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Semantic Properties of English Comparatives*

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1. Introduction

Klein (1980, 1982) and Atlas (1984) present interesting semantic analyses of comparative constructions like those exemplified in (1) below :

- (1) a. This board is longer than Jude is tall.
b. Chris is taller than Alex is.
c. Max is cleverer than Bill.
d. Mary is happier than Monica.
e. John is as tall as Brian.

The purpose of this paper is to note certain questions which arise under these analyses regarding the application of the concepts involving "Extension Gap" and the treatment of non-linear adjectival comparatives and some other proposals. Though our discussion will suggest that Klein's theory seems to afford the most promising method of interpreting simple adjectival comparatives, it is argued that these questions should be answered through an expansion of his definitions of the basic ideas treating comparatives. We shall be primarily concerned with the description of semantic properties presented by comparative constructions and discuss how some interesting semantical aspects of the constructions can be accounted for. We shall not attempt to translate the target sentences into expressions of a logical calculus...usually some version of first order logic and we shall not use logical tools in this essay. In section 2, I shall consider compared comparatives in contrast to so-called degree theory of comparatives, following Klein's analysis. In

section 3, it will be argued that Klein's model must face some difficulties in analyzing comparative constructions and we shall propose new ideas in order to overcome the difficulties. In section 4, it will be argued that comparatives with 'as' require us to introduce another new notion of 'Vague partition' in order to explain their semantic properties. In section 5, some problematic constructions will be discussed and we will give reasonable explanations for them within our framework. Section 6 will be given to concluding remarks.

2. Klein's semantics for comparatives is proposed in order to overcome the shortcomings in the degree theory developed by Cresswell's study (1976) for comparative constructions. In Cresswell's analysis of comparatives, he claims that a sentence like

(2) Max is taller than Ben is

makes sense if the degree to which Max is tall exceeds the degree to which Ben is tall on the relevant scale of heights. The idea in the definition of a degree is that the degree to which Max is tall is simply an equivalence class consisting of all things which are neither less tall nor taller than Ben. This idea leads us to use the comparative relation '-er than' as an unanalyzed primitive. This means that this system presupposes an understanding of comparative sentences in order to account for the notion of 'degree'.

Scholars claim that extents could be treated as primitive and it is possible to identify 'the extents to which Max is tall' with some point on the appropriate scale. The notion of 'scale' has been attractive and prevalent in the semantic analysis of comparatives. According to Klein (1982), we rarely spell out what would be meant by saying that there is some extent to which May is miserable or generous in the sentence 'Max is more miserable (or generous) than Jane'. He denies that semantics incorporates extents as primitive, though he admits that it is possible to talk about some extent being a point on the speaker's subjunctive scale for misery or generosity.

Klein (1982) claims that the semantic theory must account for an important semantic difference between (2) and (3):

- (3) Felix is more modest than Moe.

Only one criterion is necessary to determine the truth of (2) and that is the height of the two people. In the case of (3), we must take into account many possible criteria which could be used to decide what modest means. Under any given situations, these criteria may fail to occur coincidentally. For example, Felix may be more reasonable or sensible in his demands than Moe, while Moe has a humble estimate of her own ability. In such circumstances, we must determine the relevant criteria for applying the word 'modest' to give a definite truth value to the sentence in (3). Consequently the semantics for comparatives is required to have a method for determining 'modesty' depending on contextual factors. In exactly the same way, Klein (1980) develops the discussion opposed to the degree theory of comparatives, analysing the word 'clever'. We must note that two deferent orders of dimension should not be confused and this will be discussed later.

To avoid the shortcomings mentioned above, Klein proposes a modeltheoretic semantics for comparatives. His idea is that comparative constructions involve what is essentially a quantification over degree modifiers. That is, he says that there is some value of 'that' such that 'Max is that tall' is true, while 'Ben is that tall' is false. His theory has been established through a critical investigation of positive adjectives. He argues against the attempt to explain the positive adjectives in terms of the corresponding comparatives and insists that we must account for the fact that across a wide variety of languages the positive is formally unmarked in relation to the comparative.

He divides degree adjectives into Linear adjectives and Non-linear ones on the basis of the following definition of Linear adjectives¹.

- (4) Whenever C is a context of use, and NP1, NP2 denote individual within the sortal range of A, then the sentence NP1 is A-er than NP2 has a definite truth value in C.

He observes, as discussed by McConnel-Ginet (1973) and Kemp (1975), that Nonlinear adjectives are associated with a number of criteria, and that these fail to constitute a necessary and sufficient set of conditions for them. From the grouping of adjectives, he suggests that Linear and Non-linear adjections exhibit two dif-

ferent and particular kinds of Vagueness, Graduality and Indeterminacy, respectively. Graduality can be conceptualized as a gradual transition, while indeterminacy is not to determine particular criteria to assign the truth value to the adjectives. The most important point lies in the fact that an indeterminate predicate can be regarded as the meanings of a set of predicates which are either not vague at all or are only gradual. This means that the understanding of Non-linear adjective relies on the knowledge about the meanings of the involved determinate predicates.

Klein (1982) introduces the notion of Vague model along the lines of the discussion mentioned above. In his model, the universe is partitioned into three disjoint subsets: positive extension, negative extension and extension gap. Extension gap is a range between positive [+tallness] and negative extension [−tallness]. We shall show that the notion of extension must be extended under a new light for serving as a tool in the analysis of comparatives.

Another important notion presented by Klein (1980) is that of Comparison Class. We can understand that it is a set of the sets to which things to be compared belong. Klein (1980) defines the comparison class in the following way. We cite his definition for convenience.

“In interpreting a sentence like ‘Lana is clever’ at a context C in which Lana is presupposed to be a chimp, we would naturally understand ‘clever’ to mean ‘clever for a chimp’. We would be concerned with Lana’s cleverness relative to the set of chimps. The latter constitutes the comparison class”. (Klein (1980); 13)

Klein must introduce the notion of comparison class² to overcome the difficulty when he tries to explain the following sentences cited from Klein (1980):

- (5) a. ‘an’ is a longer word than ‘a’.
 b. ‘an’ is a long word.
 c. ‘a’ is a long word.

In this case, we easily recognize the difficulty in seeing how the operation of making a vague predicate more precise can lead to such a context in which ‘an’ is counted as a long word. However, we can constitute a set of word forms consisting of either

one or two letters by considering the comparison class for 'long'. Since a comparison class is a subset of the universe of discourse which is picked out relative to a context of use, it would be possible to develop it within a wider pragmatic theory, as Klein claims.

As can be easily seen in the explanation of (5), there is the psychological difficulty in moving from a set to the more restrictive one. Generally speaking, we may feel such uneasiness when a comparison class is narrowed down rather than when it is expanded³. It is clear that the sentence in (5a) involves an absurdity in the pragmatic sense, though logically possible and grammatical. Unfortunately Klein limits his attention to the analysis of Linear adjectives and does not fully develop the theory so as to cover the whole range of comparatives. For this reason, his model cannot clarify some quite interesting properties of comparatives enough to extend his notions to non-linear adjectival compared constructions.

3. In this section, we shall describe the semantic properties of comparatives and accommodate them by using new concepts and modifying the ideas created by Klein (1980). Among Klein's concepts, two of them are considered important in order to account for some semantic universe of comparatives: EXTENSION GAP and COMPARISON CLASS. But we must consider the former at first and extend it so as to be able to interpret comparative constructions that have particular semantic ranges different from those of positive adjectives. The notion of Extension is developed so as to assign the truth value for a vague predicates. Klein describes adjectival predicates as a vague predicate. The semantic role of a predicate formed by an adjective is to be true or false to an object. But there is some set for which the truth definition for the vague predicate will be partial. Klein claims that such a set falls in the extension gap.

Comparative constructions show a slightly different extension from that of positive adjectives. Consider the following examples.

- (6) a. Max is older than Alice, he is eighty.
 Max is older than Alice, he is forty.
 Max is older than Alice, he is five.
 b. Peter is taller than Jude, he is 6 feet.
 Peter is taller than Alex, he is 5.5 feet.

Peter is taller than Mary, he is 3 feet.

c. Mike is a foot taller than Jude.

d. Mike is taller than six feet (tall).

From (6a) and (6b), we can understand that a speaker is talking about the height and age of a pair of persons and it is possible for them to be classified as old or young and tall or short. However, there must be some distance in age or height between them. Thus the pair of individuals must remain undefined in height or age. In this sense, the gap in scale of graduality between them performs the same function as the Extension Gap in a vague predicate. The extension gap is defined as a range in which a member of the comparison class does not fall. In addition, the extension gap has no boundary partition in the case of the expressions in (6a) and (6b), like that in a positive adjective. The example (6c) suggests that a degree modifier, 'a foot', determines the quantitative scale definitely, that is, the effect of the measure phrase is to fix the partitions on both sides of the extension gap. In (6d), only one partition is made at the point of six feet. The extension gap can move upwards or downwards freely. In other words, the extension gap for comparatives has fuzzy boundaries without a measure phrase but it is never eliminated like that for positive adjectives. In positive adjectives, a modifier 'very' has the effect of shifting upwards the partition imposed by an adjective and 'quite' moves the partition downwards so as to absorb the extension gap. Moreover, the measure phrase like 'six feet' eliminate it.

Now consider the following sentences in which the vague predicates contain degree modifiers, 'very' and 'quite'.

(7) a. ? Bill is very much taller than Alex (is).

b. John is quite alot taller than Felix (is).

As shown by these sentences, the degree modifiers wider the extension gap. As a result, the expression in (7a) has a wider ensension gap than the sentence (7b) does. The adverb 'much' performs the same function as 'very'.

Comparative constructions involve a pair of individuals or things for comparison and each individual or thing partitions the universe in a quite different manner. Thus we can recognize that it is possible for them to be within the same extension

like 'tallness' or a different extension like 'happiness' or 'sadness'. Our notion of the extension gap always exists in 'A-er than' comparative constructions. We proceed to investigate how this extension of comparatives is constructed. Consider the following examples borrowed from Rusiecki (1985).

- (8) a. Max is taller than Alex \Rightarrow a'. Alex is shorter than Max.
 b. Max is older than Alex \Rightarrow b'. Alex is younger than Max.
 c. That Honda is more economical than this Toyota X c'. This Toyota is more uneconomical than that Honda.
 d. My towel is wetter than yours \Rightarrow d'. My towel is wet.
 (where \Rightarrow means 'entail' while X means 'not entail'.)

Using these examples, we want to investigate positive extension and negative extension for comparatives. As the sentences in (8a) and (8b) show, linear adjectives such as tall, old, noisy, deep, etc., have reverse values of extension to their antonymic counterparts in the positive and negative extension. In other words, the range of positive extension for tallness corresponds to that of negative extension for shortness. This means that these kinds of adjective are considered to have a double extension in comparatives that refers to the absolute top and the absolute bottom of the scale for the size of things. The two extensions are connected to each other and form two planes in the semantic space like the structure of phonological features proposed by Clements (1987). The entailment between them can be accounted for by the plane structure of the extension. The sentence in (8c), as pointed out by Rusiecki (1985), indicates that both cars may be economical, both economical, or one may be economical and the other uneconomical. However, Rusiecki notes that 'A is more uneconomical than B' can entail 'B is more economical than A'. In this case, there is a semi-double extension in which the plane is connected only in the negative extension of 'economy'. We can call the double extension a reciprocal one, while the semi-double extension can be referred as semi-reciprocal one, following Rusiecki's terms for positive adjectives. The sentence in (8d) suggests that there is some restriction on the comparison class. This kind of adjective does not have a negative extension in positive, but in the comparative construction it can make a half-double extension with its antonymic counterpart. Thus the comparison nucleus that we will define later can be set on the point on the positive extension of the counterpart,

for example, 'dryness'.

Next consider the sentences as follows:

- (9) a. Alice is happier than Mary is sad.
 b. Mary is more amiable than Jane is quarrelsome.
 c. Max is more sociable than positive.
 d. ?? Max is more sociable than Jane is quarrelsome.
 e. * The meeting is longer than the table.
 f. * John is taller than the carpet is red.

Each sentence cited in (9) contains so-called Non-Linear adjectives which fall in a different semantic category respectively. The data in (9) indicate that two different adjectives must have a common dimension which may be specified as height, emotion, personalty, etc.. In case there is no common dimension between two adjectives, the sentence containing them does not fail to be marked as semantically deviant one. The dimension connects the extension of each adjective together and makes a double extension which constitutes a new semantic space. As Klein (1980) and other writers discuss, the dimension as we now define it may depend on contextual factors. The assay of tallness may be different between Japan and the UIA and the size of a house varies from society to society¹. The dimension is determined by taking account into the variety of contextual factors. Each dimension has a hierarchical structure that is arranged from a higher order to lower one. For example, concerning with cleverness, chimps and human beings are in the same higher order of the hierarchical structure of the dimension, while 'mathematical skill' is in a lower order of the hierarchy than a chimp and so on.

As all the comparative constructions cited here show, another interesting feature of comparatives lies in the fact that in X is A-er than Y, Y functions as a nucleus for comparison. Let us introduce this notion into our analysis and call it the COMPARISON NUCLEUS. The interpretation of comparative constructions mainly depends on the meaning of comparison nucleus. Consider the following examples.

- (10) a. My elephant is bigger than that flea.
 b. That mountain is taller than John.

The sentences cited in (10) will be interpreted as figurative, since the comparison class consists of a disjunctive set in each sentence. It includes two adjectives belonging to a different order of dimension to each other. The sentence in (10a) may have the meaning that that flea is so big that it can be compared with an elephant or my elephant is unbelievably small. The same interpretation process may work in (10b). The comparison nucleus can determine the distance between the mountain and John with respect to tallness and account for the semantic absurdity of the sentence, associated with the difference of the dimension.

However, there are some comparative constructions whose ungrammaticality is explained by the semantic restrictions that adjectives themselves have. The examples are cited in (11).

- (11) a. This bottle is emptier than that.
 b. *My house is more vacant than yours.
 c. *This page is blanker than that.
 d. ??The land is more level than the river's surface.

The adjectives in the sentences (11b, 11c, 11d) cannot subcategorized into a degree adjective. These can be said to constitute a definite predicate and fall in a different group from that of 'empty', though they are synonymous. We shall define them as absolute adjectives. Within our framework, we shall say that the set of comparison class formed by absolute adjectives always is empty. As shown by our discussion, the defect of Klein's semantics for comparatives is that some value of 'that' in, "A is taller than B" such that 'A is that tall' is true, while 'B is that tall' is false", cannot exist in some linear adjectives like 'economical'. Moreover, it is clear that his model fail to explain the relation between 'tall' and 'short' that is presented here.

Klein (1982) insists that his model can account for the sentences cited in (12) in a reasonably natural way.

- (12) a. Chris is much taller than Alex is.
 b. Chris is one foot taller than Alex is. (Borrowed from Klein (1982))

He argues that there are two important semantic properties which must be captured. The first is that 'much' behaves like a vague predicate, and the second is that it behaves like a quantifier. In turn, he notes that 'one foot' will denote a degree of length, acting as a predicate modifier. Furthermore, he observes that it denotes equivalence class of object which is exactly as long as some prototypical object 'f'. It seems to me that he turns to and relies on the concept of degree in order to account for the example (12). If he is right, we could accept the following sentences as grammatical.

- (13) a. *Chris is much.
 b. *Chris is six foot⁵.
 c. Chris is six foot tall.

Now we could say that the data cited in (12) are problematic for Klein's analysis and the degree theory as well. On the contrary, our principles can neatly explain the data without recourse to any new treatment of measure phrase.

Next we shall discuss some other sentences exemplified as follows:

- (14) a. *He is taller than nobody here.
 b. *Bill ran faster than I couldn't.
 (15) a. *John is heavier than fat.
 b. The door is wider than is necessary.
 c. *The door is wider than it is necessary.

The sentences in (14) indicate that comparison nucleus must have a reference point for comparison. The sentences in (15a, c) cannot be accepted, as there are no common dimensions between the vague predicate and the comparison nucleus. It should be emphasized that the comparison class, comparison nucleus and extension including extension gap are all well-established and essential notions for interpreting comparative constructions.

4. In this section, our discussion will be focused on the comparative construction with 'as', that is, so-called equivalent comparatives. We want to conclude whether the extension gap can play any part in this construction and what the extension gap could accommodate, if it exists. The comparatives with 'as' are ordinarily analyses as 'comparative constructions of equality'. This definitions proved to be misleading (Klein (1980), Atlas (1984), Rusiecki (1985)). Klein argues that the sentence in (15a) is equivalent to 'Jim is at least as tall as Robin' in meaning.

(15) a. Jim is as tall as Robin.

b. Jim is as tall as Robin is; indeed he is considerably taller.

He points out that any approach which takes (15a) to mean 'Jim is exactly as tall as Robin' will be unable to explain why (15b) is not a logical contradiction. Klein (1982) successfully show that there is a variant of the comparatives with 'as' which express certain inequality.

However, there is evidence that the sentence in (15a) may not be equivalent to 'Jim is at least as tall as Robin'. Consider the following sentences.

(16) a. Mary is as tall as Robin, if not taller.

b. *Mary is as tall as Robin. In fact, she is shorter than him.

c. ?Mary is at least as tall as Robin, if not taller.

d. *This play is half as long as that one, if not longer.

e. Mary is as tall as Robin. In fact, they are identical in height.

As Atlas (1984) correctly notes, if 'as tall as' means 'at least as tall as', then 'John is as tall as, or at least as tall as Brian' would be redundant, but it isn't. His argument is supported by the data exemplified in (16). Moreover, the sentences in (16a, 16e) suggest that 'as A as' construction may be interpreted as a 'greater than or equal to' relation (Rusiecki (1985)). This leads us to the contradictory situation in which there is some extension gap or no extension gap at the same time. Is it necessary to look for an alternative analysis this time in order to clarify the semantic structure of comparatives with 'as'. Fortunately some examples suggest that this is not the case.

Consider the examples as follows :

(17) a. Jim₂ is as tall as Jim₂. (Jim is used co-referentially)

b. A merchant is good as his word. (Atlas (1984))

c. Bob is as short as Jeff X d. Jeff is as short as Bob.

If 'as A as' comparative expresses 'a greater than or equal' relation, the sentences in (17a, 17b) would have the meanings that Jim₂ is identical in height to himself or taller than Jim₂ and a merchant's goodness is the same or greater than his word, respectively. (Atlas (1984)). Atlas points out that the sentence (17c) presupposes 'Jeff is short' but 'Atlas is as tall as Brian' does not presupposes 'Brian is tall'. As we discussed earlier in section 2, the difference of the presupposition can be explained by asserting that there is a restriction concerning comparison nucleus for adjectives like 'short'. The restriction is defined such that in a vague predicate with a negative value, the reference point of the comparison nucleus must be within the positive extension in comparatives with 'as'. It can be easily justified by the existence of many examples and by the case of 'wet' in the 'A-er than' construction. What the restriction means is that in X is as tall as Y, the reference point of the comparison nucleus 'Y' could be set in both the negative and positive extensions of tallness, but in X is as short as Y, Y is exclusively in the positive extension of shortness.

The close examination of the examples cited in (16) leads us to conclude that there is a vague partition region instead of an extension gap here. By incorporating the notion of a vague partition into our analysis, the particular semantic implication presented in comparatives with 'as' will be able to be explained consistently. The difference between a partition generated by a measure phrase and a vague one is that in the vague partition region, the comparison nucleus is given the position on the side of the negative extension compared with X in X is as A as Y. In other words, the vague partition seems to behave as a kind of degree modifier, but it does not create an extension gap. We can recognize the semantic focus expressed by the vague partition clearly when comparative constructions with 'as' are joined with additional structures like 'if not A-er' or the sentences seen in (16). Fundamentally vague partition only performs covert semantic functions.

Next we shall proceed to the investigation of some other semantical aspects of 'as A as' comparatives. One of them is to explain the quality of semi-redundancy of the sentence in (18), as discussed by Atlas (1984). We shall follow his discussion briefly.

(18) John is as tall as Brian, and Brian is as tall as John.

He argues that only his analysis can explain such semi-redundancy and the other two theories fail to account for it. He develops his argument about it as follows:

(19) "Asserting 'John is as tall as Brian' implicates 'John's height is the same as Brian's'. That implication followed by '...and Brian is as tall as John' is redundant, since the implication 'John's height is the same as Brian's' means 'Brian's height is the same as John's', which entails 'Brian is as tall as John'. Thus the second clause partially reinforces the implication of the first clause". (Atlas (1984): 368)

As pointed by Atlas, it is clear that there is some redundancy as asserting 'John is as tall as Brian' implies 'John's height is the same as Brian's'. The redundancy of the sentence in (18) could be accounted for and his argument may be right. But the sentence in (18) imposes other more serious problem on the analysis of 'as A as' comparatives. The question is why the sentence in (18) is judged as completely acceptable if the sentence 'John is as tall as Brian' means 'John is identical to or greater than Brian in height' or 'John is at least as tall as Brian'. If the example in (18) contains semi-redundancy as illustrated by 'John's height is the same as Brian's', what is the meaning of the non-redundant part of the sentences? Is this question too naive? Contradiction or insufficiency may be seen to be involved in accounting for the meaning of the example (18) 'John's height is equal to or greater than Brian's, and Brian's height is equal or greater than John's'. If so, the sentence in (18) would be excluded as an unacceptable one. But this does not happen. We can assume that the meaning expressed by 'John is at least as tall as Brian' or 'John is greater than Brian in height' makes no covert contribution to the meaning of 'John is as tall as Brian', though it is surely involved. Our argument is supported by the examples cited in (20).

(20) a. *John is as tall as Brian, but Brian is as tall as John.

b. ?John is as tall as Brian, or Brian is as tall as John.

The implication of 'John's height is greater than Brian's' may stem from the choice

of the reference point of the comparison nucleus. Thus there would be no way to explicitly express the implicit semantic content by using our ordinary language. This means that it is impossible to paraphrase the sentence in (18) into other expressions exactly. Thus this analysis suggests that the existence of semi-redundancy in (18) is dubious. The argument that the sentence in (18) is almost tautology or repetition is thought to be closer to the truth.

The addition of adverbs and degree modifiers to comparatives and the adjunct of other constructions all make the same contribution to the formation of the extension gap in the interpretation of comparatives. What we want to show is that 'John is as taller as Brian' clearly has a different meaning from 'John is at least as tall as Brian', 'John is exactly as tall as Brian' or 'John is identical to or greater than Brian'. At first glance, the last sentence correctly expresses the meaning of the sentence in question. However, 'greater than' of course presupposes the extension gap in the semantic field, while 'as tall as' cannot include it and the member of the comparison class are obligatorily in the vague partition. Our analysis is compatible with a linguistic fact presented by comparative constructions. The following examples prove that adverbs or degree modifiers function as generators of the extension gap and indicate their own particular size of gap.

- (21) a. John is more or less as old as Kitty.
 b. This window is twice as long as the table is long.
 c. But for two inches Bill is as tall as Alice.
 d. That picture book is half as wide as it is long.

We can easily see that 'at least' or 'exactly' could work in the same way.

Lastly we want to discuss the proposition proposed by Atlas (1984). His proposition is cited here for convenience to discussion.

- (22) For unmarked, gradable Q, X is as Q as Y means 'Whatever (measure of) Q-ness Y has (exhibits), X has (exhibits) also.'

Concerning the notion of unmarked, he says that 'tall' is the unmarked, more frequently occurring item. It must be noted that the frequent occurrence is too obscure and imprecise to be a criterion. The term 'measure' will surely give rise to

the severe objections because it may ascribe his theory to the degree theory. To avoid the objection, the measure is considered as the measure M of Q -Ness that X exhibits. In his view, if an individual exhibits measure m of tallness, he exhibits measure of m' if $m' < m$. The point of this definition is that ' X exhibits some measure m of 'tallness' does not entail ' X is tall'. In our view, X could be in any position in the full range of the extension if it can fix a comparison nucleus successfully. The extension is thought to correspond to his notion of measure in a rough sense. He may rely on the preference of 'up' to 'down' found in the language user's common knowledge in order to explain the implication of 'greater than' in 'as Q as'. Even though he could adopt the cognitive biases together with his proposition as tools of accommodation, his analysis would lack explicitness. In addition, he says nothing about the behavior of marked adjectives and naturally his model cannot explain the implication that Bill is set on the more positive side of the extension in comparison with John in 'Bill is as short as John'. This means that there is the preference of 'down' to 'up' in this case.

5. Here we want to discuss polarity items and other interesting items found in comparatives. In his analysis of comparatives, Seuren (1973) discusses the polarity items in order to justify his underlying structure of comparative constructions. He notes that negative polarity items such as 'can possibly' and 'care to' can occur in a comparison nucleus clause.

- (23) a. *I could possibly catch up with him.
 b. I could not possibly catch up with him.
 c. Jean was a slower learner than I could possibly catch up with.
- (24) a. *My cat would care to be dirty.
 b. My cat would not care to be dirty.
 c. His dog was dirtier than my cat would care to be.

Conversely, affirmative polarity items like 'pretty' do not occur in than-clause.

- (25) a. *I wouldn't pretty much like to study hard.
 b. I would pretty much like to study hard.
 c. *Alex studies harder than I would pretty much like to.

Seuren (1973) argues that there is a negation element in the underlying structure of comparatives, though no overt negation is present in the surface representation. This means that negation appears in the semantic representation of the comparison nucleus. If Seuren is right, this would not impose any difficulty on our proposal. The assumption that the comparison nucleus involves a negative element enable us to judge the sentences in (14) as semantically deviant, as they violate both conditions that double negation by negative element of a comparative nucleus is not permitted and that a comparison nucleus must have a definite reference point.

The following examples that McCawley (1981) and Klein (1982) cite as evidence against Seuren's proposal strengthen our proposal.

- (26) a. His dog was as dirty as my cat would ever care to be.
 b. *Alex studies as hard as I would pretty much like to.

I shall not attempt an explanation as to why negative polarity items can occur in if -clause and questions. In this context, Seuren's discussion should be said to be shaky. Klein admits that this is an example of a class of linguistic contexts which cannot be reduced to a single logical configuration.

Citing the following examples, Seuren (1973) observes that there is an interesting distinction between the grammatical and the ungrammatical. However, Seuren does not make any effort to clarify the reason for the ungrammaticality, as far as I know.

- (27) a. John bought many older cars than that Ford (is).
 b. *John bought many older cars than Bill (did).
 c. John never bought any older cars than that Ford (is).
 d. *John never bought any older cars than Bill (did).
 e. *What John bought was many older cars than what Bill bought.
 f. John bought an older car than Bill (did).
 g. John bought older cars than Bill (did).

Seuren says that the indefinite article in (27f) does not represent genuine quantification, which can be understood by the distinction between grammatical and ungrammatical as holds between (27a, 27c) and (27b, d, e). However, such a distinction

explains nothing about the reason for their ungrammaticalities and why we can say (27f, g).

Within our framework, a comparison nucleus may account for the difference which occurs in their grammaticalities. The comparison nucleus must have a definite reference point, as pointed out earlier. This means that the reference point must be specified in comparative constructions. From this point of view, in (27a, c, f) each comparison nucleus is thought to have a specific point of reference like 'that car called Ford' and 'Bill's car'. In spite of the occurrence of the plural noun 'cars', the sentence in (27g) is grammatical, as the comparison nucleus 'Bill's cars' is recognized as a set, that is, each car is not referred to. In these sentences, the indefinite meanings of the words like 'an' could have no influence with the interpretation of the comparison nuclei.

On the other hand, the sentences in (27b, e) are regarded as a synonymous and could be treated in the same way. These two sentences might force us to specify 'many cars of Bill's' as the comparison nucleus. Such a comparison nucleus can be seen not to have a specific point of reference because 'many' and 'any' in (27d) never refer to each specific car. In other words, it has many points of reference and we cannot specify the object to be compared to. Next our discussion will turn to the case in which a comparison class cannot be formed. The sentences in (28) are borrowed from Seuren (1973).

- (28) a. *Six feet is as tall as John.
 b. *Six feet is smaller than John.
 c. ??Six feet is as much as John is tall.
 d. ??Six feet is more than John is tall.
 e. ?Six feet is as much height as John has.

It is clear that the examples cited in (28a, b) cannot be constituted within the common comparison class between 'six feet' and 'John', because there is no reason why the comparison nucleus 'John' should specify its reference point within the dimension of 'length'. In the case of the other examples in (28), we found a some difficulty in finding the common dimension for the comparison and in not partitioning the universe so that the comparison class comes into existence. The examples (28c, d) are judged as completely acceptable by Seuren, but our informants insist that

these sentences are unacceptable. The oddness of these sentences including (28e) tells us that this is the case and the acceptability of these sentences could swing from person to person. Though in the sentence (28e) the reference point of the comparison nucleus is easily identified, the phrase 'six feet' may force us to incur the dimension of 'length'. This could be the cause of the oddness of the sentence.

Larson (1988) notes that the following sentence in (29a) is ambiguous according to the relative scope of the comparison nucleus and 'someone'. According to his analysis, the sentence can mean that there is some person X who is smarter than every other person Y (narrow scope for 'everyone') and can mean that for every person X there is some person Y who is smarter than they are (wide scope for 'everyone').

- (29) a. Someone is smarter than everyone.
 b. Someone is smarter than everyone is.

He says that (12b) only has narrow scope reading for 'everyone'. Our analysis suggests that this ambiguity can be reduced to the way the comparison class is constituted for (12a). It is natural that the interpretation of (12a) should involve the meaning of (12b) because 'is' can be deleted from (12b). As we have already discussed in (27), 'everyone' would involve 'someone' when the comparison nucleus 'everyone' is interpreted as a set. On the other hand, the wide scope reading could occur when the comparison nucleus refers to each member of everyone. (12a) is acceptable because we can specify some person.

6. CONCLUSION

We have argued that it is necessary to introduce new ideas in order to give the appropriate semantical explanation to comparative constructions. The modified extension gap plays an important part in interpreting degree modifiers in comparatives and the plane structure of extension can account for the relation of entailment. The vague partition should be equipped for the analysis of the implication created by comparatives with 'as'. The extension gap and the vague partition share some characteristics in common. Our explanation depends on other important concepts: comparison class, comparison nucleus, dimension. We can see that semantic space is partitioned by a comparison class from universe. The Comparison nucleus and dimension make a contribution to the judgment of the grammaticality or acceptability.

lity of comparatives. Our concept of dimension could apply to the pragmatic interpretation of comparative constructions, as it is defined as having a hierarchical structure.

We did not discuss the comparatives with 'less' and 'not as A as' here, but these constructions will impose no difficulty on the framework developed here. Our discussion shows that the notion of logical equivalence may be misleading, as there are two structures that are logically equivalent but not synonymous. This suggests that any analysis of comparative constructions exclusively depending on logical calculus may result in serious problems. It might be possible to incorporate our devices into a formal theory of semantics.

NOTES

1. For a detailed discussion of groupings of adjectives, see Rusiecki (1985). Rusiecki's categorization of them is very interesting and useful. Rusiecki defines Linear as numerical and Non-linear as non-numerical.
2. Rusiecki (1985) proposes the concept of 'reference set' similar to Klein's comparison class. In Rusiecki's theory, a reference set subcategorizes dimensions such as 'height, age, etc.'
3. For details, see Lewis (1979).
4. The semantic properties of adjectives also differ from society to society. For example, the following Japanese sentence is unacceptable, though we can have the English sentence corresponding to it.
(a)*Kono bin-wa ano bin yori karada. (this bottle is emptier than that).
5. This sentence is completely acceptable in the conversational context.
A: How tall is John?
b: Oh, he is six foot.
This was suggested by Weedon-Newstead who is a foreign instructor of our college.

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