SPP Application

XPrag.de: New Pragmatic Theories
based on Experimental Evidence

Contents

1   Applicants

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2   Duration and Funding Periods

01.01.2014 – 31.12.2019, divided into two three-year funding periods: Because of the difficulty of the subject matter, three-year projects offer the greatest chance of success. Shorter employment periods also make staff recruitment difficult.

3   Scientific Program

Summary for the SPP Call for Papers

The overall goal of XPrag.de is to develop a precise pragmatic theory that is informed by evidence using experimental methods. The program is addressed at researchers in linguistics, psychology, neuroscience, philosophy and related fields who seek to advance pragmatic theory by simultaneously 1) formulating formally explicit models of the cognitive mechanisms underlying pragmatics and 2) testing these models using experimental methods.

The new field of *Experimental Pragmatics* has emerged gradually since 2004, primarily through efforts in Germany and other parts of Europe. Experimental Pragmatics represents a new approach to pragmatics, which is one of the most challenging areas of linguistic theory, where progress has been difficult. Three reasons why progress in pragmatics has been slow are the absence of formally explicit models and correspondingly precise hypotheses, the lack of relations from pragmatic theory to cognitive mechanisms, and the sole reliance on natural observation, which is a coarse-grained method, to test hypotheses. Experimental Pragmatics has begun to make substantial progress on age-old pragmatic problems by integrating three independent advances: 1) The growing power of formally precise, predictive pragmatic models on the basis of developments in other fields of linguistics, especially semantics, and their ability to make fine-grained predictions. 2) The emergence of links between elements of pragmatic models and cognitive and neuro-scientific mechanisms for example within the embodied cognition paradigm. And 3) the increased availability and accessibility of many suitable experimental methods to test the fine-grained predictions of these new pragmatic

models. These three developments in combination have already proven capable of resolving some long-standing pragmatic problems, but much more of the potential remains for future work.

We expect XPrag.de to bring about major progress in pragmatics in three direct ways: 1) subtle phenomena like vagueness and meaning projection become accessible for investigation through experimental methods, 2) timing and neural data tie pragmatic theory to psychological and neural models of language and support the development of processing models, and 3) populations other than healthy adults, especially children, and crosslinguistic comparisons can be investigated with experimental protocols. Beyond these specific areas, we expect two broad benefits of the project to cognitive science in general: For one, the focus on experimentally testable predictions supports the development of increasingly precise pragmatic theories. Furthermore, XPrag.de connects the model theoretic view of linguistics and the cognitive view of psychology and neuroscience in a vital way.

XPrag.de aims to make progress in all areas of theoretical pragmatics. The three core areas where XPrag.de invites proposals are: 1) enrichment of literal meaning (implicatures, vagueness, free choice, projective meaning), 2) access to non-literal meanings (e.g. metaphor, metonymy, coercion), and 3) models for pragmatic phenomena (e.g. intentions, presuppositions, anaphoric reference, multi-modality).

The scientific ambition of XPrag.de is best met by a broad collaboration involving researchers from different disciplines: in addition to pragmaticists, semanticists, psycholinguists, psychologists of language, neuroscientists and philosophers of language have substantial contributions to make.

3.1 Novelty of the Research Area, State of the Art and Own Contributions

The field of Experimental Pragmatics has emerged within the last decade. It combines research in Gricean pragmatics with the formal models of modern grammar and the powerful experimental methods of psychology and neuroscience. As a result, Experimental Pragmatics can theoretically state and then empirically test much more precise hypotheses than research in pragmatics previously could. Experimental Pragmatics is thereby expected to lead to a new theory of mechanisms involved in language understanding. In this section, we summarize the four underlying developments in pragmatics: the formal models emerging from linguistics and cognitive science, and the methods that have led to Experimental Pragmatics, followed by an overview of the initial results of Experimental Pragmatics.

Starting Point 1: Pragmatic Theory The first starting point of the project is Grice's theory of meaning. What does a person do when she ascribes meaning to a sentence as she hears or reads it? Most current scientific work on this question assumes the notion of *meaning* that the philosopher Grice proposed in an essay in 1957 and developed in a 1967 lecture series (published as Grice 1989). Grice argues that two notions of meaning should be distinguished. One is the *Speaker's Meaning* – a reconstruction of the intentions of the speaker when making that utterance. The other is the *Sentence Meaning* – a semantic representation the grammar assigns to a sentence. For example, when a happy father utters to his wife *'The boys are coming'* his intent may be to alert her to the fact that their

sons will soon arrive home. However, when a robber says *'The boys are coming'* the intent could be to warn an accomplice that the police are approaching. The example shows that different utterances with the same sentence meaning can carry different speaker-specific meanings.

In Grice's model, a speaker with a certain intention selects a sentence on the basis of its sentence meaning and the context. Based on their knowledge of the sentence meaning and the context, the addressees then attempt to reconstruct the intention of the speaker. Grice's model obviously applies not just to language, but to all forms of communication. The case of language, however, is the most interesting case because the grammar of sentence meanings offers an infinite array of possibilities to the speaker. Research in pragmatics since Grice has focused on the problem of meaning – the connection of speaker's intention and sentence meaning to yield the speaker's meaning. This was a natural step: Though pragmatics was originally conceived of as the study of all language use, virtually any aspect of language use involves a voluntary, intentional choice by the speaker, and thereby carries a speaker's meaning with it.

The work planned in this program adopts the focus of Grice's philosophy on speaker's meaning at least as a starting point. Gricean pragmatics, however, has not progressed substantially in the last three decades, at least compared to other subfields of linguistics. Three inter-connected obstacles have held back pragmatic theory: 1) The pragmatic theories of Grice as well as Neo- and Post-Gricean theories (Sperber and Wilson 1986) have been *informal*, or at least have rarely been formally fully specified. Instead, the common sense of the linguist is necessary to apply the theory, as e.g. Sadock (1978) and Levinson (1989) criticize. 2) Existing pragmatic theory lacks a specified connection to neuro-cognitive models–i.e. it is largely *non-cognitive*. This makes it impossible to test hypotheses with any other but behavioral data. 3) Pragmatic theory is *observation-based* much like other early scientific theories e.g. Darwin's theory of evolution. But in many cases in pragmatics, further progress requires experimental methods because they are much more sensitive than observations and can test hypotheses that are too fine-grained for observation alone. All the three obstacles have been recognized before, but not been overcome because they are interconnected – e.g. without precise hypotheses, sensitive verification methods alone do not help. Importantly, it has now become possible to overcome all three obstacles that held back pragmatic theory as we argue in the following three sections. The following graph summarizes the strengths and obstacles of existing pragmatic theory and how XPrag.de overcomes all three obstacles by starting points 2, 3 and 4.
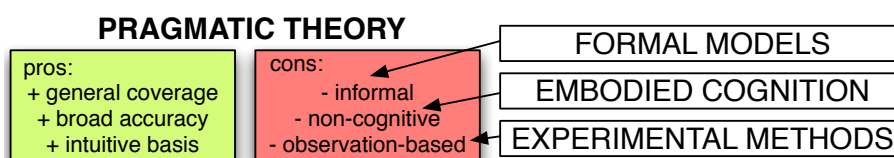

Table 1: How XPrag.de eliminates weaknesses of pragmatic theory.

Starting Point 2: Formal Models The second starting point of the project is the modern theory of grammar. For the assignment of sentence meaning, research in pragmatics relies on other subfields of linguistics. Especially research in semantics has yielded a number of suitable, interesting models for sentence meaning

that connect up to research in pragmatics. Other subfields of linguistics, such as syntax and phonology concern the structure and pronunciation of sentences, but, their effect on interpretation is often also captured via the semantic representation. The most widely accepted research program in semantics is truth-conditional semantics, which builds on mathematical model theory and originates from work of Montague (1974). This line of work assumes that truth conditions are a core aspect of sentence meaning. The approach is suited in particular for declarative sentences (like *'You left.'*), though perhaps less so for questions (*'Who left?'*), imperatives (*'Leave!'*) and other sentence types where truth isn't directly at issue. But for declarative sentences, the truth conditions of a sentence indeed play an important role for pragmatics – specifically, part of the speaker's intentions is in many cases to notify or convince another person of the truth of their statement. Research in semantics has been very successful over the last twenty years, with many important contributions with international impact coming from German researchers.

While semantics and pragmatics have initially developed separately, this has changed in recent years. This change has led to journals such as *Semantics and Pragmatics* and the same researchers being active in both areas. In Germany in particular the *Semantiknetzwerk* grant (DFG SA 925/2) led by **Sauerland**[1] from 2004 to 2008 has supported this development. Also, formal notions in use in semantics have been adopted in pragmatics to make more precise the important intuitions of Grice and other pragmaticists. Finally, the semantics-pragmatics borderline has itself become the target of debate in several domains like implicatures and speech-acts. Overall the influence of semantics on pragmatics has led to more complete and more precise models of meaning that make it easier to derive testable predictions. Nevertheless progress has been difficult since pragmatics addresses a much broader domain than semantics. This broader scope of pragmatics has two consequences: 1) Semantic models must be extended to capture pragmatic phenomena, and 2) verifying the new more fine-grained predictions requires a new methodological basis.

Starting Point 3: Embodied Cognition   The third starting point addresses the relation between language and action, vision and other cognitive faculties. Accounts within the *Mental Model* (Johnson-Laird 1983) and *Embodied Cognition* (Barsalou 2008) views assume a strong connection between meaning representations and experience and aim to ground language in action and perception. Simulation of experience allows these frameworks to represent information beyond a person's current experience. As we have seen with Starting Point 1, simulation also plays an important role in Gricean pragmatic theory where meaning is defined as a simulation of the speaker's cognitive state that led to an utterance. Simulation thereby connects pragmatic theory and embodied cognition more closely than most research acknowledges.

In addition to the common interest in the notion of simulation, pragmatic theory and embodied cognition complement very well. Developing the connection therefore should connect neuro-cognitive evidence with pragmatic theory. At the same time, embodied cognition accounts of language have addressed word meaning extensively (Barsalou 1999, **Pulvermüller** 2005). But, an important insight of pragmatic research has been that sentence meaning, not word meanings, is pri-

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[1]The names of the applicants and prospective participants are bold-faced in this application.

mary: We can assign meaning to sentences without effort, even in cases where we struggle to describe the meaning of words they contain. For example, *'or'* occurs in both *'You can eat cake or you can eat ice cream'* and *'Hands up or I'll shoot'*. But what *'or'* means is by no means clear: in the latter sentence *'or'* serves to exclude the conjunction *'Hands up and I'll shoot'*, while in the former the conjunction is included: You can eat cake and you can eat ice cream. For neuro-cognitive models of sentence meaning, both insights from pragmatics and embodied cognition are needed. A further area that will benefit from this connection are pragmatic theories of multi-modal communication (Willems and Hagoort 2007, Lascarides and Stone 2009, de Langavant et al. 2011) and XPrag.de plans to include projects on gesture.

Starting Point 4: Experimental Methods   The fourth and final starting point is the application of experimental methods to investigate sentence use. Research in pragmatics has to date relied primarily on the observation of native speaker intuitions. But while many questions can be decided using observation alone, many current questions require more sensitive methods – experimental methods. Two reasons explain that experimental research hasn't been influential in pragmatics in the past: 1) Only few researchers could access certain experimental methods because of lack of interdisciplinary collaboration or training. 2) The developments in both experimental paradigms and pragmatic theory, especially as mathematical models from semantics gained influence, made it difficult for researchers engaged in the experimental approach to follow both developments simultaneously. However, both reasons don't apply anymore because of recent advances in the accessibility of experimental methods.

Recent developments in software technology now make it much easier for researchers to contribute to linguistic theory while at the same time conducting experiments. For example, use of the Mechanical Turk internet platform and similar software tools make it possible to conduct several types of experiments such as questionnaire surveys, reaction time studies and mouse tracking even for researchers without access to a laboratory. Furthermore, the R statistics software in the public domain makes it possible for researchers to create publication-quality statistical analyses and graphs in an economic way. In many other domains such as eye-tracking (gaze-plotting), software has become user-friendly, lowering the barrier to start experimental study. Another progress for eyetracking has been the development of the visual world paradigm (Tanenhaus et al. 1995). This method is based on the observation that as a sentence is presented to a participant, the eyes move towards the referents mentioned in the sentence. It thus allows the measurement of some aspects of meaning that are relevant for pragmatic investigation during the presentation of a sentence. This method has recently been adapted to research questions targeting situated cognition and the use of linguistic and non-linguistic visual cues during language processing and sophisticated technology is utilized to investigate how language understanding is impacted by the surrounding visual environment.

The methodological advances in cognitive neuroscience have offered new avenues to the language-brain connection, which traditionally has been investigated through the study of lesion patients who show impaired language performance. With the rise of neuroimaging methods – in particular functional magnetic resonance imaging (fMRI) – cognitive neuroscience has gained a non-invasive ap-

proach to identify brain regions involved in language processing in unimpaired language users. The spatial advances have been complemented by time-course data form electrophysiology. Electroencephalography (EEG) has been of prime importance to disentangle the fast and multifaceted processes that contribute to language processing and has given rise to multi-stage language architectures.

For pragmatics, the growing accessibility and use of sophisticated experimental methods is particularly important: Speaker intuitions underlying research in other subfields such as syntax and semantics are comparatively easy to access. Pragmatics, however, concerns the felicity of sentences in context and the data are therefore often more difficult to pin down and test empirically. While the mathematical models of semantics allow pragmaticists to make precise predictions, often only experimental methods are sensitive enough to test these predictions. Easy access to experimental methods combined with precise models has thereby brought about a fundamental change in pragmatic research: The emergence of the field of Experimental Pragmatics.

Experimental Pragmatics (Including Coordinators' Contributions)

Experimental Pragmatics fruitfully connects the four starting points just presented, and it already has shown its potential to go beyond these starting points to establish new insights in all four areas. The 2004 edited volume of Sperber and Noveck can be said to mark the birth of Experimental Pragmatics. The volume gathers essentially all work in Experimental Pragmatics up to 2004. In their introduction, Sperber and Noveck declare that *'this volume lays down the bases for a new field, Experimental Pragmatics, that draws on pragmatics, psycholinguistics and also on the psychology of reasoning.'* Since 2004 considerable progress has been made and the number of researchers in Experimental Pragmatics has grown substantially. But there is still enormous promise for future development as the power of coupling formal models and experimental methods has enormous potential for pragmatics. The following Web of Science search for the terms 'experimental' and 'pragmatics' demonstrates the growth and rising attention of the field:
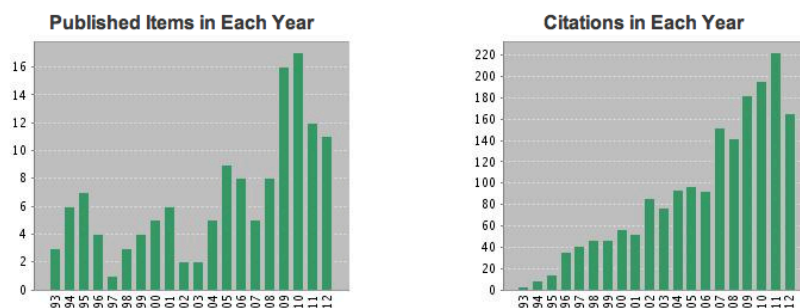
Support Before presenting the initial scientific results of Experimental Pragmatics, we address two important institutional factors that have supported the growth of the field: conferences and grant support. Since 2005, the conference Experimental Pragmatics has been established as a biannual event (Cambridge 2005, Berlin 2007, Lyon 2009, and Barcelona 2011). While initially focused on implicatures, the DFG-funded 2007 conference organized by **Sauerland** and others extended Experimental Pragmatics to its current scope including all areas of pragmatics

with its links to semantic models and also established the XPrag acronym. More recently, additional conferences have also supported the development of Experimental Pragmatics, especially two workshops with the DGfS annual meeting of the German linguistics society organized by **Meibauer**, **Schumacher** and others and the Theoretical Pragmatics conference organized in Berlin in 2011 by **Benz**, Jasinskaya, and **Sauerland**. Several of these conferences also resulted in book and journal volumes (**Sauerland** and Yatsushiro 2009, **Meibauer** and **Steinbach** 2011, **Finkbeiner et al.** 2012, **Benz et al.** 2012). In addition, two book series have a focus on Experimental Pragmatics, namely the Palgrave series edited by Breheny and **Sauerland** and a newer series from Brill.

Past grant support for Experimental Pragmatics has been at a small scale, but crucial. The most influential one is the EuroXPrag networking program initiated by Noveck, Geurts and **Sauerland** and funded by the European Science Foundation until 2013 (`http://www.euro-xprag.org`). The program has supported focused, collaborative projects in Experimental Pragmatics with travel funds of less than 4000€ each. A large number of German researchers beyond **Sauerland** have successfully applied for support of the EuroXPrag program. In particular, **Schumacher** in Mainz was successful with three projects, and also other researchers in Frankfurt, Tübingen, Potsdam, Leipzig, and Berlin were involved. Additionally, a small university-internal grant has led to the creation of a research group 'Pragmatic Enrichment' in Mainz with four Ph.D. projects (principal investigators: **Bisang, Schlesewsky, Schumacher, Meibauer**). The XPrag.de project builds on these accomplishments as well as those of the earlier DFG-funded *Semantiknetzwerk* (2004-2008, PI **Sauerland**) that focused on connecting formal semantics with pragmatic theory.

Implicatures   Experimental Pragmatics by now extends across all domains of traditional pragmatics (see also Noveck and Reboul 2008). The most substantial progress has been on implicatures, presuppositions, non-literal interpretation, and pragmatic models, which we summarize in the following. Implicatures is the term introduced by Grice (1989) to refer to aspects of meaning that strengthen the sentence meaning. Grice furthermore proposed an explanation for the important subclass of conversational implicatures, which later has been made more precise by linguists such as Horn (1989), **Sauerland** (2004) and others. Work in Experimental Pragmatics has turned up surprising support for Grice's general model, but also helped to narrow down the theoretical model of implicatures. Specifically, Grice's analysis predicts that adult speakers' meanings should often be richer and more restrictive than the literal meanings, that are more bare. For instance, *'I saw some of your children'* is literally true when I actually saw all of your children, however, the speaker's meaning is not satisfied in that situation because the sentence is underinformative. Grice's account, if adopted as a processing model therefore predicts that the literal meaning is more accessible than the strengthened speaker's meaning. This prediction has indeed been confirmed by experimental research on a number of populations that seem to access only speaker's meaning: children (Noveck 2001), language impaired children (Katsos et al. 2011), adults under time-pressure (Bott and Noveck 2004), and second language learners (Slabakova 2010). Initial indications of the influence of speaker's meaning on incremental processing have been provided by event-related brain potential data Noveck and Posada (2003) and eye-tracking measures Huang and

Snedeker (2011). A second prediction of Grice's account is that only full utterances should have speaker's meanings. However, findings by Fox (2007), **Sauerland** (2012), and **Cummins et al.** (2012) have by now disconfirmed the prediction in several case, and supported the alternative theoretical model of Chierchia (2004), where some implicatures arise independent of Grice's mechanism. But the debate is still ongoing since Geurts and Pouscoulous (2009) present experimental findings problematic for Chierchia's account (see also **Sauerland** 2010, Chemla and Spector 2011).

Presupposition   Experimental methods have likewise already contributed to the theory of presupposition and reference. Presuppositions are conditions on the pragmatic model. For example, the definite determiner in the singular *the man* requires that a discourse referent be uniquely identifiable within the pragmatic model. Hence, *the* cannot replace *a* in *'Julie married a man'*, though we assume that the man Julie married is unique. However, two uses of *the* have remained problematic for such an account: 1) uses where the sentence context can contribute to the unique identification (Haddock 1987): e.g. in *'The circle in the square is white'*, the second definite, i.e., *'the square'*, isn't uniquely identifying in and of itself.

However, Champollion and **Sauerland** (2010) have shown experimentally that in examples like *the circle that is in the/a square* the indefinite is subtly more acceptable than the definite, and on this basis argued for a novel solution to this longstanding problem. Problem case 2) are cases where unique identification relies on pragmatic enrichment as in *'Julie bought a bike. The frame is carbon.'* where speakers can infer that the bike's frame is the intended referent. Behavioral measures registered a disadvantage for these inferentially linked definites over coreferentially used definites (Haviland and Clark 1974). Using electrophysiological measures, Schumacher (**Burkhardt** 2006, 2007) has shown that this disadvantage affects two discrete processing stages suggesting that the apparent violation of the uniqueness condition is resolved through inferential reasoning.

Despite this progress, many areas of the theory of presupposition are still in a tenuous state, and we expect that Experimental Pragmatics will lead to many new results in this area. One current debate relates to division of presupposition into two classes: lexical and implicated presupposition (Heim 1991, **Sauerland** 2008). Though experimental data from language acquisition support the division (Yatsushiro 2008), more recent experimental data point towards a more complex picture (**Bade** 2012). For presupposition projection, experiments are increasingly used to test current theories as well (Schlenker 2007, Chemla 2009, Chemla and Schlenker 2012).

Non-Literality   Utterance interpretation quite often requires the adjustment of meaning and the enrichment of unarticulated meaning constituents. The underlying processes thus demand more cognitive resources (Gibbs 1990, Noveck et al. 2001). Using electrophysiological measures, the same potential (a Late Positivity) that is observed during inferential reasoning (cf. **Burkhardt** 2007) is evoked

during the processing of metaphor and metonymy (Coulson and van Petten 2002, **Schumacher** 2011, 2012, Weiland and **Schumacher** 2012). From a neuroanatomical perspective, non-literal meaning interpretation spans across a predominantly left lateralized fronto-temporal network. A recent meta-analysis of neuroanatomical studies on non-literal language comprehension reported increased activation in the left inferior frontal gyrus for figurative over literal meaning (Bohrn et al. in press). Left inferior frontal activation has been associated with both general inferential reasoning and enrichment required during non-literal meaning composition (cf. Rapp et al. 2004, 2011). This indicates that enrichment of a core meaning towards an extended meaning and inferencing do not only share similar time-course characteristics but also recruit processing resources from overlapping neural circuits. Clinical pragmatics is also informative for a more precise neuroanatomical and temporal characterization. Autistic spectrum disorder, for instance, is closely linked to difficulties with inferencing and non-literal language use (Rundblad and Annaz 2010).

Importantly, context-dependence as one characteristics of pragmatics serves a facilitating function but does not appear to be a necessary prerequisite for the enrichment to occur. This is evidenced by findings from meaning shift in utterances like *'The ham sandwich from table 7 wants to pay'* where contextual support (i.e. a restaurant setting) eases initial retrieval of the relevant properties of the noun but subsequent enrichment occurs irrespective of contextual licensing (**Schumacher** submitted). Similar findings have been reported for metaphors (Bambini 2010). The role of context has further been assessed in neuroimaging studies varying the familiarity of metaphors, where additional right hemisphere involvement is observed for novel uses of language (Bohrn et al. in press). Coercion involving for instance type and aspectual shifts represents another important test case for enrichment that shows intricate interactions with telicity and ontology (see Pylkkänen 2008 and **Bott** 2010 for neural and time-course findings). XPrag.de intends to identify commonalities and specific processes associated with these phenomena.

Pragmatic Models   Some initial progress has been made in the description of pragmatic operations. Cognitive models have thus far targeted phonological, morphological, syntactic and semantic operations at the word and sentence-level. With the exception of cognitive approaches to referential processing (Kamide 2008, **Schumacher** 2009, 2012, van Berkum 2012), operations beyond sentence-internal relations have received relatively sparse attention. Some recent progress on sentence-level processing using ERP points to a late component that interfaces with world knowledge and possibly reflects plausibility computation and inferencing (Bornkessel and **Schlesewsky** 2006, Hagoort 2005). A model that explicitly accounts for the temporal dynamics of utterance meaning proposes that a wide array of (contextual) cues initially feeds into the generation of expectations during incremental processing on the one hand and that reconstructing speaker intentions via inferencing is reflected in distinct processing costs on the other hand (**Schumacher** 2012, **Schumacher** and Hung 2012). Initial evidence also suggests that assumptions about speakers and their intentions influences these two processing stages (van Berkum et al. 2008). At the word-level, the embodied cognition accounts introduced as Starting Point 3 above support representations that integrate different domains of cognition: Action and perception words activate brain regions that overlap with the respective sensorimotor brain areas (**Pulver-**

müller 2003, 2005). Visual-spatial representations of lingustic and non-linguistic information show commonalities in neural activity (Dahan 2002) and the underlying processing patterns (Glenberg et al. 1987, **Kaup** et al. 1999). During language comprehension, hand and eye movements emulate the situation expressed (Klatzky et al. 1989). Some recent research activities have tested pragmatic phenomena within embodied cognition views with initial results on negation (**Kaup** et al. 2006), non-literality (Gentner et al. 2002, **Boulenger et al.** 2012), and intentionality (Ciaramidaro et al. 2007, Sassa et al. 2007).

Established pragmatic models are in many domains confronted with the new findings of Experimental Pragmatics. In many cases, experimental findings corroborate established theories. For instance, **Pearson** et al. (2011) confirm a view of the meaning of the plural involving pragmatic competition using experimental data from child language. However, Experimental Pragmatics has started to go further and experimental results have even begun to exert influence on the core formal notion of truth. Alxatib and Pelletier (2011), **Sauerland** (2011), Cobreros et al. (2012), and **Alxatib et al.** (2012) discuss the acceptability of logical contradictions involving vague predicates such as *'A 180cm tall man is and isn't tall.'* In this domain individual judgments are often malleable and only systematic data gathering helps. Experimental research and formal theorizing have progressed hand-in-hand and led to a new view of truth based on fuzzy logic which incorporates intensional logical junctors. Experimental Pragmatics, in this way, broadly aims at evidence-based, formal models of language that are integrated with other domains of cognition.

3.2 Scientific Goals

Over many years, pragmatic theory hasn't substantially advanced beyond the promising ideas and concepts of Grice's work of the 1950s and 60s, while other subfields of linguistics have advanced enormously at the same time. Problems that other subfields of linguistics could not resolve have even been assigned to the 'pragmatic waste-basket'. Pragmatics was held back simultaneously by a lack of formally precise theories and a lack of suitable methods to test the predictions of pragmatic theories – two components of scientific progress mutually dependent upon each other. The recent simultaneous advances in the models for pragmatics and the accessibility of sophisticated experimental methods suitable for questions about speaker meaning have radically changed the outlook for pragmatic theory. Experimental Pragmatics aims to broadly transform pragmatic theory towards more precise theories that crucially consider the temporal and neural underpinnings of language processing, utilizing the full range of a growing array of experimental methods, as well as data from varying populations and languages. This is the main goal of XPrag.de. The scientific ambition of Experimental Pragmatics can be best met by a broad collaboration involving researchers from different fields: in addition to pragmaticists and semanticists the expertise of psycholinguists, psychologists of language, neuroscientists and philosophers of language have substantial contributions to make.

XPrag.de pursues two secondary goals that will strongly contribute towards the main goal, but also hold additional, independent value. The first secondary goal of the project is to work towards pragmatic models that incorporate existing

results from psychology and neuroscience, especially from the embodied cognition perspective. XPrag.de seeks to extend the fruitful integration of the embodied cognition perspective within Experimental Pragmatics. It is natural to connect these two lines of research, in particular since they seem to complement each other well: embodied cognition research largely concerns lexical content words such as *hand* and *left* (though see work on negation by **Kaup** et al. 2006), while pragmatic models mostly concern functional items like *or* and the imperative. Furthermore, work on gesture offers additional potential for connecting pragmatics and embodiment (Hostetter and Alibali 2008). XPrag.de involves several experts from both lines of research, so substantial progress on this secondary goal can realistically be expected.

The second secondary goal is to extend pragmatic theory towards real-time processing. Current pragmatic theory often uses operational language such as *form an alternative* or *compute a sentence meaning*, but it is not clear whether these terms are metaphorically used or meant to reflect actual mental processing. Experimental Pragmatics has begun to address this question by providing data on the time-course of pragmatic processes. In particular, there is a solid basis of evidence from referentiality and context that we can build on (Kamide 2008, **Schumacher** 2012), but many other areas of pragmatic investigation are still unexplored with respect to temporal and also neural underpinnings. XPrag.de aims to develop a general model of pragmatic processing based upon pragmatic theory that accounts for time-course and neural data.

3.3   Work Program

There are three concrete ways in which Experimental Pragmatics promises to advance pragmatic theory: it allows 1) testing of new phenomena, 2) access to more differentiated data, and 3) access to novel populations. Approaching language processing from these three perspectives allows us to determine which cognitive processes are generalizable across different phenomena that are connected to speaker meaning and across the languages of the world, and also to provide more fine-grained characterizations of the underlying cognitive processes. All three ways of applying Experimental Pragmatics play a big role in XPrag.de, and we briefly discuss domains where each is the most appropriate.

1) New Phenomena: The experimental approach allows the investigation of subtle phenomena, where individual judgment data are not a good method of investigation. This includes both cases where individual judgments are not distinguishing sharply (e.g. Champollion and **Sauerland** 2010 on presupposition) and cases where individual judgments are highly variable (e.g. the work on vagueness of **Sauerland** 2011 and others). Other current debates on implicatures and presupposition also show that many theoretical questions require differentiated data for their resolution. This way of applying the experimental approach thus already plays a major role in developing new pragmatic theories and models, and we expect it to be at least one part of most work within XPrag.de. It is especially important for work on pragmatic inferences like implicature and presupposition.

2) Online Data: The envisioned experiments allow access to more differentiated data especially timing data and neurological data. Existing work of this type includes Schumacher's work on presupposition and non-literal interpretation men-

tioned above, but also plays a role for some accounts of implicature (Bott and Noveck 2004). Such data is especially important for the extension of pragmatic theories to models of pragmatic processing, but will also be important to substantiate the link between embodied cognition accounts and pragmatics. Certain research questions may further require the refinement of current online methods or their adaptation to pragmatic questions (cf. **Schumacher** et al. 2012). Hence we expect that a substantial amount of work within XPrag.de is going to extend pragmatic theory by the use of more differentiated data.

3) Novel Populations: The final advantage of the experimental method is that it allows linguists to access data beyond healthy adults. As mentioned above, current pragmatic theory developed on the basis of the linguistic judgments of mature, well-informed speakers. However, judgment data are not easily available for populations other than educated, healthy adults: One cannot easily ask a person without any linguistic education whether a sentence is ambiguous or felicitous because these concepts rely on a linguistic understanding. Only an experimental approach makes it possible to gather data from such populations and to compare different populations including cross-linguistic comparison of gradient phenomena. Cross-linguistic research has the capacity to identify cognitive processes that are generalizable across the languages of world and to determine the basic building blocks of the language system. Work on language acquisition and language pathology further holds tremendous potential beyond the few examples mentioned above (e.g. children's insensitivity to implicatures) and allows us to chart the development and decay of pragmatic processes. Work in this domain also offers great potential for transition to applications, e.g. in the diagnosis and treatment of cognitive disorders.

Short and Medium Term Research Objectives

Though XPrag.de aims to substantially change pragmatic theory, we adopt the traditional terminology and division of pragmatic phenomena as a starting point. In particular, the uniform terminology is useful to facilitate collaboration within the program. The program objectives are structured in three broad areas of interest: 1) pragmatic enrichment including biases, free choice and implicature, 2) non-literal interpretations including metaphor, coercion, and weakening, and 3) aspects of context including presupposition, reference, and speech acts. In the following, we mention prior work of prospective participants as well as other important work and sketch out potential directions of the program.

1) Enrichment Pragmatic enrichment phenomena generally add inferences to the literal meaning of a sentence. The weakest pragmatic inferences are the biases associated, for example, with negated polar questions: For example, if I ask *'Don't you want coffee?'*, I seem to expect you to want coffee more so than with *'Do you want coffee?'*. Different pragmatic accounts of this bias effect have been proposed by **Romero** and Han (2004) and **Krifka** (2012), but it is difficult to resolve the debate because the bias effect is very subtle. We expect therefore that differentiated experiments allow substantial progress in this domain. Negation is also important for other types of inferences, in particular implicatures. An important theoretical question is the relationship between implicatures and negative polarity items: **Krifka** (1995) and Chierchia (2004) have argued in favor of, but Guerzoni

(2006) against such an account. Experimental work by **Drenhaus** et al. (2006) on the ERP profile of negative polarity allows a new approach to this open question. Negation is also has been important for the integration of pragmatic theory and embodied cognition work at least since **Kaup** et al. (2006) has done substantial work on negation from the embodied view. Kaup's work offers the potential to more broadly address the non-actual elements in language such as counterfactuals, wishes, and promises. Pragmatic theory uses possible worlds to account for such phenomena, which can be understood as a simulation of non-actual experience. For further pragmatic investigation of implicatures, the domain of quantifiers offers a rich empirical domain where the semantics is well understood, but the pragmatics less so. Recently, **Cummins et al.** (2012) have shown experimentally that implicatures arise even from modified numerals such as *more than three*. This domain still promises much potential because pragmatic research up to now has largely focused on the Aristotelian quantifiers *some*, *all*, and *none* (e.g. Huang and Snedeker 2009a,b). Recent research on *most* by **Solt** (submitted), on *almost* and superlative modifiers such as *at least* by **Penka** (2006, 2010), Nouwen (2010), and others shows tremendous interest, but so far only **Cummins et al.** (2012) has put together some elements of a general model of the pragmatics of quantifier use. Exhaustivity inferences are also closely related to implicatures, in particular when there is no overt marker of exhaustivity such as *only*. Recent work has reexamined the relationship between exhaustivity and implicature in some cases: For example, **Drenhaus et al.** (2011) argue for a pragmatic account of exhaustivity in clefts. **Bade** (2012) proposes to extend an exhaustivity based analysis to phenomena **Sauerland** (2008) has called implicated presupposition. Another interesting case is exhaustivity in questions: **Schulz** and Roeper (2011) shows that whether children give exhaustive answers to questions such as *who bought what* is strongly related to language impairments. Consolidating such findings within a general theory of pragmatics and extending them to other implicatures is a much needed effort. Finally, the borderline between exhaustivity and implicature also is important for the legal use of language (**Rathert** 2006), an area that begs for experimental investigation.

Ambiguity plays an important role in many current accounts of implicature: Chierchia et al. (2008) and **Benz** (2012) assume sentences are ambiguous between the actually articulated and the enriched meaning. While Chierchia *et al.* assume an inaudible operator that enriches the interpretation, Benz argues for an account where parts of the sentence are not pronounced and models this in game-theoretic terms as pragmatic errors. Many predictions of Benz's theoretical model, however, still need to be evaluated empirically. Ambiguity is also cross-linguistically varying in interesting ways. For example, some languages (e.g. Japanese, Korean, Thai, sometimes called *topic drop* languages) allow the omission of arguments much more frequently than German does. This creates ambiguities which **Bisang** (2009) argues introduce a form of pragmatic complexity. **Meyer** and **Sauerland** (2009) show that ambiguity resolution involves a pragmatic principle of *Truth Dominance*. A final case of inference related to underspecification are free-choice inferences that strengthen such cases to state that no individual case can be ruled out **Zimmermann** (2000), Chierchia (2006).

2) Non-Literality Non-literal interpretation refers to phenomena where the speaker's meaning contradicts at least some aspects of the literal meaning. The

contradiction is based on a pragmatic reinterpretation of the literal meaning. Perhaps the most dramatic cases of this are irony and some forms of humor (for some initial experimental results at the neural level see **Hunger et al.** 2012). Further important phenomena are metaphor and metonymy where already some progress has been made with Experimental Pragmatics (**Schumacher** 2011, Weiland and **Schumacher** 2012), as discussed above. However, current theories only predict that reinterpretation occurs, but don't actually predict the meaning derived by reinterpretation (Hogeweg 2012). XPrag.de aims to close this gap by developing more fine-grained, evidence-based categories of subtypes of metaphor and metonymy. In addition the type and underlying mechanisms of reinterpretation can differ: for example in *stone lion* the lion-shape is preserved, while in a *human lion* the character of the lion is preserved by the reinterpretation. The lack of theoretical models and experimental results in this domain will be overcome by the interdisciplinary approach of XPrag.de.

Finally, the mildest reinterpretation phenomenon, coercion, adjusts the interpretation as in *She started the book,* where she really started some activity involving the book. Coercion has been well studied in the case of aspect (**Filip** 2008, **Primus** 2011). **Bott** (2010) proposes a typology of aspectual coercion types based on both theoretical and experimental evidence. XPrag.de extends research on coercion in this and other domains using experimental evidence.

3) Context   Pragmatic theory has shown that the modeling of context plays an important role in the theory since the work of the philosopher Stalnaker (1973). Stalnaker's context set model represents all context information uniformly as information of the same type. But linguists have argued that, for example, referential accessibility is represented in a less general format (Kamp 1981, Heim 1982). At this point there is little agreement as to how different aspects of context should be modelled (**Meibauer** 2012). For example, **Onea** (2012) discusses the representation of questions, which in Stalnaker's model require an indirect representation as information that the speaker would like the addressee to answer the question (**Sauerland** 2009). Experimental methods offer new perspectives (e.g. **Radach** et al. 2004, **Ferstl** 2010) as for example the access speed to elements of context can be used as a criterion (Heller et al. 2008, **Bosch** et al. 2011). This line of work offers much further potential, especially as it is extended to different ways of expressing discourse prominence cross-linguistically (**Chiriacescu** and **von Heusinger** 2010).

For embodied cognition, context representation is a rich problem with many interesting aspects to study. Intuitively, the perceptual stimulus underlying a piece of contextual information seems to fade away, but the effect on context remains. Furthermore, notions such as topic and focus that play a role for context representation, have no evident bodily counterpart (**Krifka** 2008). Other pragmatic notions such as that of a speech act are ripe for investigation from different experimental perspectives as neural models of language become more serious about sentence meaning (**Pulvermüller** 2012). **Grosse** et al. (2010) have recently shown how surprisingly early speech acts are acquired by children.

Finally, the integration of gesture with language is an important case for pragmatic models (**Ladewig** 2011, **Müller** 1999). Some gestures provide a spatio-temporal representation of pragmatic phenomena that is absent in oral language. For example, **Ebert** et al. (2011) argue that focus marking can be expressed by gesture in addition to its oral component. Sign language offers another perspective

on such phenomena with spatio-temporal representation playing a prominent role (Pfau and **Steinbach** 2011).

3.4 Targeted Measures to Support the Scientific Goals

To accomplish its ambitious scientific goals, XPrag.de should consist of twenty individual research projects in each of two funding periods (2014–16, 2017–19). Since a small and restricted survey of interest has already yielded over 35 indications of interest from qualified researchers, we expect that the selection of research projects funded within the program is going to be highly competitive and only truly excellent and innovative projects will be funded. The individual project quality should therefore at least match the standard of individual projects funded within the general program of the DFG. In addition, Dr. G. Grosse and Dr. S. Solt are preparing applications for Emmy-Noether groups associated with XPrag.de. Overall we expect about 70 participating researchers at any time.

The scale of XPrag.de requires a well-balanced, extensive suite of individual measures to support networking and dissemination, and to ensure the success of female and early career researchers. All fifteen planned measures are briefly summarized in the following. Three of the measures (Workshops, Short Term Cooperation, and Start Up) are bottom-up measures where an internal steering committee selects the strongest proposals from a set of applications. Accepted proposals receive a block grant from the central budget and report to the coordination office.

Steering Committee: an internal committee of XPrag.de participants including the coordinators oversees progress and takes project decisions. Specifically the steering committee selects proposals within the three bottom-up measures.

Project Manager: working at the Berlin coordination office, the project manager's primary tasks are: support the coordinators, prepare the work of the steering committee, initiate and administer the bottom-up measures, lead the outreach program and project communications.

Outreach Program targets three groups: researchers not involved, students in relevant fields, and the general public. XPrag.de provides a website, a twitter-feed, facebook-page, two printed brochures, and three professionally produced two minute movies for YouTube.

Early Career Mentoring Program: pairs up graduate and early postgraduate researchers with an XPrag principal investigator at a different institution for regular consultation.

Women Mentoring Program: pairs up early-career female researchers that lack a female role model at their home institution with an experienced female XPrag principal investigator and funds annual consultation visits.

Short Term Collaboration Program: funds six collaborative research projects between XPrag.de researchers and a German or international partner for a duration of up to 24 months. Decisions are made biannually by the steering committee.

Emergency Daycare Program: All XPrag.de researchers with children can use emergency daycare under similar terms as Mainz University offers to all its students and employees through the nationwide provider pme-Familienservice. Initial cost estimate ca. 13 000€.

Conference/Workshop Daycare Program: XPrag.de funded workshops, meetings, and conferences provide infant care to XPrag.de researchers.

Mercator Fellow Program For the 2014–16 period, Ira Noveck (L2C2 Lyon) and Jesse Snedeker (Harvard) have agreed to contribute as Mercator fellows to XPrag.de. Both attend the annual meetings, act as mentors for young researchers, and advise the steering committee. The coordinators will apply for each fellow for funds for yearly round-trips to Germany, one 6 week salaried stay each, and travel funds to visit different participating institutions in Germany during the 6-week stay (total cost 14 425€/fellow). Two new fellows are selected for the 2017–19 period.

Start Up Program XPrag.de supports up to four exceptional recent Ph.D. graduates in year 2 and 3 of the SPP to enable them to prepare an application within the second funding period. The coordinators apply for 5 person-years of PostDoc funding for this program.

Annual Meetings: principal investigators and project staff gather annually to review project progress, share findings and advise peers, as well as hold a management meeting of principal investigators.

Workshop Program (Internal/External): XPrag.de workshops are organized in a bottom-up fashion: workshop proposals are reviewed by the steering committee and, if accepted, receive a block grant for travel and accommodation costs, possibly supplemented from other sources. The coordinators apply for an annual workshop budget of 13 000€. Some workshops will be small, focused meetings of only 5 to 10 researchers from XPrag.de. Large workshops should be held as part of existing venues such as the meetings of the German Linguistics Society (DGfS) or the European Society for Philosophy and Psychology (ESPP). Workshops should be organized by at least two XPrag.de researchers from two different institutions.

Methods Workshops: is a special workshop organized by the coordinators: A three-day workshop on new developments in experimental methods takes place in year 1 and 4 in conjunction with the annual meeting.

XPrag Conference 2017: XPrag.de has been selected to organize the international XPrag conference in 2017 in Germany.

XPrag/DGfS Summerschool 2019 is the triannual, two-week summerschool of the German Linguistics Society. XPrag.de has been preselected to lead a school with an Experimental Pragmatics focus.

The XPrag.de program focuses on bottom-up measures because the field of Experimental Pragmatics is still undergoing rapid development and we want a flexible structure.

In the following sections, we show how these fifteen measures target the evaluation criteria important for the success of XPrag.de.

3.4.1 Synergy ways and means of planning cooperation

At least three fields – linguistics, psychology, and neuroscience – are relevant to XPrag.de. Cooperation across disciplinary boundaries is favored when selection decisions are made. The steering committee is representative of the three fields mentioned.

Of the 15 measures listed above, the annual meetings and the method workshops bring together all participating researchers, while the workshop program and the travel grant program support more targeted collaborations. The women and early career mentoring programs also contribute to the cooperation by linking up early career researchers with established figures in their field.

The coordination office maintains an internet presence including a website, a twitter feed, a facebook page, and a YouTube video channel. These offerings are primarily directed at outsiders, but also keep all XPrag.de researchers up-to-date on advances, for instance by logging new papers of members.

3.4.2   Coordination of the SPP: Coordinators and Steering Committee

The two applicants, Uli Sauerland and Petra Schumacher, act as the coordinators for the duration of XPrag.de. Their research is representative for the two main pillars of the SPP, theoretically based models and experimentally based cognitive models; they are interconnected with the international communities interested in the current interdisciplinary initiative. They have substantial experience in leading research projects such as an Emmy-Noether group (both), a COST Action, a Eurocores CRP, a DFG Scientific Network and a FP6 STREP project (Sauerland). Both also are experienced in presenting their research to news media from *Deutschlandfunk* to *Nature*. The coordinators meet at least twice a year in person, and regularly consult via telecommunications. The XPrag.de office is located at the ZAS Berlin where the project manager works. The project manager has a B.A. in a relevant field, web-skills, and strong management skills.

Selection decisions within the bottom-up measures and other general decisions are taken by a steering committee (SC). The two coordinators and four other PIs of XPrag.de are members of the SC. At the first meeting of the SPP, the four additional SC members will be determined by vote. One will represent the early career researchers, the other three should represent the different disciplines within XPrag.de. Three prospective participants interested in SC-membership are: Zimmermann (Frankfurt, linguistics), Kaup (Tübingen, psychology), and Pulvermüller (FU Berlin, neuroscience). Mercator fellows are special advisors to the steering committee without voting rights. The steering committee determines its operating rules ('Geschäftsordnung') at its first meeting. It meets at least annually to review project progress, select applications in the bottom-up measure for funding, and discuss any other business.

3.4.3   Ways of promoting early career researchers

The success of XPrag.de significantly depends also on the success of the young researchers involved. Most, if not all of the positions created within the projects of XPrag.de are going to be filled by researchers at an early career stage. Several institutions of prospective participants also host a graduate school in linguistics and/or adjacent fields (Potsdam, Stuttgart, Tübingen, HU Berlin) and offer a rich training environment for Ph.D.-students. The majority of the researchers hired within XPrag.de, though, should be at an early postdoctoral stage. We encourage the early independence, and support the applications for two independent Emmy Noether groups mentioned above. Furthermore, four young researchers have indicated interest to apply for their own position within XPrag.de. This also

provides an opportunity for researchers who are currently finishing their Ph.D.'s abroad to return to Germany (J. Degen, M.-C. Meyer).

Of the fifteen general measures introduced above, the two mentoring programs and the start-up program benefit early career researchers exclusively. Furthermore, the workshop and the short term collaboration programs with their bottom-up structure will be attractive to early career researchers. The method workshops will include sessions on career-needed soft-skills. The Mercator fellows spend ample time engaging with early career researchers. The 2019 XPrag/DGfS summerschool disseminates the results of XPrag.de to the next generation of researchers in the field.

3.4.4 Gender equality measures

Experimental Pragmatics offers good research opportunities for people of either gender, and specifically continues to attract highly talented female researchers. This is reflected by the gender distribution of the prospective participants listed in the appendix as shown in the following table:

	Prof.	Privatdoz.	Juniorprof.	Postdoc	total
female	12	3	6	14	**35**
male	17	3	1	6	**27**

While the gender distribution is roughly balanced, it doesn't reflect the gender distribution of students in relevant fields. For example, at the University of Frankfurt female students outnumber males 783 : 250 in *Germanistik*, 248 : 55 in *Anglistik*, and 588 : 152 in *Psychologie* (SS 2012). The different gender distributions at different career stages also show that considerable career obstacles still persist for female researchers in the fields relevant for XPrag.de. For example, at the preparatory meeting for XPrag.de two female researchers were invited, but unable to attend because we could not provide daycare for infants.

The success of XPrag.de depends on good research conditions and career opportunities for researchers regardless of their gender and family status. Since we expect a substantial number of female researchers to participate at all levels, XPrag.de requests the maximum sum of 15 000 EUR to support gender equality measures. These funds will be used to support three targeted measures: the emergency daycare program, infant daycare at XPrag.de events and travel support within the women mentoring program. In addition, XPrag.de events should generally take place on weekdays so researchers can rely on existing childcare arrangements. The female coordinator will regularly review the situation of female researchers and hear grievances of female employees.

3.4.5 International involvement and prominence

International networking of the XPrag.de researchers is supported by the workshop program, the Mercator fellow program, the short term travel grant program, and the XPrag.de conference. In addition, individual projects apply for travel funds to finance conference travel specific to each project.

The biannual XPrag conference series is the most important international conference for XPrag.de. The 2015 meeting is already planned at the University of

Chicago. XPrag.de organizes the 2017 meeting in Germany with coordinator Schumacher as the lead organizer. A second, new conference series relevant to all XPrag.de researchers is the theoretical pragmatics series held for the first time in 2011 at the ZAS in Berlin with Benz, Krifka, and Sauerland among the organizers. The ZAS will continue to finance this from its own funding. Some further relevant established annual conferences in adjacent fields are SALT, Sinn und Bedeutung, CogSci, CUNY sentence processing conference, Neurobiology of Language and the BU-conference, all of which accept Experimental Pragmatics papers for presentation. Researchers of XPrag.de are encouraged to present their work at the conferences that best fit their specialization. Through the workshop program XPrag.de participates with thematic workshop sessions in established general conferences and training schools.

3.4.6   Integration into the context of other, topically related funding activities

XPrag.de is a unique program to advance the study of language in general and Experimental Pragmatics in particular. The only existing grant support for Experimental Pragmatics – the ESF research network Euro-XPrag – ends in 2013 and was of a much smaller scale than an SPP. XPrag.de brings to fruition much of the seeds sown by the ESF program.

XPrag.de synergizes with several related programs funded within Germany. Several SFBs in Germany include research on language meaning and share several of the starting points of Experimental Pragmatics, though never all four of them. SFB 833 in Tübingen contains four projects (B1, B2, B4, an B8) linking starting point 2 and 4, specifically semantics and experiments, but doesn't include pragmatics. SFB 732 in Stuttgart primarily concerns lexical and structural contributions to meaning. While projects A1 and C4-N share our starting points 1 and 2, they don't exploit experiments. D6-N investigates coercion phenomena, but from a lexical-semantic rather than pragmatic perspective. SFB 632 in Berlin/Potsdam is focused on the means to express information structure, and thus shares starting point 2. Pragmatics plays a role in projects A2 and A8, but these also don't make use of experimentation. SFB 991 in Düsseldorf focuses on representations and shares an interest in our starting points 2 and 3, especially project A3. Furthermore projects C1 to C4 on conceptual shifts have interesting links to the planned research on coercion, but they don't look at the phenomenon from a pragmatic perspective. Finally, SFB 637 in Bielefeld also departs from our starting point 3, however, the SFB is not based on Gricean pragmatic theory while XPrag.de is. Projects A3 and A4 on basic factors in mental modeling are most related to Experimental Pragmatics, while project B1 looks at gesture, but in order to relate it to speech, not to speaker's meaning. The University of Mainz hosts a small doctoral research group on typological and methodological issues in Experimental Pragmatics. Despite the divergent foci, we hope that XPrag.de research will co-organize open workshops with many of the projects mentioned.

Among the other institutions in Germany, only the ZAS, where one coordinator is based, has a small group – four people – in pragmatics doing work in Experimental Pragmatics. The MPI for Human Cognitive and Brain Sciences in Leipzig and the MPI of Psycholinguistics in Nijmegen carry out a wealth of experimental work on language, but have only individual projects sharing some of our starting

points (e.g., on non-literality). The MPI for Evolutionary Anthropology in Leipzig has a small group in infant psychology where an XPrag.de associated Noether group will be located. Within the neuroscience, several groups apply embodied cognition such as the EU-funded ITN TESIS, however, not to pragmatic phenomena. In philosophy, the DFG-funded reasearch group 1614 looks at counterfactuals, a relevant pragmatic phenomenon, but does not use experiments.

5   Signatures

Cambridge, USA, 7.10.2012, U. Sauerland   Köln, 9.10.2012, P. Schumacher

References

Alxatib, S., Pagin, P., **Sauerland, U.**, 2012. Acceptable contradictions: Pragmatics or semantics? a reply to Cobreros et al. Journal of Philosophical Logic .

Alxatib, S., Pelletier, J., 2011. On the psychology of truth-gaps. In: Nouwen, R., van Rooij, R., **Sauerland, U.**, Schmitz, H.-C. (Eds.), Vagueness in Communication. Springer, Heidelberg, Germany, pp. 13–36.

Bade, N., 2012. Obligatory presuppositions and exhaustive interpretation. Ms. Harvard University and University of Tübingen.

Bambini, V., 2010. Neuropragmatics. Italian Journal of Linguistics 22, 1–20.

Baron-Cohen, S., 1995. Mindblindness: An Essay on Autism and Theory of Mind. MIT Press, Cambridge, Mass.

Barsalou, L. W., 1999. Perceptual symbol systems. Behavioral and Brain Sciences 22, 577–609.

Barsalou, L., 2008. Grounded cognition. Annual Review of Psychology 59, 617–645.

Benz, A., 2012. Errors in pragmatics. Journal of Logic, Language, and Information 21, 97–116.

Benz, A., Jasinskaja, K., **Sauerland, U.** (Eds.), 2012. International Review of Pragmatics. Special Issue.

van Berkum, J. J. A., 2012. The electrophysiology of discourse and conversation. In: Spivey, M., Joanisse, M., McRay, K. (Eds.), The Cambridge Handbook of Psycholinguistics. Cambridge University Press, Cambridge, UK.

van Berkum, J. J. A., Brink, D. V. D., Tesink, C. M. J. Y., Kos, M., Hagoort, P., 2008. The neural integration of speaker and message. Journal of Cognitive Neuroscience 20, 580–591.

Bisang, W., 2009. On the evolution of complexity sometimes less is more in East and mainland Southeast Asia. In: Sampson, G., G. D., Trudgill, P. (Eds.), Language Complexity as an Evolving Variable. Oxford University Press, Oxford, pp. 34–49.

Bohrn, I., Altmann, U., Jacobs, A., in press. Looking at the brains behind figurative languagea quantitative meta-analysis of neuroimaging studies on metaphor, idiom, and irony processing. Neuropsychologia.

Bornkessel, I., **Schlesewsky, M.**, 2006. The extended argument dependency model: A neurocognitive approach to sentence comprehension across languages. Psychological Review 113, 787–821.

Bornkessel-Schlesewsky, I., Kretzschmar, F., Tune, S., Wang, L., Genç, S., Philipp, M., Roehm, D., **Schlesewsky, M.**, 2011. Think globally: Cross-linguistic variation in electrophysiological activity during sentence comprehension. Brain & Language 117, 133–152.

Bosch, P., Alexeyenko, S., Brukamp, K., Cieschinger, M., Deng, X., König, P., 2011. Salience is only a poor substitute for uniqueness. PRE-CogSci 2011. Workshop on Production of referring expressions, July 20, 2011. Boston.

Bott, L., Noveck, I. A., 2004. Some utterances are underinformative: The onset and time course of scalar inferences. Journal of Memory and Language 51, 437–457.

Bott, O., 2010. The Processing of Events. John Benjamins, Amsterdam, Netherlands.

Boulenger, V., Shtyrov, Y., **Pulvermüller, F.**, 2012. When do you grasp the idea? MEG evidence for instantaneous idiom understanding. Neuroimage 59, 3502–3513.

Burkhardt, P., 2006. Dependency precedes independence: Online evidence from discourse processing. In: Kühnlein, P., **Benz, A.** (Eds.), Constraints in Discourse. John Benjamins, Amsterdam, Netherlands.

Burkhardt, P., 2007. The p600 reflects cost of new information in discourse memory. Neuroreport 18, 1851–1854.

Champollion, L., **Sauerland, U.**, 2010. Move and accommodate: A solution to Haddocks puzzle. Empirical Issues in Syntax and Semantics 8, 27–54.

Chemla, E., 2009. Presuppositions of quantified sentences: experimental data 17, 299–340.

Chemla, E., Schlenker, P., 2012. Incremental vs. symmetric accounts of presupposition projection: An experimental approach , 1–50.

Chemla, E., Spector, B., 2011. Experimental evidence for embedded scalar implicatures. Journal of Semantics 28, 359–400.

Chierchia, G., 2004. Scalar implicatures, polarity phenomena, and the syntax/pragmatics interface. In: Belletti, A. (Ed.), Structures and Beyond. Oxford University Press, Oxford, UK, pp. 39–103.

Chierchia, G., 2006. Broaden your views: Implicatures of domain widening and the "logicality" of language. Linguistic Inquiry 37, 535–590.

Chierchia, G., Spector, B., Fox, D., 2008. The grammatical view of scalar implicatures and the relationship between semantics and pragmatics.

Chiriacescu, S., **von Heusinger, K.**, 2010. Discourse prominence and pe-marking in romanian. International Review of Pragmatics 2, 298–332.

Ciaramidaro, A., Adenzato, M., Enrici, I., Erk, S., Pia, L., Bara, B., Walter, H., 2007. The intentional network: how the brain reads varieties of intentions. Neuropsychologia 45, 31053113.

Cobreros, P., Egré, P., Ripley, D., van Rooij, R., 2012. Tolerant, classical, strict. Journal of Philosophical Logic 41, 347–385.

Coulson, S., van Petten, C., 2002. Conceptual integration and metaphor: An event-related potential study. Memory & Cognition 30, 958–968.

Cummins, C., **Sauerland, U.**, **Solt, S.**, 2012. Granularity and scalar implicature in numerical expressions. Linguistics and Philosophy 35, 135–169.

Dahan, D., . T. M., 2002. Activation of conceptual representations during spoken word recognition. Abstracts of the Psychonomic Society 7, 14.

Drenhaus, H., beim Graben, P., Frisch, S., Saddy, D., 2006. Diagnosis and repair of negative polarity constructions in the light of symbolic resonance analysis. Brain & Language 96, 180–193.

Drenhaus, H., **Zimmermann, M.**, Vasisht, S., 2011. Exhaustiveness effects in clefts are not truth-functional. Journal of Neurolinguistics 24, 320–337.

Ebert, C., Evert, S., Wilmes, K., 2011. Focus marking via gestures. In: Proceedings of Sinn und Bedeutung 15. Saarland Unversity Press, Saarbrücken, Germany.

Ferreira, F., Bailey, K. G. D., Ferraro, V., 2002. Good-enough representations in language comprehension. Current Directions in Psychological Science 11, 11–15.

Ferstl, E. C., 2010. Neuroimaging of text comprehension: Where are we now? Italian Journal of Linguistics 22, 61–88.

Filip, H., 2008. Events and maximalization. In: Rothstein, S. (Ed.), Theoretical and Crosslinguistic Approaches to the Semantics of Aspect. John Benjamins, Amsterdam, pp. 217–256.

Finkbeiner, R., **Meibauer, J.**, **Schumacher, P.** (Eds.), 2012. What is a context? Benjamins, Amsterdam, Netherlands.

Fox, D., 2007. Free choice and the theory of scalar implicatures. In: **Sauerland** and Stateva (2007), pp. 71–120.

Frith, C., Frith, U., 1999. Cognitive psychology - interacting minds - a biological basis. Science 286, 1692–1695.

Gentner, D., Imai, M., Boroditsky, L., 2002. As time goes by: Evidence for two systems in processing space time metaphors. Language and Cognitive Processes 17, 537–565.

Geurts, B., Pouscoulous, N., 2009. Embedded implicatures?!? Semantics and Pragmatics 2, 1–34.

Gibbs, R. W. J., 1990. Comprehending figurative referential descriptions. Journal of Experimental Psychology: Learning, Memory, and Cognition 16, 56–66.

Glenberg, A. M., Meyer, M., Lindem, K., 1987. Mental models contribute to foregrounding during text comprehension. Journal of Memory and Language 26, 6983.

Grice, H. P., 1957. Meaning. Philosophical Review 66, 377–388. Reprinted in (Grice 1989, 213–223).

Grice, H. P., 1989. Studies in the Way of Words. Harvard University Press, Cambridge, Mass.

Grosse, G., Moll, H., Tomasello, M., 2010. 21-month-olds understand the cooperative logic of requests. Journal of Pragmatics 42, 33773383.

Guerzoni, E., 2006. Intervention effects on NPIs and feature movement: towards a unified account of intervention. Natural Language Semantics 14, 359–398.

Haddock, N. J., 1987. Incremental interpretation and combinatory categorial grammar.

Hagoort, P., 2005. On broca, brain, and binding: A new framework. Trends in Cognitive Science 9, 416–423.

Haviland, S. E., Clark, H. H., 1974. Whats new? acquiring new information as a process in comprehension. Journal of Verbal Learning and Verbal Behavior 13, 512–521.

Heim, I., 1982. The semantics of definite and indefinite noun phrases. Ph.D. thesis, University of Massachusetts, Amherst.

Heim, I., 1991. Artikel und Definitheit. In: von Stechow, A., Wunderlich, D. (Eds.), Semantik: Ein internationales Handbuch der zeitgenössischen Forschung. de Gruyter, Berlin, pp. 487–535.

Heller, D., Grodner, D., Tanenhaus, M. K., 2008. The role of perspective in identifying domains of reference. Cognition 108, 831–836.

Hogeweg, Lotte. 2012. Rich lexical representations and conflicting features. International Review of Pragmatics (in print).

Horn, L. R., 1989. A Natural History of Negation. University of Chicago Press, Chicago, Ill.

Hostetter, A., Alibali, M., 2008. Visible embodiment: Gestures as simulated action. Psychonomic Bulletin and Review 15, 495–514.

Huang, Y., Snedeker, J., 2009a. Online interpretation of scalar quantifiers: Insight into the semantics-pragmatics interface. Cognitive Psychology 58, 376–415.

Huang, Y. T., Snedeker, J., 2009b. Semantic meaning and pragmatic interpretation in 5-year-olds: Evidence from real-time spoken language comprehension. Developmental Psychology 45, 1723–1739.

Huang, Y. T., Snedeker, J., 2011. Logic and conversation revisited: Evidence for a division between semantic and pragmatic content in real-time language comprehension. Language and Cognitive Processes 26, 1161–1172.

Hunger, B., Siebörger, F., **Ferstl, E. C.**, 2012. Schluss mit lustig: Wie Hirnläsionen das Humorverständnis beeinträchtigen. Neurolinguistik .

Johnson-Laird, P. N., 1983. Mental models: towards a cognitive science of language, inference, and consciousness. Harvard University Pres, Cambridge, Mass.

Kamide, Y., 2008. Anticipatory processes in sentence processing. Language and Linguistics Compass 2, 647–670.

Kamp, H., 1981. A theory of truth and semantic interpretation. In: Groenendijk, J., Stokhof, M. (Eds.), Formal Methods in the Study of Language. Mathematical Centre, Amsterdam, pp. 277–321.

Katsos, N., Andres Roqueta, C., Clemente Estevan, R. A., Cummins, C., 2011. Are children with specific language impairment competent with the pragmatics and logic of quantification? Cognition 119: 43–57.

Kaup, B., Kelter, S., Habel, C., 1999. Taking the functional aspect of mental models as a starting point for studying discourse comprehension. In: Rickheit, G., Habel, C. H. (Eds.), Mental models in discourse processing and reasoning. North-Holland, Amsterdam, p. 93–112.

Kaup, B., Lüdtke, J., Zwaan, R. A., 2006. Processing negated sentences with contradictory predicates: Is a door that is not open mentally closed? Journal of Pragmatics 38, 1033–1050.

Klatzky, R. L., Pellegrino, J. W., McCloskey, B. P., Doherty, S., 1989. Can you squeeze a tomato? the role of motor representations in semantic sensibility judgments. Journal of Memory and Language 28, 56–77.

Krifka, M., 1995. The semantics and pragmatics of polarity items. Linguistic Analysis 25, 209–257.

Krifka, M., 2008. Functional similarities between bimanual coordination and topic/comment structure. In: Eckardt, R., Jäger, G., Veenstra, T. (Eds.), Variation, Selection, Development: Probing the Evolutionary Model of Language Change. de Gruyter, pp. 307–336.

Krifka, M., 2012. Negated polarity questions as denegations of assertions. In: Lee, C., Kiefer, F. (Eds.), Contrastiveness and Scalar Implicatures. Springer, Heidelberg.

Ladewig, S., 2011. Syntactic and semantic integration of gestures into speech Structural, cognitive, and conceptual aspects. Ph.D. thesis, European University Viadrina, Frankfurt (Oder).

de Langavant, L., Remy, P., Trinkler, I., McIntyre, J., Dupoux, E., Berthoz, A., Bachoud-Lévi, A., 2011. Behavioral and neural correlates of communication via pointing. PLoS One 6, e17719.

Lascarides, A., Stone, M., 2009. A formal semantic analaysis of gesture. Journal of Semantics 26, 393–449.

Levinson, S. C., 1989. A review of Relevance. Journal of Linguistics 25, 455–472.

Meibauer, J., 2012. What is a context? theoretical and empirical evidence. In: **Finkbeiner et al.** (2012).

Meibauer, J., Steinbach, M. (Eds.), 2011. Experimental Pragmatics/Semantics. John Benjamins, Amsterdam.

Meyer, M.-C., Sauerland, U., 2009. A pragmatic constraint on ambiguity detection: A rejoinder to Büring and Hartmann and to Reis. Natural Language & Linguistic Theory 27, 139–150.

Montague, R., 1974[1970]. The proper treatment of quantification in ordinary English. In: Thomason, R. (Ed.), Richard Montague: Selected Papers. Yale University Press, New Haven, Conn., pp. 247–270.

Müller, C., 1999. Redebegleitende Gesten: Kulturgeschichte, Theorie, Sprachvergleich. Arno Spitz, Berlin, Germany.

Nouwen, R., 2010. Two kinds of modified numerals. Semantics and Pragmatics 3, 1–41.

Noveck, I. A., 2001. When children are more logical than adults: Experimental investigations of scalar implicature. Cognition 78, 165–188.

Noveck, I. A., Posada, A., 2003. Characterizing the time course of an implicature: An evoked potentials study. Brain and Language 85, 203–210.

Noveck, I. A., Bianco, M., Castry, A., 2001. The costs and benefits of metaphor. Metaphor and Symbol 16, 109–121.

Noveck, I. A., Reboul, A., 2008. Experimental pragmatics: a Gricean turn in the study of language. Trends in Cognitive Sciences 12.

Onea, E., 2012. Potential questions in discourse and grammar. University of Göttingen.

Pearson, H., M. Khan, J. Snedeker, 2011. Even more evidence for the emptiness of plurality: An experimental investigation of plural interpretation as a species of implicature. Proceedings of SALT, vol. 20, 489–507.

Penka, D., 2006. Almost there: The meaning of *almost*. In: Proceedings of Sinn und Bedeutung 10. ZAS Working Papers in Linguisics, Berlin.

Penka, D., 2010. A superlative analysis of superlative scalar modifiers. Paper presented at Sinn und Bedeutung (SuB) 15.

Pfau, R. & **Steinbach, M.**, 2011. Grammaticalization in sign languages. In: Heine, B. & Narrog, H. (eds.), Handbook of grammaticalization. Oxford: OUP, 681–693.

Primus, B., 2011. Animacy and telicity: Semantic constraints on impersonal passives. Lingua 121, 80–99.

Pulvermüller, F., 2012. Meaning and the brain: The neurosemantics of referential, interactive, and combinatorial knowledge. Journal of Neurolinguistics 25, 423–459.

Pulvermüller, F., 2003. The Neuroscience of Language. On Brain Circuits of Words and Serial Order. Cambridge University Press, Cambridge, UK.

Pulvermüller, F., 2005. Brain mechanisms linking language and action. Nature Reviews Neuroscience 6, 576–582.

Pylkkänen, L., 2008. Mismatching meanings in brain and behavior. Language and Linguistics Compass 2, 712738.

Radach, R., Rayner, K., Kennedy, A. (Eds.), 2004. Eye movements and information processing during reading. Taylor & Francis, New York.

Rapp, A., Erb, M., Grodd, W., Bartels, M., Markert, K., 2011. Neural correlates of metonymy resolution. Brain and Language 119, 196–205.

Rapp, A., Leube, D., Erb, M., Grodd, W., Kircher, T., 2004. Neural correlates of metaphor processing. Cognitive Brain Research 20, 395–402.

Rathert, M., 2006. Sprache und Recht. Universitätsverlag, Heidelberg, Germany.

Romero, M., Han, C.-H., 2004. On negative *Yes/No* questions. Linguistics and Philosophy 27, 609–658.

Rundblad, G., Annaz, D., 2010. The atypical development of metaphor and metonymy comprehension in children with autism. Autism 14, 29–46.

Sadock, J. M., 1978. On testing for conversational implicature. In: Pragmatics. No. 9 in Syntax and Semantics, Academic Press, New York, N.Y.

Sassa, Y., M. Sugiura, H. Jeong, K. Horie, S. Sato, R. Kawashima. 2007. Cortical mechanism of communicative speech production. NeuroImage 37, 985992.

Sauerland, U., 2004. Scalar implicatures in complex sentences. Linguistics and Philosophy 27, 367–391.

Sauerland, U., 2008. Implicated presuppositions. In: Steube, A. (Ed.), The Discourse Potential of Underspecified Structures. Mouton de Gruyter, Berlin, Germany, pp. 581–600.

Sauerland, U., 2009. Decomposing questions acts. Snippets , 62–63.

Sauerland, U., 2010. Embedded implicatures and experimental constraints: A reply to Geurts & Pouscoulous and Chemla. Semantics & Pragmatics 3, 2:1–13.

Sauerland, U., 2011. Vagueness in language: The case against fuzzy logic revisited. In: Cintula, P., Fermüller, C., Godo, L., Hájek, P. (Eds.), Understanding Vagueness - Logical, Philosophical, and Linguistic Perspectives, vol. 36 of Studies in Logic. College Publications, London, UK, pp. 185–198.

Sauerland, U., 2012. The computation of scalar implicatures: Pragmatic, lexical, or grammatical? Language and Linguistics Compass 6.

Sauerland, U., Stateva, P. (Eds.), 2007. Presupposition and Implicature in Compositional Semantics. Palgrave Macmillan, Basingstoke, UK.

Sauerland, U., Yatsushiro, K. (Eds.), 2009. Semantics and Pragmatics: From Experiment to Theory. Palgrave Macmillan, Basingstoke, UK.

Schlenker, P., 2007. Transparency: An incremental theory of presupposition projection. In: **Sauerland** and Stateva (2007), pp. 214–242.

Schulz, P., Roeper, T., 2011. Acquisition of exhaustivity in wh-questions: A semantic dimension of SLI? Lingua 121, 383–407.

Schumacher, P. B., 2011. *The hepatitis called . . .* : Electrophysiological evidence for enriched composition. In: **Meibauer** and **Steinbach** (2011).

Schumacher, P. B., 2012. Context in neurolinguistics: Time-course data from electrophysiology. In: **Finkbeiner et al.** (2012), pp. 33–53.

Schumacher, P. B., submitted. Content and context in real-time processing: "the ham sandwich" revisited. Philosophical Studies.

Schumacher, P. B., Hung, Y., 2012. Positional influences on information packaging: Insights from topological fields in German. Journal of Memory and Language .

Schumacher, P. B., 2009. Definiteness marking shows late effects during discourse processing: Evidence from ERPs. Lecture Notes in Artificial Intelligence 5847, 91–106.

Schumacher, P. B., Bambini, V., Weiland, H., 2012. Event-related brain potentials of masked repetition and semantic priming while listening to sentences. Neuroscience Letters (in print).

Slabakova, R., 2010. Scalar implicatures in second language acquisition. Lingua 120, 2444–2462.

Solt, S., submitted. On measurement and quantification:The case of *most* and *more than half*. submitted to Language.

Sperber, D., Wilson, D., 1986. Relevance: Communication and Cognition. Harvard University Press, Cambridge, Mass.

Stalnaker, R., 1973. Presuppositions. Journal of Philosophical Logic 2, 447–457.

Tanenhaus, M. K., Spivey-Knowlton, M. J., Eberhard, K. M., Sedivy, J. C., 1995. Intergration of visual and linguistic information in spoken language comprehension. Science 268, 1632–1634.

Weiland, H., **Schumacher, P. B.**, 2012. The processing of metonymic and metaphoric relations in adjective–noun combinations. 4th UK Cognitive Linguistics Conference. Kings College: London.

Willems, R. M., Hagoort, P., 2007. Neural evidence for the interplay between language, gesture, and action: A review. Brain and Language 101, 278–289.

Yatsushiro, K., 2008. Quantifier acquisition: Presuppositions of "every". In: Grønn, A. (Ed.), Proceedings of Sinn und Bedeutung 12. ILOS, Oslo, Norway.

Zimmermann, T. E., 2000. Free choice disjunction and epistemic possibility. Natural Language Semantics 8, 255–290.

Zwaan, R. A., Madden, C. J., 2005. Embodied sentence comprehension. In: Pecher, D., Zwaan, R. A. (Eds.), Grounding Cognition: The Role of Perception and Action in Memory, Language, and Thinking. Cambridge University Press, Cambridge, UK, pp. 224–245.