Projectaanvraag voor doctoraatsbursaal met aanvang in 2011

The formal semantics of proportional quantification in Dutch and English

0. INTRODUCTION

This project focuses on proportional quantificational expressions of the type illustrated in (1):

(1) a. **De meeste** Amerikanen stemden voor Obama
The-most-Americans-voted-for-Obama
Most Americans voted for Obama

b. **Meer dan de helft** van de Amerikanen stemden voor Obama
More-than-the-half- of-the-Americans-voted-for-Obama
More than half of the Americans voted for Obama

c. **Een/de (overgrote) meerderheid** van de Amerikanen stemden voor Obama
A/The-(vast)-majority-of-the-Americans-voted-for-Obama
A/the (vast) majority of Americans voted for Obama

d. **Een/?de (kleine) minderheid** van de Amerikanen stemden voor Obama
A/The-(small)-minority-of-the-Americans-voted-for-Obama
A/the (small) minority of Americans voted for Obama

In order to evaluate the truth of these sentences, one needs to know the cardinality of two sets: on the one hand, the number of Americans qualified to vote; on the other, the cardinality of a subset of that first set, viz. the number of Obama-voting Americans. It is the relative size of the subset (the Obama-voters) with respect to the superset (all American voters) that will determine the truth or falsity of the above sentences. For so-called absolute quantifiers (e.g. *all, some, at least 10 million*) no such cardinality comparison between two sets is necessary.

While there is a sizeable body of semantic and pragmatic literature for English constructions containing such expressions of proportional quantification as in (1a) and (1b), there is little for (1c) and (1d) and for Dutch proportional quantifiers in general. In view of that situation the aim of this project is to fill those gaps and offer a formal analysis for all the expressions listed in (1). The main research question can be formulated as follows:

Q1: What is the proper characterization and formalization of the meaning of the Dutch proportional quantifiers *"de meeste/{een/de} meerderheid/{een/de} minderheid/meer dan de helft"* and of their English counterparts *"most/{a/the} majority/ {a/the} minority/more than half".*

To flesh out the different aspects of this general research question, the proposal is divided into six sections. First, we shall sketch the kernel features of the theory within which proportional quantification has been studied so far and introduce two basic problems that have arisen. These will generate the seven subquestions of

Q1 that define the concrete research agenda of the present project. The second section will describe the two methodological means required to answer the questions, namely corpus research and paper-and-pencil experiments to elicit native speaker judgments. The third section will detail the implications and consequences that this project will have for the domain of research within which it is conducted, i.e. for formal semantics and the logic of cognition. In the fourth section, the relevance of this project to existing research within HUBrussel is reviewed, specifically to the research goals of the Center for Research in Syntax, Semantics and Phonology (CRISSP). Section five presents the planning and time schedule. The sixth section, finally, is the list of bibliographical references.

1. GENERALIZED QUANTIFIER THEORY AND PROBLEMS WITH PROPORTIONAL QUANTIFIERS

The aim of formal semantics is to adopt and adapt the tools of Logic for the precise description of meaning in natural language. For the domain of natural language quantification, the obvious starting point is classical first-order Predicate Logic. As demonstrated in Generalized Quantifier Theory (GQT: Barwise & Cooper, 1981; Keenan, 1996; Keenan & Westerståhl, 1997; Peters & Westerståhl, 2006), however, Predicate Logic faces two considerable shortcomings: (1) its syntactic structure deviates considerably from that of natural language syntax, and (2) the meaning of natural language quantifiers like *most* or *more than half* cannot be defined in first-order Predicate Logic (i.e. in terms of the elementary existential and universal quantifiers). By introducing a new syntax and incorporating set theory, however, GQT has managed to overcome these two problems.

Proportional quantifiers such as *most* in *most A's are B* played a key role in this evolution. The meaning of the latter was defined as 'more than half the A's are B', sometimes more narrowly as 'more than half but not all of the A's are B'. Both semantic characterizations, however, are problematic, as we will proceed to show. Sections 1.1 and 1.2 will explain how in each case the problem involves a semantic ambiguity between a more natural mathematically imprecise meaning and a more technical but arguably "non-natural" meaning. Let us use the labels 'more than half' and 'but not all' to refer to the two problems and spell out in detail the questions they give rise to.

1.1 The 'more than half' problem

Defining the meaning of *most A's are B* as 'more than half the A's are B' cannot account for the fact that, at least in Dutch, the equivalent expressions *meer dan de helft* ('more than half') and *de meeste* ('most') can naturally be combined in coordinating patterns such as (2-4). These patterns are based on the notion of amplification (Horn, 2001), and are standardly taken to reveal that one element (i.e. *meer dan de helft (*'more than half') counts as a weaker member on a given scale and the other (i.e. *de meeste* ('most') as a stronger element on that scale:

(2) a. meer dan de helft of misschien zelfs de meeste
more-than-the-half-or-possibly-even-the-most
('more than half or possibly even most')

b. meer dan de helft zoniet de meeste
more-than-the-half-if-not-the-most
('more than half if not most')

c. de meeste of toch meer dan de helft
the-most-or-at least-more-than-the-half
('most or at least more than half')

(3) a. niet alleen meer dan de helft maar zelfs de meeste
not-only-more-than-the-half-but-even-the-most
('not only more than half but even most')

b. meer dan de helft en in feite de meeste
more-than-the-half-and-in-fact-the-most
('more than half and in fact most')

(4) a. zelfs nog niet meer dan de helft laat staan de meeste
even-yet-not-more-than-the-half-let-alone-the-most
('not even more than half let alone most')

b. meer dan de helft maar niet de meeste
more-than-the-half-but-not-the-most
('more than half but not most')

In (2) the amplification from *meer dan de helft* ('more than half') to *de meeste* ('most') is presented as a possibility. In (3) this amplification relation is explicitly asserted, whereas in (4) it is explicitly denied. The conclusion can only be that the meanings of *meer dan de helft* ('more than half') and *de meeste* ('most') are not identical. This leads us to the following research question:

Q1.1: How can the differences in meaning between *de meeste/most* on the one hand, and *meer dan de helft/more than half* on the other be characterized and formalized*?*

A number of insights bearing on this issue have already been adduced in the literature on the English proportional quantifiers *most* and *more than half*. A brief survey of them will make it possible to split up Q1.1 into more specific subquestions in sections 1.1.1 and 1.1.2.

1.1.1 Counters and non-counters

Szabolcsi (1998: 145) provides the following grammaticality contrasts between *most* and *more than half* in sentences with binominal *each* and in existential sentences:

(5) a. * The professors met most of the students each
b. The professors met more than half of the students each.

(6) a. *There will be most boys in the yard.
b. There will be more than half of the boys in the yard.

She introduces the term "counter" to refer to quantifiers like *more than half*, a terminology that we will adopt. Since accounts for proportional quantifiers are standardly in denotational semantic terms, the differences in grammaticality in

(5) and (6) suggest that there is a denotational difference between the proportional quantifiers *most* and *more than half.*

In the same vein, Solt (2010) observes that *more than half* cannot give rise to a generic reading ('boys in general') in contexts parallel to those where *most* followed by a plural head noun can:

(7) a. Most boys do not want to be businessmen and most girls do not want to marry businessmen.

b. ?More than half of the boys do not want to be businessmen and more than half of the girls do not want to marry businessmen.

Sentence (7a) can have both a generic and a mathematical "survey result" reading, while sentence (7b), with the counter *more than half*, can only get the latter.

Two prominent theoretical accounts that have been proposed to explain the difference between counters and other proportional quantifiers in denotational terms are Hackl (2009) and Solt (2010). Hackl (2009) associates the difference between *most* and *more than half* with different verification strategies: the former compares the number of A's that are B to the number of A's that aren't B, whereas the latter counts the A's that are B and compares that to half the total number of A's. Solt (2010) proposes an even more radical difference: *most* concerns the comparison of sets and allows verification via approximation strategies, whereas *more than half* concerns the comparison of numbers and requires verification via a precise mathematical ordering relation on numbers. Given the difference between these proposals, systematic consideration of corpus data and native speaker judgments, as well as widening of the empirical range to Dutch facts will help decide whether the one or the other proposal is on the right track or whether neither provides a satisfactory answer and another alternative needs to be formulated.

Q1.1.1: How can the difference in interpretation between a technical counter reading and a natural non-counter reading be characterized and formalized*?*

1.1.2 *De meeste/most* and the concept 'significantly higher'

Bearing in mind the empirical fact that *meer dan de helft/more than half* differs from *most/de meeste* in that it only permits a technical counter reading, let us now return to the natural interpretation of *de meeste/most* as reflected in the amplification data of (2)-(4). It was Peterson (1979) who first argued that the primary sense of *most flags are green* is not the simple majority reading 'more than half of the flags are green', but rather a large majority reading. Though the specifics of his theoretical analysis were refuted by Horn (2005), Peterson's characterization does reflect the empirical fact that *more than half* is primarily used for values close to 50% (8a), while *most* is primarily used for higher percentages (8b).

(8) a. More than half of respondents (55%) say that making money is more important now than it was five years ago (*Money*, 21(3), 1992) (Example from Solt 2009)

b. … most students (81.5%) do not use websites for math-related assignments *(Education*, 129(1), 2008) (Example from Solt 2009)

On the whole, the numerical or mathematical definition 'more than half' seems to be very marked for *most.* The more common characterization of *most A's are B* is 'the number of A's that are B is significantly higher than those that are not B', or alternatively 'the proportion of A's that are B is considerably greater than that of the A's that are not B'. Only in specific counter or survey contexts can the concept of 'significantly higher' give way to 'at least 51%' or 'more than half'. In ordinary non-technical cases only a proportion of say 2-to-1 or higher will count as significant.

The abovementioned contrast between the natural 'significantly higher' reading and the less natural reading of *most* cannot plausibly be dealt with in terms of classical set theory in GQT. The problem this generates is to figure out whether the issue has to be resolved in pragmatic terms or whether it is semantic in nature. The latter option cannot be discarded since there is a semantic framework in which the contrast between natural non-technical and non-natural technical meanings has been analysed successfully for a range of quantifiers, namely that of Natural Logic (Jaspers, 2005; Seuren, 2001, 2006, 2007, 2009) and Seuren's Natural Set Theory. NST cuts down standard set theory to naturalness, both in terms of the kinds of sets that are allowed, and in terms of the kinds of operations allowed. Specifically, a number of sets with extreme values (namely the empty set, the singleton and the universe set) are not considered to be cognitively natural. The resulting theory has provided a plausible explanation for a number of linguistically "non-natural" features of standard modern predicate calculus, including for example the requirement that sentences such as *all his friends attended his funeral* are true when the set of his friends is empty. In natural language, this interpretation is marked (and ironical) with the specified empty set reading, indicating that such a set-theoretically accurate but non-natural Russellian reading is only marginally resorted to, namely in the absence of the more natural reading. The latter is the one that does not violate the precepts of NST and therefore disallows the null set as the extension of *his friends*. Since this type of imposition of naturalness constraints on classical set theory has proven to be successful in dealing with the difference between natural and non-natural technical meanings of quantifiers such as *all*, it offers a promising new strategy to approach the natural vs. technical contrast observed for *most/de meeste*, namely by resorting to natural set concepts and relations to characterize notions such as 'significantly higher'.

The research question emanating from this section can be formulated as follows:

Q1.1.2: Is the "significantly higher"-characterization of the natural reading of *de meeste/most* to be analysed in semantic or pragmatic terms?

1.2 The 'but not all' problem

It has often been noted (e.g. Horn 2001) that the statement *most flags are green* invites the conclusion that *not all flags are green*. In this respect, *most* is similar to a quantifier like *some*: when a speaker states that *some flags are green*, the corresponding utterance with an informationally stronger quantifier (*all flags are green*) is taken to be false, so that *some* in effect conveys 'some but not all'. In recent analyses of English *most*, however, the precise relationship between *most A's are B* and *not all A's are B* has become a matter of considerable controversy, once again relating to the fundamental question about the division of labour between semantics and pragmatics. In particular, on the classical (neo-) Gricean account (Horn, 2005; Papafragou & Schwarz, 2005/6), *most* receives a semantic analysis of 'more than half (possibly all)', which is called unilateral because it only provides the lower boundary. The interpretation of *most* as 'more than half but not all'—which is called bilateral because the reading now provides both a lower and an upper boundary—is then accounted for in terms of pragmatics: the speaker's use of *most* implicates that a corresponding utterance with the informationally stronger term *all* is not true because, according to the conversational maxim of quantity, the speaker should have made the stronger, more informative claim if it was true. In sum, the upper boundary results from a scalar implicature, i.e. a conversational implicature based on the Gricean maxim of Quantity.

The alternative view is defended in Ariel (2003, 2004, 2006), who argues that the upper boundary of *most* cannot be accounted for pragmatically in terms of a 'not all'-implicature. Instead, the bilateral reading as 'more than half but not all' constitutes the core lexical semantics of *most*, which thus includes the upper boundary. The fact that the use of *most* is sometimes compatible with states of affairs in which *all* is true then has to be accounted for by (other types of) pragmatic inferencing.

The upper bound question that results from this theoretical state of affairs, can be formulated as follows:

Q1.2: is *de meeste/most* upper-bounded by lexical semantics or by quantity-based pragmatic implicature?

The null hypothesis within the context of the present project proposal is that the lexical semantics solution is the right one and that the proper characterisation of the upper boundary can be stated in terms of Natural Set Theory. Specifically, situations in which *all A's are B* are highly marked cases of *most A's are B*, since in those cases there are no A's that are not B. Consequently, 'the number of A's that are B is significantly higher than those that are not B' here amounts to 'the number of A's that are B is significantly higher than that of the *empty set*', which brings in one of the sets discarded as non-natural in Natural Set Theory, resulting in a non-natural reading.

1.3 The role of the article in Dutch proportional quantifiers

A conspicuous difference between English *most* and its Dutch counterpart *de meeste* is the explicit presence of the definite article in the latter. This is not a quirk of Dutch, but forms a very common pattern cross-linguistically, e.g. German, French, Spanish, Greek and many other languages (Giannakidou & Rathert 2009). It raises the following question:

Q1.3: If *most* and *de meeste* are semantically equivalent, then how does *most* incorporate the semantic definiteness that is explicitly present in its Dutch counterpart?

That *most* and *de meeste* display the same definiteness behaviour can be derived from their shared ungrammaticality in existential *there*-sentences such as (9). From such sentences, definite noun phrases are barred by the so-called definiteness restriction (Milsark 1977). The fact that *most* phrases are also barred, indicates that it incorporates the same definiteness as *de meeste*:

(9) a. * Er zitten [de meeste studenten] achter de boeken momenteel
b *There are [most students] studying at the moment.

1.4 *Een minderheid/a minority* and *een meerderheid/a majority*

Up to this point, much of the discussion has centered on those proportional quantifiers which have received much attention in the literature, i.e. *de meeste/most* and *meer dan de helft/more than half*. One of the aims of the present project is to extend the discussion by linking these cases to other proportional quantifiers. Thus Smessaert (1993, 1996, 2009) has observed that a semantic equivalence relation obtains between (a) and (b) in (10) and also between sentences with the adjectivally modified proportional quantifiers *een kleine minderheid/a minority* and *een grote meerderheid/a majority* in (11), in each case realized by means of the mechanism of internal or predicate negation.

(10) a. De meeste A's zijn B
The-most-As-are-B
Most A's are B
b. Een minderheid van de A's zijn niet-B
A-minority-of-the-As-are-not B
A minority of A's are not B

(11) a. De overgrote meerderheid van de A's zijn B
The-vast-majority-of-the-As-are-B
The vast majority of the A's are B
b. Een kleine minderheid van de A's zijn niet-B
A-small-minority-of-the-As-are-not be
A small minority of A's are not B

The existence of such relations raises the question whether they apply only to the technical type of proportionality (unambiguously attested in (11)) or also to the natural meaning of *de meeste/most*, a question which careful analysis of new corpus data from Dutch and elicitation of native speaker judgments should be able to provide an answer to. The question can be stated as follows:

Q1.4: Are semantic equivalence relations involving proportional quantifiers restricted to the technical meaning of proportionality or not?

1.5 Extension to *veel/many* and *weinig/few*

There are several analyses in the literature (such as Hackl 2009 and Živanović 2008) that relate *many* to *most,* arguing that the latter should be analyzed as a straightforward superlative of *many*. The exact nature of that relationship is however not easy to determine. Thus Horn (2005) argues convincingly against the proposal in Peterson (1979, 1991) that the relationship between *most* and *many* is one of duality (in which case *Most A's are B* would mean *Not many A's are not B* or *Few A's are not B*). Horn uses the following examples to make his point:

(12) a. Most Massachusetts voters are Democrats

b. Few (= not many) Massachusetts voters are not Democrats
c. Many Massachusetts voters are not Democrats

If Peterson were right, (12)a. is true iff (12)b. is true. But the former can be true and the latter false: most Massachusetts voters may be Democrats and yet there may still be many (instead of few) who are not. Crucially, however, the interpretation of *many* in the latter case is not proportional, but what Milsark (1977) calls the 'weak' (i.e. unstressed) cardinality reading of *veel/many*, which is non-proportional in that it does not require set comparisons of the type needed with *most.* Admittedly, there is also another reading of English *many*, which Milsark (1977) identified as 'strongly' quantificational and infelicitous in existential sentences – just like *de meeste/most* in (9) above and hence a good candidate for proportionality status and for being linked to *de meeste/most*. Yet, in Dutch the relationship between ungrammaticality in existential sentences and strong readings is not a straightforward issue: certain explicit and implicit proportional partitives are fully grammatical in existential sentences, as observed by de Hoop (1992):

(13) a. Er zijn twee van de drie eenhoorns wit
There-are-two-of-the-three-unicorns-white
*There are two of the three unicorns white
b. Er zijn enkele eenhoorns wit, de rest is zwart
There-are-some-unicorns-white-the-rest-is-black
*There are some unicorns white, the rest are black

Analysis of the corpus data and questionnaires eliciting native speaker judgments will be helpful here in ascertaining the robustness of this observed grammaticality contrast between Dutch and English and in determining the nature of the complex relationship between strong readings and grammaticality in existential sentences containing proportional *veel/many* and *weinig/few*.

Q1.5: What is the proper characterization and formalization of the meaning of proportional readings of *veel/many* and *few/weinig*?

1.5 Summary

The main research question of the present project proposal concerns the proper formal description of the semantics of Dutch proportional quantifiers:

Q1: What is the proper characterization and formalization of the meaning of the Dutch proportional quantifiers "*de meeste/{een/de} meerderheid/{een/de} minderheid/meer dan de helft*" and of their English counterparts "*most/{a/the} majority/ {a/the} minority/more than half".*

To make it possible to provide a comprehensive and at the same time detailed answer to this general question, the following subsidiary questions have been introduced:

Q1.1: How can the differences in meaning between *de meeste/most* on the one hand, and *meer dan de helft/more than half* on the other be characterized and formalized*?*

Q1.1.1: How can the difference between a technical counter reading and a natural non-counter reading be characterized and formalized*?*

Q1.1.2: Is the "significantly higher"-characterization of the natural reading of *de meeste/most* to be analysed in semantic or pragmatic terms?

Q1.2: Is *de meeste/most* upper-bounded by lexical semantics or by quantity-based pragmatic implicature?

Q1.3: If *most* and *de meeste* are semantically equivalent, then how does *most* incorporate the semantic definiteness that is explicitly present in its Dutch counterpart?

Q1.4: Are semantic equivalence relations involving proportional quantifiers restricted to the technical meaning of proportionality or not?

Q1.5: What is the proper characterization and formalization of the meaning of the proportional readings of *veel/many* and *few/weinig*?

2 DESIGN AND METHODOLOGY

The investigation into the semantics of proportional quantification in Dutch and English will crucially combine two methodological approaches, namely the detailed analysis of corpus data and elicitation of native speaker judgements by means of questionnaires. This two-pronged approach – of which certainly the first element is rare in formal semantic research – follows naturally from the nature of the research questions.

Carefully designed questionnaires eliciting native speaker judgments are indispensable (a) to find out whether speakers experience a difference in meaning between *de meeste/most* and *meer dan de helft/more than half* (Q1.1), (b) to test the validity or naturalness of the amplification patterns illustrated in examples (2)-(4) (Q1.1), (c) to pit the verification and approximation strategies of Hackl (2009) and Solt (2010) against each other (Q.1.1.1), (d) to test the equivalence relations in (10)-(11) (Q.1.4), and (e) to ascertain the robustness of this observed grammaticality contrast between Dutch and English in sentences with proportional *veel/many* and *few/weinig* (Q1.5). Classical paper-and-pencil experiments will be designed to ask subjects (e.g. first-year undergraduate students) to evaluate on a numerical scale the test sentences (when needed in further context). This way the possible bias of the grammaticality judgements of professionally trained linguists is countered by the evaluations of unprejudiced average native speakers.

As far as the corpus analysis is concerned, we will extract data from the *Corpus Gesproken Nederlands* (Corpus of Spoken Dutch) and the *British National Corpus*. They will be extracted for each propositional quantifier, followed by initial annotation of a limited set and assessment to what extent the results provide answers to the questions of 1.5. In function of the results obtained and the empirical generalizations that emerge, further annotation and extraction of additional data will be carried out. Given the qualitative nature of the large majority of the research questions, our primary concern with the corpus-based analysis is to ensure that the formal semantic conclusions are adequately based on real-life language material.

As far as annotation is concerned, description of contexts will be an important component in order to accurately identify the precise meaning of the propositional

quantifiers. Very often, the nature of the proportionality in a statement of the type *most A's are B* is further elaborated in the following sentence(s), as illustrated with the corpus example in (14):

(14) *De meeste* in deeltijd werkende vrouwen willen niet voltijds werken, maar *veel van hen* zouden wel iets meer uren willen werken dan ze nu doen [...] *twee op de drie* vrouwen met een zeer kleine deeltijdbaan (1-11 uur) en *bijna de helft* van de vrouwen met een kleine deeltijdbaan (12-19 uur) wil een grotere deeltijdbaan.

('*Most* women working part-time do not want to work full-time, but *many* of them would like to work more hours than they do now [...] *two in three* women with a very small part-time job and *almost half* the women with a small part-time job want a bigger part-time job')

In order to chart such *contextual parameters* involved in the mechanism of proportional quantification, both in Dutch and in English, we will extract sufficient context for the data from the *Corpus Gesproken Nederlands* and the *British National Corpus*. The contextual parameters that will be checked include not only quantifiers, but also the semantic class of the head noun, the nature of the verb, definiteness and the presence or absence of partitives ("van de") in proportional quantifiers. As for the semantic class of the head noun, we will distinguish between count and mass nouns (*more than half* requires an enumerable domain). *Most* more easily yields a generic interpretation than *more than half*, whereas the latter typically co-occurs with mention of the source of the supporting data, i.e. numerical data from counts, surveys or analyses. As for the nature of the verb we will examine whether or not the action referred to is a precise or technical action such as explicit counting in elections etc.

This approach will enable comparison with existing corpus data for English in Solt (2010) but will also crucially provide novel corpus-based analysis of proportional quantification in Dutch. It should be emphasized that this type of corpus analysis (including the identification of the contextual parameters involved in quantification) testifies to the innovative character of the proposed project, since it is hardly ever applied in formal semantic research.

3. IMPLICATIONS AND CONSEQUENCES FOR THE DOMAIN OF RESEARCH

This project is situated on the border between formal semantics and the logic of cognition and is bound to have an impact on each of these domains. First of all, the project will result in a valuable scientific contribution to the formal semantics of natural language quantification, especially in the framework of Generalized Quantifier Theory. It will do so by providing corpus of Dutch and English proportional quantification data with annotated contexts, and made available to the research community via a database, and also by enabling comparison of the resulting theoretically solid analysis of the semantics of Dutch and English proportional quantifiers to existing analyses for data from other languages. Secondly, this project will contribute to cognitive science, in particular the relatively new area of scientific research within the frameworks of Natural Logic (Jaspers, 2005, 2009; Seuren, 2001, 2006, 2007, 2009) and Natural Set Theory (Seuren 2006, 2009). A detailed study of the phenomenon of proportional quantification will yield new insights into the capacities of human cognition to handle abstract set theoretic objects and operations. In this broader perspective, the focus is not just on providing semantic representations or truth-conditions for natural language expressions, but also on accounting for the various ways these

expressions are used in human reasoning. In other words, the realm of syllogistic reasoning can be expanded beyond the classical Predicate Logic operations by including numerical and proportional quantification.

4 RELEVANCE OF RESEARCH WITHIN HUBRUSSEL

The relevance of this research within the context of HUBrussel is that it continues the research agenda that constitutes the *semantics* leg of the activities of the Center for Research in Syntax, Semantics and Phonology (CRISSP). International CRISSP conferences where the theoretical framework to which this project belongs took central stage, were The first Brussels Conference on Generative Linguistics (June 8-9, 2006) and Logic Now and Then (December 5-7 2008), organized collaboratively with K.U. Leuven. This research continuity shows that new semantic projects within CRISSP are part of a single theoretical programme, anchored in the domains of formal semantics, cognitive science and natural logic. Smessaert (KULeuven) and Jaspers (HUBrussel) have not only cooperated within CRISSP, but also in the KULeuven Research Group Formal Linguistics (RG FormL) KULeuven and they are also both active in the international Research Community of N-Opposition Theory (NOT). In the Leuven- and NOT-contexts they have contributed invited lectures at the First (2007) and Second (2010) World Congress on the Square of Oppositions and co-organised NOT-workshops in Leuven (January 2010) and Nice (June 2010).

5. RESULTS AIMED FOR: PLANNING, TIME SCHEDULE, DISCIPLINE CODES AND KEYWORDS

The outline of the different stages in the four-year research plan are described in (14-17):

(14) ***year 1 (October 2011-September 2012)***:

- (a) construction of the database of proportional patterns on the basis of the Corpus Gesproken Nederlands and the British National Corpus (first stage)
- (b) study of the relevant literature,
- (c) operationalisation of the contextual parameters (quantifiers, head noun types, verb types, definiteness, partitives)
- (d) initial application of the descriptive parameters to the corpus data

(15) ***year 2 (October 2012-September 2013)***:

- (a) application of the descriptive parameters to the corpus data
- (b) synthesis of descriptive analysis of corpus data
- (c) formulation of first own theoretical hypotheses
- (d) testing of hypotheses
- (c) presentation of (partial) results at (inter)national conferences

(16) ***year 3 (October 2013-September 2014)***:

- (a) test corpus data for amplification patterns and equivalence relations
- (b) incorporation of insights into the theoretical framework of Natural Logic
- (c) presentation of results at international conferences
- (d) publication of results in (inter)national journals

(17) ***year 4 (October 2014-September 2015)***:

- (a) publication of results in international journals
- (b) writing of the Ph.D dissertation

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