

# 1 post-doctoral and 13 doctoral positions in the DFG Research Training Group on Dimensions of Constructional Space at FAU Erlangen-Nürnberg:

## GENERAL

The DFG-funded Research Training Group **Dimensions of Constructional Space** at the Friedrich-Alexander-Universität Erlangen-Nürnberg is seeking to appoint 13 doctoral researchers and one postdoctoral researcher to work on a variety of projects within the Construction Grammar framework. All the groups' activities will be conducted in English, so knowledge of German is not required (except for projects which specifically involve the German language).

The PhD researchers will be employed on a 65% basis on an E13 scale (starting from around 31,700 € per annum; depending on your experience) for three years, starting 15 October 2022.

The postdoctoral researcher (PDR) will be employed on a 100% basis on the E13 scale (~48,800€-70,000€ per annum; depending on your experience) for 4.5 years, starting 1 October 2022.

Application deadline: **10 July 2022**

## PROFILE OF THE RESEARCH TRAINING GROUP

The Research Training Group will explore a relatively new paradigm in linguistics that has become known under the name of Construction Grammar (CxG). The fundamental premise of this approach is that the totality of speakers' linguistic knowledge is represented in a network of form-meaning pairings called constructions. Constructions differ in size (ranging from morphemes through phrasal and clausal templates to discourse conventions), abstractness (fully elaborated, partially schematic, fully schematic) and entrenchment, as well as in the way they interconnect with other constructions in the network. These properties define a multidimensional space we call 'constructional space'.

The project will address central theoretical questions in CxG (e.g. criteria for identifying constructions and establishing links between them), apply the framework to various languages (including less studied languages such as Persian, Arabic and Haitian Creole) and different historical stages / language contact situations, and test predictions derived from CxG using a variety of methods, including traditional and 'big data' corpus methods, behavioural experiments and neuroimaging techniques. In addition, the project will develop an open-access database for the academic community (linguists, psychologists, cognitive neuroscientists, computational linguists, etc.) in the form of a research construction that brings together and interconnects constructional descriptions as well as experimental results obtained in the various research projects on individual constructions and particular types of constructions. The project is interdisciplinary in that it combines insights from theoretical linguistics (both synchronic and diachronic), computational linguistics, neuroscience and psycholinguistics. What brings the individual projects together is a shared theoretical framework (CxG), which itself is to be subject of critical analysis, shared research questions and a radical commitment to empirical research.

The early-career researchers involved in the RTG will benefit from a structured research training program comprising a winter school, three bootcamps, and regular seminars and research group meetings as well as a variety of optional courses, international placement opportunities, and individual coaching. The qualification program is designed to recruit high quality doctoral

candidates and to provide them with a solid foundation in linguistic theory and research methods. Each doctoral candidate will have two supervisors from different disciplines or methodological approaches and one or two additional advisors (one of whom will normally be associated with a research group outside of Germany). Candidates will also gain experience working in an interdisciplinary context, acquire a variety of transferrable skills and have opportunities to develop an extensive network of international contacts, all of which will prepare them for careers both within and outside of academia.

## **General Research Themes (GRTs) and General Research Questions (GRQs)**

The research conducted in the RTG will focus on four broad themes, each comprising several related general research questions, as outlined below. The first three themes correspond to the most salient dimensions of constructional space (size/complexity and abstractness in the case of GRT1, connectivity, i.e. links between constructions, for GRT2, and entrenchment for GRT3), while the last theme (GRT4) situates constructions in the broader context of language use, variation and change. The overall design is such that each doctoral project will address at least two of the general research questions, and each of the GRQs should be addressed by at least two research projects. In the first phase (beginning in 2022), the main focus will be on the concept of the concept of construction (GRT1, esp. CON1 and CON2), but we will also begin to explore the other three themes.

### **General Research Theme 1: The concept of construction [CON]**

Although CxG researchers share the view that linguistic knowledge is represented in a (possibly multimodal) mental constructicon (Beckner et al. 2009), there exist different conceptions of constructions (Croft 2012, Diessel 2019, Goldberg 2019, see also Lasch 2016 and Imo 2011). Furthermore, there is disagreement about the most relevant level of abstraction for language use (Boas 2003; Goldberg 2006; Hampe & Schönefeld 2006; Herbst 2011, 2014) and the theoretical implications of synchronic and diachronic variation for CxG (Dąbrowska 2012a, 2020; Huber 2017; Goldberg & Herbst 2021). The RTG will examine the various positions critically in the light of empirical research and develop a more precise understanding of the term *construction*, as well as reproducible criteria for identifying constructions.

**CON1:** How do we identify constructions (what are their defining criteria; are they better seen as discrete units, prototypes, attractors in constructional space, or nodes in a network of cognitive associations)?

**CON2:** To what extent is constructional knowledge determined by the specific items occurring in them (collo-profiles) and how can we measure and operationalize the degree of lexical specificity vs. productivity of construction slots?

**CON3:** Do all native speakers of a language share the same constructions? If not, how do individual constructicons differ, and what are the implications of these differences for Construction Grammar as a model for language as a shared system?

**CON4:** To what extent can constructions (and their constituents) identified in one language be equated with superficially similar constructions in another language?

### **General Research Theme 2: Networks in constructional space [NET]**

The idea of a network of constructions is central to CxG theory (Beckner et al. 2009, Lasch & Ziem 2014, Diessel 2019, Goldberg 2019, Sommerer and Smirnova 2020). Constructions can theoretically be conceived as linked on the basis of (partially) shared form and/or meaning and/or contexts of usage and/or collo-profiles (i.e. overlap in the items that occur in open slots of the construction).

**NET1:** What kind of empirical evidence can we provide to establish the claim that constructions are connected in a cognitive network? How can computational methods help reveal the network

character of constructional space in the sense of shared form/meaning/usage contexts/collo-profiles?

**NET2:** To what extent is the linguistic concept of inheritance links (polysemy, subpart, metaphorical extension, instance) psychologically real?

**NET3:** In multilingual speakers, are different languages represented in separate language-specific networks or in one multilingual network?

### **General Research Theme 3: Entrenchment and mental representation [ENT]**

The basic assumption of CxG models is that constructions get entrenched through repeated usage events which leave “lossy memory traces” in the brain (Goldberg 2019: 7; see also Bybee 2010). However, despite a considerable amount of research on entrenchment, many issues still remain open. Thus, the RTG will investigate the factors that contribute to entrenchment (i.e. dimensions like frequency, salience, dispersion, age of acquisition etc.: e.g. Behrens & Pfänder 2016 and other work from RTG 1624: *Frequency effects in language*; Dąbrowska 2008a, 2008b, Divjak and Cardwell-Harris 2015, Hilpert and Diessel 2017, Schmid 2017, 2020), the role of items in the learning and storage of constructions (Casenhiser & Goldberg 2005, Herbst 2016) and the role that entrenched L1-constructions play in the learning of a second/foreign language (MacWhinney 2017, Uhrig et al. 2022). A strong emphasis will be put on further exploring the multifactorial complexity of entrenchment on the basis of empirical data from different research areas (corpora, behavioural experiments, neurolinguistic measurements).

**ENT1:** How do factors such as frequency, salience, dispersion and age of acquisition influence entrenchment?

**ENT2:** What role do collo-profiles (i.e. lexical units frequently used in a construction) play in the learning of constructions and their mental representation?

**ENT3:** To what extent do measures of neural activity during language processing coincide with the results of behavioural and corpus data and how does this expand our understanding of how constructions are stored and processed in speakers' brains?

### **General Research Theme 4: Constructions in language use [USE]**

This theme will investigate how factors such as the speaker's communicative intentions, the situation, the medium, the social status of the interlocutors, an individual speaker's repertoire of constructions, etc. affect the choice of specific constructions in language use, and how these factors lead to language change at the community level. These issues will be investigated in the context of existing sociolinguistic research and cognitive theories (Geeraerts, Kristiansen and Peirsman 2010, Geeraerts and Kristiansen 2015, Hollmann 2013, Kristiansen and Dirven 2008, Pütz, Robinson and Reif 2014).

**USE1:** What factors influence speakers' choices from a range of competing constructions (e.g. communicative intentions, situational context, speaker-hearer relations, monologue vs. dialogue, medium)?

**USE2:** To what extent do the factors determining the choice of construction differ between speakers with respect to their individual backgrounds and personalities (socioeconomic status, dialect, general cognitive abilities, ability to accommodate to other people or cultures, multilingualism, extroversion)?

**USE3:** How are constructions combined in the process of formulating an utterance and what role do co-occurrence, overlap and blending play in this process?

**USE4:** How do the factors mentioned in USE1 and USE2 result in language change at the community level at different timescales?

### **The Research Constructicon**

An important integrative component of research data management and documentation in the RTG will be a multilingual research constructicon (RCnn), i.e. a semantic representation model

and a central database that connects the corpus data, experimental results, lexicographic descriptions and (links to) publications generated by the various research projects. The RCnn will provide a common representation for all individual constructions covered in the different projects and languages. This innovative approach to linguistic research documentation will require the development of a rich, descriptively adequate and extensible format for such entries and for the links between them as well as a user-friendly access structure.

The postdoctoral researcher will bear the primary responsibility for development of the formal and technical framework of the RCnn, and will work together closely on this with the individual PhD researchers.

#### **PRIMARY INVESTIGATORS**

Prof. Dr. Ewa Dąbrowska  
Prof. Dr. Lutz Edzard  
Prof. Dr. Stephanie Evert  
Prof. Dr. Ludwig Fesenmeier  
Prof. Dr. Mechthild Habermann  
Prof. Dr. Thomas Herbst  
Dr. Judith Huber  
Prof. Dr. Silke Jansen  
Dr. Patrick Krauss  
Dr. Miguel Llompарт-Garcia  
Prof. Dr. Thorsten Piske  
Dr. Peter Uhrig

#### **DETAILS OF INDIVIDUAL PHD PROJECTS**

The first phase of the RTG (beginning 2022) will include 13 individual PhD projects, as outlined below.

### **1 Corpus Evidence for Delineating Constructions**

CxG and many other usage-based approaches agree that language consists of pre-fabricated form-meaning pairings of varying sizes (e.g. Goldberg 1995, Hunston & Francis 2000, Sinclair & Mauranen 2006, Wray 2008), which are called constructions in CxG. In contrast to approaches that understand language as a probabilistic system, such as lexical priming theory (Hoey 2005) or the EC-Model (Schmid 2020), constructions are usually conceptualised as discrete symbolic units or the “nodes of a symbolic network” (Diessel 2019: 249), possibly emerging from the generalisation of associational patterns or clusters of memory traces (e.g. Goldberg 2019).

Prior research is typically focused on extensive linguistic analysis and discussion of a relatively small set of specific constructions (such as the English ditransitive or the *let alone* construction). Such studies have not been able to establish clear-cut criteria and diagnostics for determining at scale, i.e. with broad coverage, which form-meaning pairings should be considered as constructions and which elements (lexical items, restricted or open slots, and grammatical features) should be included in a given construction. While it is evident in a usage-based approach that there can be no dichotomic distinction of constructions vs. non-constructions and that “constructionhood” is a matter of degree, binary decisions on an inventory of constructions still have to be made for the purposes of linguistic analysis and the systematic compilation of a broad-coverage reference construction.

First efforts to build such a reference construction have been started for different languages, including English (Perek & Patten 2019) and German (Ziem et al. 2019). They build on existing lexical resources such as FrameNet (Perek & Patten 2019) and/or manual in-depth analysis of selected constructions (Ziem et al. 2019). Automatic identification of constructions has only been attempted by a small number of exploratory studies, based on word n-grams (Shibuya &

Jensen 2015), hybrid n-grams of words and POS tags (Forsberg et al. 2014), or a combination of dependency-based co-occurrence with distributional clustering (Martí et al. 2019). All three studies focus on extracting and ranking construction candidates for manual inspection, but do not discuss identifying criteria or generate additional quantitative evidence for human annotators. Gries (2003) carries out a small feasibility study on finding prototypical instances of a given construction, but does not address the issue of construction identification.

This project explores how and to what extent quantitative data from large corpora can contribute to the task of delineating constructions, i.e. help researchers to assess the degree of “constructionhood” of a candidate construction (CxCand), develop systematic defining criteria for this assessment, and lay the groundwork for (semi-)automatic identification of constructions at scale. The project combines computational big data analysis of English and German corpora with constructicographic work (Lyngfelt et al. 2018), extending the collo-profile approach proposed by Herbst & Uhrig (2019: 177ff) for argument structure constructions. It addresses three central research questions: **Q1**: Does quantitative evidence from large corpora improve the manual identification of constructions and the development of defining criteria? **Q2**: What statistical measures are suitable as an operationalisation of such quantitative data, providing a basis for computing an index of “constructionhood” and for the automatic identification of constructions? **Q3**: Can context-sensitive neural word and phrase embeddings be used as a corpus-based approximation of construction meaning?

The project starts by extracting large databases of CxCand from English and German Web corpora of more than 10 billion words, based on pre-defined syntactic patterns such as verb argument structure. The extraction relies on an existing HPC infrastructure for parsing large corpora at FAU. Widely-used criteria for determining “constructionhood” such as *productivity*, *compositionality* / *idiomaticity* and *schematicity* / *lexical specificity* (Ziem et al. 2019: 69f) are operationalised in terms of corpus frequency, productivity of slots, statistical association between lexical elements, morpho-syntactic preferences, context entropy, etc. They are computed from the CxCand database using state-of-the-art measures from methodological research carried out at FAU, which provide the basis for answering Q2. Following Herbst & Uhrig (2019), the meaning aspect of a CxCand is initially approximated by the collo-profiles of its open slots. A thorough constructicographic analysis of different sets of CxCand sheds light on Q1 (whether constructions can clearly be identified) and Q2 (which quantitative measures are most useful for this purpose). These sets include well-studied examples of constructions from the literature (used for validation of the approach), sets based on a syntactic pattern (such as mono-transitive verb argument structure), and sets based on a lexical item (in particular various prepositions, in collaboration with project #9). The most challenging and open-ended aspect of the project explores the use of context-sensitive word and phrase embeddings (e.g. Devlin et al. 2019) to operationalise the semantics of a CxCand, following the distributional hypothesis (Harris 1954) and recent proposals for a distributional CxG (DisCxG: Rambelli et al. 2019). If successful, i.e., if there is a positive answer to Q3, not only the form of a construction but also its meaning can be studied based on corpus evidence.

Research questions Q1 and Q2 directly address GRQ **CON1** (How do we identify constructions? Can they be seen as discrete units?) and GRQ **CON2** (To what extent is constructional knowledge determined by collo-profiles? How can we measure the lexical specificity vs. productivity of constructions slots?). An important part of the constructicographic analysis is to delineate between a CxCand and related constructions, such as a generalisation of the CxCand or an overlapping combination of two constructions. In this way, the project also addresses GRQ **NET1** (How can computational methods help reveal the network character of constructional space?).

The project will contribute a substantial number of entries to the RCnn, combining constructicographic descriptions with rich quantitative evidence. A suitable representation format for these entries will be developed in close collaboration with the PDR. The CxCand database constitutes a valuable resource for other projects working on English or German constructions; an extension to other languages is envisaged for the second phase of the RTG.

## 2 Multimodal Constructional Space

While it is obvious that natural communication is essentially multimodal — much more than the transmission of words and sentences — many linguistic models focus on language in a very narrow sense while ignoring co-speech gesture, facial expressions and sometimes even prosodic features. The short video snippet behind the QR code (Uhrig 2020: 345; <http://go.redhenlab.org/zaa/14>) is an extreme example, illustrating just how much information can be lost if the auditory and visual channels are not taken into account.



Over the past few years, Construction Grammar has become the theoretical home of many researchers working on multimodal phenomena such as co-speech gesture, not least because many of the same mechanisms used for other cognitive tasks are assumed to be at work in language production and reception. Construction Grammar is ideally suited to accommodate phenomena that are beyond the scope of other linguistic theories that assume a strong role of language-specific mental capabilities.

Still, it is not immediately clear how to model the interaction of the various modalities in a constructionist framework. Suggestions focusing on slightly different aspects have been made by Cienki (2017), Schoonjans (2018), Hoffmann (2017), Herbst (2020c), Uhrig (2021) and various others, e.g. in the special issue of *Linguistics Vanguard* edited by Zima and Bergs (2017) and the special issue of *ZAA* edited by Uhrig (2020).

One of the major discussion points in the various approaches is whether and to what extent a multimodal Construction Grammar needs multimodal constructions (see also the 2021 SLE workshop *Constructional analysis in multimodal perspective* organized by Fried, Nikiforidou and Bergs). The proposed project will look at mechanisms of multimodal meaning-making in selected phenomena, including those where gesture and linguistic form (possibly including prosody) are strongly associated (as e.g. certain German modal particles [Schoonjans 2018] or “all the way from X to Y” [Zima 2014]), those where no such association can be found (e.g. so-called air quotes as shown in the video linked above) and phenomena in between, which Uhrig (2021) calls *crossmodal collostructions*. Extending the approach of collostructional analysis (Stefanowitsch & Gries 2003, Gries and Stefanowitsch 2004ab) to multimodality, a major focus of the project will be on such crossmodal collostructions, i.e. the varying associations between verbal, gestural and/or prosodic constructions and their semantic integration.

The major aim of the proposed project will thus be to arrive at a better understanding of the theoretical implications of multimodal communication for Construction Grammar, i.e. to evaluate existing approaches in the light of corpus data and to suggest ways of modelling multimodal phenomena in a Construction Grammar framework. The project is designed as a theoretical, corpus-based study in English Linguistics. Besides existing studies, the data will be taken from the massive NewsScape English Corpus, annotated with Red Hen Tools and analysed with existing software (CQPweb, ELAN, Praat, Red Hen Rapid Annotator; see Uhrig 2021). The required computing time of several thousand hours on CPU and GPU clusters is available at FAU.

Within the RTG, there are strong connections and synergies with the project *Delineating Constructions*, which is also central to research questions CON1 (identification of constructions) and CON2 (collo-profiles). In particular, the project is also closely linked to the research construction of the RTG with respect to the issue of whether (and how) the description of constructions in the construction should contain a level of multimodal information will be addressed. The question of multimodal meaning making touches directly on USE3 (combination of constructions into utterances).

## 3 Form and meaning as factors in the identification and learning of constructional slots – English phrasal verbs and verb-preposition combinations

While there is considerable evidence to support the claim that linguistic knowledge 'exists' in the mind in the form of constructions (as defined in CxG- and usage-based approaches) (Casenhiser & Goldberg 2005; Goldberg 2019; Dąbrowska & Lieven 2005), there is comparatively little research on how particular constructions are stored and processed in the brain. Cappelle, Shtyrov and Pulvermüller (2010) have argued on the basis of mismatch negativity that phrasal verbs (*look up*) are processed in the brain like single lexemes and expressed a warning "against a total abolition of a lexicon-syntax distinction" (Pulvermüller, Cappelle & Shtyrov 2013: 415). This project aims to follow up this issue, which is central to the design of a model of constructional space, by obtaining fMRI, MEG and EEG data to investigate whether phrasal verbs (as idiomatic combinations) are exceptional in this respect or whether similar effects can be found in other constructions containing lexical elements – e.g. argument structure constructions with prepositions (*decide on*) or clauses (*say that ..., aim to do*) and how these compare with constructions without such lexical elements such as the ditransitive construction (*X VERB Y Z*).

The results of this research will make a valuable contribution to GRQ1 in that they will provide evidence to resolve the issue of how to delimit particular constructions, slot-fillers of constructions and the nature of chunks with respect to purely lexical associations and chunks with more schematic slots. The analysis will comprise a number of behavioural experiments such as eye-tracking and neurolinguistic measurements. The first task of the project will consist in designing (a) a text that embeds a sufficiently large number of tokens of the types of constructions to be explored in a kind of natural narrative as well as (b) a set of isolated test sentences highlighting the same phenomena. Candidates for test items will be identified by means of cluster and frequency analyses of corpora of present-day English. In a second phase, eye-tracking and brain activity measurements will be carried out with ca. 50 native speakers of English in order to explore (i) whether the reactions to phrasal verbs in the test battery confirm the results of P/C/S 2013, and (ii) to what extent they differ from measurements for the other types of constructions identified.

By including running text into the research design, we deliberately go beyond previous research to ensure that subjects' performance will be studied in a more natural setting than is possible by isolated sentences. This part of the research will be based on methodology developed at FAU enabling multi-modal neuroimaging measurements during continuous speech perception (Schilling et al 2021) and multivariate cluster analysis of the resulting spatio-temporal neural activation patterns (Kriegeskorte, Mur, & Bandettini 2008; Krauss et al 2018; Schilling et al 2021).

#### **4 Representation and processing of constructions in the brain**

The main objective of this project is to study the representational and computational principles of construction storage and processing, and their structural and functional implementation in the brain.

Recent experimental findings in neuroscience provide converging evidence for the neural and psychological plausibility of network-like representations of hierarchical linguistic structures such as constructions (Herbst 2018a, 2020) on abstract cognitive maps. Cognitive maps are mental representations that serve an organism to acquire, code, store, recall, and decode information about the relative locations and features of objects (Tolman 1948, O'Keefe & Nadel 1978). Electrophysiological research in rodents suggests that the hippocampus (O'Keefe & Nadel 1978) and the entorhinal cortex (Moser, Moser & McNaughton 2017) are the neurological basis of cognitive maps. There, highly specialised neurons including place (O'Keefe & Dostrovsky 1971) and grid cells (Hafting et al. 2005) support map-like spatial codes, and thus enable spatial navigation (Moser, Kropff & Moser 2008). Furthermore, human fMRI studies during virtual navigation tasks have shown that the hippocampal and entorhinal spatial codes, together with areas in the frontal lobe, enable route planning during navigation (Spiers & Maguire 2006, Spiers & Gilbert 2015, Hartley et al. 2003, Balaguer et al. 2016) based on distance preserving representations (Morgan et al. 2011). Recent human fMRI studies even suggest that these

map-like representations extend beyond physical space to more abstract social and conceptual spaces (Epstein et al. 2017), thereby contributing broadly to other cognitive domains (Schiller et al. 2015), and thus enabling navigation and route planning in arbitrary abstract cognitive spaces (Bellmund et al. 2018). Besides contributing to spatial navigation, the hippocampus also plays a crucial role in episodic and declarative memory (Tulving & Markowitsch 1998) by receiving highly processed information via direct and indirect pathways from a large number of multi-modal areas of the cerebral cortex (Battaglia et al. 2011) including language related areas (Hickok & Poeppel 2004). Finally, some findings indicate that the hippocampus even contributes to the coding of narrative context (Milivojevic et al. 2016). These findings provide a novel theoretical framework of language representation and processing. There, hippocampal coding would enable flexible representational mapping of linguistic structures across a wide range of scales and hierarchical levels, from phonemes, single words and collocations (Evert 2008), through valency patterns (Herbst & Uhrig 2019, Herbst et al. 2004), to idioms and abstract argument structure constructions (Herbst 2018, Herbst & Uhrig 2019).

In particular, the project is to explore the hypothesis that linguistic constructions are represented as multi-scale network-like maps, and that constructions are combined in the process of formulating an utterance by navigating on these maps, i.e. a certain utterance would correspond to a certain route. Furthermore, overlap and blending (Herbst 2018b) of constructions are realized and guided as and correspond to switching between different levels of the multi-scale maps.

In contrast to the brain, computational models have the decisive advantage that they are fully accessible, i.e. the temporal evolution of all model variables can be read out for further analysis at any time. In addition, we can perform arbitrary experimental manipulations on these models. Therefore, starting from contemporary machine learning approaches for the representation and processing of natural language (e.g. Devlin et al. 2019), computational models will be constructed that can build and navigate on hierarchical map-like multi-scale representations of language, thereby being capable of representing natural language input, transforming these representations according to pre-defined tasks (e.g. re-phrasing), and producing modified natural language output. Using evolutionary optimization, the biological fidelity of the initially constructed models will be increased iteratively by applying the concepts of variation and selection. In order to select those candidate models that best fit to measured brain activity, internal model activity and brain activity will be compared using an advanced methodology comprising multivariate statistics (Kriegeskorte, Mur & Bandettini 2008, Krauss et al. 2018, Schilling et al. 2021) and Bayesian model selection (Mark et al. 2018). After each selection step, new “child models” will be created by adjusting their architectures and parameters using machine learning approaches such as neural architecture search (Elsken, Metzen & Hutter 2018, Wistuba, Rawat & Pedapati 2019, Liu et al. 2018, Zoph & Le 2016, Chen et al. 2019) and genetic algorithms (Gerum et al. 2020).

So far, neuroscientific studies of language have mostly employed over-simplified experimental paradigms, e.g. by focussing on single word processing or sentences in isolation. Very recently, the advantages of using natural, connected language such as narratives for neuroimaging studies have been discussed (Willems, Nastase & Milivojevic 2020, Jääskeläinen et al. 2020, Hamilton & Huth 2020, Hauk & Weiss 2020, Schilling et al. 2021). Therefore, multi-modal (fMRI, MEG, EEG, iEEG and ECoG) measurements during continuous speech perception (listening to audiobooks) will be performed, as described in detail in our preliminary work (Schilling et al. 2021).

Note: A strong background in coding and programming is essential for this project.

## **5 Representation and acquisition of agreement relations in a usage-based framework**

In most grammatical frameworks, agreement relations such as subject-verb and adjective-noun agreement are handled by using abstract features and a formal operation which copies or unifies them. Such an approach, however, is incompatible with Langacker’s (1987) content requirement, (which prohibits meaningless grammatical features), raises numerous learnability problems, as well as being problematic for empirical reasons (Kibrik 2019). Building on prior work in construction grammar and cognitive linguistics (Acuña-Fariña 2018, Kibrik 2019, Miorelli



& Dąbrowska under review), this project will provide a comprehensive inventory of agreement constructions in a particular language (to be agreed with the supervisors) and an explicit account of how these constructions can be learned from the input available to children which makes testable predictions about acquisition or processing, and test these predictions experimentally.

The first phase of the project will involve analysing spontaneous speech data from the CHILDES corpus in order to examine the suggestion made by Miorelli & Dąbrowska (under review) that children could, in principle, attain a high degree of accuracy on agreement in production without any knowledge of agreement features, by simply superimposing lexically specific chunks with partially overlapping semantic and phonological specifications. Consider, for example, the utterance *dove è andato il pomodoro?* 'where did the tomato go?' produced by a two-year-old Italian child. The utterance contains three agreement relations: between the subject noun and its determiner (*il~POMODORO*), between the subject and the auxiliary (*POMODORO~è*), and between the subject and the past participle (*POMODORO~andato*). In line with earlier studies of production using the so-called traceback method (Lieven et al. 2003, Dąbrowska and Lieven 2005, Dąbrowska 2014), such an utterance can be derived by superimposing the lexically specific unit *il pomodoro* 'the tomato' and the schema *dove è andato il NOUN-o?* 'where did the NOUN go?' (which could be derived by generalizing over similar utterances in the input, e.g. *dove è andato il ragazzo?* 'where did the boy go?', *dove è andato il libro?* 'where did the book go?', etc.). If this account is correct, knowledge about agreement is (at least initially) 'hidden' inside other constructions, which raises interesting theoretical questions about the nature of speakers' knowledge of agreement. This part of the project will address the GRQs **CON1** (How do we identify constructions – in this case, how do we know when/if a speaker has mastered a particular agreement construction, and how general is it?) and **USE3** (How are constructions combined in the process of formulating an utterance and what role do co-occurrence, overlap and blending play in this process? – cf. Dąbrowska and Lieven 2005, Herbst and Hoffman 2018).

In the second phase, specific hypotheses about the acquisition and processing of agreement relations will be tested using elicited imitation and grammaticality judgment tasks with sentences containing agreement violations. In particular, we will examine the suggestion made above that young children's knowledge of agreement is largely 'buried' inside chunks (i.e., it is not an independent construction), and a hypothesis derived from Acuña-Fariña's work, namely that young children's knowledge of agreement is to a large extent based on purely phonological patterns (*il ...o ...o*, as in *il ragazzo alto* 'the tall boy' and *la ...a ...a*, as in *la camicia bianca* 'the white shirt'). It is anticipated that, across development, speakers will be better at detecting or correcting errors when these occur inside fixed chunks (i.e., we anticipate better performance on *la camicia \*bianco* 'the white shirt' than on *la camicia \*grigio* 'the grey shirt') and when they involve phonologically regular patterns like those mentioned above (better performance on *la barca \*bianco* 'the white boat' than on *la nave \*bianco* 'the white ship'). This part of the project will address GRQ **ENT1** (How do frequency and salience influence entrenchment?). If time allows, we will also conduct ERP studies to examine the brain response to these types of agreement violations and thus address **ENT3** (To what extent do measures of neural activity during language processing coincide with the results of behavioural and corpus data and how does this expand our understanding of how constructions are stored and processed in speakers' brains?).

## 6 Representation and acquisition of idiomatic constructions in L1 and L2 learners

Although the study of idioms has played a crucial role in the development of Construction Grammar (e.g. Croft and Cruse 2004, Fillmore et al. 1988), there are still only a few studies comparing constructions with a relatively high degree of idiomaticity in different languages (e.g. Abel 2003, Apresjan 2014, see also Gries and Wulff (2005) for a more general study of constructions in foreign language learners). Idioms that are motivated semantically are common across different languages (e.g. Dobrovolskij and Piirainen 2010). These idioms can share the same underlying functional (semantic/pragmatic) properties and form such as *A wolf in a*

*sheep's clothing* in English, *Ein Wolf im Schafspelz* in German and *gorgī dar lebāse mish* in Persian. Or they can be motivated by similar symbolic or cultural concepts or coercion but have different forms as in *to take the bread out of someone's mouth* in English, *das ist ein hartes Brot* in German, and *nān-e kasi rā ājor kardan* 'make someone's bread a brick' in Persian. The major goals of this project are (i) to examine how and to what extent the processing of L2 idiomatic constructions is influenced by the existence of similar idiomatic constructions in the L1 and (ii) to determine which factors, e.g., age of learning, typological similarity or frequency and context of use, contribute to the entrenchment of L2 and L1 idiomatic constructions.

In the first phase of the project, a contrastive corpus analysis (e.g. Granger 2002) will be used to identify semantically similar idiomatic constructions and their frequencies in the three languages: English, German and Persian. By using phrase classification tasks (e.g. Swinney and Cutler 1979) and priming experiments (including sentence generation and completion tasks), similar to the ones, for example, described by Sprenger et al. (2006) and Yeganehjoo and Thai (2012), the receptive and productive knowledge of comparable idiomatic expressions in L1 and L2 learners of English, German and Persian will be tested in order to determine to what extent the processing of L2 idioms is facilitated by the existence of similar constructions entrenched in the L1 of an L2 learner. This part of the project will address GRQ **CON4** (To what extent can constructions (and their constituents) identified in one language be equated with superficially similar constructions in another language?) as well as **CON1** (How do we identify constructions?).

The results of the experiments obtained in the first phase will form the basis of the analyses carried out in the second phase, in which specific hypotheses about factors possibly influencing the entrenchment of L1 and L2 idiomatic constructions will be tested. In particular, by comparing the results obtained for different age groups of L1 and L2 learners, different L1 and L2 pairings of typologically more similar and more distinct languages, different types of idiomatic expressions (i.e., those that share the same functional properties and form across different languages vs. those that are motivated by similar symbolic or cultural concepts but have different forms) and idiomatic expressions differing in terms of their frequency and contexts of use, the possible effects of different factors that have generally been claimed to affect the processing and entrenchment of constructions will be examined with regard to the specific role they play in the processing of L1 and L2 idiomatic expressions (for the possible contribution of different factors to the processing and entrenchment of constructions and/or idiomatic expressions, see, e.g., Abel 2003, Apresjan 2014, Divjak and Cardwell-Harris 2015, Steinkrauss and Schmid 2016, Wasserscheidt 2014). This part of the project will address GRQ **ENT1** (How do factors such as frequency, salience, dispersion and age of acquisition influence entrenchment?). If time permits, we will also conduct ERP studies to examine the neural correlates of L1 and L2 idiomatic constructions in L1 and L2 speakers, which would allow us to address **ENT3** (To what extent do measures of neural activity during language processing coincide with the results of behavioural and corpus data and how does this expand our understanding of how constructions are stored and processed in speakers' brains?).

Naturally, insights gained in this project will also make a contribution towards applying Construction Grammar to foreign language teaching (De Knop and Gilquin 2016, Herbst 2017, Erfurt & De Knop 2019, see also special issue of ZAA edited by Piske, Herbst & Uhrig 2014).

## **7 Artificial language learning as a window to the early entrenchment of constructions**

Entrenchment is a crucial concept for CxG (for a review, see Hilpert & Diessel 2017). However, in addition to the fact that entrenchment itself can be difficult to measure, a frequent hurdle that researchers encounter, especially when second language learning is assessed, is that it is hard to quantify how much exposure learners have had to specific constructions and lexical items at the moment of testing. One way to address this issue is through the use of artificial language learning paradigms (Llompert & Reinisch 2020, 2021; Pili-Moss, Brill-Schuetz, Faretta-Stutenberg & Morgan-Short 2020), where one is prompted to learn a new, often simplified language from scratch. This ensures that prospective learners have not had any previous

exposure to the language and crucially allows for full control over the lexical and structural frequencies in the input, as well as the co-occurrence frequency across items. Because of that, the input in artificial language learning paradigms can be easily tailored to the research questions at hand.

This project will take advantage of the artificial language learning methodology with the aim of assessing the effects of co-occurrence frequency (Ambridge, Kidd, Rowland & Theakston 2015; Goldberg 2006; Speelman, Tummers & Gerraerts 2009) and phonological salience (Höder 2014; McDonough & Trofimovich 2017) on the early entrenchment of novel constructions. Co-occurrence frequency refers to how often particular lexical items co-occur in the slots of a given construction (Casenhiser & Goldberg 2005; Goldberg, Casenhiser & Sethuraman 2004). Phonological salience is defined for the purposes of this project as the phonological weight of relevant morphosyntactic markers as defined, for instance, through their length, stress patterns and/or syllable structures (e.g. /t/ vs. /ɪd/ as markers of English past tense).

The project will consist of a series of multi-session artificial language learning experiments in which participants will undergo training on the language to be learned by means of a combination of comprehension (e.g. visual four-alternative forced-choice task) and production tasks (e.g. sentence elicitation) where they will be provided with feedback on their performances at all times. Subsequently, their knowledge of the language will be tested through similar perception and production tasks without feedback plus grammaticality judgment tasks aimed at gauging participants' sensitivity to grammatical violations. Test materials will include both trained utterances and novel utterances to assess learning generalization. By carefully manipulating the training input in terms of co-occurrence frequency for construction slots and phonological salience of morphosyntactic markers across experiments, while keeping test materials constant, we will be able to quantify the impact that these factors have on the acquisition of the novel constructions. In addition, the fact that the experiments will be spread over multiple sessions will enable researchers to collect behavioural measures (e.g. accuracy, reaction times) and indexes of neural activity (ERP responses) at different stages in the learning process, allowing thus for a detailed characterization of construction entrenchment over time.

Therefore, this project will further our understanding of how frequency and salience influence entrenchment (ENT1) in a broad sense, while simultaneously providing key insights on the role that collo-profiles play in the learning, representation and productivity of constructions in particular (CON2, ENT2). Furthermore, the combination of behavioral and neural measures affords an excellent opportunity to assess to what extent the latter, often regarded as more sensitive and direct indicators language processing, coincide with the former, which have been more commonly examined in previous research (ENT 3).

## **8 German verbs with particles or prefixes in language change: Form, meaning, and syntax**

Word formation processes occupy a central position in constructional space in that they involve units which are small in size but nevertheless complex and because word formation processes are located between the lexical and syntactic poles of this space (cf. Felfe 2012, Michel 2014). However, studies on word formation in language change are rare. For this reason, we will address one key aspect of the diachronic emergence of verbs with particles and prefixes in this project. In the first phase, German verbs with *durch-*, *hinter-*, *über-*, *um-*, *unter-*, and *wider-* will be analysed with respect to their formal and semantic change from initially loose syntagms to stable word units. The change in the form-function pairs will be described alongside the variation and change of the syntactic constructions in which they are embedded. In accordance with Booij's view (2010: 3) that word formation patterns are "abstractions over sets of related words", and that complex words are based on constructional schemata, we are aiming to identify different levels of abstraction for the combinations analysed. In the second phase, we want to uncover the multi-faceted network of the continuum of schematicity in diachrony by tracing the processes of idiomatization resulting in non-transparent expressions. In the third phase, the conditions of the spread of word formation change phenomena in the language will

be analysed. Methodologically, this is an empirical research project based on the analysis of historical language corpora of German. In addition to historical word formation research, approaches of Construction Grammar and Relational Morphology (Jackendoff & Audring 2020), grammaticalization research and valency grammar are drawn upon.

The first phase of the project will involve analysing data from historical language corpora of German such as the following: Deutsch Diachron Digital (DDD) Altdeutsch, Mittelhochdeutsch, Frühneuhochdeutsch, Mittelhochdeutsche Begriffsdatenbank, GerManC, Deutsches Textarchiv (DTA) and DWDS. The analysis will include the description of all verbs with *durch-*, *hinter-*, *über-*, *um-*, *unter-*, and *wider-* to be found in these corpora. The development of the selected particles or prefixes will be studied phonologically and graphemically to determine grammaticalization processes (erosion, univerbization) diachronically. All of these verb combinations will be described (and annotated, wherever possible) morphologically (word formation base, separable particle or non-separable prefix, etc.) and syntactically (valency, semantic role, lexical filler of slots, syntactic collocations, topology). Subsequently, the individual verbs will be assigned to semantically defined schemas (e.g. 'local', 'aspectual') and subschemata defined by their specific word formation components and their syntactic environment. This part of the project will focus on the GRQ **CON1** (How do we identify constructions – in this case, to what extent do word formation schemata differ from lexical items, and what is construction change in word formation?; cf. Hilpert 2013, Jackendoff & Audring 2020).

The second phase of the project will deal with constraints on open slots in syntactic use and their semantic fixation on certain words: for example, in the construction *x geht um*, literally 'x walks around', the *x* slot was highly productive in MHG, whereas in NHG it is restricted to *ein Gespenst* 'a ghost', *eine Seuche* 'a plague', *eine Liste* 'a list' and a small number of related NPs. We will model the processes and degrees of idomaticity in meaning change in terms of a "continuum of schematicity" (Croft & Cruse 2004: 255). The data for different periods will be analysed synchronically before a diachronic analysis is attempted – cf. Habermann (in press). This part of the project will address the GRQs **CON2** (How can we operationalize the degree of lexical specificity vs. productivity of construction slots?).

A third aim of this research will ask to what extent some factors favour the spread of word formation constructions from individual use in particular situations, text types, or regions to more general use throughout society (as far as this can be seen historically). To find an answer to this question, the verbs of the text corpus will be described (and annotated) for frequency, with special attention paid to hapax legomena, taking into account factors such as individual usage (author), stylistic (text type) and regional context (see also Bybee 2015). (This latter aspect could be extended in a follow-up project in the second phase of the RTG.) This part of the project will address GRQs **ENT1** (How do frequency, salience and dispersion influence entrenchment?) and **USE4** (How do the factors communicative intentions, socioeconomic status, and dialect result in language change at the community level at different timescales?).

## 9 Functions and cognitive semantics of prepositions in complex constructions

Fundamental work in cognitive linguistics has highlighted the role of space and spatial expressions to the cognitive organization of language (Talmy 1983, 2008, Lakoff and Johnson 1980), which resulted in a very detailed interest in the semantics of prepositions and their organization in semantic networks already quite early on (see Sandra and Rice 1995 for an overview and a critique). This project will be concerned with an analysis of German prepositions and the central role they play in the expression of space, time, instrumentality, and modality both in concrete and more abstract uses such as the so-called governed prepositions (see e.g. Breindl 1989 for a detailed account of prepositional objects). Recent constructional treatments of German prepositions, such as the ones by Rostila (2014, 2015, 2018) and Zeschel (2019) will provide the theoretical starting point. German constructions with prepositions such as *mit* 'with', *unter* 'under', *zwischen* 'between' and *über* 'over', *um* 'round', *zu* 'to' form semantic nests of similarity, which express roles such as PARTNER or TOPIC in the communication frame (e.g. with

*diskutieren* 'discuss', *sprechen* 'speak', *Diskussion* 'discussion', *Debatte* 'debate') (compare the families of overlapping constructions with the preposition *into*, Herbst & Uhrig 2019). The aim of the project is to provide a corpus-based description of argument structure constructions with these prepositions and an illustration of the way they cluster, i.e. of overlap or links between the various constructions postulated, making use of semantic frames (e.g. German FrameNet) or image schemata. These descriptions, which will also consider aspects such as text types, cultural background etc., can then become entries of the general research constructicon, which is one common aim of the RTG. This part of the project addresses CON 1. (CON1: How do we identify constructions (what are their defining criteria; are they better seen as discrete units, prototypes, attractors in constructional space, or nodes in a network of cognitive associations?)) A contrastive analysis between selected German and English prepositions (in the spirit of Uhrig & Zeschel 2016) will be carried out to determine the extent of language-specific encodings (CON4: To what extent can constructions (and their constituents) identified in one language be equated with superficially similar constructions in another language?). This is directly related to the question of the degree of detail and item-specificity with which such prepositional constructions should be distinguished and stored in the mental constructicon and the reference constructicon (**CON2**: To what extent is constructional knowledge determined by the specific items occurring in them (collo-profiles) and how can we measure and operationalize the degree of lexical specificity vs. productivity of construction slots?), because if it turns out that uses across English and German are not predictable, a stronger role of storage will have to be assumed. More specifically, possible factors determining construction status will be investigated, including variables related to diachronic or regional variation, and weighted against factors such as individual differences (Dąbrowska 2012a, 2012b, 2015b) and socio-cultural conditions of the use of a construction (**USE1**: What factors influence speakers' choices from a range of competing constructions? ).

The project will make use of various methodological approaches, including hermeneutic analysis of meaning and semantic similarity supported by judgments tests. Most importantly, however, the project will build on the corpus-analytic procedures described by Schierholz (2006) and Zeschel (2015) for the monolingual research and Uhrig & Zeschel (2016) for the contrastive aspects.

## 10 Argument structure constructions with prepositions and phrasal verbs in Arabic and other Semitic languages

One of the key challenges of this project is to explore to what extent and in what form the Construction Grammar approach can be applied to a Semitic language. Indeed, it would seem that the concept of constructional space is apt to capture and formally analyze the form-meaning pairings entailed in the system of diatheses/*binyanim* expressing voice, intensity, reflexivity, interaction, and other qualities (cf., e.g., Retsö 1989) characteristic of Arabic and other Semitic languages, but, to the best of our knowledge, Construction Grammar has not been used in the analysis of Arabic so far. The main focus of the present project will lie on verbal constructions with prepositions and particles, and in particular on the interaction of prepositional constructions with verbs in the creation of meaningful units (which in turn may be stored holistically by speakers as low-level constructions) and on phrasal verbs in Arabic and Semitic in general.

Even a superficial look at an Arabic-European lexicon reveals various and seemingly contradicting meanings for the verb *daʕā* 'to call', namely 'to pray' and 'to curse'. A closer look shows that these meanings depend on the prepositions governed by the core verb, *li* 'for' and *ʕalā* 'upon, against', respectively. Diachronically, *daʕā li* means 'to invoke God on someone's behalf', and *daʕā ʕalā* 'to invoke God against someone', resulting in the contradictory semantics. Synchronically, however, speakers (usually) are not aware of this background. Rather, they use the combination of core verb and preposition as an exocentric construction. This type of exocentric constructions permeates the whole verbal system of Semitic and still awaits a systematic investigation. Certain prepositions in this context have undergone grammaticalization (cf., e.g., Rubín 2005). By and large, the same holds true for the meaning of

derived diatheses (*binyanim*) in Semitic and the relationship between intransitive, transitive, and ditransitive uses of one and the same verb in different constructions. While the meaning of derived diatheses is predictable in some cases, this is not the case in other cases, which, again, can be better captured in terms of exocentric constructions used morpho-syntactic building blocks. Experiencer constructions also play an important role in this context (cf., e.g., Retsö 1987 and Edzard 2016).

A related type of construction in Semitic is presented by phrasal verbs. There is a host of constructions in Arabic and Semitic, among them cognate object constructions which reflect the concept of “conflated complements” (e.g. Talmy 1985). What is more, there also exist constructions, notably in Ethio-Semitic, that typically consist of an invariable element (e.g. an ideophone, onomatopoeic element or noun, sometimes with an opaque meaning) and a grammaticalized (semantically bleached) verb with the original meaning ‘to say’ or ‘to do’. In Amharic, the relevant verbs are *ʔalä* ‘to say’ and *ʔadärrägä* ‘to do’. Examples include *k’uʔʔʔ ʔalä* ‘to sit’, *zimm ʔalä* ‘to be quiet’, *k’uʔʔʔ ʔadärrägä* ‘to put down’, and *täsfä ʔadärrägä* ‘to hope’. The semantics of *zimm ʔalä* ‘to be quiet’ (lit. “to say *zimm*”) perfectly illustrates the relevance of the concept of construction.

The project is to explore the hypothesis that a model that combines the level of rather abstract argument structure constructions (Goldberg 1995, 2006) with the valency properties of particular lexical units by regarding lexical items as an integral part of these constructions (Herbst 2018, 2020; Goldberg & Herbst 2021) would provide an adequate framework for describing valency phenomena in Semitic languages.

The combination of verbs and prepositions on the one hand, and the internal composition of phrasal verbs in Semitic on the other hand, often represent an exocentric scenario, i.e. the meaning of the whole verb phrase cannot be automatically deduced from the meaning of the constituents; in other words, such cases are constructions (in the sense of Langacker 1987, Goldberg 2019, and Hilpert 2020) *par excellence*. For Arabic and Semitic, this question has never been systematically analyzed. The clear delineation of the relevant exocentric constructions thus addresses GRQs **CON1** (How do we identify constructions?) and **CON2** (To what extent is constructional knowledge determined by the specific items occurring in them (collo-profiles) and how can we measure and operationalize the degree of lexical specificity vs. productivity of construction slots?). What is more the GRQs **USE1** (What factors influence speakers’ choices from a range of competing constructions?) and **USE2** (To what extent do the factors determining the choice of construction differ between speakers with respect to their individual backgrounds and personalities?) are of high relevance especially in the realms of dialectal variation, accommodation to other peoples and cultures, and multilingualism. Furthermore, the constructions analyzed can be included in the RTG’s research construction as examples of how the format for construction entries originally developed for English can be used for Semitic languages.

## 11 Constructions beyond the sentence: text-structuring in (esp.) sixteenth-century historiographical texts

This project aims to apply the constructionist approach to units larger than the sentence, as suggested by Hoffmann & Bergs (2018) (see also Hoffmann 2015 and Hoffmann & Bergs 2015), in particular in the analysis of sixteenth-century Italian historiographical texts such as Machiavelli’s *Istorie fiorentine* (1525) and F. Guicciardini’s *Storia d’Italia* (1561). The text-structuring devices employed in these texts have not received much attention in previous research, since analyses tend to rely on modern editions, in which these texts appear *typographically* subdivided into smaller units, i.e. into chapters and paragraphs. These subdivisions, however, had only been introduced in 19th century editions, while the original versions, i.e. the 16th century prints, were nearly completely devoid of such *typographic* text-structuring devices. Nevertheless, the analyses proposed so far (cf. e.g. Blumenthal 1980, Nencioni 1984, Dardano 2017: 282–371) give reason to assume very close relationships

between linguistic forms and text structuring functions, i.e. originally, text structuring (foreground vs. background; narration vs. comment; discourse-topic shift etc.; cf. Fesenmeier & Kersten 2018) seems to be expressed by certain recurrent lexicogrammatical patterns, which vary however considerably in size and complexity, for example sentence-initial *ma* 'but' without any adversative value, anaphoric *coniunctio relativa*-constructions, verb subject ordering, complex hypotactic structures with different types and degrees of subordination.

Traditionally, such lexicogrammatical patterns have been described as stylistic devices and often treated independently from one another. However, at least some of them seem to be related (e.g. *coniunctio relativa* + subordination + passive + present tense: [*Le quali cose*] [*mentre che*] ... [*si trattano*]); moreover, the relation between the "grammatical" elements (determiners, subordinating conjunctions) and the "lexical" elements (e.g. encapsulating noun phrases such as *cosa/cose* 'thing(s)' which function "as a resumptive paraphrase for a preceding portion of a text" (Conte 1996: 1)) of such patterns does not always seem to be grasped in a satisfying manner. Since one of the advantages of Construction Grammar as a theoretical framework is that the mechanisms developed to describe standard syntactic phenomena can be extended to higher levels of linguistic organization (cf. e.g. Östman 2005, Masini 2016: 75–78, Groom 2019, Hoffmann & Bergs 2018) and since previous work has clearly shown that linguistic conventions also exist at higher levels of linguistic organization, e.g. complexes of clauses revolving around the same discourse topic (cf. Nir & Berman 2010), it seems reasonable to assume the existence of constructions that function as schematic frames for the organization of discourse and whose details (grammatical structure, lexical elements etc.) can be described in a systematic way (CON1: How do we identify constructions – in particular: what are their defining criteria?).

Since Machiavelli's *Istorie fiorentine* and Guicciardini's *Storia d'Italia* present highly complex syntactic "architectures", it seems promising to analyse both texts in the analytical framework of CxG, in particular with recourse to the concept of "clause packages", i.e. "*text-embedded units* of one or more clauses connected by abstract linkage relations" (Nir & Berman 2010: 748, our italics). Following Berman & Nir-Sagiv (2009: 160), parameters of a more fine-grained analysis could be the number of clauses attached to a main clause, the different types of subordinate clauses, their ordering (in particular with respect to the main clause), and the overall structure (parataxis, hypotaxis etc.). As Machiavelli and Guicciardini strongly differ in their views on both history and historiography, it can be expected that such analyses reveal important differences in terms of clause packaging strategies, differences which in turn should reflect certain "epistemological" differences, just as "the epistemologies and phraseologies of academic disciplines" turned out to be "mutually constitutive" (Groom 2019: 315). The project will thus address GRQs **USE1** (What factors influence speakers' choices from a range of competing constructions?) and **USE2** (To what extent do the factors determining the choice of construction differ between speakers with respect to their individual backgrounds and personalities?).

In the first stage of the project, the focus will be "synchronic", i.e. it will involve an in-depth analysis of the two Italian 16<sup>th</sup> century texts (thereby applying the CxG framework to a "text-language" in the sense of Fleischman 1991: 252 n. 1, i.e. to a "dead language (*langue de corpus*), one for which all evidence derives from texts"). Nevertheless, it seems appropriate to also include a "diachronic" perspective by taking into account earlier/later historiographical texts in order to shed light on changes in clause packaging and organization of discourse (cf. the evidence given in Colussi 2014); this relates to GRQ **USE4** (How do the factors mentioned in USE1 and USE2 result in language change at the community level at different timescales?). Furthermore, since both the *Istorie fiorentine* and the *Storia d'Italia* were translated into French in the 16<sup>th</sup> century, a contrastive analysis could equally allow for relevant insights in the (construction?) status of previously identified lexicogrammatical patterns in the original texts, since 16<sup>th</sup> century French does not display the same syntactic devices that can be found in 16<sup>th</sup> century Italian; therefore one might expect different recurring lexicogrammatical patterns in the two languages.



## 12 Argument structure constructions in language contact: intransitive motion in Anglo-Norman

Constructionist perspectives have been applied to phenomena of language contact and multilingualism only recently (e.g. Hilpert & Östman 2016, Boas & Höder 2018). A central idea here is the multilingual constructicon (instead of assuming separate systems for each language) which comprises both language-specific and language-unspecific constructions, as put forward, for instance, in Höder's *Diasystematic Construction Grammar* (2018) in which contact-induced change is modelled as constructionalization, constructional change, and reorganization in the multilingual constructicon.

The contact language to be investigated here is Anglo-Norman, i.e., the variety of French used in Britain from after the Norman Conquest to the early 15th century. Anglo-Norman developed several characteristics in which it differed from continental varieties of medieval French. Many of these features can be seen as effects of contact with Middle English, as is clearly visible at the phonological level. Anglo-Norman syntax, by contrast, has been argued to remain largely unaffected by language contact until the mid 14th century (Ingham 2012). This has been shown to be the case mostly for abstract syntactic phenomena such as V2, null subjects, or the clitic vs strong form distinction in object pronouns (Ingham 2012, 2010). Argument structure constructions, however, being more 'meaningful', might be expected to be more likely to change towards being less language-specific, particularly in a setting where many verbs are used in both languages anyway, and hence language-unspecific (cf. e.g. Durkin 2014 for the large scale borrowing of French lexis into Middle English). According to Schauwecker (2017), for instance, Anglo-Norman develops a resultative construction with legal speech act verbs, copied from Middle English (à la *sentence someone to prison*).

One of the aspects in which medieval English and medieval French differ with regard to argument structure is the expression of intransitive motion (Huber 2017, Schauwecker & Trips 2018): Middle English often combines directional prepositional phrases and adverbs ("satellite-framing") with manner of motion verbs (e.g. *ride into the forest*) or even non-motion verbs (e.g. *toil into the forest*), whereas medieval French avoids such combinations. Initial research points towards an Anglicization of Anglo-Norman motion expressions: Huber (in press) shows that the non-motion verbs *travailler* 'toil' and *labourer* 'toil' are attested in motion uses in Anglo-Norman since the late 13<sup>th</sup> century and Schauwecker's analysis of four selected manner verbs finds them combined with directional complements (PPs with *à* and *sur*) more frequently in 12th to 14th century Anglo-Norman material than in continental French (Schauwecker 2019: 60–61) (cf. also Schøsler (2008: 207) who suspects directional adverbs to be more frequent in Anglo-Norman than in continental medieval French, and cf. more generally the work of the DFG-project BASICS (Stein & Trips, 2015–2021)).

The aim of the project proposed here is to investigate motion constructions in Anglo-Norman in more detail, to find out to which degree these are influenced by contact with Middle English, and whether contact influence is felt earlier on the level of argument-structure-constructions than in more abstract syntactic characteristics of Anglo-Norman. This will be done by analyzing motion expressions in the Anglo-Norman textbase (c. 3 million words, various genres), the Anglo-Norman Yearbooks Corpus (c. 1.5 million words, narrative and dialogical sequences from court hearings) and perhaps the PROME database (c. 8 million words, trilingual parliament rolls) and other, not yet digitized Anglo-Norman texts (editions by the Anglo-Norman Text Society). The project addresses the following GRQs:

- **NET3** In multilingual speakers, are the different languages represented in different networks or one multilingual network? In particular, are constructional changes towards the Middle English model predominantly found with verbs used in both languages (e.g. *gallop/galoper*, *hasten/haster*), and hence happening on the level of the verb, or are we dealing with changes on the more schematic level of the argument-structure-construction?
- **USE4**: How do the factors mentioned in USE1 and USE2 [here: multilingualism] result in language change at the community level at different timescales? Particularly [also related to



**USE3]:** if the intransitive motion construction in Anglo-Norman is undergoing change to become more like the Middle English one, does this happen “sneakily” (De Smet 2012), i.e. first in more inconspicuous contexts (coordination with other motion verbs, perfect construction (resultative), reflexive pronoun)?

### 13 Multifunctionality in Haitian Creole: New insights from a Construction Grammar perspective

Basic typological features of Creole languages include the so-called “multifunctionality” of linguistic items (Lefebvre/Lorange 2015:359). Multifunctionality is generally understood as “the capacity of a linguistic unit to fall within more than one linguistic class or category” (Véronique 2020:197–198, our translation). For example, Haitian Creole words such as *manje* or *malad* are invariable and can be used as predicates in *li manje* ‘(s)he has eaten’ or *mwen malad* ‘I’m sore’, but also as subjects or objects in *li achete manje li* ‘(s)he bought his/her food’, or *malad mwen an geri* ‘my sore has healed’. Likewise, personal deictic expressions such as *mwen* ‘1st sg’ or *li* ‘3rd sg’ can function as a subject, an object, or a possessive marker, and in the case of *yo* ‘3rd pl’ as a plural marker. These different uses can clearly be distinguished by distributional criteria, but are in each case related to the same semantic core, i.e. eating and soreness (*manje*, *malad*), grammatical person and number (*mwen*, *li*, *yo* etc.).

In previous research, Haitian Creole word forms that can occur in different syntactic slots have generally been analysed in terms of homonymy. For example, Valdman’s (2007) reference dictionary lists different numbered senses for each of the functions mentioned above, which are assigned to parts of speech such as verbs, nouns, adjectives, and prepositions. However, this treatment of multifunctional items may not only obscure an adequate description of Haitian Creole grammar, but also be an artefact of well-entrenched European grammaticographic traditions, which are not necessarily appropriate for describing languages with other typological features (Broschart 1997:124). Similar observations have been made for English concerning words such as *since*, *before* etc. (which are often assigned to the word classes of adverb, conjunction and preposition in dictionaries) or *both*, *this* etc. (classified as determiners, pronouns and adverbs) (see e.g. Huddleston & Pullum 2002, Herbst & Schüller 2008).

It would thus seem appropriate to develop a model for the word classes in Haitian Creole along the lines of Croft’s (2001) Radical Construction Grammar, in which word class categories are defined on the basis of their occurrence in constructional slots characterized by semantic roles and are seen as construction- and thus language-specific (Croft 2001:106; 2016:383). Word classes can then be regarded as generalizations over usage experiences (Vartiainen 2021:231). Previous studies on English adjectives (Croft 2016, Vartiainen 2021) have shown that the Construction Grammar approach complies only partially with the canonical understanding of parts of speech. What appears to be one word category can often be described as a cluster of constructions that show different frequencies and in which particular items participate to different degrees, so that membership seems to be a matter of degree rather than a categorical property. In addition, the number of word classes to be distinguished varies according to the level of abstraction chosen for the description. Thus, the concept of “word class”, from which “multifunctionality” is implicitly derived, raises a number of questions that are directly relevant to the organization of the construction (see also the discussion in Croft 2001:107ff). This makes Haitian Creole a particularly promising candidate to explore the nature of constructions and constructional networks.

Against this backdrop, the aim of this project is to identify, systematise and analyse families of constructions in which a selection of Haitian Creole items can occur, and in which they cannot. In order to do this, we rely on a corpus-based approach (cf. also Fitzgerald 2020), using the Corpus of Northern Haitian Creole (Indiana University, Bloomington, ca. 200,000 tokens). A list of “multifunctional” items will be extracted from Valdman’s (2007) dictionary (i.e. items with senses assigned to different word classes). These items will be searched in the corpus based on their surface form (to ensure high recall) and those with at least 50 occurrences will be retained for further analysis. Addressing the GRQs **CON1** and **CON2**, the examples will be

analysed and divided into categories, based on common distributional and semantic properties. Items that can be used in similar sets of constructions will be grouped together. On this basis, the following issues relevant to **NET2** will be discussed: What are the candidates for constructions that define word classes in Haitian Creole? At which level of abstraction can they be described? How do they relate to each other in terms of polysemy, subpart, metaphorical extension or instance? Can membership be determined in absolute or gradual terms? With how many word-class defining constructions do so-called multifunctional items occur, so that they should be called multifunctional? If this is the case: Can these word class-defining constructions be brought together at a higher level of abstraction? Is the concept of multifunctionality as applied to Haitian and other Creole languages empirically justified under a Construction Grammar framework?

## THE POSTDOCTORAL RESEARCHER

The PDR will bear the primary responsibility for development of the formal and technical framework of the research constructicon. In addition, the researcher will have the opportunity to build up a track record of independent research with a clear focus on a highly innovative topic and with a substantial number of co-authored and single-authored publications, and, if s/he wishes, to complete a cumulative Habilitation (German post-doctoral degree).

### PDR: Research constructicon

The RCnn is an innovative approach to linguistic research documentation. It will thus require solutions to the following research problems to be developed and implemented by the PDR over the course of the RTG:

**(1)** One key challenge addressed by the PDR is to develop a rich, descriptively adequate and extensible format for such entries and for the links between them as well as a user-friendly access structure on the basis of previous lexicographic and constructicographic work at FAU (Schierholz 2001, 2006, 2013, Herbst et al. 2004, Herbst & Uhrig 2009, 2019) combined with experience from efforts at construction building already under way for various languages, such as those collected in a recent volume on *Constructicography* (Lyngfelt et al. 2018). The PDR will integrate recently proposed extensions to CxG representations, e.g. the inclusion of collo-profiles for open slots of a construction (ColloCxG; Herbst 2018, Herbst & Uhrig 2019) and the use of distributional vectors as (part of) a semantic representation (DisCxG; Rambelli et al. 2019). S/he will continue to develop the representation format throughout the duration of the RTG based on the requirements and insights of the individual projects, working closely with the doctoral researchers and PIs.

**(2)** While the RCnn itself cannot aim to be a general reference constructicon, it will provide a structural template for the future development of such constructions for different languages (and possibly even a multilingual constructicon), which will present all the information traditionally contained in dictionaries and grammars on the basis of an integrative theoretical framework, i.e. CxG, and lay the foundations for a completely new type of reference work (Boas and Ziem 2018, Herbst 2016, 2019, Lyngfelt et al. 2018, Ziem, Flick and Sandkühler 2019; see also thematic part of *Lexicographica* 2019). In this spirit, it will be linked from the outset with an ongoing English constructicon project at FAU and the Catholic University of Eichstätt-Ingolstadt – the CASA English constructicon (Herbst, Hoffmann & Uhrig in progress; see [www.constructicon.de](http://www.constructicon.de)). Beyond that, and very importantly, researchers from outside the RTG will be more than welcome to contribute as well, and will be supported by the PDR in technical and conceptual matters.

**(3)** The construction entries in the RCnn will be linked into a network within each language (by different forms of hierarchical and contiguity relations, such as generalisation/specialisation, shared lexical or structural elements, similar collo-profiles, or co-occurrence of the constructions) as well as across different languages (e.g. by equivalence/similarity with respect

to structure and/or semantic or pragmatic function). Since constructions per se are seen as language-specific, a key challenge to be explored here is to what extent and in what kind of framework the constructions identified for the different languages can actually be compared (Croft 2016, Haspelmath 2010; CON4), and cross-language links will generally need to be identified as “fuzzy” correspondences in the formalized representation.

**(4)** For the purposes of research documentation, each construction entry in the RCnn will be connected to relevant research findings (in publications and internal reports) and to its instantiations in data sets (corpora, behavioural experiments, etc.) created by the RTG. Such connections will be made at the finest level of granularity possible, e.g. linking to the specific occurrences of a construction rather than an entire corpus or text, or linking to the particular experimental items realising the construction rather than an entire data set. The PDR will work closely with all doctoral researchers in order to make sure that both research documentation and data sets are suitably encoded as linked data so that precise references can be made, drawing on our expertise on data structures and standards for language resources (Evert & Hardie 2015; Evert et al. 2020).

The RCnn will also play an important role in the dissemination and data sharing strategy of the RTG. It will be made publicly available online via a user-friendly Web interface, connecting all research publications, technical reports and data made available to other researchers by the RTG.

## **SELECTION CRITERIA**

For the PhD candidates

- MA in linguistics or a related discipline (or, for project 4, MSc in computer science, neuroimaging, physics or biology);
- previous academic experience relevant to the project;
- ability to work independently and as part of a team;
- fluency in English.

For the PDR

- a PhD in computational linguistics, knowledge representation, digital humanities, linguistics or a related discipline;
- demonstrated capacity for independent research;
- fluency in English;
- computer programming experience;
- preferably good knowledge of CxG.

We particularly encourage applications from women and minority candidates.

## **APPLICATION PROCEDURE**

Informal enquiries and applications for the positions should be submitted by email to [project-cxgram@fau.de](mailto:project-cxgram@fau.de). The subject line should have the following format:

If you are applying for a PhD project : Application PhD project XX (alternatively, project YY and ZZ) – please insert project number as appropriate.

If you are applying for the postdoctoral position: Application PDR.

Applications should be in English and should contain the following:

- an academic CV;
- a cover letter explaining how you meet the recruitment criteria, which project you are applying for, why you are interested in this particular project, and where appropriate, up to two additional projects that you would like to be considered for; and

- an academic writing sample in English (e.g. MA dissertation, essay, or a review of the literature relevant to the project);
- details (name, affiliation, email, and relationship to you) of 2-3 academic referees.

The most promising candidates will be invited to take part in the next stage of the selection process, which will involve (1) giving a presentation about their previous work and (2) a formal interview.

### **IMPORTANT DATES**

Deadline for applications: 10 July 2022

Interviews: between 1 and 11 August (via Zoom)

Follow-up interviews: 12 August pm

Project begins: 1 October 2022

### **NATIONAL AND INTERNATIONAL PARTNERS**

The RTG and the young researchers will be embedded in a world-wide community of scholars who share an interest in constructionist and usage-based approaches and a commitment to rigorous empirical research. The project team already has well-established academic links and ongoing collaborations with many universities, including Austin (H. Boas), Birmingham (D. Divjak), Case Western Reserve University (M. Turner), Eichstätt-Ingolstadt (T. Hoffmann), Université d'État d'Haïti (R. Govain), Lancaster (T. McEnery), Louvain-la-Neuve (G. Gilquin), Milan (F. Mollica), Murcia (P. Cantos Gómez), Pisa (A. Lenci), Princeton (A. Goldberg), Zhejiang University (E. Pascual) as well as the German Constructicon project related to FrameNet (A. Ziem, Düsseldorf). They provide an excellent environment for international placements, ensuring a smooth continuation of supervision during this time. All doctoral researchers will have an opportunity to meet with these internationally renowned experts (e.g. during research visits at FAU), obtain feedback on their research, and start building up their own academic network.

### **INFRASTRUCTURE**

The FAU Linguistics Lab provides all necessary equipment for experimental studies, including a portable eye tracker, two portable ERP headsets, and a testing suite with laptops and response boxes. Further equipment (EEG, MEG, fMRI, ECoG) can be accessed via a collaboration with the University Hospital.

The Linguistics Lab also has high-grade servers and more than 100 TB of storage space for corpus analysis, as well as a rich software infrastructure and large collection of corpus resources. For big data approaches, the Tier3 high-performance computing (HPC) cluster of the local computing centre (RRZE) can be used.

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