PROJECTING THE ADJECTIVE

The Syntax and Semantics of Gradability and Comparison

CHRISTOPHER KENNEDY

GARLAND PUBLISHING, Inc.
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NEW YORK & LONDON / 1999

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Library of Congress Cataloging-in-Publication Data

Kennedy, Christopher, 1967–
Projecting the adjective : the syntax and semantics of gradability and comparison / Christopher Kennedy.
p. cm. — (Outstanding dissertations in linguistics)
Includes bibliographical references and index.
ISBN 0-8153-3349-8 (alk. paper)
1. Grammar, Comparative and general—Adjective. 2. Grammar, Comparative and general—Gradation. 3. Comparison (Grammar) 4. Semantics. I. Title. II. Series.
P273.K46 1999
415—dc21

98-49253

Printed on acid-free, 250-year-life paper
Manufactured in the United States of America

For Frederic

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Preface

This book is a virtually unchanged reproduction of my 1997 University of California, Santa Cruz Ph.D. thesis. The main argument presented here is that gradable adjectives like *bright, dense* and *short* denote *measure functions*–functions from objects to abstract representations of measurement, or *scales* and *degrees*. This proposal is shown to provide a foundation for principled explanations of a wide range of syntactic and semantic properties of gradable adjectives and the constructions in which they appear, ranging from the syntactic distribution of gradable adjectives to the scopal characteristics of comparatives and the empirical effects of adjectival polarity. The only contentful additions to this book are a discussion of Bierwisch's analysis of cross-polar anomaly in chapter 3, and a number of references in chapter 2 to Pinkal 1989, a paper that I did not come across until after completing the thesis. Since Pinkal's proposals are similar in spirit to my own, while different in implementation and formalization, I have taken the opportunity to include them in this text.

Chapter 1 presents an overview of the core semantic properties of gradable adjectives and outlines the two primary approaches to their meaning that have appeared in the literature. Building on a number

empirical observations, the chapter reaches two conclusions: first, the meaning of gradable adjectives should be characterized in terms of scales and degrees, and second, the traditional analysis of gradable adjectives as relations between objects and degrees and complex degree constructions such as comparatives as expressions that quantify over degrees does not account for the scopal properties of comparatives.

Chapter 2 presents the analysis of gradable adjectives as measure functions and argues that gradable adjectives combine with a degree morphology to generate properties of individuals, which are defined in terms of relations between two degrees. This analysis not only provides an explanation for the facts discussed in chapter 1, but also supports a robust account of the compositional semantics of a range of degree constructions within a syntactic framework in which gradable adjectives project extended functional structure headed by degree morphology.

Finally, chapter 3 investigates the ontology of degrees and the characterization of adjectival polarity, focusing on the anomaly of comparatives constructed out of antonymous pairs of adjectives and the monotonicity properties of polar adjectives. The facts are shown to support an ontology in which degrees are formalized as intervals on a scale, or *extents*, and a structural distinction is made between two sorts of extents: positive extents and negative extents. This distinction forms the basis for a sortal characterization of adjectival polarity.

Introduction

Gradable adjectives can be identified in (at least) two ways: in terms of their basic semantic characteristics, or in terms of their syntactic distribution (see Siegel 1976 for an overview of the semantic properties of adjectives in general; see also Hamman 1991). Semantically, gradable adjectives can be informally defined as predicative expressions whose domains can be partially ordered according to some property that permits grading. For example, the domain of the adjective *tall* can be ordered according to a measure of *height*, the domain of the adjective *dense* can be ordered according to a measure of *density*, and the domain of *bright* according to a measure of *brightness*. In contrast, adjectives like *dead*, *octagonal*, and *former* do not introduce the same kind of orderings on their domains. Although the domains of these adjectives are partially ordered–those objects for which it is true to say e.g., *x is dead* or *a former x* are distinguished from those objects for which these claims are false–it is not the case that objects can be *dead*, *octagonal*, or *former* to varying degrees.

Distributionally, the class of gradable adjectives has two defining characteristics (cf. Klein 1980:6). First, gradable adjectives can be modified by degree adverbials such as *quite*, *very*, and *fairly*. According

to this criterion, *inexpensive, dense,* and *bright* are identified as gradable adjectives, but *dead, octagonal,* and *former* are not, as shown by (1)-(6).

(1) The Mars Pathfinder mission was quite inexpensive.
(2) The neutron star in the Crab Nebula is very dense.
(3) The city lights are fairly bright tonight.
(4) ??Giordano Bruno is very dead.
(5) ??I want the new spacecraft to be quite octagonal.
(6) ??Carter is a fairly former president, and Lincoln is an extremely former president.

Although non-gradable adjectives like *dead* do sometimes occur with degree modifiers, as in e.g., *Giordano Bruno is quite dead,* such uses are marked, and tend to convey a sense of irony or humor. Such uses indicate is that (at least some) non-gradable adjectives can be coerced into having gradable interpretations in contexts that are otherwise incompatible with their canonical meanings.

The second distributional characteristic of gradable adjectives is that they can appear in a class of complex syntactic environments, which I will refer to as *degree constructions*. Roughly speaking, a degree construction is a construction formed out of an adjective and a *degree morpheme*–an element of {*er/more, less, as, too, enough, so, how, ...*}. For concreteness, I will identify degree constructions as structures in which an adjective occurs in the environments specified in (7), where 'Deg' is a degree morpheme.

(7) [Deg (Adv)* __]
[__ Deg]

Typical examples of degree constructions are given in (8)-(14): comparatives, equatives, *too* and *enough* constructions, *so...that* constructions, *how* questions, and anaphoric *this/that* constructions. These examples, like the data discussed above, indicate that *expensive, dense,* and *bright,* as well as *distant, old* and *fast,* are gradable adjectives.

(8) Mars Pathfinder was less expensive than previous missions to Mars.
(9) Venus is brighter than Mars.
(10) Neptune is not as distant as Pluto.
(11) The equipment is too old to be of much use to us.
(12) Current spacecraft are not fast enough to approach the speed of light.
(13) The black hole at the center of the galaxy is so dense that nothing can escape the pull of its gravity, not even light.
(14) How bright is Alpha Centauri?

Examples (15)-(17) show that non-gradable adjectives such as *dead, octagonal,* and *former* cannot appear in degree constructions.

(15) ??Giordano Bruno is too dead to fly on the space shuttle.
(16) ??The new spacecraft is more octagonal than the old one.
(17) ??How former a president is Carter?

Degree constructions, and comparatives in particular, have been the focus of much of the work on the syntax and semantics of gradable adjectives in the tradition of generative grammar. The syntactic complexity of these constructions was recognized and discussed in very early work (see e.g., Lees 1961, Smith 1961, Pilch 1965, Huddleston 1967, and Hale 1970), and has formed the basis for important developments in the theory of phrase structure, exemplified by Bresnan's (1973, 1975) detailed analysis of the syntax of comparatives and the adjective phrase and Jackendoff's (1977) investigation of X-bar theory, as well as important work on ellipsis (e.g., Hankamer 1973, Bresnan 1973, 1975, Chomsky 1977, Kuno 1981, Pinkham 1982, Napoli 1983, Hazout 1995). Recent work in the Principles and Parameters framework has sought to reevaluate and recast many of Bresnan's and Jackendoff's insights in light of more current thinking about phrase structure and the relation between lexical and functional categories (see in particular Abney 1987, Corver 1990, 1997, and Grimshaw 1991; see also Larson 1991 and Izvorski 1994).

On the semantic side, the interest in degree constructions can be

explained very straightforwardly: they provide important insight into the core meaning of gradable adjectives. Simply put, there is a strong intuition that the anomaly which results from inserting adjectives like *dead, octagonal* and *former* into the context of a degree construction is semantic, not syntactic. If this is true, then it is some aspect of the meaning of gradable adjectives that is responsible for the fact that they can occur in these constructions, and it is this component of their meaning which distinguishes them from non-gradable ones like *dead, octagonal,* and *former.* The most obvious semantic difference between *tall, old, bright* and *dense* on the one hand, and *dead, octagonal,* and *former* on the other, is the one observed above: the domains of the former can be partially ordered according to some gradient property; the domains of the latter cannot be. If degree morphemes are sensitive to the ordering on the domain of a gradable adjective (i.e., if their meaning is such that they require the adjectives with which they combine to be associated with partially ordered domains), then the distribution of gradable and non-gradable adjectives illustrated by the examples above can be explained. Degree constructions, then, provide an empirical foundation upon which to build an investigation of the semantic characteristics of gradable adjectives and, more generally, the expression of ordering relations in natural language.

The intuition that the core meaning of gradable and non-gradable adjectives determines their felicity in degree constructions, combined with the general hypothesis that the syntactic distribution of meaningful expressions should follow from the interaction of their meanings with the meanings of the expressions with which they combine, provides the foundation for the thesis of this dissertation. Specifically, I will argue that gradable adjectives denote *measure functions*–functions from objects to abstract representations of measurement, or *degrees*–and degree constructions denote properties of individuals that are characterized as relations between degrees, and I will support this proposal by showing that it provides principled explanations of a wide range of semantic properties of gradable adjectives and degree constructions, ranging from the distribution of gradable and non-gradable adjectives in degree constructions to the

scopal characteristics of comparatives and the behavior of antonymous pairs of "positive" and "negative" adjectives.

The organization of the dissertation is as follows. Chapter 1 provides a detailed introduction to the semantic characteristics of gradable adjectives–the core facts that any theory must explain–and introduces the two most prominent approaches to the semantic analysis of gradable adjectives. The first, articulated in the work of McConnell-Ginet 1973, Kamp 1975, Klein 1980, 1982, 1991, van Benthem 1983, Larson 1988, and Sánchez-Valencia 1994, builds on the hypothesis that gradable adjectives are of the same semantic type as other predicates–they denote (possibly partial) functions from individuals to truth values–but differ in having partially ordered domains. I survey the basic claims of this type of analysis, then discuss several sets of facts which are problematic for it, concluding that the analysis, in its basic form, cannot be maintained. The second account, adopted by a number of researchers on gradable adjectives and comparatives (see e.g., Seuren 1973, Cresswell 1976, Hellan 1981, Hoeksema 1983, von Stechow 1984a, Heim 1985, Lerner and Pinkal 1992, 1995, Moltmann 1992a, Gawron 1995, Rullmann 1995, Izvorski 1995), analyzes gradable adjectives as relations between objects and abstract representations of measurement, or *degrees*, and degree constructions are analyzed as expressions which quantify over degrees. I show that this type of approach contains the machinery necessary for an explanation of the data which are problematic for the vague predicate analysis. I conclude by laying out some additional facts involving the scopal properties of comparatives which are problematic for this type of theory in its basic form.

Taking the observations about the scopal properties of comparatives as a starting point, chapter 2 develops an alternative to the relational analysis discussed in chapter 1 in which gradable adjectives are analyzed as functions from objects to degrees (cf. Bartsch and Vennemann 1973). I argue that propositions in which the main predicate is headed by a gradable adjective φ have three primary semantic constituents: a *reference value*, which denotes the degree to which the subject is φ, a *standard value*, which corresponds to another degree or to a proposition, and a *degree relation*, which is introduced by a degree

morpheme and which defines a relation between the reference value and the standard value. Building on a syntactic analysis in which gradable adjectives project extended functional structure headed by a degree morpheme (as in Abney 1987, Corver 1990, 1997, and Grimshaw 1991), I show that this analysis supports a straightforward compositional semantics for degree constructions in English, and that it explains the scopal properties of comparatives that are problematic for the traditional scalar analysis.

Finally, chapter 3 addresses the ontological status of degrees, arguing that degrees should be analyzed as intervals on a scale, or *extents*, rather than as points on a scale, as traditionally assumed. Using the anomaly of comparatives constructed out of positive and negative pairs of adjectives as the empirical basis for my claims, I argue that gradable adjectives denote functions from objects to extents, and adopt an ontology originally proposed in Seuren 1978, which distinguishes between two sorts of extents: positive extents and negative extents. I claim that the difference between positive and negative adjectives is a sortal one: positive adjectives denote functions from objects to positive extents, and negative adjectives denote functions from objects to negative extents. After setting this analysis into the semantic framework developed in chapter 2, I show that the approach supports an explanation of the facts that were problematic for the traditional degree-based analysis. The chapter continues with an examination of a set of constructions, which at first glance appear to be counterexamples to the analysis, but upon closer examination turn out to provide interesting support. Finally, I show that the algebra of extents has the additional positive result of providing an independently motivated explanation of the monotonicity properties of gradable adjectives.

Acknowledgments

The problem of finding a thesis topic is often more difficult than the problems a thesis sets out to solve; in my case, however, the topic came in a flash on Interstate 5 somewhere between Santa Cruz and Los Angeles: I would work on comparatives. What better topic for a thesis than something I knew next to nothing about, and most people I spoke with seemed determined to avoid? It is a testament to the trust, support, and good humor of my thesis committee–supervisors Donka Farkas and Bill Ladusaw and committee member Sandy Chung–that I was able to convince them to agree (or coerce them into agreeing) to sign on to a project that started out looking at comparatives and ended up being about gradable adjectives in general. It is an even stronger testament to their depth of knowledge and strength as teachers that I was able to work the unstructured and various ideas, hypotheses, and questions that came up over the course of my research into the document presented here.

In addition to my committee, Jorge Hankamer and Jim McCloskey played important roles in the development of my thinking about the specific issues discussed in this thesis and in my personal development as a researcher and a teacher, and I would like to express my gratitude to

both of them. I would also like to take this opportunity to thank those people outside of the Santa Cruz community whose generous gifts of time and thoughts contributed to the progress of this work at various stages, in particular, Ewan Klein, Chris Barker, Irene Heim, Robert May, and Ivan Sag. I am particularly grateful to have had the opportunity to work with, and learn from, Branimir Boguraev during my last two years in the Bay Area. Though this relationship was not directly connected to my thesis work, it had a profound effect on my development as a researcher in linguistics.

I was extremely fortunate to end up as a graduate student at the University of California at Santa Cruz. Although the circumstances of my arrival were a bit unusual, the consequences were excellent. My gratitude to three members of this community in particular runs very deep: Jason Merchant, Jaye Padgett and Rachel Walker. I would also like to thank Judith Aissen, Junko Itô, Armin Mester, and Geoff Pullum for the quality of their teaching and the standards of excellence they set, Tanya Honig, whose support and help could always be counted on, and those who came with, before, and during: in particular, Chris Albert, Geoff Duke, Ted Fernald, Anastasia Giannakidou, Klaus von Heusinger, Michael Johnston, Motoko Katayama, Eric Potsdam, Philip Spaelti, Peter Svenonius, and Kari Swingle. Finally, a long, deep shout to Frederic Evans, who showed me that I made the right choice in becoming a linguist, and whose spirit persists in the excitement of asking questions about language.

Four final things were instrumental to the successful completion of this text: Hillary, Lyosha, the Sub-Mersians (and the transcendental groove of surf music), and last, but certainly not least, the *Haynes Guide to the Volvo 140 Series.*

Projecting the Adjective

CHAPTER 1

Gradable Adjectives

This chapter provides an overview of the semantic properties of gradable adjectives–the core set of facts that any theory must explain–and surveys the primary approaches to the semantic analysis of gradable adjectives that have been developed in the literature, focusing on two approaches. The first, which I refer to as the "vague predicate analysis", builds on the hypothesis that gradable adjectives denote partial functions from individuals to truth values. I survey the basic claims of this type of analysis, then discuss several sets of facts which are highly problematic for it, concluding that the analysis, in its basic form, cannot be maintained. I then discuss a second account, which I refer to as the "scalar analysis", in which gradable adjectives are analyzed as expressions that denote relations between objects and abstract measures, or *degrees*, and degree constructions are analyzed as expressions which quantify over degrees. I show that this type of approach contains the machinery necessary for an explanation of the data which is problematic for the vague predicate analysis. I conclude by laying out some additional facts which are problematic for a traditional scalar analysis, focusing on the scopal properties of comparatives.

1.1 THE SEMANTIC CHARACTERISTICS OF GRADABLE ADJECTIVES

A defining characteristic of gradable adjectives is that there is some gradient property associated with their meaning with respect to which the objects in their domains can be ordered. For example, any set of objects that have some positive linear dimension can be ordered according to how *long* the objects are or how *short* they are, and any set of objects that move can be ordered according to how *fast* or *slow* they are.[1] Some connection between gradable adjectives and ordering relations is incorporated into all approaches to their semantics; what distinguishes the two analyses that I will discuss in the sections 1.2 and 1.3 of this chapter is the way in which the ordering on the domain is determined, in particular, whether the ordering on the domain is presupposed and the adjective is analyzed as a function from objects in an ordered set to truth values, or whether the ordering on the domain is actually determined by the meaning of the adjective. In order to appreciate the differences between the two approaches, however, it is necessary to first review some of the crucial facts that any analysis must explain. One important set of facts was discussed in the introduction: the presence of gradable adjectives in comparatives and other degree constructions. The goal of this section is to introduce several additional empirical domains that provide important insight into the semantic characteristics of gradable adjectives.

1.1.1 Vagueness

Sentences containing adjectives are inherently vague; (1), for example, may be judged true in one context and false in another.

(1) The Mars Pathfinder mission is expensive.

In a context in which the discussion includes all objects that have some cost associated with them, (1)would most likely be judged true, since the cost of sending a spacecraft to Mars is far greater than the cost of most things (e.g., nails, dog food, a used Volvo, etc.). If the context is such that only missions involving interplanetary exploration are

salient, however, then (1) would be judged false, since a unique characteristic of the Mars Pathfinder mission was its low cost compared to other projects involving the exploration of outer space.

This discussion brings into focus an important aspect of the vagueness of gradable adjectives: determining the truth of a sentence of the form *x is* φ (where φ is a gradable adjective in its absolute form) involves a judgment of whether *x* "counts as" φ in the context of utterance. The problem of resolving the vagueness of a gradable adjective, then, can be viewed as the problem of answering the question *does x count as* φ *in context c?* Although there may be many different ways to construct an algorithm for answering this question, two approaches have predominated in research on the semantics of gradable adjectives. In the following paragraphs, I will present an informal outline of these two approaches, returning to a more formal discussion of the same issues in Sections 1.2 and 1.3.

The first approach, which I will refer to as the "vague predicate analysis" (see McConnell-Ginet 1973, Kamp 1975, Klein 1980, 1982, 1991, van Benthem 1983, Larson 1988a, and Sánchez-Valencia 1995), starts from the assumption that gradable adjectives are of the same semantic type as non-gradable adjectives and other predicates: they denote functions from objects to truth values. What distinguishes gradable adjectives from other predicative expressions is that the domains of the former are partially ordered with respect to some property that permits gradation, such as *cost, temperature, height*, or *brightness*. On this view, the observation that objects can be ordered according to the amount to which they possess some property is interpreted as basic principle (see Sapir 1941 for relevant discussion), and the meaning of a gradable adjective is built on top of it. Specifically, a gradable adjective φ is analyzed as a function that induces a partitioning on a partially ordered set into objects ordered above some point and objects below that point: for objects ordered towards the upper end of the set, *x is* φ is true, and for objects ordered towards the lower end, *x is* φ is false.[2]

In this type of approach, the problem of vagueness can be characterized as the problem of determining how the domain of a gradable adjective should be partitioned in a particular context. One

way to go about solving this problem is to assume a very general algorithm whereby a gradable adjective partitions any partially ordered set according to some "norm value", and to allow for the possibility that in different contexts, instead of applying the adjective to its entire domain, only a subset of the domain is considered.[3] Specifically, when evaluating a sentence of the form *x is* φ in a context *c*, attention is restricted to a subset of the domain of φ that contains only objects that are deemed to be "like *x*" in some relevant sense in *c* (assuming that the relation "is like *x*" is reflexive, this subset will always include *x*), and then checking to see whether the partitioning of the subset by φ is such that *x is* φ is true.

Following Klein, I will refer to this contextually relevant subset as a *comparison class*. Intuitively, a comparison class is a subset of the domain of a gradable adjective that contains just those objects that are determined to be relevant in a particular context of utterance, in particular, those objects that are similar to *x* in some appropriate respect. The intuition underlying this type of approach is that in order to make a precise judgment about whether an object "counts as" φ, it is first necessary to focus attention on a subset of the domain that contains objects that are in some way similar to *x*, and then check to see whether *x* falls "at one end of the other" of the ordered subset. The basic idea can be illustrated by considering example (1). Assume that the domain of the adjective *expensive* is the set of entities that can have some cost value. Among this set are the objects in (2), which are ordered according to increasing cost.

(2) $D_{expensive}$ = {... a nail ... a bag of dog food ... a Hank Mobley album ... a copy of *Stricture in Feature Geometry* ... a dinner at Chez Panisse ... a new BMW ... a house in San Francisco ... the Mars Pathfinder mission ... a manned mission to Mars ...}

If all of the objects in the domain of *expensive* must be considered when evaluating the truth of (1), then it is clear that (1) should be true, since the cost of the Mars Pathfinder mission is greater than the cost of most things. If, however, the context is such that only projects in the space program are relevant, then the comparison class would consist of the subset of $D_{expensive}$ illustrated in (3).

(3) {the Mars Pathfinder mission ... a 15 day space shuttle mission ... a mission to the moon ... the international space station ... a manned mission to Mars}

In this context, (1) would be false, because the Mars Pathfinder mission falls at the low end of the ordering. Other contexts might give rise to comparison classes in which the Mars Pathfinder mission falls at the upper end of the ordered set (e.g., contexts in which the comparison class consists of expeditions involving 6-wheeled vehicles), in which case (1) would again be true.

The initial assumption that the domain of a gradable adjective has an inherent ordering imposed upon it is crucial to the vague predicate analysis, since the truth or falsity of a sentence of the form *x is* φ is determined by the position of *x* in the ordered set (whether it is ordered at the upper end or whether it is ordered at the lower end). Moreover, the inherent ordering on the domain plays an important role in the analysis of vagueness outlined here, as well, since it is necessary that any comparison class constructed from an ordered set *S* preserves the ordering on *S*. If the ordering on the domain was not inherent, but could change from context to context, then a subset of the domain of *expensive* as presented in (2) with the ordering indicated in (1) would be a possible comparison class for (1), with the result that (5) would be false and (6) true *in the same context.*

(4) {a manned mission to Mars ... the international space station ... a mission to the moon ... a 15 day space shuttle mission ... the Mars Pathfinder project}
(5) The Mars Pathfinder mission is expensive.
(6) A manned mission to Mars is expensive.

This would be an unacceptable result: there is a clear intuition that if the basic ordering on the domain of *expensive* is as in (2), then any context in which (5) is true should also be one in which (6) is true. In

order to avoid this problem, Klein (1982:126) stipulates that the ordering on a comparison class must preserve the initial ordering on the domain of the adjective, pointing out that this is not an unjustified assumption; rather, it is "fundamental to the expression of ordering relations in natural language." This claim raises the following question, however: should a principle like this be made to follow more directly from the meaning of a gradable adjective itself? More generally, should the ordering on the domain of a gradable adjective be viewed as a primitive, or should it be determined in some way by the meaning of the adjective itself? The analysis that I have outlined here takes the former position; in the following paragraphs, I will sketch an alternative approach that makes the latter assumption.

The second approach to the problem of vagueness, first articulated in Cresswell 1976 (see also Seuren 1973) but since incorporated into many analyses of the semantics of gradable adjectives (see e.g., Hellan 1981, Hoeksema 1983, von Stechow 1984a, Heim 1985, Lerner & Pinkal 1992, 1995, Moltmann 1992a, Gawron 1995, Rullmann 1995, Hendriks 1995), provides a means of answering the question *does x count as φ in c?* by constructing an abstract representation of measurement and defining the interpretation of a gradable adjective in terms of this representation.[4] This abstract representation, or *scale*, can be construed as a set of points ordered by a relation ≤, where each point represents a measure or *degree* of "φ-ness". The introduction of scales and degrees into the ontology makes it possible to analyze gradable adjectives as relational expressions; specifically, as expressions whose semantic function is to establish a relation between objects in its domain and degrees on the scale. A more general consequence of defining the interpretation of an adjective in terms of a scale is that the ordering on the domain of a gradable adjective is determined by a semantic property of the adjective itself: by establishing a relation between objects and points in a totally ordered set, the adjective imposes a partial order on its domain.

For illustration, consider the domain of the adjective *expensive*, repeated below as (7).

(7) D = {a nail ... a bag of dog food ... a Hank Mobley album ... a copy of *Stricture in Feature Geometry* ... dinner at Chez Panisse ... a new BMW ... a house in San Francisco ... the Mars Pathfinder project ... a 15 day space shuttle mission ... a mission to the moon ... the international space station ... sending people to Mars}

In the vague predicate analysis outlined above, the ordering represented in (7) is assumed to be an inherent property of the domain of the adjective. In the alternative "scalar" analysis, however, the domain of the adjective is unordered, but an ordering corresponding to the one illustrated in (7) can be derived as a consequence of the fact that the adjective *expensive* establishes relations between the objects in $D_{expensive}$ and elements in a totally ordered set of points, i.e., degrees on a scale of *expensiveness*.

The characterization of gradable adjectives as relational expressions supports an alternative approach to the interpretation of vague sentences like (1). Specifically, a sentence of the form *x is φ* is taken to mean *x is at least as φ as d*, where *d* is a degree on the scale associated with *φ* that identifies a "standard" of *φ*-ness. Intuitively, a standard-denoting degree is a value that provides a means of separating those objects for which the statement *x is φ* is true from those objects for which *x is φ* is false, in some context. The structure of scales–specifically, the fact that they are defined as totally ordered sets–ensures that the relative ordering of a standard-denoting degree and a degree which corresponds to the measure of an object's "adjectiveness" can always be determined.

For example, a sentence like (1), on this view, is assigned an interpretation that can be paraphrased as (8), which is true just in case the degree that indicates the expensiveness of the Mars Pathfinder mission is at least as great as the standard value (I will return to a more formal discussion of this approach in section 1.3).

(8) The Mars Pathfinder mission is at least as expensive as a standard of expensiveness.

Within this type of analysis, the problem of vagueness can be cast as the problem of determining the actual value of the standard in the context of utterance. The standard assumption is that the standard value is set indexically, and that its value may be determined by the a contextually relevant comparison class (see Cresswell 1976, von Stechow 1984a, and, in particular, Bierwisch 1989 for discussion).[5] For example, assume that in a context in which the comparison class is determined to be projects in the space program, as in (3) above, the relation between the projections of the objects in the comparison class onto the scale of expensiveness may (i.e., their "degrees of expensiveness") stand in relation to the standard degree d_{stnd} as shown in (9).

(9) *expensive*: $-d_{Pathfinder}-d_{Shuttle}-d_{stnd}-d_{Moon}-d_{Station}-d_{People\ to\ Mars}\longrightarrow$

In this context, (8) is true, because $d_{Pathfinder}$–the degree to which the Pathfinder mission is expensive–is ordered below d_{stnd}. In an alternative context, however, in which the comparison class were such that the standard value were to shift to a point below $d_{Pathfinder}$, (8) would be false. What the scalar analysis "gets for free" is the preservation of the ordering on the domain, because a change in comparison class, with a concomitant change in the value of the standard, does not affect the overall ordering of the degrees on the scale. Since the scale determines the ordering on the domain of the adjective, this ordering remains constant, regardless of a shift in comparison class.

An important similarity between the two approaches to vagueness discussed here is that the context-dependence of vague sentences like (1) is ultimately explained in the same way: in terms of comparison classes. In order to know whether a sentence of the form x *is* φ is true in a context c–whether x "counts as" φ in c–it is first necessary to determine what subset of the domain of the gradable adjective is taken to be relevant in the context. This subset–the comparison class–is then used as the basis for evaluating the truth of the sentence. In the first account, the comparison class introduces the set that is partitioned by the adjective; in the second account, the comparison class is used as the

basis for fixing the value of the standard. In both cases, when the comparison class is changed, the truth of the original sentence may be affected: either the partitioning induced by the adjective may change, or the standard value may be shifted accordingly.

Despite this similarity, the two analyses outlined here differ in a fundamental way. Specifically, they make very different claims about the relation between the meaning of a gradable adjective and the ordering on its domain. In the vague predicate analysis, the ordering on the domain is assumed to be inherent. This assumption not only permits a straightforward semantic analysis of gradable adjectives as predicative expressions, it also provides justification for the assumption that the construction of a comparison class always preserves the ordering on the domain. In contrast, the scalar analysis derives the ordering on the objects in the domain of a gradable adjective from the meaning of the adjective itself, which establishes a relation between domain objects and degrees on a scale (i.e., points in a totally ordered set). This result does not come without a cost, however. Although the scalar approach derives the ordering on the domain, it gives up the analysis of gradable adjectives as simple predicates, treating them instead as relational expressions. In addition, it requires the introduction of abstract objects into the ontology, namely scales and degrees.

The latter difference is of primary importance, as it introduces a potential basis for making an empirical distinction between the two analyses sketched here. If scales and degrees do play a role in the interpretation of gradable adjectives, then it should be possible to show that there are facts which can be explained only if scales and degrees are part of the ontology; such facts would then constitute an argument for a scalar approach. One of the goals of this thesis is to make exactly this argument. In section 1.2, I will introduce several sets of facts which are problematic for the analysis of gradable adjectives as simple predicates, and in section 1.3, I will show that these facts can be straightforwardly explained if scales and degrees are part of the ontology.[6] Before moving on to this discussion, though, some additional semantic characteristics of gradable adjectives that will play crucial roles in the argument will be introduced.

1.1.2 Indeterminacy and the Dimensional Parameter

In most cases, the resolution of vagueness–the judgment of whether an object x "counts as" φ–can be accomplished as described above: either by restricting attention to a particular comparison class, or by determining an appropriate standard. Both of these operations presuppose that the ordering associated with the adjective (either on the domain or with respect to the scale) is determinate, however, since it is with respect to this ordering that the ultimate judgment is made. For many adjectives, however, this presupposition is not met. Consider, for example, the following sentences:

(10) Richard is smart.
(11) *The Devils* is a slow book.
(12) William is liberal.

The truth of a sentence like (10) is *indeterminate* in a way that is different from that of a typical vague sentence such as *Richard is tall*. A particular individual might be considered smart in the role of, for example, a political advisor, but decidedly *not* smart when it comes to social behavior and discreetness. As a result, the truth or falsity of a general statement like (10) is unclear, raising the following question: *smart in what sense*? (11) and (12) are similarly indeterminate. A book might be exciting and engaging, but nevertheless be slow to read due to the complexity of its characters and language. Similarly, an individual might be judged liberal with respect to some issues (e.g., health care, affirmative action); but with respect to other issues (e.g., welfare, immigration), the same individual might not be.

One way to approach the problem of indeterminacy would be to assume that it is a kind of vagueness, arising from a difficulty in some contexts of determining an appropriate comparison class. Although this might be true of (12), examples like (10) and (11) call this characterization of indeterminacy into question. What is at issue in these sentences is not the content of the comparison class, but rather the actual ordering on the domain of the adjective. Adjectives like *smart*, *slow* and *liberal* have a wider range of interpretations than an

adjective like *tall*, in that they permit different orderings on their domains in different contexts of use. For example, *smart* may involve an ordering according to political or strategic skill, or it may be associated with an ordering according to more general notions of social behavior and personal conduct. In the former case, (10) might be judged true; in the latter case (10) might be judged false. What is important to note is that even if the comparison class remains constant–the set of political consultants, for example–the truth value of a sentence like (10) can still vary depending on which of these two interpretations of *smart* is chosen.[7]

Indeterminacy is a characteristic of a large number of gradable adjectives in English, which McConnell-Ginet (1973) and Kamp (1975) refer to as the NON-LINEAR adjectives (see also Klein 1980). A defining characteristic of non-linear adjectives is that comparative constructions in which they appear do not have definite truth values, in contrast to comparative constructions in which otherwise vague adjectives appear; indeed, this characteristic explicitly distinguishes indeterminacy from the type of vagueness discussed in section 1.1.1. For example, (13) has the same status as (10)–we cannot evaluate the truth of this sentence without first knowing the sense in which *smart* is used–i.e., what the criteria for "smartness" are. In contrast, (14) can be evaluated simply by determining the costs of the different missions.

(13) Richard is smarter than George.
(14) The Mars Pathfinder mission was less expensive than the Viking missions.

What the facts discussed here indicate is that the relation between an adjective and a particular ordering relation is not one to one: some gradable adjectives may be associated with more than one ordering on a domain. For example, consider the adjective *large* in the context of cities. Cities can be ordered according to different aspects of largeness, such as volume, population, or even size of the bureaucracy (see Klein 1991:686 and Cresswell 1976:270-271 for discussion); not surprisingly, the NP *a large city* is ambiguous in at least these three ways. In the discussion that follows, I will refer to the aspect according