Chapter 11

Conclusions and Implications

11.1 Introduction
In this thesis I have investigated the question whether the limits on variation in adult languages of the world are identical to the limits on variation in stages of first language acquisition. The studies of typological variation and language acquisition are in general separate disciplines in linguistics. However, as discussed in Chapter 1, there are probably important relations between the two fields. Acquisitional processes could be constraining factors on the possible variation in adult language systems. The field of typology might thus benefit from insights from psycholinguistics. On the other hand, the study on typology might provide helpful insights to psycholinguistics. Linguistic universals presumably also hold for stages of language acquisition. Phenomena in child language should, therefore, not be studied in isolation, but be compared to adult systems and to the systems in the input to children.

Powerful tools to describe linguistic variation in the discipline of typological variation are implicational hierarchies or markedness scales. These hierarchies define the possible configurations and occurrence of linguistic properties, the diachronic development, and relations to morphosyntax. One of the main issues in this thesis was whether implicational hierarchies also have predictive power with respect to first language acquisition. On the basis of an implicational hierarchy, the possible variation in grammatical TMA systems in adult languages and in stages of child language were studied in order to determine whether the limits on variation are identical. In 11.2 the main findings of this thesis are summarized. In 11.3 the implications for future research will be discussed.

11.2 Summary and Conclusions
Part I of this thesis dealt with theoretical issues of TMA. In Chapter 2 the approach to TMA in the theory of FG was explicated. In FG grammatical TMA expressions are described as operators that modify a semantic unit. The part that they modify, that they have in their scope, may be the predicate, the
predication or the proposition. The communicative functions of operators correlates with their scope. \(\pi_1\)-Operators, having scope over the predicate, modify the property or relation designated by the predicate. They help to build up a proper description of the event. \(\pi_2\)-Operators, having scope over the predication, modify the event designated by the predication. They situate the entire event in time or actuality, or indicate the frequency of occurrence; they specify the link to the real of imaginary world. \(\pi_3\)-Operators, having scope over the proposition, evaluate the propositional content. They express the speaker's attitude or commitment with respect to the propositional content designated by the proposition. There are hierarchical relations between the operators: \(\pi_1\)-operators fall within the scope of \(\pi_2\)-operators and \(\pi_2\)-operators fall within the scope of \(\pi_3\)-operators. Each operator with wider scope modifies a semantic unit that is more complex and that denotes a more abstract entity: it is therefore cognitively more complex. Furthermore, the function of each operator with narrower scope seems to be communicatively more relevant or basic: the modifications of each operator with narrower scope are less predictable or inferable from context. This leads to the positioning of operators on a markedness scale, the Scope Hierarchy: \(\pi_1\)-operators \(\subset\ \pi_2\)-operators \(\subset\ \pi_3\)-operators, in which \(\subset\) stands for 'is less marked than'. The general hypothesis that has been tested in this thesis is that the Scope Hierarchy is reflected in both adult and child languages.

In Chapters 3 and 4, the crosslinguistically most common TMA categories are semantically defined and classified according to their scope. In Chapter 3 the domains of aspect, tense and quantification were considered. A crucial distinction between the domains of aspect and tense turned out to be their scope. Aspect selects part of the temporal structure of the property or relation, and only this part is ascribed to the argument(s). Aspect expressions, therefore, have scope over the predicate only and function as \(\pi_1\)-operators. Tense locates the relevant part of the event in time with respect to a referential point. Tense expressions have scope over the complete predication and function as \(\pi_2\)-operators. With respect to quantification, a distinction was made between expressions of property quantification (\(\pi_1\)) that indicate the frequency or intensity of the property or relation designated by the predicate and expressions of event quantification (\(\pi_2\)) that quantify the entire event.

In Chapter 4 the domain of modality and related areas were discussed. Modality was classified on the basis of the three parameters sense, scope, and source. It was shown that these parameters could account for the fine distinctions within the domain of modality. For this thesis, the parameter of scope was most important: modal expressions can have narrow scope, medial scope or wide scope, referred to as participant-oriented modality (\(\pi_1\)), event-oriented modality (\(\pi_2\)), and proposition-oriented modality (\(\pi_3\)), respectively.
The domains of irrealis and evidentiality were also discussed: irrealis expressions function as $\pi_2$-operators and evidential expressions as $\pi_3$-operators.

In Chapter 5 the general hypothesis that the Scope Hierarchy is linguistically reflected in adult and child language was split up in specific hypotheses with respect to diachrony, frequency, synchronic configurations, expression form, expression order and acquisition order of TMA expressions. Grammaticalization processes were considered an important factor in formulating the expected limits on variation in adult TMA systems. Since the general direction of grammaticalization is towards generality, abstractness and interpersonal meaning and since operators with wider scope have more general, abstract and interpersonal meanings than operators with narrower scope, it was hypothesized in 5.4.1 that the diachronic development of linguistic elements will show an increase in scope (H1). With respect to the frequency of operators, two factors were considered of importance (see 5.4.2). Firstly, it was assumed that operators with narrower scope are communicatively more motivated than operators with wider scope. They should, therefore, be more frequent, across and within languages and classes of narrower scope operators should be larger than classes of wider scope operators. Secondly, diachronic competition leads to the disappearance of operators further down the grammaticalization path (having wider scope, see H1). This also led to the expectation that the frequency of operators should decrease if scope increases: this should hold for the token frequency within a language, the number of operators in a specific class, and the cross-linguistic incidence of different operators (H2a-c). In 5.4.3, it was hypothesized that the Scope Hierarchy is reflected in the possible synchronic configurations of operators. The presence of less marked operators in a language is expected to be implied by the presence of more marked operators. This means that there are only four possible TMA systems; languages without operators, languages with only $\pi_1$-operators, languages with $\pi_1$- and $\pi_2$-operators and languages with $\pi_1$, $\pi_2$ and $\pi_3$-operators (H3a). It was also predicted that polysemous expressions and portmanteau expressions could only have multiple semantic functions that are related conceptually and that have the same or adjacent scope (H3b). As for the expression form of operators, scope was expected to correlate with the degree of formal grammaticalization. Operators with wider scope should have a higher degree of formal grammaticalization than operators with narrower scope (H4, 5.4.4). Finally, the expression order of operators was expected to iconically reflect the hierarchical relations between operators: operators with narrower scope should be expressed closer to the predicate than operators with wider scope (H5, 5.4.5).
As the general assumption in this thesis was that the limits on variation in linguistic systems do not only hold for adult languages, but also for each stage of first language acquisition, it was expected that the Scope Hierarchy also describes the acquisition order of operators (5.4.6). Only if children acquire the operators in the order of the Scope Hierarchy, from least ($\pi_1$) to most ($\pi_3$) marked operators (H6), then their TMA systems are at each stage in accordance with the possible synchronic configurations (cf. H3a). This acquisition order was also independently motivated: if the assumptions are correct that children acquire concrete functions before abstract functions, less complex functions before more complex functions and communicatively more relevant functions before communicatively less relevant functions, then this also leads to the prediction that children first begin to use $\pi_1$-operators, then $\pi_2$-operators and finally $\pi_3$-operators. Finally, it was hypothesized that polysemous items in child language, like in adult language, can only have meanings with similar or adjacent scope (H7, cf. H3b).

The hypotheses were first tested in grammatical TMA systems in adult languages (Part II). Chapter 6 concentrated on TMA expressions in one specific language, English. First, the TMA system of English was described in detail, based on corpus research. On the basis of this inventory H1 to H5 were tested. It appeared that the Scope Hierarchy makes correct predictions for the diachronic development of grammatical TMA expressions in English (H1), the synchronic configuration (H3a), the polysemous expressions (H3b), and the expression order (H5). The token frequency of $\pi_2$-operators in adult conversations (H2a), however, appeared to be much higher than of $\pi_1$-operators, whereas the opposite was expected. The high frequency of $\pi_2$-operators appeared to be caused by the extremely large proportion of tense expressions ($\pi_2$), resulting from the obligatory encoding of tense in English. When only non-obligatory expressions were compared, within the domain of modality, the token-frequency of $\pi_1$-operators appeared to be higher than of $\pi_2$-operators and the token-frequency of $\pi_3$-operators was lowest, which is in accordance with H2a. These facts led to the conclusion that scope in fact influences the token-frequency of TMA expressions, but that obliqutoriness of expression more strongly determines token-frequency. Finally, the expression form of operators (H4) appeared to be related to scope only indirectly: scope correlates to a certain extent with age of expressions and age correlates strongly with the degree of formal grammaticalization.

In Chapter 7 adult TMA systems were examined from a crosslinguistic perspective. H1 was tested in the literature: the universal semantic paths strongly supported the expectation that grammatical TMA expressions show an increase in scope in diachronic development. No counterexamples were attested. H2 to H5 were tested in a sample of 76 languages (the GRAMCATS...
CONCLUSIONS AND IMPLICATIONS

The Scope Hierarchy appeared to make correct predictions for the frequency of operators (H2b-2c) in that \( \pi_3 \)-operators are far less frequent crosslinguistically than \( \pi_1 \)- and \( \pi_2 \)-operators and the size of the class of \( \pi_3 \)-operators is smaller than of \( \pi_1 \)- and \( \pi_2 \)-operators. However, the crosslinguistic frequency of \( \pi_1 \)- and \( \pi_2 \)-operators is about equal, as well as the size of these operator classes, whereas it was expected that \( \pi_1 \)-operators would be more frequent than \( \pi_2 \)-operators. These results suggest that \( \pi_1 \)- and \( \pi_2 \)-operators do not differ greatly in their cognitive complexity and/or their communicative relevance. The next hypotheses, H3a and H3b, were strongly supported by the languages in the sample. All languages showed one of the predicted configurations of operators. Furthermore, the different functions of polysemous expressions and portmanteau expressions had similar or adjacent scope for the vast majority (H3b). The only exception was an expression that could encode perfect aspect (\( \pi_1 \)) and evidentiality (\( \pi_3 \)). With respect to the expression form of operators (H4), the Scope Hierarchy seemed to be irrelevant. There was no clear relation between the degree of formal grammaticalization and scope, which confirmed the findings on English in Chapter 6. Rather, there appeared to be relations between semantic function, formal grammaticalization and morphological type of language. Finally, scope seemed to play a role in the expression order of operators (H5), in that there were many languages in which operators with narrower scope are expressed closer to the predicate than operators with wider scope. However, iconicity cannot by itself account for the syntactic phenomena.

In Part III the focus was on first language acquisition. Chapter 8 dealt with the acquisition of grammatical TMA expressions in English. The longitudinal spontaneous speech of eight children was examined with regard to the spontaneous production of TMA expressions. Using precise productivity criteria—relative frequency of operators compared to the adult stage and the input, variation in use, and contrastive use—the acquisition order was established. Although there were large distinctions in speed of acquisition, the qualitative development was very similar in all children. Most children appeared to start with \( \pi_1 \)-operators, but one child began with \( \pi_1 \)- and \( \pi_2 \)-operators simultaneously. This child seemed to have a holistic learning style. All children showed a higher rate of acquisition of different \( \pi_1 \)-operators, compared to other operators. \( \pi_3 \)-Operators were clearly acquired last. H6 was thus supported by the data. H7 could only be tested for one child: his data supported the hypothesis.

In Chapter 9 the question was examined with what meanings children use their TMA expressions in English. The hypothesis was tested that children’s early tense and aspect expressions encode situation type, such as claimed by the Aspect Before Tense Hypothesis and the Prototype Account. The study...
focused on inflectional tense and aspect expressions (Progressive, Simple present and Simple past) and their co-occurrence with situation types (states, activities, telic events). The distributions of possible combinations were compared to the distribution in the input and in the adult stage of English. It appeared that children do not show a stronger correlation between Progressive and activities than adults, but that they do show a stronger correlation between Simple present and states and between Simple past and telic situations. The correlation is, however, never absolute, so that there is no reason to assume that children use their tense and aspect forms to encode situation type. An alternative hypothesis was formulated: the Discourse Topic Hypothesis. There are strong relations between the use of certain forms and the general discourse topic. It appeared that the differences in distribution could be accounted for by the predominance of the discourse topic of the here-and-now in child language compared to adult and input language.

Finally, Chapter 10 examined the acquisition of TMA from a crosslinguistic perspective. For 24 languages from 13 language families reports have been found in the literature on the acquisition of TMA. Although the acquisition order of language specific categories was different across languages, a comparison of the use of these categories revealed remarkable crosslinguistic similarities. Children speaking very different languages appeared to start with linguistically encoding a distinction between events that have just ended and events that are ongoing, followed a bit later by the contrast with events that are about to happen (intentional events). These distinctions were interpreted as aspectual distinctions, rather than temporal distinctions: in the children’s utterances, the topic time, the interval to which the speaker’s claim is confined, is predominantly in the here-and-now. Children seem to encode which phase of an event is relevant at topic time. It was argued that encoding of tense occurs only when topic time is variable: however, in the early stages, it are the parents and not the children who initiate conversations in which the topic time is outside the here-and-now. Children thus encode aspectual distinctions productively and spontaneously before they encode temporal distinctions. The forms that are used to encode these distinctions are dependent on the language. The events just ended are encoded by a “perfective” form: (immediate) past tense, perfective, perfect or resultative forms. The ongoing events are encoded by an “imperfective” form: present tense, imperfective or progressive. Finally, the events about to happen are encoded by an “intuitive” form: prospective, (immediate) future, or participant-oriented modality. This development supported the hypothesis that children start out with $\pi_1$-operators, under the condition that TMA expressions are analyzed according to the function they fulfill in the child’s system. Children start out with linguistically encoding aspectual distinctions ($\pi_1$) and participant-oriented modality ($\pi_1$). Later, they
acquire the encoding of tense ($\pi_2$). After about 3;0, other $\pi_2$-operators are acquired: event-oriented modality, event quantification and irrealis. The last categories to be acquired, after about 3;6 or 4;0, are proposition-oriented modality and evidentiality ($\pi_3$).

Overall, the approach taken to TMA appeared to be fruitful. The analysis of the utterance in different layers is related to cognitive complexity and to communicative relevance. As a result, operators can be positioned on a markedness scale, the Scope Hierarchy. This scale appeared to account for various linguistic phenomena in adult and in child language. Although scope could not explain expression form, it could partly account for frequency and expression order and the Scope Hierarchy made correct predictions on diachronic development, synchronic configurations and acquisition order. It appeared that there are probably no languages and no stages in child language that have a configuration of operators different from the predicted configurations. A general conclusion is thus that the limits on variation in adult languages and in stages of first language acquisition are in fact identical within the domain of TMA.

11.3 IMPLICATIONS FOR FUTURE RESEARCH

This research led to some important findings that have implications for future research. Firstly, the model of FG provided a rather abstract level of analysis of TMA expressions, with respect to their scope. Scope unites TMA categories that are in other studies considered unrelated, such as event-oriented modality and tense which both function as $\pi_2$-operators or participant-oriented modality and aspect that both function as $\pi_1$-operators. This approach revealed tendencies that could have been missed if the analysis had taken place at the level of specific semantic functions. The FG approach also has implications for the definition of different TMA domains. On the basis of scope a distinction should be made between property and event quantification and between different types of modality: participant-oriented modality, event-oriented modality and proposition-oriented modality. These distinctions should be recognized in further research.

Notwithstanding the success of the FG approach, the analysis at the level of scope also appeared to oversimplify matters at some points: with respect to the diachronic development of specific elements and the acquisition of operators, finer semantic distinctions appeared to be necessary to describe the precise developmental steps. Furthermore, certain semantic functions appeared to be overrepresented within a class of operators, such as tense within the class of $\pi_2$-operators. As a consequence, these functions disproportionally determine the characteristics of the specific operator class. In future research on TMA, the
parameter of scope should therefore be included as one of the possible variables but the analysis should also take place at the more detailed level of specific TMA categories.

Second, this thesis provided some proposals for the definition and classification of different TMA domains. I adapted the definition of tense, using the notion of topic time of Klein (1994). However, contrary to Klein, I assume that topic time is not systematically located in time by tense expressions but inferred by pragmatic knowledge. Tense expressions, then, indicate the temporal location of the event with respect to a temporal reference point, in general, the moment of speaking. Furthermore, I attempted to describe the complex domain of modality. I showed that at least the three parameters sense, source and scope are needed to account for subcategories within the domain. This approach led to a preliminary sketch of a conceptual space for modality, reflecting the relations between different meanings. Further investigation is needed to find out whether this conceptual space can account for crosslinguistic variation.

Third, this thesis revealed new insights in possible variation in TMA systems. It appeared that all adult languages have grammatical TMA expressions; in child language, the first encodings of TMA arise very early (around 2;0) and most Creole languages also seem to have at least some grammatical TMA marking. Apparently, grammatical TMA expressions are very widespread crosslinguistically. Why TMA is such an important domain to be expressed grammatically in language is an important question for further research. Further, the possible configurations of TMA expressions within a language appeared to be limited: languages and stages of first language acquisition only have TMA expressions with wider scope if they also have TMA expressions with narrower scope. In this thesis it was assumed that cognitive complexity and communicative relevance account for the fact that operators with narrower scope outnumber operators with wider scope. This relation between operator types and specific TMA categories on the one hand and communicative relevance and cognitive complexity on the other hand should, however, be examined in more detail. If possible, neurolinguistic evidence should be found for the assumed relation between scope and cognitive complexity. The communicative relevance of different operators also needs to be elaborated further and might be linked to discourse topics.

Fourth, there appeared to be a relation between morphological type of language, expression forms, and TMA categories that are present in a language. This seems to be an important area for further investigation. If the presence of certain categories is strongly dependent on language type, this would have important consequences for the understanding of grammaticalization processes and the general typology of languages. It might become possible to predict
what meanings are most probable to grammaticalize within a specific language. It would also imply that languages cannot only be distinguished on the basis of their formal characteristics, but also on the basis of semantic characteristics. Which semantic functions are prominent? A proposal in this direction has been presented in Bhat (1999).

Fifth, because of the broad range of data that are taken into account in this thesis it was possible to establish universal relations between different TMA categories. Developmental steps in diachrony and language acquisition and functions of polysemous items show again and again that the following relations are very strong crosslinguistically:

i) resultative, perfect, perfective and (recent) past tense;
ii) progressive, imperfective, and present tense, and continuative. These categories are also related to iterative, habitual and frequentative;
iii) participant-oriented modality, prospective, intention, immediate future and future;
iv) irrealis, future and epistemic modality;
v) participant-oriented modality, event-oriented modality, proposition-oriented modality.

Language users create new meanings by pragmatic inference: the possible implicatures of certain meanings seem to be universal. The explanation for the relatedness of meanings must lie in universal conceptual relatedness. Scope is an important parameter in understanding pragmatic implicatures of specific semantic functions and in understanding ambiguous and polysemous interpretations of one form. The implicatures of a linguistic construction often concern wider scope interpretations. Metaphorical extension can be understood as interpreting the basic sense of an expression as applying to a larger part of the utterance.

Although there are similar developments in diachrony and in language acquisition, this should not be explained by a general principle that ontogeny repeats phylogeny. The correspondence arises because minds make similar inferences about semantics: relations between meanings are universal. Similar inferences can occur in diachrony and in language acquisition, because similar human beings deal with language. However, the underlying process is not identical. In historical development, grammaticalization in general starts with lexical items that become more general in meaning and are used more frequently. This is a process that runs over generations and across individuals: it is a change in the conventionalized meaning of a linguistic item within a group that correlates with an increase in scope.
For children, operators that have narrow scope are apparently easier to grasp, as they are more frequent in the input and probably more related to the discourse topic of the here-and-now. Therefore items that can be interpreted with different scopes will in general, but not necessarily, be acquired first in their most narrow scope interpretation. This is simply the meaning children are most familiar with. When in the input these items get used with wider scope interpretations, children will find out what is the implicature and what is the basic meaning. It looks as if history repeats itself, but the underlying developmental process is very different. This is evident, for example, from the fact that children do not necessarily start with the most narrow scope function of polysemous items. If the function with wider scope is more frequent in the input, this is the first function that is acquired. This is, for example, the case in English, where future will (\(\pi_2\)) is much more frequent in the input than volition will (\(\pi_1\)), and, accordingly, children acquire the future (or rather, the intention function) first, and only later the volition function, whereas the diachronic development was from volition to future. A further difference between the diachronic development and language acquisition may lie in the role of the conceptual maps of adults and children. When adult language users start interpreting linguistic elements with different meanings than their original meanings, this is the consequence of their conceptual map that makes inferences probable. However, when children start using linguistic elements with more general functions, it is unknown whether children can do so because they already have conceptual maps that help to make similar inferences as adults do or whether the input helps children to build up the relations between concepts. This question recently received special attention in Bowerman and Levinson (2001b).

Sixth, there are several implications of this study with respect to the study of first language acquisition. First of all, in Chapters 8 and 9, it was demonstrated that it is important to compare phenomena in stages of child language to the adult stage in order to establish what is specific for child language. Too often, claims are made about child language phenomena without explicitly investigating adult language use. This might lead to erroneous conclusions about developmental steps in language acquisition.

The research on the influence of discourse topics on the use of linguistic forms indicated that there are differences at least in the communicative needs of children and adults. This is an area that also needs further examination. What exactly are possible discourse topics in the stages of first language acquisition up to the adult stage of language? What linguistic forms are needed to talk about certain topics? And what is the distribution of the different forms for different discourse topics?
Furthermore, this thesis has shown that it is very important in the search for universals in language acquisition not only to compare the acquisition of language-specific categories, but also to examine the function these categories fulfil in the child’s system. At this more abstract level of analysis there might be crosslinguistic similarities. Such an approach can only be successful if reports on language acquisition include the contexts of use: what does the child use these forms for? Unfortunately, detailed information on the use of specific categories is often missing.

Finally, this thesis supports the view that implicational hierarchies in fact describe possible languages for adult and for child language within the domain of TMA. Whether this conclusion may be generalized to other domains should be further investigated. Numerous implicational hierarchies have been established on the basis of research on typological variation that could be tested in child language, for example, the universals mentioned in Chapter 1 of this thesis. This might lead to new insights on constraining principles on child language: not every language system is a possible system for a child, because of general cognitive capacities and communicative needs that hold for all language users. If there appear to be consistent relations between typological variation and language acquisition in different linguistic domains it should also be examined whether the similarities in adult and child languages can be explained by the same underlying factors: are the cognitive and communicative factors responsible for limits on variation similar in children and in adults? Or are there specific processes that play a role in acquisition and that account for typological variation?

In order to understand what language is, why certain properties are frequent within and across languages and stages of language and others are rare, research should focus more on language users. The links should be examined between universal conceptual structures, communicative needs in different stages of language, learning mechanisms and specific linguistic properties.