CHAPTER 1

Indeterminacy, context, economy and well-formedness in specialist communication

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In this article I make a contrast between the concepts of indeterminacy and well-formedness on the one hand, and the concepts of vagueness and exactness on the other hand. In the further distinction between determination (degree of vagueness) and specification (degree of generality) I exemplify with the genitive deverbal noun construction in Norwegian. Various approaches to the concept of context are discussed and I apply Kubińsky's vagueness model to demonstrate that there are some areas of grammar, such as the categorial status of the parts of speech, where the question of membership very seldom arises, although gradience is present.

Key words: indeterminacy, context, well-formedness, categoriality

1. Indeterminacy in various disciplines

Any scientific research in any field of study strives to establish a maximum of certainty and control in the field of categorization. This guiding principle dates back to the classical, Aristotelian, scholastic tradition. Aristotle's definition of categories is often referred to as the law of the excluded middle: *tertium non datur*, that is, there is no third possibility (Frege 1903/70:33). An element is either a member of a given class or not a member of that class. In other words, categories are discrete and there is no room for compromise (cf. Aristotle 1984). This principle has dominated classical logic for a very long time (cf. Frege *op.cit.*, Russel 1923). In classical terminology this tradition is to some extent represented by Wüster (1974, 1985).

The more recent influence of cognitive science in terminology and LSP has questioned the validity of the classical approach and focused on the nature of such concepts as *indeterminacy* (Beaugrande 1987, 1988) and *chaos theory* (Toft 2001, 2002). In linguistics the discussion has often taken place in terms of antonymic

pairs such as *indeterminacy* vs *well-formedness* and *vagueness* (or *fuzziness*) vs *exactness* (Beaugrande 1989, 1990, 1994).

The concept of indeterminacy can be traced back to Wittgenstein's game theory and his concept of *family resemblance* (Wittgenstein 1953/58). The indeterminacy concept has motivated studies of vagueness and fuzziness in other fields, such as in cognitive psychology (Rosch 1978, 1981) and in terminology (Weissenhofer 1995).

The emerging discipline of cognitive science concentrates on the workings of the mind and offers a coherent framework based on evidence from philosophy, linguistics, anthropology and psychology. It has become evident that categorization involves every aspect of human existence and its complexity is almost overwhelming. Indeterminacy and vagueness cannot be ignored in this framework. The basic studies of Lakoff (1987) show that the semantic structure of categories is much richer than the classical view could account for. One of his basic ideas is that human thought is organized as comprehensive idealized cognitive models (ICM) (Lakoff *op.cit*: 68). The conceptual systems in terminology, such as Nuopponen (1994), have much of the same structure.

But there are linguistic studies which have focused on indeterminacy long before Lakoff. Labov's 1973 study focused on borderline fuzziness in the categorization of concrete objects, and Rosch studied the gradience of category membership and came up with an influential theory of prototypes and basic level categorization (Rosch 1973, 1978, 1981, Rosch & Lloyd 1978).

In the description of the grammar of natural human languages, the principles of well-formedness and modularity were strictly adhered to by Chomskyan generative grammar. These axioms were bravely attacked by Langacker in his cognitive grammar (1987, 1991). Semantic structure, in Langacker's framework, is based on conventional imagery and must be characterized relative to knowledge structures. As opposed to Chomsky's autonomy principle of syntax and strict modularity of linguistic levels, Langacker views syntax, morphology and lexicon as forming an integrated continuum. Their basic function is to symbolize semantic structure. Thus, rigid dichotomies, based on the principles of well-formedness and modularity, such as competence vs performance, grammar vs lexicon, morphology vs syntax, semantics vs pragmatics, rule vs analogy and grammatical vs ungrammatical were rejected.

This was, broadly speaking, the general background when Beaugrande and Dressler (1981:xv) formulated the task of LSP research in the following way: "It is the task of science to systematize the *fuzziness* of its objects of inquiry, not to ignore it or argue it away".

2. Indeterminacy, levels and ranks

Degrees of determinacy can be analyzed both at different levels of linguistic description and at different ranks (Beaugrande 2004: 6). The classical levels of description consist of phonology, morphology, syntax and semantics. The relevant ranks in our context are word, phrase and sentence. The degree of determinacy is always higher in a closed system than in an open system. Consequently, the phonological level has the highest degree of determinacy. Morphology, being a semi-open system, has lower determinacy; syntax, being an open system has even lower determinacy, but still higher than semantics, which, quite apart from being an open system, is not observable to the same extent as syntactic constructions. Consequently, the American structuralists applied a *bottom up* approach to linguistic description, that is, they started with the closed inventory of phonemes, tried to combine these in a mechanical way by using formal distribution analysis to establish a well-defined (highly determined) area of morphophonology (cf. Hockett 1958). It was important to avoid semantics, because it was too indeterminate and had to be left to "future generations" (cf. Bloomfield 1933).

Chomskyan generative grammar introduced the principle of the centrality of syntax and postulated its autonomy, but the paranoid fear of semantics persisted. Later there was a reaction to this fear and the generative semanticists focused on a semantic interpretation of deep structure. This resulted in much higher indeterminacy. Still, the obligatory principle of well-formedness leads to a much higher degree of complexity of formal notation. This again necessitated a very high degree of abstraction with a concomitant loss of empirical basis. In terms of rank, the degree of indeterminacy increases semantically in the opposite direction. It is lowest at sentence level, higher at phrase level and highest at word level. This is an interesting phenomenon in terminology and LSP, and I will give some examples from Norwegian to illustrate it.

But first it is necessary to distinguish between *determination* and *specification*. A term with high determination is said to be precise or accurate as opposed to a term with low determination, which is said to be vague (or fuzzy). A term with high specification is specific as opposed to a term with low specification, which is said to be general.

Further, we have to draw a distinction between *vagueness* (or indeterminacy) and *ambiguity*. The extension of a vague term is characterized by the fact that in some cases it is impossible to decide whether a referent or entity is a member of its extensional class or not. Ambiguous terms have two or more extensions which exclude each other. (For further elaborations cf. Andersen 2002). These extensions may or may not be indeterminate.

Applied to ranks (exemplified by deverbal nouns) we see that the low degree of determination in a sentence (1) decreases in the corresponding phrase (2) and continues to decrease when packed down into a word:

(1) Firma-et bestil-te var-er.
firm-DEF order-PST good-PL
"The firm ordered goods".

(2) firma-et-s bestill-ing av var-er
firm-DEF-GEN order-NMLZ of good-PL
"the firm's ordering of goods"

(3) vare-bestill-ing
goods-order-NMLZ
"goods-ordering"

Let us simplify by assuming that (1) is unambiguous and relatively highly determined. In (2) the verb *bestille* "to order" has been nominalized and the associated subject and direct object are realized as a genitive pre modifier (*firmaets* "the firm's") and as a post modifying prepositional phrase (*av varer* "of goods"). This process is called *packing* (Vendler 1967). The packed nominalization (2) contains a process-result ambiguity which is not present in the unpacked (1): *bestilling* "ordering" may refer either to the process of ordering or to the product (i.e. the actual entity, (e.g. a document) resulting from the process). Both these interpretations are in principle distinct and context will in many cases disambiguate the intended meaning.

But if we have a closer look at the relation between the pre modifying genitive *firmaets*) and the result reading of the deverbal head (*bestilling*) we soon see that the relation is vague. Many interpretations are possible. Rather than forming distinct alternatives they seem to form a continuum without clear borders: The firm may own the order, they may have borrowed it for a specific task, or they may have referred to it on various occasions, or they may have written it. They are in some sense associated with it. Contextual information may disambiguate, but we have no guarantee that we will reach a more specific interpretation. The relation is simply underdetermined.

In the process reading of (2) this underdetermination is not present, however, since the genitive in that case will be interpreted as a derived agentive, i.e. the performer of the action denoted by the deverbal noun.

If you continue packing down to word rank (3) the ambiguity and the underdetermination described in (2) persist. But in (3) the derived direct object *av varer* of goods"is realized as a premodifying first root of a compound. We still tend to read this as a derived direct object, because the first element *varer-* is inanimate.

But if the first element in a compound deverbal noun is animate (especially if it refers to a human being) the interpretation as derived subject or derived direct object is genuinely underdetermined syntactically, as in *student+evaluering* ("student evaluation") where the students are either evaluating something, or somebody is evaluating them.

3. Context and economy

Examples (1)-(3) also illustrate the general fact that the more you pack expressions, the less determinacy you get. This means that there is a correlation between degree of determinacy on the one hand, and the amount of phonological or graphical material you are willing to spend on a linguistic expression on the other hand. This also includes the formation of terms in specialist communication. Special concepts pertaining to a specific knowledge area may be quite short, and this is often recommended in term formation. In other words, large amounts of knowledge may be packed into small amounts of linguistic material. This linguistic economy implies that the sender and the receiver both share a considerable amount of common background knowledge. This knowledge cannot entirely be a part of the context. In order to investigate the relationship between context and domain specific knowledge we have to identify what context is.

The term *context* has been defined from different perspectives. Traditionally, the modular approach posits a well-defined pragmatic/textual module or level. Context is said to belong to the level of pragmatics or of text level. This level is traditionally seen as a sort of appendix to the language system or the grammar, consisting of the phonological, the morphological, the syntactic and the semantic level. In other words, the context is the connecting bridge between the system and the interpretation of utterances in conversation or text production and comprehension. Basically, there is a distinction between the context as *given* and the context as *chosen* by the sender. These views are also tied to the view of the context as being a part of a central *decoding* process or of a central *inferential* process. The former view is associated with (amongst others) Petöfi (1971), the latter view with Sperber and Wilson (1986). Petöfi's concept has been quite influential both in linguistics and in LSP text linguistics.

In Sebeok (1986) the terms *context* and *co-text* are treated as complementary terms, and the terms are seen as two "stages":

> The two terms, co-text and context refer, respectively, to verbal environment and situational environment. Adoption of the term co-text (by Petöfi 1971) stresses the distinction between those elements which are intrinsically textual (or intratextual) and extratextual elements: the latter being proper to extensional seman-

tics (possible worlds, etc.) and to pragmatics (production, reception, interpretation of the text). (Sebeok 1986: 151).

Petöfi's theory of text and context is oriented towards logic, relying heavily on possible worlds semantics. But he has also important elements of Morris' semiotics (Morris 1946). Petöfi's context theory is mainly receiver oriented, and can be said to have a *semiological* character, i.e. the code is the starting point and the decoding process relies on both truth functional semantics and contextual keys such as inference, reference anchoring, time and place of utterance, deictic orientation, etc. In a receiver oriented approach to context the context has a tendency to be treated as given.

But context can also be treated as formed and chosen by the sender. This is one of the basic assumptions of Sperber and Wilson's relevance theory (Sperber and Wilson 1986). In this theory the starting point is inferential mechanisms rather than a code. This type of theory may be called *onomasiological*, because the code itself is the end product rather than the starting point. A basic question is in either case how we can distinguish between contexts. Another basic question is where context is ontologically: Is it *out there* in a world outside language or is it created in the minds of the speech participants? Domain specific knowledge cannot form a part of this context in itself, but expectations pertaining to specific knowledge as common ground intersubjective knowledge must be present in both the sender and the receiver's consciousness before specialist communication can take place. These expectations form a specific level of context for what it is possible to talk about in a domain specific discourse. Thus it forms an important part of what is generally referred to as *genre* in text linguistics.

But, if context is chosen by the sender, the main question is which elements are chosen as elements of context. The context is primarily seen as a psychological concept in relevance theory, and constitutes a subset of the sender's and the hearer's assumptions about the world. A match between these two subsets is no guarantee of success in communication. It is an important prerequisite but not a sufficient precondition. There is no guarantee of success in communication, not even if you obey all the Gricean maxims of communication (Grice 1975) or the relevance principle of Sperber and Wilson. Communication is a risky business, but we strive to minimize the dangers of misunderstanding. Still, we would expect that awareness of common background knowledge reduces the danger of misinterpretation and increases control (in the sense of Beaugrande 1989) and reduces general indeterminacy.

But, all other things being equal, context dependency increases indeterminacy. So in mainstream linguistics there is a long tradition for minimizing the role of context in language. Describing a linguistic phenomenon as contextual is considered to be a last resort. The general attitude is: How far do we get using context-free phrase structure grammars? Once you introduce context-sensitive aspects into grammar complexity increases and control becomes weaker. But it is highly unlikely that humans process and decode language by first running through a set of well formed algorithms, applying various types of filters and constraints at various levels in grammar before contextual elements are considered in language processing. It is a much more plausible assumption that these two types of knowledge are processed simultaneously in the mind of the language user. Consequently, as Petöfi (1974) points out, syntax, semantics and pragmatics are inherently intertwined.

4. Language and well-formedness

The well-formedness hypothesis of language still has a firm basis in mainstream linguistics, and its consequences are seen in emerging areas of linguistics such as diachronic syntax, language acquisition and second language learning. There is a current debate between the formalist and the functionalist approach: Are language change and first language acquisition parametrically determined (Kemenade and Vincent 1997) or are they determined by communicative functional and language external factors (Kellermann and Morrissey 1992, Tomasello 2003)? In this context the question of the status of the categories of the parts of speech has been discussed: Are categories like verbs and nouns discrete categories with well defined borders or do they have gradience properties with fuzzy borders? We traditionally tend to think of categories such as nouns and verbs as discrete well-formed categories with transparent borders. By using examples from Norwegian I will illustrate that this is not always the case. In order to test whether there are borderline cases I use Kubińsky's vagueness model (Neustupný 2004: 343ff). This is shown in Table 1.

Table 1. Kubinský's vagueness model

εxy	ηxyz	ωxyz	ηxzy	εxz
centre of y	periphery of y	boundary	periphery of z	centre of z

εxy	ηxyz	ωxyz	ηxzy	εxz
centre of y	periphery of y	boundary	periphery of z	centre of z

margin

As primitive terms of his system, Kubińsky introduces a functor ε which has an intuitive content "is undoubtedly" (e.g. εxy reads as "x is undoubtedly y") and the functor η with which it is possible to express the relation between x, y, z, of the type "x is rather y than z". There are defined functors $^{\vee}$ in the same system describing

the relation "*x* is rather *y* than non-*y*" and functor ω expressing the relation of equidistance "*x* is *y* and *z* in the same degree".

A lexical item A can be classified in three different ways in the model:

a. A is undoubtedly a noun (functor ε, centre of y)
b. A is not undoubtedly a noun, but it is nearer to an evaluation as a noun than as a verb (functor η, periphery of y).
c. A is on the boundary between a noun and a verb (functor ω, boundary).

Likewise, a lexical item B can be classified in three different ways in the model:

d B is undoubtedly a verb (functor ε, centre of z)
e. B is not undoubtedly a verb, but it is nearer to an evaluation as a verb than as a noun (functor η, periphery of z)
f. B is on the boundary between a verb and a noun (functor ω, boundary).

As Neustupný (*op.cit.*:347) points out, an important cause of vagueness is the fact that not all elements of a class can be characterized by all the characteristic features of a class. Some features may be characterized by the features of other classes. Neustupný refers to these features as *asymmetry* features. Elements which are less characterized or are characterized by features of the opposite class, but still belong to the given class, are elements which are in the periphery area of Kubińsky's model. Boundary elements are characterized as elements which are so negligibly characterized that it is not clear whether they belong to the given or the opposite class. An application of Neustupný's asymmetry matrix may illustrate this.

If the a-features are taken as typical noun properties, and the b-features are typical verb features we come up with a picture such as Table 2.

Table 2. Typical noun and verb properties

a_1 = entity reference	b_1 = event denotation
a_2 = countability	b_2 = non-countability
a_3 = specific reference	b_3 = description
a_4 = static denotation	b_4 = dynamic denotation
a_5 = no participant structure	b_5 = participant structure
a_6 = no argument structure	b_6 = argument structure
a_7 = instantiation	b_7 = no instantiation
a_8 = non-agentivity	b_8 = agentivity
a_9 = pronominalization	b_9 = no pronominalization
a_{10} = intransitivity	b_{10} = transitivity

In Table 2, a-elements are normally categorized as noun-properties, and b-elements are normally categorized as verb-properties. To illustrate gradience, I choose 4 Norwegian nouns and 4 verbs all showing different degrees of membership. The nouns are *stol* (hair), *sand* (sand), *spark* (kick), *sparking* (kicking) and the verbs are *å regne* (to rain), *å sove* (to sleep), *å løpe* (to run) and *å sparke* (to kick).

A is a noun and B is a verb in the model. See Table 3.

Table 3. Neustupný's Table of Asymmetry

	e^1	e^2	e^3	e^4	f^1	f^2	g^1	g^2	g^3	g^4
elements:	stol	sand	spark	sparking			regne	sove	løpe	sparke
features:										
a1 = entity reference	+	−	+	−			−	−	−	−
a2 = countability	+	−	+	−			−	−	−	−
a3 = specific reference	+	+	+	−			−	−	−	−
a4 = static denotation	+	+	−	−			−	+	−	−
a5 = no participant structure	+	+	−	−			+	−	−	−
a6 = no argument structure	+	+	+	−			+	−	−	−
a7 = instantiation	+	−	+	−			−	−	−	−
a8 = non-agentivity	+	+	−	−			+	+	−	−
a9 = pronominalization	+	+	+	+			−	−	−	−
a10 = intransitivity	+	+	+	−			+	+	+	−
b1 = event denotation	−	−	+	+			+	+	+	+
b2 = uncountability	−	+	−	+			+	+	+	+
b3 = description	−	−	−	−			+	+	+	+
b4 = dynamic denotation	−	−	+	+			+	−	+	+
b5 = participant structure	−	−	+	+			−	+	+	+
b6 = argument structure	−	−	−	+			−	+	+	+
b7 = no instantiation	−	+	−	−			+	+	+	+
b8 = agentivity	−	−	+	+			−	−	+	+
b9 = no pronominalization	−	−	−	−			+	+	+	+
b10 = transitivity	−	−	−	+			−	−	−	+
	centre A		periphery A		boundary		periphery B			centre B

In Table 3, the elements e^1 and g^4 are centre members of the categories A and B. They are often referred to as prototypes. e^1 has all the a-properties and none of the b-properties, and g^4 has all the b-properties and none of the a-properties. e^2, e^3 and e^4 show a declining degree of membership of the A category. They belong to the periphery of A. Likewise, g^3, g^2 and g^1 show a corresponding decline of membership of the B category. They belong to the periphery of B.

However, for Norwegian I have not been able to find members of the two categories which are equidistant with respect to A and B, i.e. in the boundary A/B area. Whether this can be found for other languages remains to be demonstrated.

This model shows that although gradience of category membership easily can be demonstrated there are no specific cases where it is impossible to decide whether a certain lexical item belongs to the category of verb or the category of noun. So even if membership is a matter of degree, as Rosch has demonstrated, the question of membership itself, i.e. cases where it is impossible to decide, does not arise in Norwegian at least. Membership of the categories nouns and verbs seems to be a discrete either-or phenomenon in spite of the fact that some verbs are better verbs than others and some nouns are better nouns than others.

4. Conclusion

This article shows that the re-evaluation of the rigid well-formedness hypothesis has given new directions in linguistic and LSP research. The study of fuzziness, seen as an interesting and revealing phenomenon, has opened up new and alternative approaches to the study of language and grammar. The indeterminacy inherent in grammatical and terminological metaterms has been recognized to a much larger extent than previously.

Nevertheless, in grammar there seems to be a core area where the question of membership itself never arises, even though gradience is present. The parts of speech seem to be an example of this.

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CHAPTER 2

Lexical chains in technical translation

A case study in indeterminacy

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This contribution examines the role of terms in establishing cohesive ties in a German technical text–a safety-critical text (instructions for use) in the medical field–and its translations into English and French. It expands the notion of terms as multifunctional elements contributing to the "texture" of written communication on the one hand, and performing a referential function with respect to a highly-constrained specialist domain on the other hand. Both intralingual and interlingual aspects of variation are explored, revealing tensions and complex interrelations which suggest a degree of indeterminacy in lexical relations, understood here as lexical choice exercised by the translator but against a background of considerable stability.

Keywords: technical translation, indeterminacy, lexical chain, equivalence

1. Indeterminacy and terms

The translation of terms in specialist texts may seem to some an odd choice as the basis for a discussion of indeterminacy (or what Quine calls the "difficulty or indeterminacy of correlation", 1966: 172), as terms are said to be distinguished from words by their relative precision and semantic circumscription, even if no longer by their complete context-independence. There is now a general acceptance that the goal of achieving a one-to-one term-concept and concept-term relationship (*Eineindeutigkeit*) within a subject field is unattainable–we can recall that Wüster himself had practical doubts about the viability of this ultimate goal on a comprehensive scale, describing it as "ein frommer Wunsch" ('a pious wish') (Wüster 1985: 79). However, a set of conditions under which terminological variation is maximally constrained–not necessarily entailing the attempted forced determinacy of controlled language–could be envisaged. So, for instance, if the objects which form