187). Thus, in the case of the catenative verb construction, it will be predicted that high-frequency exemplars are more likely to be produced with a target-like catenative complement than less frequent ones, which can be seen as a sign of entrenched item-based knowledge.

Furthermore, it is investigated whether learners 'exceed' item-based knowledge of high-frequency exemplars and also form schematic knowledge of the catenative verb construction, i.e. for the target-*ing* and target-*to* construction. As explained in Chapter 2,

schematisation is a cognitive process that involves a taxonomic generalisation across related exemplars (Traugott & Trousdale 2013: 13) and results in the representation of an abstract schema for a certain construction. In order to recognise the similarities between exemplars and to make possible schematic knowledge arise, a construction has to be witnessed with different types and tokens (see Sections 2.1.3.2 and 2.2.4.1). Schematic knowledge for the subschemas of the catenative verb construction can be demonstrated whenever a learner successfully prefers the target-like catenative complement also with a low-frequency/unfamiliar verb. In other words, if a learner recognises similarities between the construction and the low-frequency exemplar and matches schema and item, i.e. uses this pattern productively.

As mentioned above, the proficiency of the learner is another crucial factor that we will consider. This will allow us to explore how the mental representation of the catenative verb construction changes in the L2 acquisition process. Thus, the following question will be asked:

How does the constructional knowledge of the catenative verb construction change with increasing L2 proficiency?

One fundamental question that will be addressed is whether learners' representation of the construction becomes more native-like with increasing proficiency. At the same time, it will be interesting to see how learners 'build' constructional knowledge, i.e. which pieces of form-, meaning-, and usage-related information become relevant for learning a construction in a target-like way. This issue is also related to the question of whether the L2 acquisition of constructions is best described as a bottom-up or top-down process as pointed out in Chapter 2 (see Section 2.2.4.3). How the generalisations of the catenative verb construction emerge and change will be examined in Chapter 6, which presents a large-sale sentence completion task with learners of different proficiency levels.

Another aspect related to the proficiency of the learner is the choice of the catenative complement over other types of complements, which will be addressed in Chapter 5. Catenative verbs can, of course, take other types and forms of complements, such noun phrases (e.g. *He avoids* [*people*]$_{NP}$) or a finite clause (e.g. *The committee decided* [*that he should be the new head of department*] $_{Clfinite}$). Therefore, it will be interesting to see whether low-proficiency learners will prefer less marked/more frequent complement types when they

have the choice and produce catenative complements (i.e. the catenative verb construction) more often with rising proficiency.

Having presented the central research questions that will be addressed in the empirical part of this thesis, a brief overview of the specific research objectives of each study will now be presented. As mentioned above, all four empirical studies will systematically investigate the effects of frequency as well as the differences between the two subschemas of the catenative verb construction.

Chapter 4 presents two complementary experimental studies with advanced learners that focus on the production and perception of the catenative verb construction. The aims are to determine which frequency-related factors predict a target-like complement choice and to address the differences between the target-*to* and target-*ing* construction regarding their entrenchment and schematisation. In Chapter 5, we will look at more naturalistic production data from the *EFCAMDAT* corpus (Geertzen et al. 2013) to specifically investigate whether the use of the verb in the catenative verb construction increases with rising proficiency in comparison to other constructions it can occur in. Chapter 6 describes a large-scale production study with a heterogeneous group of learners of different proficiency levels (A2-C2). It will be examined which form-, meaning- and experience-related factors have an influence on how learners 'build' constructions in the course of learning. Likewise, it will address the questions concerning the directionality of generalisations (L2 acquisition as a 'bottom-up' and/or 'top-down' process). Chapter 7 presents data on so-called 'variable verbs', i.e. catenative verbs that can take an -*ing* as well as a *to*-inf. complement (e.g. *like*, *try*, *hate*), which were collected in the same experimental study as in Chapter 6. We will explore whether frequency and other usage-related factors can also account for the choice between the two catenative complement types. Before moving to the empirical studies with the L2 learners of English, the next section prepares the ground for those studies by examining the catenative verb construction in native speaker data.

3.4 The Catenative Verb Construction in Native Speaker Usage Data

As the term suggests, usage-based approaches to language base their study of the language system on actual *usage* data rather than introspection (Barðdal & Gildea 2015: 32). The availability of large electronic sets of naturalistic data as given in corpora, i.e. large, balanced text collections, has facilitated the retrieval of information concerning the distributional patterns found in language considerably. Schmid (2017a: 14) highlights the central advantages of using corpora for the study of language as follows:

> [F]requencies of occurrence in large, balanced corpora not only can serve as an approximation of the kind of repetitiveness that the average speaker produces and is typically exposed to but can actually provide clues as to the potential effects of this exposure on the cognitive systems of individual speakers.

Corpora cannot only provide information on the representation of the L1 but can also be used to determine the probability with which constructions are encountered by 2 learners. Evidence for the validity of predicting the linguistic behaviour of learners on the basis of distributions found in native speaker corpora comes from a number of different usage-based studies on L2 acquisition (e.g. Ellis et al. 2013; Ellis et al. 2016; Eskildsen 2008; Ellis & Ferreira-Junior 2009a; Gries & Wulff 2005; Goldberg 2016; O'Donnell et al. 2013; Robenalt & Goldberg 2015b; Römer 2019a; Römer et al. 2014b just to name some studies).

Accordingly, empirical evidence from corpus data will be sought in the present study to investigate the distribution of the catenative verb construction in native speaker data. More specifically, the *British National Corpus* (BNC, The British National Corpus, version 3 (BNC XML Edition) 2007)) was used for the classification of catenative verbs as either target-*to* or target-*ing*, as well as for the quantification of the frequencies with which these verbs occur both in general and in particular in the catenative verb construction in English[35]. The BNC is an online accessible balanced corpus, which contains 100 million words of British English texts from different genres (e.g. newspaper, fiction, magazine, etc.). 90% are written and 10% spoken language. The motivation to use the BNC was that British English is a standard variety in German foreign language education and is often used as a standard in classroom material (cf. e.g. Harger & Schwarz 2010).

[35] For the production task in Chapter 6, the frequencies were extracted from the *Corpus of Contemporary American English* (Davies 2008-); see Section 6.3.2.2 for more information on this corpus.

As a starting point, a list with different catenative verbs was compiled, which served as a basis for a systematic choice of verbs for the studies that will be presented in the following chapters. The list is based on verbs discussed in *The Cambridge Grammar of the English Language* (Huddleston & Pullum 2002) as well as in Egan (2008). As mentioned in Section 3.1, the focus was on verbs that occur predominantly with one complement type (see below for more information) in the simple catenative verb construction and only optionally in the complex construction (see Section 3.1 for more information).

Another important step was to divide the verbs into three groups: 1) verbs that are distinct for the *to*-infinitival complement (target-*to* verbs), 2) verbs that are distinct for the gerund-participial (-*ing*) complement (target-*ing* verbs) and 3) verbs that occur with both complement types in the simple catenative verb construction (henceforth referred to as 'variable verbs'). In order to determine the distinctiveness of each verb for one catenative complement type, it was first examined how many times the verb occurs with an -*ing* complement and how many times with a *to*-infinitive complement in the BNC (see below for information on the exact queries), even if it had been described as licensing one of the two complement types only in the literature (e.g. Huddleston & Pullum 2002). The verb was said to be target-like with one complement type (i.e. *to*-inf. or -*ing* complement) and, thus classified as being a target-*to* or a target-*ing* verb if it occurred in approx. 99% of the cases with the respective complement type in the BNC. The final list contains 61 different verbs that were classified as target-*ing* verbs and 114 as target-*to* verbs (see Figure 7 below). Furthermore, we find 32 verbs that occur with both complement types (for more information see Chapter 7). All verbs and frequency measures are provided in Appendix A.

Thus, the following frequencies were of primary relevance for the aims of the present thesis:

- the token (raw) frequency of the catenative verb itself (**CV** frequency): **'[CV]'**
- the token (raw) frequency of the construction as a whole, i.e. the catenative verb together with its target-like complement type (**CV**+**Compl.** frequency): '[**CV to V**]'/ '[**CV Ving**]'

The matrix verb frequency (i.e. the frequency of the catenative verb in all of its occurrences with or without a complement), as well as its occurrence in the catenative verb construction, i.e. the frequency with which the verbs occur together with their distinct complement type,

were quantified on the basis of the BNC. Table 1 provides an overview of the annotation for the queries:

Table 1 Queries BNC

Verb Group	**Search String BNC**	**Example**
target-*to* verbs	[verb].([v*]) to [v*] [verb] to [r*] [v*] [verb] [r*] to [v*][36] [verb] not to [v*]	[refuse] to [v*] *decide to actually* V *decided also to* V *decided not to* V
target-*ing* verbs	[verb] *ing	[enjoy] *ing
variable verbs	[verb].([v*][37]) to [v*] [verb] *ing	[start].[v*] to [v*] [start].[v*] *ing

In the interface used (Davies 2004-), the brackets specify that all forms of the verb, inflected as well as non-inflected, are given. If the verb can also be a noun, such as *start*, then the following tag was added: [*start*].[v*][38]. As there was a recall problem for the target-*ing* verbs, namely a considerable number of -*ing* complements were tagged as nouns in the BNC, the collocates of the target-*ing* verbs that occurred to the right of the verb and ended with **ing* were searched for. However, this yielded not only the -*ing* catenative complement but also irrelevant collocates, such as adjectives ending in -*ing*. This precision problem was dealt with manually and all non-verbal forms were excluded from the frequency count.

Finally, the matrix verb and catenative verb construction frequency for each verb were used to calculate the third frequency measure that will be examined in the present thesis: the so-called 'faithfulness' of the verb for the catenative verb construction (cf. Section 3.3). The simplest method to determine the degree of faithfulness to a target construction is to determine "the proportion of tokens of total verb usage that appears in this particular construction." (Ellis et al. 2016: 79; see also Schmid 2000; Stefanowitsch & Gries 2003). Thus, for the verbs on the list, it was calculated by dividing the raw frequency of the verb in the catenative verb construction by the verb's total number of occurrences (i.e. the matrix

[36] This search strings with [r*], which stand for an adverb, also returned non-finite *wh*- complement clauses (e.g. And most of us have **forgotten how to listen** to those everyday sounds which form part of our lives (AYK, W_misc)). These were excluded manually as they constitute a different construction.
[37] The query 'to [v*]' stands for the particle *to* followed by any verb form; it would have been also possible to use 'to [vvi]', which is the tag for the infinitive form of the verb, but this tag yields fewer hits. Random samples were checked manually to see whether the tag 'to [v*]' reliably gives hits that are *to*-infinitives.
[38] Tagging errors cannot be accounted for (e.g. if the verb was actually a *noun* or any other word but was tagged as a verb).

verb frequency) in the BNC. This value provides an important piece of information, as it sets the catenative verb construction and matrix verb frequency into relation and shows how distinct the verb is for this construction. Faithfulness does not only provide information with respect to the associational strength between a verb and the catenative verb construction but also allows for a more differentiated view on the frequency of the verb in the target construction. For instance, it can be the case that the raw catenative verb construction frequency (token frequency) is relatively low in comparison to other verbs, but that the faithfulness is high, which means that it is distinct for the catenative verb construction. An example of such a case would be the target-*to* verb *strive* which has a very high faithfulness of 0.68, which means that 68% of all of its uses are in the catenative verb construction. In contrast to that, it has a relatively low number of occurrences in general (986, i.e. 9.86 per 1 million words in the BNC) as well in the catenative verb construction (667/6.67 per 1 million words.). As this example shows, it is advisable not to examine the raw token frequency of a construction alone (see Ellis et al. 2016: 61).

Taken together, we can now make the following observations based on the study of the verbs' distribution overall as well as in the catenative verb construction in the BNC. First, the corpus study shows that target-*to* construction has not only a higher type but also a higher token frequency than the target-*ing* construction:

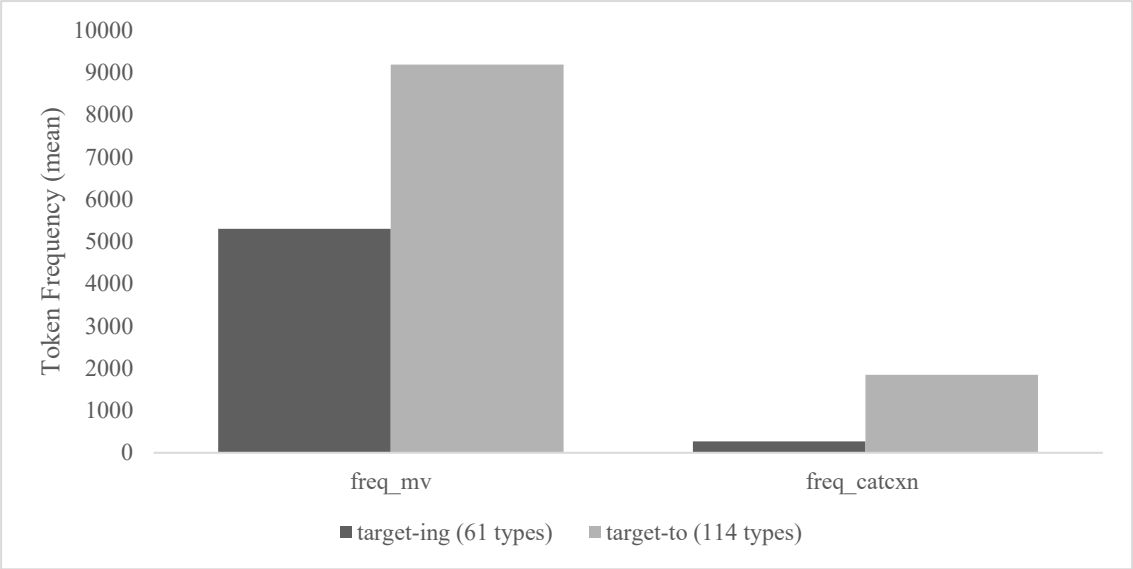

Figure 7 Type and Token Frequency of Target-to and Target-ing Verbs in the BNC

Altogether, the 61 different verbs that were classified as target-*ing* verbs have a mean token frequency in the catenative verb construction (freq_catcxn) of 269.33. In comparison, the 114 target-*to* types occur 1849.47 times in the catenative verb construction. Furthermore, we can also see that the overall frequency (freq_mv) of the target-*to* verbs is also considerably higher with 9189.60 in comparison to 5298.79 occurrences of target-*ing* verbs in the BNC. The calculation of the faithfulness to the catenative verb construction based on these measures reflects a discrepancy between these two constructions as well: while the mean faithfulness of the target-*to* verbs is 0.20, we find a considerably lower faithfulness of 0.05 in the case of the target-*ing* verbs.

In the case of the 32 variable verbs, i.e. the verbs that can take a *to*-inf. and -*ing* complement, the frequency with which these verbs occur in the BNC is much higher in comparison to the target-*ing* and target-*to* verbs described above with 27525.03 tokens on average (see Appendix A, Table 3 for all frequencies). Also, these verbs occur considerably more often with a *to*-inf. (5045.06 tokens) than with an -*ing* complement (749.38 tokens). This is also reflected in their faithfulness to the respective construction: while these verbs have a faithfulness of 0.19 on average to the *to*-inf. construction, their faithfulness to the -*ing* construction is lower with a value of 0.04.

4 Shaping Constructions: Evidence for Frequency Effects on the L2 Acquisition of the Catenative Verb Construction

4.1 Introduction and Research Questions

As pointed out in 3.3, one crucial question that arises is to what extent frequency affects a target-like representation of the catenative verb construction. To explore this issue, this chapter[39] will present two complementary experimental studies with advanced German learners of English (B2/C1 according to the CEFR, Council of Europe 2009). The first experimental study is a sentence completion task to test the production of the catenative verb construction and the second study is an acceptability judgment task with the purpose of testing its perception. The materials used in both studies comprise verbs that are distinct for one of the two types of catenative complements (target-*ing* and target-*to* verbs) and which occur with different frequencies in the *British National Corpus* (BNC, Davies 2004-).

In particular, two primary research questions are addressed by the studies. The first question is to what extent learners choose the target-like non-finite complement type and whether this can be explained by frequency. The factors examined here are narrowed down to the three frequency measures which are predicted to have a substantial impact on a target-like choice of the catenative complement (see Section 3.3 for more information): the matrix verb frequency (i.e. the overall token frequency of the catenative verb), the token frequency of the verb in the catenative verb construction and the verb's faithfulness to the construction.

The second research question asks whether there are differences between target-*ing* and target-*to* verbs in the choice of the target-like complement type. As highlighted in Chapter 3, the question is motivated by the fact that the construction with a *to*-inf. complement has a higher type and token frequency and is also found to be learned earlier and more accurately than the construction with an -*ing* complement in English.

On a theoretical level, the aims of this study are as follows. On the one hand, it will be investigated if L2 learners possess constructional knowledge of the catenative verb

[39] Parts of this chapter have been accepted for publication in *Cognitive Linguistics* and have been only altered minimally.

construction and if so, if frequency can predict a) the target-like entrenchment of high-frequency exemplars (item-based knowledge) and b) the representation of more abstract schemas. On the other hand, it is aimed to find out whether learners possess more schematic knowledge of both catenative verb constructions. Since the target-*to* construction is more frequent in terms of type and token frequency, it is hypothesised that learners have a more abstract representation for this construction, whereas the learners' command of the target-*ing* construction will only include item-based knowledge of highly frequent exemplars. Therefore, it is expected that this schema functions as a default pattern, a 'cognitive anchor' (Goldberg 2006: 89), for unfamiliar or infrequent target-*ing* verbs.

The following section provides information on the methodology of the studies. Section 4.3 presents the results of the sentence completion task and the acceptability rating task respectively as well as a discussion of the findings in light of the research questions. Finally, a conclusion will be drawn (Section 4.4).

4.2 Methodology[40]

4.2.1 Verb Selection

The sentence completion and the acceptability rating study were based on 12 catenative verbs (6 target-*ing* and 6 target-*to* verbs, see Table 2 below) that were clearly distinct for one non-finite complement type (see Section 3.4). An additional constraint on the verb selection was that the verbs should not take a finite clause as a complement (such as *promise* or *deny*) to prevent learners to produce a finite clause in the production task instead of a non-finite one. Furthermore, verbs were chosen that occur with different frequencies in the catenative verb construction. For a systematic choice, the verbs from the list introduced in Section 3.4 (see also Appendix A) were divided into 'high frequency', 'medium frequency' and 'low frequency' constructions on the basis of their token frequency in the catenative verb construction. For each frequency level, two verbs were selected that had an approximately similar frequency in the catenative verb construction. Note, however, that the target-*to* and target-*ing* verbs do not correspond in their frequencies since target-*ing* verbs have a lower

[40] The data were collected as a part of my unpublished MA thesis (Azazil (2015).

token frequency overall in the catenative verb construction than the target-*to* verbs. Consequently, 'high-frequency' verbs in the target-*to* verb group are not equally frequent as the 'high-frequency' verbs in the target-*ing* verb group (see Table 2); the frequency ranges are always relative to the frequency for the individual group.

The final selection of catenative verbs, the corresponding frequencies, including their overall frequency ('Frequency MV') and faithfulness to the construction are presented in Table 2.

Table 2 Verb Selection and BNC Frequencies

GROUP	**Frequency band (frequency of MV+Compl)**	**Catenative Verb**	**Frequency MV+Compl** (relative freq./1 million[41])	**Frequency CV** (relative freq./1 million)	**Faith-fulness**
target-to	high frequency	***refuse***	65.55	104.58	0.6268
		manage	60.22	126.23	0.4771
	medium frequency	***serve***	13.97	155.45	0.0899
		offer	13.46	274.32	0.0491
	low frequency	***proceed***	7.21	42.02	0.1716
		hesitate	3.95	19.99	0.1976
target-ing	high frequency	***avoid***	21.12	116.88	0.1807
		enjoy	17.09	140.46	0.1217
	medium frequency	***recall***	2.57	54.33	0.0473
		practice	1.86	28.22	0.0659
	low frequency	***postpone***	0.45	10.38	0.0434
		celebrate	0.26	33.92	0.0077

The frequencies presented in Table 2 do not only show that the target-*ing* verbs have a lower frequency in the catenative verb construction than the target-*to* verbs, but also that the selected verbs have a Zipf-like token frequency distribution in the construction in both groups (cf. e.g. Ellis et al. 2014b, 2014c; Ellis et al. 2016). There is one type that exhibits the highest number of tokens (e.g. *refuse* in the target-*to* group) and for all other verbs, we find a lower frequency.

[41] Normalised frequency per 1 million words = raw frequency * (1 million/size of corpus), size of BNC = 100 million word tokens.

4.2.2 Test Items

The stimuli for the tasks consisted of 24 test sentences overall (12 containing target-*to* verbs and 12 containing target-*ing* verbs). For each verb, one test sentence was created or adopted from the BNC. To control for different sources of variability, the structure of the test sentences was kept constant with respect to its form (NP CV V NP PP) and the length of the constituents. Additionally, 35 filler items were included in the two tasks, consisting of sentences with seven highly frequent matrix verbs. These verbs were: *be*, *buy*, *eat*, *get*, *open*, *sleep* and *walk*. For each verb, five simple sentences were created where the target form of the verb was either simple past, simple present or *will*-future.

4.2.3 Procedure

4.2.3.1 *Sentence Completion Task*

To collect data on the production of the catenative verb construction, a paper-based test was conducted in which the participants had to complete sentences with given constituents. To do so, the test items were arranged as follows: a gap was inserted after the catenative verb which was followed by the randomised components of the complement in brackets. This procedure was used in order to shift the focus from the non-finite form of the lexical verb to the word order of the complement clause. The words of noun phrases and prepositional phrases of the complement were presented as units:

(1) The Royals managed_____ **(without her help, enough publicity, get)**.

(2) My dog_____ **(every day, sleep, 20 hours)**.

In the case of the filler items, the subject of the sentence was followed by a gap as illustrated in (2). Test sentences and filler items were randomised and numbered. The learners' task was to complete the sentence with the words given in the brackets. The instruction was given in German ("Aufgabe: Vervollständige die Sätze mit den Wörtern, die in der Klammer stehen"), without further information on the aims of the task. The complete sentence completion task is provided in Appendix B I.

4.2.3.2 *Acceptability Rating Task*

In order to gain insight into the metalinguistic judgement of the acceptability of the catenative verb construction, the same participants were asked to judge test sentences on a four-dimensional scale in their original, target-like form as well as in a modified, non-target-like form in a paper-based test one week after the sentence completion task. As stated above, the same test and filler items as in the sentence completion task were used for this study in order to make comparisons possible. However, one of the two test sentences for each catenative verb was changed into a non-target-like form by changing the type of non-finite complement (see Mazurkewich 1988: 132). For example, in one of the two test sentences, the complement type was changed into an *-ing* complement with verbs that can take only a *to*-inf. complement. For the verbs that only take *-ing* complement the non-target-like sentence comprised a *to*-inf. complement, as exemplified in (3) and (4):

(3) *The father refused to accept the plans about their holidays.*
(4) **The government refused accepting our arguments against this law.*

The acceptability rating task also contained 35 filler items from the sentence completion task, which were adjusted accordingly so approx. half of them contained non-target-like features, e.g. concerning the tense of the verb. The participants' task was to judge the sentences on a four-point scale ranging from 4 'clearly correct' to 1 'clearly incorrect. Instructions were given in German (see Appendix B II. for the complete acceptability rating task).

4.2.4 Participants

The participants were a homogeneous group of 25 undergraduate students of English who were enrolled in a teacher training programme at the University of Siegen, Germany. The students were advanced learners of English with a proficiency level of at least B2/C1. The proficiency was not tested in the context of the studies since each student of English at the University of Siegen needs to take the Oxford Online Placement Test (OOPT, Oxford University Press 2018) at the beginning of their studies to prove that they have a level of at least B2. Students who had an L1 other than German were excluded from the analysis to keep the L1 constant. The final number of participants was 22. The average age of the students was 22.14 years (*SD* = 3.3) and most participants were in their second year of their

Bachelor's. On average, the participants had been learning English for 11.75 years (*SD* = 2.9) at school and university.

The paper-based tasks were completed during a session of a linguistics seminar. The learners had approximately 45 minutes to complete each task. Before the experiment, we made sure that none of the participants had dealt with the catenative construction in class. Participation was voluntary and there was no monetary compensation.

4.2.5 Data Coding, Statistical Analysis and the Issue of Multicollinearity

For each experiment, the outcome was coded separately. The data obtained by the sentence completion task was coded as follows: the complement produced was determined and coded for its type, which was either 'to-inf', 'ing', 'bare inf' (bare infinitivals as in *The pilot offered take the visitors on a tour*) or 'other' (e.g., noun phrases, past tense form of the lexical verb in the complement, etc.). These complement types were then further classified as being either target- or non-target-like (binary variable) depending on the verb. To give an example, a *to*-inf. complement after the target-*ing* verb *avoid* or a bare inf. after the target-*to* verb constituted non-target-like complements:

(5) **Some authors avoided **to use** difficult words in their essays.*
(6) **Some refugees managed **get** a seat on the plane.*

In the acceptability judgement task, the four different rating categories were coded as numbers ranging from 1 ('clearly incorrect') to 4 ('clearly correct').

In order to assess which frequency-related factors predict the preference for a target-like catenative complement in the production task, a mixed-effects regression model (Baayen 2008) was fitted to analyse the data. The model was built with R (R. Core Team 2017, version 3.4.2) and the R package rms (Harrell 2017, Version 5.1-1). R^2 values were implemented by the R MuMIn package (Barton 2018, version 1.40.4.) and effect plots were created using the R *effects* package (Fox 2003). The dependent variable in the sentence

completion task was the binary categorical variable 'target-likeness' (non-target-like vs target-like catenative complement) and the following predictor variables[42]:

- **freq_mv**: token frequency of the catenative verb overall (log10)
- **freq_catcxn:** token frequency of the catenative verb construction (log10)
- **faithfulness**: freq_catcxn/freq_mv
- **expected_cxn**: the expected catenative complement (-*ing* vs. *to*-inf.)

Since frequencies (raw counts) were not normally distributed, the frequency of the matrix verb, as well as the frequency of the catenative verb, was logarithmised. Subject and test item were specified as random intercepts.

One important point that had to be addressed with regard to the fixed effects was the problem of *multicollinearity*[43]. Frequency measures are often highly correlated, which can make it difficult to determine the individual contribution in predicting the dependent variable (see Baayen 2008: 37), or more specifically the cause of entrenchment, as discussed in the context of frequency effects in L1 acquisition (see e.g. Ambridge et al. 2018: 2; Ambridge et al. 2014: 238). And indeed, a correlation can be found between the frequency measures of interest for the present thesis. As shown in the matrix plot of the correlations between the frequency factors (see Figure 8), the highest correlation can be found between the matrix verb frequency (log_mv) and the frequency of the verb in the catenative verb construction (log_catcxn) with a positive correlation of $r = 0.77$ ($df = 519$, $p < 0.001$). There is also a high positive correlation between the faithfulness and log_catcxn ($r = 0.73$, $df = 519$, $p < 0.001$). The smallest correlation can be found between log_mv and faithfulness with $r = 0.28$ ($df = 519$, $p < 0.001$).

[42] Priming effects were also tested and accounted for in a separate model; it was examined whether the previously produced or rated complement type predicted a production of an -*ing* or *to*-inf. complement. No significant effects were found.

[43] I would like to thank Dr Petar Milin for his helpful suggestions on how to address collinearity in the present study.

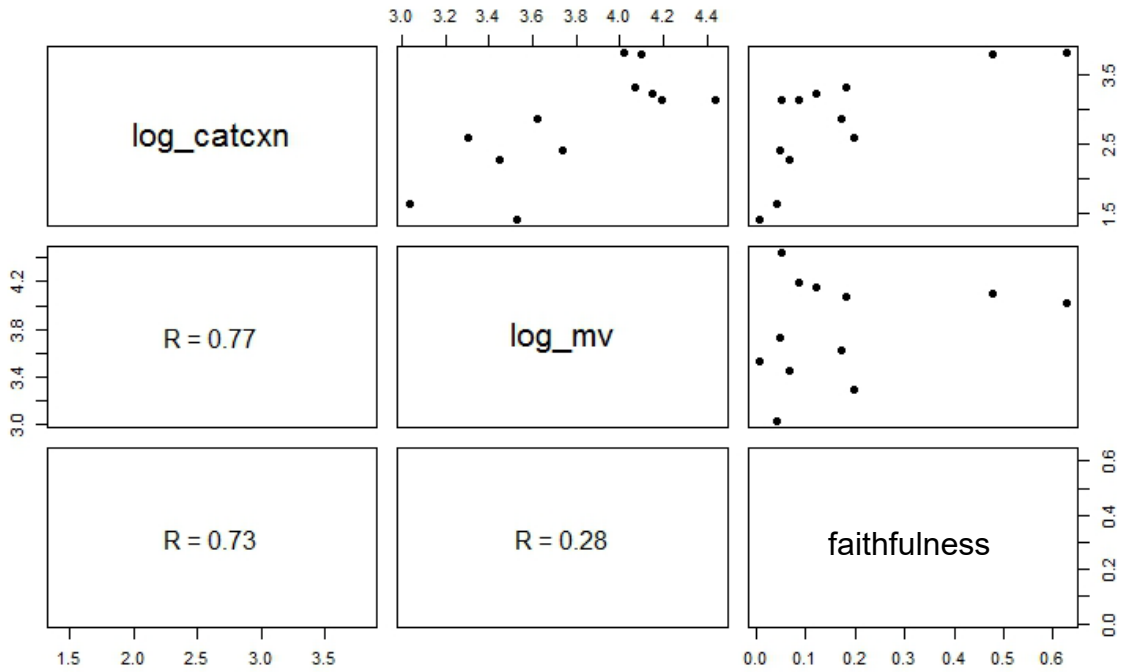

Figure 8 Matrix Plot of Correlations between Frequency Measures

A way to estimate the collinearity of predictor variables is to calculate their condition number (kappa-coefficient)[44]. For the predictor variables at hand, we get a condition number of 44.9 which indicates a "potentially harmful collinearity" (Baayen 2008: 182)[45]. Thus, it becomes evident that an analysis with all three frequency measures is problematic. The strategy to resolve the issue of collinearity taken in this study[46] is to determine which variable(s) explain(s) the data best and to eliminate the one(s) that have the least explanatory power by conducting a Random Forest Analysis. A Random Forest Analysis is a non-linear statistical test, which is based on partition trees and is less sensitive towards collinearity than linear regression models (see e.g. Tagliamonte & Baayen 2012)[47]. The Random Forest Analysis of the data from the sentence completion task included all three frequency-related factors as

[44] The kappa coefficient was calculated with the collin.fnc() in R as suggested by Baayen (2008: 182).
[45] 0-6 = no collinearity, around 15 = medium collinearity, >30 high degree of collinearity (Baayen 2009:182).
[46] A previous strategy that was applied in order to reduce collinearity in the model was to centre the frequencies around their means (see Cunnings & Finlayson (2015: 168). However, this did not solve the issue as the correlation between the frequency measures was still relatively high.
[47] Note that a Random Analysis will only be used for the estimation of variable importance but not as an alternative for a regression model.

variables to predict the dependent variable 'target-likeness'. The analysis shows that the relative importance of the variables is as follows:

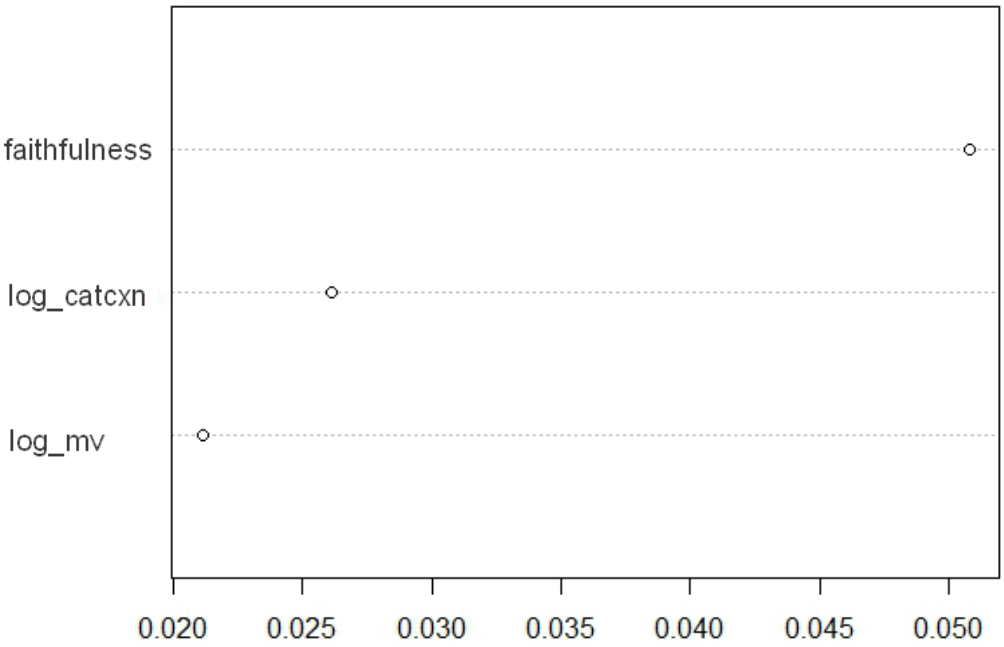

Figure 9 Dot Chart of Conditional Variable Importance

As becomes evident from Figure 9, the conditional importance of faithfulness is highest at 0.051, followed by the log_catcxn frequency (0.026). The matrix verb frequency (log_mv) had the lowest value with 0.021. For the acceptability rating task, a Random Forest analysis shows that faithfulness has the highest conditional variable importance (0.040) to predict the rating of the test items, followed by log_mv (0.034), while log_catcxn has the lowest value (0.026). Even though the variable log_mv has lower variable importance than log_catcxn for the sentence completion task data, the difference is minimal and since log_catcxn correlates strongly with the other two variables, we will exclude log_catcxn[48].

By eliminating log_catcxn, the condition number is reduced to 22.12, which suggests that there is no harmful collinearity present in the reduced predictor set. This is why for both the

[48] Note that, on a theoretical level, the effects of the matrix verb and catenative verb construction frequency are not seen to work in a mutually exclusive way; the collinearity between these factors simply shows that these two variables are likely to both have an effect on the representation of the construction. However, to come to a precise statistical assessment of their individual contribution, the procedure of the data analysis needed to be adjusted accordingly.

sentence completion task as well as the acceptability rating task, only the matrix verb (log_mv) and faithfulness were used as predictor variables to account for the preference of the target-like catenative complement. More information on the final mixed models is given in the Results section.

4.3 Results and Discussion

4.3.1 Sentence Completion Task

Overall, the sentence completion task yielded 521 numbers of observations (259 sentences with target-*ing* verbs and 262 target-*to* verbs; NAs were removed). Taken together, 34.9% (182/521) of the sentences had a non-target-like catenative complement. *To*-infinitival complements constituted 50.3% (262/521) of all responses, whereas -*ing* complements were found in 29.9% of the sentences (156/521). Only 8.1% (42/521) were bare infinitival complements or other forms. Examples of target-like and non-target sentences are provided below:

(7) **target-*to* verb (tl):** *The Royals managed to get enough publicity without her help.*

(8) **target-*to* verb (ntl)**: **Their friend proceeded telling all details about his surgery.*

(9) **target-*ing* verb (tl)**: *All kids enjoyed reading this book about three bears.*

(10) **target-*ing* verb (ntl)** **The teenagers practiced to write short messages with the tablet.*

Figure 10 shows the proportion of target-like vs. non-target-like responses by verb group. As can be seen, there is a clear difference between the target-*ing* and target-*to* verbs. In the latter, 80.52% (212/262) of the catenative complement types produced were target-like, i.e. the learners produced a *to*-infinitival complement, while 19.08% were non-target-like (50/262). The non-target-like forms were either -*ing*, bare or other forms.

Figure 10 Production Task: Target-likeness of Complement Types

With regard to target-*ing* verbs, we find more variation regarding the produced catenative complements: 50.97% (132/259) of the sentences comprised a non-target-like and 49.03% (127/259) a target-like complement. The majority of the non-target-like instances were *to*-inf. complements with 87.4% (111/127) after the target-*ing* verbs.

To see which frequency variable significantly determines a target-like choice of the complement, the final mixed-effects model was fitted as follows. The starting point of the model selection process was a maximal generalised linear mixed model (see Menard 2002), i.e. a model including all predictor variables at hand. The predictor variables were then reduced in a stepwise fashion and assessed by model comparison on the basis of log-likelihood values. Subsequently, different interactions between the significant predictor variables were added and only included in the model if they provided a significant contribution in predicting the outcome variable and showed a significant improvement of the model. The final model had the following formula**:**

target_like ~ expected_cxn + faithfulness + (1 | subj) + (1 | sent_id)[49]

[49] Random effects:
Groups Name Variance Std.Dev.
sent_id (Intercept) 4.893e-08 0.0002212
subj (Intercept) 3.741e-02 0.1934263

Thus, it included two significant predictor variables, namely the the expected complement construction type (-*ing* or *to*-inf.) and the faithfulness of the verb for the catenative verb construction. An interaction between these two variables was not significant. The coefficients of the fixed effects, their *z*- and *p*-values, as well as the R^2 values, are provided in Table 3. As mentioned above, the dependent binary variable was the target-likeness of the catenative complement (ntl vs. tl). The reference level in the model was ntl (non-target-like).

Table 3 Production Task: Fixed Effects

	estimate	***SE***	***z*-value**	***Pr(>|z|)***
Intercept	-0.3597	0.1521	-2.365	0.018 *
expected_cxnto_inf	0.9087	0.2269	4.005	6.21e-05 ***
faithfulness	4.2098	0.9867	4.267	1.98e-05 ***
Marginal R^2	0.2585			
Conditional R^2	0.2668			
No. of observations	*521*			

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

The conditional R^2 value of the model, which describes the variance explained by the fixed and random effects is 0.2668 (the marginal R^2 value, here 0.2528, provides information on the amount of variance explained based on the fixed effects alone).

As it is evident from Table 3, we find a strong and significant main effect of the faithfulness of the verb to the construction in the model. This effect is positive for the level 'tl', which means that a stronger faithfulness for the catenative verb construction significantly predicts the production of a target-like catenative complement by the learners. With regard to a difference between target-*ing* and target-*to* verbs, the model shows that if the catenative complement was expected to be a *to*-inf. complement and , therefore, the verb a target-*to* verb, then a target-like catenative complement was also more likely in comparison to target-*ing* verbs. These effects are visualised in Figure 11.

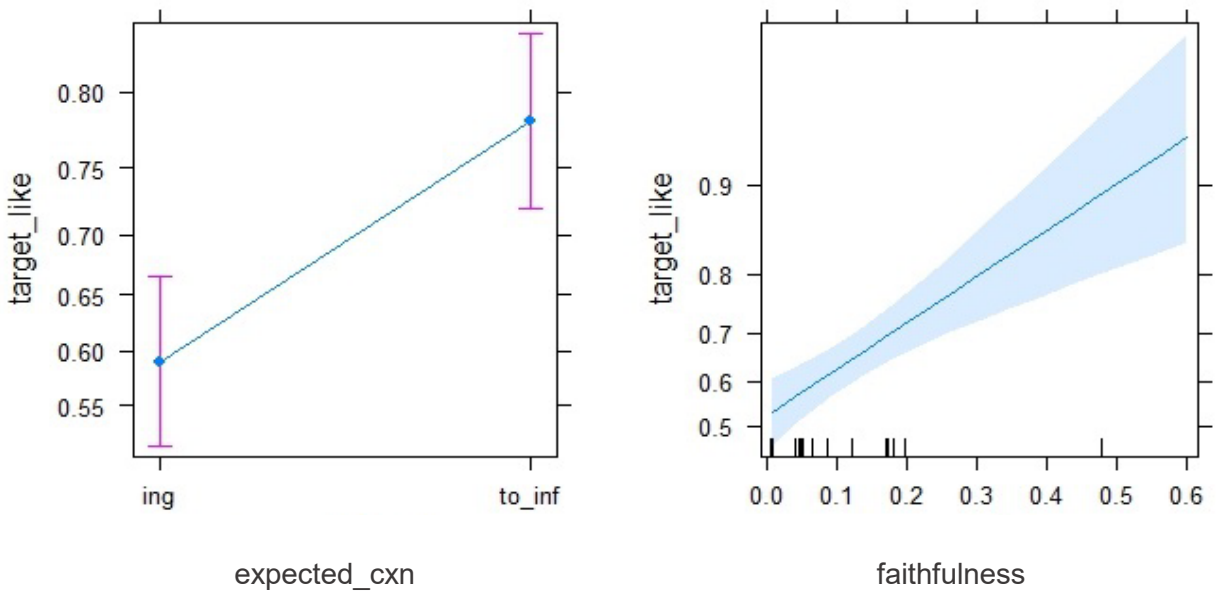

Figure 11 Production Task: Effect Plots

As shown by an ANOVA, the model with matrix verb frequency (log-transformed) was not significantly better than the model without this predictor variable ($\chi^2(1)=2.1371$, $p=0.1438$)). In other words, the frequency of the verbs under investigation in all of their different occurrences in the BNC did not have a significant impact on the production of the target-like catenative complement, which is why it was excluded as a predictor variable in the final model. As mentioned above in 4.3.5, a model with the log-transformed catenative verb construction and faithfulness was not reliable since these two factors are highly correlated.

4.3.2 The Production of the Catenative Verb Construction: Interim Discussion

First and foremost, it becomes apparent that the matrix verb frequency could not predict the production of the target-like catenative verb. Instead, the higher the faithfulness of the catenative verb in the catenative verb construction, the more likely it is that the learner uses the preferred complement type. Furthermore, we find a significant difference between the target-*to* and the target-*ing* construction. The learners completed the sentence with the target-like catenative complement after target-*to* verbs, i.e. with a *to*-inf. complement, in 80.5% of all cases. In contrast to this, only 49% of the responses were target-like in the target-*ing* group. In light of the considerably high number of target-like responses, the results suggest that the target-*to* construction, which is likely to be more entrenched due to its high type and

token frequency, is better acquired than the target-*ing* construction. Theoretical implications of the findings of the production task will be provided in the general discussion (see Section 4.5).

4.3.3 Acceptability Rating Task

As mentioned above, the learners had to rate sentences on a four-point scale where half of the catenative complements were non-target-like, which means that target-*to* verbs were presented with -*ing* complements and target-*ing* verbs with *to*-inf. complements. Examples from the stimuli presented to the learners are given in the following:

(11) **target-*to* (tl):** *The grandfather offered to take the children to the zoo.*
(12) **target-*ing* (tl) :** *His brother practised writing Chinese letters for 6 months.*
(13) **target-*to* (ntl):** **The government refused accepting our arguments against this law.*
(14) **target-*ing* (ntl):** **My friend enjoys to read scary stories in the dark.*

Figure 12 shows the mean ratings of the test items depending on the verb group and their target-likeness (the scale goes from 1 'clearly incorrect' to 4 'clearly correct').

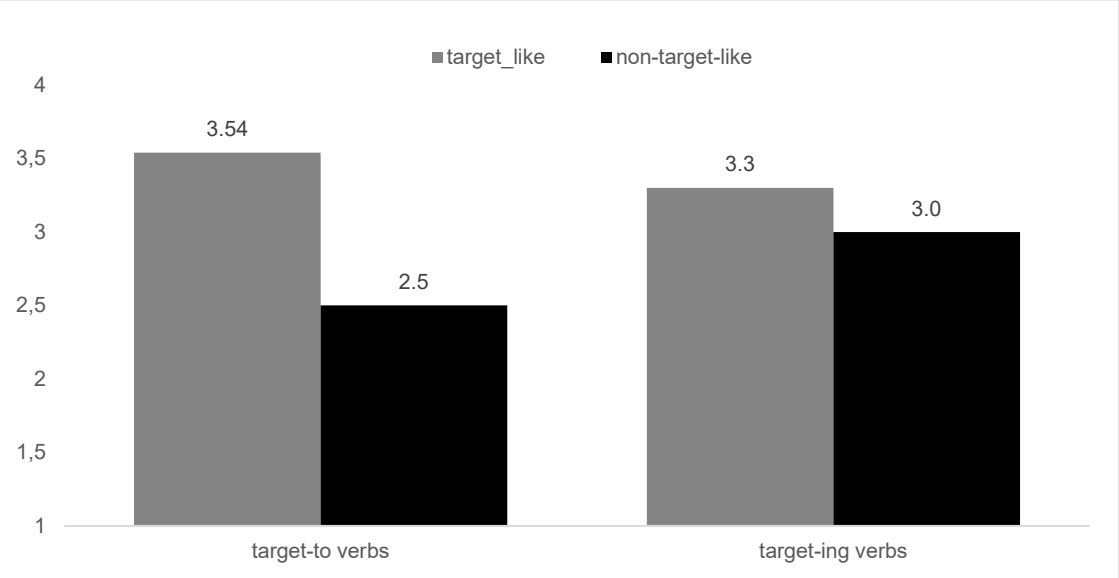

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Figure 12 Rating Task: Mean Ratings

To predict the rating of the sentences, a linear mixed-effects model using the R package lme4 (Bates et al. 2015) was constructed with the same predictor variables as in the sentence

completion task. However, the dependent variable was the rating of the sentences, measured on a scale from 1 to 4 and treated as a continuous variable. The predictor variables were the same as for the sentence completion task, with target-likeness of the test sentences (tl vs. ntl) as an additional fixed factor. Here the predictor variables were added step-wise to the null model, which included 'subject' as a random intercept[50]. Model comparison was done on the basis of likelihood ratio tests. The final model included two interactions as fixed effects: the interaction between the target-likeness (tl) of the test sentence, which was either target-like (t)l or non-target-like (ntl), and faithfulness, as well as an interaction between the target-likeness of the test items and the expected catenative complement (expected_cxn).

As in the sentence completion task, the matrix verb frequency did not lead to an improvement of the model as shown by an ANOVA, which compared the model with and without this predictor variable ($\chi^2(1)=0.5447$, $p=0.4605$)). The formula of the final model is:

*rating ~ (tl*faithfulness) + (tl*expected_cxn) + (1|subj)*[51]

The coefficients of the fixed effects as well as of their interactions, standard errors (*SD*), *t*-values and R^2 values are given in Table 4.

Table 4 Rating Task: Fixed Effects

	estimate	***SE***	***t*-value**
Intercept	2.98	0.090	30.969
tltl	0.2595	0.1273	2.038
faithfulness	0.1463	0.3882	0.377
expected_cxnto_inf	-0.2703	0.1411	-1.917
tltl: faithfulness	0.3665	0.5490	0.668
tltl:expected_cxnto_inf	0.4376	0.1995	2.194
Marginal R^2	0.0921		
Conditional R^2	0.0975		
No. of observations	*528*		

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[50] The model for the rating task contained only subject as a random factor specified as a random intercept since the test items and their target-likeness was used as a fixed factor.

[51] Random effects:

Groups	Name	Variance	Std.Dev.
subj	(Intercept)	0.02455	0.1567

Figure 13 shows plots of the main effects. Two major observations can be made here. First, the rating of the target and non-target-like sentences taken together was high overall. The mean of the rating was 3.1 (*SD* = 1.0) and the median was 3, which both correspond to the category 'probably correct'. This means that the learners rated non-target-like sentences where the catenative complement was a *to*-inf. complement as well as target-like sentences with an -*ing* complement both as 'probably correct' and therefore did not make a distinction between these sentences in their rating.

Second, it can be seen that if the verb was a target-*to* verb (expected_cxn=to) and the sentence was non-target-like, then the rating was higher than if it was an non-target-like sentence with a target-*ing* verb (expected_cxn=ing). Furthermore, the non-target-like sentences in the target-*to* group, i.e. the ones that contained an -*ing* complement, received a significantly lower rating than the target-like sentences, while the difference in ratings for the target- and non-target-like sentences in the target-*ing* verb group was not significantly different.

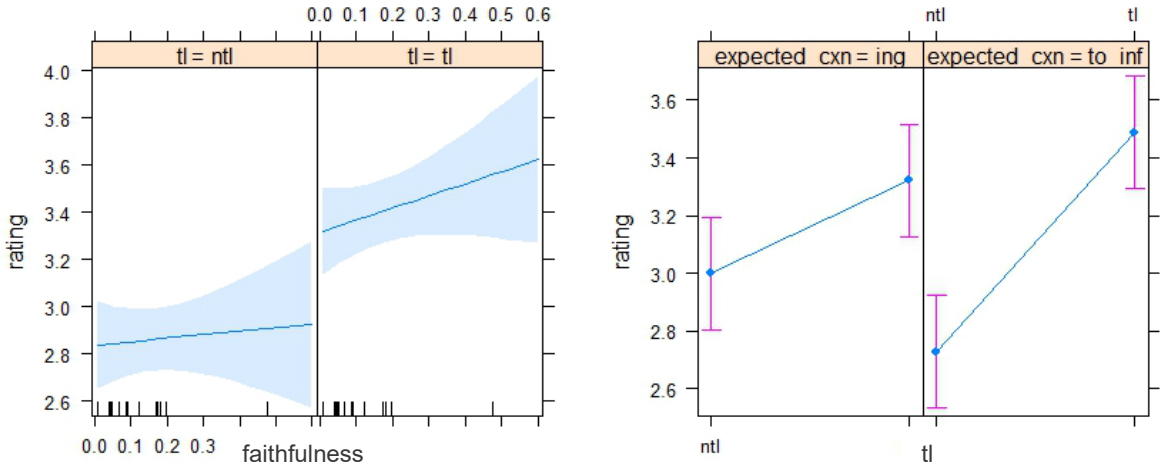

Figure 13 Rating Task: Effect Plots

The left plot shows that the verbs that have a relatively high faithfulness to the catenative verb construction are rated higher if the test item was target-like, in contrast to the test items that were non-target-like. Those verbs that are less faithful, by contrast, were rated slightly lower, in the case of both target-like and non-target-like sentences (although slightly higher in the case of the target-like sentences). Interestingly, there was no negative, reverse effect

for the rating of the non-target-like sentences: the learners did not rate the non-target-like instances lower, even when the verb's faithfulness was high. Instead, the rating of the non-target-like items was high overall with a mean rating of 2.9 ('probably correct').

4.3.4 The Perception of the Catenative Verb Construction: Interim Discussion

The acceptability rating task demonstrated that target-like sentences with verbs that occur with a high faithfulness to the catenative verb construction are judged better than less faithful verbs. One unexpected observation that could be made was that the rating of the non-target like sentences was relatively high overall (on average 3). Also, there was only a small but non-significant negative effect of faithfulness on the rating of the non-target-like sentences, although a strong negative relationship between these variables had been expected. This means that some learners did not reject the non-target-like sentences, even if the frequency of the verb in the construction was high. We can only speculate about the reason behind this outcome. It is most likely that the learners were willing to accept the construction with the non-target-like catenative complement since they perceived a certain formal and semantic compatibility of e.g. a target-*ing* verb with a *to*-inf. complement. This assumption, as well as other theoretical implications, are further discussed in the following section.

4.3.5 General Discussion

4.3.5.1 *Evidence for Frequency-Sensitive Constructional L2 Knowledge*

The first issue that will be addressed is how frequency affects the mental representation of the catenative verb construction for advanced learners of English. More specifically, the first research question is whether the frequency-related factors, the matrix verb token frequency, the token frequency of the catenative verb construction and/or the faithfulness of the verb for the catenative verb construction can predict the choice of the target-like catenative complement by German learners of English and with this a native-like representation of the construction. Prior to inferential statistical analyses, the frequency variables were tested for collinearity. In particular, evidence for potentially harmful collinearity between the matrix verb and the catenative verb construction frequency was detected. This is why only the matrix verb frequency and the verb's faithfulness to the catenative verb construction were tested as predictor variables as they did not correlate. Mixed-effects models for both studies then showed that the preference of the target-like catenative complement is significantly

predicted by the verb's faithfulness to the catenative verb construction, but not by the matrix verb frequency. These effects revealed that the more faithful the verb is to the catenative verb construction, i.e. the more often it is used in this construction in comparison to its other uses, the higher the chance for a target-like complement preference was.

Concerning the effect of faithfulness, one rather unexpected observation could be made in the acceptability rating task. Not only were the ratings of the non-target-like sentences relatively high overall (on average 'probably correct'), but there was also only a small and non-significant negative effect of faithfulness on the rating of the non-target-like sentences, although a strong negative relationship between these variables could have been expected. In other words, some learners did not reject the non-target-like sentences even when the verbs had a high faithfulness to the catenative verb construction and thus a strong association with the catenative complement preferred by native speakers. It is most likely that the learners do not perceive the formal and/or semantic differences between the target-*to* and target-*ing* construction and therefore equally accept non-target-like and target-like instances, such as '*X *refuses to* V' and 'X *refuses* V*ing*', alike, even when the latter is expected to be entrenched due to its relatively high faithfulness to the target construction. This assumption is further discussed in Section 4.3.5.2 when looking at the differences between these two subschemas.

All in all, these results have several theoretical implications. First, the fact that the matrix verb frequency was no significant predictor in the production and perception of the target-like catenative complement in the experimental studies suggests that the frequency of the verb itself does not suffice to choose the non-finite complement pattern preferred in the target language; the learners cannot deduce the target-like catenative complement solely on the basis of the form and meaning of the matrix verb alone. From a constructionist point of view, we find a unit, a *construction*, between the matrix verb and the catenative complement, where form and meaning are connected via a symbolic correspondence link that results from the co-occurrence and interaction between the respective components (see also Egan 2008, cf. Goldberg 1995; 2006). This also agrees with the general characteristics of verb-argument constructions. As pointed out by Perek (2015: 79) in the context of his work on argument structures in English, the

> […] knowledge of argument realization evidently includes general principles that go beyond mere knowledge about the syntax of an individual verb. In a constructional approach, these principles are captured by argument structure constructions, consisting of symbolic pairings of a syntactic structure with a schematic meaning stored independently of individual verbs [...].

More evidence for the importance of experiencing the construction rather than the individual verb for a target-like choice comes from the effect of the verb's faithfulness. Verbs that are more strongly associated with the catenative verb construction are more likely to be chosen with the target-like catenative complement. These results support findings from previous studies in L1 and L2 acquisition research on the effects of frequency of a verb in a specific construction and its faithfulness to it (see e.g. Ambridge et al. 2012b; Ambridge et al. 2014a; Ambridge et al. 2008; Ambridge et al. 2006; Ellis et al. 2013; Ellis et al. 2016a; Gries & Ellis 2015; Kidd et al. 2006a; Kidd et al. 2010b; Ellis 2006a). Furthermore, these observations support the hypothesis that the learner would need to experience this form-meaning pairing frequently enough in order to strengthen the construction's linguistic representation (entrenchment), which leads to a facilitated access and sharpening of the learner's expectation as to which catenative complement has to follow the verb (cf. Blumenthal-Dramé 2012: 187; Diessel 2007).

Taken together, these findings imply that linguistic material in the L2 is not stored as separate components but as coherent units (constructions) that are stored on the basis of generalisations (schemas) and which are themselves promoted by frequency. Learning a second language, thus, involves more than memorising vocabulary lists and grammar rules. Instead, as Martinez-Garcia and Wulff (2012: 22) point out, "knowing a language means to know constructions at different levels of complexity and abstraction, and how often these constructions are combined with each other". In the context of second language teaching, the findings of the studies suggest that learners can benefit from implicit learning mechanisms when it comes to idiosyncratic constructions, such as the catenative verb construction where the combination of verb and complement form can appear arbitrary to the learner, as the correspondence between form and meaning is often opaque. Exposure to the construction as well as its use can promote a probabilistic generalisation process and help to set the foundations for target-like procedural knowledge about the construction.

4.3.5.2 *Target*-to *vs. Target*-ing *Verbs*

The second research question dealt with a difference in the choice of the target-like catenative complement depending on the type of catenative verb, i.e. whether it prefers an -*ing* or a *to*-inf. complement. It was expected that target-*to* verbs would display more target-like choices than the target-*ing* verbs since they have a higher type and token frequency in general. This is supported by the data. The sentence completion task showed that the learners completed the sentence with the target-like catenative complement, i.e. with a *to*-inf. complement, after target-*to* verbs in 80.5% of all cases. By contrast, only 49% of the responses were target-like, i.e. an -*ing* complement, in the target-*ing* group. The acceptability rating task complements these findings: the non-target-like sentences for the target-*to* verbs, where the catenative complement was an -*ing* complement, were rated significantly lower (*mean* = 2.5) than the non-target-like sentences for the target-*ing* verb group (*mean* = 3.0). It is argued that the considerable preference of the target-like catenative complement for target-*to* verbs in this study suggests that the target-*to* construction is better acquired, more entrenched and schematic than the target-*ing* construction by the learners. This argument is elaborated as follows.

Since schematicity is promoted by a high type and token frequency, the challenge here for the learner is to abstract over the catenative verb slot. This slot poses the highest numbers of constraints as the available verbal items to fill the slot are very limited in the input in comparison with the items for the other slots in the construction. For instance, the subject slot of the matrix clause and the verb lemma of the catenative complement have a much higher type and token frequency than the catenative verb slot. However, the catenative verb construction with a *to*-inf. complement has a higher type and token frequency than the target-*ing* construction in English (see Section 3.4), which facilitates pattern recognition. Therefore, the perception and processing of a large number of exemplars of the target-*to* construction are assumed to lead to a taxonomic generalisation and schema abstraction (see Madlener 2015: 36; Ellis & Wulff 2015a; Traugott & Trousdale 2013). In the case of the target-*ing* construction, by contrast, it is thus much harder for a learner to detect a distinct pattern and to abstract a schema over the respective slots of this form-meaning pairing. The studies presented here suggest that some exemplars of the target-*ing* construction, which are mostly preferred with the target-like catenative complement, are entrenched, such as the semi-abstract schema S *enjoy* V*ing* X, while the high overall number of non-target-like

choices suggests that the more abstract construction S CV V*ing* X is not entrenched. This raises the question of whether the learners have a distinct abstract schema for the construction with an -*ing* complement or whether the knowledge is 'limited' to a handful of entrenched high-frequency exemplars.

Another important finding is that the majority of non-target like catenative complements after the target-*ing* verbs were *to*-inf. complements. This can be interpreted as a sign that the learners have a distinct schema for the *to*-inf. complement construction, which is productively applied to less frequent verbs (see Abbot-Smith & Tomasello 2006: 282; cf. Bybee 2007: 30) and to target-*ing* verbs in particular. As shown in first language acquisition, "[...] children are less likely to overgeneralize complementation patterns for frequent verbs (e.g., *read me a book*) than for rare ones (e.g., *examine me a book*) in production and are also more willing to accept frequent ones than rare ones as grammatical" (Schmid 2017b: 14, italics in the original; see Ambridge et al. 2008; Brooks and Tomasello 1999; Goldberg et al. 2004; Brooks et al. 1999; Theakston 2004). Furthermore, as Goldberg (2006: 89) points out, a highly frequent and prototypical example of a certain slot can function as a so-called 'cognitive anchor', which functions as a "salient standard of comparison". In this case, it is likely that the anchor would be the subschema with the *to*-inf. complement, which allows for analogical comparison and the extension to target-*ing* verbs that have not been experienced in the catenative verb construction in the input before. In more general terms, the results suggest that the learners tend to opt for the more abstract schema in the absence of an entrenched instance.

Another implication of this overgeneralisation of the *to*-inf. complement is that learners do not perceive a notable difference between certain target-*ing* and target-*to* verbs in form and meaning. This was also reflected in the rating task, where learners often accepted the non-target-like catenative complement (e.g. **The company postponed to build the factory* [...] was rated with 3.45 on average). Consequently, the mapping of a target-*ing* verb and a *to*-inf. complement on the basis of a perceived formal and semantic compatibility results in a construction that is interpretable for the learner, even if it is not attested in the target language. In other words, the learners prefer less frequent verbs with a *to*-inf. complement because they "can only be expected confidently to use a new verb in a familiar pattern when that new verb is relevantly close in meaning to verbs they have already heard used in the pattern" (Goldberg 2006: 99). The difference between the construction with the -*ing* and

to-inf. is admittedly opaque, even for native speakers (see Chapter 3, Section 3.1). However, while native speakers learn to choose (and here this is meant as a subconscious process) the target-like catenative complement for even infrequent verbs on the basis of a life-long analysis of a highly rich input, for second language learners often such a rich input is not available, which is one reason for these non-target-like representations (see e.g. Robenalt & Goldberg 2015b). Consequently, even for low-frequency constructions, such as the target-*ing* construction, native speakers learn to know which catenative complement is target-like on the basis of positive as well as indirect negative evidence ('pre-emption'), exposure to the different semantic verb classes and with this to different type and token frequencies profiles (see e.g. Ambridge et al. 2015a; Boyd & Goldberg 2011; Perek & Goldberg 2017; Robenalt & Goldberg 2015a).

4.4 Conclusion

To conclude this chapter, it can be said that the data from the two complementary studies on the production and perception of the catenative verb construction have provided evidence for "frequency-biased abstractions" (Ellis, 2002: 144) in second language acquisition. The data have shown more clearly which parts of the catenative verb constructions need to be experienced with sufficient frequency by L2 learners of English in order to acquire a native-like representation and to lead to the entrenchment of the construction. More specifically, we could find a significant effect of the verb's faithfulness to the construction, while the matrix verb frequency failed to predict a target-like choice. Furthermore, there is strong evidence for the entrenchment of item-based knowledge of high-frequency exemplars of the catenative verb construction as well as a subschema for the target-*to* construction. This subschema is overgeneralised to (less frequent) target-*ing* verbs due to a perceived semantic and formal compatibility. The results for the target-*ing* construction, by contrast, suggest that the learners do not have a representation of a distinct abstract subschema for this construction, which can be attributed to its low type and token frequency.

On a more general level, these studies provide valuable insights into the mental representation of the L2. First, we find evidence for frequency-sensitive constructional knowledge in the L2 and secondly, entrenchment can be seen as a phenomenon found with respect to item-based as well as item-general/schematic representations. Furthermore, it is argued that not only high-frequency items can function as a cognitive anchor, but also more

abstract schemas, such as the target-*to* subschema. What is more, it is shown that entrenchment and schematisation are best seen as substantial cognitive processes in second language acquisition that are implicitly shaped by distributional information (type and token frequency as well as form-function contingency). Thus, we see that the 'statistics' of language are just as important in learning a second language as in learning the L1 (see e.g. Bybee 2008; Ellis 2002; Ellis et al. 2016). Nevertheless, these findings need to be empirically supported, in particular in light of the small sample size of the present study. This is why in Chapter 6 a large-scale sentence completion task with approx. 1200 different learners will be presented, which will also investigate additional factors that have not been considered here (e.g. semantics, learner characteristics, etc.).

Before, we will look at the use of the catenative verb construction in more naturalistic data. The next chapter describes a corpus study with data by learners of different proficiency levels (A1-C2), which does not only aim at finding additional support for the effects of frequency, but also looks at the choice of a catenative verb construction over other constructions.

5 Frequency and the Complement Choice after Catenative Verbs: A Pseudo-Longitudinal Corpus Study

5.1 Introduction

This chapter presents an exploratory pseudo-longitudinal corpus study[52] with more naturalistic L2 production data. The data come from German learners of English of different proficiency levels (A1-C2), which were extracted from the *EF-Cambridge Open Language Database* (EFCAMDAT, Geertzen et al. 2013). As shown by the results of the studies presented in Chapter 4, we find evidence that advanced learners of English possess frequency-sensitive knowledge of the catenative verb construction. It was shown that construction-specific rather than verb-centred frequency was a significant predictor of a target-like preference of the catenative complement. This construction-specific frequency measure was the *faithfulness* of the verb to the catenative verb construction, which was argued to shape a target-like representation both with regard to the construction's entrenchment as well as schematisation.

While these findings with advanced learners of English are already indicating that the distribution of the catenative verb construction in the L2 matters, much less is known about the use and representation of the catenative verb construction by second language learners across different proficiency levels (from low to higher levels of proficiency[53]). Furthermore, it is not clear when learners prefer to use catenative verbs with other complement types (e.g. nominal complements; see Section 5.2). Therefore, this study sets out to corroborate and expand the findings from the experimental studies (see Chapter 4) with more naturalistic production data from a heterogeneous learner group.

The organisation of this chapter is as follows: First, the research questions and hypotheses of the present study will be introduced (Section 5.2). Section 5.3 provides an overview of the methodology, which comprises information on the EFCAMDAT corpus, the verb selection, the data collection, coding, and analysis. The results will be presented in Section

[52] Parts of Section 5.3, 5.4.3 and 5.5.2 are accepted for publication in *Cognitive Linguistics*.
[53] Mostly, the studies mentioned in 3.2 (e.g. Gries & Wulff 2009; Martinez-Garcia & Wulff 2012) focus on a specific learner population, namely on more advanced learners of English. Only Schwartz & Causarano (2007: 46–47) examine high-intermediate, intermediate and also advanced learners. However, their sample size is fairly small with 13 participants in total, which is why their results have to be interpreted with caution.

5.4 and then discussed (Section 5.5) with respect to the research questions. In addition, Section 5.5 will include a discussion of some methodological considerations of the study. Finally, a conclusion will be drawn.

5.2 Research Questions and Hypotheses

The use of corpus data, which are more naturalistic than data gained by a forced-choice production task like the one presented in Chapter 4, allow us to investigate what constructions learners use or do not use or even avoid when they have the choice between different forms that express similar meaning. In the case of the catenative verb construction, therefore, the question arises whether learners prefer the verb in the catenative verb construction or in a different but related construction, as exemplified in (1) to (4):

(1) *She **finished** [her homework]*$_{NomCompl}$ *before dinner.*
(2) *She **finished** [doing her homework]*$_{CatCompl}$ *before dinner.*
(3) *His dad **decided** [to live in Australia]*$_{CatCompl}$.
(4) *His dad **decided** [that he wanted to live in Australia]*$_{InternCompl}$.

The catenative verb *finish*, for instance, cannot only take a catenative complement but also licenses a nominal complement (in other words, a noun phrase functioning as a direct object[54]). There are also verbs like *decide* that can be followed by a finite complement clause, e.g. in the form of a *that*-clause (also referred to as 'internal complement'[55] of the verb in terms of its syntactic function, according to Huddleston & Pullum 2002). In both cases, the nominal or finite complement can express a similar/almost identical meaning as the catenative complement (cf. (1) and (2)). In comparison, however, they are less marked, i.e. cognitively less complex as well as more frequent than the non-finite catenative complement (cf. Biber et al. 1999: 754–759; Diessel 2004; Szmrecsanyi 2006).

[54] Note that the catenative complement is not treated as a direct object here and follows Huddleston & Pullum's (2002) analysis of the non-finite complement as a distinct type of complement (see Ch. 3.1 for more information). According to other reference grammars (e.g. Quirk et al. 1985), however, the terminology would be here 'non-finite clausal complement' vs. 'nominal complement'. The terms 'nominal complement' and 'direct object' will be sometimes used interchangeably in this chapter.
[55] For instance, in contrast to other grammarians, such as Quirk et al. (1985), Huddleston and Pullum (2002: 949-972) analyse e.g. declarative (usually *that*-clauses) or interrogative content clauses after the matrix verb as so-called 'internal complements' of the verb and not as direct objects.

In light of this issue, the first aim of this study will be to assess whether proficiency and frequency determine the choice of a catenative over a non-catenative complement (e.g. a direct object in the form of a noun phrase or internal complement of the verb as in a *that*-clause), which leads to the following research questions:

> ***RQ 1****: What complement types are used with the catenative verbs under investigation and how are they distributed?*
>
> ***RQ 2****: Can frequency predict the production of a catenative complement over a non-catenative complement? Which frequency-related factors in particular?*
>
> ***RQ 3****: How does proficiency influence the complement choice?*

It is hypothesised that frequency affects the complement choice. In particular, the more frequent the catenative verb is together with its complement (i.e. its occurrence in the catenative verb construction) than with other complement types, the more likely it is that the learner associates it with the catenative verb construction. In addition, it is predicted that the verb's faithfulness to the catenative verb construction plays an important role: if the verb is distinct for this construction (i.e. if it occurs predominantly or very frequently in the catenative verb construction in relation to other constructions), the probability for the learners using it is higher. This prediction is also based on findings from research on verb-VAC associations by L2 learners. As Ellis et al. (2016: 100) state, "[v]erbs that are faithful to particular VACs in usage should be those which are more readily accessed by those VAC frames than verbs which are more promiscuous". So in this case, we can assume that the more diverse the verb's use is across different constructions, the less likely it is that the learners produce the catenative verb construction due to a lower association strength.

With respect to the learners' proficiency level, it can be hypothesised that the learners will prefer the less marked/more frequent complement type, e.g. a direct object, in early stages and will produce catenative complements (i.e. the catenative verb construction) more often with rising proficiency. This hypothesis is motivated by the assumption that learners exhibit a larger repertoire of different constructions with increasing usage experience, which also includes more marked/infrequent ones.

The other set of research questions deals specifically with attested exemplars of the catenative verb construction and the target-likeness of the catenative complement:

***RQ 4**: Which frequency-related factors predict a target-like choice?*

***RQ 5**: Does the catenative verb construction become more target-like with increasing proficiency?*

***RQ 6**: Is there a difference between target-*ing *and target-*to *verbs?*

Taken together, we will see whether the distinct catenative complement type will be produced after the catenative verbs under investigation and whether frequency and proficiency determine this choice. Another aspect that will be examined is potential differences between target-*ing* and target-*to* verbs. It is hypothesised that the verbs of the target-*ing* group will have a higher number of non-target-like catenative complements, which will mostly have the form of a *to*-inf. complement. An overgeneralisation of this construction to target-*ing* verbs would support the cognitive anchor hypothesis, which predicts that the more frequent target-*to* schema should become the default pattern for less entrenched verbs.

5.3 Methodology

5.3.1 The EF-Cambridge Open Language Database (EFCAMDAT)

As mentioned in the introduction, the data was extracted from the *EF-Cambridge Open Language Database* (EFCAMDAT, Geertzen et al. 2013), the "first freely available large learner corpus exploiting online foreign language learning" (Alexopoulou et al. 2015: 98). This corpus, which has, to my knowledge, not yet been examined with regard to the catenative verb construction, provides the opportunity to conduct a pseudo-longitudinal[56] corpus study with data from a relatively large sample of learners with different proficiency levels and diverse personal backgrounds. More precisely, the corpus contains data ranging from beginners to highly advanced learners, which is not the case with most existing learner corpora, such as the *ICLE* (International Corpus of Learner English, Granger et al. 2009), as they contain data from high-intermediate to advanced learners of English only.

The EFCAMDAT was created by the Department of Theoretical and Applied Linguistics at the University of Cambridge in collaboration with EF Education (Geertzen et al. 2013). At the time of the analysis, the corpus consisted of approximately 70 million words from 1.2

[56] Since not all learners did all units, we cannot investigate an individual's development from A1 to C2.

million assignments written by almost 175 thousand learners (ibid.)[57]. The corpus is comprised of texts by learners of different nationalities and of different levels that have been submitted to the learning platform *Englishtown*[58] (ibid.: 3). When enrolling in this platform, learners are assigned to one of 16 levels on the basis of a placement test. These 16 levels are in line with standards of language proficiency tests and correspond to the scale established by the *Common European Framework of Reference for Languages* (CEFR, Council of Europe 2009), ranging from A1 to C2 as shown in Table 5 (adopted from Alexopoulou et al. 2015: 98).

Table 5 Correspondence of Englishtown Teaching and CEFR Levels

Englishtown Teaching Levels	**CEFR**
1-3	A1
4-6	A2
7-9	B1
10-12	B2
13-15	C1
16	C2

Each level has eight units and ranges from basic topics like introducing oneself, ordering food and other everyday situations in the beginning levels to more complex and abstract communicative tasks on the more advanced levels, such as 'covering a news story' (see also Alexopoulou et al. 2015: 100). In order to proceed to the next level, the learner has to pass an assessment test after the last unit of each level (Alexopoulou et al. 2015: 100).

For the purpose of the present study, data from the German subcorpus was investigated. At the point of data collection, this subcorpus contained approx. 2,190,000 words from 28,555 texts produced by 5,112 different learners (Geertzen et al. 2013: 3, see Table 6 for an overview of the distribution of learners across different levels).

[57] In September 2017, which was after the data collection for the present study, the section version of the EFCAMDAT with more data was released.
[58] http://www.efenglishtown.com/de-de/lp/os/home/?&gclid=CIay2-D5hs4CFTYW0wodMrwHog, retrieved 22/07/2016

Table 6 Distribution of Scripts by German Learners across Proficiency Levels (Geertzen et al. 2013)

Level	**1**	**2**	**3**	**4**	**5**	**6**	**7**
No. of Scripts	5935	2805	1981	4710	2342	1455	3190

8	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	***total***
1176	856	1882	752	458	608	215	107	83	***28,555***

At this point, it has to be highlighted that information on the L1(s) of the learner is not given since the corpus only provides information on the country of residence (see Gilquin 2015: 14). Nonetheless, the learners' nationality is shown to correlate with the first language background (see e.g. Alexopoulou et al. 2015). For reasons of simplicity, the learners will be referred to as 'German learners of English' in the present study.

5.3.2 Verb Selection

Ten verbs, 5 target-*ing* and 5 target-*to* verbs (see Table 7 below), with a relatively high frequency in the catenative verb construction in the BNC were selected to ensure that enough observations for the catenative verb construction could be found in general and across all proficiency levels in the corpus. These verbs, which is partially identical to the set tested in Chapter 4, occur mostly in the simple catenative verb construction (cf. Section 3.1 for more information) and can also take other complement types.

Table 7 shows the frequency of the catenative verb in all of its occurrences ('MV'), its frequency in the catenative verb construction ('MV+Compl') as well as its faithfulness to it.

Table 7 Corpus Study: Verb Selection and BNC Frequencies

Group	**Catenative Verb**	**MV+Compl** (relative freq./1 million words)	**MV** (relative freq./1 million words)	**Faithfulness**
target-*to*	***appear***[59]	105.76	295.03	0.3585
	fail	100.46	155.52	0.6460
	decide	84.15	235.06	0.3580
	tend	59.15	115.67	0.5114
	seek	58.23	163.67	0.3558

[59] Depending on the grammar, the *to*-inf. complement after *appear* and *tend* are analysed as 'subject complements' / 'raised complements' (see e.g. Huddleston & Pullum 2002: 65). However, since in the simple catenative verb construction, they are semantically and syntactically tightly connected to the matrix verb and the subject of the matrix clause, they will be considered as subclass of catenative verbs, in line with Palmer's (1974: 208–209) classification.

target-*ing*	***avoid***	21.12	116.88	0.1807
	enjoy	17.09	140.46	0.1217
	finish	8.27	112.73	0.0733
	mind	7.85	74.43	0.1055
	risk	6.03	19.68	0.3064

When looking at the token frequency of the verb in the catenative verb construction (normalised frequency), we find a skewed/Zipfian distribution, with *appear* having the highest and *risk* the lowest frequency in the catenative verb construction. We can also see that the faithfulness of the verb for the catenative verb construction ranges from very low values, such as 0.0733 for *finish*, to very high ones as for example 0.6460 for *fail*. It will be interesting to see whether these uneven distributions are also reflected in the learner texts.

5.3.3 Data Collection and Coding

The verbs presented in Table 7 above were searched for in the corpus[60] manually, using 'AntConc', an analysis toolkit for concordancing and text analysis (Anthony 2015). Each verb of the list was entered with the wildcard '*' at the end in order to obtain all inflected forms of the verb. For irregular past tense forms, the respective form was entered as a search string (e.g. *seek – sought*). The sentences were checked manually and cases in which the verb was used in the correction comment by the Englishtown proof-reader were not considered[61]. Each sentence found for the verb was copied into an excel spreadsheet, including the metadata on each learner and text, and coded according to the categories listed below in Table 8.

The metadata that were relevant for the present study include the level, unit, topic, learner ID, and writing ID of each piece of text. The data were coded for the matrix verb searched for, the complement type occurring after the matrix verb, the form of the complement type (e.g. noun phrase, to-inf. complement, declarative content clause, etc.), any intervening

[60] Since the corpus was under maintenance during the conduction of the present study, the subcorpus was downloaded as a text file with friendly permission of the University of Cambridge. Special thanks to Dora Alexopoulou and Akira Murakami.
[61] In some texts, the forms corrected by the proof-readers from *Englishtown* are given (Geertzen et al. 2015). The corrected forms are tagged and the original forms are preserved in the text file.

element between the MV and the complement[62] and the information on the frequencies shown above in Table 7. The variable 'complement type' includes the syntactic functions of e.g. direct object, the internal complement of the verb or catenative complement (see Table 8). At this point, it is important to mention again that the classification of complements was largely based on *The Cambridge Grammar of the English Language* (Huddleston & Pullum 2002), where a sharp distinction between direct objects (e.g. in the form of noun phrases) and the function of catenative complements is drawn. Accordingly, an *-ing* complement like in *I enjoy* [*reading*] is not analysed as a direct object but as a catenative complement (see Section 3.1 for more information on the syntactic status of catenative complement).

For all sentence functions, the form of the complement type was determined. Examples of complement forms are noun phrases, prepositional phrases, declarative content clauses, *to*-infinitivals, gerund-participials etc. The variables, as well as their abbreviations and examples, are given in the following table and an extract of the excel file with the data is provided in Appendix C I.

Table 8 Variables Used in the Annotation of the Data

	Variable	Variable Levels and Examples
1	**SentenceID (**The ID in this data set.)	
2	**WritingID** (The writing ID given in the corpus)	
3	**Level** (Level in *Englishtown*)	1, 2, 3…, 16
4	**Unit (**Learning unit in *Englishtown*)	1, 2, 3, …, 8
5	**CEFR:** level according to the CEFR	A1, A2, B1, B2, C1, C2
6	**TopicID** (topic ID provided in corpus)	
7	**Topic:** Topic of text.	E.g. 'Helping a coworker deal with a phobia'
8	**LearnerID** (the ID assigned to an individual learner provided in the corpus)	
9	**MV** (one of the 10 matrix verbs searched for in the corpus)	e.g. *fail*, *avoid*
10	**Sentence** (the sentence in which the verb is used)	*I really would enjoy learning with your online study program.*
11	**Group** (group of the verb)	target_to vs. target_ing
12	**Compl_Type** (the type of complement taken by the matrix verb)	- direct_obj (direct object, e.g. *I enjoy [the food*]) - intern_compl (internal complement, e.g. It is difficult to decide [what is true or false].)

[62] Since there were only 11 observations with an intervening element, as shown in the following example, this variable was not taken into consideration for the analysis: SentID 743 *I can not stand it, I will find a new job to avoid [**things**] being more awful.*

		- subj_compl (subject complement, e.g. […] *the composition appears* [*well-balanced*].) - relcl_obj (object in relative clause, e.g. I grew up in a big city and now I'm living in a small village [which] I really enjoy.) - prep_compl (prepositional complement, e.g. *I finished [with work]*) - preposed_obj (preposed object[63], e.g. *Tell me [what] you decided*.) - cat_compl (catenative complement, e.g. *I enjoy* [*reading in bed*] or *I decided* [to leave]) - adjunct[64] (e.g. *I thought a murderer will appear [every minute]*. - none (e.g. *Enjoy*!)
13	**Compl_Form** (complement form, i.e. phrasal type of the complement)	e.g. noun phrase (NP), prepositional phrase (PP), relative pronoun (relprn)[65], declarative content clause (thatCl), interrogative content clause (whCl),interrogative pronoun (interroprn), adverb phrase (AdvP), adjective phrase (AdjP), bare infinitival (inf), *to*-infintival (to_inf), gerund-participial (ger_part)
14	**catother** (binary dependent variable)	cat vs nocat; catenative complement or non-catenative complement (all complements that were no catenative complements subsumed)

In order to assess whether the sentences with a catenative verb construction contained the target-like catenative complement, a subset with sentences that contain a catenative complement was created. Here the variable 'target-likeness' (levels: target-like (tl) or non-target-like (ntl)) was added and the catenative complements were annotated manually with regard to their target-likeness for the respective verb on the basis of the BNC corpus study described in Section 3.4. An example of a non-target-like catenative complement after the verb *enjoy* produced by a learner on the C1 level can be seen in the following:

(5) * *You will enjoy <u>to</u> <u>cook</u> delicious meals as well as you will enjoy* [*to eat them on the amazing rustic porch*]. (SentID 1391)

[63] In cases where the catenative verb was in passive voice as in "*Due to that talent even some serious faults could have been avoided"*(SentID 762), the object of the active sentence, which becomes the subject in the passivised sentence, was coded as a 'preposed object'.

[64]Adjuncts are grammatically speaking no complements, still, I included them into the analysis in order to account for all forms of sentence functions that are produced after the matrix verb. If there was no complement, object, or adjunct after the verb, this was annotated as 'none'.

[65] This category was also used for sentences in which the relative pronoun was omitted due to reasons of consistency.

Spelling mistakes or grammatical mistakes after the verb in the catenative complement (e.g. concerning word order) were not taken into consideration in the analysis.

5.3.4 Statistical Analysis

As mixed-effects models are particularly suitable for investigating large and unbalanced datasets such as corpus data (Baayen et al. 2008: 410), these were fitted to the data. As for the experimental data presented in Chapter 4, the models were built with R (R. Core Team 2017, version 3.4.2) and the R package rms (Harrell 2017, Version 5.1-1). R^2 values were calculated with the R MuMIn package (Barton 2018, version 1.40.4.) and effect plots were created using the R *effects* package (Fox 2003).

For the first set of research questions, the dependent binary variable was 'catother' (levels: *cat* vs. *nocat*), that is whether the complement produced by the learner was a catenative complement or any other type of complement (direct objects, internal complements, as well as the other levels, were summarised to the level 'nocat', see Table 8). The LearnerID was specified as a random intercept. The predictor variables (or: independent variables) that were of interest were as follows:

- **CEFR**: CEFR proficiency level A1-C2
- **Group**: target-*ing* vs. target-*to*
- **freq_mv**: token frequency of the catenative verb (log10)
- **freq_catcxn:** token frequency of the catenative verb construction (log10)
- **faithfulness**: freq_catcxn/freq_mv
- **TopicID**: the topic of the text that the learner had to write about

As shown in Chapter 4, the token frequency of the matrix verb in its overall use is highly correlated with the token frequency of the verb in the catenative verb construction, which could lead to potentially harmful collinearity in the statistical analysis of the data. This is why it was essential to test for multicollinearity between the frequency variables listed above (for more information see Section 4.2.5).

As Figure 14 shows, the frequency of the verb in the catenative verb construction (log_catcxn) correlates strongly with the matrix verb frequency (log_mv) with $r = 0.86$ ($df = 555$, $p < 0.001$), as well as with faithfulness ($r = 0.88$, $df = 555$ $p < 0.001$). There is a medium correlation between log_mv and faithfulness with ($r = 0.53$, $df = 519$, $p < 0.001$).

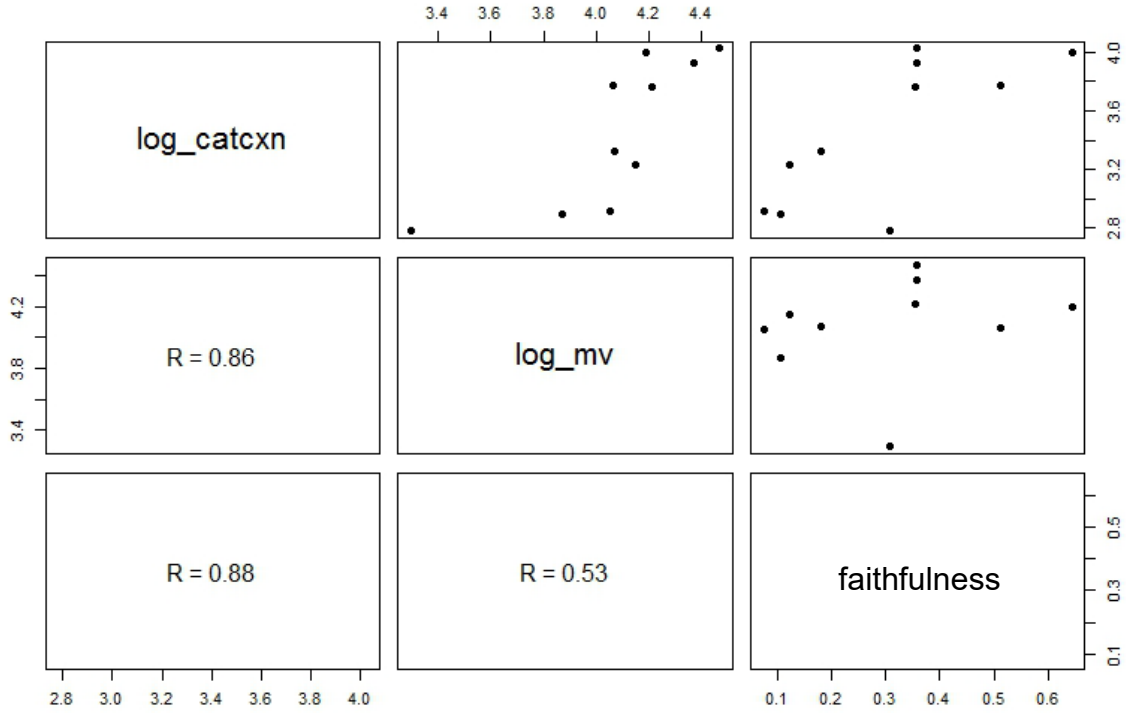

Figure 14 Corpus Study: Matrix Plot of Correlations between Frequency Measures

The condition number (kappa-coefficient) for the variables is 294.11 which indicates a high degree of collinearity. A random forest analysis (see Appendix C II for a dot chart of conditional variable importance) shows log_mv has the highest value with 0.014, followed by the log_catcxn frequency (0.007). By contrast, the conditional importance of faithfulness was very low (0.001). Still, due to the high correlation values that were shown above, as well as for reasons of comparability with the experimental studies in Chapter 4, only a model fitted with faithfulness and log_mv will be presented in this chapter, as these two variables have the lowest correlation value.

To statistically examine the target-likeness of the catenative complement, the statistical analyse were run on a subset of the data with those observations that contained the catenative verb construction only. The binary dependent variable was 'target-likeness' (target-like vs. non-target-like). The predictor variables were the same as above. However, the proficiency level of the learners was summarised as the levels A (A1+A2), B (B1+B2) and C (C1+C2), because of the low number of observations on the C levels. The random factor that was

specified as a random intercept for the corpus study model was the topic ID of the text produced in order to minimise task-based effects[66].

In both cases, the model selection was similar to the one used in the production task in the previous chapter (see Section 4.2.5). A maximal generalised linear mixed model (see Menard 2002), i.e. a model including all predictor variables, was computed. The predictor variables were then reduced stepwise and assessed by model comparison on the basis of log-likelihood values. Different interactions between the significant predictor variables were added and only included in the model if they showed a significant improvement.

5.4 Results

5.4.1 Overview

The search for the catenative verbs under investigation yielded 2,028 sentences in the German subcorpus of the EFCAMDAT. Before we inspect the data with regard to the research questions introduced in Section 5.2, we will look at how the sentences are distributed across the different proficiency levels and how many hits we find for each verb.

Altogether, the data stem from 1030 different learners (some learners produced more than one sentence in the present data set) and are distributed as follows:

[66] TopicID was here specified as a random intercept instead of LearnerID for two reasons. In the first model for the assessment of the factors that determine the choice of a catenative complement over a non-catenative complement, the impact of the topic was tested as a fixed factor. In this case, however, the impact of the topic on the target-likeness was not of interest and was therefore controlled for. Second, the number of observations per participant in the corpus study was 1.9 sentences per learner on average, which was too small to use 'subject' as a random factor for the mixed model.

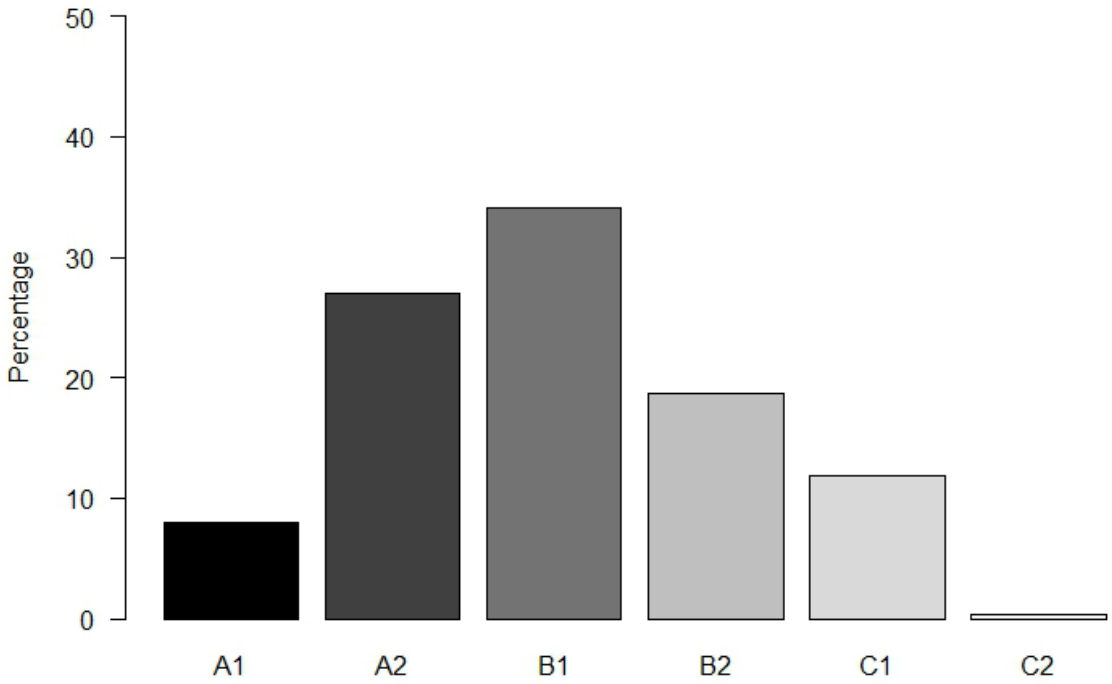

Figure 15 Proficiency Level (CEFR) Distribution (n= 1030)

As can be seen in the bar chart, the distribution is approximately symmetrical. The majority of the sentences with a catenative verb, which is 34.08% (691/2,028), was produced by learners on a B1 level (levels 7-9 in *Englishtown*), followed by learners on an A2-level (levels 4-6) with 27.02% (548/2,028). Only a small number, namely 0.35% (7/2,028), of the sentences were produced by highly advanced learners (C2/level 16). Generally, the number of learners on a C2 level (level 16) in the entire German subcorpus is relatively low (see Table 6, Section 5.3.1).

The table below displays the total number of hits as well as the number of catenative complements (i.e. the catenative verb construction) for each verb. Additionally, the percentage of catenative verb constructions in relation to all hits is shown:

Table 9 Overview of Findings

Group	Verb	Total	Cat. Cxn total hits	Percentage cat v cxn/all hits
target_*to*	*appear*	65	10	15.38%
	fail	22	6	27.27%
	decide	430	307	71.40%
	seek	67	3	4.48%
	tend	14	13	92.9%
target_*ing*	*avoid*	221	60	27.15%
	enjoy	666	122	18.32%
	finish	495	5	01.01%
	mind	31	15	48.39%
	risk	17	8	47.06%
	Total	**2,028**	**549**	**27.07%**

From the 2,028 sentences with one of the ten catenative verbs under investigation, 549 contained a catenative complement, which constitutes 27.07% of the data. Furthermore, it can be seen that the number of hits per verb is not distributed equally and does not mirror the distribution found in the BNC (see Table 7, Section 5.3.2). For instance, while *enjoy* had 666 hits, *tend* was found in 14 sentences only, despite the fact that *tend* has a relatively high frequency in the BNC. Furthermore, the verbs behave very differently with regard to the type of complement they take: some verbs occur more often with a catenative complement and less often with a non-catenative complement than others and vice versa. To mention two striking examples, consider the verbs *decide* and *finish*: while the target-*to* verb *decide* has the highest number of catenative complements produced (*n*=307), *finish* takes the lowest number of catenative complements from all verbs in the target-*ing* group (*n*=5) and the highest number of non-catenative complements. A sentence with each complement type is given in (6) and (7):

(6) **Non-catenative complement** (direct object): *Here I started and **finished** <u>the elementary school</u>.* (SentID 1681)

(7) **Catenative complement:** *On Friday the 29th of May at 5pm I **finished** <u>working</u> at New York office.* (SentID 1904)

What can also be deduced from Table 9 above is that the target-*ing* verbs were used more often than the target-*to* verbs in general. As a matter of fact, 1430 (70.5%) of the sentences contained one of the five target-*ing* verbs and only 598 (29.5%) one of the five target-*to*

verbs. However, the latter were more often produced in the catenative verb construction. From the 548 sentences with a catenative complement in the whole data set, 220 were instances with a target-*ing* verb and the remaining 339 sentences contained a target-*to* verb.

5.4.2 The Choice of the Catenative Complement vs. other Complement Types

The first research question asked what complement types are used by the learners after the catenative verbs and how they are distributed. As explained in 5.3.3, the complement following the catenative verb was coded according to whether it was a catenative complement, a direct object, an internal complement of the verb, a preposed object, an object in a relative clause, etc. (see Table 8 in 5.3.3 for details and examples). However, some complement types such as preposed objects were highly infrequent in the data (only nine sentences were found with a preposed object). This is why the levels of the variable 'Compl_Type' were reduced to four categories: catenative complement, direct object, internal complement of the verb and other types of complements ('other' = adjuncts, preposed objects, relative clause objects, complements of a preposition as well as subject complements). The category of the complement type 'intern_compl' (internal complement of the verb) was kept since some verbs, such as *appear* or *decide*, often take an internal complement in e.g. the form of a *that*-clause in the English language, which is why it was interesting to see whether learners prefer the internal complement of the verb more than a catenative complement.

Figure 16 shows an overview of the complement types and their distribution (in percentages). Direct objects were the most frequent complement types: direct objects were found in 1170 of the sentences, which constitute 57.69% of the data, followed by catenative complements, which could be found in 549 sentences (27.07%).

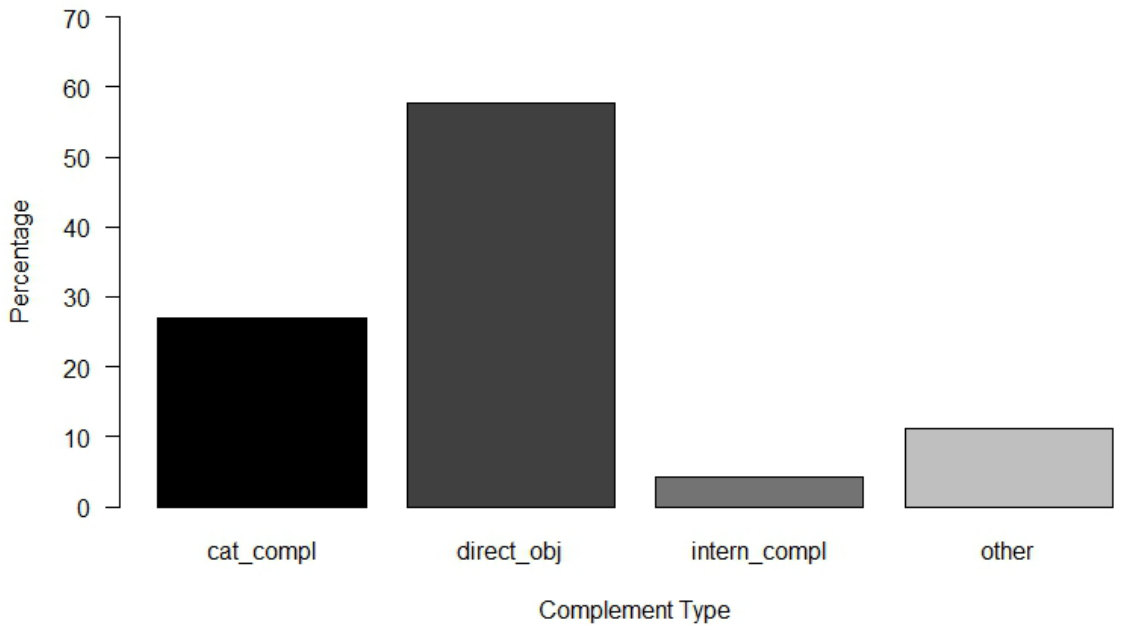

Figure 16 Distribution of Complement Types (n= 2,028)

Internal complements of the verb were found in 4.14% (84/2,028) of the data and those complements which were subsumed under the category 'other' constitute 11.09% (225/2,028) of the sentences found with the catenative verbs under investigation. Example sentences from the data are provided as follows:

(8) **Direct Object:** *I was happy to hear that you finished* [*the exams*] *being the best of all.* (SentID: 1916)
(9) **Catenative Complement:** *I decide* [*to take the english lesson program*]*, because I need to speak more fluently than I do know.* (SentID 362)
(10) **Internal Complement**: **It appeared* [*that it would never again*]. (SentID 65)
(11) **Other** (here: relative clause object[67]). *I grew up in a big city and now I'm living in a small village* [*which*] *I really enjoy*.

Before coming to the effects of the predictor variables on the complement choice, it will be interesting to take a look at the distribution of sentences produced with a catenative verb across the different proficiency levels (see Figure 17):

[67] The relative pronoun *which* links back to the antecedent noun *village* (cf. Huddleston & Pullum 2002: chapter 12 for more information on relative clause constructions) and is therefore analysed as the object of the relative clause.

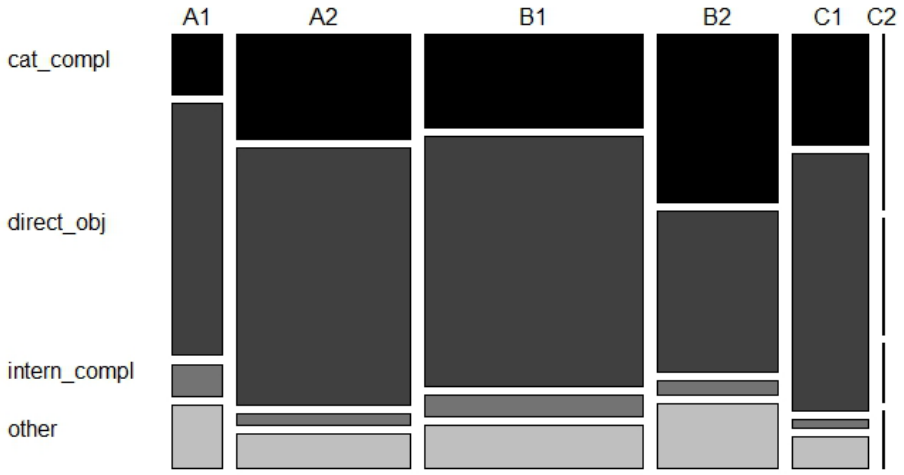

Figure 17 Distribution of Complement Types Across Proficiency Levels (n = 2,028)

Figure 17 shows the distribution of the four complement types for each CEFR level from A1 to C2 (raw counts). This mosaic plot is to be interpreted as follows: larger boxes represent larger datasets with different complement types (see labels to the left of the plot). We can see that the number of catenative complements rises from the A1 to A2 level (from 24 to 141 catenative complements). It increases only slightly on the B1 level to 159 catenative complements and on the B2 level, we find 157 catenative complements. This is the highest number of catenative complements produced across all levels and is even slightly higher than the number of direct objects produced on this level (149). In other words, 41.32% of all complement types are catenative complements. On the C1 level, we find fewer catenative complements (65) and more direct objects (151). The number of observations by C2-level learners is very low (n = 7), which is why I will not go into detail here. Taken together, on the A1, A2, B1 and C1 level around 62% of all sentences had a direct object and between 15-27% catenative complements. With regard to the other complement types, the number was generally low, in particular, the sentences where the matrix verb was followed by an internal complement. Still, internal complements as well as 'other' complements increase as well from the A1 to the B1 level and are produced almost twice as frequent as on the beginning level. On the C1 level, fewer complements of these types are found.

In the following, the results obtained from the mixed-effects model will be presented. The primary question was which frequency measures can predict the choice of a catenative

complement over other complement types (the matrix verb frequency or faithfulness). Furthermore, the proficiency level, the topic[68], and the group of the verb were tested among other factors. The regression model was fit by first taking all predictor variables into consideration and then by discarding those variables which were not significant with regard to the prediction of the complement type. Different combinations of predictor variables were tested and chosen according to the best overall fit. The formula of the final model is as follows:

catother ~ CEFR + log_mv + faithfulness + (1 | LearnerID)[69]

Table 10 presents the coefficients of the fixed effects, standard errors (*SD*), *t*-values and R^2 values. The reference level of the dependent variable 'catother' is 'cat' (i.e. catenative complement).

Table 10 Corpus Study: Fixed Effects Predicting a Catenative over a Non-Catenative Complement

	estimate	***SE***	***z*-value**	***Pr(>|z|)***
Intercept	7.9270	1.9293	4.109	3.98e-05***
CEFR A2	-0.9413	0.2887	-3.260	0.001113**
CEFR B1	-0.6006	0.2841	-2.114	0.034506 *
CEFR B2	-1.1403	0.2945	-3.872	0.000108***
CEFR C1	-0.8914	0.3180	-2.803	0.005067**
CEFR C2	-0.8711	1.0040	-0.868	0.385591
log_mv	-1.0476	0.4716	-2.221	0.026344*
faithfulness	-7.6470	0.6639	-11.52	< 2e-16***
Marginal R^2	0.2608			
Conditional R^2	0.3511			
No. of observations	*2,028*			

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

First, we can see that only the proficiency level of the learners, the matrix verb frequency (log_mv) and the faithfulness made a significant prediction, while e.g. the group of the verb

[68] Since the number of topics was very high (there were 128 different task prompts) and the dataset too small in comparison, the model failed to converge with TopicID as a fixed factor, which is why it has to be discarded from the analysis.

[69] Random effects:

Groups	Name	Variance	Std.Dev.
LearnerID	(Intercept)	0.4453	0.6673

had no impact on the choice of the complement type. In total, 35.1% (Conditional R^2) of the variation found in the data can be explained by the model at hand.

The effects of the significant predictors are visualised in Figure 18. As can be derived from the analysis, a catenative complement gets more likely with increasing proficiency (the reference level is 'A1'. The most salient effect can be seen when comparing the A1 level with the B2 level: here the probability of a catenative complement was especially high (-1.14, *SE* = 0.29, *p* = 0.00011). The only level that did not yield any significant results was the C2-level.

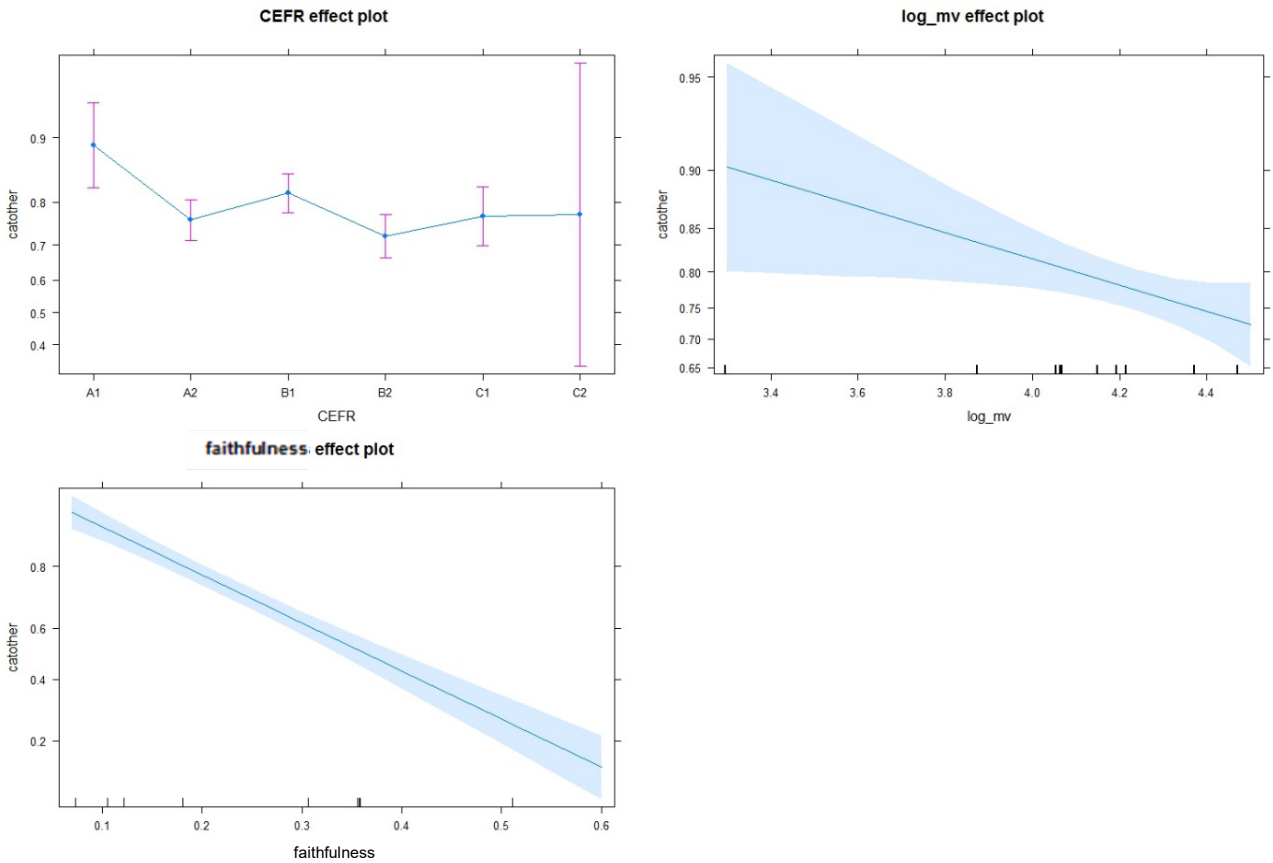

Figure 18 Corpus Study: Effect Plots Catenative vs. Non-Catenative Complement

Coming to the frequency measures, we can find a strong faithfulness effect: the higher the faithfulness for the catenative verb construction, the less likely a non-catenative complement gets (-7.65, *SE* = 0.66, $p < 0.0001$). A similar effect can be seen with the frequency of the matrix verb, even though the effect is smaller (-1.05, *SE* = 0.47, *p* = 0.02644). More specifically, we see that the more frequently the verb occurs in English overall, the more likely a catenative complement. Note that the interaction between the proficiency level and

the frequency measures did not yield a significant effect. These results and their implications will be discussed in 5.5.1.

5.4.3 The Catenative Verb Construction

Now it will be interesting to see whether the catenative complements produced are target-like, i.e. whether the catenative verbs were combined with the distinct complement type (*to*-inf. vs. -*ing*) and which factors have an influence on this choice. Table 11 below presents the total number of catenative complements per verb found in the EFCAMDAT corpus, the number of the distribution of target- and non-target-like catenative complements, as well as the proportion of target-like catenative complements in relation to all catenative complements, found:

Table 11 Distribution of Target- vs. Non-target-like Catenative Complements

Group	**Verb**	**All Catenative Compl.**	**Target-like Catenative Compl.**	**Non-target Catenative Compl.**	**Percentage Target-like/all Hits**
target_to	***appear***	10	10	0	100%
	fail	6	6	0	100%
	decide	307	299	8	97.39%
	seek	3	3	0	100%
	tend	13	13	0	100%
target_ing	***avoid***	60	46	14	76.67%
	enjoy	121	102	19	84.3%
	finish	5	5	0	100%
	mind	15	7	8	53.33%
	risk	8	3	5	37.5%
	Total	***548***	***494***	***54***	***90.15%***

The most surprising observation is the relatively low number of non-target-like catenative complements in general: only 54 (9.85%) of the 548 catenative complements are not in line with a native speaker's preference of the complement form. When looking at the two verb groups, we can see that the number of target-like uses of the catenative verb construction with one of the target-*to* verbs was very high; only 2.4% of all uses were non-target-like. In the target-*ing* group, however, the number of non-target-like catenative complements was higher with 22.00%. Example sentences for target- and non-target-like instances are given in (12) to (16).

(12) *John and Isabella* ***decided*** ***<u>to leave</u>*** *the ship meanwhile the next stop at the New York harbour.* (SentID 159, Level 6/A2)

(13) *You will **enjoy** **sleeping** in on of the three great bedrooms*. (SentID 1390, Level C1)
(14) *[…] *I would have the freedom to **decide** **making** changes on the house*. (SentID 396, Level B2)
(15) **Would you **mind** **to have** dinner at our house, next week, instead?* (SentID 2006, Level B2)
(16) **Even the song has not a happy lyric, I **enjoyed** **to listen** to the music.* (SentID 1148, Level B1)

Most non-target-like catenative complements (41/46) had the form of a *to*-infinitive occurring after target-*ing* verbs as in (17) and only 3 instances out of 8 non-target-like sentences are attested in the data where the catenative complement was an -*ing* complement after a target-*to* verb as shown in (16).

As mentioned in 5.3.4, a maximal generalised linear mixed model was fitted by first taking all predictor variables into consideration and then by discarding those variables which were not significant with regard to the prediction of the binary dependent variable 'target-likeness' (tl vs ntl). The final model with the predictor variables that were chosen according to the best overall fit (R^2 value = 0.3827) has the following formula:

target_like ~ ABC + log_mv + faithfulness + (1 | TopicID)[70]

Table 12 below the outcome of the final mixed-effects model, including the coefficient estimates, the standard errors (*SE*), *z*-values, and the *p*-values.

Table 12 Corpus Study: Fixed Effects Predicting a Target-Like Catenative Complement

	estimate	***SE***	***z*-value**	***Pr(>|z|)***
Intercept	-20.0258	3.8820	-5.159	2.49e-07 ***
Level B	0.4603	0.4338	1.061	0.28870
Level C	1.9093	0.7549	2.529	0.01143 *
log_mv	4.9489	0.9445	5.240	1.61e-07 ***
faithfulness	5.0570	1.7638	2.867	0.00414 **
Marginal R^2	0.3256			
Conditional R^2	0.3827			
No.of observations	*548*			

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

[70] Random effects:
Group Name Variance Std.Dev.
Topic (Intercept) 0.319 0.5648
Number of obs: 548

The intercept of the model has a relatively high estimate, which is due to the high number of target-like catenative complements overall. Furthermore, one can find a positive effect of the log-transformed token frequency of the matrix verb (+4.95, $SE = 0.94$, $p < 0.001$) as well as of faithfulness (+5.1, $SE = 1.76$, $p = 0.00414$) on the level 'target-like', which means that the higher the frequency of the matrix verb as well as its faithfulness to the catenative verb construction was, the more likely the target-like catenative complement was used. The proficiency of the learners also had a significant effect on the production of a target-like catenative verb construction but only when comparing the discrepancy between lower level (A-level) and high proficiency learners (C-level, + 1.91, $SE = 0.75$, $p = 0.1143$)). These effects are also visualised in Figure 19.

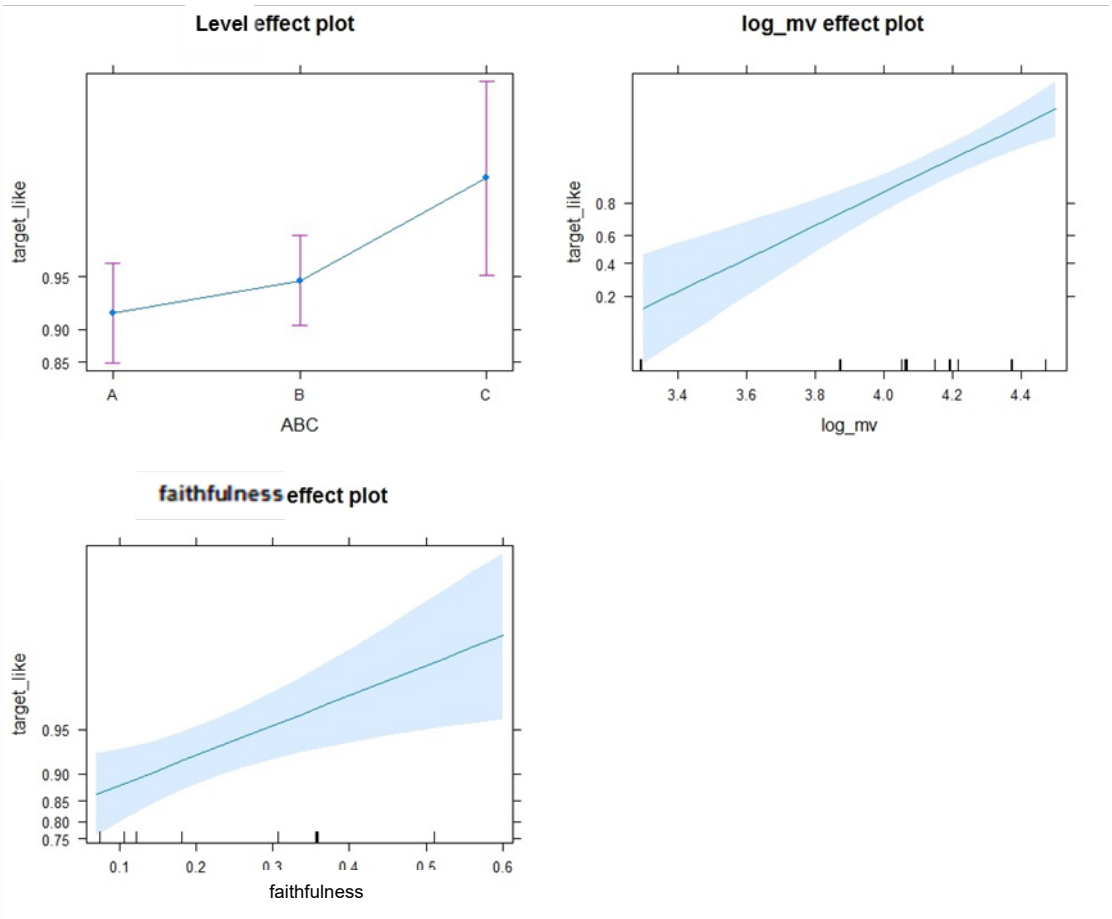

Figure 19 Effect Plots Target-Likeness of Catenative Complement

Neither a significant effect of the group of the verb nor an interaction between proficiency level and the frequency-related factors was found in the analysis.

5.5 Discussion

5.5.1 Frequency and Proficiency Increase the Chance of a Catenative Verb Construction

In this section, the results will be discussed in light of the first set of research questions, which dealt with the complement types that are used with the verbs under investigation. It also addresses the effects of frequency and proficiency on the complement choice.

The first question addressed by the examination of the data was what complement types are used with the catenative verbs under investigation and how are they distributed in the German subcorpus of the EFCAMDAT. As shown in Table 9 above (Section 5.4.1), 2,028 sentences with the ten catenative verbs were produced by 1030 different learners. From these 2,028 sentences, the majority contained a direct object with 57.69% (1170/2,028), and 27.07% (549/2,028) a catenative verb complement. As established by the mixed-effects model, the frequency of the matrix verb as well as the faithfulness of the verb for the catenative verb construction made significant predictions of whether the learners produce a catenative complement or not (i.e. any other complement type). In addition, a significant impact of the proficiency level could be attested: a higher proficiency level increased the likelihood of a catenative verb construction. These factors accounted for 35.1% of the variation found in the data (conditional R^2 = 0.3511), which is a relatively high value considering the fact that there are multiple factors that have an impact on the complement choice.

On a theoretical level, the results indicate that the higher the familiarity with the catenative verb is (in other words: the more frequently it has been encountered), the more often it will be produced in general, which increases the chance of the verb to be found in the catenative verb construction. This is enhanced when the verb has a high faithfulness to the catenative verb construction (i.e. a strong form-function contingency), and is, therefore, more likely to be encountered in this specific construction in the input (cf. Goldberg 2006; Bybee 2008). If the verb is experienced in this construction with a high frequency, it can become more strongly associated with this construction, and processed with less effort and interference from “paradigmatic competitors” (Schmid 2017a: 11–12; cf. also Goldberg 2016). This is, of course, closely related to the effect of proficiency: the more experience the learners have with the target language, the higher the chances that they will use a wider range of (verb-argument) constructions.

Similarly to processes in L1 acquisition (see e.g. Brooks & Tomasello 1999; Tomasello 2003), the catenative verb is learned to be used not only in one specific verb-argument construction (for instance, the ditransitive construction) but also in other (comparably lower frequent or more complex) constructions with increasing proficiency. In order to know, for instance, that the verb *fail* cannot only take a nominal complement (*I failed* <u>*the exam*</u>) but also a catenative complement (*I failed* <u>*to pass the exam*</u>), learners have to have witnessed this specific verb being used in this construction or in the case they have not experienced it before, make the inference on the basis of a perceived compatibility with a more abstract schema of the catenative verb construction. However, if the verb is found more often in a different construction and is entrenched in it, it is unlikely that learners will use the verb with a catenative complement. They will choose the construction which is more readily accessible, as far as it expresses the desired communicative proposition.

Another point that is worth discussing is the learners' production of nominal complements, i.e. direct objects. The high number of direct objects in the corpus data is not surprising for several reasons. First, it can be attributed to the fact that eight out of the ten verbs examined in the corpus can occur in a transitive construction, i.e. with a direct object (only two of the verbs, namely the target-*to* verbs *appear* and *tend*, do not occur in this construction). Consequently, we find a high proportion of direct objects, primarily after target-*ing* verbs (see Table 9, Section 5.4.1). As mentioned before, target-*ing* verbs have a lower token frequency in the catenative verb construction, as well as a lower faithfulness to the catenative verb construction in comparison to target-*to* verbs, and are therefore more likely to occur in other constructions.

To give an example, the target-*ing* verb *finish* is relatively infrequent in the catenative verb construction in relation to the other verbs under investigation (to be more specific: it occurs 8.27 times in the catenative verb construction per million words in the BNC and its faithfulness to the construction is 0.07), which is also reflected in the result. Only 1% (5/495) of the sentences produced by the learners contained a catenative complement (see (18) for an example), while the remaining 99% (490/495) contain other constructions, such as a direct object (see (17)).

(17) *In the evening at 8 o'clock I **finish** work and drive to my home.* (SentID 1497, Level A1, Topic 'Describing your favorite day')

(18) *On Friday the 29th of May at 5pm I **finished** working at New York office.* (SentID 1902, Level B1, Topic: 'Describing a business trip')

Second, nominal complements are an unmarked complement type since they are generally highly frequent in English (i.e. not only in constructions with catenative verbs) and less complex than verbal complements[71]. In the case of the catenative verb construction, it can be said to be cognitively more complex as its meaning derives from a number of different elements that have to be interpreted as a whole. In other words, it consists of different constructions combining as one, namely the main and the subordinate clause construction (which then again are comprised of smaller constructions). Their forms are, therefore, more tightly integrated into each other on a semantical level than it is the case for constructions with a matrix verb and a nominal complement or even a complement clause with a finite head (see Diessel 2004: 59). Accordingly, it can be assumed that the more cognitively demanding and less frequent catenative verb construction is (subconsciously) avoided by less proficient learners. This could particularly be the case when the less marked and ultimately more entrenched direct object can express a similar semantic concept[72] (cf. *finish work* vs. *finish working*). However, the findings of the study also suggest that with rising proficiency, learners develop constructional knowledge of more marked structures, as the number of non-catenative complements decreases with rising proficiency and the verbs are more often produced with a catenative complement the higher the verb's faithfulness to the catenative verb construction.

However, more research is needed to specifically investigate whether and why the choice between a direct object and a catenative complement compete in some contexts, as this goes

[71] Note, however, that the relationship between complexity and frequency can be difficult to tease apart, as they often correlate. Diessel (2004: 74), who raises this issue in his study on the L1 acquisition of non-finite clauses, states: "Since the most frequent structures tend to be the ones that are semantically simple and morphologically unmarked, the two factors, frequency and complexity, are difficult to disentangle". In this case, we can see that the nominal complement is not only semantically and morphologically more 'simple', but is also highly frequent at the same time.

[72] Of course, the meaning is rarely synonymous since in the case of the verbal complement more emphasis is on the action expressed in the complement, while in the case of a nominal complement, it is an entity, i.e. the patient, affected by the verb.

beyond the explanatory power of the present data. Another related issue that requires further work is the syntactic or rather 'cognitive' status of the *-ing* complement. As mentioned in Chapter 3, there is a controversy whether its function is best described as a direct object or a verbal/catenative complement. Even if the *-ing* complement has some noun-like attributes (to name one feature, it can be pronominalised similarly to noun phrases in object position (*I love* [*reading books*] → *I love* [*it*]), there are still enough differences on a formal and meaning level to assume that the *-ing* complement is not synonymous with a noun (rather we could speak of a continuum between a verb and a noun), and has not the same function as a nominal complement (direct object). For instance, we find differences with regard to its phrase structure (in contrast to a noun, it usually does not occur with a determiner or modifier) or its morphological form (i.e. the *-ing* inflection of the verb). In a constructionist framework, there is, therefore, no doubt that these two complement types constitute two distinct constructions, as aspects of their form and meaning differ. However, the question here is not what (grammatical) label to use but to assess whether these complement constructions are different in terms of the cognitive effort in production and parsing. To address these issues, psycholinguistic studies (see also McDonough & Trofimovich 2012 for an overview of different methods in SLA research), such as reaction time experiments (e.g. a self-paced reading task), could tell more about the processing of a nominal versus a catenative complement.

5.5.2 The Target-Likeness of the Catenative Verb Complement

The second part of the analysis (see Section 5.4.3) dealt with the question of whether learners develop a target-like representation of catenative verb constructions, i.e. whether they choose the catenative complement that is preferred by native speakers. Furthermore, it sought to find out whether frequency and proficiency level have an effect on the production of a target-like construction and whether we find a difference between target-*ing* and target-*to* verbs.

First, one unanticipated finding was the low number of non-target-like catenative complements: only 54 (9.9%) of the 548 constructions found in the corpus were not in line with a native speaker's preference of the complement form determined on the basis of the BNC. This speaks in favour of a target-like representation of the construction. As ascertained by the mixed-effects model presented in Section 5.4.3 (see Table 12), frequency, and

proficiency significantly predict the production of a target-like construction and account for 38.37% (conditional R-square value) of the variability found in the data. The effect of the learner's proficiency is expected, since with more experience the learners gradually acquire a larger repertoire of different constructions as well as knowledge on their distribution in the target language, as already mentioned above in 5.5.1. Furthermore, frequency is not only shown to predict the production of the verb in the catenative verb construction but also whether the produced catenative verb construction is target-like or not. In more detail, both the frequency of the matrix verb as well as the verb's faithfulness significantly predict the choice of the target-like catenative complement. The effect of faithfulness is in line with the findings presented in Chapter 4 and suggests that the more often the verb is experienced in the catenative verb construction, the more strongly it is associated with it, or, in other words, the higher its degree of entrenchment.

The effect of faithfulness is also likely to be accountable for the high number of target-like constructions found in the data. Since the frequency (token frequency as well as faithfulness) of the majority of verbs examined in the catenative verb construction in this study was relatively high, it can be assumed that the learners were sufficiently familiar with the majority of verbs in the catenative verb construction. Second, learners tend to avoid less entrenched /unfamiliar or difficult structures, when they have the choice (see e.g. Gass & Selinker 2008: 178; Larsen-Freeman & Long 1991: 26). This is also reflected in the results for the catenative verbs, which are less frequent in the catenative verb construction than the other verbs examined in the corpus study. For instance, there were only a small number of sentences produced with the catenative verb construction with *mind* or *risk* (15 and 8 respectively; see Table 9, Section 5.3.2). In addition, with these verbs, a non-target-like catenative complement was more often found than with, for instance, the high-frequency verbs *avoid* or *enjoy*. This suggests that, if the learners had to use less frequent verbs, the number of non-target instances would have been higher, as demonstrated in the sentence completion task with advanced learners in Chapter 4.

As far as the two verb groups are concerned, we can see that the number of target-like uses of the catenative verb construction with one of the target-*to* verbs was very high; only 2.4% of all uses were non-target-like. In the target-*ing* group, however, the number of non-target-like catenative complements was higher (22.00%). Nevertheless, probably due to the small overall number of non-target-like catenative complements, a significant group effect could

not be attested in the prediction of a target-like catenative construction. This is why the overgeneralisation of the *to*-inf. complement after target-*ing* verbs is left to speculation. As it becomes evident from the data, the tendency is in line with the findings of previous studies (see Mazurkewich 1988; Schwartz & Causarano 2007[73]) as well as the findings presented in Chapter 4. We find instances where the *to*-inf. catenative complement was overgeneralised to verbs that take an -*ing* catenative complement as demonstrated in the following examples:

(19) **Would you **mind** **to tell** me, when you're free the next few days.* (SentID 2009)

(20) **I won't to **risk** **to get** up a relationship with another girl.* (SentID 2019)

However, this is again speculative as we mostly find only positive evidence for entrenched exemplars of the catenative verb construction. This calls for a discussion of some methodological issues, to which we now turn.

5.5.3 Methodological Considerations

Having discussed the theoretical implications of the results, we will now move on to the discussion of several methodological aspects. In particular, corpus-specific issues will be addressed which concern the design and data of the *EF Cambridge Open Language Database*. Moreover, the advantages and disadvantages of investigating learner corpus data as opposed to experimental data will be discussed.

As mentioned in the introduction, this study was of exploratory nature as it was not clear how well the relatively infrequent/marked catenative verb construction could be investigated in the EFCAMDAT corpus. This is why ten verbs that occur with a relatively high frequency in the catenative verb construction were examined to find enough attestations. We could see that these verbs yielded a different number of hits in total (i.e. in all constructions) despite their relatively comparable matrix verb frequency in native speaker data. In fact, there is only a small positive correlation between the number of sentences for each verb in the

[73] Note that the results and their implications of the study by Schwartz and Causarano (2007) have to be considered with caution: the number of -*ing* complements was relatively small in their sample (see ibid. 50, Table 1).

EFCAMDAT and the frequencies of the verbs in BNC, which is also not significant (r_S = 0.13, p = 0.70).

A distribution that is different from the one in a native speaker corpus such as the BNC is not unexpected for several reasons. First, the data were not collected for the compilation of a corpus in the first place. The writing tasks were instead developed for teaching purposes and not for the investigation of theoretical constructs in SLA research (Alexopoulou et al. 2015: 99). Therefore, text types are not balanced and register and task-based effects are likely to play a role in the use of certain constructions. To give an example, the verbs *enjoy*, *finish*, *decide* and *avoid* were used by the learners with a relatively high frequency in general, while e.g. *risk*, *mind*, *tend* or *fail* returned only a small number of hits. Thus, it can be assumed that some verbs are more likely to be used and found, depending on the semantic fields covered by the tasks. For instance, *enjoy* occurred in texts on topics such as 'Writing about what you do', 'Writing about a memorable experience', or 'Writing a resume' (see (21) to (23) below). These topics require the learners to express their personal attitude about a certain event or activity, which is also reflected in the subject of the sentence, which is the first personal pronoun *I* in all three instances:

(21) *After the meetings I'm tired and enjoy my freetime at home.* (SentID 902)

(22) *I enjoyed swimming, although I'm afraid of deep water.* (SentID1094)

(23) *I enjoy learning languages.* (SentID1043)

Of course, the effect of the task, as well as general register effects, require further research to assess more accurately their impact on the verb choice. This is true in spite of the fact it was attempted to control for it (see Section 5.3.4) by specifying the topic as a random intercept in the mixed model.

Another issue that can also have an impact on the verb choice and the target-likeness of the catenative constructions, in particular, has to do with the following design features of the learning platform *Englishtown*: the availability of model solutions and the existence of word limits for the production of a text (Alexopoulou et al. 2015: 101). In particular, this forces us to interpret the high numbers of target-like catenative verb constructions with caution, since we cannot be sure that learners have not copied fragments from the model solutions (they are not available in the corpus). Generally, as lays in the nature of an online course,

the production circumstances are not controlled for and since the focus is on accuracy in this learning program, we cannot rule out that additional sources such as grammars or dictionaries have been used by the learners.

Furthermore, most of the learners were on an A2 or a B1 level (lower and intermediate level) and only a little number of sentences by advanced learners could be found. The more advanced learners might have made use of the lower frequency verbs, also in the catenative verb construction, more often. The low number of advanced learners also reflects the nature of a learning platform like this; predominantly, beginners or intermediate learners of a foreign language register for a website such as Englishtown to improve their English skills. As soon as the desired level is reached, the learners are likely to drop out (see also Römer & Berger 2019: 5–6). Therefore, it is problematic to draw reliable conclusions with regard to the performance of highly advanced learners (C1 and C2 level).

Despite these problems of this particular corpus, we can say that learner corpora generally offer a complementary perspective on experimental data (see also e.g. Römer 2016, 2019b for a discussion of advantages of combining different methods) for reasons that are summarised in Table 13 below. One advantage of corpus data is that the production of the construction is not a result of manipulated experimental conditions but of a more natural text production process. As far as the 'naturalness' of linguistic data is concerned, Gilquin and Gries (2009: 5) locate corpus data from written texts on the highest rank of naturalness and "experimentation requiring subjects to do something with language they usually do not do" on the lowest position of the scale.

Table 13 Experiments vs. Corpus Studies (see Gilquin & Gries 2009)

Method	PRO	CON
Experiments	- can be controlled for numerous variables → less noise - suitable to investigate less frequent constructions	- smaller datasets - less natural
Corpus Studies	- large amount of data, many learners - different levels - more natural	- often little data on lower frequency constructions - less controllable → more noise

Furthermore, as highlighted above, corpora allow the investigation of a large number of learners with different backgrounds. This is generally harder to achieve in experiments since these are often based on small homogeneous samples. On the other hand, there are a number of advantages of experimental studies that target the shortcomings of corpus studies (see also Durrant 2014; Durrant & Siyanova-Chanturia 2015). For instance, experiments facilitate the controlling for different factors that might cause noise in the analysis of the dataset (e.g. the learner background, the production circumstances, the variables investigated, etc.). Furthermore, as Gilquin and Gries (2009: 9) point out, experimental data elicitation methods allow studying phenomena that are otherwise too infrequent to be investigated in corpora, especially with respect to the Zipfian distribution of many constructions. This also applies to the catenative verb construction, which is rather infrequent in comparison to other verb-argument constructions and has a Zipfian character as well (see Table 7, Section 5.3.2 for the distribution of verbs).

Another problem that corpus data has is that it often only provides positive evidence. In the case of the results presented in this chapter, we could see that approximately 90% of exemplars of the catenative verb construction were target-like, while in the production task with highly advanced learners we found more variation (75% of the catenative complements produced were target-like). These observations might be misleading for drawing conclusions on the entrenchment of the construction without further empirical evidence (see Durrant & Siyanova-Chanturia 2015: 74–75) As explained in the previous section (5.5.2), learners tend to use constructions that they are familiar with and which are often entrenched, rather than using infrequent constructions, especially if they have less complex alternatives to express a similar proposition. In experimental setups, avoidance of such constructions is not possible and can tell us more about how frequency operates in the mental representation of constructions in the learner's construct-i-con.

5.6 Conclusion

The present corpus study had the main goal to explore how the catenative verb construction develops on the basis of the *EF-Cambridge Open Language Database*. Despite its exploratory nature, this study made a contribution to the growing literature on the L2 learner's developing construct-i-con, and, in particular, to studies on the emergence of VACs in the EFCAMDAT (e.g. Römer 2019; Römer & Berger 2019). In particular, the first aim

was to determine how the catenative verbs are used across different proficiency levels, what complement types the catenative verbs take and if frequency and proficiency affect the choice. Not surprisingly, the majority of complements were direct objects (in other words, nominal complements), but still, 27.07% of the corpus sentences contained an instance of a catenative verb construction. A mixed-effects model has shown that the frequency of the matrix verb, the faithfulness, as well as the proficiency level of the learner (A1-C2) has a significant effect on the complement choice. In other words, the more often these verbs occur in English in general and the more distinct they are for the catenative verb construction, the more likely the production of a catenative verb construction gets. On a theoretical level, I have argued that this speaks in favour of developing constructional knowledge: with increasing experience, learners acquire frequency-sensitive knowledge and learn about the use of a verb in different (also less frequent) constructions. Future research needs to examine more closely the factors affecting the learners' choice of complement type and the degree of complexity in processing them, especially when it comes to the choice between a nominal and catenative complement.

In order to complement the findings of the previous chapter, the second goal of the study was to assess the target-like representation of the catenative verb construction. It was investigated whether the catenative complements produced after the catenative verbs were target-like, i.e. the distinct catenative complement, and whether frequency and proficiency had an effect on this. Although the corpus data showed only little variation with regard to the target-likeness of the catenative complement (only 9.9% of all hits contained a non-target like combination of catenative verb and complement), a mixed-effects model showed that the higher the proficiency level, the matrix verb frequency, as well as the faithfulness, the more likely a target-like catenative complement was to be produced. The small number of non-target-like instances can be explained by the fact that the verbs chosen for this study have a relatively high frequency in the catenative verb construction and are likely to be entrenched. Furthermore, it was argued that learners tend to avoid infrequent, more complex and ultimately more difficult constructions when they have a choice (cf. Gilquin & Gries 2009).

Concerning the differences between the two verb groups, it was predicted that the catenative verb construction with a complement taking the form of a *to*-infinitive is acquired more accurately than the variant with an *-ing* complement. This could, however, not be statistically

confirmed by the data. Still, we find the tendency that the *to*-inf. complement is overgeneralised to target-*ing* verbs (rather than the opposite direction) and sentences like **I avoided to see her* could be found in the data. To investigate the overgeneralisation of the target-*to* construction and to find further support for the cognitive anchor hypothesis, learner corpus data turned out to be problematic to a certain extent since the target-*ing* verbs are overall less frequent than target-*to* verbs and do not obtain a high number of hits.

The next chapter presents a large-scale experimental study with data from learners of different proficiency levels and their complementation preference for a large number of catenative verbs, ranging from very infrequent to highly frequent verbs. This study will provide new insights into the effects of frequency and other usage-related factors on the development of the entrenchment and schematisation of the catenative verb construction.

6 How to Build Constructions: Investigating Frequency, Form, Meaning, and Use

6.1 Introduction

As frequency is not the only factor that shapes constructional knowledge, it is important to "[...] bring together linguistic form, learner cognition, and usage. Constructions cannot be defined purely on the basis of linguistic form, *or* semantics, *or* frequency of usage *alone.* All three factors are necessary in their operationalization and measurement" (Ellis et al. 2015a: 169; italics in the original). For that reason, this chapter presents a large-scale production study conducted with a heterogeneous group of over 1,200 German learners of English of different proficiency levels (A2-C2) with the aim to gain a more holistic picture of the L2 acquisition of the catenative verb construction. In particular, we will look at how frequency, individual usage experience, meaning, and proficiency shape the knowledge of this construction.

Concerning the first two factors, this study does not only assess how the distribution of the catenative verb construction in native speaker data impacts the target-like choice of the catenative complement but also how the learner's individual learning and usage experience influences the representation of the construction. This research, therefore, adopts an exploratory approach of collecting information and operationalising the individual linguistic experience of learners. Another factor that will be examined is the semantic class of the catenative verb. From the perspective of a constructionist usage-based approach, we can assume that the acquisition of linguistic units does not entail the acquisition of form and meaning in isolation but it involves the learning of a form-*meaning* pairing. This is why it will be crucial to also investigate how semantics affects the representation of the construction. The third aspect is the learners' proficiency level and its effect on the representation of the catenative verb construction. On a theoretical level, the findings will be brought together to advance the understanding of how constructional (schema) knowledge is developed and (re-)organised with increasing proficiency.

In the following section (Section 6.2), a detailed account of the research questions pursued in the present study will be given. Section 6.3 describes the methodology of the study, including information on the materials, procedure, and participants. Section 6.4 presents and

discusses the findings of the research, focusing on the key themes: the effect of frequency and the individual usage experience of the learners, the influence of semantics, and the preceding factors in relation to the learners' proficiency in the acquisition of the catenative verb construction. The last section summarises the most important findings.

6.2 Research Questions

There are four primary aims of this study. The first aim is to further assess the role of frequency in the complement choice, including the effects of the learner's individual usage experience with the catenative verbs and with the target language in general. The second aim is to explore the acquisition of the meaning side of the construction by looking at the different semantic subclasses of the catenative verbs. The third aim is to find out whether the representation of the catenative verb construction differs across proficiency levels and becomes more native-like in the course of learning. On a theoretical level, the findings will be brought together to answer the question of how and if (sub-)schemas for the catenative verb construction are (re-)structured with increasing proficiency. In the following, these aspects and their theoretical motivation will be elaborated in more detail, starting with the effects of frequency.

How do frequency and the individual usage experience affect the choice of the complement type?

Further evidence for frequency-sensitive constructional knowledge of the catenative verb construction is sought by systematically investigating different frequency measures and their impact on the (target-like) representation of the catenative verb construction. Apart from the aim of corroborating the findings from the previous studies on the effects of the matrix verb frequency and faithfulness of the verb to the catenative verb construction (see Chapters 4 and 5), the present study also sets out to incorporate a more holistic frequency measure. This categorical variable, which will be referred to as 'frequency profile', does not only capture information on the matrix verb frequency and faithfulness but also on the token frequency of the verb in the catenative verb construction (see Section 6.3.2.1 for more information). The latter has to be discarded from the analysis as an individual predictor variable because of collinearity issues (see Sections 6.3.3.3), which have also been attested in the previous studies in Chapters 4 and 5.

Overall, the investigation of verbs that occur with different frequencies and association strengths in the catenative verb construction will show whether we can find different degrees of entrenchment. As in the previous studies, entrenchment in the sense of representational strength is operationalised as the target-like choice of the complement, i.e. whether it is in line with native speakers' representations of the catenative verb construction. It is expected that verbs that are more strongly associated with the construction, i.e. that are more frequent in the construction overall and in relation to their use in other constructions, will be produced with the target-like catenative complement more often.

In addition to the frequencies in native usage data, information about the learners' individual usage experience with the verbs and the English language, in general, is considered. As demonstrated in the studies presented in Chapters 4 and 5 (see Section 3.4), native speaker corpora are a valuable resource to make generalisations on the distribution of constructions, their probability to occur in the input and ultimately to predict the linguistic behaviour of learners. This is also shown by a number of other usage-based studies in this area (see e.g. Deshors & Gries 2016; Ellis 2017; Ellis et al. 2016; Gries & Wulff 2005, 2009; Martinez-Garcia & Wulff 2012). However, it has to be pointed out that at the same time corpus data often do not provide information on individual backgrounds and usage experiences[74], which is why a subjective frequency measure will be added that addresses both input and output. One part of the experiment is, therefore, a rating of the catenative verbs under investigation with respect to the learner's individual familiarity with them. Previous research on L1 and L2 speakers' intuition on frequencies of words, word pairs, and collocations (e.g. Alderson 2007; Bermel et al. 2018; Hernández et al. 2016; Hoffmann & Lehmann 2000; Siyanova & Schmitt 2008; Siyanova-Chanturia & Spina 2015) suggests that the estimation of words and phrases is often relatively accurate, i.e. in line with native speaker corpus frequencies. Thus, one of the goals of the study is to evaluate whether the ratings correlate with the corpus frequencies and/or can explain the choice of the catenative complement. In addition to these ratings, the participants were asked, for instance, to estimate their weekly input and output in the target language, i.e. how much they speak, read, write, and listen to English per week,

[74] See Blumenthal-Dramé (2012: Chapter 3) for an extensive discussion of a related issue concerning the use of corpora for usage-based generalisations.

to see whether these experience-related factors have an effect on the target-like representation of the catenative verb construction.

How does the semantic class of the verb influence the choice of the complement type?

If we proceed from constructions as units in the L2, we need to investigate the learners' mapping between meaning and form. In the target language English, the two patterns of the catenative verb construction do not only show a difference with regard to form and frequency, but also when it comes to the meaning of these two subschemas, even if this difference is often opaque (see Section 3.1). Despite the variety of different classifications that exist for the target-*to* and target-*ing* construction, the target-*ing* construction is prototypically associated with generality and processual actions, while the target-*to* construction is said to denote futurity and specificity (see e.g. Quirk et al. 1985; Wood 1956).

We will look at a more fine-grained lexical classification[75] of the catenative verb construction on the basis of Palmer's (1988) *The English Verb* (see also Section 3.1), and explore whether these semantic subclasses[76] have an impact on the complement choice. If this is the case, the question that arises is whether some classes yield more target-like responses than others. For example, we will see if futurity and process verbs, which express this prototypical meaning of the respective subschema, are acquired better than other subclasses. The subclasses, including a definition, examples, and distribution across the two groups, are provided in Table 14 below. The 'x' in the table means that the semantic class is associated with the -*ing* or *to*-inf. construction. This means that, according to Palmer, the majority of verbs that fall into this semantic class take an -*ing* complement or a *to*-inf. complement. For a list with the distribution of all verbs examined in the present study across these semantic classes see Section 6.4.1.3, Table 24).

[75] Even though, Egan's (2008) usage-based classifications of the catenative verb construction are accurate and more in line with the theoretical assumptions adapted in this paper, I decided against using them. The reason for this was that his classifications refer to the whole construction, i.e. catenative verb + catenative complement, in native speaker use, which is often different than the learners' representation of the construction. Instead, this more 'verb-centred' classification was chosen.

[76] Note, as stated in 3.1., that in line with a constructionist account of language, the different subclasses constitute constructions of the more abstract schema 'S CV *to* V' or 'S CV V*ing*', which have different meanings, and can be seen as subschemas themselves (cf. e.g. Traugott & Trousdale 2013: 16-17). However, for reasons of clarity and comprehensibility, we will use the term 'subclass of the verb'.

Table 14 Semantic Subclasses and Definition Based on Palmer (1988: 191-204)

Semantic class	***Definition***	***Examples***	***target-* to**	***target-* ing**
attitude	- verbs that express an attitude towards the activities expressed by the catenative complement	*enjoy*, *mind*		x
effort/achievement	- verbs that state the circumstances under which the activities expressed by the complement are carried out	*struggle, fail*	x	
futurity	- verbs that refer to plans, hopes, wishes, etc. for future activities by the subject of the matrix clause	*pledge, decide*	x	
process	- verbs denoting a 'process', often related to the beginning or ending of an action[77]	*keep, finish*		x
reporting	- verbs of reporting, saying, believing, etc.	*mention, den*y		x

When looking at the classification of the verbs, we find a complementary distribution of target-*ing* and target-*to* verbs across the different semantic subclasses. We will, therefore, explore the possibility of whether we can find an effect of frequency (and form) and/or semantics on the target-like representation of the construction. In first language acquisition, it is an issue of debate whether semantics or frequency play a more important role in unlearning verb-argument overgeneralisation errors (see e.g. Ambridge et al. 2012; Ambridge et al. 2014; Pinker 1989). There is, for instance, evidence that entrenchment (frequency) has an effect at an early stage of acquisition, while the building of semantic subclasses emerges later (Tomasello 2003: 180). This leads us to the next research question:

How does the proficiency of the learner influence the complement choice?

The third research question deals with the proficiency level of the learners and how it affects the choice of the catenative complement. We will examine how the representation of the catenative verb construction differs across proficiency levels and whether it becomes increasingly native-like. Finally, the findings for the different factors above will be brought together and assessed on the basis of multivariate statistics, in order to address the following theoretical issue:

[77] In other grammars, these verbs are often referred to as 'aspectual verbs'; e.g. Biber et a. 1999).

How do learners of different proficiency levels build constructions?

Another goal of the study is to show how learners form generalisations and which pieces of information are relevant for 'building' constructional (schema) knowledge of the catenative verb construction across different proficiency levels. Specifically, we will assess which formal, frequency- and meaning-related factors (e.g. native speaker frequencies, individual usage experience, meaning and other factors) are relevant in the development of a (sub-)schema(s) for the catenative verb construction.

We expect to find schematic knowledge of a form-meaning mapping whenever a learner successfully chooses the target-like catenative complement also with a low-frequency/unfamiliar verb. Since the target-*to* construction is more frequent in its type and token frequency, we expect to find a more schematic representation for it that emerges earlier than for the target-*ing* construction. Furthermore, it is expected that low-proficiency learners' command of the target-*ing* construction is 'limited' to item-based knowledge of highly frequent exemplars. In general, we can hypothesise that the target-*to* subschema is used a default pattern, a 'cognitive anchor', which promotes analogical comparisons and pattern extension on the basis of perceived formal and/or semantic compatibility between this schema and less entrenched exemplars (see Chapter 4). By contrast, it can be assumed that the target-*ing* construction will be extended less often to low-frequency verbs, as it is less productive than the target-*to* construction.

In sum, investigating these aspects will also enable us to look at the question of whether we find schemas are formed in a bottom-up and/or top-down manner. If proceeding from a bottom-up process, we can predict that more abstract patterns are 'constructed' with rising proficiency and that lower proficiency learners start with item-based knowledge centred around high-frequency exemplars, progress to low-scope patterns and then to schematic constructional knowledge (Ellis 2002; Tomasello 2003, 2009). In the case of a top-down process, learners would generate schematic knowledge right from the beginning, which is then gradually refined with increasing experience with the target language (Goldberg 2006; Roehr-Brackin 2015). This would imply that schemas become increasingly fine-grained and more native-like.

6.3 Methodology

6.3.1 Overview

The present study was designed and carried out with an online survey tool (Questback GmbH. 2016). The structure of the study was as follow:

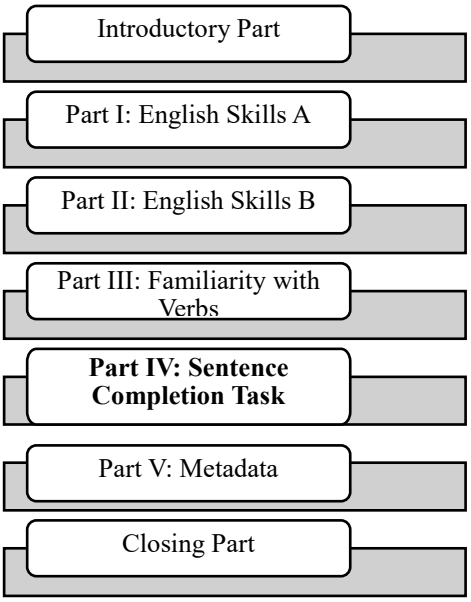

Figure 20 Structure of Study

The main part of the study was a sentence completion task, where learners were asked to complete a sentence with given constituents. Nine different versions (each containing 7 catenative verbs and 14 filler verbs) of the familiarity rating task as well as the sentence completion part were created for the study; each participant was randomly assigned to one of the versions (see Appendix C I for parts of one version). The rest of the study (i.e. Part I, II, and V) was identical for each participant. The estimated amount of time to complete the study was approx. 20-30 minutes. In the following sections, a detailed description of the verb and test item selection, as well as the experimental design, will be provided. Section 6.3.4 provides information about the participants.

6.3.2 Materials

6.3.2.1 Verb Selection

61 catenative verbs were investigated in total: 22 catenative verbs that are target-like with a *to*-infinitival complement and 22 that were target-like with an *-ing* catenative complement (see Table 15 below). The remaining 17 were catenative verbs that can occur both with an *-ing* and a *to-inf.* complement (e.g. *like*, *start*, *remember*). The results for these so-called 'variable verbs' will be presented separately in Chapter 7.

Table 15 Catenative Verb Selection for the Sentence Completion Task[78]

Target-*to* verbs	**Target-*ing* verbs**
plead, swear, request, volunteer, demand, pledge, hesitate, proceed, decline, dare, offer, struggle, serve, afford, choose, seek, tend, manage, attempt, refuse, decide, fail	*detest, tolerate, celebrate, postpone, quit, complete, dislike, mention, discuss, miss, practise, justify, recall, contemplate, resist, deny, risk, mind, finish, enjoy, avoid, keep*

The selected target-*to* and target-*ing* verbs occur with different frequencies in English. As already pointed out above (see Section 6.2), the token frequency of the matrix verb in its overall use is highly confounded with the token frequency of the verb in the catenative verb construction, which leads to collinearity in the statistical analysis of the data (see Appendix C III; cf. Chapter 4, Section 4.2.5). This is why the variable 'frequency profile' was introduced. This variable is of categorical nature and captures information on the matrix verb frequency, the catenative verb construction frequency as well as on the faithfulness of the verb for the construction. For each measure, a binary distinction between a high **(↑)** and low **(↓)** frequency was made. This distinction was based on mean BNC frequencies of a preselection of verbs[79]. The values are presented in Table 16:

Table 16 Division into 'High' and 'Low' Frequency Constructions

	'high'(↑)	**'low' (↓)**
MV token frequency (mean)	>8000	<8000
Cat v cxn token frequency (mean)	> 2100	<2100
Faithfulness (ratio)	>0.10	<0.10

[78] The target-*to* and target-*ing* verbs are ordered from the lowest number of occurrence in the catenative verb construction to the highest.

[79] This 'pre-section' of verbs included 71 verbs (37 target-*to* and 34 target-*ing* verbs) that qualified as potential candidates for the sentence completion task (judged on the basis of the criteria defined for the verbs in the previous studies; see Chapter 4 and 5). Their mean values served then as a baseline to differentiate between 'high' and 'low' values (see Table 17).

The different combinations of these measures resulted in different frequency profiles[80], which are summarised in Table 17 below. If the arrow points upwards, it means that the respective frequency measure is high in relation to other catenative verbs. For instance, 'MV ↑' means that the matrix verb frequency is higher than 8000 tokens/hits in the BNC, and if the arrow is pointing downwards (↓) it means that we find a number below 8000. Generally, it is predicted that the different interactions between these frequency measures, which are captured by the profiles, yield different results. For instance, Profile A, which stands for a verb that is highly frequent across these three different measures, will lead to a high number of target-like responses. By contrast, Profile D, which represents low-frequency verbs is expected to have the lowest number of target-like complements.

Table 17 Frequency Profiles

Profile	**Freq. MV**	**Freq. cat v cxn**	**Faithfulness**
A	MV ↑	CAT CXN ↑	FAITH ↑
B	MV ↑	CAT CXN ↓	FAITH ↓
C	MV ↓	CAT CXN ↓	FAITH ↑
D	MV ↓	CAT CXN ↓	FAITH ↓

The 22 target-*ing* and 22 *target-to* verbs that were selected are distributed across the different frequency profiles as follows:

[80] Not all possible combinations of the frequency measures are given here. For instance, a profile with a low matrix verb frequency, high catenative verb construction frequency, and high faithfulness was not attested among the preselected verbs. This makes sense considering that a high catenative verb construction frequency is highly correlated with a high matrix verb frequency.

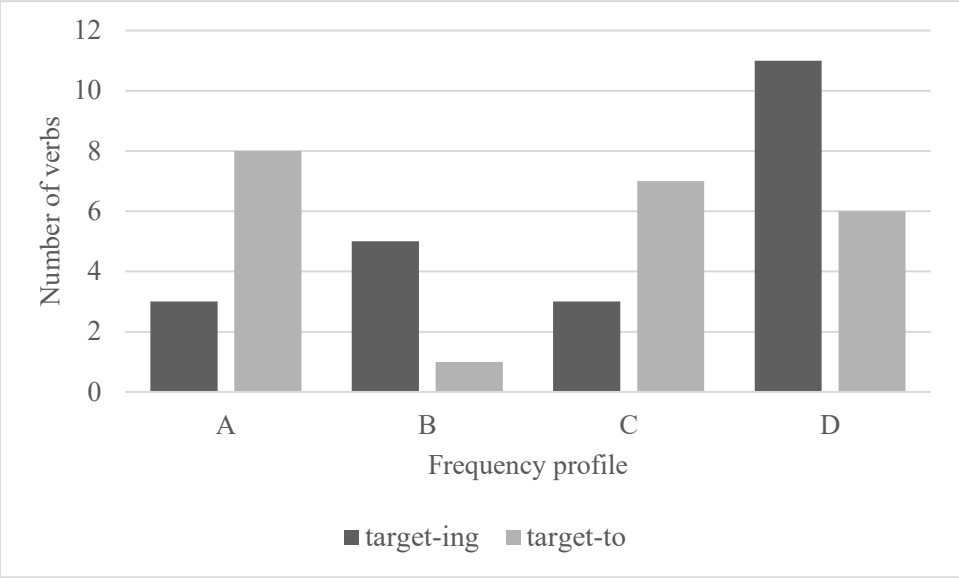

*Figure 21 Distribution of Target-*ing *and Target-*to *Verbs) across Frequency Profiles*

As evident from Figure 21, the distribution of target-*ing* (dark grey bars) and target-*to* (light grey bars) verbs across the different profiles is not equal due to the lower frequency of target-*ing* verbs in general. The majority of target-*ing* verbs (11/22), such as *celebrate*, *deny*, *recall* or *tolerate*, belong to Profile D, which means that they have low values with regard to all three frequency measures. For Profile A we find eight target-*to* verbs (e.g. *attempt*, *decide*, *fail*), while only three target-*ing* verbs can be found here (*avoid*, *enjoy*, *keep*). The mean values for each frequency measure for the target-*ing* and target-*to* verbs investigated in the presented study are shown in Table 18:

*Table 18 Mean BNC Frequencies of Verbs (*target-*to &* target-*ing, n = 44) for Sentence Completion Task*

Group	**Freq. MV** (token frequency)	**Freq. cat v cxn** (token frequency)	**Faithfulness**
target_*to*	8858	2831	0.30
target_*ing*	7918	822	0.08
total	*8388.41*	*1736.77*	*0.19*

We can see that the mean matrix verb (MV) token frequencies of the two verb groups were similar, while the means of the catenative verb construction frequency, as well as the faithfulness, show a relatively large difference. This also explains the unequal distribution of verbs across the frequency profiles.

As filler verbs, 62 frequent non-catenative verbs were selected based on the most frequent verb lemmas in the BNC[81] (the list of verbs with their frequencies is provided in Appendix C II. and Appendix D I.). The selection covers a range of intransitive, mono- or ditransitive verbs, and displays verbs that should be largely familiar to most learners (e.g. *read*, *drive*, *sleep*). The filler verbs are listed in the following table:

Table 19 Filler Verbs for the Online Sentence Completion Task

apply, argue, be, build, call, carry, catch, close, cook, do, draw, drink, drive, eat, exercise, feed, feel, find, fly, get, give, go, have, hear, hit, insist, kill, know, lead, live, look, make, meet, open, pay, put, read, recognise, repair, ride, save, say, see, send, sit, sleep, smile, speak, stand, stay, study, talk, taste, tell, travel, understand, wait, walk, wear, wonder, work, write

The 61 (including the 'variable verbs' that will be presented in Ch. 7) catenative and 62 filler verbs were randomly divided into 9 sets since the number of stimuli presented to the participants had to be organised into manageable parts to keep the rating and sentence completion task relatively short: each set contained 7 catenative verbs and 14 filler verbs. Some filler items were used several times in the different sets. Also, two of the catenative verbs were used twice (*decide* and *commence* – the choice was arbitrary) in two different sets in order to have the same number of verbs in each set.

6.3.2.2 *Test Sentences*

The sentence completion task was based on 142 test sentences in total as well as 130 filler items (for some filler verbs, 4 test items were collected, see Appendix C IV for a list with all test items). As stated above, they were randomly divided into 9 sets so each participant had to complete 42 sentences. In order to obtain more natural test items, different corpora were used. The primary corpus was the *Corpus of American Soaps* (SOAP, Davies 2011-), which contains "100 million words of data from 22,000 transcripts from American soap operas from the early 2000s" (ibid.). This corpus is a valuable source for potential test items because it contains informal and 'pseudo-natural' language that is relatively easy to understand for learners of English of different proficiency levels (see Arndt-Lappe & Sanz in preparation). Another source for test sentences with comparable characteristics was the SubtlexUS corpus (Brysbaert & New 2009), a corpus based on American film subtitles. In case neither of the

[81] The main reason for not including low level frequency filler verbs was that completing test sentences with unknown verbs might require more processing time / cognitive effort and would have increased the time to complete the study considerably.

two corpora yielded any suitable sentences, which was often the case with relatively infrequent verbs, I consulted the *Corpus of Contemporary American English* (COCA, Davies 2008-). The COCA contains 560 million words of texts from 1990 to 2017 and is based on a balanced selection of texts from different registers, ranging from academic to spoken texts. Sentences were both lexically and pragmatically neutral with regard to the variety concerned (British English or American English).

To control for different sources of variability, the corpus sentences were slightly modified in some cases. For instance, they had to have a declarative clause structure, be comprehensible without any context and were shortened if they were too long or contained another (subordinate) clause. The tense of the catenative verb was changed into simple present in one of the two test items and into simple past in the other one unless it did not agree with the verb's preference (i.e. if a verb is unlikely to occur in e.g. simple present but mostly occurs in present past, then it the tense was not changed). For instance, the verb *manage* (a target-*to* verb) occurs with a relatively high frequency in the past tense (28871/58387) hits in the COCA), which is why the final test items contained both the past tense form *managed.* Also for verbs that have an irregular past tense form (for example *sought*, the past tense form of *seek*), only present tense sentences were selected to minimise the difficulty of 'recognising' the verb. Furthermore, verbs that usually occur in a negated form (with a dummy *do* or another auxiliary verb), such as *bother* or *afford* (*I don't bother to..*, *I can't afford to…*), were not changed into a positive sentence but kept their original form.

Furthermore, two (in some cases 4) sentences for each filler verb were collected from the same corpora enlisted above (COCA, SOAP, SUBTLEX). Examples of filler items with the verbs *read*, *eat*, and *drink* are given in (1) to (3):

(1) *Jack is reading a book to my grandson.*
(2) *I've already eaten at home.*
(3) *Just drink some champagne with me.*

The filler items were all short simple sentences to require little processing effort.

The final test and filler items were proof-read by a native speaker of English. This person knew about the task instructions as well as the rough goal of this study. He was instructed to

carefully read the test items to see whether the sentences were syntactically as well as semantically comprehensible in general and whether they sounded idiomatic ('native-like').

6.3.3 Procedure

6.3.3.1 Experimental Design

All instructions, scales, and questions were given in German to ensure that every participant would understand the tasks. The study began with a welcome-page, with an introduction, and with information with regard to the structure and length of the study. However, the aim of the study was kept intentionally vague; the participants were only told that the purpose of the study was to learn more about how a foreign language is learned. The first page also provided information on a raffle[82], ethical issues (anonymity of responses etc.), and a confirmation by the participants that they had understood the information and that they were older than 14 years.

The first part (after the introduction to the study) consisted of two pages eliciting information on the participant's English language background and skills. First, the participants were asked to state how old they were when they started learning English and how many years they had been learning English at that point of time (at school, at university, in a language school or any other institution). Furthermore, they were asked to indicate whether they had been to and, if so, how much time they had spent in an English-speaking country. Next, they were asked to assess their proficiency level in English, choosing between the levels of the European Framework (Council of Europe 2009). These questions were followed by the participant's own estimation of average contact hours with English per week in terms of a) listening and reading (later summarised as 'input'), and b) writing and speaking (summarised as 'output') (cf. Madlener 2015: 121). The participants could choose from the following options: <1 hour, 1-2 hours, 3-4 hours, 5-6 hours, 7-8 hours or >8 hours.

[82]The participants had the opportunity to take part in a ruffle, where the prizes were 4 vouchers for an online shop between 30€ and 10. However, there was otherwise no monetary compensation.

Another question asked which variety[83] of English the participants are most familiar with. The options were limited to the main standard varieties taught in Germany, namely British English and American English. However, it was also possible to choose the option 'I don't know', or specify any other variety the participants were more familiar with. Despite the fact that this question is in principle difficult to answer, it was still included in the questionnaire as an attempt to receive additional information on the input of the learners, and ultimately on the reliability of the corpus frequencies – either BNC or COCA – that were chosen as predictor variables in the analysis of the data.

The final part dealt with an estimation of their English skills (cf. Siyanova-Chanturia & Spina 2015: 541). The participants could indicate how they evaluated their reading, writing, listening comprehension as well as speaking skills on a 5-point Likert scale given in German (in English: 1 = very poor, 2 = rather poor, 3 = okay, 4 = good, 5 = very good).

Before the actual production task, a question was included where the participants had to rate on a 5-point Likert scale how familiar they were with the catenative verbs and the filler verbs (7 catenative verbs and 14 filler verbs, the order of verbs was randomised) used in the present study. More precisely, they first had to rate how often they had used the respective verb (from now on referred to as 'production'), and how often they thought they had heard and read the verb (referred to as 'perception') before. The scale included the following categories: read/heard or used 'never', 'rarely', 'occasionally', 'often', 'very often'. This was then followed by the main part of the study, namely the sentence completion task.

In total, 42 test sentences with the verbs that the participants judged in the familiarity rating task were presented in a randomised order in the experiment (2 sentences[84] for each of the 7 catenative and 14 filler verbs). As in the production task presented in Chapter 4, the participants' main task was to complete sentences with words (or constituents, depending on the length and complexity of the test sentence[85]) that were provided in brackets and had a

[83] In the questionnaire, the term *Dialekt* ('dialect') was used, although this is not the accurate term in this case. However, this more common and well-known term was used to avoid confusion.
[84] Unfortunately, when writing the script with the test sentences one of the two test items for *struggle* had to be coded as *NA,* i.e. discarded from the analysis, since the catenative verb was missing after the subject. The item then looked as follows: Her son ____ (in Maths, get, a good grade).
[85]For instance, some larger noun or prepositional phrases were divided into two parts as in the following example: She pledged to make [Daria's dream of her own café]$_{NP}$ come true.: She pledged_____ (come true, [of her own café], [Daria's dream], make).

randomised order. A screenshot of one example page, including the instructions, is given in Figure 22:

(Seite 4 von 4)

Bitte schreiben Sie auf, wie der Satz weitergehen muss. Verwenden Sie dabei alle Wörter, die in den Klammern stehen und passen Sie die Verbform an, wenn nötig. Bitte schauen Sie keine Vokabeln nach. Wenn Sie ein Wort nicht kennen, entscheiden Sie intuitiv, wie der Satz gut klingt.

Hier ein Beispielsatz: She _____ (to the cinema, always, go) = She always goes to the cinema.

The police		. (him, find, with the gun)
We avoid		. (about problems, talk, in our family)
The students will		. (of that novel, a couple of chapters, read)
We		. (popcorn, for the rest of our life, eat)
Her friends discussed		. (nearby, to this new Indian restaurant, go)
I		. (this evening, alone, speak, with him)
His neighbour David		. (in a fight, kill, his wife)
Emily		. (for you, over broken glass, walk)
Anna		. (her head, on the table, hit)
She		. (from the toothpaste ad, like the girl, smile)
Maria didn't mention		. (last time, be, afraid of dogs)

Figure 22 Sentence Completion Task: Example Page (Screenshot)

The final part asked for information concerning age, gender, mother tongue(s) and the educational background of the participants, and was followed by a closing part where the participants had the opportunity to leave their e-mail address in case they wanted to participate in the raffle and/or receive a summary of the study results[86].

As the aim of this study was to collect data from a heterogeneous group of German learners of English, the link to the study was sent to as many potential participants as possible. Participants were recruited by means of convenience or opportunity sampling, as well as snowball sampling (Dörnyei & Csizdér 2012: 81). For instance, an invitation was distributed via e-mail and social media: Staff and students from the University of Trier were contacted by e-mails and/or the university-intern newsletter and other potential participants on the social media platform Facebook[87]. The field phase took approx. 3 months.

[86] To ensure absolute anonymity of the results, the e-mail addresses were saved on a separate page, and on a different server, which was provided by ZIMK, the IT department of the University of Trier.

[87] The invitation to the study was posted privately, as well as in different Facebook university groups, and English learner groups.

6.3.3.2 *Data Coding*

In total, there were four sets of variables. The first set comprised the different frequency measures and the second one comprised other construction-related factors, such as the semantic class of the matrix verb, the length of the catenative complement, etc. A third set of variables dealt with the usage experience of the learners, which included e.g. the familiarity with the catenative verbs or the proficiency level. The last set contained the variables related to the metalinguistic information about the learners. Table 20 below provides an overview of the most important variables for the statistical analysis[88]:

Table 20 Variables Used for the Annotation of the Data

Variable	Variable Levels/Descriptions
group: The group to which the verb belongs with regard to the complement type that it takes in the catenative verb construction. (categorical)	**target_to** (*to*-inf. complement is target-like), **target_ing** (*-ing* complement is target-like)
semantics_mv: Semantic class of the matrix verb (categorical)	attitude, effort/achievement, futurity, process, reporting (based on Palmer 1988)
mv tense: the tense of the matrix verb and negation (categorical)	**neg_past**: *My sister **couldn't** resist making a comment about my new hat.* **neg_present**: *This **doesn't** justify going behind the back of your friend.* **past**: *She **denied** having any feelings for me.* **present**: *Brides **tend** to get a little nervous on their wedding day.*
freq_profile (categorical)	A-D (see Table 18, Section 6.3.2.1)
log_catcxn_BNC (numeric)	log transformed token frequency of catenative verb construction per 1 million words in the BNC
log_mv_BNC (numeric)	log transformed token frequency of the matrix verb per 1 million words in the BNC
faithfulness_BNC (numeric)	ratio: token frequency of catenative verb construction (BNC token frequency)/ frequency of matrix verb (BNC token frequency)
log_catcxn_COCA (numeric)	log transformed token frequency of catenative verb construction per 1 million words in the COCA
log_mv_COCA (numeric)	log transformed token frequency of the matrix verb per 1 million words in the COCA

[88]From the external, learner-related variables, only the learner's higher education as well as a language-related educational background had a significant effect. However, the effects were fairly small and only significant for some factor levels in some mixed models. Furthermore, since a considerable number of participants did not provide these pieces of information as they terminated the study after the sentence completion task (they were asked at the end of the experiment), the dataset on which the mixed-effects model was fitted was smaller. So it was decided to discard these variables from the final statistical analysis for all datasets.

faithfulness_COCA **(numeric)**	ratio: token frequency of catenative verb construction (COCA token frequency)/ frequency of matrix verb (COCA token frequency)
compl_verb: verb lemma in the catenative complement (categorical)	e.g. *take*, *walk*, *see*, *write*
compl_weight **(numeric)**	number of words in the catenative complement
compl_type: The type of complement taken by the matrix verb. (categorical)	**cat_compl** (catenative complement, e.g. *I enjoy [reading in bed] or I decided [to leave]*) **X_cat**[89], e.g. *I don't mind [my boss]*$_{X}$ *[being around the office]*$_{cat}$ **prep_cat** (preposition preceding the catenative complement), e.g. *He pleaded* ***for*** *[getting another chance after his mistake]* $_{cat}$. **direct_obj**, e.g. *I enjoy [the food*]. **intern_compl** (internal complement of the verb), e.g. *It is difficult to decide* [*what is true or false*].*)* **other**
compl_form: The form of the complement) (categorical)	**ing**, **to_inf**, **bare**, **other** (e.g. noun phrase, subordinate clause)
target_like: The target-likeness of the complement type (see below for more information). (categorical)	the dependent variable in the analysis of the target-to and target-ing verbs: **ntl** (non-target-like) vs. **tl** (target-like)
Level: proficiency level (categorical)	self-assessment of proficiency in English (A1-C2)
fam_usage **(numeric)**	familiarity rating of the catenative verbs in usage (1-5)
fam_percept **(numeric)**	familiarity rating of the catenative verbs in perception (1-5)
input: the weekly input (numeric)	hours per week spent with reading and listening to English: 1-5 (1= < 1 hour, 5 = > 8 hours)
output: the weekly output (numeric)	hours per week spent with speaking and writing in English: 1-5 (1= < 1 hour, 5 = > 8 hours)
prof_writing **(numeric)**	proficiency in writing: 1-5 (1 = very good, 5 = very poor)
prof_reading **(numeric)**	proficiency in reading: 1-5 (1 = very good, 5 = very poor)
prof_listening **(numeric)**	proficiency in listening comprehension: 1-5 (1 = very good, 5 = very poor)
prof_speaking **(numeric)**	proficiency in speaking: 1-5 (1 = very good, 5 = very poor)

For each sentence, the catenative complement was coded manually with regard to a) its type, b) form, and c) target-likeness. All participants' answers that involved constructions other than the catenative verb construction (e.g. nominal complements, etc.) were excluded from

[89] Note that this does not fully correspond to the complex catenative verb construction. As shown in the examples, the intervening element was often an adverbial and not a different subject.

the analysis, even if they were grammatical, as exemplified in (4) to (7). Therefore, only sentences with a catenative verb construction were examined and coded for their target-likeness.

(4) *I miss [the time that i spent with my mother]*$_{NP}$. (ID 1074)
(5) *She didn't mention [that she has a younger sister called Stella]*$_{declCl}$. (ID 6697)
(6) *Her sister avoided [responsibility]*$_{NP}$ *for her actions.* (ID 9522)
(7) *She denied [any feelings] she is having for me.* (ID 1103)

Since the complement length was not kept constant to preserve the 'naturalness' of the sentences (see Section 6.3.2.2), the catenative complement was also coded for length/weight by counting every word after the matrix verb, except for the *to*-particle in the case of a produced *to*-infinitive[90] (see below for examples). It will be explored whether it has an impact on the complement choice and whether the learners show, therefore, a sensitivity towards this processing-related factor (see e.g. Wasow 1997; Wasow 2002 for more information on the effects of weight in constituent ordering). Examples of test items of different complement length are provided below:

(8) *A lot of people choose to* [*be vegetarians nowadays*]. (3 words)
(9) *We have postponed* [*buying a new car for another year*]. (7 words)

Another important point that needs to be mentioned is the use of the frequencies extracted from the BNC and COCA. Pearson's product-moment correlations show that the BNC and COCA frequencies of the verbs investigated in the present study strongly correlate (see Table 21). However, since the COCA contains a considerably large amount of data and is also more up-to-date than the BNC, it was decided to use the COCA frequencies (matrix verb frequency as well as faithfulness) as predictor variables in the mixed models.

Table 21 Correlations BNC and COCA Frequencies ($p < 0.001$*)*

	log_mv_COCA	**log_catcxn_COCA**	**faithfulness_COCA**
log_mv_BNC	0.9546		
log_catcxn_BNC		0.9569	
faithfulness_BNC			0.9259

[90] Even though the *to*-particle can be counted as one word, it is, however, statistically a problem to include it into the word count as this would per default make a complement with the *to*-infinitive form of the lexical verb longer than a complement that contains the *-ing* form of the verb.

Note that, as will be shown in the Results section (see Section 6.4.1), the COCA frequencies of the catenative verbs (matrix verb frequency) had a slightly higher correlation with the familiarity ratings of the learners.

6.3.3.3 *Statistical Analysis*

The observations were divided into two subsets: one containing the data for the target-*ing* and target-*to* verbs, where the binary dependent variable was the target-likeness of the catenative complement (ntl vs. tl), and one with the variable verbs, where the binary response variable was the catenative form (ing vs to_inf). The latter set will be analysed and discussed in Chapter 7.

All datasets were analysed in the open-source software R[91] (R. Core Team 2017). Prior to the analysis, it was tested whether we find any signs of potentially harmful collinearity between the numeric frequency measures, i.e. faithfulness and matrix verb frequency. A correlation coefficient of $r_s = 0.1$ ($p < 0.001$) and a kappa coefficient of 8.02 indicate no signs of multicollinearity (see Appendix C, III *Collinearity Tests* for a detailed analysis).

For the assessment of the statistical significance of the predictor variables (see Table 20 above), a stepwise model selection was performed automatically via *Likelihood-Ratio Test* (see e.g. Baayen 2008; Winter 2013) with the R package *afex* (Singmann et al. 2018: Version 0.22-1). This package fits the most complex model to the data and removes one effect at the time, arriving at the set of predictor variables that have a significant effect and the highest predictor power[92]. Those predictor variables were then used as fixed factors in generalised linear mixed-effects models (see e.g. Baayen 2008), which were fitted in a next step with the R-package *rms* (Harrell Jr 2016: Version 4.5-0). In every model, participant ID and the version of the sentence completion task (1-9; see Section 6.3.1) were specified as random intercepts. Model comparisons were made on the basis of log-likelihood values. Effect plots were generated with the R *effects* package (Fox 2003). Furthermore, in the context of a more

[91] The data were analysed in RStudio (R. Core Team 2018, Version 1.1.456).
[92] Several interactions were tested. However, either the interactions were not significant, did not improve the model or the models did not converge. Some interactions were excluded from the final model because the outcome was hard to interpret, especially in the case of variables with several levels, as for instance, the interaction between the proficiency level of the learner and different variables, like the semantic class of the verb or the different frequency measures.

detailed analysis of the impact of the learners' proficiency level on the complement choice (see Section 6.4.2.2), a conditional inference tree was fitted using the R package *party* (Hothorn et al. 2006).

6.3.4 Participants

In total, 1,965 different individuals participated in the online study. They were a heterogeneous group with regard to their age, proficiency, educational, as well as language learning background. 678 participants had to be discarded from the analysis either because they left the study before starting the sentence-completion task or because they were non-native speakers of German. Even though the impact of the L1 was not investigated in this study, it was kept constant. Thus, the final number of individuals who completed the study or did parts of the sentence completion task was 1,287 (1169 completed the study, 118 terminated the questionnaire during or right after the sentence completion part, however, those observations were not excluded from the analysis).

95.5% of the participants were German monolinguals and 4.5% were bilinguals (German and another language). The average age of the participants was 27.4 years (*median* = 25 years, *min*. 15 years, *max.* 70 years, *SD*= 7.8 years), 75.9% were female and 16.55% male (the remaining 7.55% were 'other'/NAs). The majority of participants who provided information on their occupation were Bachelor students (35.6%). 26.9% stated that they were employed, 23.1% were Master students, 6.9% PhD students, and 7.4% had another occupation (pupil, pensioner, etc.). The participants who were students were further asked to provide information on their subject. Of those who indicated the discipline of their studies, 20.25% had studied or were studying a subject related to language (e.g., Literature Studies, Translation Studies), and 15.47% had a background in English studies (English Literature, English Linguistics, etc.).

The majority of the participants started learning English with 9.7 years on average (*median* = 10 years, *min*. = 2 years, *max.* = 50 years), and had been studying this L2 at a school, at university or in another institutionalised setting for 11.28 years on average (*median* = 10 years, *min*. = 1 years, *max.* = 40 years). 84.03% reported to have been to an English speaking country before (e.g. on holidays, term abroad, internship, etc.), mostly less than one month (35.1%). 16.47% of the participants had spent 1-3 months abroad. 10.37% had been to an

English-speaking country between 4-6 months, and 11.54% between 7-12 months. Furthermore, 19.34% had been to an English speaking country for more than twelve months altogether.

The next question asked the participants to self-assess their proficiency level. As mentioned above, the scale that was used corresponded to the CEFR proficiency levels, ranging from 1 to 6 (1= A1 to 6= C2). The distribution of proficiency is visualised in Figure 23 below:

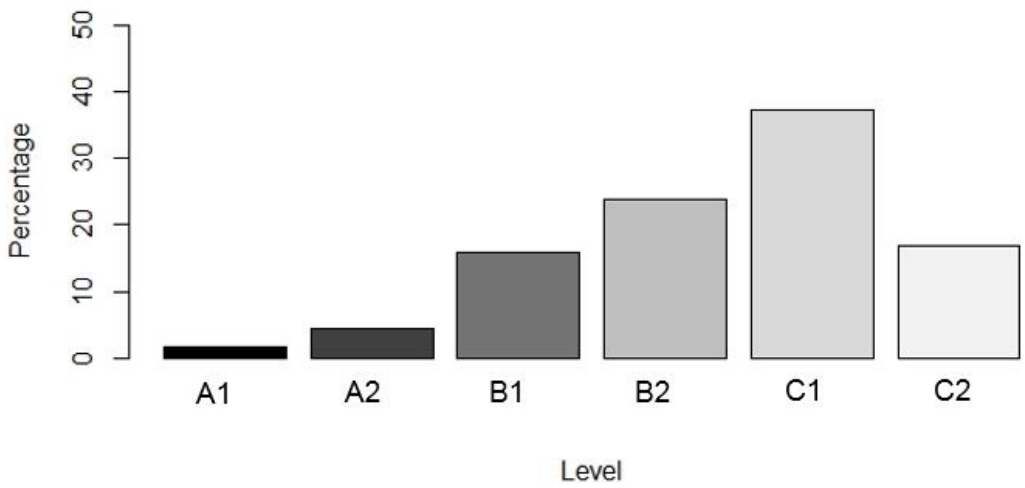

Figure 23 Proficiency Level (CEFR) Distribution

Most of the participants assessed themselves as highly proficient learners: over half of the participants rated their proficiency level as C1 (37.37%) or C2 (16.87%). 23.76% estimated to have a B2-level, and 15.93% a B1-level. Only 6.06% were A1 or A2 learners, according to their self-assessment. In Section 6.4.1, it will be shown whether the self-assessed proficiency level is a reliable indicator for the performance on the task. Furthermore, this section will also provide more information on the learners' individual linguistic experience depending on their proficiency (e.g. estimated weekly English input and output and the individual familiarity with the catenative verbs under investigation).

When asked how the participants would assess their English skills with regard to reading, writing, speaking and listening comprehension, the majority indicated a relatively good proficiency in all areas (between 'very good' to 'good'). The self-assessments provided by the participants are summarised in Table 22:

Table 22 Self-Assessment Language Skills (1= 'Very Good', 5 = 'Very Poor')

Skill	***1 (very good)***	***2 (good)***	***3 (okay)***	***4 (rather poor)***	***5 (very poor)***	***Mean***	***Median***	***NAs***
Reading	59.15%	32.88%	7.06%	0.81%	0.10%	1.50	1.00	25
Writing	27.47%	40.59%	23.85%	7.46%	0.63%	2.13	2.00	32
Speaking	28.59%	37.98%	24.60%	7.35%	1.46%	2.15	2.00	18
Listening	39.97%	40.23%	15.00%	4.39%	0.41%	1.85	2.00	25

The majority of participants judged their reading skills best (almost 60% said they were 'very good'). Furthermore, almost 40% stated that they had very good listening skills. Writing and speaking were assessed similarly: the majority indicated to have 'good' writing and reading skills.

Another question related to the learners' linguistic experience was which variety the participants were most familiar with. 41.37% named British English, followed by American English with 38.60%. There were 15.39% who were not sure (i.e. they chose the option 'I don't know.'), and 4.64% who named another variety (e.g. Irish or Australian English). Furthermore, 86% stated that they had a command of at least one foreign language other than English.

6.4 Results and Discussion

This section is structured as follows. First, Section 6.4.1 presents a brief overview of the complements produced as well as of a selection of variables that are predicted to determine a target-like choice of the catenative complement. In particular, we will look at univariate analyses of the effects of frequency, semantic class of the verbs as well as the proficiency level of the learner on the complement choice. The latter also includes a comparison between the different proficiency levels with regard to the participants' individual usage experiences. Sections 6.4.3 and 6.4.4 present the results of the multivariate analysis of the predictor variables for low-proficiency and high-proficiency learners respectively. The two groups will be then compared in Section 6.4.4 in regard to the main factors investigated in the present study. Finally, Section 6.4.4.3 brings the results together and discusses how learners form generalisations and which pieces of information are relevant for 'building'

constructional (schema) knowledge of the catenative verb construction in the course of learning.

6.4.1 Determinants of a Target-Like Catenative Complement

6.4.1.1 *Distribution of Target-Like vs. Non-Target-Like Complements*

The data comprise 10,661 observations produced by 1282 participants (A1-C2 learners). Of all complements, 52.00% had the form of a *to*-inf. complement, 44.91% of an *-ing* complement, and only 2.95% were bare infinitivals (see (11) and (13)). 0.14% of the data comprised other forms.

(10) **target-*to* verb**: **A lot of people **choose** being vegetarians nowadays.* (Participant ID 2580, C1)
(11) **target-*to* verb**: **I **fail** see the difference between the two pictures.* (Participant ID 8653, A2)
(12) **target-*ing* verb**: **We can't **tolerate** to have a racist as our president.* (Participant ID 406, B2)
(13) **target-*ing* verb**: **Ben **postponed** go to the dentist for a couple of months.* (Participant ID 8418, B1)

Overall, 25.5% of the test sentences contained a non-target-like catenative complement, which means that in most cases (75.5%) the learners produced the target-like form. However, there are considerable differences between the individual verbs concerning the target-likeness of the catenative complements produced. Some relatively infrequent verbs, such *afford*, *contemplate*, *proceed*, or *resist*, have been completed with a non-target-like catenative complement between 43% and 58% of the times, while other verbs, such as *finish*, *decide* or *keep*, show a very high proportion of target-like responses (89% and more). The latter verbs are highly frequent in general as well as in the catenative verb construction.

6.4.1.2 *Frequency*

This section will look at the effects of the frequency profiles of the verbs as well as their group on the target-like choice of the catenative complement. The individual effects of the matrix verb frequency, as well as the verb's faithfulness, will be discussed in more detail when presenting the results of the mixed-effects models (see Section 6.4.2 and 6.4.3)

The effect of the frequency profile, which captures information on the verb's occurrence both in general and the catenative construction and its faithfulness to it in native speaker data (see Table 23 below for an overview and examples), shows that the different profiles yield different results with regard to a target-like choice of the complement type:

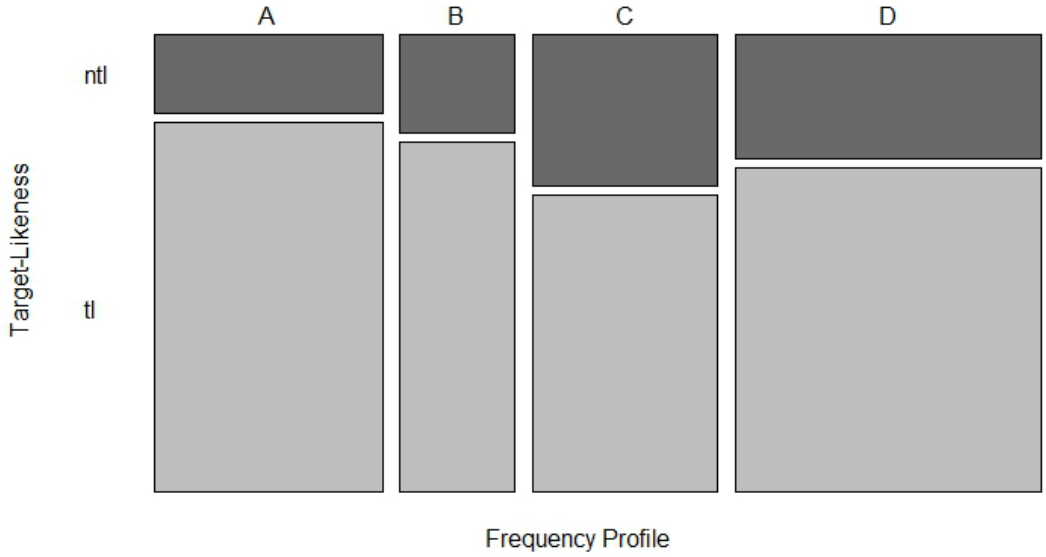

Figure 24 Frequency Profile and Target-likeness of the Catenative Complement

As evident from Figure 24, most verbs belong to profile D, which is a low frequency for all frequency measures, namely matrix verb frequency, frequency of the catenative verb construction, as well as the faithfulness of the verb for the construction. Examples are, for instance, the verbs *postpone* or *swear*. In this group, 72.20% of the responses were target-like.

Table 23 Frequency Profiles with Examples

Profile	Freq. MV	Freq. cat v cxn	Faithfulness	Example (target-*ing*, target-*to*) verb
A	MV ↑	CAT CXN ↑	FAITH ↑	*enjoy, fail*
B	MV ↑	CAT CXN ↓	FAITH ↓	*miss, offer*
C	MV ↓	CAT CXN ↓	FAITH ↑	*mind, hesitate*
D	MV ↓	CAT CXN ↓	FAITH ↓	*postpone, swear*

Profile C verbs, which have a relatively high faithfulness, but have a low matrix verb or catenative verb construction frequency, had the lowest target-like responses with 33.77% (i.e. 66.22% were target-like). Verbs that belong to this category are e.g. *hesitate* or *mind*.

Not surprisingly, profile A, which stands for a verb that has a high frequency in all three categories, had the highest proportion of target-like responses: in only 17.53% of the sentences a non-target-like catenative complement could be found.

A closely related factor to frequency is the impact of the verb group, as target-*to* verbs have a higher type and token frequency than target-*ing* verbs (see Chapter 3, Section 3.4). Figure 25 shows that in the case of the target-*to* verbs the number of target-like responses was slightly higher (78.08%) than for the target-*ing* verbs (70.91%).

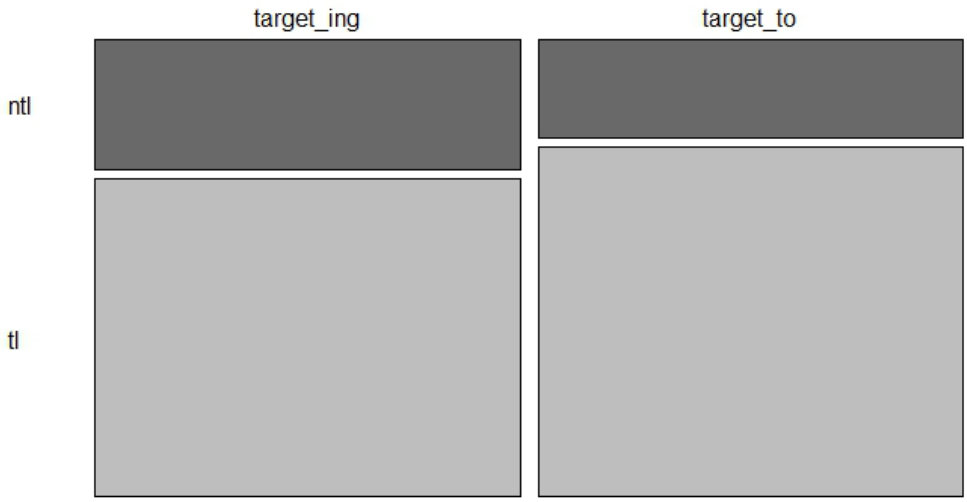

Figure 25 Group of the Catenative Complement and Target-Likeness of the Catenative Complement

After the target-*ing* verbs, 26.4% of all catenative complements produced had the form of a *to*-infinitival (see (14)). For the target-*to* verbs, 19.19% of the test items contained an -*ing* complement as exemplified in (15):

(14) **target-*ing* verb**: **I don't **recall** <u>to see</u> these photographs of my grandma.*

(15) **target-*to* verb**: ** She **pleaded** <u>having</u> a role in the new Harry Potter movie* (ParticipantID 7615, A2)

6.4.1.3 *Semantics*

In order to assess how the meaning of the verb influences the choice of the complement type, we can first take a look at the distribution of the target-*ing* and target-*to* verbs across the semantic subclasses introduced in Section 6.2:

Table 24 Semantic Classification of Verbs according to Palmer (1988)

Semantic class	**target-*to***	**target-*ing***
attitude		*detest, dislike, discuss, miss, justify, contemplate, risk, mind, enjoy, tolerate, celebrate*
effort/ achievement	*proceed, struggle, serve, seek, manage, attempt, fail, tend, afford*	
futurity	*plead, swear, request, volunteer, demand, pledge, hesitate, decline, offer, refuse, decide, choose, dare*	
process		*avoid, quit, complete, practise, recall, resist, finish, keep, postpone*
reporting		*mention, deny*

Based on Palmer's (1988) semantic classification of catenative verbs, the target-*ing* verbs of this study are either verbs denoting attitude, process or verbs of reporting, while target-*to* verbs express effort/achievement (for reasons of brevity henceforth referred to as 'effort' verbs) or futurity. The complementary distribution of the two verb groups across the subclasses raises the question whether learners' complement choice is more dependent on the verb group (i.e. target-*ing* vs. target-*to*) or the semantic class the verbs belong to, or whether both factors play a role. This question will be addressed when dealing with a multivariate analysis of these factors. Before, we will look at the relation between the semantic classes and the target-likeness of the catenative complement. Figure 26 shows that some semantic classes constitute a higher proportion of target-like responses:

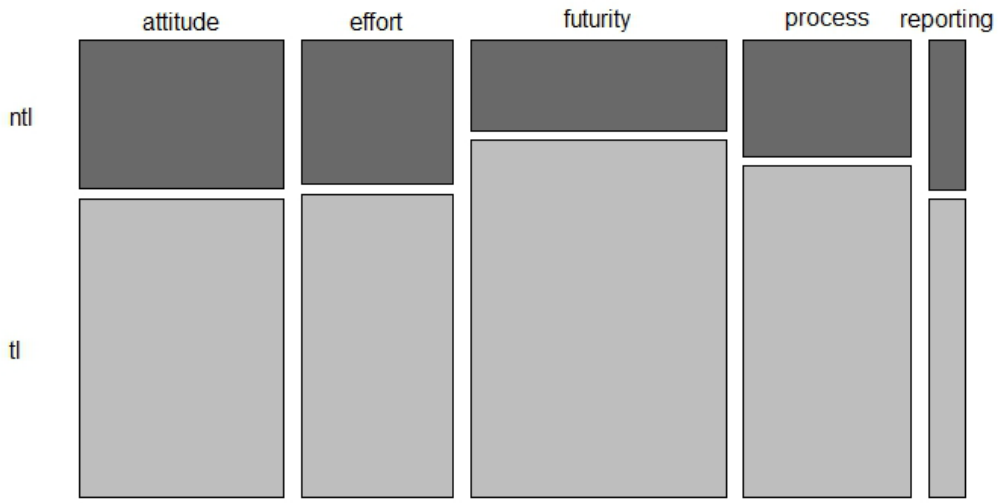

Figure 26 Semantic Class of Catenative Verb and Target-Likeness of the Catenative Complement

Those verbs that were classified as verbs expressing futurity (target-*to* verbs), such as *decide*, *refuse* or *demand*, had the highest rate of target-like responses (79.71%). Attitude verbs (target-*ing* verbs), as for instance, *quit*, *keep*, or *recall*, were completed with the target-like complement in 66.7%, which is the second lowest value across all subclasses (verbs of reporting had a lower value of 65.2%).

6.4.1.4 *Proficiency and Individual Usage Experience*

As the learners were not tested with regard to their proficiency but had to assess their estimated level themselves, a conditional inference tree model (ctree; see e.g. Levshina 2015: 292 ff.; Tagliamonte & Baayen 2012 for more information) was fitted with proficiency level as a predictor variable and target-likeness as the dependent variable to explore an effect of proficiency and with this the reliability of the self-assessment. This ctree is shown in Figure 27 below.

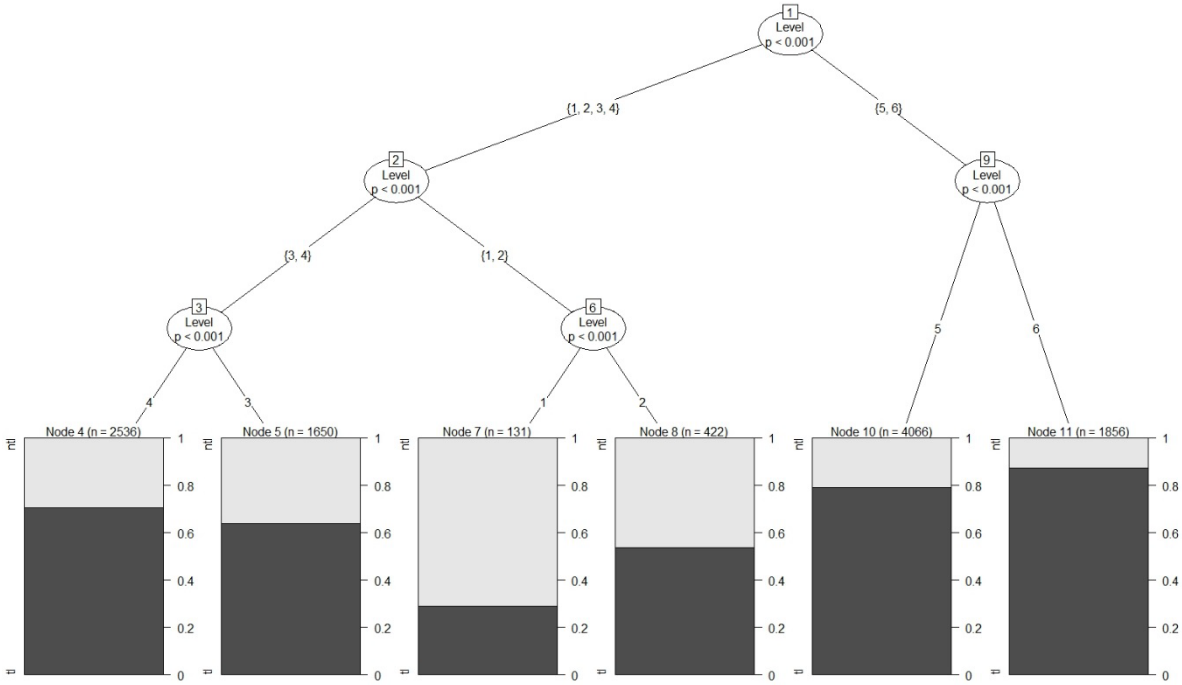

Figure 27 Ctree Target-Likeness Predicted by Proficiency Level

This ctree shows a binary split that divides the proficiency levels, namely between A1 to B2 (1-4), and C1 and C2 (5-6). This means that we can find a significant difference between highly proficient, and low/intermediate learners of English. We also find another split between A1 to A2 (1-2), and B1 to B2 (3-4) learners. Overall, it can be seen that the lower the proficiency, the lower the number of target-like (tl) responses; C2-level learners perform best, while A1 level learners produce the lowest number of target-like responses.

The most striking observation to emerge from this ctree is the fact that the self-assessed proficiency levels are divided in an expected way, i.e. we find a division between less advanced and more advanced learners. This result does not only provide evidence for the plausibility of the self-assessment but also has several implications for the analysis of the data. As there is evidence that the representation of the catenative verb construction changes with increasing proficiency, interactions between the predictor variables and proficiency level could be tested in a mixed-effects model. However, these statistical interactions are

difficult to interpret[93] due to the high number of different predictor variables. Therefore, for a more comprehensible comparison of the proficiency levels, the dataset will be divided into two subsets. The first subset contains data by 586 low- and intermediate learners from A2 to B2 (A1 learners were excluded because the number of observations was too small with 131 sentences only). This group will be referred to as 'low-proficiency learners' from now on for reasons of simplicity. The distribution across the levels was as follows: 9.2% had an A2, 35.8% a B1, and 55% a B2 level. The second group comprises data by 669 advanced learners, of whom 68.6% had a C1 and 34.4% a C2 level. In the following, these two groups will be compared with regard to their individual linguistic experience and familiarity ratings of the verbs, before presenting the results of the mixed-effects models for each learner group.

One of the variables that dealt with the individual usage experience of the learners was the weekly input and output. The participants were asked to indicate how many contact hours to the target language they had per week (scale: <1 hour, 1-2 hours, 3-4 hours, 5-6 hours, 7-8 hours or >8 hours) in terms of writing and speaking in English (summarised as 'output'), as well as reading and listening to the target language ('input'). Figure 28 shows the results for the low-proficiency learners on the left-hand side and for the high-proficiency learners on the right-hand side. Most low-proficiency learners estimated that they either had an input of less than one hour (26.7%) or between 1 and 2 hours (25.76%) per week. By contrast, the majority of the participants with a high proficiency (53.64%) said that they had an input of more than eight hours a week.

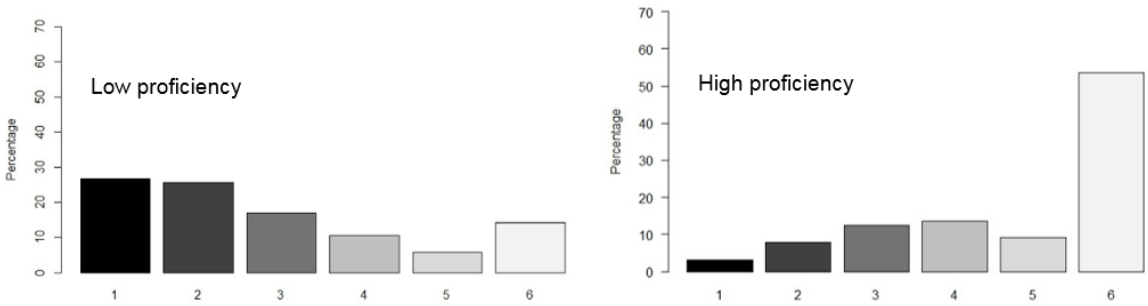

Figure 28 Weekly Input (Reading & Listening) by Low- and High- Proficiency Learners

[93]Some attempts to include interactions between the predictor variables and proficiency level failed practically because the models did not converge when computing them in R.

When looking at the estimated output in the form of writing or speaking (see Figure 29 below) and comparing it with the input per week, it is apparent that the output and input differ considerably, especially for the low-proficiency learners. 65.91% of the participants in this group and 23.95% of the advanced learners use English less than one hour per week. However, 31.61% of the advanced learners also stated that they have an output of more than 8 hours.

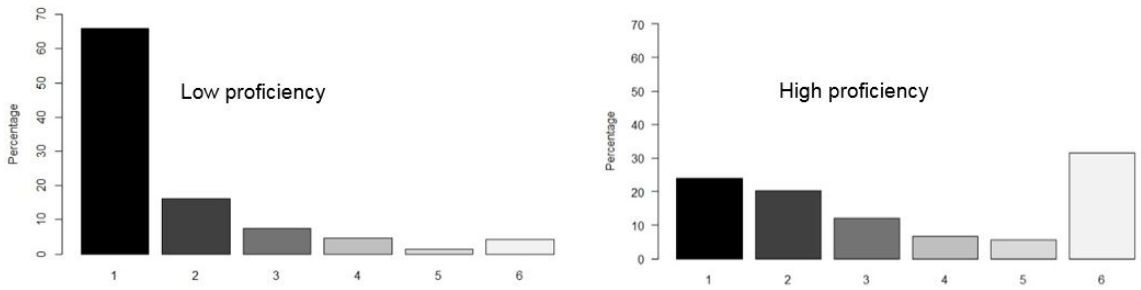

Figure 29 Weekly Output (Speaking & Writing) by Low- and High-Proficiency Learners

When it comes to the self-assessment of their English skills, the skill that has been assessed best by the low-proficiency learners is the proficiency in reading, which has been rated with 1.86 on average (scale: 1 = very good, 2 = good, 3 =okay, 4 = rather poor, 5 = very poor). Listening skills received the second highest rating (2.34, on average). By contrast, the participants' proficiency in writing and speaking was rated lower with 2.69 and 2.78 respectively, which corresponds to the category 'okay'. The high-proficiency learners assessed their reading skills also best with 1.41 on average, followed by listening comprehension with 1.39. The two skills writing and speaking were rated slightly lower (their respective means were 1.61 and 1.58).

Having summarised the ratings of the language skills, we will now turn to a comparison between the low- and high-proficiency learners' individual familiarity with the catenative verbs. Figure 30 presents the ratings of the verbs with regard to how often the learners have heard the verbs before (referred to as 'perception' in the present study). '5' stands for heard/read 'very often' and '1' for 'never' heard/read before.

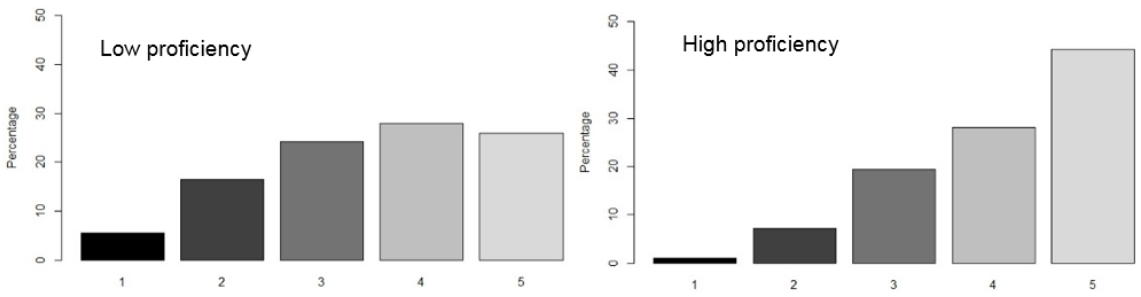

Figure 30 Familiarity Rating of Catenative Verbs (Perception)

The ratings of the verbs by the low- and high-proficiency learners are distributed differently, which is reflected in the mean ratings of the verbs: low-proficiency learners rated the verbs with 3.53 (heard/read 'occasionally'/ 'often'; *median* = 4), while the high-proficiency learners' rating was slightly higher with 4.07 on average (heard/read 'often'; *median* = 4). In terms of usage, i.e. how often the learners have used the verbs before, the following picture emerges:

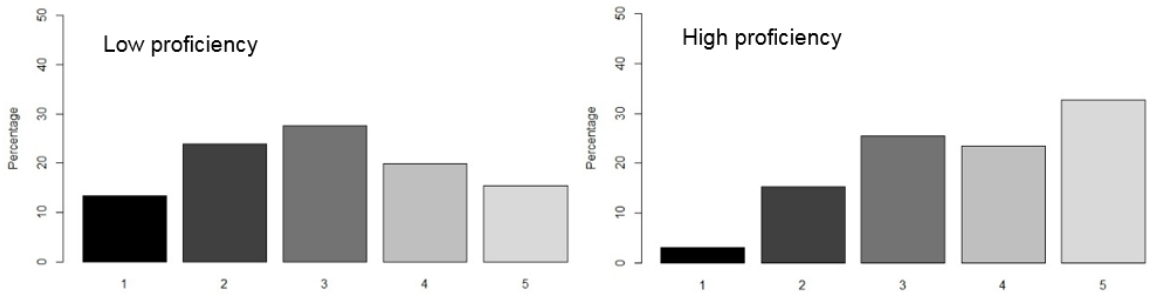

Figure 31 Familiarity Rating of Catenative Verbs (Usage)

The low-proficiency learners indicated that they had used the verb 'occasionally' on average (3.0; *median* = 3), while the rating by the high-proficiency learners was slightly higher with 3.67 (*median* = 4)[94].

[94] On the whole, the ratings for both learner groups show that the familiarity of the verbs in terms of perception is slightly higher than for their usage. However, these two rating correlate: for the low-proficiency learners we find a positive correlation of $r_S = 0.78$ ($p < 0.001$) and for the high-proficiency learners a correlation of $r_S = 0.76$ ($p < 0.001$).

Finally, we will look at the correlations (Spearman's Rank Correlation) between the individual familiarity ratings of the catenative verbs and their frequency in native speaker data from the BNC and COCA (normalised frequencies per one million words):

Table 25 Correlations Corpus Frequencies and Familiarity Ratings (r_S*-Values,* $p < 0.001$*)*

	Perception		***Usage***	
	Low	**High**	**Low**	**High**
freq_mv_BNC_mil	0.3339	0.2877	0.3931	0.3531
freq_mv_COCA_mil	0.3685	0.2945	0.4287	0.3633

The correlations between the BNC and COCA frequencies and the ratings by the low-proficiency learners is slightly higher than the ones by the advanced learners. However, all correlations are generally moderate. The highest correlations can be found between the matrix verb frequencies of the verbs in the COCA and the learners' usage of them. Despite these weak correlations, we will explore if and to what extent the learners' individual experience with these verbs can predict a target-like choice of the complement.

6.4.2 Low-Proficiency Learners: What Determines a Target-Like Choice?

The number of non-target-like responses was 1541 out of 4608 sentences, which is approximately one-third of all responses (33.44%). Overall, target-*to* verbs were completed with a non-target-like catenative complement less often (29.18%) than target-*ing* verbs (37.85%). Non-target-like forms are exemplified by (16) and (19) below.

51.82% of all catenative complements had the form of a *to*-inf., 43% were -*ing* complements, 4.9% bare infinitivals, and the rest had another form (e.g. NP + -*ing*). Note that all non-catenative constructions were excluded from the analysis (e.g. *that*-clauses, noun phrases, etc.).

(16) bare inf.: **He risks <u>go</u> to jail for the rest of his life.* (Participant ID 2370, Level A1)

(17) *to*-inf.: *My father didn't hesitate <u>to take</u> me away from my mother.* (Participant ID 1429, Level A2)

(18) -*ing*: *All students completed <u>reading</u> two novels in one week.* (Participant ID 2876, Level A2)

(19) *NP + -ing*: **Dr Spencer attempted his patient to make it a little more comfortable.* (Participant ID 3945, Level B2)

Some verbs had an especially high number of non-target-like responses. For instance, the verbs *contemplate* (63% ntl responses), *postpone* (67.94% ntl), *proceed* (66.67% ntl), or *resist* (57.3% ntl) were completed with a non-target-like complement most often. Apart from *proceed*, all these verbs are target-*ing* verbs. Some target-*to* verbs that had a relatively high rate of non-target-like responses were, for instance, *afford* (46.32% ntl), *hesitate* (35.71% ntl), or *serve* (38.89% ntl). In most of the cases, as can be deduced by the distribution of complement forms presented above, the non-target-like form was either an -*ing* or a *to*-inf. complement (see (20) to (23) for illustration).

(20) *contemplate*: **She had contemplated to take a break from her legal career.*
(21) *resist*: **I can't resist to take a quick look at his new wife.*
(22) *proceed*: **The lawyer proceeds asking them more questions about the victim.*
(23) *afford*: **She couldn't afford taking her children to a restaurant.*

Verbs that were complemented with the target-like form were, for example, *keep* (90.48% tl responses), *decide* (89.43% tl), or *tend* (79% tl), which all have a high frequency in the catenative construction. But there were also relatively infrequent verbs, such as *quit* or *plead*, which were predominantly completed with a target-like complement (82.76% and 79.2% respectively). However, even though *quit* has not a high token frequency in general as well as in the catenative verb construction (matrix verb frequency = 31.08 per one million words, catenative verb construction = 5.26 per one million words in the COCA), it has, among all target-*ing* verbs used in the experiment, one of the highest faithfulness values with 16.91 (in comparison, *risk* has the highest faithfulness with 18.01).

To assess how the factors under investigation affect the target-like choice for all verbs, a mixed-effects regression model was fitted (for information on the model fitting procedure see Section 6.3.3.3). The final model had the following formula:

target_like ~ freq_profile + log_mv_COCA + fam_usage + prof_writing + Level + semantics_mv + (1 | *ParticipantID*) + (1 | *Set_version*)[95]

Table 26 shows the coefficient estimates, the standard errors (*SE*), *z*-values and the *p*-values of the final mixed model. Again, the reference levels appear in alphabetic order.

Table 26 Low-Proficiency Learners: Fixed Effects Predicting the Production of a Target-Like Catenative Complement

	estimate	***SE***	***z*-value**	***Pr(>|z|)***
Intercept	-0.353060	0.344650	-1.024	0.305646
freq_profile_B (MV ↑ CAT CXN ↓ FAITH ↓)	-0.039756	0.150004	-0.265	0.790985
freq_profile_C (MV ↓ CAT CXN ↓ FAITH ↑)	-0.624847	0.131998	-4.734	2.20e-06 ***
freq_profile_D (MV ↓ CAT CXN ↓ FAITH ↓)	-0.146661	0.132808	-1.104	0.269458
log_mv_COCA	0.410703	0.112784	3.641	0.000271 ***
fam_usage	0.229383	0.034591	6.631	3.33e-11 ***
prof_writing	-0.255885	0.059272	-4.317	1.58e-05 ***
Level 3 (B1)	0.307525	0.148329	2.073	0.038148 *
Level 4 (B2)	0.471744	0.153861	3.066	0.002169 **
semantics_mv_effort	-0.001567	0.134711	0.012	0.990721
semantics_mv_futurity	0.810482	0.100025	8.103	5.37e-16 ***
semantics_mv_process	0.126202	0.108763	1.160	0.245911
semantics_reporting	-0.140752	0.207960	-0.677	0.498518
No. of observations	*4566*			

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

When looking at the frequency-related factors and their effect on the choice of the target-like catenative complement by learners between an A2 and B2 level, several interesting outcomes emerge. First, the only significant effect that can be shown when looking at the frequency profiles of the verb is the difference between verbs of profile A and C. Profile A, which corresponds to a verb that is highly frequent both in general and in the catenative construction, and has a high faithfulness to the latter (examples: *avoid*, *keep*, *manage* or *refuse*), yield the highest number of target-like responses. By contrast, catenative verbs that belong to frequency profile C (MV ↓ CAT CXN ↓ FAITH ↑), as for instance *risk* or

[95] Random effects:

Groups	Name	Variance	Std.Dev.
ParticipantID	(Intercept)	0.311078	0.55774
Set_version	(Intercept)	0.005548	0.07449

volunteer, have the lowest number of target-like responses (see Figure 32). In comparison to frequency profile A this effect is highly significant (-0.62, $SE = 0.13$, $p < 0.0001$).

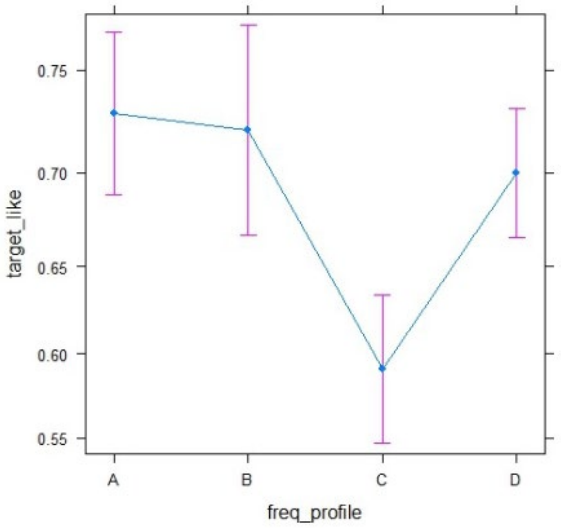

Figure 32 Low-Proficiency Learners: Effect Plot Frequency Profiles

Second, the other frequency measure that significantly predicts a target-like choice is the frequency of the matrix verb. The effect is positive, which means that the more frequent the verb is in general, the higher the probability of a target-like response (+0.41, $SE = 0.11$, $p = 0.0003$, see Figure 33).

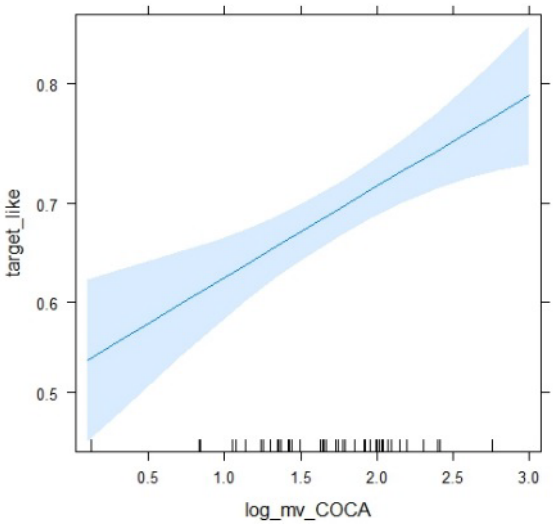

Figure 33 Low-Proficiency Learners: Effect Plot Matrix Verb Frequency

Third, the faithfulness of the verb did not make any significant predictions, which was why it was discarded from the final model. This means that this frequency measure, which provides information on how often the verb occurs in the catenative verb construction in relation to other constructions, has no effect on the complement choice. So even when verbs had a high faithfulness to the target construction, they were not necessarily completed with a native-like complement. This is a relevant finding that will be discussed in 6.4.4.

Moving on to the factors that deal with the learners' individual usage experience, we can see that two factors increased the probability of a target-like catenative complement: the familiarity with the verbs in usage as well as the proficiency in writing. So the more often the verb has been used, the more likely a target-like catenative complement can be found (+0.23, $SE = 0.034$, $p < 0.0001$; see Figure 34). By contrast, the familiarity rating for the perception of the verbs was not a significant factor.

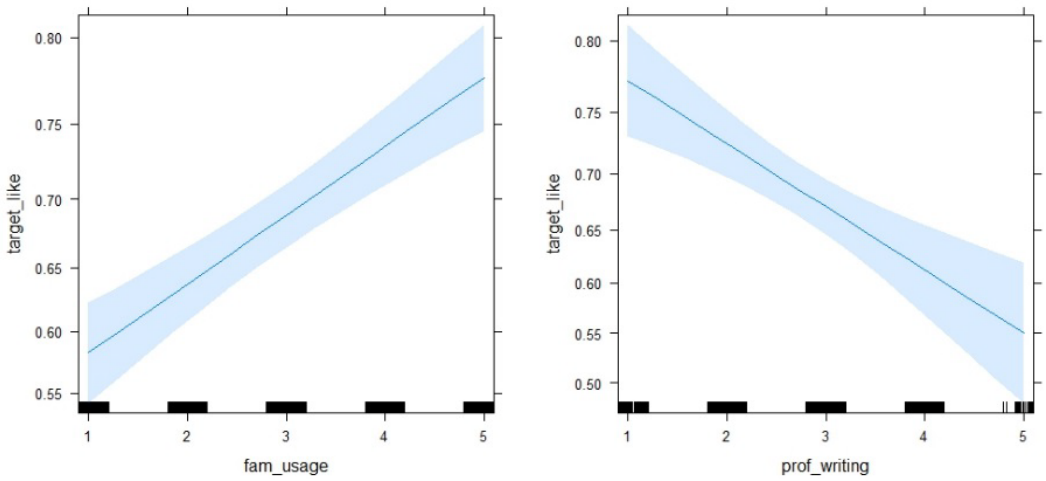

Figure 34 Low-Proficiency Learners: Effect Plots Individual Usage Experience

A similar effect as with the familiarity in usage can be seen with the proficiency in writing: the higher the rating of the participants' writing skills, the greater the chance that we find a target-like response (1 corresponds to 'very good' and 5 to 'very bad'; -0.26, $SE = 0.06$, $p < 0.0001$). The other self-assessed skills (reading, speaking, and listening) were no significant predictors. Other variables related to the learners' usage experience that were not significant were, e.g. the weekly input (reading and listening) and the output (writing and speaking). However, as already shown in 6.4.1.4, we can see a positive effect of the learner's general proficiency level. There is an increase of target-like responses from the A2 level to the B1

(+0.31, *SE* = 0.15, *p* = 0.04) as well as B2 level (+0.47, SE = 0.15, *p* = 0.002, see Table 26 above). 46.2% of A2 level responses were non-target-like. Unexpectedly, on a B1-level the non-target-like responses had a lower percentage (36.24%) than on a B2 level (42.8%).

Turning now to the influence of the semantic subclass of the catenative verb on the complement choice, only one significant effect can be seen: Futurity verbs (target-*to* verbs) significantly predicted a target-like complement in comparison to attitude verbs (+0.81, *SE* = 0.10, *p* < 0.001, see Figure 35).

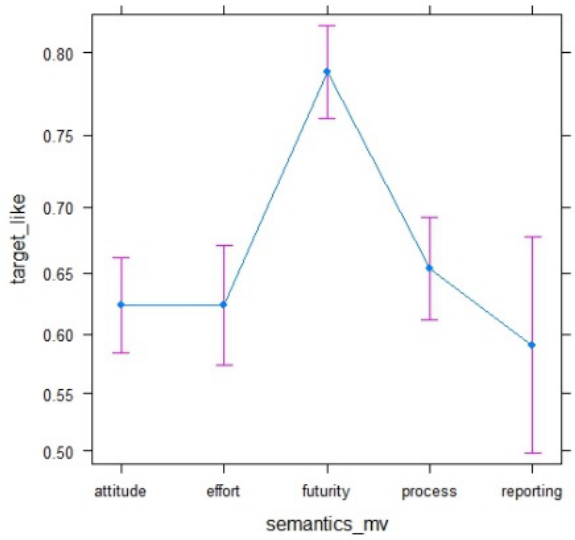

Figure 35 Low-Proficiency: Effect Plot Semantic Class

As mentioned before, the group of the verb correlates with the distribution of the verbs across the different semantic classes: attitude, process, and reporting verbs are target-*ing* and futurity and effort verbs target-*to* verbs (see Section 6.2). Statistically, they were confounded so that these two variables could not be used as predictor variables in the same mixed-model. This is why a separate model with the group of the verb was fitted (all other predictor variables were identical). In this model, the effect of group was significant. If the verb was a target-*to* verb, the probability of a target-like catenative complement was higher than for target-*ing* verbs (+0.54, *SE* = 0.08, *p* < 0.001). However, the model with the semantic class of the verb had a better explanatory power than the model with group as assessed by an ANOVA (($\chi 2(3)$= 44.95, *p* < 0.001)). What this means on a theoretical level with regard to the acquisition of the catenative verb construction, will be discussed in more detail in 6.4.4.

6.4.3 High-Proficiency Learners (C1-C2): What Determines a Target-Like Choice?

The subset with the high-proficiency learners contains only 18.35% (1085/5912) non-target-like responses. Of all the catenative complements produced, 52.8% had the form of a *to*-inf. complement and 46.8% were *-ing* complements. Only 0.4% had another form (e.g. bare infinitivals). Some verbs, such as the high-frequency verbs *decide*, *tend*, or *keep* can be found with a target-like complement in more than 97% of the cases. *Keep*, for instance, which has the highest token frequency in the catenative verb construction among the target-*ing* verbs (76.95/ 1 million words, mv frequency = 569.46/ 1 million words, faithfulness = 0.14), was produced with the target-like catenative complement in 100% of the cases. However, there were also some verbs that had a lower number of target-like complements in comparison. For instance, for the target-*to* verb *proceed*, we find the lowest number of target-like responses: 50.43% of the sentences had a non-target-like catenative complement, which was almost exclusively an *-ing* complement. In comparison to other target-*to* verbs, it has a relatively low matrix verb as well as catenative verb construction frequency (mv freq./1 million words = 26.80, cat v cxn freq.= 4.91, faithfulness = 0.1832). Overall, the number of non-target-like responses was lower in the case of target-*to* verbs (15.02%) in comparison to target-*ing* verbs (21.62%).

To test which variables predict a target-like choice, a mixed-effects model was fitted, adopting the same procedure as for the low-proficiency learners. The formula of the final model is presented in the following:

target-like ~ freq_profile + log_mv_COCA + faithfulness_COCA +
+ fam_percept + input + prof_writing + semantics_mv + Level + (1 | ParticipantID) + (1 | Set_version)[96]

The detailed outcome of the mixed-effects model with the final predictor variables is provided Table 27 below. A description of the most interesting results, including the visualisation of the effects is provided below.

[96] Random effects:

Groups	Name	Variance	Std.Dev.
ParticipantID	(Intercept)	0.40125	0.6334
Set_version	(Intercept)	0.08697	0.2949

Table 27 High-Proficiency Learners: Fixed Effects Predicting the Production of a Target-Like Catenative Complement

	estimate	***SE***	***z*-value**	***Pr(>|z|)***
Intercept	-0.98653	0.39195	-2.517	0.011837 *
freq_profile_B (MV ↑ CAT CXN ↓ FAITH ↓)	0.30030	0.17070	1.759	0.078540 .
freq_profile_C (MV ↓ CAT CXN ↓ FAITH ↑)	-0.55463	0.16709	-3.319	0.000903 ***
freq_profile_D (MV ↓ CAT CXN ↓ FAITH ↓)	0.47026	0.17346	2.711	0.006706 **
log_mv_COCA	0.88207	0.12511	7.050	1.78e-12 ***
faithfulness_COCA	2.07189	0.39513	5.244	1.57e-07 ***
fam_percept	0.09162	0.04183	2.190	0.028498 *
input	0.10619	0.03031	3.503	0.000459 ***
prof_writing	-0.14228	0.07731	-1.840	0.065713 .
Level6	0.42390	0.11273	3.737	0.000170 ***
semantics_mv_effort	0.52406	0.17770	-2.949	0.003187 **
semantics_mv_futurity	0.51598	0.1202864	5.146	2.66e-07 ***
semantics_mv_process	-0.03830	0.11759	-0.326	0.744625
semantics_reporting	-0.63689	0.20156	-3.160	0.001579 **
No. of observations	*5809*			

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

To assess the sensitivity of highly advanced learners for frequencies, we will first look at the effects of the frequency profile of the verbs more closely. In relation to the reference level, profile A (MV ↑ CAT CXN ↑ FAITH ↑), profile C decreased the likelihood of a target-like catenative complement by -0.56 (*SE* = 0.17, *p* = 0.0009, see Figure 36 below). The verbs that belong to this category, such as *afford* or *proceed,* have a relatively low matrix verb and catenative verb construction frequency, but a relatively high faithfulness to the catenative verb construction.

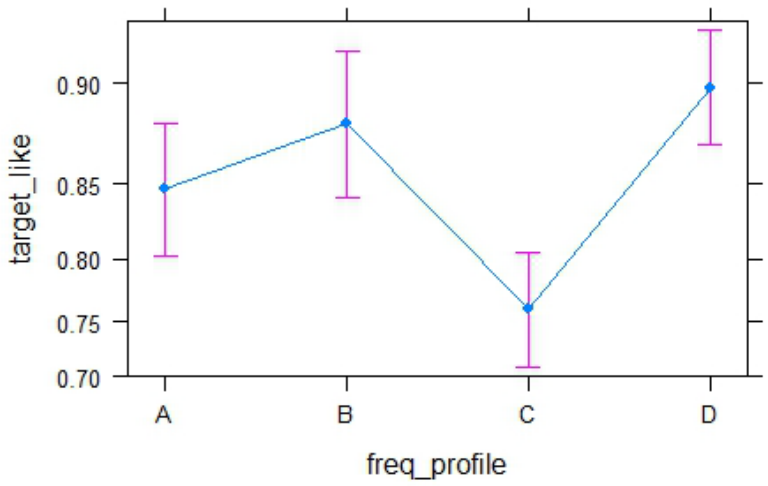

Figure 36 High-Proficiency Learners: Effect Plot Frequency Profiles

Counter to expectations, profile D, which are verbs that are infrequent with regard to all three frequency measures (e.g., *postpone* or *demand*), increases the chance of a target-like response in comparison to profile A verbs (+0.47, $SE = 0.78$, $p = 0.0067$). This stands in contrast to the effect of the matrix verb frequency (log-transformed) as well as the faithfulness of the verb for the catenative verb construction, which are shown to be significant predictors of the dependent variable. The more frequent the matrix verb is in English, the more likely a target-like response gets (+0.88, $SE = 0.13$, $p < 0.001$; see Figure 37, left plot).

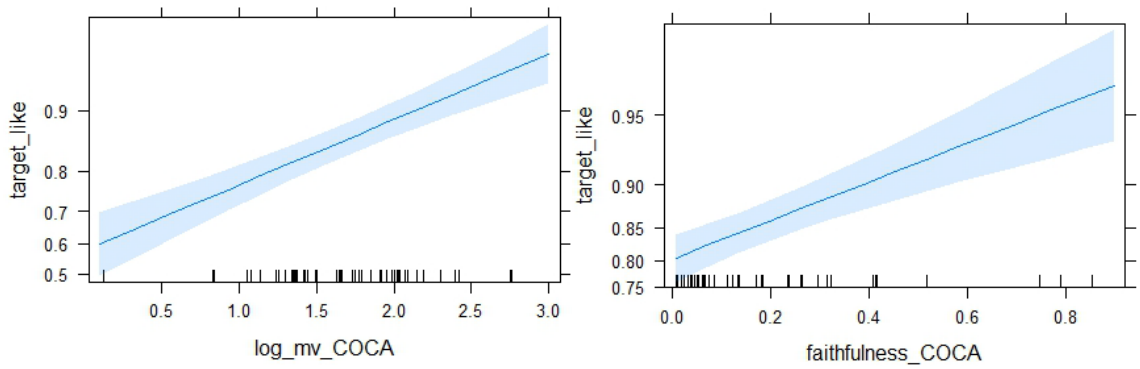

Figure 37 High-Proficiency Learners: Effect Plots Matrix Verb Frequency & Faithfulness

The same effect can be found for the faithfulness of the verb for the catenative verb construction, but the effect is bigger here than for the matrix verb frequency (+2.07, SE =

0.40, $p < 0.001$). As visualised by the rugs in the effect plot (see Figure 37, right plot), only a few verbs, however, had a faithfulness bigger than 0.4. Verbs that exceed this value are, for instance, the target-*to* verbs *refuse* (0.75) or *fail* (0.52). For the target-*ing* verbs, the highest faithfulness can be found with *risk*, which is 0.18.

Turning now to the variables that deal with the learners' individual usage experience with the target language, several interesting observations emerge (see Figure 38). First, only the familiarity rating with regard to the *perception* of the verbs had a positive but small effect (+0.09, SE =0.042, p = 0.03). This implies that the more often the participants had heard or read the matrix verb before, the more likely it was that they chose the target-like complement. By contrast, the assessment of how often the verb had been used before (usage) was no significant predictor and was thus not included in the final model[97].

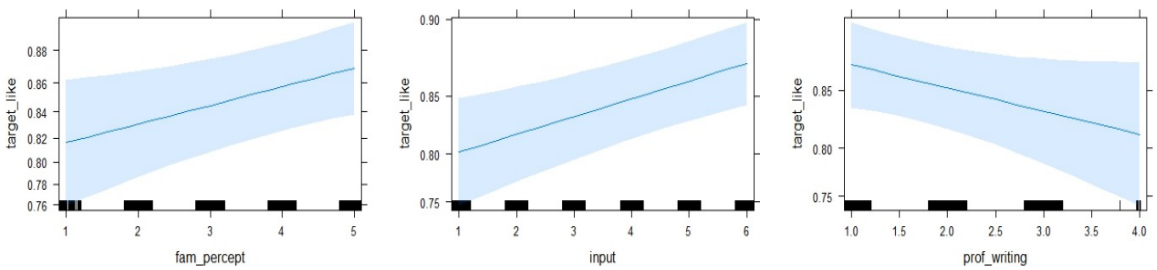

Figure 38 High-Proficiency Learners: Effect Plots Individual Usage Experience

Furthermore, the participants' weekly input (i.e. hours reading or listening to English) had a positive effect, even though it was only small (+0.11, SE = 0.03, p = 0.0005), while the output (writing and speaking) did not predict the target-like choice of the complement significantly. The third variable that deals with the individual usage experience of the learner is the proficiency in writing (5 equals 'very good' and 1 'very poor'): while it has a positive effect, it is, however, only marginally significant (-0.14, SE = 0.077, p = 0.0657). The other self-assessed skills, namely reading, listening comprehension and speaking did not yield any significant results. However, we find a positive effect of proficiency in general (+0.42, SE = 0.11, p = 0.0002). The number of non-target-like responses decreases from 20.96% (C1) to 12.6% (C2).

[97] Furthermore, as mentioned in 6.4.2.1 above, the two ratings had a strong positive correlation (r_S = 0.78, p < 0.001), which is why keeping these two predictor variables in the final model would have also led to collinearity.

Moving to the meaning of the construction, the mixed model shows that the semantic class of the matrix verb makes a significant prediction of whether we find a target-like catenative complement or not. The effects of the individual subclasses vary as Figure 39 below shows. The reference level for this predictor variable was 'attitude'.

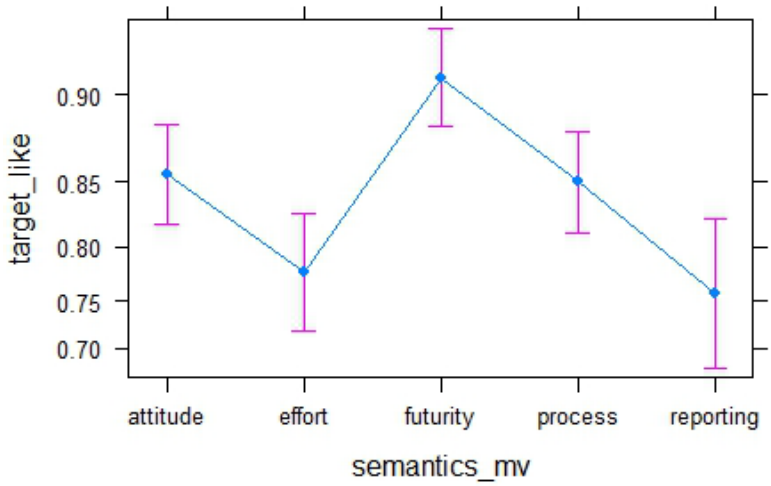

Figure 39 High-Proficiency Learners: Effect Plot Semantic Class

The difference between attitude verbs (target-*ing* verbs, such as *avoid*, *mind*, *enjoy*), and verbs denoting effort (target-*to* verbs, e.g. *struggle* or *afford*) was significant: when the verb expressed effort, it was likely to be complemented with the target-like form. (-0.52, SE = 0.18, p = 0.0032). When the verb denoted futurity (target-*to* verbs, e.g. *hesitate*, *decide* or *choose*), the probability for a target-like response was significantly higher (+0.52, SE = 0.12, $p < 0.001$), and lower when it was a verb of reporting (-0.64, SE = 0.20, p = 0.00158). Process verbs (target-*ing* verbs), however, did not significantly increase the chance of a target-like complement in comparison to attitude verbs. On the whole, 'futurity' verbs, which take a *to*-infinitival as their target catenative complement, have the highest proportion of target-like responses across the five semantic groups.

As for the low-proficiency learners, an alternative model with the group of the verb was fitted. First, it can be said that the effect of group was significant and that target-*to* verbs increased the probability of a target-like complement in comparison to target-*ing* verbs (+0.42, SE = 0.10. $p < 0.001$). Second, the model with the semantic class of the verb had a

better explanatory power than the model with group as assessed by an ANOVA (($\chi^2(3)$= 52.53, $p < 0.001$)). The implication of this finding will be discussed in Section 6.4.4.2.

As already shown for the low-proficiency learners, complement weight/length did not make any significant predictions for the target-like complement choice. One question that this raises is whether there is a correlation between the length and the type of complement type produced. More specifically, it will be interesting to see whether the length of the complement clause has an impact on the learners' production of a *to*-infinitive or an *-ing* catenative complement. This will be further investigated in the analysis of the variable verbs (see Chapter 7).

6.4.4 How Does the Representation of the Catenative Verb Construction Change with Increasing Proficiency?

In this section, the results will be discussed with respect to the differences between the low- and high-proficiency learners. First, we will look at the effects of frequency and the learners' individual usage experience, followed by a discussion of how meaning influences a target-like choice of the catenative complement depending on the learners' proficiency level. Finally, we come to a conclusion with regard to how constructional (schema) knowledge of the catenative verb construction changes and is built with increasing proficiency.

6.4.4.1 *More Experience Matters: Frequency and Individual Usage Experience*

First, we will discuss how the picture changes with increasing proficiency when it comes to the effects of frequency and individual usage experience on the target-like choice of the catenative complement. We will first start with a discussion of the frequency-related measures. For a better overview, the outcomes of the multivariate analyses that were presented in the sections above are summarised in Table 28. The first column shows the variable or variable level and the two other columns display their estimates as well as significance levels in the mixed-effect models, which were fitted for the low- and high-proficiency learners (see Sections 6.4.2 and 6.4.3). 'N.s.' indicates that this factor was not significant in predicting a target-like choice of the catenative complement. A positive coefficient means an increase of target-like responses.

Table 28 Low- vs. High-Proficiency Level: Significant Frequency-Related Variables with Coefficient Estimates

Variable/Variable Level	Low-Proficiency	High-Proficiency
freq_profile_B **(MV ↑ CAT CXN ↓ FAITH ↓)**	**n.s.**	+0.30.
freq_profile_C **(MV ↓ CAT CXN ↓ FAITH ↑)**	-0.62***	-0.55**
freq_profile_D **(MV ↓ CAT CXN ↓ FAITH ↓)**	**n.s.**	+0.47**
log_mv_COCA	+0.41***	+0.88**
faithfulness_COCA	**n.s.**	+2.07***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '

If we compare the learners, the most striking observation to emerge from the data is that there are fundamental differences in the individual effects of the frequency-related factors. While for the low-proficiency learners only the matrix verb frequency and one frequency profile were significant, the high-proficiency learners' complement choice was influenced by all frequency variables. Faithfulness, i.e. the form-function contingency, which provides information on the strength of association of the verb for the target construction, significantly predicted a target-like choice only in the case of the high-proficiency learners. In addition, the different frequency profiles yielded different results for the two groups. While each frequency profile had a different impact on the choice of the catenative complement in the advanced learners group, there was only a significant effect of profile A and C for the low-proficiency learners. Before inspecting the outcomes for the individual frequency profiles of the verbs in more detail, the implications of the findings for the matrix verb frequency and faithfulness will be discussed.

In accordance with the results of the corpus study presented in Chapter 5, the matrix verb frequency, i.e. the verb's overall frequency in native speaker data, has a positive effect for both learner groups, although it is stronger in the high-proficiency group than for the less advanced learners (+0.88 vs. +0.41). This means that the more often the verb occurs in the English language, the more likely it is that learners make a target-like choice (see also Diessel 2004 for a positive effect of the matrix verb in the L1 acquisition of non-finite complements). To give an example, the most frequent verb across all target-*ing* and target-*to* verbs is *keep*. This verb occurs 569.46 per one million words in the COCA and had one of the highest target-like responses with 90.47% in the low- and 100% in the high-proficiency group. In comparison, the least frequent verb, *detest*, occurs only 1.34 times per

one million words in the COCA and was complemented with the target-like form in only 49.5% of the cases by the low-proficiency learners and in 64.17% by the high-proficiency learners. A possible explanation for the effect of the matrix verb is that a higher frequency of the verb in the target language also increases the probability of being encountered in the L2, whether in the classroom, social media, TV shows, or any other type of input the learner receives in English (even though the matrix verb frequency and the familiarity ratings only correlated moderately; potential reasons for this will be critically discussed below). Generally, it is well-known from L1 and L2 acquisition research (see e.g. Bybee 2008; Tomasello 2003) that words which are relatively frequent in the input are those that are often acquired before less frequent ones. Particularly in the case of the less advanced learners, having experienced/learned the verb can help to infer what complement form it takes, especially in a forced production task as in the present study.

Assuming that the learners have never heard or used the verb in the catenative verb construction before, but know what the verb means, they are still able to deduce that the verb has to be complemented by a non-finite clause since they are asked to combine the given constituents. Of course, this implies that the learners have to have a certain understanding of how non-finite constructions are built. As only 7.4% of the data collected in the present study did not contain a catenative complement, but e.g. a nominal complement or a declarative content clause construction, we can assume that the learners generally possessed knowledge of how to construct a *to*-inf. and -*ing* complement.

Nonetheless, being familiar with the matrix verb on the one hand and these non-finite constructions, on the other hand, does not necessarily guarantee a target-like production of the catenative verb construction, as it is evident from the relatively high number of non-target-like complements (33.44%) produced by the low-proficiency learners. As argued in Chapter 4 (see Section 4.4.1), in order to strengthen the learner's expectation (Bybee 2008; Diessel 2007) as to which catenative complement has to follow the verb, a repeated exposure to the verb *together* with its target-like catenative complement is fundamental for acquiring a native-like representation of the catenative verb construction.

Evidence for the importance of the experience with the verb in the target pattern is found in the data by the high-proficiency learner group, where approximately 82% of all test items were completed with the target-like catenative complement. This high number of target-like

choices was significantly predicted by the faithfulness of the catenative verbs to the construction in native speaker data (see e.g. Ellis et al. 2016: 147 ff. for a comparable outcome on L2 learners' acquisition of VACs). This effect of form-function contingency does not only corroborate the findings from Chapter 4 and 5 but it also adds additional evidence for the importance of contingency learning in second language acquisition (Ellis 2006a, 2006b; Ellis & Ferreira-Junior 2009a; Ellis et al. 2014a). In fact, faithfulness had the strongest effect across all predictor variables for the advanced learners (see Section 6.4.3, Table 26) and had a coefficient estimate that was more than two times higher than the one by the matrix verb frequency (estimates: 2.07 vs. 0.88). Consequently, the overall verb frequency seems less important for a native-like choice than the learners' experience of the verb in the catenative verb construction. This outcome does not only show that a strong form-function contingency between the verb and the target construction correlates with a target-like complement choice, but also generally provides evidence that advanced learners possess frequency-sensitive constructional knowledge.

Additional evidence for construction-related frequency effects comes from the frequency profiles, which have been introduced to address the problem of multicollinearity. The strongest evidence comes from the effect of profile A verbs. These verbs, which are verbs that are frequent in all three frequency categories (MV ↑ CAT CXN ↑ FAITH ↑), had the highest probability of being produced with a target-like catenative complement in comparison to other profiles. The effect could be attested in both learner groups. This finding suggests that a higher frequency of a verb, overall as well as in a specific construction, promotes the entrenchment of this construction in a native-like way as well as facilitated access (see e.g. Ellis 2002, 2006a). To illustrate this with a concrete example, we can come back to the target-*ing* verb *keep*, which has a high frequency with respect to all three measures: 100% of the high-proficiency and 90.5% of the low-proficiency learners chose the native-like complement type. This suggests that *keep* is likely to be accessed faster and produced with higher accuracy than an infrequent exemplar. On a general level, this raises the question of whether verbs that correspond to profile A are stored and entrenched on a more item-based level, as in the form of a low-scope pattern such S *keep* V*ing*. The advantage of more holistic storage of such lexically filled patterns would be a facilitated computation of the construction, which requires less processing effort than with the case of

a low-frequency exemplar (see e.g. Arnon & Snider 2010; Ellis 2002; Ellis et al. 2014c Siyanova-Chanturia et al. 2011).

By contrast, profile B verbs had no effect on the low proficiency learners' complement choice and only a marginally significant effect for the high-proficiency learners. These verbs have a relatively high matrix verb frequency but other than that are relatively infrequent in the target construction. Only six verbs in total belonged to the class: five target-*ing* verbs (*complete*, *discuss*, *finish*, *mention*, *miss*) and one target-*to* verb (*offer*). To give an example, the verb *miss* has a very high matrix verb frequency (123.39 instances per 1 million words in the COCA) but only occurs 2.22 times per one million words in the catenative verb construction, which results in a faithfulness value of 0.02. This decreases the probability of the learners associating this verb with the catenative verb construction. Instead, it can be hypothesised that they are more prone to having an entrenched representation of e.g. a nominal complement with this verb (*I miss you/my dog/the times when we were still young*). When the verb is not frequent in the catenative verb construction and also has a low faithfulness to it, there is little chance that learners have encountered it in the input and, if they have, only rarely, which is unlikely to leave traces in the construct-i-con, let alone lead to the entrenchment of this pattern.

In the reverse case, namely a high faithfulness but a low token frequency of the verb in the catenative verb construction as well as in its overall occurrence (profile C verbs), the probability of a target-like complement decreases in comparison to profile A verbs for low- and high-proficiency learners alike. Verbs with this profile, which yielded a relatively high number of non-target-like complements were, for instance, the target-*to* verbs *afford* or *proceed*, or the target-*ing* verbs *contemplate* or *risk*. For example, *risk* has a faithfulness of 0.18, which is the highest value across all target-*ing* verbs studied in the experiment. However, it occurs only 4.22 times in the catenative verb construction and 23.44 overall per one million words in the COCA (cf. the values for *keep* were 76.95 in the catenative verb construction and 569.46 overall per one million words and a faithfulness of 0.14). As a result, not only the statistical chances to experience this verb in the catenative verb construction are low, but also to encounter *risk* (as a verb) in general in the input.

The last profile to be discussed is profile D, which comprises verbs that are relatively infrequent with respect to all three frequency measures. This profile was only significant in

comparison to profile A for the high-proficiency learners. However, the direction of the effect goes counter to the frequency effects discussed so far: profile D verbs increased the probability of a target-like catenative complement. Thus, certain verbs that have a low frequency overall and in the catenative verb construction yielded a high number of target-like responses such as *quit* (97.42%), *swear* (93.2%), *celebrate* (88.37%), *practise* (84.07%), or *justify* (81.94%). However, at the same time there are also verbs in this category that were complemented in a more expected way and had a relatively high number of non-target-like responses, such as *decline* (25.8% non-target-like complements), *resist* (33.59%), *detest* (35.83%), or *proceed* (50.43%). It is difficult to explain this result, but a possible explanation for this might be of a methodological nature. When using this categorical classification of numerical values, information can get lost and individual differences between verbs, which affect the complement choice, are 'creased out'. On the other hand, as the learners have a very high proficiency, it can be assumed that they have inferred the target structure for some low-frequency verbs based on syntactic and semantic bootstrapping, which can be benefited by a more schematic representation of the catenative verb construction or the comparison with a highly entrenched exemplar. More specifically, when encountering an infrequent verb, the learners might activate the more schematic pattern S CV V*ing or* S CV *to* V in order to compute the target construction as they detect compatible semantic and formal features between subschema and exemplar. However, this interpretation requires further in-depth research.

After having discussed the different effects of frequency measured on the basis of native speaker data, it will be now interesting to take a closer look at the differences between the two learner groups with regard to their individual usage experience. As evident from Table 29 below, we can see that the different experience types have an impact on the native-like choice:

Table 29 Low- vs. High-Proficiency Level: Significant Usage-Related Variables with Coefficient Estimates

Variable/Variable Level	Low-Proficiency	High-Proficiency
fam_percept	**n.s.**	+0.09*
fam_usage	+0.23***	**n.s.**
input	**n.s.**	0.11***
prof_writing	-0.26***	-0.14.

First, we could see that the familiarity ratings yielded different results. For the low-proficiency learners, the individual familiarity of the verb in *usage* (determined on the question 'How often have you used the verb before?') was a significant predictor, while for the advanced learner it was the familiarity in *perception* ('How often have you heard/read the verb before?'). A lower proficiency usually implies less experience with the target language, which is why the active usage is more likely to have an impact on the mental representation of the construction than the 'passive' experience with it and is, thus, ultimately more influential for the linguistic behaviour of a learner. By contrast, for a learner with a higher proficiency, it can be hypothesised that s/he has been more exposed to the target language and might not only have developed an intuition about the frequency with which a word occurs in the L2 but can also choose the target-like complement without having used that verb before. However, the effect of familiarity of the verbs in perception is rather small in comparison to other predictor variables, which is why these results have to be interpreted with caution.

Furthermore, as shown in Section 6.4.1.4, there is only a moderate correlation between the ratings and the frequency of the matrix verb in the BNC or COCA. This can be attributed to several reasons. A study by Siyanova-Chanturia & Spina (2015) on the subjective judgments of collocation frequencies with native speakers and learners of Italian has shown, for instance, that the judgment of high- and very low-frequency collocations correlated with corpus frequencies for both L1 and L2 learners. By contrast, collocations of medium frequency were not judged accurately. The authors of the study argue (ibid: 552) that highly frequent and highly infrequent items have a higher salience as "they appear at the far ends of the frequency continuum", while medium frequency collocations are more difficult to judge as they are less prominent. Probabilistic knowledge about constructions emerges and manifests itself on a subconscious level as it never involves conscious counting (see Ellis et al. 2016: 119–120). Therefore, 'quantifying' this type of implicit knowledge can easily lead to inaccuracies in the judgement of their frequency.

Another issue that has to be considered is that these ratings are always *relative*, i.e. the accuracy with which language users subjectively judge the frequency of words or phrases is shown to be dependent on how frequent the respective word or phrase is in relation to others (see Anderson 2007). Consequently, in the case of the familiarity ratings of the present study, there might be also an influence of the filler verbs. The filler verbs that were chosen are

among those with the highest lemma frequency in the BNC, which is why it could be investigated how their ratings correlate with their frequencies in native speaker data. Furthermore, the catenative verbs in comparison were generally less frequent so the question arises whether some of them had a 'medium' frequency in comparison and were, therefore, more difficult to judge for the learners. For future studies, it can be advisable to balance the frequency bands, including the frequencies of the filler verbs, and also include the subjective judgments of native speakers for comparison. Another option to assess the learners' general linguistic experience with the target language in a more controlled way could be e.g. a vocabulary size test (see e.g. Nation & Beglar 2007).

In accordance with the learners' familiarity with the verb in perception, as well as the attested frequency effects, the estimated weekly input of the target language also had a small but significant effect on the complement choice in the case of the high-proficiency learners. This means that the more input the learners get, i.e. the more they are exposed to English, the higher the number of target-like responses. Interestingly, the weekly output had no effect on neither group. It can be hypothesised that this outcome is because learners tend to use constructions in speaking and writing (output) that are more frequent and familiar rather than low-frequency ones (see also discussion Chapter 5), while a wider range of constructions with different frequencies is experienced in the input.

Another factor that is related to the learner's individual usage experience is proficiency in writing. It was shown that the learner's self-assessed writing skills had a positive impact[98] on the target-like choice of the catenative complement for both learner groups (although only with marginal significance in the high-proficiency group), while the proficiency in other areas, namely reading, listening comprehension, or speaking, had no effect. These results can be explained as follows. First, for L2 learners living in an environment where English is not the predominant language, the input is limited to certain contexts, most likely to written ones. This is also reflected in the results for the estimated weekly input (see Section 6.4.1.4); the learners stated that they read and listen to English more often than producing it.

[98] Note, the coefficient in Table 20 is negative because the assessment of this skill was done on the basis of the German grading system, where 1 corresponds to the best and 6 to the worst grade.

Furthermore, the catenative verb construction, especially with many verbs examined in this study, is relatively infrequent in comparison to other constructions, e.g. nominal or finite complement constructions. This is a general tendency, but one that applies, in particular, to less formal registers. In accordance with this, the finding that the catenative verb construction is more likely to occur in written registers explains that the learners' writing skills increase the chance of a target-like complement. Second, writing is a more monitored activity than speaking, which allows for more processing time and therefore increases the chances of using constructions that are more complex, such as the catenative verb construction.

To conclude this section, we can say that the picture does indeed change with increasing proficiency: a higher overall frequency of the matrix verb in native speaker data increases the chances of a target-like complement for all proficiency levels, while more 'construction-oriented' frequency measures emerge as determinants of a target-like choice only with a higher proficiency. In general, the findings do not only corroborate the effects of frequency in the L1 and L2 acquisition of verb-argument constructions (see e.g. Ambridge et al. 2012b; Ambridge et al. 2014a; Ambridge et al. 2008; Ambridge et al. 2006; Ellis & Ferreira-Junior 2009; Ellis et al. 2013; Ellis et al. 2016a; Gries & Ellis 2015; Kidd et al. 2006a; Kidd et al. 2010b; Ellis 2006a) but also yield new and important data and insights into the effects of frequency and individual usage experience on the learning of constructions across different levels of proficiency.

6.4.4.2 *L2 Constructions as Form-**Meaning** Pairings: Semantic Subclasses*

Based on the evidence presented in the present thesis, it is clear that the exposure to the form of the catenative verb construction is fundamental in acquiring a target-like representation of it. However, as constructions are defined as pairings of form *and* meaning, it is also essential to investigate the meaning side of the catenative verb construction, especially in light of its role for learners with different proficiency levels. The results for the effects of the different semantic subclasses of the catenative verbs in the two proficiency groups are summarised in Table 30. The numbers are the estimates of the different subclasses in relation to the reference level (attitude verbs).

Table 30 Low- vs. High-Proficiency Level: Effects of Semantic Subclasses with Coefficient Estimates

Semantic Class	Low-Proficiency	High-Proficiency
effort	**n.s.**	-0.52**
futurity	+0.81***	+0.52***
process	**n.s.**	**n.s.**
reporting	**n.s.**	-0.64***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '

In both proficiency groups, we can observe an effect of the semantic class of the verb. However, its impact on the target-like choice of the catenative complement was limited in the case of the low-proficiency learners. The single semantic class that made a significant prediction of a target-like complement was that of futurity (e.g. *demand*, *offer*, *refuse*). Futurity verbs did not only yield the highest number of target-like responses in the low-proficiency group but also had the highest coefficient estimate across all predictor variables (see Section 6.4.3, Table 27), which means it was the stronger predictor of a target-like complement choice. By contrast, the high-proficiency learners were influenced by every semantic class[99]. In other words, there were differences in the complementation preference of the learners depending on the verb's class. Futurity verbs yielded the highest number of target-like responses, similar to the low-proficiency learners, followed by verbs denoting attitude (e.g. *mind*, *enjoy*).

As stated above, the semantic classes correlate with the verb group: the semantic classes of futurity and effort/achievement are target-*to* verbs while verbs denoting attitude, process and reporting are target-*ing* verbs. Therefore, the semantic class that yielded the highest number of target-like responses in both proficiency groups, namely futurity, comprises target-*to* verbs. This suggests that this specific form-meaning mapping is less marked and is thus acquired early, which cannot only be explained by the higher type and token frequency of the target-*to* construction in general (see Section 6.4.4.3 for a more detailed discussion) but also because futurity verbs can be seen to express a prototypical meaning of the target-*to* construction. *To*-infinitive clauses are, in fact, mostly associated with the meaning of potentiality and futurity (see Chapter 3.1, Figure 6; Egan 2008: 25). This can be linked to

[99]Only process verbs were not significantly different from attitude verbs but they yielded a comparable probability of a target-like catenative complement (cf. Section 6.4.3, Figure 35).

the *to*-particle, which derives historically from the preposition *to* (see e.g. Huddleston & Pullum 2005: 205). It is considered to carry a meaning that connotes direction, even though in a more metaphorical sense (see e.g. Duffley 1992; Duffley 2000).

Attitude verbs, on the other hand, seem to denote a more prototypical meaning among the target-*ing* verbs, which might be accountable for the higher number of target-like responses in the high-proficiency group. The meaning most strongly associated with the target-*ing* construction is 'generality' (cf. e.g. Wierzbicka 1988: 69), which is also reflected in the expression of an attitude towards e.g. an activity (*I enjoy drinking coffee*). However, it has to be noted that process verbs yielded similarly high target-like responses in the high-proficiency group (there was no significant difference between these two types of verbs). This raises the question of whether it reflects a similar or 'more' prototypical meaning of the target-*ing* construction. The construction with process verbs expresses a certain simultaneity between the action denoted by the matrix verb and the complement, as e.g. in *She practised playing the flute*, where the actions of practising and playing are happening at the same time. This simultaneity is also compatible with the general semantic associations that -*ing* constructions (for instance, the present progressive construction) evoke (cf. Langacker 1987; Quirk et al. 1985: 1192). However, considering the idiosyncratic nature of the construction (see e.g. Duffley 2000 and Section 3.1), it is hard to determine which semantic verb class, attitude and/or process, is semantically more central[100]. The relevant point for the present study is that proficient learners make associations between the meaning of the target-*ing* verb and the pattern that is most likely to be associated with it.

However, we also find cases where the verbs deviate from the prototypical meaning of the construction they are found within the target language. The semantic class of 'effort/achievement' verbs, which corresponds to target-*to* verbs, decreased the chance of a target-like catenative complement for the high-proficiency learners (it was no significant predictor in the case of the low-proficiency learners, see Table 30 above). It seems that these verbs, such as *afford*, *proceed*, or *seek*, are less transparent when it comes to the choice of a *to*-inf. complement. A relatively high number of -*ing* complements found in the data suggests

[100] In order to address this issue, future research can adopt a more elaborate semantic analysis as presented in Ellis et al. (2016: 80 ff.) that does not only operationalises prototypicality of the verb but also its semantic cohesion and polysemy (ibid. 82).

that the learners might have perceived semantic compatibility between these verbs and the target-*ing* construction. When looking at some examples from the data, it gets clear that this compatibility is more in place than for the semantic subclass futurity verbs:

(24) **She **proceeded** singing opera with her windows wide open. (*Participant ID 395, Level C1*)*
(25) **She couldn't **afford** taking her children to a restaurant. (*Participant ID 6786, Level C2)

After *proceed* approx. 50% of the learners produced the -*ing* complement and for *afford* we find an -*ing* complement in 45% of all sentences. In the case of *proceed*, a procedural reading is apparent, as it expresses a continuing activity, which is reflected in the learner's choice of an -*ing* clause as exemplified in (24). The example with *afford* in (25)[101], on the other hand, denotes a certain generality and simultaneity between catenative verb and complement that is prototypically associated with the -*ing* construction. This demonstrates that in English the complementation pattern after some verbs is less clear than for others (cf. de Smet & Cuyckens 2005; see Section 3.1) and might be, therefore, best acquired implicitly on the basis of the input (cf. Sections 3.2 and 8.2). Most of the verbs denoting effort that yielded a relatively high number of non-target-like choices have a relatively low token frequency in English (e.g. *proceed* and *afford* are classified as profile C verbs; see also Section 6.4.4.1, Table 28 for an overview). This makes it more difficult to acquire the idiosyncratic pairing of verb and catenative complement implicitly and to 'pre-empt' the non-target-like complementation pattern (cf. Section 2.2.4.2. for more information on pre-emption).

Nevertheless, in cases where the meaning of the verb is more compatible with the meaning of the catenative complement, the learners can benefit from the knowledge of prototypical form-meaning mappings in the processing of low-frequency exemplars. As pointed out in the discussion of the frequency profiles above, the majority of profile D verbs, namely those that are infrequent with regard to all three frequency measures, were complemented with the target-like catenative complement by the high-proficiency learners with relatively high accuracy. Among them were e.g. the attitude verbs *celebrate* and *justify* or the process verbs *recall* and *practise*. Even though these verbs are unlikely to be encountered in the catenative

[101] Note that the tense and negation of the matrix verb did make a significant prediction of the target-like catenative complement. However, the number of observations with negated matrix verbs was relatively small, which is why the effect of negation could be addressed in a future study (cf. also Deshors 2015).

verb construction by the learners, it was argued that they may make a native-like choice for these low-frequency exemplars on the basis of perceived formal *and* semantic similarities between a schema or a highly-entrenched exemplar of the catenative verb construction (or both, as this does not have to be a mutually exclusive process). High-frequency exemplars often have an influence in defining a certain category and can also be seen as a prototype, which can benefit the acquisition process (see e.g. Casenhiser & Goldberg 2005; Ellis et al. 2014c; Ellis et al. 2016). However, whether the compatibility is seen between the low-frequency verb and a more general schema or the low-frequency verb and a highly frequent entrenched verb is, as argued above, a purely theoretical question that would have to be answered empirically. In any case, it is necessary for the verb to be semantically similar to the already experienced verbs in order to be able to use this new verb in the target construction (Goldberg 2006: 99).

Overall, these findings indicate that the high-proficiency learners, in contrast to the less advanced learners, have acquired more fine-grained knowledge about the mapping between the form and the meaning. Furthermore, there is evidence that the prototypical meaning of futurity, which is associated with the target-*to* pattern, is acquired more accurately and earlier in comparison to the other semantic classes. As the combination of form and meaning is often rather opaque (see Section 3.1), the results suggest that especially low-proficiency learners are often not aware of the fine-grained semantic differences that underlie the different complementation patterns and therefore make 'false' assumptions about the complement form following the catenative verb. This finding is in line with Tomasello's (2003: 180) observation that semantic subclasses emerge later in the acquisition process. For the emergence of these subclasses as well as a native-like form-meaning mapping, enough experience is required to enable a taxonomic generalisation across verb classes.

6.4.4.3 *How to Build Constructions: Proficiency*

This section brings together the findings of the present study to discuss how learners 'build' constructional knowledge of the catenative verb construction and which pieces of information become relevant with increasing proficiency. At the same time, we will address the question of whether, and how, learners of different proficiencies come to make generalisations across exemplars and thus build schematic knowledge of the construction

and its subschemas. Finally, this section is concluded with a discussion of whether the development of a (sub-)schema(s) for the catenative verb construction is best described as a bottom-up and/or as a top-down process.

First, the fundamental question arises whether we can actually justify the existence of constructions in the sense of native-like form-meaning mappings in the case of the catenative verb construction for L2 learners across *all* proficiency levels. To start with, the results indicate that the learners' mental representations of the catenative verb construction become increasingly more native-like, as the number of non-target-like choices decreases from 46.2% on an A2 level to 12.6% on a C2 level. Altogether, 66.6% of all responses were target-like in the low-proficiency group (A2-B2) and 81.65% in the high-proficiency group (C1-C2). It was shown that the overall frequency with which the verb occurs in native speaker data had an effect on the target-like choice for the learners with a lower proficiency, while in the case of highly proficient learners not only the matrix verb made a significant prediction but also the different frequency profiles and the faithfulness of the verb for the construction. More specifically, we could see that verbs that are not only frequent overall but also more strongly associated with the construction were more likely to be produced with the target-like catenative complement. This implies that the high-proficiency learners, in contrast with the low-proficiency learners, have acquired more detailed distributional information on the occurrence of the catenative verb in the target construction.

A more-fine grained representation is not only given on a formal level but also when it comes to the meaning of the construction, as reflected by the effects of the different semantic subclasses on the complement choice by the high-proficiency learners. By contrast, except for one class (futurity verbs), the low-proficiency learners' choice of a target-like complement was not affected by the semantic subclasses. On a general level, this suggests that learners with a lower level of proficiency and experience do not seem to have acquired more relational constructional knowledge yet, i.e. they have not acquired details on the form and meaning and the linking 'rules' between them (see Croft & Cruse 2004: 227). On the other hand, high proficiency learners seem to have come very close to a form-function mapping that is in line with native speakers' representation. This is, for instance, in line with other work on the L2 acquisition of verb-argument constructions (see e.g. Ellis et al. 2014a; Gries & Wulff 2005, 2009; Römer & Berger 2019; Römer & Garner 2019; Römer et al.

2017), which has shown that higher proficiency learners show frequency- and constructional-sensitive knowledge that is similar to native speakers' mental representations.

Related to the specificity of the knowledge with which the target construction is produced, we will now discuss the question whether low- and high-proficiency learners build a representation of the catenative verb construction and its subschemas on different levels of abstraction. In both proficiency groups, there is evidence for strongly entrenched item-based knowledge of some high-frequency exemplars/low-scope patterns for both target-*ing* and target-*to* verbs. For instance, the pattern 'S *keep* V*ing*' was produced in a target-like manner by *all* high-proficiency learners and 90.5% of the low-proficiency learners. An example of an entrenched target-*to* low-scope pattern is 'S *decide to* V', which yielded 98% correct complements in the high-proficiency group and 89.4% in the low-proficiency group. In this context, it would be interesting to further investigate whether highly frequent exemplars of the catenative verb construction can be seen as 'path-breaking' for learners, in the sense that they facilitate the acquisition of the catenative verb construction (see e.g. Ellis et al. 2016: 34). This would be in line with the skewed frequency hypothesis, which predicts that the acquisition of a form-meaning mapping is benefited by the experience with one highly frequent type (Boyd & Goldberg 2009; Casenhiser & Goldberg 2005; Goldberg et al. 2004). In order to investigate this matter experimentally, an intervention classroom study with manipulated input floods as in Madlener's (2015) study could be attempted.

Apart from the construction's item-based representation, there is also evidence for more schematic knowledge. A combination of a verb that is infrequent (in general and/or in the catenative verb construction with the target-like complement) strongly suggests that the choice is based on perceived similarities between this particular exemplar and a more schematic representation. In the case of the high-proficiency learners, we could find not only a higher number of target-like responses than for the low-proficiency learners in general but also for infrequent/unfamiliar verbs. This was shown, in particular, in the case of profile D verbs (MV ↓ CAT CXN ↓ FAITH ↓), which were completed with the target-like form with a relatively high accuracy despite their low frequency. Nonetheless, it can be assumed that also learners with a lower proficiency rely on generalisations to some extent, as otherwise the number of non-target-like responses, as well as the number of non-catenative complements and bare infinitivals, would have been probably higher overall. Of course, the design of this forced production task also played a role, as the structure 'subject – matrix

verb – gap' (see also Section 6.3.3.1, Table 22) plus the second verb that was given in brackets facilitated the production of the target pattern. But even if this shows an 'ad-hoc categorisation' of the structural similarities found between the test items (see Ellis et al. 2016: 118), it still suggests that learners have made some broad generalisations.

Another sign for the restructuring of abstract constructional knowledge was reflected by the subschemas for the target-*to* and target-*ing* construction. These subschemas do not only differ in their form but also with respect to their meaning. The results show that target-*ing* verbs significantly decrease the chance of a target-like catenative complement in comparison to target-*to* verbs. Still, it has to be mentioned that an alternative mixed-model with the semantic class instead of verb group as a predictor variable (see Sections 6.2 and 6.4.4.2) had a better explanatory power for both proficiency groups. However, as form and semantic subclass are shown to correlate, which corresponds to the theoretical assumption that *both* aspects play an influential role in the emergence of the two subschemas. For instance, we find evidence that the target-*to* schema denoting a sense of futurity is semantically more prototypical than the other subclasses and that this transparent correspondence between meaning and form facilitates its acquisition. This prototypically in combination with a higher type and token frequency leads to a deeper entrenchment of this schema and also motivates its function as a cognitive anchor for low-proficiency learners. Thus, this schema is used as a default pattern that is used with infrequent/unknown verbs, which also implies an overgeneralisation to low-frequency target-*ing* verbs. As the form-meaning mapping between the verb and catenative complement is often opaque in the target language (see Section 3.1), 'false' analogical assumptions about the compatibility between form and meaning of the verb and the schema are likely to occur. This can result in non-target-like forms such as **Ben postponed to go to the dentist* [...]. However, with increasing proficiency, these overgeneralisations are eventually unlearned, as reflected in the high-proficiency learner group, which does not only exhibit a more target-like and schematic representation of the target-*to* but also of the target-*ing* construction.

Finally, we can draw conclusions on the directionality of the acquisition process. More specifically, the question that arises is how constructional knowledge develops: in a bottom-up and/or top-down process. A bottom-up process entails a progression from item-based knowledge to abstract schemas (see e.g. Ellis 2002; Tomasello 2003). By contrast, if learners

first form larger generalisations, refine them, and then restructure the schema, we can speak of a top-down process (see e.g. Goldberg 2006; Roehr-Brackin 2014).

Taken together, the results suggest that the low-proficiency learners have made more coarse-grained generalisations, as they are based on high-frequency target-*to* and target-*ing* exemplars rather than relational frequency or specific semantic properties. In particular, it could be seen that prototypical and highly frequent verbs, mainly target-*to* verbs denoting futurity seem to be more strongly entrenched than less central and infrequent verbs. Furthermore, this more entrenched pattern seems to be more schematic as it is also overgeneralised to target-*ing* verbs. These early generalisations, which are centred around high-frequency and prototypical exemplars/low-scope patterns, suggest an acquisition process that proceeds in a bottom-up fashion. With a higher proficiency level and richer experience with the target language, however, the picture changes. Not only does the number of target-like complements increase both in the case of target-*ing* and target-*to* verbs, but also relational information that has to do with the network structure of the construct-i-con, such as the semantic subclasses of the verb, form-function contingency and so on, becomes relevant for the target-like choice. Therefore, the representation is restructured and becomes more fine-grained, but, at the same time, more abstract and ultimately more native-like. This tendency is also shown by other usage-based studies on the development of verb-argument constructions in L2 acquisition (Ellis & Ferreira-Junior 2009b; Ellis & Larsen-Freeman 2009; Römer 2019a; Römer & Berger 2019; Römer & Garner 2019). Additionally, advanced learners 'exceed' item-based knowledge as they also possess distinct subschemas for both the target-*to* and the less frequent target-*ing* construction, which are successfully applied to infrequent verbs. Overall, this suggests that with rising proficiency we find evidence for a top-down schematisation process.

6.5 Conclusion

This research has provided novel insights into the second language acquisition of the catenative verb construction by German learners of English. By investigating a large group of heterogeneous learners (n = 1,287) with different proficiency levels (A2-C2) and language learning backgrounds, the study corroborates the findings from the studies presented in Chapter 4 and 5 on the mental representation of the catenative verb construction. Moreover,

it has also contributed to a deeper understanding of the L2 acquisition of constructions from a usage-based perspective and added to the growing literature on the L2 acquisition of verb-argument constructions (e.g. Ellis et al. 2014c; Ellis et al. 2016; Gries & Wulff 2005, 2009; Römer et al. 2014b; Römer et al. 2017). The main factors that were investigated with respect to see how they affect a target-like complement choice were the frequency and the individual linguistic experience of the learner, the semantic class of the verb as well as the learners' proficiency level. To investigate the latter, the learners were divided into two groups for a more comprehensible analysis: low-proficiency learners (A2-B2) and high-proficiency learners (C1-C2). The results of both groups were then brought together to address the question of how constructions are built with increasing proficiency.

It could be shown that frequency was as a reliable predictor of a target-like choice, which confirms the findings from Chapters 4 and 5. However, we could see that the impact of frequency differs depending on the proficiency level. While the low-proficiency learners were influenced only by the overall occurrence of the catenative verb in the English language, the advanced learners' complement choices were also affected by faithfulness and the token frequency of the catenative verb construction, i.e. construction-related frequencies. In addition to the distributions in the target language, we also investigated the learners' individual linguistic experience with the L2. Even though the familiarity ratings of the catenative verbs in terms of the learner's individual usage and perception did not correlate strongly with the occurrence of the verbs' in native speaker data (i.e. COCA and BNC frequencies), we could see that they affected the complement choice to some extent. In addition, we could see effects of other usage-related factors such as the proficiency in writing or the weekly input in case of the advanced learners. This outcome is in accordance with the most fundamental claim of the theoretical framework adopted in the present study: language is shaped by use (Bybee 2006; Cadierno & Eskildsen 2015; Croft 2001; Ellis et al. 2013; Goldberg 1995, 2006a; Ortega et al. 2016; Tomasello 2003). Even though the operationalisation of the learners' individual linguistic experience implemented in this study was of exploratory nature, it gives directions for future research. As mentioned before, more standardised methods, such as vocabulary size tests can be used to achieve a more accurate assessment of the learners' individual experience with the L2.

More evidence for the representation of the L2 in the form pairings between form *and* meaning constructions came from an investigation of the semantic class of the verb. Again,

we find a clear effect of proficiency: the knowledge of semantic subclasses only seems to emerge with higher proficiency (see Tomasello 2003: 180). The only semantic class that determined a target-like choice of the low-proficiency learners was that of futurity verbs, which exclusively take a *to*-inf. complement. Furthermore, in combination with its high frequency in the target language, it was argued that this particular construction serves as a default schema, i.e. cognitive anchor, for infrequent/unfamiliar verbs. In Chapter 7, we will seek more evidence for this hypothesis by looking into verbs that can occur with a *to*-inf. as well as an -*ing* complement.

Addressing the final research question, namely, how learners come to 'build' constructions, we could see that with more linguistic experience with the target language, learners record increasingly more frequency-sensitive and semantic linguistic knowledge, which does not only lead to the entrenchment of highly frequent exemplars and low-scope patterns but also benefits the taxonomic generalisation across related exemplars and leads to the emergence of distinct subschemas (see Ellis 2002: 170). In the course of the acquisition process, we find evidence for a bottom-up process, starting with item-based, more coarse-grained generalisations as well as a top-down process with increasing usage experience. Learners ultimately develop a more elaborate, interconnected representation of the catenative verb construction, which gains more resemblance to the form-meaning mappings of native speakers.

Despite the study's contributions to research on the second language acquisition of constructions from a usage-based perspective as well as new insights gained into how the catenative verb construction is learned, there are still issues that need to be addressed in future research. For instance, the role of the L1 of the learners has not been addressed in this study. German has a construction which is equivalent to the target-*to* construction (*zu* + infinitive, see Section 3.2), which evokes the question of whether and to what extent learners are affected by this. In particular, it would be interesting to see whether less advanced learners, in particular, rely on their constructional knowledge from their L1. Even though it was argued against transfer as a decisive explanatory factor (see Section 2.2.2 and Section 8.2 below for a related discussion) and also seems unlikely in light of the robust frequency effects presented throughout this thesis, the investigation of learners with other L1s can bring more certainty with regard to this issue.

The next chapter explores the complement choice after catenative verbs that can take both an -*ing* as well as *to*-inf. catenative complement, such as *start*, *like* or *remember*. In particular, we will see whether the factors investigated in the present study also make predictions when it comes to the choice between -*ing* and *to*-inf. On a theoretical level, the study seeks to find more evidence for the idea that the *to*-inf. catenative complement functions as a default pattern.

7 Variable Verbs: What Determines the Choice between a *to*-inf. and an -*ing* Complement?

7.1 Introduction and Research Objectives

This chapter presents an exploratory study of so-called 'variable verbs', such as *love*, *remember* or *try*, and the question of which usage-related factors affect the complement choice by German learners of English of different proficiency levels (A1-C2).

These verbs are interesting to investigate for several reasons. First, in contrast to the catenative verbs investigated so far (see Chapters 4-6), they can occur with a gerund-participial (-*ing*) or a *to*-infinitival (*to*-inf.) complement alike in English, as illustrated by the following sentences:

(1)
a. *Britta* ***remembered*** *bringing her camera to the trip.*
b. *Britta* ***remembered*** *to bring her camera to the trip.*

(2)
a. *He* ***started*** *to drink his cappuccino with tons of sugar.*
b. *He* ***started*** *drinking his cappuccino with tons of sugar.*

Therefore, the target-likeness of the complement choice, i.e. how native-like it is, is more gradual with these verbs as opposed to the target-*to* and target-*ing* verbs, where it is relatively clear which catenative complement is dispreferred by native speakers (see Section 3.4 for information on determining the target-like complement after target-*ing* and target-*to* verbs).

Second, this formal variability often correlates with a variation in meaning depending on the complement type. With some verbs denoting effort, e.g. *remember* or *try*, the complement choice can result in a semantic difference as illustrated by (1a) and (1b) (see also Section 3.1). However, there are also verbs where we do not find an apparent meaning difference, especially in the case of certain process verbs, such as *start* (see Biber et al. 1999: 758-759) as exemplified in (2a) and (2b) above. This implies that we find different forms (e.g. *start* V*ing* vs. *start to* V) that have a similar function, which raises the question whether this has an impact on the complement choice. While it is difficult to judge to what extent learners are aware of this meaning difference, we can examine whether the semantic class of the verb has an effect on the learners' choice between a *to*-inf. and an -*ing* complement and whether

we find a similar correlation between the meaning of the verb and the complement construction as shown in Chapter 6 (see Section 6.4.4.2).

Third, many of these verbs, such as *love*, *like*, *hate*, *try*, *begin* or *start* are not only highly frequent overall in the English language but also occur across registers of different degrees of formality, including less formal text types such as personal dialogues or fiction. Therefore, we can expect learners to be highly familiar with these verbs, which makes it interesting to look at the learners' familiarity rating of these verbs (cf. Chapter 6). In particular, we will investigate to what extent the learners' use and perception of the verbs correlate with their frequency in native speaker corpora.

Moreover, some of the variable verbs that will be investigated have also a higher frequency in the catenative verb construction and are also more faithful to the construction in comparison to the target-*to* and target-*ing* verbs examined in Chapter 6 as will be shown in the next section (see Section 7.3.1, Table 32). However, most variable verbs do not occur with the same frequency with an -*ing* and a *to*-inf. complement, but are used with one of the two complement types more often. Thus, one question that the present study addresses is whether learners are influenced by frequency distributions in the target language and prefer the complement type that is also more frequent in native speaker data. In fact, previous studies on the L2 acquisition that have also examined variable verbs (Gries & Wulff 2009; Martinez-Garcia & Wulff 2012) demonstrate an effect of the verb's preference for either the *to*-inf. or -*ing* complement in English on the learners' complement choice. However, in all these studies frequency effects were assessed on the basis of a distinctive collexeme analysis (Gries & Stefanowitsch 2004). This method, which has been developed to contrast two related competing constructions, works with a single value that is computed on the basis of the token frequency of the verb lemma in the *to*-construction, the lemma frequency of the -*ing* construction, as well as the corpus frequency of the *to*-construction and -*ing* construction in general (Gries & Wulff 2009: 171). While this is a methodologically sound approach, it does, however, not allow for a more fine-grained assessment of frequency effects. This is why the present study adopts the same frequency-related factors as in Chapter 6 to address the question of how the different frequency measures affect the complement choice (see Section 7.2.1 for more information). More specifically, three factors are tested, which do not show any signs of harmful collinearity (see Section 7.2.2): the matrix verb

frequency, the faithfulness of the verb to the *to*-construction, and the faithfulness of the verb to the -*ing* construction all measured on the basis of the COCA.

Furthermore, previous studies have largely focussed on advanced L2 learners of English, which is why we will not only examine the effects of frequency but also how proficiency (levels A1 to C2) affects a choice between a *to*-inf. and an -*ing* complement. On a more theoretical level, this allows us to find additional evidence for the 'cognitive anchor hypothesis'. If we assume that the construction with a *to*-infinitive functions as a default pattern because of its stronger entrenchment and schematisation, we would expect an overuse of this complement type with the variable verbs under investigation, especially by less advanced learners.

Taken together, the aim of this study is to investigate the learners' choice between -*ing* and *to*-inf. complement and the effects of different usage-related factors on the complement choice. The factors that were hypothesised to influence on the complement choice were the same predictor variables tested for the target-*to* and target-*ing* verbs presented in Chapter 6 (see Section 6.3.3.2, Table 20 for an overview). In particular, we will look at how the frequency-related factors, the learners' individual linguistic experience with the target language, the verb's meaning as well as the proficiency level of the learners affect the complement choice.

As the data were collected in the same study presented in Chapter 6 (for more information see Section 6.3), the next section only outlines the verb selection, including an overview of the verbs' frequencies as well as information on the test items for the sentence completion task, as well as the coding and analysis of the data. Section 7.2 presents the univariate analysis of a selection of variables, followed by the results of a mixed-model with all significant predictors of the complement choice. In Section 7.4 the results will be discussed and finally, a conclusion will be drawn in Section 7.4.

7.2 Methodology

7.2.1 Verb Selection, Frequencies, and Test Items

From a list compiled on the basis of Huddleston & Pullum (2002) and Egan (2008) (cf. Section 3.4; see Appendix A, Table 3 with the complete list), 17 variable verbs were selected for the present study. Table 31 presents the verbs as well as their frequencies in the COCA. The second column (MV) gives the overall token frequency of the verb in the COCA per one million words. In the columns 'MV+ *to*-inf.' and 'MV+ -*ing*', we find the token frequency of the catenative verb with a *to*-inf. and with an -*ing* complement respectively per one million words. Furthermore, the respective faithfulness for each construction is given. For the BNC frequencies and their correlation with the COCA frequencies see Appendix D I (Tables 6 and 7).

Table 31 Variable Verbs: Frequencies COCA

Verb	**MV** (relative freq./1 million words)	**MV+ *to*-inf.** (relative freq./1 million words)	**faithfulness *to*-inf.**	**MV+-*ing*** (relative freq./1 million words)	**faithfulness -*ing***
commence	1.19	0.28	0.2328	0.36	0.3047
dread	5.74	0.10	0.0177	0.63	0.109
neglect	9.50	2.17	0.2281	0.1	0.0109
cease	13.16	5.25	0.3991	1.94	0.0188
deserve	17.94	6.35	0.3539	0.23	0.0126
bother	19.37	7.76	0.4007	1.65	0.1254
prefer	27.12	16.83	0.6206	2.44	0.1262
hate	43.89	8.27	0.1885	4.23	0.0964
consider	103.14	9.14	0.0886	2.47	0.0915
fear	103.34	0.65	0.0063	21.92	0.1178
remember	186.11	4.10	0.0220	20.57	0.1994
continue	328.35	149.79	0.4562	13.02	0.0394
love	330.11	25.32	0.0767	1.48	0.0008
begin	564.52	184.24	0.3264	20.08	0.0612
start	599.79	94.06	0.1568	0.07	0.0717
try	769.71	580.66	0.7544	19.08	0.0248
like	1971.14	139.70	0.0709	1.4	0.0008

These verbs were selected on the basis of two criteria. First, it was attempted to include verbs that occur with different frequencies in English. As mentioned in the introduction, a large number of these variable verbs have a relatively high frequency in English (cf. also Appendix A), which is why it was also attempted to include verbs that are less frequent overall. Thus, the verb selection for the present study includes highly frequent verbs such as *like* and *try* as well as infrequent verbs; such as *commence* and *dread*. Accordingly, the token frequency in

the catenative verb construction also varies from verb to verb. Related to this, the second criterion for the verb selection was the frequency with which the verb occurs with the *-ing* and the *to*-infinitive complement. Most of the variable verbs are more often found in the catenative verb construction with a *to*-inf. complement (cf. Appendix A, Table 3), which is also the case for the verbs examined in this study. However, there are also a few verbs that occur more often with an *-ing* complement, which is why the *-ing* preferring verbs *commence*, *dread*, *fear,* and *remember* were included in the study.

When comparing the frequencies of these verbs with the target-*ing* and target-*to* verbs examined in Chapter 6, it gets clear that the variable verbs are more frequent with respect to every frequency measure. Table 32 provides an overview of the mean, minimum, and maximum values of the matrix verb frequency (MV), the frequency of the verb with the respective complement type (MV+Compl) as well as its faithfulness to it:

Table 32 COCA frequencies (per one million words) target-to, target-ing and variable verbs

Verb Group	**MV** (relative freq./1 million words)			**MV + Compl** (relative freq./ 1 million words)			**faithfulness**		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
target-*ing*	77.73	1.34	596.46	6.49	0.07	76.95	0.07	0.006	0.18
target-*to*	82.28	11.28	260.80	24.61	0.18	82.26	0.31	0.01	0.86
Total	***82.01***	***1.34***	***596.46***	***16.77***	***0.07***	***82.26***	***0.19***	***0.006***	***0.86***
variable v + *-ing*	299.65	1.19	1971.14	12.37	0.07	21.92	0.09	0.0008	0.30
variable v+ *to*-inf				72.63	0.10	580.66	0.26	0.006	0.75

First, we can see that the variable verbs are more than 3.5 times more frequent in English overall (299.65) than the target-*ing* and target-*to* verbs together (82.01). Also, their frequencies in the catenative verb construction are higher on average, both for the construction with an *-ing* and *to*-inf. complement. For instance, we find almost twice as many exemplars of the variable verbs with an *-ing* complement on average (12.37 per one million words) as target-*ing* constructions (6.49 per million words on average).

Turning now the meaning of these verbs, we find the following distribution of the verbs across the semantic subclasses based on Palmer's (1988) classification of catenative verbs (see Section 6.2 for more information).

Table 33 Variable Verbs: Semantic Class

Semantic class	**Verb**
attitude	*bother, consider, dread, fear, hate, like, love, prefer*
effort/achievement	*deserve, neglect, remember, try*
process	*begin, cease, continue, commence, start*

In Chapter 6, we saw that the class of attitude and process verbs are strongly associated with the target-*ing* construction while effort/achievement verbs occur in the target-*to* construction (see Section 6.2, Table 14). Therefore, it will be interesting to see whether the semantic class of the verb yields similar effects for the complement choice by the learners.

The meaning difference between the constructions the verbs occur in, as exemplified with *remember* in (1a) and (1b) above, was also relevant when it came to the selection of test items. Therefore, two test items were collected for each verb where both an -*ing* and *to*-inf. complement would be possible, as illustrated by the following test sentences:

(3)

a. *I **hate** to be a big disappointment to my parents.*

b. *I **hate** being a big disappointment to my parents.*

(4)

a. *He **started** to get his life back together after his treatment.*

b. *He **started** getting his life back together after his treatment.*

Apart from this, the collection and design of the test item were the same as for the non-variable verbs (see Chapter 6, Section 6.3.2.2).

7.2.2 Coding and Statistical Analysis

The data were coded for the same variables as the sentences of the study presented in Chapter 6 (see Section 6.3.3.2). The only difference concerned the complement form: in the case of the variable verbs to distinguish between 'target' and 'non-target-like' catenative complements would have been misleading. Therefore, we will not examine whether the learners choose the 'target-like' complement but what determines their choice between an -*ing* vs. *to*-infinitive complement. Accordingly, the binary dependent variable was the

complement form, namely 'ing' vs 'to_inf', which is why all catenative complements that had a different form (e.g. bare inf.) were excluded prior to the analysis.

The predictor variables that were tested are largely identical to the ones examined in Chapter 6 (cf. Section 6.3.3.2, Table 20 for an overview). One difference concerns the frequency measures. In the case of the variable verbs, we will test three frequency measures: the matrix verb frequency and two faithfulness values, i.e. the faithfulness to the *-ing* construction and the faithfulness to the *to*-inf. construction. The token frequencies of the two complement types with the 17 verbs examined in the present study had to be discarded from the analysis because of collinearity issues. As we can see in Figure 40, these two variables show particularly strong correlations with some of the other frequency measures:

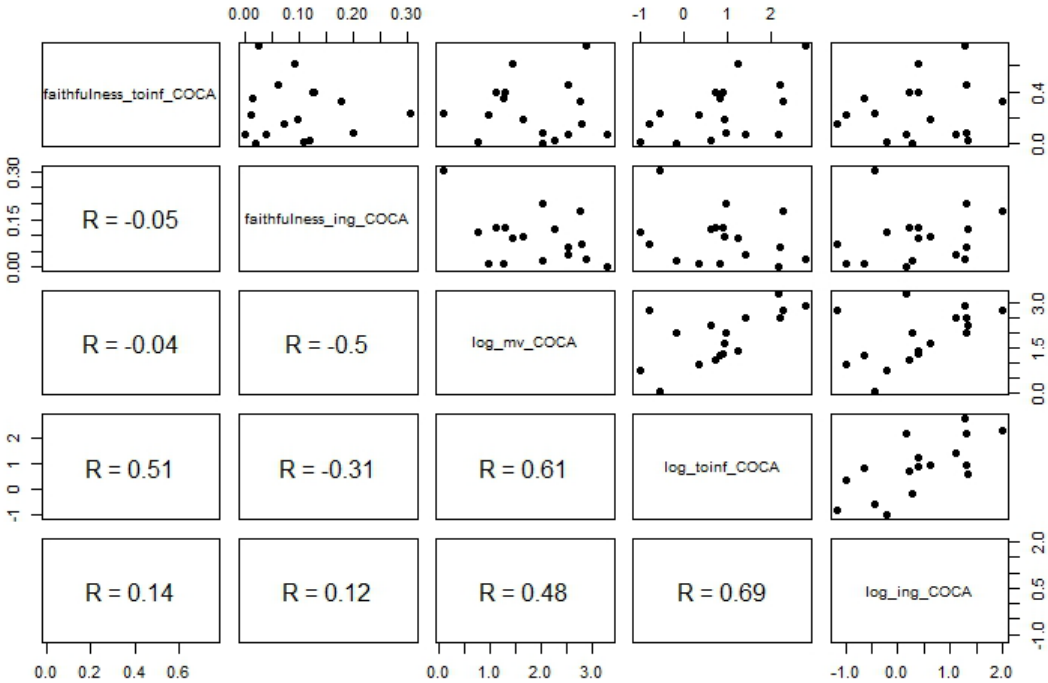

Figure 40 Variable Verbs: Matrix Plot of Correlations between Frequency Measures

The token frequencies of the two complement types (log_toinf_COCA and log_ing_COCA) strongly correlate with each other (r = 0.69, p < 0.001), as well as with the matrix verb frequency (with *to*-inf.: 0.61, with *-ing*: 0.48, p < 0.001), which might have been cause for

collinearity issues in the multivariate analysis[102] of the data (see also Chapter 4, Section 4.2.5 for more information). By contrast, the two faithfulness values (faithfulness_ing_COCA and faithfulness_toinf_COCA) correlated only minimally with each other ($r = -0.05$, $p = 0.0002$). Furthermore, the faithfulness to the *to*-construction and the matrix verb frequency ($r = -0.04$, $p < 0.001$) also show only a weak correlation. The faithfulness to the *-ing* construction and the matrix verb frequency have a medium negative correlation ($r = -0.50$, $p < 0.001$).

To see whether we can exclude the frequency of the catenative verb constructions (i.e. log_toinf_COCA and log_ing_COCA) as predictor variables without losing considerable explanatory power, a Random Forest Analysis was carried out. All five frequency measures were used as predictor variables to assess their effect on the dependent variable, the complement form. The analysis showed (see Figure 41) that the faithfulness to the *to*-inf. construction has the highest conditional variable importance (0.011), followed by the faithfulness to the *-ing* construction (0.002). The other variables yielded lower values (< 0.002).

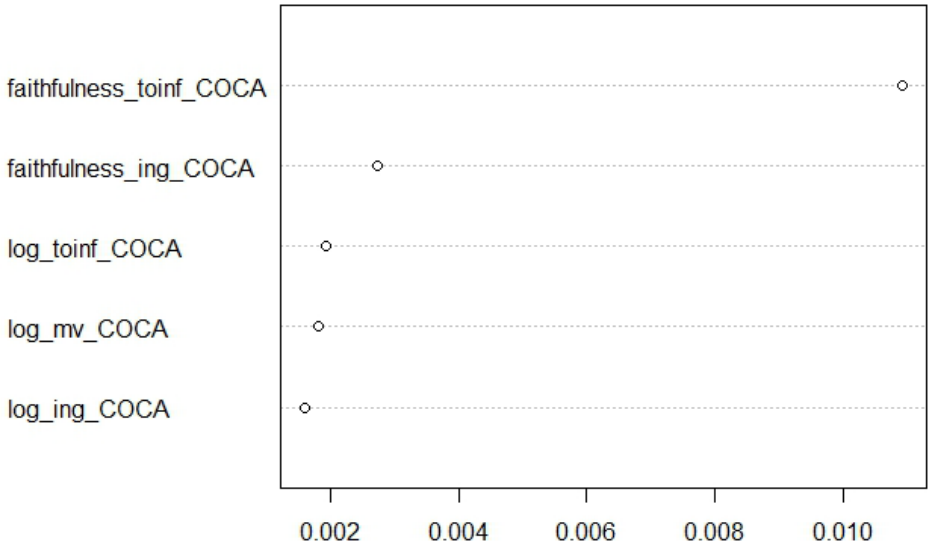

Figure 41 Variable Verbs: Dot Chart of Conditional Variable Importance

[102] Frequency profiles were not implemented for the variable verbs as this would have required two profiles for each verb, which would have overlapped with respect to the information they contain (i.e. the matrix verb frequency). This would have not allowed to assess the individual contribution of the frequency variables in predicting the complement choice.

Therefore, we will not consider the token frequencies of the verbs in the respective catenative verb construction for the multivariate analysis. This also increases the kappa coefficient from 12.6 to 8.49 (i.e. no harmful collinearity, see Baayen 2008: 182) when only using the two faithfulness measures and the matrix verb frequency as predictor variables.

Moreover, in contrast to the analysis presented in Chapter 6 (cf. Section 6.4.1.4), all proficiency levels, i.e. A1 to C2, were examined. The primary reason to include A1-level learners was that some of the verb, such as *love* or *like*, are highly frequent in English and are very likely to be known to learners with low proficiency in English.

As for the data in Chapter 6 (cf. Section 6.3.3.3), the predictor variables were selected by means of an automatic stepwise model selection with the R package *afex* (Singmann et al. 2018: Version 0.22-1) and were fitted in a next step with the R-package *rms* (Harrell Jr 2016: Version 4.5-0). Model comparisons were based on log-likelihood values. The effects of the fixed factors were plotted based on the R package *effects* (Fox 2003). Like in the analysis in Chapter 6, the participant ID and the version of the sentence completion task (1-9) were specified as random intercepts.

7.3 Results

Altogether, the study yielded 4,251 observations by 1,220 different learners. The proficiency level of the learners was no significant predictor in determining the complement form, which is why the data were not further divided into subsets. Section 7.3.1 presents a univariate analysis of the data. Since the characteristics of the learners have been already described in Sections 6.3.1 and 6.4.1.4, only the outcome of the familiarity rating of the verbs will be presented. This is followed by the distribution of *to*-inf. and *-ing* complements overall as well as for the individual verbs. In Section 7.3.2, the outcomes of the final mixed-effects model will be presented.

7.3.1 The Learners' Familiarity with the Variable Verbs and Distribution of Complement Forms

Starting with the individual familiarity of the learners with regard to how often they have heard and read the verbs before ('perception'; '5' stands for heard/read 'very often' and '1'

for ‘never’ heard/read before), we find a relatively high mean rating of 3.91 (i.e. ‘heard/read often’, *median* = 4). The majority of the verbs were estimated to have been heard/read ‘very often’ in 45.27% of the cases and 21.80% were rated with the category ‘heard/read often’ (see Figure 42).

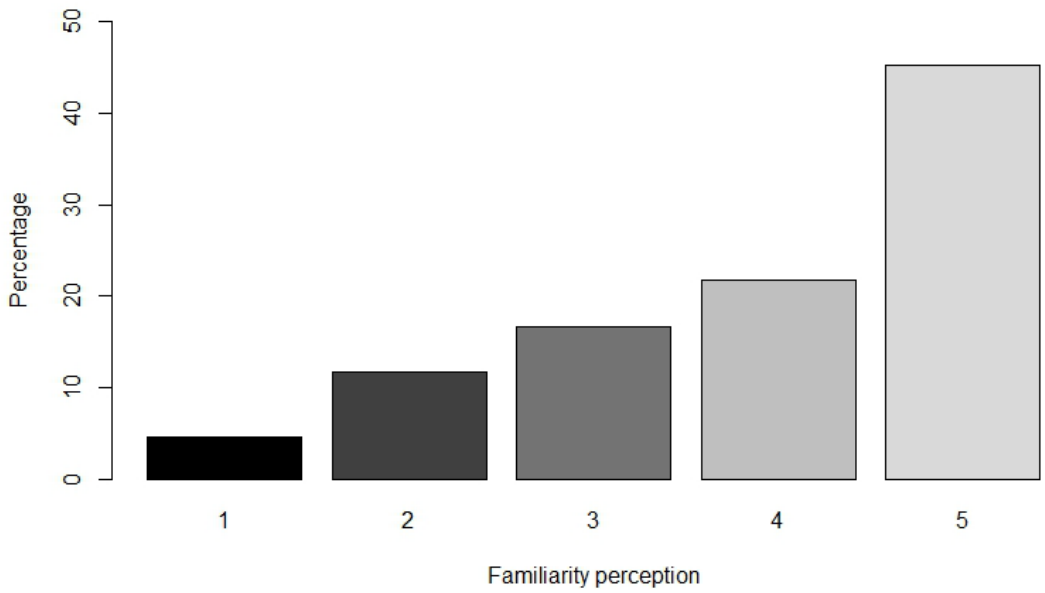

Figure 42 Familiarity Rating of Variable Verbs (Perception)

Some verbs that are shown to be highly frequent in English (see Section 7.2.1, Table 31), such as *like* or *try*, received particularly high ratings and were stated to be heard or read ‘very often’ by the majority of participants (83.13% in the case of *like* and 79.07% for *try*). The less frequent verbs among the examined verbs, i.e. *cease*, *commence*, *dread*, and *neglect*, received considerably lower ratings and were stated to have never or only rarely been heard or read before.

When looking at the participants’ individual familiarity with the verbs with regard to their use (see Figure 43 below), we find a slightly lower rating overall with a mean of 3.57 (median = 4). Still, the majority of verbs were rated with ‘used very often’ in 35.60% of the cases, followed by ‘used often’ (21.54%). *Like* was the verb that was stated to be used ‘very often’ by the majority of participants (81.96%), followed by *try* (60%) and *start* (68.33%).

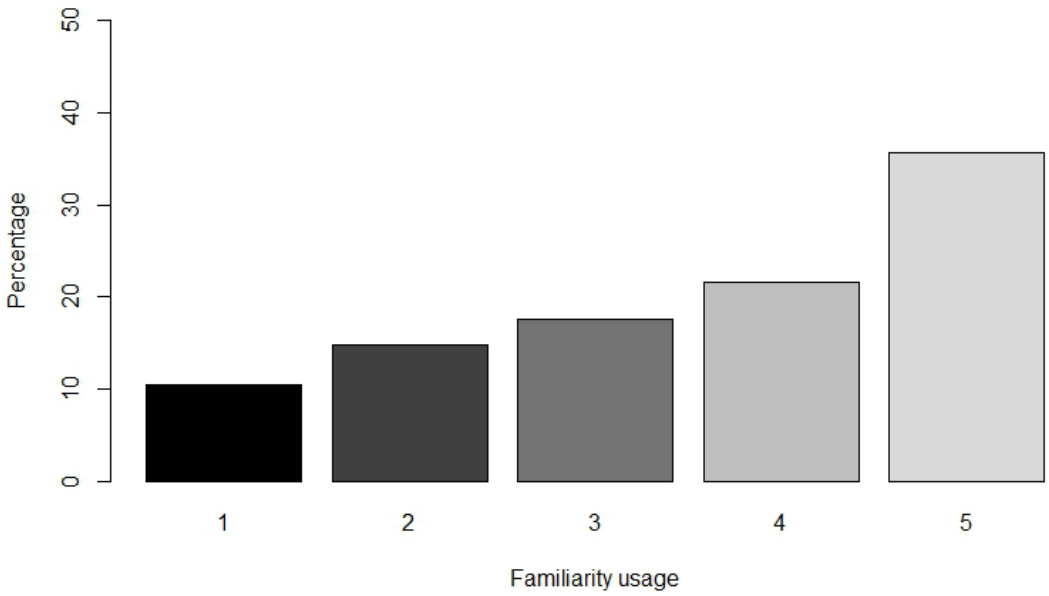

Figure 43 Familiarity Rating of Variable Verbs (Usage)

By contrast, some verbs (10.41%) have never or only rarely (14.86%) been used according to the learners' ratings. For instance, in the case of *commence*, 41.79% stated that they have never used this verb before. We find similar responses for the other low-frequency verbs *cease*, *dread,* and *neglect*.

In light of these rating, we will now look at the correlations between the corpus frequencies (normalised frequency per one million words) and the ratings for these verbs. As shown in Table 34, the ratings of the verbs with respect to their perception and usage show a medium to high correlation with their occurrence in native speaker data:

Table 34 Correlations Corpus Frequencies & Familiarity Ratings Variable Verbs ($p < 0.001$*)*

	Perception	***Usage***
freq_mv_BNC_mil	0.5623	0.6189
freq_mv_COCA_mil	0.5751	0.6223

The strongest correlation can be found between the familiarity with respect to the use of the verbs and the verbs' frequencies in the COCA with r_s= 0.6223. Overall, the ratings of the verbs with respect to their use are higher than their perception. In comparison to the target-*ing* and target-*to* verbs (see Section 6.4.1.4), not only the familiarity ratings of the variable verbs were higher but also their correlation with the corpus frequencies (cf. Section 6.4.1.4, Table 25). The implications of these observations will be discussed in Section 7.4.

Before moving to the results of the mixed-effects model, we will look at the distribution of the complement forms produced by the learners. Generally, the number of complements that had neither an *-ing* nor *to*-inf. form constitute 6.3% of the data (284/4536). Examples are given in (7) to (9) below.

(5) *-ing*: *Students **love** watching videos online during class.*
(6) *to*-inf.: *He **started** to get his life back together after his treatment.*
(7) bare inf.: **Andy **tried** get a job with no experience at all.* (Participant ID 8463, Level B1)
(8) NP *-ing*: **I **dreaded** my parents telling about the spider bite.* (Participant ID 3225, Level C2)
(9) NP *to*-inf.: * *I **deserve** everything about you to know as my future husband.* (Participant ID 8623, Level A2).

Excluding the non-catenative complements, 54.75% of the complements have the form of a *to*-infinitive as in (5), and 45.25% an *-ing* complement as exemplified in (6).

The following table shows the distribution of *to*-inf. and *-ing* complements across the 17 verbs, ordered from the lowest to the highest percentage of *-ing* complements produced by the learners:

Table 35 Variable Verbs: Percentage of -ing *vs.* to-*inf. Complements*

Verb	***ing* %**	***to_inf* %**
deserve	20	80
try	21	79
cease	37	63
continue	40	60
begin	40	60
dread	42	58
bother	44	56
fear	44	56
remember	45	55
neglect	50	50
like	51	49
prefer	54	46
consider	54	46
start	56	44
commence	56	44
hate	61	39
love	62	38

First, we can see that a distinct preference for one complement type is only given for some verbs. For instance, *deserve* and *try* were produced with a *to*-inf. in approx. 80% of all

sentences. As shown in Section 7.2. (Table 31), the only verbs that occur more often with an *-ing* than with a *to*-inf. complement in English are the verbs *commence*, *dread*, *fear*, and *remember*. In the learner data, however, these verbs are not, or only minimally, preferred with the *-ing* complement. The verbs that were produced more often with an *-ing* complement were the two attitude verbs *love* and *hate*. In the next section, we will examine how frequency, usage experience, and semantics affect the complement choice exactly.

7.3.2 When do Learners Prefer an *-ing* over a *to*-inf. Complement?

The final mixed-effects model with complement form as a dependent variable (*-ing* vs *to*-inf.) has the following formula:

compl_form ~ log_mv_COCA + faithfulness_toinf_COCA + semantics_mv + (1|ParticipantID) + (1|Set_version)[103]

These factors, which significantly predict the production of *to*-inf. over an *-ing* complement (reference level is '*-ing*'), as well as their estimates, standard errors, and *p*-values are given in Table 36:

Table 36 Fixed Effects Predicting the Production of an -ing *vs a* to-*inf. Complement*

	estimate	***SE***	***z*-value**	***Pr(>|z|)***
Intercept	-0.35284	0.26978	-1.308	0.190913
log_mv_COCA	0.18641	0.06924	2.692	0.007099 **
faithfulness_toinf_COCA	2.22847	0.29743	7.492	6.76e-14 ***
semantics_mv_effort	0.23860	0.20894	1.142	0.253487
semantics_mv_process	-0.71760	0.21488	-3.340	0.000839 ***
No. of observations	*4251*			

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Among the frequency-related factors, the matrix verb frequency as well as the faithfulness of the verb to the construction with a *to*-inf. were significant predictors of the complement choice. The faithfulness of the verb to the *-ing* construction, by contrast, had no effect on the choice between the two complement forms.

[103]Random effects:

Groups	Name	Variance	Std.Dev.
ParticipantID	(Intercept)	2.4181	1.555
Set_version	(Intercept)	0.3648	0.604

The effects of the significant predictors are visualised in Figures 44 and 45, where the y-axis shows the probability of a *to*-inf. complement in comparison to the *-ing* complement.

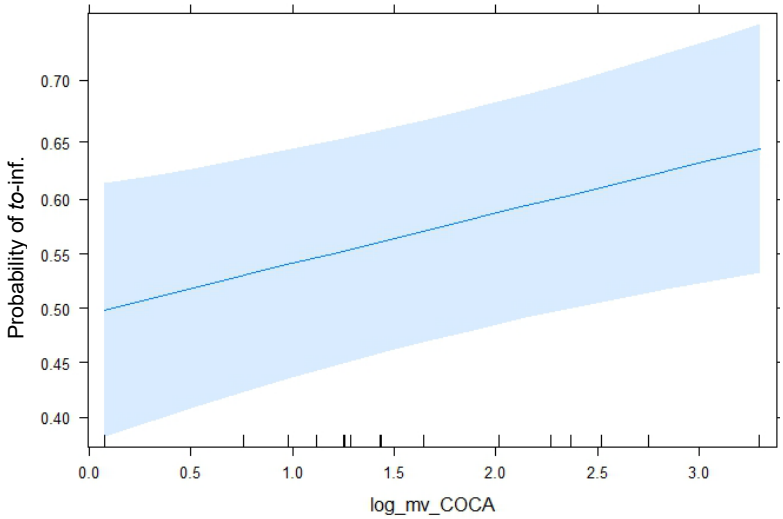

Figure 44 Variable Verbs: Effect Plots Matrix Verb Frequency

The effects are to be interpreted as follows. A higher frequency of the matrix verb made the production of a *to*-inf. complement more likely, even though this effect is rather small (+0.19, $SE = 0.07$, $p = 0.007$).

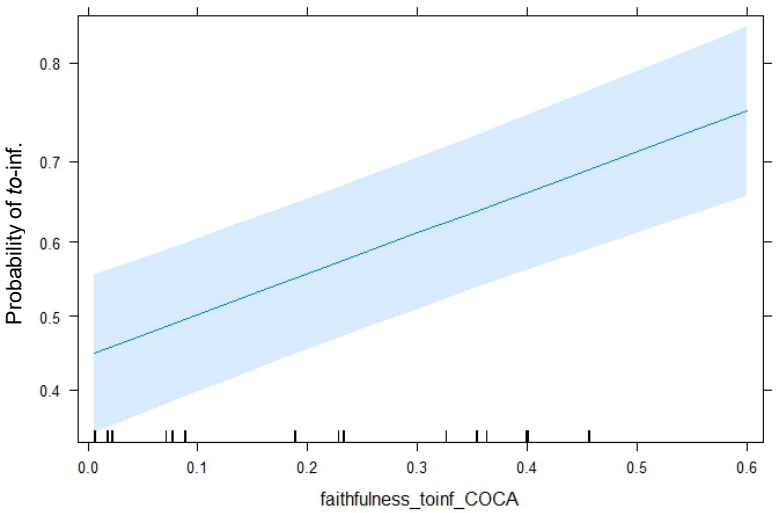

Figure 45 Variable Verbs: Effects Plot Faithfulness to-*inf. Complement*

Figure 45 shows that a higher faithfulness of the verb to the catenative verb construction with a *to*-infinitive considerably increases the chance of a *to*-inf. complement to be produced (+2.23, $SE = 0.30$, $p < 0.001$). To give an example, the verb *try* was preferred with a *to*-inf.

complement in 80% of the test sentences, which can be explained by its exceptionally high faithfulness to this construction with 0.7544.

As stated in the introduction of this section, the proficiency level (A1-C2) of the learner had no effect, which means that the complement choice did not depend on whether learners were less advanced or highly proficient. Moreover, none of the usage-related variables had an effect on the complement choice. Even the variables that affected the target-like choice after the target-*ing* and target-*to* verbs in the preceding study, i.e. the familiarity rating of the verbs, the proficiency in writing or the estimated weekly input or output made no significant prediction of the complement form.

Whether learners choose an -*ing* or *to*-inf. is, however, influenced by the semantic class of the verb (see Figure 46). Process verbs (e.g. *cease*, *begin*, *start*) increase the probability of an -*ing* complement in comparison to attitude verbs (-0.72, $SE = 0.21$, $p < 0.001$). This verb class is also associated with the target-*ing* verbs investigated in Chapter 6 (see Section 6.2 and Section 7.4 for a discussion).

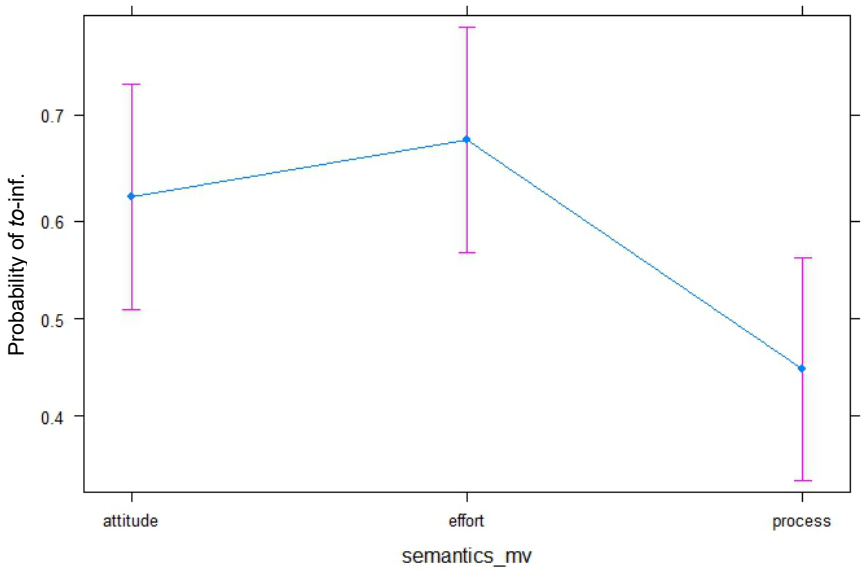

Figure 46 Variable Verbs: Effect Plot Semantic Subclass

Even though the number of *to*-inf. complement with verbs denoting effort, such as *try* or *remember*, is slightly higher in comparison to attitude verbs (e.g. *bother*, *love*, *hate*) this effect is not significant. Example sentences for the different verb classes are given in (10) to (12) below.

(10) attitude: *Oliver **hates** seeing Theresa with another man.*

(11) effort: *Andy **tried** to get a job with no experience at all.*

(12) process: *He **started** getting his life back together after his treatment.*

What these results imply theoretically, will be now discussed in the following section.

7.4 Discussion

The first interesting observation to emerge from the analysis of the data was the distribution of the complement forms: 45.35% were -*ing* and 54.75% *to*-inf. complements. Even though the latter was slightly more frequent in the data than the construction with an -*ing* complement, we cannot speak of a strong overuse of the *to*-inf. complement by the learners. Furthermore, the analysis revealed that frequency, i.e. the matrix verb frequency and faithfulness to the *to*-inf. construction, as well as the semantic class, had an effect on the choice between these two catenative complements. By contrast, the proficiency level of the learner was not significant in predicting the complement form, meaning that it made no difference if the learner had a lower proficiency in English or was highly advanced. Furthermore, none of the factors that dealt with the learners' more specific individual usage experience with the target language (familiarity rating of the verbs, the different proficiency skills, etc.) turned out to be relevant for the complement choice.

These results may be explained by the fact that the majority of the verbs had a relatively high frequency, not only overall but also in the catenative verb construction. Therefore, this suggests that these verbs are entrenched in the catenative verb construction with both complement types, even on lower levels of proficiency. As shown in Section 7.2.1, the verbs are approx. 3.5 times as frequent overall (299.65/one million words) than all the target-*ing* and target-*to* verbs together (82.01) on average (see Table 32 above). The variable verb *like*, for instance, occurs 1971.14 times per one million words in the COCA, while the most frequent verb in the target-*to* verb group, *offer*, is attested 260.80 times. The most frequent verb in the target-*ing* group, *keep*, has a relative frequency of 596.46. Furthermore, we could also see that the variable verbs investigated in this study have a higher faithfulness and higher token frequency in the catenative verb construction than the other two verb groups. To give an example, a verb that is particularly faithful to the catenative verb construction with a *to*-infinitive (0.7544) is *try*. The relative frequency (per million words) with which it is attested

in this construction is 580.7 (compare this with the target-*to* verb *decide*, which had the highest token frequency with 82.26 hits). Consequently, it can be assumed that these verbs are not only more likely to be well-known by the learners overall, but also in the catenative verb construction.

Furthermore, as mentioned in the introduction, most of the variable verbs are not only highly frequent overall but also found in less formal registers as in personal conversations. It can, therefore, also be expected that these verbs are taught earlier in foreign language classes than less frequent catenative verbs. A greater salience of these verbs in the input is also suggested by the outcome of the familiarity task. The learners' intuition about how often they have heard/read or used the verbs correlated strongly with the verbs' occurrence in native speaker data, in contrast to the target-*ing* and target-*to* verbs, which only yielded weak correlations (see Section 6.4.1.4).

The frequency with which the variable verbs occur in English, as well as their faithfulness to the catenative verb construction, were also shown to influence the learners' complement choice. The strongest effect could be found for the faithfulness of the verb to the construction with a *to*-inf. Thus, a greater distinctiveness for this complement form increased the chances of the production of the *to*-inf. The effect of the matrix verb was similar: a verb that had a higher frequency overall was more likely to be completed with the *to*- inf. construction, even though this effect was smaller compared to the one by faithfulness. Similar findings for a correlation between the complement choice and the verb's preference could be attested in Martinez-Garcia & Wulff's (2012) study with advanced German learners, even though these learners were found to be more attuned to the -*ing* construction (cf. ibid. 233). Since their observations are based on a distinctive collexeme analyses of corpus data (*ICLE*, Granger et al. 2009), which are more natural than elicited production data, differences are to be expected (cf. Section 5.5.3).

More evidence for the representation of the construction as a mapping between form and meaning comes from the effect of the semantic class of the verb. Those verbs that express a process and which are often referred to as 'aspectual verbs' in the literature (see e.g. Biber et al. 1999; Quirk et al. 1985), increased the chance of an -*ing* over a *to*-inf. complement. Process verbs refer to the beginning, continuation or ending of an action (see Palmer 1988:

200–202), which also corresponds to the prototypical meaning of the gerund-participial in general, as it is associated with ongoing action.

Even though not statistically significant, the semantic class of attitude also yielded a higher number of *-ing* complements. This corresponds to the classification of the target-*ing* construction examined in Chapter 6: all verbs expressing attitude were target-*ing* verbs, which increased the chance of the target-like complement type in the case of the high-proficiency learners (see Sections 6.4.3 and 6.4.4.2). It was argued that this class reflects a central meaning of this construction, namely that of generality (see e.g. Quirk et al. 1985). Two verbs that were clearly preferred with the *-ing* construction and which express an attitude towards the action described in the catenative complement are *hate* (61% *-ing*), and *love* (62% *-ing*). Test items are given below for illustration:

(13) *Students love watching videos online during class.*
(14) *Oliver hates seeing Theresa with another man.*

For effort verbs, as for example *try*, *remember,* or *deserve*, a *to*-inf. was more likely than for the other two classes. This correlation between complement form and meaning was also described for the target-*to* verbs presented in Chapter 6 (see Section 6.2). However, the target-*to* verbs denoting effort increased the chance of a non-target-like complement usually in the form of an *-ing* complement for the high-proficiency learners (see Section 6.4.3). It was argued that this could be attributed to the fact that many of the target-*to* verbs were relatively infrequent and denoted a less central meaning of the *to*-inf. construction (see Section 6.4.4.2). In contrast to this, the tested variable verbs are mostly highly frequent and semantically more prototypical, which facilitates the detection of the form-meaning pairing, even for less proficient learners.

Finally, the question of whether the data show additional evidence for the construction with a *to*-inf. as a cognitive anchor will be discussed. On the basis of the results presented in the previous chapters, it was argued that the higher type and token frequency of the target-*to* construction, as well as its more transparent form-meaning mapping (see Section 6.4.4.2), promotes its functions as a default pattern for infrequent and/or unfamiliar verbs, especially by learners of lower proficiency. This, however, cannot be clearly shown for the data presented in this chapter. First, we could see that the complement choice did not yield a

considerable overuse of *to*-inf. complements. Second, there was no effect of proficiency level and third, most of the variable verbs tested were highly frequent and were shown to be largely known by the learners. This implies that no cognitive anchor was 'needed' because of an already existing representation of the construction, even with an *-ing* complement. In other words, the largely balanced distribution of the complement types indicates that learners know about the variability in complement choice.

Nevertheless, we could see that the learners are slightly more attuned to *to*-infinitive complements and their association with the verbs under investigation: verbs that have a high faithfulness to the *to*-inf. construction in native speaker data were more likely to be complemented with a *to*-inf. rather than with the *-ing* construction. Generally, it has to be highlighted that the catenative verb construction with a *to*-infinitive complement– with variable and target-*to* verbs – is considerably more frequent than with an *-ing* complement overall both in terms of type and token frequency (cf. Sections 3.4 and 7.2.1; see also Appendix A Tables 1-3). Thus, there are more exemplars and types of catenative verbs that take a *to*-inf. complement, which makes it more productive and promotes its entrenchment, even early in the acquisition process. This provides additional support for the *to*-inf. construction as a default pattern.

7.5 Conclusion

This chapter has presented an investigation of the L2 acquisition of so-called 'variable verbs', i.e. catenative verbs that can take both an *-ing* as well as a *to*-inf. catenative complement. On the basis of a sentence completion task, data were collected to explore factors that determine the complementation preference of learners with different proficiency levels (A1-C2).

It was shown that the matrix verb frequency, the faithfulness to the construction with a *to*-infinitive, as well as the semantic class of the verb have a significant effect on the choice between an *-ing* and *to*-inf. catenative complement. These factors were also significant predictors for a target-like choice after target-*ing* and target-*to* verbs for high-proficiency learners (C1 and C2) presented in Chapter 6 (see Section 6.4.3). However, in this study, the learner's proficiency level had no effect on the complement choice after the variable verbs. This was explained by the fact that the majority of the verbs examined in this study were highly frequent (e.g. *love*, *hate*, *try*) in the target language and therefore also sufficiently

familiar to less proficient learners. This was further supported by the learners' subjective familiarity ratings of these verbs, which correlated strongly with their occurrence in native speaker data (COCA and BNC).

Support for the hypothesis of the *to*-inf. as a cognitive anchor was only given indirectly, as there was no overuse of this construction. Its function as a default pattern is best tested with infrequent and/or unfamiliar verbs rather than with verbs which are strongly associated with the catenative verb construction and its subschemas. Nevertheless, the learners show sensitivity towards the verbs' faithfulness to the *to*-inf. construction (form-function contingency), which shows that this subschema is strongly entrenched.

To conclude, the present study has added relevant insights to the literature on the L2 acquisition of verbs that show variability with respect to their non-finite complementation preference (e.g. Gries & Wulff 2009; Martinez-Garcia & Wulff 2012; Tízon-Couto 2014) despite its exploratory nature. Certainly, more factors can be examined that have an influence on the choice of the catenative complement after these variable verbs, as e.g. the matrix verb form with respect to (tense, aspect, negation[104]; see e.g. Deshors 2015, Deshors & Gries 2016 on the catenative verb construction in ESL varieties of English, such as Hong Kong or Indian English). Other aspects that are worth investigating by means of more natural data are register effects, variability in meaning depending on the complement form (e.g. *remember* V*ing vs. remember to* V), self-priming and *horror aequi*[105] (cf. Gries & Wulff 2009; Mair 2003) and many more possible factors. However, this would have gone beyond the scope of the present thesis, as even for native speakers of English the complement choice in the case of these variable verbs is often difficult to predict (cf. de Smet & Cuyckens 2005; Duffley 2000). Therefore, further work is needed to examine more closely when and why L2 learners prefer one complement type over the other.

[104] In fact, tense and negation were tested but not found to be significant, which is not unexpected as the matrix verbs in the test items were controlled for with respect to this.

[105] Another issue that needs to be addressed in future research is the relation between variable verbs and target-*ing* and target-*to* verbs. One interesting question that emerges is the issue whether some of the (high frequency) variable verbs (e.g. *love*, *start*, *try*, etc.) affect the complement choice after those verbs that are distinct for one complement type. This issue could be addressed in, for instance, a priming experiment with a production part, where variable verbs are used as primes to see if the choice of the catenative complement after target-*to* or target-*ing* verb in production will be affected by the prime's complementation preference.

8 Summary and Conclusion

This chapter first provides a summary of this work on the second language acquisition of the catenative verb construction from a usage-based perspective (Section 8.1). Section 8.2 brings the results together to answer the main research questions that were addressed in the present thesis and to discuss the theoretical implications of these findings for a usage-based approach to L2 acquisition. Furthermore, directions of future research will be given.

8.1 The L2 Acquisition of the Catenative Verb Construction: Summary

The central aim of the present thesis was to systematically investigate how usage-related factors, such as frequency, influence the L2 acquisition of constructions. Apart from seeking evidence for frequency-sensitive constructional knowledge in general, it was also explored whether frequency has an impact on the entrenchment of item-based knowledge as well as on the emergence of more abstract, schematic representations of an L2 construction. Furthermore, we looked at the development of the construction across different proficiency levels or, in other words, how constructions are 'built' in the course of learning.

In order to gain an understanding of these issues, the catenative verb construction served as a testbed phenomenon. This construction represents a complex idiosyncratic verb-argument construction that poses a challenge for even advanced learners of English and is particularly difficult to be taught explicitly (see e.g. Bourke 2007; Petrovitz 2001). By triangulating different types of usage data and analysing these by multivariate statistical tests, we explored to what extent different usage-related factors shape its representation and, in particular, whether they can predict the native-like form-meaning pairing of a catenative verb and non-finite complement. The two subschemas of the construction, namely the target-*ing* and target-*to* construction, further allowed to investigate more specifically how frequency affects the entrenchment and schematisation of these constructions, which occur with different type and token frequencies in the English language.

Before these issues were addressed empirically, Chapter 2 presented the key tenets of usage-based and constructionist approaches to language that laid the theoretical foundation of the present thesis. This framework models language as a complex network of constructions, i.e. form-meaning pairings, of different granularity and abstractness, instead of dividing language into two separate faculties, namely grammar and lexicon (cf. mainstream

Generative Grammar, e.g. see Chomsky 1965, 1988). Furthermore, crucial characteristics of constructions, such as idiosyncrasy and non-compositionality, as well as models of mental networks were introduced. In this context, we also took a look at the role of frequency in the organisation and storage of language. The second part of the chapter dealt with the phenomena of first and second language acquisition from a usage-based perspective. Among other issues, we touched upon the complex topic of the 'bilingual construct-i-con' as well as the role of implicit and explicit learning in L2 acquisition. The final section of Chapter 2 dealt with frequency effects in L1 and L2 acquisition, with a special focus on its role in the entrenchment and abstraction of constructions.

Chapter 3 provided a brief overview of the characteristics of the catenative verb construction, including its classification as a form-meaning mapping in a constructionist sense. Furthermore, previous studies on the L1 and L2 acquisition of this construction and their limits were discussed. In light of the research gaps identified in the theoretical part of this work, the leading research questions to be addressed by the empirical studies (Chapters 4-7) were introduced. In addition, it was established how entrenchment and schematisation were operationalised for the purpose of the present thesis. It was argued that we find signs of entrenched knowledge when the learners choose the target-like catenative complement, which was expected in the case of high-frequency exemplars/low-scope patterns of the catenative verb construction. More schematic knowledge, on the other hand, was expected whenever the learners paired an infrequent verb with the native-like catenative complement. One prediction was that learners possess schematic knowledge of the target-*to* construction, which was hypothesised to be overgeneralised to infrequent target-*ing* constructions. Finally, the procedure of measuring the frequencies for the catenative verb construction on the basis of the BNC was described.

The empirical part of this work started with Chapter 4, which presented two complementary studies with advanced German learners of English. These studies, a sentence completion and an acceptability rating task, were conducted with verbs that occur with different frequencies in the catenative verb construction with the goals of a) determining whether learners exhibit constructional knowledge which is shaped by frequency and b) showing possible differences between the target-*to* and target-*ing* construction regarding their entrenchment and schematisation. It was shown that the faithfulness of the verb to the catenative verb construction significantly determined a target-like choice. Thus, the more faithful the verb

was, the higher the preference for a catenative complement that is in line with a native speaker's choice. By contrast, the matrix verb frequency, i.e. the verb's overall frequency in English, had no effect. Furthermore, it was demonstrated that the target-*to* construction is better acquired than the construction with target-*ing* verbs and functions presumably as a 'cognitive anchor', which is overgeneralised to (less frequent) target-*ing* verbs. The results of the acceptability rating task, in particular, indicated that the learners, even in the case of faithful verbs, do not reject non-target-like pairings of verb and complement (e.g. a target-*ing* verb with a *to*-inf. complement) because of a possible perceived semantic and formal compatibility between these two subschemas. These findings were interpreted as learners having frequency-sensitive constructional knowledge that ranges from item-based representations of highly frequent exemplars of both constructions to more schematic knowledge of the target-*to* construction.

Chapter 5 presented a pseudo-longitudinal corpus study with more naturalistic written data from the *EF-Cambridge Open Language Database* (EFCAMDAT, Geertzen et al. 2013). The first goal was to examine how German learners use catenative verbs across different proficiency levels (A1-C2), what complement types the catenative verbs take and if frequency has an effect on the choice. It was shown that not only proficiency but also faithfulness and the matrix verb frequency increased the chance of a catenative verb construction in comparison to other constructions in which the verbs can occur (e.g. with a nominal complement). This outcome indicates that learners develop frequency-sensitive knowledge and learn about the use of a verb in different constructions, including less frequent ones as the catenative verb construction.

The second aim was to see whether the attested instances of the catenative verb construction were target-like or not. The majority (approx. 90%) of verb-complement combinations were native-like and could statistically be predicted by the same variables as those mentioned above. Consequently, the target-like production was predicted by the proficiency level, the verb's overall frequency, as well as faithfulness to the catenative verb construction. By contrast, a difference between target-*ing* and target-*to* verbs could not be confirmed, even though we found a tendency of *to*-inf. complements being overgeneralised to target-*ing* verbs (rather than the opposite direction) in the case of the attested non-target-like instances. The high number of target-like constructions was explained by several factors. First, most verbs investigated in this study had a relatively high frequency in the catenative verb construction,

which motivates a target-like entrenchment. Second, and related to this issue, learners tend to avoid infrequent and/or complex constructions when they can choose from a range of other less difficult and/or more entrenched ones that communicate a similar meaning. Apart from these issues, it is likely that the production circumstances associated with the source of the data, an online learning platform, had an impact on this high degree of accuracy.

Chapter 6 presented a large-scale production study with over 1,200 German learners of different proficiency levels and with diverse backgrounds with the aim to corroborate and expand the findings from the previous studies. We looked at three connected main aspects that were predicted to affect the representation of the catenative verb construction: frequency and the individual usage experience of the learner, the meaning of the verb, and proficiency level. First, we did not only gain novel insights into the role of the construction's distribution in native speaker data but also into how the learner's individual learning and usage experience influence the representation of the construction. In order to operationalise the latter, detailed information on the learners' language learning background, proficiency, and individual familiarity with the catenative verbs were collected. Second, to inspect the meaning side of the construction, it was explored whether the semantic subclass (e.g. verbs denoting attitude, effort, etc.) of the construction had an effect on the target-like choice of the complement. And finally, all these aspects were brought together to answer the question of how learners 'build' constructional knowledge with increasing proficiency and whether this proceeds in a bottom-up and/or top-down fashion.

The most central findings of this study were as follows. Advanced learners move to a form-function mapping that is close to a native-like representation, which comprises entrenched exemplars as well as subschemas for both the target-*to* and target-*ing* construction. Furthermore, the target-like choices by these learners are determined by e.g. different construction-based frequencies (e.g. faithfulness) and the different semantic verb subclasses. By contrast, in the case of less advanced learners, the knowledge of the catenative verb construction is based on more coarse-grained non-relational information: for instance, only the overall frequency of the verb and the semantic class of futurity verbs were among the significant predictors. Overall, the results of this strongly suggest that the representation of the construction becomes increasingly more fine-grained and 'holistic' in the sense that relational knowledge on form, frequency, meaning, and use emerge in the course of learning.

Chapter 7 introduced the last study of the present thesis. Data on so-called 'variable verbs' were collected in the same production task as in Chapter 6. These verbs are, in contrast to the target-*ing* and target-*to* verbs, attested both with an -*ing* as well as a *to*-inf. catenative complement in native speaker data. It was aimed to see which frequency-, usage- and meaning-related factors examined in the previous chapter can predict the complement choice (*to*-inf. vs. -*ing*). Another purpose was to see whether we find additional support for the *to*-inf. construction as a cognitive anchor, i.e. a default pattern, especially on lower levels of proficiency. First, it was shown that proficiency and individual usage experience had no effect. However, significant variables that predicted the choice of a *to*-inf. over an -*ing* complement were: the matrix verb frequency, the faithfulness to the construction with a *to*-infinitive as well as the semantic class of the verb. It was argued that the verbs under investigation, such as *love*, *hate*, *try*, are sufficiently frequent in general as well as in the catenative verb construction, which is why they are accurately acquired by learners of all proficiency levels. The findings of this study also provide additional support that the construction with *to*-inf. is more entrenched and more productive than the construction with an -*ing* complement.

8.2 Theoretical Implications and Future Directions

The results of the studies presented in Chapters 4 to 7 will now be brought together to be discussed with respect to the main research questions that were addressed in the present thesis (see Chapter 3, Section 3.3). Moreover, this section provides theoretical implications for second language acquisition from a usage-based perspective and offers directions for future research.

Taken together, the following conclusions can be drawn:

Frequency shapes L2 knowledge of the catenative verb construction

First and foremost, the most crucial theoretical implication of the results is that learners are sensitive towards frequency, i.e. the distribution of constructions in the target language, which is shown to shape the representation of L2 constructions in various ways. This does not only corroborate findings from previous studies on the L1 and L2 acquisition of other verb-argument constructions (e.g. Ambridge & Brandt 2013; Ellis & Ferreira-Junior 2009a;

Ellis et al. 2014a; Ellis et al. 2016; Robenalt & Goldberg 2015b; Römer 2019a; Römer & Berger 2019; Römer & Garner 2019; Römer et al. 2017; Perek & Goldberg 2015, 2017) but also emphasises the importance of studying frequency-sensitive learning mechanisms in language acquisition (Ambridge et al. 2015b: 240).

In the case of our testbed phenomenon, the catenative verb construction, all studies were able to show a robust effect of frequency on the complement choice. Furthermore, we could see that the overall frequency of the verb in the English language alone is not sufficient for a native-like combination of catenative verb and complement. Instead, the verb needs to be experienced *in* the target construction frequently enough to successfully acquire the idiosyncratic mapping of verb and complement. Consequently, the frequency of the verb in the catenative verb construction, and faithfulness (form-function contingency) in particular, emerged as reliable predictors of a target-like choice. In other words, the stronger the verb is associated with the construction, the more likely it is for the learners to have a native-like representation of it (cf. Ellis 2006a, 2006b), which was reflected throughout the studies in a high number of target-like responses after verbs that are distinct for this construction.

Of course, it would be naïve to assume that frequency was a single predictor of linguistic behaviour and learning success. Apart from individual differences between learners with respect to e.g. their first language (cf. Ellis et al. 2015b; Römer et al. 2014a), language aptitude, motivation (see e.g. Dörney & Shekan 2003; Skehan 1991) or individual usage experience (see Chapter 6), there is a large number of other construction-related factors, such as the cognitive complexity (cf. 'markedness', Section 2.2.2) or salience of the construction (Ellis 2016b; Cintrón-Valentín & Ellis 2016) that can impact the learning success. As shown in Chapters 6 and 7, the meaning side of the construction also needs to be taken into consideration and future studies need to investigate the role of prototypicality and other semantic factors in the acquisition of the catenative verb construction more closely (see e.g. Ellis 2016: 80 ff. for an elaborate approach), in particular, because of the opacity of this form-meaning mapping.

Taken together, the attested frequency effects on the representation of this idiosyncratic multi-word construction speak in favour of L2 acquisition as a dynamic process involving the detection of distributions and the interconnectivity of linguistic units in a complex network ('construct-i-con') by usage and experience, as opposed to a 'rule-based'

composition of language. As stated in the introduction, "[l]earners have to *figure* language out" (Ellis 2002: 144; emphasis in the original). And, as the results indicate, learners successfully do so despite the fact that the system of the L2 has to be estimated on the grounds of a limited sample (Ellis et al. 2016: 297). The domain-general cognitive ability of pattern detection makes this possible (Tomasello 2003: 4); we make sense of the world and find patterns by experiencing events and generalising over them (see Ellis 2005: 340). The frequency with which we encounter these can 'accelerate' these generalisation processes.

Constructional knowledge is manifested on different levels of abstraction

The studies further show that frequency does not only lead to the entrenchment of high-frequency exemplars of the construction but is also found to motivate a taxonomic generalisation across related exemplars. By investigating the verbs that occur with different frequencies in the target construction, ranging from very few to a high number of attestations, we could see that frequency determines the specificity with which the construction is entrenched. It was demonstrated that some high-frequency exemplars were produced accurately, which speaks for facilitated access and an autonomous representation (see e.g. Blumenthal-Dramé 2012; Schmid 2017a, 2018).

The comparison of the target-*to* and target-*ing* construction, in particular, provided the opportunity to inspect the schematicity with which these constructions are represented in greater detail. The data imply that the learners possess item-based knowledge of high-frequency target-*ing* exemplars/low-scope patterns (e.g. S *keep* V*ing* X). However, the high overall number of non-target-like choices for these verbs suggests that particularly less proficient learners do not have a more abstract representation of this schema (S CV V*ing* X). By contrast, we do not only find evidence for entrenched item-based knowledge of the target-*to* construction but also for a more abstract generalisation, as even low-frequency exemplars were often complemented in a target-like way. Since the target-*to* construction has a higher type and token frequency than the target-*ing* construction, this can be predicted to facilitate pattern recognition as well as the extension of this schema to novel/less frequent items (cf. Madlener 2015: 124; Goldberg 2006), i.e. in the absence of an entrenched instance.

In general, these results highlight, first and foremost, the importance for language learning and teaching environments to acknowledge that L2 knowledge is represented in the form of

highly interconnected form-meaning pairings, i.e. constructions, that can be found on different levels of abstraction and complexity (see Martinez-Garcia & Wulff 2012: 229; cf. Bybee 2013; Goldberg 2006a; Ellis 2002), as well as different degrees of entrenchment.

The target-*to *schema as a cognitive anchor and arguments against transfer

This leads to the third crucial implication of the studies: the target-*to* construction as a default schema of the catenative verb construction, or to use Goldberg's (2006: 89) term 'cognitive anchor'. The target-*to* construction, due to its higher type and token frequency, functions as a cognitive anchor in the sense that it allows for analogical comparisons and pattern extension with less entrenched exemplars. This schema is likely to be overgeneralised to (less frequent) target-*ing* verbs because the learners perceive formal and semantic compatibility between the unknown/infrequent verb and this pattern. As the form-meaning mapping between the verb and catenative complement is often opaque in the target language (see Section 3.1), this 'benefits' the mapping of a target-*ing* verb and a *to*-inf. complement, which leads to an unattested, but interpretable construction such as **I don't recall to see these photographs of my grandma.*

Even though German has a construction which is equivalent to the target-*to* construction (*zu* + infinitive), as briefly mentioned in Chapter 6 (Section 6.5), transfer can, however, be discarded as a major explanatory factor to account for the higher target-like responses and overgeneralisation of the target-*to* construction. The first argument against transfer as the only reason comprises the robust effects of frequency and usage experience-related factors across all studies presented in the present thesis. Additionally, we could see that high-frequency exemplars of target-*ing* verbs (e.g. *keep*) are entrenched and no overgeneralisation takes place, even when the learners are less proficient.

In addition, when looking at the equivalent of the *to*-infinitival construction in German, which is prototypically built S V (*es*) (X) *zu* V (e.g. *Ich genieße es, zu schlafen*), it could have been expected that especially beginners would transfer this structure to English and produce a non-target-like complex catenative verb construction such as **I enjoy it to sleep*. However, this word order/forms with an intervening element between the catenative verb and complement was highly infrequent in the studies presented in Chapters 6 and 7 (1.5%; 237/15,804 sentences).

Moreover, the results of the present study show that we do not find a one-directional overgeneralisation of the complement pattern: *-ing* complements, as shown in (1) – (3) (examples from the sentence completion task in Chapter 6), have been also produced after target-*to* verbs:

(1) **The lawyer **proceeds** asking them more questions about the victim*. (Participant ID 1430, B1)
(2) **She **chose** living with her new boyfriend Luke*. (Participant ID 1925 B2)
(3) **He **demanded** seeing questions before the interview.* (Participant ID 6862, C1)

Another argument against mere transfer comes from previous studies on the L2 acquisition of the catenative verb construction, which showed that the target-*to* construction is also better acquired by learners with other L1s (such as Persian or Inuit) which are not typologically related to English (see e.g. Anderson 1976, Mazurkewich 1988, Schwartz & Causarano 2007, and Section 3.2 for more information on these studies).

Overall, the assumption that the target-*to* construction is acquired more accurately than the target-*ing* construction and functions as a default pattern can be also grounded on general processing-related factors. The catenative verb construction with *to*-infinitive is not only more frequent and productive than the construction with an *-ing* complement in the English language (cf. Section 3.4; Chapter 7), but it is also likely to be cognitively less complex than the construction with an *-ing* complement. The *to*-particle is treated as a complementiser/subordinator in many grammars (Huddleston and Pullum 2002), which overtly marks the complement (see also Gries & Wulff 2009: 166). In addition to its more explicit and analytical form, the target-*to* construction can also be seen to be semantically more transparent than the target-*ing* construction. *To*-infinitive clauses are generally associated with the meaning of potentiality and futurity (see Chapter 3.1, Figure 6; Egan 2008: 25), which is also a prototypical meaning of target-*to* construction (cf. Chapter 6). This can be linked to the *to*-particle which derives historically from the preposition *to* (see e.g. Huddleston & Pullum 2005: 205) and still carries a meaning that connotes direction, even though in a more metaphorical sense (see e.g. Duffley 1992; Duffley 2000). Therefore, it can be assumed that the connotation of 'direction' is more transparent and 'semantically filled' than the meaning of the morpheme {ING} and is preferred when the learners are not aware of the verb's specific complement preference and meaning. This is in line with

VanPatten's (2004: 9) hypothesis on processing in second language acquisition, which states that learners tend to rely on lexical items rather than grammatical forms to encode (the same) semantic information. In a constructionist sense this, of course, means that learners rely on the target-*to* construction because the form-meaning mapping is more compositional and less idiosyncratic than in the case of the target-*ing* construction.

Nevertheless, future research is needed to confirm these assumptions. In particular, the investigation of learners with typologically different L1s (especially L1s that do not have an equivalent of these non-finite complementation patterns) and proficiency levels would be useful to assess the impact of the first language on the representation of the catenative verb construction (see e.g. Römer & Berger 2019 for a usage-based study on VACs with learners of different L1s and proficiency levels). Additionally, more evidence for the target-*to* construction as a default schema can be gained by a production task with nonce verbs to exclude the impact of the matrix verb on the complement choice. The methodology could be similar to the sentence completion tasks presented in Chapters 4 and 6.

Furthermore, a general direction of future research lies in the assessment of when and why a construction or subschemas of this construction can be assumed to be cognitively more complex. In the case of the catenative verb construction, reaction time experiments or self-paced reading tasks (see e.g. Phakiti 2014; Roberts 2012), would be promising approaches to test whether we find general cognitive processing differences between the target-*ing* and target-*to* construction. Assuming that the target-*ing* construction is cognitively more complex, it would be expected that its access requires more processing time than in the case of the target-*to* construction. Future psycholinguistic research could also examine the processing of items of different frequencies to generally assess whether high-frequency exemplars of the catenative verb construction are accessed faster (cf. Arnon & Snider 2010; Conklin & Schmitt 2012; Hernández et al. 2016; Siyanova-Chanturia 2015; Siyanova-Chanturia et al. 2011 for studies on comparable issues).

How to build constructional knowledge or: From coarse- to fine-grained representations

In sum, the results of the studies with learners of different proficiency levels indicate that the representation of the catenative verb construction changes in the course of learning. As shown by the learner corpus data presented in Chapter 5, learners do not only use the catenative verb construction more often in comparison to other, less complex constructions

in which the verb can occur (e.g. in a subject-predicate construction with a nominal complement) but we could also see that the construction becomes incrementally more native-like with higher proficiency (see Chapters 5 and 6).

One crucial question that was discussed was how learners 'build' constructional knowledge. In particular, the large-scale study presented in Chapter 6 provides evidence for 'top-down' as well as 'bottom-up' generalisation processes. We could see that the low-proficiency learners make early, bottom-up generalisations, which are based on more coarse-grained information as they are mainly centred around high-frequency and semantically prototypical exemplars/low-scope constructions. These central exemplars were mainly high-frequency target-*to* verbs denoting futurity, which were shown to be more entrenched in a native-like way than less frequent and semantically central verbs. Furthermore, it was found that less advanced learners seem to possess item-based knowledge of the target-*ing* construction when presented with a highly frequent verb. However, as the learners tend to overgeneralise the *to*-infinitival complement to (infrequent) target-*ing* verbs, it was argued that schematic knowledge of the -*ing* construction has not emerged yet.

Nevertheless, with increased proficiency and experience with the L2, learners 'exceed' item-based knowledge as they also show to possess distinct subschemas for both the target-*to* and the less frequent target-*ing* construction, which allows them to productively apply them to unknown/infrequent verbs. With this, non-target-like overgeneralisations become fewer (cf. Ambridge et al. 2011; Ambridge & Brandt 2013; Ambridge et al. 2012; Ambridge et al. 2014; Brooks & Tomasello 1999). Apart from the emergence of a subschema for the target-*ing* construction, it is generally assumed that the schemas for the construction are restructured with increasing proficiency. In particular, the representation of the catenative verb construction seems to be shaped by more fine-grained properties of the construction in the target language. These properties include relation information on, for instance, the semantic subclasses of the catenative verbs, as well as more 'construction-oriented' distributional information, such as form-function contingency and the token frequency of the construction. These more elaborate schemas allow for 'top-down' generalisations as the learners successfully apply more abstract schemas to unknown/infrequent verbs.

Overall, we can say that constructions are the outcome of "a gradual process involving the mapping of form, meaning, and use" (Larsen-Freeman 2014: 261), which moves from "initial reliance on concrete items to more abstract linguistic schemata" (Ellis 2015a: 50).

With increasing usage experience learners ultimately come to develop a more elaborate, interconnected representation of constructions, which resembles the form-meaning mappings of native speakers (cf. Ellis et al. 2016; Römer & Berger 2019; Römer et al. 2017).

Some implications for the teaching of (the catenative verb) construction(s)

As a final point, we will briefly turn to methodological implications for the learning and teaching of the catenative verb construction[106]. As Bourke (2007: 35) notes, "[…] many grammarians have a hard time explaining verbal complementation. Many pedagogical grammars ignore it on the grounds that it is unteachable, or at least very complex and messy. It is seen as one of those areas of English grammar that is best acquired without overt instruction". And although there are several attempts to bring order into these 'messy' complementation patterns for learners by formulating rules (e.g. Bourke 2007; Celce-Murcia & Larsen-Freeman 2016; Conti 2011; Petrovitz 2001), it seems as the idiosyncratic form-meaning mappings between verb and complement strongly benefit from implicit probabilistic learning mechanisms, judging from the robust effects of frequency we found in the present thesis.

Of course, explicit teaching of metalinguistic rules is undeniably an essential part in learning a foreign language. For instance, it can make the learning process more efficient and ultimately 'top-down' (see e.g. Roehr-Brackin 2015) or can draw the learners' attention to features that might go unnoticed otherwise due to their low salience (Ellis 2006b). However, certain aspects of a construction, such as distributional information, prototypes, discourse-related contexts of use, and other more fine-grained information are not fully captured by metalinguistic rules. They can best be seen as coarse-grained generalisations that can be used as a 'starting point' for the development of more elaborate constructional knowledge, which can emerge, become entrenched and automatised with rising proficiency, practise/usage, and input (see Bybee 2007: 282; Ellis 2005: 305; Rebuschat & Williams 2012; 2006: 100). Therefore, while explicit instructions can benefit the acquisition process, it is important to adopt an approach that goes beyond a traditional way of teaching rules and vocabulary apart from each other.

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[106] Thanks to Daniel Helsper for his helpful comments on this section.

One simple way to implement this in the case of the catenative verb construction would be the teaching of verbs in a more 'construction-conform' way, i.e. as chunks together with the target-like complementation pattern (e.g. *to refuse to do sth*), which is to some extent already found in some textbooks (e.g. the German 'Greenline Series', Horner & Weisshaar 2009). However, memorising a list with these chunks might not be sufficient to acquire the construction and mere input floods as often discussed in usage-based approaches to language acquisition (cf. e.g. Madlener 2015, 2016) might be either. The challenge is to ascertain how learners can move from declarative rule knowledge, which can cost a considerable amount of cognitive effort, to procedural probabilistic knowledge. Therefore, it is suggested to adopt an approach that starts with explicit teaching and transitions into implicit learning (see Ellis 2005), as will be outlined in the following.

First of all, instead of explaining the syntactic and semantic differences between target-*to*, target-*ing*, and variable verbs in one unit, it could be helpful to teach them separately (see e.g. Petrovitz 2001). For instance, one could start with the target-*ing* construction, even though it is supposedly more complex and less productive, to promote the development of a representation that is autonomous from the target-*to* construction. Variable verbs can be taught last so their acquisition benefits from the developed subschemas of the target-*to* and target-*ing* construction.

Generally, the differences between the constructions with a *to*-inf. and -*ing* complement should be highlighted. Learners should, for instance, know that the *to*-inf. construction is more productive and more frequent than the -*ing* construction (cf. Section 3.4). Furthermore, despite the opacity of the form-meaning pairing between verb and complement, it is essential that the learner gets introduced to both of these aspects (Larsen-Freeman 2014; cf. Ellis et al. 2015: 169) to provide some initial guidance of how to map form and meaning. The communicative purpose (context of use), as well as the meaning that prototypically correlates with the respective construction (e.g. futurity, attitude, etc., see Chapter 6), can be pointed out and exemplified by some central high-frequency exemplars. The explicit memory of these concrete exemplars can then function as 'seeds', which can become the foundation for more schematic generalisations (Ellis 2005: 320 –321). And this is when implicit frequency-sensitive learning mechanisms come into play. On the basis of different types and tokens of the construction presented in different tasks and usage-contexts, generalisations can be made inductively (cf. Larsen-Freeman 2014: 268) and a more fine-

grained and tightly bound representation of form, meaning, and use can emerge (see Ellis 2005: 321). Once a more abstract schema for the respective construction is formed, it can contribute to target-like extensibility of the construction to other possible verbs.

However, to find more support for this approach empirical research is needed as well as studies that validate the effectiveness of such a method in non-experimental set-ups. Generally, adopting such a teaching method would require the development of teaching materials on the basis of native speaker corpora (see e.g. Aijmer 2009; Reppen 2010; Timmis 2015) and, more crucially, a conceptualisation of language that goes beyond a traditional model of 'rules vs grammar'. To quote Martinez-Garcia and Wulff on this matter (2012: 229):

> A constructionist perspective has several implications for our understanding of second language proficiency and second language teaching. First, the traditional distinction between vocabulary and syntax is discarded with: instead of learning words and grammatical rules to accurately combine these words, knowing a language means to know constructions at different levels of complexity and abstraction, and how often these constructions are combined with each other.

But the methodological implementation of these theoretical insights into foreign language teaching has still a lot of work ahead and requires an interdisciplinary exchange between theory and practice. On the one hand, the challenge is to develop teaching material that adopts the conceptualisation of language as constructions, in the sense of form-meaning pairings (for a convincing proposal on how to teach 'grammar' by implementing the concept of constructions as form-meaning pairings see Larsen-Freeman 2014). On the other hand, the testing of the different theoretical constructs of cognitive linguistic theories by means of 'real-life' applications to teaching is still in its infancy and has just been addressed recently (see e.g. de Knop & Gilquin 2016; Eskildsen 2014; Herbst 2017; Torres-Martínez 2017; Tyler 2010).

To come to a final conclusion, the study of the second language acquisition of the catenative verb construction has advanced the understanding of how idiosyncratic complex constructions are acquired by learners of English and has highlighted the fundamental role of frequency in shaping its representation as a form-meaning pairing. By triangulating different types of usage data, it was possible to provide empirical support for one of the most fundamental theoretical constructs of the framework adopted in the present thesis, namely

that *usage shapes language*. Nevertheless, paired with the complexity of the topic that (second) language acquisition represents, many theoretical assumptions of usage-based approaches to language still require (additional) empirical evidence. Thus, a considerable amount of research lies ahead. Or, to use Ellis et al.'s (2016: 24) words, "[t]hese are exciting times to work in usage-based approaches".

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Appendices

Appendix A: Catenative Verbs and BNC Frequencies

*Table 1 Target-*to *Verbs: Raw Token Frequencies and Faithfulness BNC*

no	catenative verb	freq_catcxn_ BNC	freq_mv_ BNC	faithfulness
1	purpose	0	39	0
2	endeavor	1	3	0.33333
3	chafe	1	82	0.01220
4	beseech	2	74	0.02703
5	entreat	2	36	0.05556
6	essay	2	21	0.09524
7	fret	2	275	0.00727
8	hanker	2	56	0.03571
9	implore	2	128	0.01563
10	pine	2	96	0.02083
11	pant	4	351	0.01140
12	scorn	4	143	0.02797
13	whine	4	271	0.01476
14	assay	5	851	0.00588
15	sweat	5	641	0.00780
16	thirst	5	74	0.06757
17	delight	6	808	0.00743
18	scruple	7	9	0.77778
19	speed	7	1711	0.00409
20	disdain	10	41	0.24390
21	proclaim	10	1169	0.00855
22	crave	12	307	0.03909
23	petition	12	262	0.04580
24	plead	17	1722	0.00987
25	condescend	18	32	0.56250
26	scheme	20	274	0.07299
27	pray	22	2507	0.00878
28	labour	34	658	0.05167

29	affect	37	13038	0.00284
30	ache	41	599	0.06845
31	chance	50	137	0.36496
32	burn	55	4985	0.01103
33	deign	65	69	0.94203
34	trouble	66	1123	0.05877
35	yearn	69	316	0.21835
36	engage	75	4297	0.01745
37	swear	98	2138	0.04584
38	plot	108	1065	0.10141
39	battle	109	865	0.12601
40	push	115	9967	0.01154
41	confess	119	1548	0.07687
42	survive	120	7002	0.01714
43	profess	123	286	0.43007
44	omit	123	1088	0.11305
45	consent	123	650	0.18923
46	contract	129	1605	0.08037
47	trust	139	3739	0.03718
48	bid	139	1468	0.09469
49	beg	142	1777	0.07991
50	die	149	20991	0.00710
51	venture	150	922	0.16269
52	aspire	151	508	0.29724
53	hasten	153	475	0.32211
54	strain	154	1237	0.12449
55	suffice	166	632	0.26266
56	grow	169	14476	0.01167
57	reckon	185	3797	0.04872
58	contrive	188	387	0.48579
59	conspire	196	335	0.58507
60	request	197	2632	0.07485
61	volunteer	242	851	0.28437
62	judge	246	4666	0.05272
63	live	292	31493	0.00927

64	presume	292	1138	0.25659
65	vow	297	603	0.49254
66	demand	304	7889	0.03853
67	pledge	315	1008	0.31250
68	elect	331	4878	0.06786
69	apply	395	18993	0.02080
70	hesitate	395	1999	0.19760
71	vote	414	4990	0.08297
72	care	443	7487	0.05917
73	resolve	452	4284	0.10551
74	arrange	484	6897	0.07018
75	train	520	5803	0.08961
76	long	544	1204	0.45183
77	stand	557	30404	0.01832
78	strive	589	986	0.59736
79	undertake	605	5845	0.10351
80	pay	683	41122	0.01661
81	assume	686	10855	0.06320
82	proceed	721	4202	0.17158
83	decline	758	3301	0.22963
84	dare	757	3282	0.23065
85	pretend	1068	2616	0.40826
86	look	1121	105871	0.01059
87	struggle	1337	3549	0.37673
88	offer	1346	27432	0.04907
89	serve	1397	15545	0.08987
90	aim	1557	7510	0.20732
91	promise	1591	5881	0.27053
92	threaten	1885	6459	0.29184
93	afford	1921	5170	0.37157
94	turn out	2215	4217	0.52525
95	claim	2502	18255	0.13706
96	agree	2823	22393	0.12607
97	learn	3063	18630	0.16441
98	allow	3428	31422	0.10910

99	choose	3643	16197	0.22492
100	ask	4278	57321	0.07463
101	hope	4832	20916	0.23102
102	help	5303	39770	0.13334
103	seek	5823	16367	0.35578
104	tend	5915	11567	0.51137
105	manage	6022	12623	0.47707
106	attempt	6152	7896	0.77913
107	refuse	6555	10458	0.62679
108	decide	8415	23506	0.35799
109	wish	8663	16166	0.53588
110	fail	10046	15552	0.64596
111	expect	10347	27648	0.37424
112	appear	10576	29503	0.35847
113	seem	28014	59126	0.47380
114	want	43558	87073	0.50025
mean		***1849.47***	***9189.60***	***0.20126***

Table 2 Target-ing *Verbs: Raw Token Frequencies and Faithfulness BNC*

no	**catenative verb**	**freq_catcxn _BNC**	**freq_mv_ BNC**	**faithfulness**
1	abhor	0	114	0
2	repent	0	133	0
3	stomach	0	6	0
4	abide	0	361	0
5	ape	0	38	0
6	renounce	2	375	0.00533
7	grudge	2	46	0.04348
8	begrudge	3	70	0.04286
9	eschew	5	225	0.02222
10	defy	7	809	0.00865
11	countenance	7	193	0.03627

12	overlook	2	2038	0.00098
13	value	9	1791	0.00503
14	mime	9	133	0.06767
15	recommence	9	64	0.14063
16	discontinue	9	320	0.02813
17	detest	9	235	0.03830
18	foresee	9	764	0.01178
19	endure	10	1059	0.00944
20	recollect	11	214	0.05140
21	invite	15	6074	0.00247
22	acknowledge	15	4108	0.00365
23	evade	15	517	0.02901
24	defer	17	516	0.03295
25	welcome	17	5638	0.00302
26	tolerate	18	1141	0.01578
27	celebrate	26	3392	0.00767
28	appreciate	35	4310	0.00812
29	postpone	45	1083	0.04155
30	relish	48	531	0.09040
31	quit	53	1079	0.04912
32	undertake	54	5845	0.00924
33	complete	64	9893	0.00647
34	escape	63	5135	0.01227
35	resent	68	897	0.07581
36	stay	91	18013	0.00505
37	envisage	68	1786	0.03807
38	put off	70	543	0.12891
39	anticipate	73	2304	0.03168
40	lie	114	13125	0.00869
41	dislike	101	1165	0.08670

42	resume	99	1727	0.05732
43	mention	117	12150	0.00963
44	describe	121	23069	0.00525
45	discuss	139	14569	0.00954
46	miss	155	10117	0.01532
47	delay	172	2552	0.06740
48	practise	186	2822	0.06591
49	justify	201	4484	0.04483
50	recall	257	5433	0.04730
51	face	260	15650	0.01661
52	contemplate	263	1592	0.16520
53	resist	278	3341	0.08321
54	deny	446	7303	0.06107
55	risk	603	1968	0.30640
56	mind	785	7443	0.10547
57	sit	783	27929	0.02804
58	finish	827	11273	0.07336
59	enjoy	1709	14046	0.12167
60	avoid	2112	11688	0.18070
61	keep	5738	47987	0.11957
mean		***269.33***	***5298.79***	0.05083

Table 3 Variable Verbs: Raw Token Frequencies and Faithfulness BNC

no	**catenative verb**	**freq_mv_ BNC**	**freq_toinf_ BNC**	**faithfulness_ to**	**freq_ing_ BNC**	**faithfulness_i ng**
1	adore	492	4	0.0081	18	0.0366
2	bear	10051	399	0.0397	99	0.0098
3	begin	41566	19049	0.4583	2813	0.0677
4	bother	4157	1003	0.2413	243	0.0585
5	cease	2907	1553	0.5342	203	0.0698
6	commence	1511	31	0.0205	80	0.0529
7	consider	28178	1614	0.0573	1423	0.0505
8	continue	27175	11536	0.4245	1033	0.0380
9	deserve	2970	518	0.1744	14	0.0047
10	dread	468	39	0.0833	73	0.1560
11	fear	5038	86	0.0171	77	0.0153
12	forget	11640	991	0.0851	28	0.0024
13	get	211009	10590	0.0502	1006	0.0048
14	hate	4553	384	0.0843	368	0.0808
15	help	39770	5303	0.1333	735	0.0185
16	intend	10422	6977	0.6694	295	0.0283
17	like	154130	13561	0.0880	1573	0.0102
18	loathe	333	35	0.1051	17	0.0511
19	love	13862	1111	0.0801	510	0.0368
20	need	63240	25522	0.4036	1490	0.0236
21	neglect	1344	111	0.0826	6	0.0045
22	plan	14551	4100	0.2818	56	0.0038
23	prefer	6528	2774	0.4249	132	0.0202
24	prepare	15185	5938	0.3910	51	0.0034
25	propose	7203	1196	0.1660	169	0.0235
26	regret	1657	57	0.0344	123	0.0742
27	remain	25969	816	0.0314	213	0.0082
28	remember	25333	612	0.0242	1339	0.0529
29	require	27798	4272	0.1537	382	0.0137
30	stand	30404	445	0.0146	853	0.0281
31	start	39316	6096	0.1551	7302	0.1857
32	try	52041	34719	0.6671	1256	0.0241
mean		***27525.03***	***5045.06***	***0.19***	***749.38***	***0.04***

Appendix B: Tasks Chapter 4

I Sentence Completion Task

Dieser Fragebogen wurde im Rahmen meiner Master Arbeit in ‚MA Englische Sprachwissenschaft' an der Universität Siegen erstellt. Die Daten werden vertraulich und anonym behandelt.

Fülle bitte die unten stehenden Angaben aus:

1. Alter: _____
2. Semester: _____
3. Seit wie vielen Jahren lernst du English? _____
4. Was ist/sind deine Muttersprache(n) (d.h. die Sprache(n). die du von Geburt an gelernt hast)?

_____

Aufgabe: Vervollständige die Sätze mit den Wörtern. die in der Klammer stehen.

1. The Royals managed_____ **(without her help. enough publicity. get)**.
2. Little children_____ **(too much. sometimes. candy. eat).**
3. The boss proposed_____ **(in his office. do. the work).**
4. My dog_____ **(every day. sleep. 20 hours).**
5. The mother hesitates_____ **(about his problems. ask. her son).**
6. She_____ **(too much. eat. yesterday. popcorn).**

7. Some authors avoid_____ **(in their essays. difficult words. use).**
8. Susi_____ **(buy. 3 years ago. a new car).**
9. The architect postponed _____ **(the tower. build. in the city).**
10. Tom and Sally_____ **(at work. not. be. today).**
11. I_____ **(last week. new clothes. buy).**
12. We_____ **(eat. tonight. at the new restaurant).**
13. The captain recalled _____ **(a whale. see. in the sea).**
14. I_____ **(for 7 hours. be. last week. in the library).**
15. The students_____ **(on page 4. open. their English books).**
16. All kids enjoyed_____ **(about three bears. read. this book).**
17. Her neighbour hesitated_____ **(for some butter. her mother. ask).**
18. Christina_____ **(soon. some trouble. get).**
19. One guest didn't bother_____ **(about the soup. the cook. ask).**
20. A new café_____ **(open. nearby. 2 months ago).**
21. The grandfather offered_____ **(the children. to the zoo. take).**
22. He_____ **(a bottle. just. open. of red wine).**
23. The journalist proceeded_____ **(during the conference. tell. the story).**
24. My parents_____ **(for me. buy. nice present).**
25. My friend enjoys_____ **(in the dark. read. scary stories).**
26. The filmstar celebrated_____ **(for this film. win. the prize).**
27. I_____ **(in Japan. for my sister. buy. a nice souvenir).**
28. His brother practised _____ **(Chinese letters. write. for 6 months).**
29. Lucy_____ **(every day. eat. 3 red apples).**
30. You_____ **(sometimes. be. a nice person).**
31. The girl intended_____ **(after her classes. most things. do).**
32. Larry and Robert_____ **(never. hamburgers. on Sundays. eat).**
33. The government refused_____ **(accept. against this law. our arguments).**
34. Small children_____ **(at noon. sleep. usually).**
35. The oven serves_____ **(tasty pizzas. make. for the guests.)**
36. Anna_____ **(be. with red her. the girl).**
37. The teacher proposed_____ **(the task. do. in 4 groups).**
38. Andy_____ **(all alone. walk. 100 kilometres).**
39. Sally_____ **(a bottle of juice. open. for her sister).**
40. All workers intended_____ **(do. in two hours. the job).**

41. I_____ **(tightly. after this dinner. sleep).**
42. Their friend proceeded_____ **(all details. tell. about his surgery).**
43. Her parents planned_____ **(in the evening. do. the cooking).**
44. I_____ **(tomorrow. walk. in the park. with the dog).**
45. The doctor didn't bother_____ **(about his health. ask. a question).**
46. She_____ **(be. before. to London).**
47. The pilot offered_____ **(on a tour. several visitors. take).**
48. Walter_____ **(until 11 o'clock. sleep. in the morning).**
49. The father refused_____ **(about their holidays. accept. the plans).**
50. We _____ **(tonight. to the top of the mountain. walk).**
51. Sandra_____ **(before midnight. never. sleep).**
52. The company postponed_____ **(during the winter. the factory. build).**
53. Her sister_____ **(get. for her next birthday. a pony).**
54. The football team celebrated_____ **(win. with their friends. the championship).**
55. She_____ **(what she wants. get. always).**
56. My brother planned_____ **(the shopping. before the weekend. do).**
57. Sarah and Lilli_____ **(for Christmas. the same present. get).**
58. Her family avoided_____ **(for cleaning. use. cheap soap).**
59. Cathy_____ **(already. buy. for her room. a new couch).**
60. The teenagers practised_____ **(with the tablet. short messages. write).**
61. My mom_____ **(never so angry. get. before).**
62. This machine serves_____ **(for trendy cars. make. comfortable seats).**
63. The shop_____ **(at 9 o'clock. open. in the morning).**
64. Some refugees managed_____ **(a seat. get. on the plane).**
65. Tom_____ **(before. to work. walk).**
66. He_____ **(7 to 8 hours. work. a day).**
67. The guests recalled _____ **(a rat. see. in this restaurant).**

Thank you very much for your participation! ☺

II Acceptability Rating Task

Diese Aufgabe wurde im Rahmen meiner Master Arbeit in ‚MA Englische Sprachwissenschaft' an der Universität Siegen erstellt. Die Daten werden vertraulich und anonym behandelt.

Fülle bitte die unten stehenden Angaben aus:

Alter: _____

Semester: _____

Seit wie vielen Jahren lernst du English? _____

Was ist/sind deine Muttersprache(n) (d.h. die Sprache(n). die du von Geburt an gelernt hast)?

_____

Lies dir die unten stehenden Sätze durch. Entscheide für jeden Satz. ob er korrekt oder falsch ist. Du kannst Folgendes ankreuzen: „eindeutig korrekt". „eher korrekt". „ich weiß nicht". „eher falsch". oder „eindeutig falsch".

	eindeutig korrekt	**eher korrekt**	**eher falsch**	**eindeutig falsch**
1. Sarah and Lilli got the same present for Christmas.				
2. The father refused to accept the plans about their holidays.				
3. My dog sleep twenty hours every day.				
4. The teenagers practised to write short messages with the tablet.				
5. Sally opened a bottle of juice for her sister.				
6. My brother planned to do the shopping before the weekend.				

	eindeutig korrekt	eher korrekt	eher falsch	eindeutig falsch
7. Tom and Sally is not at work today.				
8. The football team celebrated winning the championship with their friends.				
9. Susi buy a new car three years ago.				
10. All kids enjoyed reading this book about three bears.				
11. You was a very nice person sometimes.				
12. The doctor didn't bother to ask a question about his health.				
13. We ate at the new restaurant tonight.				
14. This machine serves making comfortable seats for trendy cars.				
15. Andy walk 100 kilometres all alone.				
16. The company postponed to build the factory during the winter.				
17. My parents have bought a nice present for me.				
18. All workers intended to do the job in two hours.				
19. She has never been to London before.				
20. The mother hesitated to ask her son about his problems.				
21. I walked with the dog in the park tomorrow.				
22. Some refugees managed to get a seat on the plane.				
23. I was in the library for 7 hours last week.				
24. The shop opens at 9 o'clock in the morning.				
25. The pilot offered taking the visitors on a tour.				
26. Anna is the girl with the red hair.				
27. She is eating too much popcorn yesterday.				
28. The captain recalled to see a whale in the sea.				
29. Walter sleeping until 11 o'clock in the morning.				
30. The boss proposed to do the work in his office.				
31. My mom gotten never so angry before.				
32. The journalist proceeded to tell the story during the conference.				
33. Tom has never walked to work before.				
34. Her family avoided to use cheap soap for the cleaning.				
35. Lucy eats three red apples every day.				
36. I buy some new clothes last week.				
37. Her parents planned doing the cooking in the evening.				

	eindeutig korrekt	eher korrekt	eher falsch	eindeutig falsch
38. She always getted what she wants.				
39. We will walk to the top of the mountain tonight.				
40. The architect postponed building the tower in the city.				
41. I buyed a nice souvenir for my sister in Japan.				
42. His brother practised writing Chinese letters for 6 months.				
43. Little children eat too much candy sometimes.				
44. Her sister will get a pony for her next birthday.				
45. Her neighbour hesitated asking her mother for some butter.				
46. Christina got some trouble soon.				
47. My friend enjoys to read scary stories in the dark.				
48. Small children usually sleep at noon.				
49. One guest didn't bother asking the cook about the soup.				
50. He work seven to eight hours a day.				
51. The students open their English books on page 4.				
52. The guests recalled seeing a rat in this restaurant.				
53. Sandra never sleeped before midnight.				
54. The grandfather offered to take the children to the zoo.				
55. The teacher proposed doing the task in four groups.				
56. Their friend proceeded telling all details about his surgery.				
57. Cathy has bought a new couch for her room.				
58. The Royals managed getting enough publicity without her help.				
59. He just opening a bottle of red wine.				
60. The government refused accepting our arguments against this law.				
61. I will sleep tightly after this dinner.				
62. A new café will open two months ago nearby.				
63. The girl intended doing most things after her classes.				
64. The filmstar celebrated to win the prize for this film.				

Thank you very much for your participation! ☺

Appendix B: Corpus Data Chapter 5

I Examples for Annotation of Data

Table 1 Example sentences (examples for some variables and random selection of items)

SentID	WritingID	Level	CEFR	Topic	LearnerID	Sentence	Group	MV	Compl_Type	Compl_Form
2026	U480049	14	C1	Talking a friend out of a risky action	18459030	*If I were you I wouldn't risk losing that privilege.*	target_ing	risk	cat_compl	ger_part
2013	U180433	7	B1	Writing about a memorable experience	18921415	*But for all that I risked to go on the edge of a rock near the waves.*	target_ing	risk	cat_compl	to_inf
1947	U272674	10	B2	Describing a terrifying experience	21082427	*The couple were caught by the police but I wondered how such a nice day finished.*	target_ing	finish	other	other
1916	U593574	8	B1	Congratulating a friend on an award	22611209	*You have been learning so hard and now you have finished so great. wow.*	target_ing	finish	other	other
977	U401856	5	A2	Labeling photos from a safari	21484120	*You will be very enjoyed to watch them. if you are going on a safari.*	target_ing	enjoy	cat_compl	to_inf
640	U20842	7	B1	Taking part in a TV viewing survey	18665533	*I could avoid talk shows etc.*	target_ing	avoid	direct_obj	NP

639	U20842	7	B1	Taking part in a TV viewing survey	18665533	*I couldn"t avoid that.*	target_ing	avoid	direct_obj	NP
594	U173131	12	B2	Buying a painting for a friend	20904407	*Even though the person is wearing a skirt with an oval on it. I tend to think that it might be a man.*	target_to	tend	cat_compl	to_inf
577	U7574	13	C1	Writing a campaign speech	18695901	*That means on one hand I will seek to optimize the learning conditions for all students.*	target_to	seek	cat_compl	to_inf
518	U152316	2	A1	Buying clothes from a catalog	22517163	*For a start the company seeks to increase their market share on the east cost of America and refrains from an expansion in foreign markets.*	target_to	seek	cat_compl	to_inf
437	U575467	10	B2	Describing a terrifying experience	24428568	*After they breaked the window with a hammer and throwing paint on the store front. Meg decided to go to them to stop them possibly.*	target_to	decide	cat_compl	to_inf
436	U563972	10	B2	Describing a terrifying experience	24535861	*She decided to stop them. but suddenly the young woman came at her waving a gun!*	target_to	decide	cat_compl	to_inf
145	U425333	5	A2	Summarizing a story	21584788	*Daria decided to do her investigation.*	target_to	decide	cat_compl	to_inf
143	U371384	5	A2	Summarizing a story	21782441	*The cultered old lady decides to win him for the world of books.*	target_to	decide	cat_compl	to_inf

83	U549923	13	C1	Writing a campaign speech	24587317	*Each year we elect another student council president and each year he has failed our expectations and nothing has changed.*	target_to	fail	direct_obj	NP
81	U91384	11	B2	Reviewing a self-help book	18607801	*She starts with an short overview why so many people fail to search and to find the job which is really suitable to their personality and strengh.*	target_to	fail	cat_compl	to_inf
80	U14690	11	B2	Reviewing a self-help book	18695230	*Despite Wights efforts to create a bible for discontented people. she even fails to convince really nave readers of changing their lives in a breath.*	target_to	fail	cat_compl	to_inf
79	U193209	11	B2	Writing an advertising blurb	18908889	*But don't fail to see the other built-in features:*	target_to	fail	cat_compl	to_inf
41	U11482	11	B2	Setting rules for social networking	18698258	*you should reduce what appears in your profile - without changing the pre-adjustments. others can see when you have viewed their profiles;*	target_to	appear	other	other
40	U11481	11	B2	Setting rules for social networking	18698257	*it is possible to block specific users so that they can only see a limited profile - think about what appears in your profile and that weakly related friends can see it;*	target_to	appear	other	other
39	U5486	11	B2	Setting rules for social networking	18532717	*Please hide your profile that only your name and headline or better only your title and industry appear.*	target_to	appear	other	other

II Dot Chart of Conditional Variable Importance

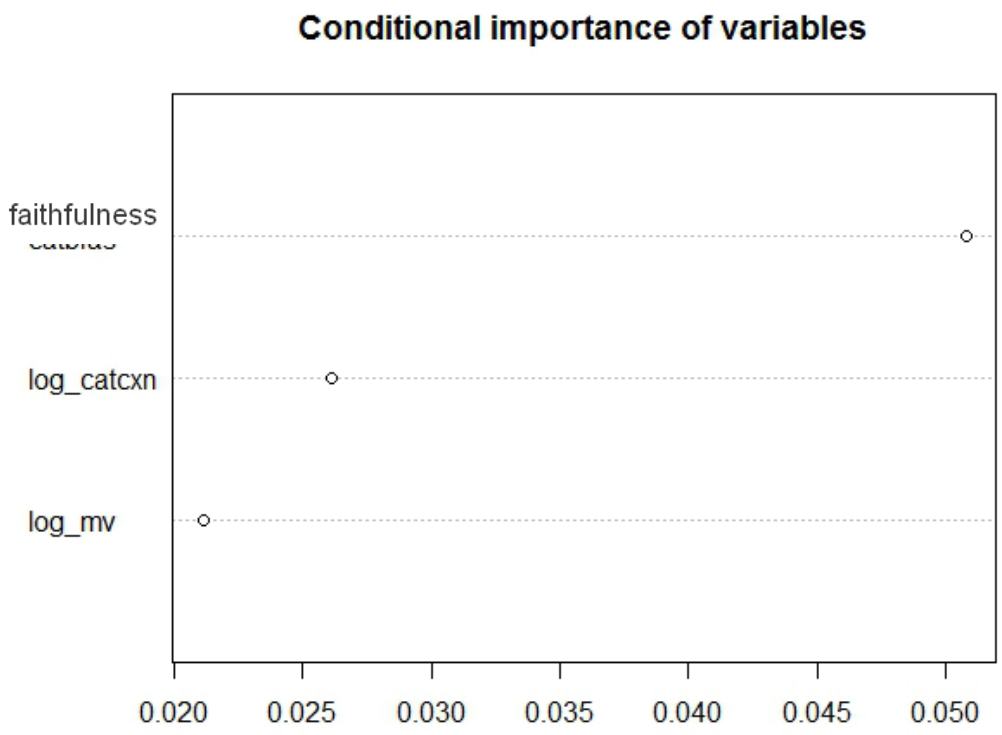

Figure 1 Corpus Study: Dot Chart of Conditional Variable Importance

Appendix C: Task and Materials Chapter 6

I Extract Sentence Completion Task (Print Version)

Vielen Dank für Ihr Interesse an dieser Studie teilzunehmen!

Teilnahme und Thema

Diese Studie wurde im Rahmen meiner Doktorarbeit in der Englischen Sprachwissenschaft an der Universität Trier erstellt. Sie untersucht den Gebrauch der englischen Sprache von Personen, die diese im Laufe ihres Lebens erlernt haben bzw. noch erlernen. Durch Ihre Teilnahme helfen Sie mir dabei, mehr darüber herauszufinden, wie eine Fremdsprache erworben wird. Im Rahmen des Fragebogens werden Sie u.a. dazu gebeten, Lückentexte auszufüllen. Beachten Sie bitte hierbei, dass es nicht Ziel der Studie ist, Ihre Englischkenntnisse zu testen oder zu bewerten. Deswegen möchte ich Sie darum bitten, alles vollständig und ehrlich zu beantworten.

Ablauf der Studie
Es handelt sich um 5 Teilbereiche, für deren Bearbeitung Sie insgesamt ca. 20-30 Minuten benötigen werden. Unter allen interessierten TeilnehmerInnen werden zudem Amazon-Gutscheine im Wert von 1x30€, 1x20€ und 2x10€ verlost. Genauere Informationen zur Verlosung finden Sie auf der letzten Seite des Fragebogens.

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Mit Ihrer Teilnahme bestätigen Sie, dass Sie diese Informationen zur Kenntnis genommen haben und ihnen zustimmen. Zudem bestätigen Sie damit auch, dass Sie über 14 Jahre alt sind.

Ich danke Ihnen noch einmal vielmals für Ihre Unterstützung durch die Teilnahme an diesem Projekt.

Für weitere Fragen stehe ich Ihnen gerne zur Verfügung:
Lina Baldus, M.A., Universität Trier
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2 Teil 1 Englischkenntnisse

1/5

Wie alt waren Sie, als Sie angefangen haben, Englisch zu lernen?

Wie lange lernen Sie oder haben Sie Englisch gelernt (in der Schule, an der Uni, Sprachschule, o.Ä.)?

(in Jahren)

Waren Sie schon mal im englischsprachigen Ausland (z.B. im Rahmen eines Urlaubs, Studiums, Praktikums, o.Ä.)?

- Nein
- Ja

Wenn ja, wie lange waren Sie insgesamt im englischsprachigen Ausland?

- weniger als 1 Monat
- 1-3 Monate
- 4-6 Monate
- 7-12 Monate
- mehr als 12 Monate

Auf welches Niveau schätzen Sie Ihre Englischkenntnisse ein (A1-C2)?

A1= Anfänger/in, C2 = muttersprachliches Niveau

- A1
- A2
- B1
- B2
- C1

- C2

2.1 Teil 2 Englischkenntnisse 2

2/5

Wie viele Stunden lesen und hören Sie Englisch pro Woche insgesamt?

- weniger als 1 Stunde
- 1-2 Stunden
- 3-4 Stunden
- 5-6 Stunden
- 7-8 Stunden
- mehr als 8 Stunden

Wie viele Stunden schreiben und sprechen Sie Englisch pro Woche insgesamt?

- weniger als 1 Stunde
- 1-2 Stunden
- 3-4 Stunden
- 5-6 Stunden
- 7-8 Stunden
- mehr als 8 Stunden

Welchen Dialekt des Englischen kennen Sie besser?

- Britisches Englisch
- Amerikanisches Englisch
- Anderes Englisch und zwar: _____
- Weiß nicht

Bitte geben Sie an, wie Sie Ihre Englischkenntnisse in folgenden Bereichen einschätzen würden:

	Sehr gut	Gut	Okay	Eher schlecht	Sehr schlecht
Lesen	○	○	○	○	○
Schreiben	○	○	○	○	○
Sprechen	○	○	○	○	○
Hörverständnis	○	○	○	○	○

Wählen Sie bitte aus, wie oft Sie die folgenden Verben bereits benutzt und/oder gehört/gelesen haben

	Wie häufig haben Sie das Verb bereits benutzt?	**Wie häufig haben Sie es das Verb bereits gehört und gelesen?**
hesitate	Bitte wählen Sie noch nie benutzt selten benutzt gelegentlich benutzt häufig benutzt sehr häufig benutzt	Bitte wählen Sie noch nie gelesen/gehört selten gelesen/gehört gelegentlich gelesen/gehört häufig gelesen/gehört sehr häufig gelesen/gehört

...

Bitte schreiben Sie auf, wie der Satz weitergehen muss. Verwenden Sie dabei alle Wörter, die in den Klammern stehen und passen Sie die Verbform an, wenn nötig. Bitte schauen Sie keine Vokabeln nach. Wenn Sie ein Wort nicht kennen, entscheiden Sie intuitiv, wie der Satz gut klingt.

Hier ein Beispielsatz: She _____ (to the cinema, always, go) = She always goes to the cinema.

I might _____. (a terrible mistake, make, unfortunately)

Andrea _____. (her new bag, carry, everywhere)

He risks _____. (for the rest, to jail, of his life, go)

Her uncle _____. (this ring, her, give, years ago)

She _____. (without the keys, drive, my car)

The doctor _____. (an untested drug, feed, his wife)

He started _____. (back together, get, his life).

I have _____. (many times, with me, Jenny's spirit, feel)

He demanded _____. (questions, see, before the interview)

I _____. (Libby, from the pictures, recognise)

Bitte schreiben Sie auf, wie der Satz weitergehen muss. Verwenden Sie dabei alle Wörter, die in den Klammern stehen und passen Sie die Verbform an, wenn nötig. Bitte schauen Sie keine Vokabeln nach. Wenn Sie ein Wort nicht kennen, entscheiden Sie intuitiv, wie der Satz gut klingt.

Hier ein Beispielsatz: She _____ (to the cinema, always, go) = She always goes to the cinema.

Her friend neglected _____. (with Anna, his wedding, mention)

We have been _____. (for a long time, work, on this)

The publishers _____. (to her office, a copy of the magazine, send)

The old lady _____. (with her back, open, the door)

He _____. (that this is not, understand, about Chris)

He swears _____. (from her mom, away, keep)

I was _____. (just, if you could do me a favour, wonder)

We have _____. (with our customers, a personal relationship, build)

Ron Hunter denies _____. (of this baby, the father, be)

Melanie was _____. (outside, for 10 minutes, in the cold, stand)

Thomas couldn't _____. (his bike, repair, again)

II Target-*to* and Target-*ing* Verbs

Table 2 BNC and COCA Frequencies Target-ing *and Target*-to *Verbs*

No	Group	Verb	freq_catcxn_BNC	freq_mv_BNC	freq_catcxn_BNC_mil	freq_mv_BNC_mil	Faithfulness_BNC	freq_catcxn_COCA	freq_mv_COCA	freq_catcxn_COCA_mil	freq_mv_COCA_mil	Faithfulness_COCA
1	***target-ing***	**detest**	9	235	0.09	2.35	0.03830	37	726	0.0685	1.3444	0.05096
2	***target-ing***	**tolerate**	18	1141	0.18	11.41	0.01578	166	7385	0.3074	13.6759	0.02248
3	***target-ing***	**celebrate**	26	3392	0.26	33.92	0.00767	154	24289	0.2852	44.9796	0.00634
4	***target-ing***	**postpone**	45	1083	0.45	10.83	0.04155	183	3749	0.3389	6.9426	0.04881
5	***target-ing***	**quit**	53	1079	0.53	10.79	0.04912	2838	16784	5.2556	31.0815	0.16909
6	***target-ing***	**complete**	64	9893	0.64	98.93	0.00647	301	45018	0.5574	83.3667	0.00669
7	***target-ing***	**dislike**	101	1165	1.01	11.65	0.08670	236	3670	0.4370	6.7963	0.06431
8	***target-ing***	**mention**	117	12150	1.17	121.5	0.00963	468	52711	0.8667	97.6130	0.00888
9	***target-ing***	**discuss**	139	14569	1.39	145.69	0.00954	632	58945	1.1704	109.1574	0.01072
10	***target-ing***	**miss**	155	10117	1.55	101.17	0.01532	1200	66630	2.2222	123.3889	0.01801
11	***target-ing***	**practise**	186	2822	1.86	28.22	0.06591	475	14872	0.8796	27.5407	0.03194
12	***target-ing***	**justify**	201	4484	2.01	44.84	0.05196	693	14147	1.2833	26.1981	0.04899
13	***target-ing***	**recall**	257	5433	2.57	54.33	0.04730	2273	44244	4.2093	81.9333	0.05137
14	***target-ing***	**contemplate**	263	1592	2.63	15.92	0.16520	537	6417	0.9944	11.8833	0.08368
15	***target-ing***	**resist**	278	3341	2.78	33.41	0.08321	1277	16999	2.3648	31.4796	0.07512
16	***target-ing***	**deny**	446	7303	4.46	73.03	0.06107	1292	33107	2.3926	61.3093	0.03902
17	***target-ing***	**risk**	603	1968	6.03	19.68	0.30640	2279	12656	4.2204	23.4370	0.18007
18	***target-ing***	**mind**	785	7443	7.85	74.43	0.10547	2819	22866	5.2204	42.3444	0.12328
19	***target-ing***	**finish**	827	11273	8.27	112.73	0.07336	3727	56486	6.9019	104.6037	0.06598
20	***target-ing***	**enjoy**	1709	14046	17.09	140.46	0.12167	6522	58122	12.0778	107.6333	0.11221
21	***target-ing***	**avoid**	2112	11688	21.12	116.88	0.18070	7430	56145	13.7593	103.9722	0.13234
22	***target-ing***	**keep**	5738	47987	57.38	479.87	0.11957	41552	307508	76.9481	569.4593	0.13512

1	***target-to***	**plead**	17	1722	0.17	17.22	0.00987	103	10758	0.1907	19.9222	0.00957
2	***target-to***	**swear**	98	2138	0.98	21.38	0.04584	752	12236	1.3926	22.6593	0.06146
3	***target-to***	**request**	197	2632	1.97	26.32	0.07485	577	12693	1.0685	23.5056	0.04546
4	***target-to***	**volunteer**	242	851	2.42	8.51	0.28437	2219	9335	4.1093	17.2870	0.23771
5	***target-to***	**demand**	304	7889	3.04	78.89	0.03853	1224	32062	2.2667	59.3741	0.03818
7	***target-to***	**hesitate**	305	1999	3.05	19.99	0.15258	2480	6090	4.5926	11.2778	0.40722
6	***target-to***	**pledge**	315	1008	3.15	10.08	0.31250	2275	9655	4.2130	17.8796	0.23563
8	***target-to***	**proceed**	721	4202	7.21	42.02	0.17158	2651	14470	4.9093	26.7963	0.18321
10	***target-to***	**dare**	757	3282	7.57	32.82	0.23065	7526	23950	13.9370	44.3519	0.31424
9	***target-to***	**decline**	758	3301	7.58	33.01	0.22963	3147	11945	5.8278	22.1204	0.26346
12	***target-to***	**struggle**	1337	3549	13.37	35.49	0.37673	6377	140831	11.8093	260.7981	0.04528
11	***target-to***	**offer**	1346	27432	13.46	274.32	0.04907	12580	30216	23.2963	55.9556	0.41634
13	***target-to***	**serve**	1397	15545	13.97	155.45	0.08987	4973	135000	9.2093	250.0000	0.03684
14	***target-to***	**afford**	1921	5170	19.21	51.7	0.37157	8017	24909	14.8463	46.1278	0.32185
15	***target-to***	**choose**	3643	16197	36.43	161.97	0.22492	21952	84308	40.6519	156.1259	0.26038
16	***target-to***	**seek**	5823	16367	58.23	163.67	0.35578	22711	76549	42.0574	141.7574	0.29669
17	***target-to***	**tend**	5915	11567	59.15	115.67	0.51137	41671	48734	77.1685	90.2481	0.85507
18	***target-to***	**manage**	6022	12623	60.22	126.23	0.47707	22398	54231	41.4778	100.4278	0.41301
19	***target-to***	**attempt**	6152	7896	61.52	78.96	0.77913	22820	28899	42.2593	53.5167	0.78965
20	***target-to***	**refuse**	6555	10458	65.55	104.58	0.62679	28683	38350	53.1167	71.0185	0.74793
21	***target-to***	**decide**	8415	23506	84.15	235.06	0.46809	44419	108898	82.2574	201.6630	0.40790
22	***target-to***	**fail**	10046	15552	100.46	155.52	0.64596	32849	63378	60.8315	117.3667	0.51830

III Collinearity Tests

To test for potential collinearity between the frequency variables of the verbs examined in Chapter 6, a similar approach as for the verbs in Chapter 4 and 5 was adopted (see Section 4.2.5 for a detailed description).

The following figure shows a matrix plot of the correlations between the matrix verb frequency (log-transformed), the token frequency of the catenative verb construction (log-transformed), and the faithfulness of the verb to the catenative verb construction of the 44 verbs investigated in this study:

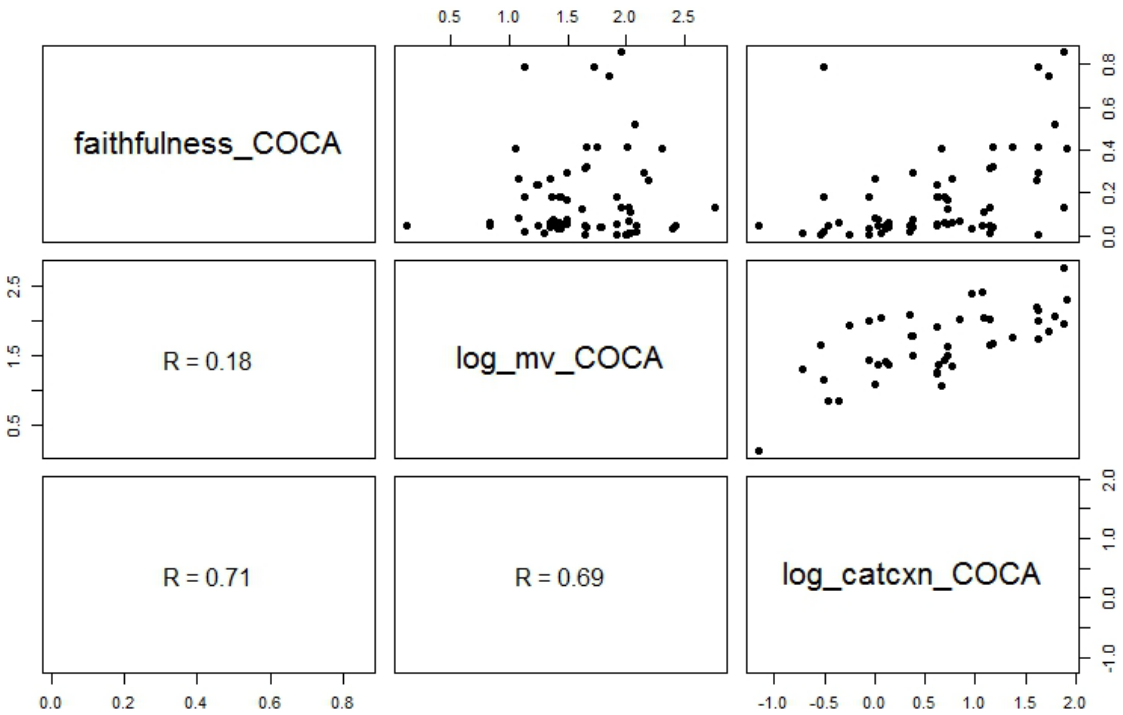

Figure 2 Matrix Plot of Correlations between Frequency Measures Target-to and Target-ing Verbs Ch. 6

As can be seen in Figure 2, the highest correlation can be found between the faithfulness of the verb and the catenative verb construction frequency (log_catcxn_COCA) with a Pearson's product moment coefficient of $r = 0.71$ ($p < 0.001$). The second highest correlation exists between the matrix verb frequency (log_mv_COCA) and the catenative verb construction frequency (log_catcxn) with a correlation coefficient of $r = 0.69$ ($p < 0.001$). The two measures that correlate the least are faithfulness and log_mv_COCA: there is only a small correlation of $r = 0.18$ ($p < 0.001$) between these two variables.

A Random Forest Analysis with all three variables as predictor variables of the dependent variable 'target-likeness' was conducted to see whether we can safely exclude the frequency of the catenative verb construction as a predictor variable without losing considerable explanatory power. The analysis shows the following with respect to the variables' importance:

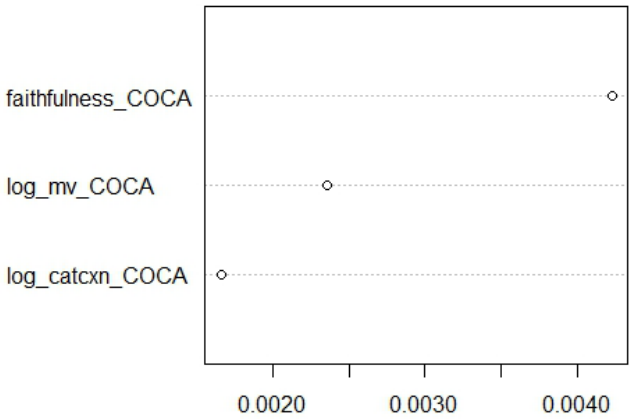

Figure 3 Target-to & Target-ing Verbs: Dot Chart of Conditional Variable Importance

As we can see in this dot chart, the catenative verb construction (log_catcxn_COCA) has the least explanatory power (0.0019), while faithfulness has the highest (0.0043). Furthermore, by eliminating the token frequency of the catenative verb construction as a predictor variable, the kappa coefficient is reduced from 16.82 (medium collinearity) to 8.02, which means that we do not find a harmful collinearity between these two variables (see Baayen 2008: 182). Therefore, faithfulness as matrix verb frequency were used as predictor variables in the mixed-effects models presented in Section 6.4.

IV Test Items

Target-to *verbs*

1. I fail to see the difference between the two pictures. (the difference. see. the two pictures. between)
2. The wizard failed to save her from the dragon. (her. from the dragon. save)
3. I refuse to wear earplugs in my own house. (in my own house. wear. earplugs)
4. My grandpa refused to take medical advice from his doctor. (from his doctor. medical advice. take)
5. U.S. companies seek to do business in Vietnam. (in Vietnam. business. do)
6. The judge seeks to use this recording as evidence. (as evidence. use. this recording)
7. My friend offered to do the Maths homework for my sister. (the Maths homework. for my sister. do)
8. He offered to take us to the zoo at the weekend. (at the weekend. us. take. to the zoo)
9. Her son struggles to get a good grade in Maths. (in Maths. get. a good grade)
10. We struggle to find a way out of this building. (a way. find. out of this building)
11. She proceeded to sing opera with her windows wide open. (wide open. with her windows. opera. sing)
12. The lawyer proceeds to ask them more questions about the victim. (about the victim. ask. more questions. them)
13. My sister hesitates to tell my dad about her new boyfriend. (about her new boyfriend. tell. my dad)
14. My father didn't hesitate to take me away from my mother. (away. me. from my mother. take)
15. Jim volunteered to give the new girl a tour of the school. (a tour of the school. give. the new girl)
16. His brother volunteered to drive us home after the game. (home. after the game. us. drive)
17. She pledged to make Daria's dream of her own café come true. (come true. Daria's dream. make)
18. We pledged to take this secret to our graves. (to our graves. take. this secret)
19. Fred decided to take a walk on the beach. (on the beach. a walk. take)
20. Her parents decided to go to the new restaurant nearby. (to the new restaurant. go. nearby)
21. Christmas tends to make some people extremely emotional. (some people. make. extremely emotional)
22. Brides tend to get a little nervous on their wedding day. (on their wedding day. a little nervous. get)
23. Dr Spencer attempted to make his patient a little more comfortable. (his patient. make. a little more comfortable)
24. Teachers attempt to use digital media in their classes. (in their classes. digital media. use)
25. I managed to find your favourite muffins in the supermarket. (in the supermarket. your favourite muffins. find)
26. Meg managed to get an invitation to the party of the year. (an invitation. get. to the party of the year)
27. A lot of people choose to be vegetarians nowadays. (nowadays. vegetarians. be)
28. She chose to live with her new boyfriend Luke. (her new boyfriend Luke. live. with)
29. I can't afford to have a relationship with someone like you. (someone like you. a relationship with. have)
30. She couldn't afford to take her children to a restaurant. (to a restaurant. take. her children)
31. The cameras serve to keep our city safe after the attacks. (our city. after the attacks. safe. keep)

32. His discovery served to bring him a lot of attention. (a lot of attention. him. bring)
33. Sarah declined to answer the questions during the conference. (during the conference. the questions. answer)
34. Mr. Martin declines to give further details about his private life. (further details. give. about his private life)
35. He demanded to see the questions before the interview. (questions. see. before the interview)
36. Ray demands to wear his lucky socks for the football game. (for the football game. his lucky socks. wear)
37. Mr. Ryan has requested to see you in his office as soon as possible. (as soon as possible. in his office. see. you)
38. He will request to be your Facebook friend someday. (your Facebook friend. be. some day)
39. This man swears to love you for the rest of his life. (of his life. for the rest. love. you)
40. He swears to keep the journals away from her mom. (from her mom. away. keep)
41. He pleads to get another chance after his mistake. (after his mistake. another chance. get)
42. She pleaded to have a role in the new Harry Potter movie. (a role. have. in the Harry Potter movie)
43. Phillip dared to ask her the question after five years. (after five years. her. the question. ask)
44. Paula didn't dare to look Adam in the eyes. (in the eyes. look. Adam)

Target-ing Verbs

1. You keep making the same mistakes over and over again. (the same mistakes. make. over and over again)
2. Laura keeps asking me questions about my love life. (about my love life. questions. me. ask)
3. Her sister avoided taking responsibility for her actions. (responsibility. for her actions. take)
4. We avoid talking about problems in our family. (about problems. talk. in our family)
5. He enjoys spending time with his new friend. (with his family. time. spend)
6. Carry enjoys being in front of the camera as an actress. (in front of the camera. be. as an actress)
7. I finished reading the book about African animals. (about African animals. the book. read)
8. Mr. Miller finished writing a novel about zombies. (a novel. write. about zombies)
9. I don't mind being around my boss in the office. (in the office. around my boss. be)
10. He didn't mind telling people about his affair. (people. tell. about his affair)
11. He risks going to jail for the rest of his life. (for the rest. to jail. of his life. go)
12. My friend risks making things worse with his behaviour. (with his behaviour. make. worse. things)
13. I can't resist taking a quick look at his new wife. (at his new wife. a quick look. take)
14. My sister couldn't resist making a comment about my new hat. (a comment. make. about my new hat)
15. We have contemplated writing a fantasy film about witches. (about witches. a fantasy film. write)
16. She had contemplated taking a break from her legal career. (from her legal career. take. a break)
17. I don't recall seeing these photographs of my grandma. (of my grandma. see. these photographs)
18. I don't recall asking you for your opinion on my new clothes. (on my new clothes. for your opinion. you. ask)
19. Theo and I practised riding our bikes again yesterday. (our bikes. ride. yesterday. again)
20. I practise driving the car every day after school. (after school. the car. drive. every day)
21. He completed writing a book about his life. (about his life. a book. write)
22. All students completed reading two novels in one week. (in one week. read. two novels)
23. My dad quit playing tennis after his 30th birthday. (tennis. after his 30th birthday. play)

24. Susan quit talking to her a after a fight. (after a fight. talk. to her husband)
25. We have postponed buying a new car for another year. (for another year. a new car. buy)
26. Ben postponed going to the dentist for a couple of months. (to the dentist. go. for a couple of months)
27. Most people dislike having meals on their own in a restaurant. (on their own. meals. have. in a restaurant)
28. My grandparents disliked talking about their life during the war. (during the war. about their life. talk)
29. We missed seeing our family from London. (from London. our family. see)
30. I miss spending time with my mother. (time. spend. with my mother)
31. The soldiers celebrate being home for Christmas. (for Christmas. home. be)
32. Mary Cook celebrated winning the prize for best actress. (for best actress. the prize. win)
33. We can't tolerate having a racist as our president. (as our president. have. a racist)
34. Jack can't tolerate being in the same room with a smoker. (with a smoker. in the same room. be)
35. She mentioned having a younger sister called Stella. (called Stella. a younger sister. have)
36. Maria didn't mention being afraid of dogs last time. (last time. be. afraid of dogs)
37. I can't justify taking a child away from her real family. (from her family. take. a child. away)
38. This doesn't justify going behind the back of your friend. (of your friend. behind the back. go)
39. Ron Hunter denies being the father of his 1-year-old daughter. (of this baby. the father. be)
40. She denied having any feelings for me. (any feelings. have. for me)
41. We detest being around each other at work. (around each other. be. at work)
42. He detested seeing himself in the mirror in the morning. (in the morning. himself. in the mirror. see)
43. Her friends discussed going to this new Indian restaurant nearby. (nearby. to this new Indian restaurant. go)
44. We discussed getting a small apartment in town. (in town. a small apartment. get)

Filler Items

1. You haven't been to work in a week. (be. not. in a week. to work)
2. He has been in prison for four months. (for four months. be. in prison)
3. I should have had the courage to do this six years ago. (the courage. to do this. have. six years ago)
4. I don't have a date tonight. (tonight. a date. have. not)
5. He does this annoying thing all the time. (this annoying thing. do. all the time)
6. Clara does Spanish at school. (at school. Spanish. do)
7. Freddy says hello to his father. (to his father. say. hello)
8. Percy said something mean to you. (to you. something mean. say)
9. I went to Canada with Joe to find you. I (to find you. go. with Joe. to Canada)
10. Please tell me why you were at the hospital today. (be. why. today. at the hospital. tell me)
11. The detective got it all on videotape. (get. all on videotape. it)
12. I saw a comic book about the Pope in Rome. I (in Rome. about the Pope. see. a comic book)
13. I might have made a terrible mistake unfortunately. I might (a terrible mistake. make. unfortunately)
14. She's known as the Black Widow by the police. She is (as the Black Widow. know. by the Police)
15. Granny has never looked more alive. Granny has (more alive. look. never)
16. The police found him with the gun. The police (him. find. with the gun)
17. I didn't tell anyone about what happened. I did (not. anyone. tell. what happened)
18. Nancy will not put pens in her pockets anymore. Nancy will not (in her pockets. put. not. pens)
19. We've been working for a long time on this. (for a long time. work. on this)
20. Andrea carries her new bag everywhere. (her new bag. carry. everywhere)

21.Rick's been talking to him a couple of times. (a couple of times. to him. talk)
22.Her uncle gave her this ring years ago. (this ring. her. give. years ago)
23.Let's call the police tomorrow morning. (tomorrow. the police. call)
24.I have been working at the casino with Tom. (with Tom. work. at the casino)
25.The paper writes stories about you every day. (about you. stories. every day. write)
26.Jack is reading a book to my grandson. (to my grandson. read. a book)
27.I have already eaten at home. (eat. at home. already)
28.Just drink some champagne with me. (with me. champagne. drink)
29.The publishers sent a copy of the magazine to her office. (to her office. a copy of the magazine. send)
30.My father had built that company for our family. (build. for our family. that company)
31.Her memory stays alive in their hearts. (alive. in their hearts. stay)
32.She drove my car without the keys. (without the keys. drive. my car)
33.An old man walked into your coffee shop that night. (the coffee shop. that night. into. walk)
34.She would only sleep with her favourite blanket next to her. (only. with her favourite blanket. sleep)
35.I have travelled through the country to find you. (to find you. through the country. travel)
36.You two will fly on honeymoon after the wedding. (after the wedding. on honeymoon. fly)
37.I have met a Japanese girl at the art museum. (a Japanese girl. meet. at the art museum)
38.Anne hit her head on the table. (her head. on the table. hit)
39.She smiled at you the whole time. (at you. the whole time. smile)
40.Linda studies dolphin communication at university. (at university. dolphin communication. study)
41.My husband and I lived with my pet in a flat near Central Park. (in a flat. live. near Central Park. with our pet)
42.I will be paid by tomorrow at noon. (by tomorrow. pay. at noon)
43.Harry sometimes hears strange noises at night. (at night. strange noises. hear. sometimes)
44.It tastes exactly like a strawberry. (exactly. strawberry. taste. like)
45.The old lady opened the door with her back. (with her back. open. the door)
46.Mrs. Smith had closed the shop for three days. (for three days. the shop. close)
47.I'll speak with him alone this evening. (this evening. alone. speak. with him)
48.You're exercising an hour a day at home. (an hour a day. exercise. at home)
49.He fed his dog some cheese. (his dog. some cheese. feed)
50.His wife insists that they move into a smaller flat. (into a smaller flat. insist. that they move)
51.He saves her whenever she gets into trouble. (her. whenever. save. she gets into trouble)
52.I was just wondering if you could do me a favour. (just. if you could do me a favour. wonder)
53.The artist is drawing a picture of our family. (of our family. draw. a picture)
54.He understands that this is not about Chris. (that this is not. understand. about Chris)
55.I recognised Libby from the picture. (Libby. from the pictures. recognise)
56.Our family never argued in front of the children before. (never. in front of the children. before. argue)
57.We're going to catch a flight to Italy today. (today. a flight to Italy. catch)
58.My sister wore my black dress last night. (wear. last night. my black dress)
59.We have built a personal relationship with our customers. (with our customers. a personal relationship. build)
60.I have been waiting years for this moment. (for this moment. wait. for years)
61.My cousin is applying to some med schools in the US. (in the US. to some med schools. apply)
62.I've felt Jenny's spirit many times. (many times. Jenny’s spirit. feel)
63.This way leads directly to the airport. (lead. to the airport. directly)
64.I'm sitting here looking at her right now. (right now. here. sit. looking at her)
65.Melanie was standing outside in the cold for 10 minutes. (outside. for 10 minutes. in the cold. stand)
66.The murderer killed him with his bare hands. (with his bare hands. him. kill)
67.My brother will not be driving anywhere tonight. (tonight. drive. anywhere)

68.I was just riding my bicycle to the police academy. (just. to the police academy. ride. my bike)
69.Thomas couldn't repair his bike again. (his bike. repair. again)
70.My younger brother will cook a whole Christmas meal tomorrow. (cook. tomorrow. a whole Christmas meal)
71.He gets into trouble every week. (every week. into trouble. get)
72.Somebody saw him in a pub with a bottle of vodka. (with a bottle of vodka. him. see. in the pub)
73.Lilly should have never made that stupid phone call. (that stupid phone call. make. never)
74.My aunt has known your mom a long time. (a long time. your mom. know)
75.Mary always looked so beautiful. (look. always. so beautiful)
76.The police found a dead woman in this house. (a dead woman. in this house. find)
77.I just told you a sad story about my family. (just. a sad story. you. tell. about my family)
78.I've been putting money away every week. (every week. put. away. money)
79.Tommy is going to work from home today. (from home. work. today)
80.A balloon can't carry a man to Mars. (to Mars. a man. carry)
81.We haven't talked in a really long time. (in a really long time. talk. not)
82.I will give my son a second chance. (my son. a second chance. give)
83.Please call me on my mobile phone. (me. on my mobile phone. call)
84.I went to the hospital last week. (to the hospital. go. last week)
85.I've written down all the facts. (all the facts. down. write)
86.The students will read a couple of chapters of that novel. (of that novel. a couple of chapters. read)
87.We're going to eat popcorn for the rest of our life. (popcorn. for the rest of our life. eat)
88.Danny and Anna were drinking the whole bottle by yourself. (the whole bottle. by themselves. drink)
89.Somebody is sending a lot of money to my mom. (to my mom. a lot of money. send)
90.You could build a big tree house in here. (a big tree house. build. in here)
91.I'm staying with Lucas at the hotel. (at the hotel. with Lucas. stay)
92.Ms. McClellan drove 13 hours to New York (from her home). (from her home)) (13 hours. drive. to New York)
93.She would walk over broken glass for you. (for you. over broken glass. walk)
94.You have slept more than four hours. (more than. sleep. four hours)
95.You've travelled all the way here from Tokyo. (from Tokyo. all the way. travel)
96.Howard flew around the world in three days. (around the world. fly. in three days)
97.I met her at a party two weeks ago. (two weeks ago. her. at a party. meet)
98.Roy can hit the ball through the window. (through the window. the ball. hit)
99.She smiles like the girl from the toothpaste ad. (from the toothpaste ad. like the girl. smile)
100. I studied with her until the eighth grade. (with her. study. until the eighth grade)
101. My grandad lives safely at home with us. (safely. with us. live)
102. The guy paid you for your work. (you. for your work. pay)
103. I have never heard a better story in my entire life. (in my life. hear. never. a better story)
104. I have not tasted Maggie's cooking yet. (yet. Maggie's cooking. taste)
105. We could open a restaurant here one day. (here. open. one day. a restaurant)
106. The child closed her eyes for one second. (her eyes. for one second. close)
107. I spoke to him on the telephone. (on the telephone. to him. speak)
108. I've been exercising every day in the morning. (in the morning. exercise. every day)
109. The doctor fed his wife an untested drug. (an untested drug. feed. his wife)
110. I will wear this dress for my sister's wedding. (for my sister's wedding. wear. this dress)
111. It always saves a copy of your files. (save. always. a copy of your files)
112. My sister wonders if you liked dogs. (wonder. dogs. if you liked)
113. My little brother drew you a pretty good picture. (a pretty good picture. of you. draw)
114. My mom never understood how to use a smartphone. (how to use a smartphone. never. understand)
115. She had recognised him from a picture. (him. from a picture. recognise)
116. I am arguing about money with my dad. (about money. argue. with my dad)

117. I will catch the flowers at Annie's wedding. (at Annie’s wedding. the flowers. catch)
118. She insists that you wear this blue shirt. (that you wear. insist. this blue shirt).
119. Mrs. Andrew has built an exact replica of this place. (an exact replica. build. of this place)
120. We are all just waiting for the results of the final test. (of the final test. wait. just. for the results)
121. Rosa applied for an internship at the museum. (at the museum. apply. for an internship)
122. I always felt so safe in this city. (in this city. so safe. feel. always)
123. Jessica led us in the wrong direction. (us. in the wrong direction. lead)
124. Paul sat on the bed with me. (on the bed. sit. with me)
125. He was standing in front of the fridge half naked. (half naked. stand. in front of the fridge)
126. His neighbour David killed his wife in a fight. (in a fight. kill. his wife)
127. You're driving the poor woman crazy. (the poor woman. crazy. drive)
128. He rode into the building on a bike. (on a bike. into the building. ride)
129. I am going to repair my relationship with my parents. (with my parents. repair. my relationship)
130. I'm cooking dinner for someone special. (for someone special. dinner. cook)

Appendix D: Verbs, Frequencies, and Test Items Chapter 7

I Frequencies of Variable Verbs

Table 1 BNC and COCA Frequencies Variable Verbs (ordered after freq_mv_COCA_mil)

no	Verb	freq_mv_BNC	freq_mv_BNC_mil	freq_toinf_BNC	freq_toinf_BNC_mil	faith_toinf_BNC	freq_ing_BNC	freq_ing_BNC_mil	faith_ing_BNC	freq_mv_COCA	freq_mv_COCA_mil	freq_toinf_COCA	freq_toinf_COCA_mil	faith_toinf_COCA	freq_ing_COCA	freq_ing_COCA_mil	faith_ing_COCA
1	**commence**	1511	15.11	31	0.31	0.0205	80	0.8	0.0529	640	1.19	149	0.28	0.2328	195	0.36	0.3047
2	**dread**	468	4.68	39	0.39	0.0833	73	0.73	0.1560	3101	5.74	55	0.10	0.0177	338	0.63	0.109
3	**neglect**	1344	13.44	111	1.11	0.0826	6	0.06	0.0045	5129	9.50	1170	2.17	0.2281	56	0.1	0.0109
4	**cease**	2907	29.07	1553	15.53	0.5342	203	2.03	0.0698	7104	13.16	2835	5.25	0.3991	891	1.94	0.0188
5	**deserve**	2970	29.7	518	5.18	0.1744	14	0.14	0.0047	9688	17.94	3429	6.35	0.3539	122	0.23	0.0126
6	**bother**	4157	41.57	1003	10.03	0.2413	243	2.43	0.0585	10458	19.37	4191	7.76	0.4007	1320	1.65	0.1254
7	**prefer**	6528	65.28	2774	27.74	0.4249	132	1.32	0.0202	14644	27.12	9088	16.83	0.6206	1335	2.44	0.1262
8	**hate**	4553	45.53	384	3.84	0.0843	368	3.68	0.0808	23699	43.89	4467	8.27	0.1885	2284	4.23	0.0964
9	**consider**	28178	281.78	1614	16.14	0.0573	1423	14.23	0.0505	55697	103.14	4935	9.14	0.0886	11106	2.47	0.0915
10	**fear**	5038	50.38	86	0.86	0.0171	77	0.77	0.0153	55803	103.34	349	0.65	0.0063	1049	21.92	0.1178
11	**remember**	25333	253.33	612	6.12	0.0242	1339	13.39	0.0529	100498	186.11	2214	4.10	0.0220	11839	20.57	0.1994
12	**continue**	27175	271.75	11536	115.36	0.4245	1033	10.33	0.0380	177307	328.35	80887	149.79	0.4562	10845	13.02	0.0394
13	**love**	13862	138.62	1111	11.11	0.0801	510	5.1	0.0368	178259	330.11	13673	25.32	0.0767	7030	1.48	0.0008
14	**begin**	41566	415.66	19049	190.49	0.4583	2813	28.13	0.0677	304842	564.52	99492	184.24	0.3264	54046	20.08	0.0612

15	**start**	39316	393.16	6096	60.96	0.1551	7302	73.02	0.1857	335881	599.79	52672	94.06	0.1568	24071	0.07	0.0717
16	**try**	52041	520.41	34719	347.19	0.6671	1256	12.56	0.0241	415642	769.71	313559	580.66	0.7544	10303	19.08	0.0248
17	**like**	154130	1541.3	13561	135.6	0.0880	1573	15.73	0.0102	1064413	1971.14	75436	139.70	0.0709	801	1.4	0.0008
	mean	***24181***	***241.81***	***5576.2***	***55.76***	***0.21***	***1085.00***	***10.85***	***0.05***	***162517.94***	***299.65***	***39329.47***	***72.63***	***0.26***	***8095.94***	***12.37***	***0.09***

Table 2 Variable Verbs: Correlations BNC and COCA Frequencies (Pearson's Product-Moment Correlation; r-values, $p < 0.001$)

	log_mv_COCA	**log_toinf_COCA**	**faithfulness_toinf_COCA**	**log_ing_COCA**	**faithfulness_ing_COCA**
log_mv_BNC	0.9305				
log_toinf_BNC		0.7762			
faithfulness_toinf_BNC			0.8620		
log_ing_BNC				0.5034	
faithfulness_ing _BNC					0.2787

II Test Items

1. Her friend neglected to mention his wedding with Anna. (with Anna, his wedding, mention)
2. Teachers neglect teaching historical aspects of music to their students. (historical aspects of music, to their students, teach)
3. I deserve to know everything about you as my future husband. (as my future husband, about you, everything, know)
4. She deserves being with a man like Ben. (like Ben, be, with a man)
5. You haven't bothered to tell your new wife about your brother. (about your brother, your new wife, tell)
6. He didn't bother coming home last night after the party. (after the party, come, last night, home)
7. His niece loves to play with her food during dinner. (with her food, play, during dinner)
8. Students love watching videos online during class. (online, during class, videos, watch)
9. My ex-wife ceased to have any power over me. (over me, any power, have)
10. They ceased speaking German after World War II. (after World War II ,German, speak)
11. I prefer to call things by their proper name. (by their proper name, things, call)
12. She preferred playing with the dog rather than with her dolls. (with the dog, play, rather than with her dolls)
13. You continue to see me in a negative light. (in a negative light, me, see)
14. I continued painting the picture of my grandparents. (the picture, paint, of my grandparents)
15. We like to eat in the living room with the whole family. (with the whole family, in the living room, eat)
16. Luisa likes taking long baths after long days. (long baths, take, after long days)
17. She began to see dots in front of her eyes after the accident. (in front of her eyes, see, dots, after the accident)
18. Mrs. Coster began having nightmares about the baby. (about the baby, nightmares, have)
19. I try to get a table dinner with the Smiths at the new restaurant. (with the Smiths, have, at the new restaurant, dinner)
20. Andy tried getting a job with no experience at all. (with no experience at all, a job, get)
21. He commenced to play an English song on the piano. (on the piano, an English song, play)
22. Lisa commenced eating her pudding with a fork. (her pudding, eat, with a fork)
23. I remembered to take my meds after lunch. (after lunch, my meds, take)
24. My aunt remembers getting presents for every family member. (for every family member, presents, get)
25. The teacher dreads to see his students in the supermarket. (in the supermarket, his student, see)
26. I dreaded telling my parents about the spider bite. (my parents, tell, about the spider bite)
27. He considered to get a professional opinion on his back pain. (a professional opinion, get, on his back pain)
28. Anna considered taking the job in Australia. (in Australia, the job, take)
29. People feared to leave their homes after the storm. (after the storm, their homes, leave)
30. He feared losing money and property in the divorce. (money and property, lose, in the divorce)
31. I hate to be a big disappointment to my parents. (to my parents, a big disappointment, be)
32. Oliver hates seeing Theresa with another man. (Theresa, see, with another man)
33. He started to get his life back together after his treatment. (back together, get, his life)
34. I started seeing these awful images of you in the night. (in the night, these awful images of you, see)