Dimension accessibility as a predictor of morphological gradability

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Existing formal theories represent the interpretations of gradable predicates in terms of single scalar dimensions. This paper presents a new approach, which aims to cover morphological gradability in multidimensional adjectives and nouns. Following psychological theories, nouns are assumed to be associated with dimension sets, like adjectives do. Degree constructions are proposed to involve quantification on dimensions. The approach correlates the acceptability of a given noun or adjective in comparison constructions and its type of characteristic categorization criterion (i.e., whether, as a default, its dimensions combine into a single criterion via quantifiers or other operations). A preliminary study confirms the predicted correlation. Directions for future research are proposed.

Key words: Degree, Adjective, Noun, Comparison, Dimension, Similarity.

1. Adjectives vs. nouns in comparison constructions

1.1 The challenges

In model-theoretic, referential semantics, the interpretation of a predicate (a word like *dog, big,* or *card game*) is modeled through its intension, namely, a function from contexts (such as worlds, times, or information states) into classes of entities, contextually given extensions. By contrast, in cognitive psychology, concepts such as 'dog', 'big', or 'card game' are modeled through their dimensions, prototypes, and similarity structures. Gradually, it is comprehended that both formal and conceptual representations play a role in natural language semantics. This is evident in the study of morphological gradability, the topic of the present study.

Natural language predicates divide into various syntactic categories, two of which are adjectives and nouns. Most adjectives, including, for example, *tall, expensive* and *healthy,* are *morphologically gradable,* meaning that they felicitously combine with degree morphemes, as in *taller, tallest, too tall, tall enough* and *very tall*. However, some adjectives exist that are not morphologically gradable, including, for instance, *geological, prime,* and *even*; e.g., a map can be said to be *more expensive* than another map, but not *more geological* than the latter.

Degree morphemes that classically combine with gradable adjectives are, by and large, incompatible with nouns, as the infelicitous forms in (1a) illustrate. The situation persists across languages (Baker 2003). In particular, within-noun comparisons such as (2) are not naturally used to compare, e.g., real ducks. Their status improves only when, e.g., toys or drawings of ducks are discussed, namely in non literal interpretations of *duck* ('duck-like'). In English, when the noun occurs as the complement of a mediating particle, such as the preposition *of* in (3a), this also raises the acceptability of the within-noun comparison. Moreover, given nouns like *duck* as inputs, morpho-syntactic processes may yield adjective phrases as outputs, such as *duckish* or *duck-like,* which are compatible with degree morphemes, as illustrated in (3b).

(1) *#Ducker, #Duckest, #duck enough, #too duck, #very duck*
(2) #The rightmost bird is more a duck than the leftmost bird.
(3) a. The rightmost bird is more **of** a duck than the leftmost bird.
b. This toy bird is more {duck**ish,** duck-**like}** than that toy bird.

Hence, generally, nouns are thought to be incompatible with degree morphemes. While the data can be captured by stipulating a syntactic constraint along these lines, researchers of gradability explain the data by postulating a semantic type difference. Nouns are conventionally thought to denote, in each context of evaluation, sets of entities, whereas adjectives are often thought to denote a scalar dimension; e.g., in every world, *long* denotes a function, f_{long}, from entities to their degrees on the length dimension. Non gradable adjectives are represented in terms of binary dimensions (Kennedy 1999; see von Stechow 1984 and Heim 2000 for slightly more complex degree-based types). Dimensions form the basis for categorization; e.g., in each context, entities whose length exceeds a contextual membership norm are classified as *long*.

The problem for a syntactic-category and/or semantic-type approach comes from gradable constructions that ARE acceptable with nouns. The unacceptable construction in (2) above is a *within-predicate comparison*, namely, a comparison of two entities along the dimensions of a single predicate (*duck*). But the *between-predicate comparisons* in (4a) and (5a,b), which involve comparisons of single entities along the dimensions of two different predicates, seem to have different distributional constraints. Many dimensional adjective pairs cannot naturally co-occur in such comparisons, as illustrated in (4b) (Kennedy 1999), while between-noun comparisons, such as (5a,b), appear generally natural – clearly more than their within-noun counterparts in (5c,d). A mediating particle *of* is mandatory for the latter to sound natural.

(4) a. This dish is more sour than sweat.
b. #The table is {longer, more long} than heavy.
(5) a. Rubinstein is more a pianist than a conductor.
b. This creature is more a crab than a lobster.
c. #Rubinstein is more a pianist than my son
d. #This creature is more a crab than that one is.

Between-noun comparisons are often analyzed in metalinguistic terms. For example, Morzycki (2011) describes them as comparisons along degrees of imprecision of propositions in the sense of Lasershon (1999). On this analysis, (5a) conveys that the proposition *Rubinstein is a pianist* is closer to the truth than the proposition *Rubinstein is a conductor*. One problem is that both of these propositions are plainly true, thus to capture examples like (5a), Morzycki's imprecision scale has to include various degrees of plain truth. The basis for the distinction between these degrees seems to lie in the prototypicality structures underlying categorization under *pianist* and *conductor*, but the details of this intuition has yet to be explicated.

What is more, Morzycki (2011) convincingly criticizes previous analyses on the grounds that they are not restrictive enough, but his account is not restrictive enough either; e.g., (5d) is judged less natural than (5b) despite the fact that the propositions *This is a crab* and *That is a crab* may differ in terms of their distance from the truth just as much as the propositions *This is a crab* and *This is a lobster* may. Nor is the data in (1)-(2) explained, e.g., why can't degree morphemes such as *very* and *too* combine with nouns and relate to imprecision-based scales? In sum, metalinguistic scales of imprecision (or of speakers' preference, cf. Giannakidou & Yoon

2011) do not form an exhaustive account of gradability in nouns. This paper proposes that these scales emerge as a consequence of the workings of categorization mechanisms. Only the latter have the potential to explain the complexity of the data.

The goals of this paper are programmatic. It aims to give a direction for an explanation of morphological gradability and to begin developing methods to test its predictions, rather than to report some complete results. The goal is to assess more systematically the relative acceptability of nouns in different comparison types, and to begin testing additional, more specific predictions of the hypothesized account, while indicating the issues which are left open for future research.

Multiple factors may affect judgments of acceptability, including, for example, syntactic well-formedness, adherence to a language norm or register, frequency of use, and semantic-pragmatic appropriateness (Bard et al. 1996). Focusing on semantic-pragmatic aspects, this paper explores the proposal that, in explaining the status of predicates in degree constructions, an important factor is the role of their dimensions in categorization. Classification under *long* is merely a matter of length, but classification under, e.g., *healthy* is a matter of degree in a variety of dimensions, such as blood-pressure, cholesterol and blood-sugar level. One can be healthy in some respects but not others (Kamp 1975; Klein 1980). Hence, in addition to the fact that, in each context, predicates denote degree functions and are associated with entity sets through classification norms (Kennedy 1999), I propose that the relation *dimension of* associates each predicate (e.g., *bird*, *healthy*, *similar*), in each context, with a set of one or more predicates – its contextual dimensions (e.g., *has a beak*, *healthy with respect to the flu*, *similar in shape*).[1]

While degree functions and entity sets can be learnt independently of a specification of dimensions, speakers do seem to make pervasive use of dimensions in decisions about degrees and categorization. For example, as explained in section 1.2, the degree functions of nouns are often determined using the degree functions of their dimensions (to be functions from entities into the degree to which their values in the dimensions match certain ideal values).

Previous formal accounts have been considering comparison constructions from the perspective of one-dimensional adjectives such as *long*. However, the naturalness of comparison constructions with multidimensional adjectives and even nouns suggests that the comparison morpheme denotes an operation that can access their dimension set and use it for comparison. An important question arises concerning semantic composition. How do the different dimensions of a predicate and the operation denoted by a degree morpheme combine?

The following paraphrases of hypothesized readings of comparison constructions illustrate the potential relevance of dimensions and the way they combine together. Examples (6a) and (6b) include paraphrases for within-adjective comparisons with a dimensional and a multidimensional adjective, respectively. Examples (6c) and (6d) include possible paraphrases for between-predicate comparisons with multidimensional adjectives and nouns, respectively. A more systematic study is needed to determine whether such readings indeed exist.

(6) a. *The sofa is 2 centimeters longer than the table (is)*: The difference between the degree of the sofa and the table in the dimension underlying entity classification as *long* or not, f_{length}, equals twice the degree of a centimeter.

b. *(Generally) John is healthier than Bill*: (Generally), the difference between the degrees of John and Bill in the dimensions contextually underlying entity classification as *healthy* or not, $f_{blood\ pressure}$, $f_{cholesterol}$, $f_{chickenpox,\ \ldots}$, exceeds zero.

[11] Describing in detail a formal model and the ways it addresses philosophical arguments against dimensions would demand more space than allocated for this paper, but see Sassoon (2013a) for extensive discussions.

c. *John is more optimistic than pessimistic*: The number of dimensions along which john is *optimistic* exceeds the number of dimensions along which he is *pessimistic*.
d. *John is more (of) a linguist than a psychologist*: The number (or proportion) of dimensions of *a linguist* which membership norm John exceeds is higher than the number of dimensions of *a psychologist* which norm he exceeds.

These paraphrases suggest that comparison morphemes involve *quantification over* or *counting of dimensions*; e.g., it follows from (6a,b) that a degree difference in at least SOME dimensions of an adjective should be present for within noun comparisons to hold true. In positive multidimensional adjectives such as *healthy,* the requirement might be stronger such that a degree difference should generally be present in ALL or MOST of the dimensions. Furthermore, it follows from (6c,d) that a larger NUMBER or PERCENTAGE of dimensions of a predicate in comparison to another predicate should be observed in an entity for the comparison to hold true. Without *of*, comparison (6d) appears ambiguous between such an interpretation, which seems especially accessible for American English speakers, and an alternative one, whereby the relative similarity of John to the prototypes of *linguist* and *psychologist* compare. Intuitively, John may neither have any properties of linguists nor of psychologists, but still resemble their prototypes to different extents, if he is, for instance, a typical philosopher, or maybe a child (Sassoon 2015).

Much data suggests that, as a default, in categorization, the degree functions of the nominal dimensions combine to form a single similarity function through *averaging operations* such as weighted sums or products, as assumed in psychological *similarity theories* (cf., section 1.2). By contrast, as a default¸ the degree functions of adjectival dimensions appear to combine through *counting operations*, such as those that formal, logical theories assume for quantifying expressions like ALL, MOST or SOME (cf., section 1.3). Thus, the hypothesis in (7) emerges:

(7) a. **The Quantificational Hypothesis**: In within-predicate comparisons (cf., (6a,b), (3)), in other degree constructions such as those in (1), and possibly also in between-noun comparisons like (5a,b), the degree morpheme combines with the dimensions of the predicates via a counting operation (quantifier) in its semantics.
b. **The reduced acceptability of nouns**: If the dimensions of a predicate are already bound by similarity operations, it is impossible or hard for a quantifier to access and bind them. As a result of this impossibility (or extra processing cost involved in overriding the similarity operations), acceptability reduces.

The following tests suggest that the dimensions of multidimensional adjectives are more accessible than those of nouns for grammatical operations, and in particular, quantifiers, to operate on (Bartsch 1986; Landman 1989; Sassoon 2013a). Linguistic labels of operations on dimensions include prepositions, as in (8a), quantifiers, as in (8b), exception phrases, as in (8c), and quantifying adverbs, as in (8d), which on the relevant reading convey that their adjectival argument holds in all (or most) respects. The dimensions of nouns, by contrast, are not easily accessible in this way, as the reduced acceptability of the nominal examples in (9) illustrates.

(8) a. healthy **with respect to** blood pressure; good **in** math.
b. healthy in {**some, most, every**} respect(s); different **in three** respects.
c. healthy **except for** high cholesterol; identical except in two respects, size and color.

d. **perfectly** healthy; {**mostly, completely, totally**} different.

(9) a. #bird with respect to size; #dog in movement.
b. #tiger in {**some, most, every**} respect(s); #table **in three** respects
c. #is a bird **except for** size; #is a snake except in two respects, length and color.
d. #**perfectly** (a) pine; #{**mostly, completely, totally**} a duck.

Accordingly, the within-predicate comparison morpheme (*-er* or *more*) and similar degree morphemes may denote operations on dimensions, which are incompatible with nouns, presumably because their dimensions are already bound by similarity operations and thus inaccessible as stated in (7b). Moreover, according to the quantifying hypothesis in (7), the acceptability of within-predicate comparisons (e.g., (6a,b) and (5c,d)) should correlate with the acceptability of constructions involving quantification over dimensions, such as those in (8)-(9), because it is hypothesized that the same problem underlies the reduced acceptability of nouns in all cases. The acceptability of these constructions is assumed to depend on the accessibility of the dimensions, namely, the possibility for a quantifying operation to bind them. These predictions extend to similar degree constructions such as those in (1) and possibly to between-predicate constructions, if those indeed have interpretations such as those in (6c,d). Finally, presumably, mediation by morphemes such as *of* raises acceptability, because these morphemes combine with the noun to prepare a set of dimensions for *more* to operate on, thus labor is divided between the two morphemes. But dimension accessibility may still affect processing and thus acceptability.

Much theoretical work is needed to develop this idea and experimentation to test it. However, the present paper focuses on the more basic, general motivation for the quantifying hypothesis. To better understand the determinants of dimension accessibility, the following two sections review studies of the role of dimensions and dimension-binding operations in categorization. We start by discussing the role of similarity and similarity operations in categorization under nouns.

1.2 Psychological theories of similarity-based categorization

Consider, for example, ordinary concepts such as *games*. The intuition that all games have something in common has been prevalent since antiquity. It led to the domination of the classical view of categorization and predicate interpretation as based on definitions, namely necessary and sufficient conditions for membership in the extension. Wittgenstein (1953) encouraged his readers to check whether there is anything in common to, e.g., board games, Olympic games, and word games. This move has led many to reject the classical view on the grounds that definitional properties are rarely, if ever, found. For example, one might think of a game as a physical activity, but this is not valid for chess. One might consider competition against opponents, but solitaire does not involve any opponents. Winning and losing characterize solitaire, but when a child throws a ball at the wall they too disappear. Thus, a member of a natural category may share a slightly different set of properties with each other member. Generally, resemblances between members are much like resemblances between family members.

This conception of categorization in terms of family resemblance triggered the development of fruitful experimental paradigms, including extensive work within cognitive psychology (for a review see Murphy 2002). This work has shown that speakers associate concepts with sets of dimensions, and they systematically consider entities that score highly in these dimensions better examples than others of the concepts in question. For example, some of the *bird* dimensions include, e.g., *having feathers, wings, beak, small size, egg-laying, flying, singing* and *perching*.

Thus, a robin is considered *more typical* or *representative* of *a bird* than an ostrich (Rosch 1973). When subjects are asked to rate an item by typicality their ratings are highly similar (McCloskey and Glucksberg 1978). Furthermore, typicality is a strong predictor of categorization probability (Hampton 1998) and speed (Rosch 1973); e.g., the verification of sentences like *a robin is a bird* is faster than of sentences like *an ostrich is a bird*. But in a context such as *the bird walked across the barnyard*, at which a chicken is regarded as a typical bird, categorization is faster for *chicken* than for *robin* (Roth and Shoben 1983).

These results motivated **the prototype theory,** which models conceptual structure via a set of weighed dimensions and selected dimensional values that characterize what the best example p of that concept is like, whether such an object exists or not. Each dimension F has a *weight* W_F (e.g., W_{flying} tells us how important flying is in classification) and a *selected value*, $f_F(p)$ (e.g., $f_{size}(p_{bird})$ represents the ideal size for birds). The typicality of an item d in a category like *bird* is modeled by d's similarity to the prototype of bird, p_{bird}; e.g., the similarity of a robin to a bird is indicated by its averaged degree in the bird dimensions: How well its values match the prototypical values in the dimensions. Since instances of a concept may resemble the prototype in some properties or others, but not necessarily in all its properties, similarity among them is described as family resemblance.

Categorization, on this view, is a process in which it is decided whether an entity is similar enough to a concept's prototype. Thus, the tight coupling between similarity and membership is captured (Hampton 1998). Moreover, newly encountered entities which average better than known members are correctly predicted to be automatically regarded as category members. Thus, this account captures the fact that we are able to categorize infinitely many new instances under the concepts we are familiar with, based on a finite set of encoded dimensions and members. Classification of atypical instances is slower because they have low degrees in the dimensions. Thus, more dimensions have to be considered to determine membership.

Two main types of similarity functions, additive and multiplicative, are relevant to us, because nouns associated with them are predicted to exhibit different levels of dimension accessibility, as explained shortly. *Additive Similarity* can be modeled as the weighted sum of x's dimensional degrees, as in (10) (Rosch and Mervis 1975) [2], while *multiplicative similarity* can be modeled by the weighted product of x's dimensional degrees, as in (11) (Medin and Schaffer 1978).

(10) **Additive similarity**: $S(x,p) = w_{F1}f_{F1}(x) + \ldots + w_{Fn}f_{Fn}(x).$

(11) **Multiplicative similarity**: $S(x,p) = f_{F1}(x)^{W_{F1}} \times \ldots \times f_{Fn}(x)^{W_{Fn}}$

Multiplication models cases in which the most radical decrease in similarity is between entities which perfectly match the ideal in all the dimensions and entities which mismatch in just one or very few dimensions. For instance, assuming, for simplicity, equal dimensional weights and dimensional degrees between 0 and 1, then even instances which match in all of the dimensions except for a 0.5 score in one dimension, have a low mean similarity, 0.5, because multiplication yields $0.5 \times 1 \times \ldots \times 1 = 0.5$ (Murphy 2002). Two 0.5 scores yield a mean similarity of 0.25, and so on. The decrease predicted by additive similarity is by far less drastic.

For example, each *bird* sub-species is associated with a bundle of dependent or interrelated dimensions, such as shape, color, behavior, genetic layout, inner biological function and

[2] With binary dimensions (dimensions denoting functions from entities to 0 or 1), and weights indicated by the number of category members satisfying them ($W_F = |\ [[bird]] \cap [[F]]\ |$), similarity reduces to x's family-resemblance score – the number of dimensions all -members share with x (cf., Tversky 1977).

offspring characterization. Multiplication models the fact that a shift in one dimension is usually sufficient to justify classification in a different sub-species; e.g., all robins resemble prototypical robins in being small, eating seeds and fruit, and communicating by singing, whereas all eagles resemble prototypical eagles in being big, eating animals, and communicating with calls. An entity which is somewhat a robin and somewhat an eagle would not classify as either; instead, it would classify as a new species. Thus, multiplicative similarity is recognized by a tendency for interrelated dimensions and gaps between categories, whereas additive similarity is recognized by independent dimensions and category overlaps; e.g., a scholar with some properties of a linguist and some properties of a philosopher may well count as both.

To study dimension integration in different noun domains, Hampton, Storms, Simmons and Heussen (2009) have invented scenarios with borderline cases. On one scenario, a historical nuclear accident nearby a remote island resulted in the evolution of hybrid creatures, e.g., a subkind with some features of lobsters and some features of crabs. In a second scenario, a secluded community in a remote area had the habit of using artifacts in ambiguous ways; for instance, some pieces of clothing had features of both a scarf and a tie. Participants were asked to help scientists classify the entities. In line with multiplicative-similarity, hybrids of two natural kinds were often classified in neither one of the kinds. By contrast, in line with additive similarity, hybrids of social categories were often classified in both categories.

In an additional study, categorization under labels of artifacts and human traits, unlike animals and plants, appeared to often be based on a simple counting strategy, i.e., on whether entities were within the norm in *some* (or *most*) of the concept's dimensions (Wattenmaker 1995). This was modeled with additive similarity, assuming binary dimensions (dimensions which denote functions from entities to 1 or 0) of equal weights. This case is unique in that the effect of averaging can be represented via quantifiers. A social noun N is interpreted as denoting the property that an entity x has if and only if x is within the membership norm ($f_F(x) = 1$) in SOME (or MOST) of N's dimensions. This property discerns social nouns from natural-kind nouns, in which categorization is based on multiplicative similarity (a weighted *product*, rather than *sum*, as in (11)), so that even a representation of their dimensions as binary and of equal weights does not yield classification based on dimension counting. Thus, given the quantificational hypothesis in (7), social nouns are predicted to be more compatible than natural-kind nouns, not only with quantificational dimension-binding operations such as those in (8)-(9), but also with degree morphemes such as those in (1)-(6).

Notice, however, that the adjective-noun distinction confounded the results of Wattanmaker's (1995) study. Most of the social concepts in his experiments were adjectives applicable to humans, and most of the natural kind concepts were nouns. Thus, the reported findings indirectly support the view that adjectives and social nouns, but not natural-kind nouns, may be interpreted by means of quantification (dimension counts). The next section reviews linguistic data suggesting that quantification on dimensions is indeed prevalent in categorization under adjectives. But this methodological issue highlights a broader point. To achieve better understanding of the complexity of language cognition, a need arises for tighter collaboration between linguists and psychologists. This need is precisely what this book is meant to address.

1.3 Logical operations of quantification on dimensions in adjective categorization

Consider, for example, the adjective *identical*. Native speakers intuitively judge entities as *identical* if and only if they are identical in *all* (or *most*) of the respects that count as relevant in

the context. By contrast, they intuitively judge entities to be *different* if and only if they are different in *some* (at least *one*) respect. Objects are considered *clean* if and only if dirt of *no sort* (dust, stains, etc.) is attested on them, while they are considered *dirty* if and only if dirt of *some* sort is attested. Individuals with a slight cold are *not* strictly speaking *healthy*, since they are not *all* healthy, while one type of sickness suffices to count as *sick*.

Considering these, among many other examples, the following hypotheses emerge. First, the dimensions of adjectives seem to be integrated using quantification or counting operations. Second, the dimensions of positive adjectives (like, e.g., *identical, healthy* and *clean*) appear, as a default, to be integrated by means of *universal quantifiers* (ALL, NO). By contrast, those of their negative antonyms appear to be integrated by *existential quantifiers* (SOME); e.g., intuitively, to count as healthy, one cannot have any serious disease, whereas to count as sick, one must have some disease or other. Hence, *healthy* seems to mean healthy in ALL respects, and *sick* – sick in SOME respects. We may consider one to be healthy (or not to be sick) despite, say, high cholesterol only when this dimension is considered irrelevant. When using expressions like *all* or *everybody*, the standard practice is to ignore irrelevant entities (von Fintel 1994), but not to allow any other exceptions. Moreover, the discourse in a given context may revolve around, e.g., cholesterol problems, such that *healthy* and *sick* would associate uniquely with this dimension. Thus, positive adjectives also have weak interpretations.

Several corpus and judgment studies (Sassoon 2012, 2013b; Shamir 2013) explored these hypotheses. They suggest that, indeed, universal and existential quantification on dimensions is general among positive and negative adjectives, but rare in concrete nouns. The methodology exploited the fact that exception phrases indicate universal generalizations (generalizations, unlike existence statements, can have exceptions). This fact is illustrated by the higher acceptability of (12a,b) than of (12c,d) (von Fintel 1994; Hoeksema 1995; Moltmann 1995; Fox and Hackle 2006). Notice that, as logical theories predict, negated existential quantifiers are universal (cf., (12b)), and negated universal quantifiers are existential (cf., (12d)).

(12) a. Everyone is happy except for Dan
b. No one is happy except for Dan
c. #Someone is happy except for Dan
d. #Not everyone is happy except for Dan

In accordance, speakers tend to accept exception phrases with adjectives whose dimensions combine via an implicit universal quantifier ALL, but not with their negative antonyms, whose dimensions combine via an existential quantifier SOME, cf. the acceptability contrast in (13a,c) (Hoeksema 1995). And since negated existential quantifiers are universal and vice versa, the effect is reversed in the presence of negation. Hence, exception phrases tend to be accepted with negated existential adjectives, but not universal ones, as illustrated in (13b,d).

(13) a. I am **healthy** except for high blood pressure (bp) ($\forall$F≠bp, I'm healthy in F).
b. He is **not sick** except for the flu ($\neg\exists$F≠flu, He's sick in F/$\forall$F≠flu, He's healthy in F).
c.#I am **sick** except for normative blood pressure (#$\exists$F≠bp, $\neg$(I'm healthy in F)).
d.#I am **not healthy** except for (normal) cholesterol (#$\exists$F≠ch, $\neg$(I'm healthy in F)).

These judgments are supported by distributional patterns, as revealed in a study of 1300 naturally occurring examples of the form 'Adj. except' with 8 antonym pairs in positive vs.

negated contexts (Sassoon 2013b). Frequency of co-occurrence of an adjective with dimensional exception phrases depended both on adjective polarity (positive vs. negative) and context polarity (existence or absence of negation), which interacted significantly ($p < .001$). **Universality**, i.e., frequency of implicit universal quantification on dimensions, as measured by the frequency of exception phrase modification of an adjective in contexts without negation, was higher in positive adjectives (cf., (13a)) than in their negative antonyms (cf., (13c)), whereas **existentiality**, i.e. frequency of implicit existential quantification on dimensions, as measured by frequency of exception phrase modification of an adjective when negated, was higher in negative adjectives (cf. (13b)) than in positive ones (cf. (13d)). Moreover, in positive adjectives, universality was higher than existentiality, but in negative adjectives, it was lower.

These patterns were also reflected in survey results (Sassoon 2012). They support the view that negative antonymy systematically affects the force of quantifier on dimensions. The dimensions of positive adjectives tend to be bound by a universal quantifier, ALL or NO, while those of negative antonyms tend to be bound by an existential quantifier, SOME. In other words, by default, multidimensional adjectives are used to convey generalizations on dimensions, while multidimensional antonyms relate to counterexamples to such generalizations. Moreover, Shamir (2013) directly compared adjectival antonyms to concrete nouns, showing that these nouns are less acceptable with dimensional exception phrases than either positive or negative adjectives, in both negated and non-negated contexts ($p <. 000$; cf. *#bird/not a bird, except for flying*/ *size*/ *wings*), in line with dimension binding via similarity operations, instead of quantification.

At the same time, context can override the tendency for similarity-based dimension binding; e.g., in a scientific context at which birdhood is defined by means of n genes, it is acceptable to state that a certain exemplar *is a bird except with respect to 3 genes.* Similarly, Sassoon's (2013b) corpus results illustrate that context can override the tendency for universal and existential quantification in positive and negative adjectives, respectively. This is also evident from certain intuitive judgments; e.g., both the combination of *smart* and of *stupid* with *except in math* are natural, and so is *The ipad is a bigger iphone except you can't make calls*. In addition, the likelihood of multiplicative vs. additive dimension-binding in Wattanmaker's (1995) study was affected by the order of presentation (the number of preceding additive vs. multiplicative predicates). Other contextual factors await future research (see one pilot in Sassoon 2012).

Returning to default contexts, we have seen that dimension-binding in nouns is mostly based on averaging functions (weighted-sums or -products), rather than quantifiers. This is in accord with the fact that the noun dimensions are normally neither necessary nor sufficient conditions for categorization (Hampton 1995). Noun dimensions often are binary (e.g., 'wings' and 'beak' for *birds*) and many. In contrast to adjectives, conceptual gradability in nouns emerges due to averaging on many of them, not due to counting or to a choice of a single scalar dimension. Adjectives, by contrast, can be represented as having a free dimension argument F. This argument can be saturated as in *clever in doing math,* which denotes the property of having higher than normal ability to do math, assuming math to be a dimension of *clever*. Alternatively, the dimension argument can be bound by an explicit or implicit quantifying expression as in *vital in every respect* or *atypical in two respects*.

Moreover, the dimension argument can be bound by comparison morphemes; e.g., *more* in *X is more expensive than Y* selects the unique member of the dimension-set of *expensive* (a function from entities to their cost), and returns the relation of being more costly (that relation between x and y such that for SOME dimension F of *expensive*, x is F-er than y; cf., (6a)). With the multidimensional adjective *healthy*, comparison can be along more dimensions; e.g.,

healthier can denote a relation between entities x and y such that for ALL health dimensions F, x is F-er than y (cf., (6b); for detailed compositional derivations see Sassoon 2014). Hypothesis (7) proposes that the acceptability of predicates in such constructions depends on the accessibility of their dimensions, namely the extent to which their interpretation can be modeled by means of a dimension argument bound by a quantifier. Here are a number of its testable predictions.

Most importantly, a continuum of (un)acceptability is predicted. All nouns are predicted to be less acceptable than adjectives in within-predicate comparisons, because as a default their dimensions are bound by averaged similarity operations and thus are not accessible for quantifiers to bind. However, additive nouns are expected to be more acceptable than multiplicative nouns, because under certain assumptions their interpretation can turn to one based on dimension counting. Thus, in particular, nouns denoting social categories are expected to be more acceptable than nouns denoting animals and plants (cf., (14c-d) vs. (14a-b), respectively). In addition, if between-noun comparisons exhibit the same continuum (cf., (15c) vs. (15a)), this will support the availability of a reading involving comparison of the number of dimensions of each compared predicate, whose norm an entity exceeds (cf., (6c,d)). But if their only reading directly exploits degrees of similarity of entities to nominal prototypes, no acceptability difference between social and natural-kind nouns is expected.

Similar contrasts are expected to occur also with quantifiers on dimensions and exception phrases that weaken generalizations on dimensions, as in (16) and (8)-(9). Moreover, if comparisons indeed involve quantification on dimensions, then the acceptability of a predicate in comparison constructions and in quantificational constructions as in (16) is expected to correlate.

(14) Within-noun comparisons: "X is more NP than that Y"
   a. #This piece of fruit is more an orange than that piece of fruit.
   b. #This farm animal is more a cow than that farm animal.
   c. ?This booklet is more a diary than that booklet.
   d. ?This artist is more a composer than that artist.

(15) Between-noun comparisons: "X is more NP_1 than (Y is) NP_2"
   a. ?This piece of fruit is more an orange than an apple
   b. ?This farm animal is more a cow than that farm animal is a horse
   c. This booklet is more a diary than a sketchbook
   d. This artist is more a composer than that artist is a poet

(16) Dimensional exception phrases: "X is (not) NP, except for/with respect to DIM"
   a. #This vegetable is (not) a potato except for color.
   b. #This predator is (not) a tiger except for its teeth number.
   c. ?This place is (not) a church except in appearance.
   d. ?This girl is (not) a genius except with respect to literature.

Finally, within-noun comparisons (cf., (14)) are expected to be less acceptable than single-subject between-noun comparisons (cf., (15a,c)). The latter seem to have a reading that directly exploits the similarity functions underlying categorization in nouns, while the former do not, presumably because they only select for dimensions compatible with difference modifiers (*interval-scale* dimensions), as in *two inches longer* and *slightly shorter* (Sassoon 2013a). Even relatively abstract adjectives seem to allow for an interval-scale construal (e.g., *slightly happier*, *a lot more beautiful*), whereas nouns appear to refuse it and be mostly based on nominal dimensions (e.g., wings: yes/no) or ordinal dimensions (movement type: flying > swimming >

running; Gardeforse 2004). Two-subject between-predicate comparisons (cf., (15b,d)) are also expected to dislike nouns as they seem to license difference modifiers (e.g., *The sofa is **2 inches** longer than the table is wide*), as opposed to single-subject comparisons (e.g.,, (15a,c)) which seem to be incompatible with difference modifiers (cf., *#slightly/ #a lot more a car than a truck*; Morzicki 2011). The judgment study we now turn to aims to test some of these predictions.

2. A pilot study of acceptability judgments

2.1 Method

The participants were recruited using Amazon mechanical Turk (AMT), an online labor market place where workers are paid small amounts of money to complete small tasks named HITs (Human Intelligence Tasks). It has been shown that AMT provides a quick and relatively cheap method to acquire high-quality experimental results that do not differ significantly in performance from standard experimental settings (Buhrmester et al. 2011). The hits were only visible to American workers with approval rates exceeding 95%. They were awarded 2 cents per hit consisting of a single item rating, with an average hourly rate of 6.5$. A group of 25 different participants completed each hit. Once 25 participants filled out a hit, it was no longer visible. Moreover, each participant chose how many hits to fill out. In total, 140 participants answered an average of 44.5 different questions each (SD=58). All hits were completed in 18/07/2013.

The stimuli were sentences formed of 24 definite noun phrases that served as *subjects* and 24 indefinite noun phrases that served as *predicates*, such as, for example, *This farm animal* and *a cow*, respectively, in *This farm animal is more a cow than that farm animal*. The factors manipulated were *entity type* – half of the subjects (and their predicates) denoted natural entity types (plants and animals) and half denoted social entity type (human traits and artifacts), and *structure* – each subject-predicate combination occurred in 7 different constructions: **two baseline conditions** (Pos, Not) including basic and negated categorization forms ('x is P' and 'x is not P'); **three comparison conditions** (Within, Be1s, Be2s) including within-noun comparisons ('x is more P than y'; cf., (14)), single-subject between-noun comparisons ('x is more P than Q', as in (15a,c)), and two-subject between noun comparisons ('x is more P than y is Q', as in (15b,d)), and **two modified forms** (Ex, ExNot) including basic and negated forms with dimensional exception phrases ('x is P except for Dim' and 'x is not P except for Dim', as in (16)).

An eighth condition consisted of within-adjective comparisons, constructed by applying each one of 6 positive one-dimensional adjectival predicates (*tall*, *heavy*, *big*, *old*, *expensive* and *colorful*) to 4 of the 24 subjects, an animal, plant, artifact and human trait. Thus, focusing on the within-predicate comparisons, the factors manipulated were *Predicate type* (adjective vs. noun) and Entity type (social vs. natural).[3,4]

In comparisons with two entities, the two were always described as *This NP* and *That NP* (as in ***This artist** is more a composer than **that artist***.) In comparisons with two predicates, each

[3] An additional factor was *Than-phrase type* – half of the sentences with each entity and predicate type included a clausal *than*-phrase and half included a phrasal one, as in *This animal is taller than that animal is* vs. *This person is taller than that person*, respectively

[4] Here is one set of examples of all the 8 conditions: (1) This place is a church; (2) This place is not a church; (3) This place is more a church than that place is; (4) This place is more a church than an art gallery; (5) This place is more a church than that place is an art gallery; (6) This place is a church except in appearance; (7) This place is not a church except in appearance; (8) This place is older than that place is.

nominal predicate was matched with a contrasting predicate (e.g., *duck* and *goose*; *dress* and *night shirt*; see table 1 for the full set of subjects and contrasting predicate pairs, but notice that, unfortunately, two errors occurred in the survey, thus 'crew' and 'fly' were used instead of 'crow' and 'insect', respectively). The matched pairs were mostly withdrawn from the stimuli reported in Hampton, Storms, Simmons and Heussen (2009). The pairs of human traits and professions were chosen from a list created by searching the corpus of contemporary American English (Coca, Davies 2010) for the string "(s)he is a" followed by a noun.

The 192 target sentences (24 x 8 conditions) with 57 additional good and bad fillers of various forms can be found in appendix 1. The 249 sentences (hits) were presented as a single randomly ordered list, out of which different participants filled out different subsets. The variables are therefore within-subject, but with many missing observations.

The following instructions occurred in every hit: "[This hit is for English Native Speakers Only] RATE THE FOLLOWING SENTENCES BY HOW NATURAL THEY SOUND TO YOU AS AN ENGLISH NATIVE SPEAKER. FOR EXAMPLE: (i) To me, the sentence "This child is rarely sick" is a perfectly natural sentence, so I give it '7'; (ii) However, the sentence "This child is rarely tall" is perfectly unnatural and makes no sense (me or my friends would never use such a combination of words), so I give it '1'." Following the instructions the participants saw a sentence and a 7-point scale with the labels PERFECTLY NATURAL and PERFECTLY UNNATURAL adjacent to 7 and 1, respectively. They selected an answer by clicking on the radio button adjacent to the relevant number.

Table 1: The 24 between noun comparisons with a single subject

Natural entity types

	Animals		**Plants**
1	This farm animal is more a cow than a horse	1	This tree is more a pine than an oak
2	This insect is more a mosquito than a wasp	2	This vegetable is more a potato than a carrot
3	This bird is more a crow than a pigeon	3	This flower is more a dandelion than a rose
4	This reptile is more a snake than a lizard	4	This spice is more onion than mint
5	This predator is more a wolf than a tiger	5	This plant is more moss than grass
6	This aquatic mammal is more a dolphin than a shark	6	This piece of fruit is more an orange than an apple

Social entity types

	Human concepts		**Artifacts**
1	This journalist is more a consultant than a reporter	1	This place is more a church than an art gallery
2	This artist is more a composer than a poet	2	This piece of clothing is more a dress than a nightshirt
3	This football player is more a champion than a celebrity	3	This car is more a taxi than an ambulance
4	This girl is more a genius than a child	4	This hall is more a theatre than a cinema
5	This colleague is more a businesswoman than a friend	5	This container is more a carafe than a vase
6	This person is more a victim than a witness	6	This booklet is more a diary than a sketchbook

2.2 Result

The samples of means per item in the comparison conditions are presented in table 2.1, and those of the baseline and modified conditions are presented in table 2.2. The results of the 7 nominal conditions were analyzed using a variety of mixed models with naturalness as the dependent variable and participant and item (24 subject+predicate combinations) as random effects. This type of analysis tests whether the manipulated factors explain anything more than what could be predicted on the basis of the participants and the stimuli. It is reasonably robust against influence of a single outlier item or participant, and against missing observations (Baayen et al. 2006).

The baseline and comparison conditions were compared using a mixed model with Entity type (natural vs. social) and Structure (Basic vs. Comparison) as fixed effects. A structure effect and an interaction were predicted. The results were significant for both Entity type (F(1, 22.136) = 12.309, p=.002; SE=.23; df=24.039, t = -4.549; p=.000) and Structure (F(1, 2905.753) = 1819.834, p = .000; SE = .086, df = 2906.256, t=27.133, p=.000), with a significant interaction between the two (F(1, 2896.888) = 18.391, p = .000; SE = .122, df = 2896.888, t=4.289, p=.000).

Table 2.1: Averages on 25 participants for the comparison conditions with nouns (left) and adjectives (right)

Nominal predicates by **entity type**	Single subject between-noun comparisons **More NP1 than NP2**		Within-noun comparisons **More NP than Y (is)**		Two-subject between-noun comparisons **More NP[1] than y is NP[2]**		**Adjectival predicates** by **entity type**	Within-adjective comparisons **More AP than Y (is)**	
Animals	**M**	**SD**	**M**	**SD**	**M**	**SD**	**Animals**	**M**	**SD**
Cow	3.64	2.06	2.92	2.00	2.32	1.62	taller	5.88	1.56
Mosquito	2.64	1.94	2.68	1.76	2.52	1.70	bigger	6.84	0.61
Crow	2.68	2.03	2.16	1.54	1.96	1.37	more expensive	6.32	1.12
Snake	4.84	1.93	3.6	1.70	3.16	2.13	more colorful	6.72	0.60
Tiger	4.28	2.03	3.28	1.80	2.84	1.69	heavier	5.6	1.74
Dolphin	3.6	2.15	2.8	1.74	2.56	1.24	older	5.48	2.14
Plants							**Plants**		
Pine	4.52	1.96	4.32	1.93	3.28	1.93	older	5.84	1.83
Potato	3.16	2.19	2.12	1.45	2.2	1.50	bigger	6.4	0.94
Dandelion	3.72	1.97	4.08	2.00	2.8	1.60	more expensive	6.08	1.65
Mint	3.32	1.89	3.76	1.94	2.52	1.65	more colorful	6.72	0.72
Moss	4.76	1.97	3.52	1.90	3.4	1.79	taller	5.68	1.76
Orange	3.6	2.00	3.4	2.23	2.48	1.58	heavier	6.4	1.39
Artifacts							**Artifacts**		
Church	5.48	1.60	4.48	1.90	4.24	2.06	older	6.16	1.59
Dress	5.44	1.63	3.8	2.15	2.8	1.83	more colorful	6	1.52
Taxi	3.72	2.20	4	1.94	2.92	1.65	heavier	5.88	1.70
Theatre	5.04	2.05	4.08	2.26	3.44	1.83	bigger	6.6	0.69
Vase	5.76	1.75	4.32	1.69	3.16	1.87	taller	6.24	1.14
Diary	6.2	1.26	4.44	1.92	3.32	1.93	more expensive	6.64	1.02
Humans							**Humans**		
Reporter	5.48	1.50	4.12	1.99	2.96	1.71	older	5.4	1.85
Composer	5.76	1.36	4.76	2.03	3.12	1.68	more colorful	5.68	1.64
Champion	5.44	1.36	4.76	1.77	3.56	1.83	more expensive	4.68	2.26
Genius	4.32	2.22	5.24	1.75	2.12	1.53	bigger	6.6	0.94
Businesswoman	4.88	1.92	4.32	1.87	3.16	1.97	heavier	5.56	1.55
Person	5.2	2.14	5.2	2.04	3	2.02	taller	6.8	0.63
M	**4.48**	**1.03**	**3.84**	**0.86**	**2.91**	**0.52**	**M**	**6.09**	**0.54**
SD	**1.03**	**0.28**	**0.86**	**0.20**	**0.52**	**0.22**	**SD**	**0.54**	**0.50**

Table 2.2: **Averages on 25 participants for the 24 nouns in baseline and modified conditions**

		Basic categorization conditions **(Pos)** **X is NP**		Negated categorization conditions **(Not)** **X is not NP**		Exception phrase condition (Ex) **X is NP except**		Negated exception phrase condition (ExNot) **X is not NP except**	
Entity type	**Item Noun**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Animals	Cow	6.68	1.12	6.68	0.68	1.92	1.29	2.04	1.40
	Mosquito	3.48	2.44	5	2.43	2.24	1.70	2.88	1.90
	Crow	3.04	2.51	3.44	2.56	1.8	1.30	1.68	1.41
	Snake	6.72	0.87	6.64	1.23	3.64	2.31	4	1.94
	Tiger	6.52	1.06	6.76	0.65	2.32	1.49	1.96	1.31
	Dolphin	6.68	0.68	6.36	1.23	3.08	1.79	3.52	1.96
Plants	Pine	6.64	1.09	6.76	0.59	2.84	1.38	2.64	1.57
	Potato	6.64	0.93	6.32	1.64	2.88	1.99	2	1.50
	Dandelion	6.84	0.46	6.92	0.39	3.28	2.16	2.68	1.67
	Mint	5.12	1.88	5.12	2.16	3.12	2.10	2.52	1.53
	Moss	5.92	1.92	6.72	0.72	2.48	1.86	2.76	2.12
	Orange	6.68	0.88	6.64	0.79	3.04	1.93	2.48	1.68
Artifacts	Church	6.92	0.27	6.72	0.66	4.32	2.48	5.24	2.34
	Dress	6.72	0.60	6.84	0.54	2.88	1.88	2.84	2.07
	Taxi	6.52	1.02	6.84	0.54	3.24	1.94	3.48	1.94
	Theatre	6.12	1.77	6.12	1.68	4.32	2.11	3.64	2.02
	Vase	6.72	0.66	6.52	1.30	3.04	1.78	2.16	1.57
	Diary	6.16	1.01	6.92	0.27	4.08	1.74	3.56	2.14
Humans	Reporter	6.6	1.10	6	1.62	2.56	1.88	2.4	1.50
	Composer	6.8	0.63	6.84	0.61	2.72	1.89	3.84	2.22
	Champion	7	0.00	6.76	0.59	4.28	1.76	4.28	1.84
	Genius	6.84	0.61	6.88	0.43	5.04	1.99	5.16	1.57
	Businesswoman	5.72	1.25	5.16	1.87	3.08	1.57	2.76	1.53
	Person	6.8	0.80	6.84	0.46	2.56	1.90	3.08	1.81
	M	**6.25**	**1.07**	**6.32**	**1.07**	**3.11**	**0.81**	**3.07**	**0.95**
	SD	**1.02**	**.063**	**0.84**	**.069**	**0.81**	**0.29**	**0.95**	**0.29**

The baselines (Pos, Not) and modified conditions (Ex, ExNot) were also compared using a mixed model with Entity type (natural vs. social) and Structure (Basic vs. modified) as fixed effects. Again, a structure effect and an interaction were predicted. The results were significant for both Entity type ($F(1, 21.999) = 6.775$, $p = .016$; SE = .282; df=24.323, $t = -3.053$; $p = .005$) and Structure ($F(1, 2307.725) = 2653.091$, $p = .000$; SE = .089, df = 2314.971, t=34.713, p=.000), with a significant interaction ($F(1,2303.405) = 5.398$, $p = .02$; SE = .125, df = 2303.405, t=2.323, p=.020). These results were also analyzed using Structure (Basic vs. modified) and Negation (yes/no) as fixed effects. Beside the structure effect ($F(1,2306.484) = 2648.421$, p=.000; SE = .089, df = 2307.885, t=35.721, p=.000), there was neither a significant negation effect ($F(1,2313.801) = .018$, p=.893), nor an interaction ($F(1,2306.604) = .905$, p=.341).

Turning to the **three comparison conditions** more specifically, a mixed model analysis with structure (Witnin, Be1s, Be2s) and entity type (social vs. natural) as fixed effects confirmed the predicted structure (F(2,1694.185)=143.680, p=.000; SE=129, for Be1s: df = 1699.007, t=4.945, p=.000; for Be2s: df=1701.879, t=-10.569, p=.000) and entity type effects (F(1,22.022)=33.067, p=.000; SE=.215, df=38.504, t=-6.265, p=.000), and revealed a significant interaction (F(2,1697.356)=16.577, p=.000; SE=183, $t_{natural*Be1s}$=-.346, p=.730, $t_{natural*Be2s}$=4.794, p=.000).

Pairwise comparisons yielded significant simple structure effects. As expected, the naturalness of the single-subject between-noun comparisons was significantly higher than the naturalness of the within-noun comparisons (Mean difference .609, SE=.091, df=1691.278, p=.000), which was significantly higher than the naturalness of the two-subject between-noun comparisons (Mean difference .930, SE=.092, df=1698.981, p=.000). Univariate tests based on the pairwise comparisons of marginal means yielded F(2,1694.119)=143.680, p=.000. An additional analysis with entity type as the only fixed effect also yielded significance (F(1,26.290)=26.494, p=.000; SE=.199, df=26.290, t=-5.147, p=.000).

Turning to the **two exception phrase modified conditions** more specifically, a mixed model analysis with structure (Ex, ExNot) and entity type (social vs. natural) as fixed effects confirmed the predicted entity type effect (F(1,22.028)=7.707, p=.011; SE=.324, df=25.581, t=-2.993, p=.006), with neither a significant structure effect (F(1,1105.666)=.335, p=.563) nor an interaction (F(1,1097.367)=1.418, p=.234). An additional analysis with entity type as the only fixed effect yielded significance (F(1,24.039)=6.823, p=.015; SE=.321, df=24.039, t=-2.612, p=.015). An analysis with structure as the only fixed effect yielded no significance (F(1,1106.794)=.319, p=.572).[5,6]

Turning to **simple entity type effects** (illustrated in figures 1a,b), separate mixed models were conducted for each structure condition, with entity type as the fixed effect. The significantly higher naturalness predicted for social vs. natural entity types was confirmed in within noun comparisons (F(1,25.804)=18.333, p=.000; SE=.284, df=25.804, t=-4.282, p=.000), in single-

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[5] All **simple structure effects** in the comparison constructions were also significant according to mixed models which were conducted separately for the dataset of natural entity types and for the dataset of social entity types, with structure as the fixed effect.

First, within the natural dataset, structure was significant (F(2,817.596)=35.245, p=.000; for Be1s: SE=.126, df=813.821, t=4.454, p=.000; for Be2s: SE=.128, df=825.669, t=-3.879, p=.000). The naturalness of the single-subject between-noun comparisons was significantly higher than the naturalness of the within-noun comparisons (Mean difference .562, SE=.126, df=813.821, p=.000), which was significantly higher than the naturalness of the two-subject between-noun comparisons (Mean difference .495, SE=.128, df=825.669, p=.000). Univariate tests based on the pairwise comparisons of marginal means yielded F(2,817.410)=35.245, p=.000.

Second, within the social dataset, structure was significant (F(2,826.535)=132.914, p=.000; for Be1s: SE=.13, df=826.555, t=5.126, p=.000; for Be2s: SE=.129, df=826.266, t=-10.842, p=.000). The naturalness of the single-subject between-noun comparisons was significantly higher than the naturalness of the within-noun comparisons (Mean difference .665, SE=.130, df=826.555, p=.000), which was significantly higher than the naturalness of the two-subject between-noun comparisons (Mean difference 1.403, SE=.129, df=826.266, p=.000). Univariate tests based on the pairwise comparisons of marginal means yielded F(2,826.535)=132.914, p=.000.

By contrast, in the exception phrase modified constructions, structure was significant neither within the natural dataset (F(1,533.610)=1.509, p=.220), nor within the social dataset (F(1,528.770)=.220, p=.639).

[6] The naturalness of the exception phrases didn't differ from that of the worst nominal comparison, i.e., the two-subject between-noun comparison (with structure (Ex, ExNot, Be2s) as fixed effect, F(2, 1700.851)=2.972, p=.051; for Be2s: Se=.089, df=1698.448, t=-1.692, p = .091; for Ex: SE=.0895, df=1700.588, t=.676, p=.499). It was significantly lower than that of the within-noun comparison (with structure (Ex, ExNot, Within) as fixed effect, F(2,1699.993)=43.496, p=.000; for Ex: SE=.093, df=1700.554, t=-7.727, p=.000; for ExNot: SE=.092, df=1697.192, t=-8.380, p=.000).

subject between-noun comparisons (F(1,30.567)=18.221, p=.000; SE=.31, df=30.567, t=-4.269, p=.000), and also in two-subject between-noun comparisons (F(1,23.711)=6.577, p=.017; SE=.187, df=23.711, t=-2.565, p=.017). Importantly, there were no entity type effects in the baselines (for Pos: F(1,21.972)=2.729, p=.113; for Not: F(1,22.207)=1.630, p=.215) and adjectival condition (F(1,21.743)=.463, p=.503). Thus, entity type only affected naturalness of nominal comparisons, as predicted. As for the exception phrases, they also exhibited an entity type effect both with negation (F(1,22.090)=7.169, p=.014; SE=.3, df=22.090, t=-2.677, p=.014) and without negation (F(1,24.689)=6.964, p=.014; SE=.368, df=24.689, t=-2.639, p=.014).

Figure 1a: Entity type effects in the comparison conditions

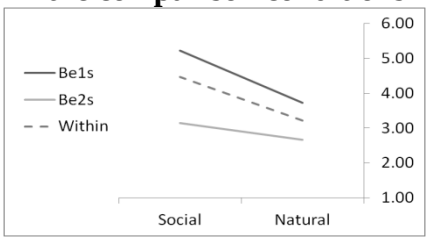
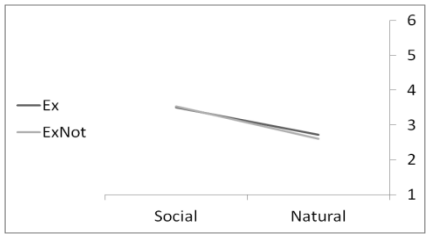


Figure 1b: Entity type effects in the modified conditions



Focusing on **within-predicate comparisons**, a mixed model with Entity type (Social vs. Natural) and Predicate type (Adjective vs. Noun) as fixed effects, and participant and item (48 subject+predicate combinations) as random effects, was carried out to test a predicted predicate-type effect and interaction. The test yielded significance for both Predicate type (F(1,43.837) = 187.392, p=.000; SE=.237, df=43.936, t = 6.637, p=.000) and Entity type (F(1,44.152) = 10.916, p=.002; SE=.237, df=44.372, t=-5.363, p=.000), with a significant interaction (F(1,44.361) = 18.364, p=.000; SE=.335, df=44.361, t = 4.285, p=.000). With entity type as single fixed effect, the results were not significant (F(1,48.201)=1.439, p=.236), and with predicate type as single fixed effect they were (F(1,74.947)=82.624, p=.000; SE=.254, df=74.947, t=9.09, p=.000).[7]

Finally, analyses by item were conducted to test correlations (for the compared samples of means per item see tables 2.1-2.2). Table 3 presents the **correlation** coefficients and p values for the ***comparison* by *exception-phrase* conditions** (n=24). Notice the moderate to strong correlation between the dimensional exception phrases and the within noun comparisons (for Ex×Within: r^s=.5, p=.012), as well as the moderate to strong correlation between the dimensional exception phrases with negation and the three comparison types (for ExNot×Be1s: r^s=.44, p=.033; for ExNot×Within: r^s=.591, p=.002; for ExNot×Be2s: r^s=.49, p=.014).

Table 3: Correlation coefficients for *exception phrase* by *comparison* conditions

Spearman's rho		Be1s	ExNot	Within	Be2s
Ex	r^s	.314	.693**	**.503***	.375
	p^2	.135	.000	**.012**	.071
Be1s	r^s	1	**.436***	.761**	.742**
	p^2	.	**.033**	.000	.000
ExNot	r^s		1	**.591****	**.493***

[7] A mixed model with Than-clause type (phrasal vs. clausal) and predicate type (adjective vs. noun) as fixed effects yielded neither a significant Than-clause type effect (mean difference -.312; F(1,44.049)=2.31, p=.136), nor an interaction (F(1,44.011)=2.529, p=.119).

	p^2			**.002**	**.014**
Within	**r^s**			1	.549**
	p^2			.	.005

3. Discussion

The results of this study confirmed the predicted continuum. First, within-predicate comparisons appear to be more felicitous with adjectives than nouns. However, this study included only positive, one-dimensional, context relative adjectives (e.g., *big*). Future studies should also consider negative (e.g., *small*), absolute (e.g., *empty,* and *closed*), and multidimensional adjectives. One multidimensional adjective (*Italian*) appeared in the three comparison types, as part of the 57 fillers. Its averaged scores in the within-predicate comparison *This film is more Italian than American,* 6.12 (1.21), and two-subject between-predicate comparison *This film is more Italian than that film is American,* 3.92 (1.79), were by far higher than the average scores of the nouns in these comparisons (4.70 and 2.97), as expected. But its score in the single-subject between-predicate comparison *This film is more Italian than that film,* 5.24 (1.68), was similar to the noun scores (4.00). These comparisons appear, indeed, to be especially suited to nouns.

Second, the acceptability of nominal comparisons matches the degree to which the noun's default interpretation can be approximated by one based on dimensional quantifiers, as hypothesized, suggesting that these constructions involve operations on accessible dimensions. An accommodation of binary dimensions with equal weights turns the interpretation of additive, but not multiplicative nouns, equivalent to one based on quantification. Thus, the former were predicted to be more acceptable in degree constructions. These predictions were born out. Social nouns were more acceptable than natural kind nouns in all the comparison constructions tested.

Similarly, social additive nouns were better than natural-kind multiplicative ones with dimensional exception phrases. The negated condition (as in "not an N except for dim") indicates the acceptability of dimension binding by an existential quantifier (SOME). By contrast, the non-negated condition ("N except for dim") indicates the acceptability of dimension binding by a universal quantifier (ALL). The two conditions did not differ significantly, suggesting that neither existential nor universal quantification dominates classification in nouns (as in Shamir 2013). But the more a noun resembles an adjective in its default dimension-binding, the more acceptable it seems to be in either exception phrase construction.

Moreover, the correlation matrix in table 4 suggests that a correlation exists between acceptability of exception phrase modification and comparison, in particular, with regard to the exception phrase modified negated nouns. This suggests that compatibility with existential quantification is more important in predicting noun acceptability in comparisons. Possibly, comparisons are interpreted by existentially binding the dimensions of their predicative argument. Thus, their naturalness correlates with that of a construction that forces a noun to be interpreted as existential on its dimensions. To assess the validity of this interpretation, future research should assess the naturalness of comparative predicates with dimensional exception phrases ("x is (not) **more P than y** except in dim"). If comparative predicates are predominantly existential, higher acceptability is expected in the negated case.

Moreover, the least significant correlation is with the single subject between-noun comparisons. This may stem from the existence of a second reading, as suggested in the discussion of (6d), whereby similarity of an entity to two nominal prototypes is directly compared. This reading does not involve dimension counting, and thus, its contribution to the naturalness judgments is expected to be independent of the naturalness of exception phrases. Its

existence is compatible also with the relatively high naturalness of nouns in this construction. At any rate, the clear preference of additive over multiplicative nouns in this comparison does support the existence of a reading based on counting of accessible dimensions, as the paraphrases in (6c-d) suggest (Sassoon 2015).

An anonymous reviewer observed that the between-natural-noun comparisons involved taxonomical hierarchies, e.g., *snake* and *lizard* were predicated over *reptile* and *wolf* and *tiger* over *predator*, whereas some between-social-noun comparisons didn't, e.g., *champion* and *celebrity* were predicated over *football player*. A second reviewer suggested that failure of an implicature may have confounded the results. The suggested implicature is that one of the two compared predicates (e.g., *rose* and *dandelion*) applies to the entity in question, but the speaker does not know which. Naturalness may have been reduced by the difficulty to imagine a speaker being unsure of whether a flower is a rose or a dandelion. These potential confounds deserve investigation (e.g., by presenting sentences in contexts where the implicature is either satisfied or not), but notice that they cannot explain why differences between natural and social nouns occurred also in several other constructions, e.g., within-noun comparisons and exception phrases, of which the between-noun comparisons were actually more acceptable.

A number of additional issues merit attention. Recall that two errors occurred in the survey ('crew' and 'fly' were used instead of 'crow' and 'insect', respectively, in all the conditions). This issue may have confounded the comparison of social vs. natural entity types, although the results remain significant also after exclusion of the two items. In addition, the embedded clause in the within-predicate comparisons was as in *This football player is more a champion than that football player (is)*, rather than as in *than that one (is)*. The idea was to block interpretations of *that one* as relating to a property, which would turn the comparison into a between-noun one, but this feature may have reduced the naturalness of these comparisons, and thus should be eliminated in future studies. Moreover, in the exception phrase conditions, each noun was matched with but one dimension. This fact may have added noise that reduced the significance of the results. Future research should assess judgments for exception phrases with at least 3-4 dimensions per noun or adjective (cf., Sassoon 2012 and Shamir 2013), as well as with other quantificational constructions, such as *P in every respect, some respect,* and *most respects*. Nouns and adjectives of additional domains can be tested (for instance, abstract nouns: *problem, love*), as well as additive natural kind nouns and multiplicative social nouns, assuming such exist. The role of mediating particles (cf., *of* in (3a)) should also be addressed.

The present study has broader implications for our understanding of the adjective-noun word class distinction, including in particular nouny adjectives and adjective-like nouns. Consider in particular, nationality concepts such as *American* or trait concepts such as *extrovert*. They can fill in attributive-adjective positions as in *extrovert personality* and *American nationality*, but unlike most adjectives, they can also 'stand alone' in argument positions without any explicit noun around, as in *Americans* and *extroverts*, and unlike the ill-formed *#talls* and *#healthies*. An explanation in terms of categorization based on accessible dimensions deserves consideration. Possibly, in argument position, the dimensions are bound by additive similarity functions, with equal dimensional weights. But since this type of interpretation can be represented by means of a dimension set bound by a quantifier, these nouns easily occupy adjectival positions.

Additional implications pertain to size adjectives such as *big* and *huge*. When modifying certain nouns, as in *this midget is a big fan*, they do not attribute big physical size. Morzycki (2009) argues that this interpretation of *big* occurs when it modifies a noun that is itself morphologically gradable (e.g., *fan, stamp-collector, genius* or *idiot*); e.g., *smoker* denotes a

measurement of frequency or affinity for smoking. On this view, size adjectives function as degree modifiers, similar to *very* (type <d,t>); e.g., *big* denotes a mapping f_{big} of nominal degrees d to their relative size, $f_{big}(d)$. Morzycki further observes that nominal gradability readings of size adjectives are absent in predicate position (as in *the fan is big*), or in negative size adjectives (as in *a small fan just came in*, which relates to physical size, not fan-hood). These features are unique to nominal-gradability readings, as opposed to abstract size readings (as in *this mistake is big/small*) and significance readings (*he is huge!*). The position generalization is captured by postulating a morpheme *meas* in the nominal degree projection, which is not available in other positions. *Meas* takes as arguments a gradable noun, a size adjective, and an entity and returns truth if and only if the entity falls under the noun and its degree in the noun is big.

However, this account of gradable nouns in terms of degree functions fails to explain why these nouns are not generally compatible with gradability morphemes (e.g., **faner, *fanest, *too fan*), and why their combinations with *more* must be mediated, as in *more **of** an idiot than Bill*. The results reported in this paper give rise to an alternative approach, which rests on the observation that the gradable dimensions of adjectives are often context dependent, and their choice is affected, among other things, by the noun they modify. For example, the dimension of *long* is different for tables than for stories. Assuming that nouns are themselves associated with dimension sets, size adjectives may, under certain circumstances, be able to access and operate on these sets. The position generalization can be captured by postulating that, unless an adjective has a dimension set argument (as *typical* does in, e.g., *typical of birds*), only in attributive position can it access the dimension set of the noun it modifies (perhaps by virtue of a syntactic head whose semantics does the job). This account uses Morzycki's logic, but spares the need to stipulate that some nouns denote a degree function, while most other nouns do not, or that size adjectives are adverbial (adnominal) modifiers, while most other adjectives are not.

This approach extends beyond size adjectives; e.g., to explain the different interpretations of *old* in *He is an old friend* and *This friend is old*. Thus, the availability of nominal dimensions for adjectives to operate on is a more general phenomenon in attributive position. Moreover, the set of examples of gradable nouns reported in the literature typically includes nouns such as *idiot, nerd, soccer fan, airhead, goat cheese enthusiast, simpleton, Barbie doll lover, loser,* and *weirdo* (de Vries 2010). It is easy to observe that all of them belong to the social domain. Thus, their dimensions are expected to be relatively accessible for grammatical operations to quantify over as in *idiot with respect to his political views* and *complete/total idiot* (de Vries 2010). Moreover, these nouns seem to have morphologically gradable dimensions (e.g., *stupid, intelligent, admiring*) accessible for size adjectives to select and use for their interpretation.

Dimension accessibility for quantifier binding seems to affect additional gradable constructions; e.g., in various languages human categories such as *boy* and *girl* directly combine with the modifier *very*, as in the Hebrew *meod yalada* ('very girl', 'very girlish/ immature') and the Spanish *Es muy hombre* ('is very man', 'He is very much a man'; Espinal 2013). Additive dimension binding for the noun *girl* makes its dimensions more accessible than those of most other nouns. The importance of gradable traits in the stereotype of girls (e.g., loving pink) can be stretched to the point that *girl* is interpreted as equivalent to *girlish*, thereby licensing *very*. In sum, nouns carrying expressive or evaluative components such as *idiot*, *coward*, *hero* or *child* in its metaphoric sense, get as close to gradable adjectives as nouns can (Constantinescu 2011: 49-96), perhaps because they have adjectival dimensions (another point to consider in the future).

To conclude, this paper highlighted connections between cognitive psychological findings and linguistic phenomena, thus potentially contributing to the study of morphological gradability

within linguistics and to an improved understanding of certain experimental results in cognitive psychology, which interpretation overlooked the potential role of the noun-adjective distinction (Wattenmaker 1995). By raising awareness both to grammatical and conceptual distinctions, and by pointing out directions for future research, this paper has aimed to deepen our understanding of the relations between the formal and conceptual components of natural languages.

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Appendix: The full set of sentences together with their naturalness mean and sd

Item	Structure: Basic form	mean	std
1.	[BaA1] This farm animal is a cow	6.68	1.12
2.	[BaA2] This fly is a mosquito	3.48	2.44
3.	[BaA3] This bird is a crew	3.04	2.51
4.	[BaA4] This reptile is a snake	6.72	0.87
5.	[BaA5] This predator is a tiger	6.52	1.06
6.	[BaA6] This aquatic mammal is a dolphin	6.68	0.68
7.	[BaH1] This journalist is a reporter	6.6	1.10
8.	[BaH2] This artist is a composer	6.8	0.63
9.	[BaH3] This football player is a champion	7	0.00
10.	[BaH4] This girl is a genius	6.84	0.61
11.	[BaH5] This colleague is a businesswoman	5.72	1.25
12.	[BaH6] This person is a victim	6.8	0.80
13.	[BaP1] This tree is a pine	6.64	1.09
14.	[BaP2] This vegetable is a potato	6.64	0.93
15.	[BaP3] This flower is a dandelion	6.84	0.46
16.	[BaP4] This spice is a mint	5.12	1.88
17.	[BaP5] This plant is moss	5.92	1.92
18.	[BaP6] This piece of fruit is an orange	6.68	0.88
19.	[BaT1] This place is a church	6.92	0.27
20.	[BaT2] This piece of clothing is a dress	6.72	0.60
21.	[BaT3] This car is a taxi	6.52	1.02
22.	[BaT4] This hall is a theatre	6.12	1.77
23.	[BaT5] This container is a vase	6.72	0.66
24.	[BaT6] This booklet is a diary	6.16	1.01
	Structure: Negated Basic form	6.25 (1.02)	1.07 (.63)
1.	[BaNA1] This farm animal is not a cow	6.68	0.68
2.	[BaNA2] This fly is not a mosquito	5	2.43
3.	[BaNA3] This bird is not a crew	3.44	2.56
4.	[BaNA4] This reptile is not a snake	6.64	1.23
5.	[BaNA5] This predator is not a tiger	6.76	0.65
6.	[BaNA6] This aquatic mammal is not a dolphin	6.36	1.23
7.	[BaNH1] This journalist is not a reporter	6	1.62
8.	[BaNH2] This artist is not a composer	6.84	0.61
9.	[BaNH3] This football player is not a champion	6.76	0.59
10.	[BaNH4] This girl is not a genius	6.88	0.43
11.	[BaNH5] This colleague is not a businesswoman	5.16	1.87
12.	[BaNH6] This person is not a victim	6.84	0.46
13.	[BaNP1] This tree is not a pine	6.76	0.59
14.	[BaNP2] This vegetable is not a potato	6.32	1.64
15.	[BaNP3] This flower is not a dandelion	6.92	0.39
16.	[BaNP4] This spice is not a mint	5.12	2.16

17.	[BaNP5] This plant is not moss	6.72	0.72
18.	[BaNP6] This piece of fruit is not an orange	6.64	0.79
19.	[BaNT1] This place is not a church	6.72	0.66
20.	[BaNT2] This piece of clothing is not a dress	6.84	0.54
21.	[BaNT3] This car is not a taxi	6.84	0.54
22.	[BaNT4] This hall is not a theatre	6.12	1.68
23.	[BaNT5] This container is not a vase	6.52	1.30
24.	[BaNT6] This booklet is not a diary	6.92	0.27
	Structure: Single entity Between noun comparisons	6.32 (.84)	1.07 (.07)
1.	[Be1s1A1] This farm animal is more a cow than a horse	3.64	2.06
2.	[Be1s1A2] This fly is more a mosquito than a wasp	2.64	1.94
3.	[Be1s1A3] This bird is more a crew than a pigeon	2.68	2.03
4.	[Be1s1A4] This reptile is more a snake than a lizard	4.84	1.93
5.	[Be1s1A5] This predator is more a wolf than a tiger	4.28	2.03
6.	[Be1s1A6] This aquatic mammal is more a dolphin than a shark	3.6	2.15
7.	[Be1sP1] This tree is more a pine than an oak	4.52	1.96
8.	[Be1sP2] This vegetable is more a potato than a carrot	3.16	2.19
9.	[Be1sP3] This flower is more a dandelion than a rose	3.72	1.97
10.	[Be1sP4] This spice is more onion than mint	3.32	1.89
11.	[Be1sP5] This plant is more moss than grass	4.76	1.97
12.	[Be1sP6] This piece of fruit is more an orange than an apple	3.6	2.00
13.	[Be1sT1] This place is more a church than an art gallery	5.48	1.60
14.	[Be1sT2] This piece of clothing is more a dress than a nightshirt	5.44	1.63
15.	[Be1sT3] This car is more a taxi than an ambulance	3.72	2.20
16.	[Be1sT4] This hall is more a theatre than a cinema	5.04	2.05
17.	[Be1sT5] This container is more a carafe than a vase	5.76	1.75
18.	[Be1sT6] This booklet is more a diary than a sketchbook	6.2	1.26
19.	[Be1sH1] This journalist is more a consultant than a reporter	5.48	1.50
20.	[Be1sH2] This artist is more a composer than a poet	5.76	1.36
21.	[Be1sH3] This football player is more a champion than a celebrity	5.44	1.36
22.	[Be1sH4] This girl is more a genius than a child	4.32	2.22
23.	[Be1sH5] This colleague is more a businesswoman than a friend	4.88	1.92
24.	[Be1sH6] This person is more a victim than a witness	5.2	2.14
	Structure: Two entity Between noun comparisons	4.48 (1.03)	1.03 (.28)
1.	[Be2sA1] This farm animal is more a cow than that farm animal is a horse	2.32	1.62
2.	[Be2sA2] This fly is more a mosquito than that fly is a wasp	2.52	1.70
3.	[Be2sA3] This bird is more a crew than that bird is a pigeon	1.96	1.37
4.	[Be2sA4] This reptile is more a snake than that reptile is a lizard	3.16	2.13
5.	[Be2sA5] This predator is more a wolf than that predator is a tiger	2.84	1.69
6.	[Be2sA6] This aquatic mammal is more a dolphin than that aquatic mammal is a shark	2.56	1.24
7.	[Be2sP1] This tree is more a pine than that tree is an oak	3.28	1.93
8.	[Be2sP2] This vegetable is more a potato than that vegetable a carrot	2.2	1.50
9.	[Be2sP3] This flower is more a dandelion than that flower is a rose	2.8	1.60

10.	[Be2sP4] This spice is more onion than that spice is a mint	2.52	1.65
11.	[Be2sP5] This plant is more moss than that plant is grass	3.4	1.79
12.	[Be2sP6] This piece of fruit is more an orange than that piece of fruit is an apple	2.48	1.58
13.	[Be2sT1] This place is more a church than that place is an art gallery	4.24	2.06
14.	[Be2sT2] This piece of clothing is more a dress than that piece of clothing is a nightshirt	2.8	1.83
15.	[Be2sT3] This car is more a taxi than that car is an ambulance	2.92	1.65
16.	[Be2sT4] This hall is more a theatre than that hall is a cinema	3.44	1.83
17.	[Be2sT5] This container is more a carafe than that container is a vase	3.16	1.87
18.	[Be2sT6] This booklet is more a diary than that booklet is a sketchbook	3.32	1.93
19.	[Be2sH1] This journalist is more a consultant than that journalist is a reporter	2.96	1.71
20.	[Be2sH2] This artist is more a composer than that artists is a poet	3.12	1.68
21.	[Be2sH3] This football player is more a champion than that football player is a celebrity	3.56	1.83
22.	[Be2sH4] This girl is more a genius than that girl is a child	2.12	1.53
23.	[Be2sH5] This colleague is more a businesswoman than that colleague is a friend	3.16	1.97
24.	[Be2sH6] This person is more a victim than that person is a witness	3	2.02
	Structure: Within adjective comparison	2.91 (.52)	0.52 (.22)
25.	[WaA1] This farm animal is taller than that farm animal is	5.88	1.56
26.	[WaA2] This fly is bigger than that fly	6.84	0.61
27.	[WaA3] This bird is more expensive than that bird is	6.32	1.12
28.	[WaA4] This reptile is more colorful than that reptile	6.72	0.60
29.	[WaA5] This predator is heavier than that predator is	5.6	1.74
30.	[WaA6] This aquatic mammal is older than that aquatic mammal	5.48	2.14
31.	[WaP1] This tree is older than that tree is	5.84	1.83
32.	[WaP2] This vegetable is bigger than that vegetable	6.4	0.94
33.	[WaP3] This flower is more expensive than that flower is	6.08	1.65
34.	[WaP4] This spice is more colorful than that spice	6.72	0.72
35.	[WaP5] This plant is taller than that plant is	5.68	1.76
36.	[WaP6] This piece of fruit is heavier than that piece of fruit	6.4	1.39
37.	[WaT1] This place is older than that place is	6.16	1.59
38.	[WaT2] This piece of clothing is more colorful than that piece of clothing	6	1.52
39.	[WaT3] This car is heavier than that car is	5.88	1.70
40.	[WaT4] This hall is bigger than that hall	6.6	0.69
41.	[WaT5] This container is taller than that container is	6.24	1.14
42.	[WaT6] This booklet is more expensive than that booklet	6.64	1.02
43.	[WaH1] This journalist is older than that journalist is	5.4	1.85
44.	[WaH2] This artist is more colorful than that artist	5.68	1.64
45.	[WaH3] This football player is more expensive than that football player is	4.68	2.26
46.	[WaH4] This girl is bigger than that girl	6.6	0.94
47.	[WaH5] This colleague is heavier than that colleague is	5.56	1.55
48.	[WaH6] This person is taller than that person	6.8	0.63
	Structure: Within noun comparisons	6.09 (.54)	0.54 (.50)
1.	[WhA1] This farm animal is more a cow than that farm animal is	2.92	2.00
2.	[WhA2] This fly is more a mosquito than that fly	2.68	1.76

3.	[WhA3] This bird is more a crew than that bird is	2.16	1.54
4.	[WhA4] This reptile is more a snake than that reptile	3.6	1.70
5.	[WhA5] This predator is more a tiger than that predator is	3.28	1.80
6.	[WhA6] This aquatic mammal is more a dolphin than that aquatic mammal	2.8	1.74
7.	[WhP1] This tree is more a pine than that tree is	4.32	1.93
8.	[WhP2] This vegetable is more a potato than that vegetable	2.12	1.45
9.	[WhP3] This flower is more a dandelion than that flower is	4.08	2.00
10.	[WhP4] This spice is more a mint than that spice	3.76	1.94
11.	[WhP5] This plant is more moss than that plant is	3.52	1.90
12.	[WhP6] This piece of fruit is more an orange than that piece of fruit	3.4	2.23
13.	[WhT1] This place is more a church than that place is	4.48	1.90
14.	[WhT2] This piece of clothing is more a dress than that piece of clothing	3.8	2.15
15.	[WhT3] This car is more a taxi than that car is	4	1.94
16.	[WhT4] This hall is more a theatre than that hall	4.08	2.26
17.	[WhT5] This container is more a vase than that container is	4.32	1.69
18.	[WhT6] This booklet is more a diary than that booklet	4.44	1.92
19.	[WhH1] This journalist is more a reporter than that journalist is	4.12	1.99
20.	[WhH2] This artist is more a composer than that artist	4.76	2.03
21.	[WhH3] This football player is more a champion than that football player is	4.76	1.77
22.	[WhH4] This girl is more a genius than that girl	5.24	1.75
23.	[WhH5] This colleague is more a businesswoman than that colleague is	4.32	1.87
24.	[WhH6] This person is more a victim than that person	5.2	2.04
	Structure: Modified forms	3.84 (.86)	0.86 (.20)
1.	[ExA1] This farm animal is a cow except for its milk taste	1.92	1.29
2.	[ExA2] This fly is a mosquito except with respect to the chemistry of its blood	2.24	1.70
3.	[ExA3] This bird is a crew except for its eating habits	1.8	1.30
4.	[ExA4] This reptile is a snake except with respect to eye structure	3.64	2.31
5.	[ExA5] This predator is a tiger except for its teeth number	2.32	1.49
6.	[ExA6] This aquatic mammal is a dolphin except in behavior	3.08	1.79
7.	[ExP1] This tree is a pine except with respect to the wood fibers	2.84	1.38
8.	[ExP2] This vegetable is a potato except for color	2.88	1.99
9.	[ExP3] This flower is a dandelion except in size	3.28	2.16
10.	[ExP4] This spice is a mint except for the bitterness	3.12	2.10
11.	[ExP5] This plant is moss except with respect to metabolism	2.48	1.86
12.	[ExP6] This piece of fruit is an orange except for shape	3.04	1.93
13.	[ExT1] This place is a church except in appearance	4.32	2.48
14.	[ExT2] This piece of clothing is a dress except for its use	2.88	1.88
15.	[ExT3] This car is a taxi except for its current function	3.24	1.94
16.	[ExT4] This hall is a theatre except with respect to seat type	4.32	2.11
17.	[ExT5] This container is a vase except with respect to texture	3.04	1.78
18.	[ExT6] This booklet is a diary except for the sketches	4.08	1.74
19.	[ExH1] This journalist is a reporter except for salary	2.56	1.88
20.	[ExH2] This artist is a composer except with respect to education	2.72	1.89

21.	[ExH3] This football player is a champion except for running abilities	4.28	1.76
22.	[ExH4] This girl is a genius except with respect to literature.	5.04	1.99
23.	[ExH5] This colleague is a businesswoman except in generosity.	3.08	1.57
24.	[ExH6] This person is a victim except for subjective experience	2.56	1.90
	<u>Structure</u>: Negated modified forms	3.11 (.81)	0.81 (.29)
1.	[ExNA1] This farm animal is not a cow except for its milk taste	2.04	1.40
2.	[ExNA2] This fly is not a mosquito except with respect to the chemistry of its blood	2.88	1.90
3.	[ExNA3] This bird is not a crew except for its eating habits	1.68	1.41
4.	[ExNA4] This reptile is not a snake except with respect to eye structure	4	1.94
5.	[ExNA5] This predator is not a tiger except for its teeth number	1.96	1.31
6.	[ExNA6] This aquatic mammal is not a dolphin except in behavior	3.52	1.96
7.	[ExNP1] This tree is not a pine except with respect to the wood fibers	2.64	1.57
8.	[ExNP2] This vegetable is not a potato except for color	2	1.50
9.	[ExNP3] This flower is not a dandelion except in size	2.68	1.67
10.	[ExNP4] This spice is not a mint except for the bitterness	2.52	1.53
11.	[ExNP5] This plant is not moss except with respect to metabolism	2.76	2.12
12.	[ExNP6] This piece of fruit is not an orange except for shape	2.48	1.68
13.	[ExNT1] This place is not a church except in appearance	5.24	2.34
14.	[ExNT2] This piece of clothing is not a dress except for its use	2.84	2.07
15.	[ExNT3] This car is not a taxi except for its current function	3.48	1.94
16.	[ExNT4] This hall is not a theatre except with respect to seat type	3.64	2.02
17.	[ExNT5] This container is not a vase except with respect to texture	2.16	1.57
18.	[ExNT6] This booklet is not a diary except for the sketches	3.56	2.14
19.	[ExNH1] This journalist is not a reporter except for salary	2.4	1.50
20.	[ExNH2] This artist is not a composer except with respect to education	3.84	2.22
21.	[ExNH3] This football player is not a champion except for running abilities	4.28	1.84
22.	[ExNH4] This girl is not a genius except with respect to literature.	5.16	1.57
23.	[ExNH5] This colleague is not a businesswoman except in generosity.	2.76	1.53
24.	[ExNH6] This person is not a victim except for subjective experience	3.08	1.81
	Fillers	3.07 (.95)	0.95 (.29)
1.	[Filba] This chair is often wide	2.28	2.01
2.	[Filba] This inspector saw anything	1.96	1.46
3.	[Filgo] This inspector did not see anything	6.8	0.63
4.	[Filgo] This chair is often covered	6.16	1.29
5.	[HeBa] This boy is healthy	6.88	0.43
6.	[HeEx] This boy is healthy except for a cold	4.88	1.90
7.	[HeExN] This boy is not healthy except for a cold	1.52	1.17
8.	[HeNBa] This boy is sick	6.92	0.27
9.	[HeNEx] This boy is sick except for a cold	1.48	0.98
10.	[HeNExN] This boy is not sick except for a cold	4.16	2.07
11.	[NaBa] This film is Italian	6.96	0.20
12.	[NaBa] This immigrant is Italian	6.92	0.27
13.	[NaBe1s] This film is more Italian than American	6.12	1.21

14.	[NaBe2s] This film is more Italian than that film is American	3.92	1.79
15.	[NaCo1] This film is Italian compared to that film	3.2	1.96
16.	[NaCo2] This man is Italian compared to that film	1.92	1.35
17.	[NaEx1] This film is Italian except with respect to the music	4.84	1.99
18.	[NaEx2] This immigrant is an Italian except with respect to the accent	3.08	2.00
19.	[NaExN1] This film is not Italian except with respect to the music	4.52	2.04
20.	[NaExN2] This immigrant is not an Italian except with respect to the accent	3.48	2.23
21.	[NaWh1] This film is more Italian than that film	5.24	1.68
22.	[Filba] This musician is a big fan	5.24	1.86
23.	[Filba] This musician is a small fan	2.84	1.78
24.	[Filba] This musician is a bigger fan than that musician	4.2	2.14
25.	[Filba] This musician is a smaller fan than that musician	2.44	1.70
26.	[Cob1] This banana is bent compared to that banana	5.12	2.20
27.	[Cob2] This rod is bent compared to that rod	6.16	1.49
28.	[Cob3] This bed is bent compared to that bed	5.08	2.02
29.	[Coba1] This creature is bald compared to that creature	5.76	1.03
30.	[Cobi1] This building is big compared to that building	6.56	0.90
31.	[Cobi2] This pencil is big compared to that pencil	6.68	0.61
32.	[Coch1] This dress is cheap compared to that dress	6.84	0.46
33.	[Coch2] This apartment is cheap compared to that apartment	6.92	0.27
34.	[Coe1] This tea glass is empty compared to that tea glass	5.88	1.37
35.	[Coe2] This wine glass is empty compared to that wine glass	5.64	1.62
36.	[Coe3] This espresso cup is empty compared to that espresso cup	4.56	1.94
37.	[Coe4] This jam jar is empty compared to that jam jar	5.36	1.81
38.	[Coe5] This whiskey glass is empty compared to that whiskey glass	5.36	1.85
39.	[Coex1] This dress is expensive compared to that dress	6.88	0.32
40.	[Coex2] This apartment is expensive compared to that apartment	6.8	0.40
41.	[Cof1] This tea glass is full compared to that tea glass	5.6	1.67
42.	[Cof2] This wine glass is full compared to that wine glass	5.92	1.38
43.	[Cof3] This espresso cup is full compared to that espresso cup	5.64	1.65
44.	[Cof4] This jam jar is full compared to that jam jar	5.72	1.37
45.	[Cof5] This whiskey glass is full compared to that whiskey glass	6	1.26
46.	[Coh1] This creature is hairy compared to that creature	6.48	0.81
47.	[Cos1] This banana is straight compared to that banana	5.92	1.57
48.	[Cos2] This rod is straight compared to that rod	6.04	1.56
49.	[Cos3] This bed is straight compared to that bed	5.92	1.32
50.	[Cosh1] This girl is short compared to that girl	6.56	0.80
51.	[Cosh2] This basketball player is short compared to that basketball player	6.56	0.94
52.	[Cosm1] This building is small compared to that building	6.8	0.49
53.	[Cosm2] This pencil is small compared to that pencil	6.52	0.90
54.	[Cot1] This girl is tall compared to that girl	6.28	1.28
55.	[Cot2] This basketball player is tall compared to that basketball player	6.28	0.87
56.	[Cota1] This ice-cream is tasty compared to that ice-cream	6.56	0.64
57.	[Cotle1] This ice-cream is tasteless compared to that ice-cream	6.6	0.89