INFERENCE AND GRAMMAR: INTERSECTIVITY, SUBSECTIVITY, AND PHASES[1]

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In the semantic tradition, the difference between intersective, subsective and non-subsective adjectives has often been taken to be a lexical phenomenon. The difference between them can be encoded in 'meaning postulates' which are part of the lexical entry of the adjective (Kamp and Partee 1995). Alternatively, intersective and non-intersective adjectives may be treated as two different lexical categories (Siegel 1976). After a short exposition of the semantic perspective in section 1, I argue against this 'lexicalist' treatment of adjectives by showing that, for most adjectives, both intersective and non-intersective readings are systematically available. This suggests that the phenomenon is grammatical rather than lexical (section 2). In section 4, I argue that the difference between intersective and subsective occurrences of adjectives follows from interface-conditions, given we assume a phasal architecture of grammar (Chomsky 2001) and adopt the recent thesis that intersective modifiers are clausal whereas non-intersective modifiers are not (Alexiadou, et al. 2007; Cinque 2010). Some of the independent grammatical evidence for this thesis is shortly summarized in section 3. To make a long story short: my overall proposal is that, due to the asymmetric structure of grammar, it is expected that modifiers are interpreted relative to their hosts. Subsectivity is thus the 'normal case'. However, if the modifier is clausal, it is also a phase. Phases are taken to be units of semantic interpretation. The interpretation of the modifier is thus already fixed at the time of modification and the modifier can therefore not be relativized to its modifee. An intersective interpretation is the only remaining possibility.

1. Different kinds of adjectives: The perspective from formal semantics

The question which inferences are valid and which ones are not has probably always been of interest in human scientific reflection, and reflection on that topic can be traced back at least to Plato. The validity of inferences can in many cases be tracked by formal features of natural language expressions. Thus, the aim of Aristotle's *Topic* was to 'develop a method which allows us to deduce what follows from any accepted premises in respect to any argument someone else raises, and to avoid contradictions when we argue ourselves' (Aristotle, Topic: 100a). Aristotle's logic covers mainly the interrelation between negative and affirmative existential and universal statements.[2] Yet, as has long been noted, not only do quantification and negation exert systematic influence upon possible inferences, also modification allows in many cases for a

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[2] Two general problems of Aristotle's logic were that, first, it did not even nearly cover all possible inferences and, second, the inference rules seemed somehow unmotivated. However, later Peripatetics and the medieval logicians improved both coverage and simplicity of traditional logic. As Ludlow (2002) calls it, the 'Holy Grail' of medieval natural logic was to reduce the number of inference rules to two.

formal treatment of the validity of inferences.[3] For example, if something is a blue house, it is both blue and a house. Adopting a standard set-theoretic semantics, the simplest way of capturing this phenomenon is to treat both the adjective and the common noun as predicates. Both will then have sets as denotations. The inference pattern is captured by the assumption that the denotation of the complex phrase [Adj, N] is, in such a case, the intersection of the two sets denoted by the two predicates as illustrated in (1).[4] For example, the meaning of *blue house* is, according to this theory, the intersection of the denotation of *blue* and the denotation of *house* as illustrated in (2).[5]

1. *Intersective adjectives:*
   [[Adj N]]   = [[Adj]] ∩ [[N]]
2. [[house]]   = {x | house(x)}
   [[blue]]   = {x | blue(x)}
   [[blue house]] = {x | house(x)} ∩ {x | blue(x)} = {x | house(x) & blue(x)}

However, there are adverbs and adjectives for which this rule does not hold when they are combined with a noun.[6] For example, a skilful surgeon does not need to be a skilful violinist, even if she is a violinist. Thus, it does not follow from the fact that someone is a skilful N that she is skilful per se. However, whoever is a skilful surgeon is a surgeon, as illustrated in (4). In set theoretic terms, the denotations of the two predicates do not intersect, but the denotation of the whole phrase can be classified as a subset of the denotation of the noun, as illustrated in (3). Following the terminology of Kamp and Partee (1995), adjectives which behave in this way are called 'subsective'.

3. *Subsective Adjectives:*
   [[Adj N]] ⊆ [[N]]
4. [[skilful surgeon]] ⊆ {x | surgeon(x)}
   [[skilful surgeon]] ⊄ {x | skilful(x)}

Formal semantics has mainly followed Kamp (1975) in the suggestion that there is a difference between truly subsective adjectives on the one hand and intersective, but vague or context

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[3] Traditionally, attributive adjectives have been treated as 'normal' predicates. This, however, is problematic in some cases for reasons reviewed below.
A note on terminology: I shall reserve the terms *attributive* and *predicative* to specify the position in which an adjective occurs. Thus, *blue* is used predicatively in *The house is blue* and attributively in *The blue house*. In contrast, I shall use the terms *intersective* and *subsective* to refer to the inferential behaviour of the relevant expressions. This contrast has also often been captured with the terms *predicative* and *attributive* (cf. Davidson 1967 and subsequent literature). Finally, the term *predicative* has been used to classify those adjectives which *can* appear in predicate position (cf. Alexiadou, et al. 2007: 290-92). According to this classification, *kind* is predicative but *mere* is not, because we can say that *the student is kind* but we cannot say that *the fact is mere*.

[4] Katz and Fodor's (1963) theory of feature conjunction follows the same intuition and has similar formal effect.

[5] It has to be noted though that even in these cases, there is an asymmetry between the modifier and the modifee: whether the colour of a certain object counts as red, for example, is not independent of whether the object is a car or an apple (cf. Kamp 1975).

[6] This observation is often traced back to Davidson (1967). For the adjectives *good* and *evil* see already the discussion in Geach (1956). To my knowledge, the first to explicitly address subsectivity is Aristotle, for example in chapter 11 of *De Interpretatione*. This chapter also contains a short description of privative adjectives.

dependent, ones on the other.[7] Thus, whether something is tall, fat or small depends on what you compare it with; and the comparison class does not always have to be provided by the predicate that is modified by the adjective in question.[8] As Higginbotham (1985: 563) notes, a big butterfly is not a big animal, but in principle, you can also refer to a butterfly that is big compared to other butterflies as 'the small butterfly'. However, relativized to the comparison class, which is generally taken to be provided by context, these adjectives, when combined with a noun, behave like other intersective adjectives.[9]

Finally, there are some adjectives for which not even (3) seems to hold. The former president is in most cases not a president anymore and an alleged murderer may not have committed any murder at all. These adjectives are called 'non-subsective'.

5. *Non-subsective adjectives*

$[[Adj\ N]] \nsubseteq [[Adj]]$ & $[[Adj\ N]] \nsubseteq [[N]]$

6. $[[former\ president]] \nsubseteq \{x \mid president(x)\}$

$[[former\ president]] \nsubseteq \{x \mid former(x)\}$

They also differ syntactically from most subsective and intersective ones in that they usually cannot be used predicatively. Thus, whereas the sentences in (7) are fine, those in (8) are not. This is consistent with the intuition that there is no single set denoted by all former things, making the second line of (6) essentially meaningless.

7. He is a former/alleged candidate.

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[7] Prior to Kamp, these adjectives were often treated as subsective. Parsons (1970), for example, proposes treating vague adjectives intensionally which may be seen as the most economical treatment if one accepts Montague's conjecture of always generalizing to the 'worst case'. However, Kamp's initial motivation for his alternative theory is to develop a proper analysis of comparatives and superlatives which the original Montagovian theory could not analyze. He claims that 'what underlies the possibility of making comparative claims is that adjectives can apply to things in various degrees' (Kamp 1975: 128). However, the standard for the grading depends on context – whether Smith is cleverer than Johns may depend on whether you take the ability of solving mathematical problems or the ability to read quickly as central for cleverness. This standard is usually provided by context. And since we need the contextual parameter anyway for comparatives and superlatives, we can also use it for an analysis of the positive. Furthermore, whenever the contextual parameter is provided by the modified noun, the two theories will provide equivalent results. However, if the adjective is interpreted relative to a different standard, the context-free theory is in trouble.

[8] However, in some cases there seem to be syntactic constraints on comparison classes. See Bresnan (1973), Ludlow (1989) and Sadler and Arnold (1994) for discussion. There are furthermore syntactic constraints on whether an absolute or relative reading is possible (cf. Cinque 2010: ch. 2.5).

[9] Nonetheless, Kamp and Partee (1995: 143) stress that there are many borderline cases and that the distinction between vague and non-intersective adjectives is thus not clear cut: 'One might argue that some or all of these other supposedly non-intersective adjectives like *skillful* might also be better analyzed as context-dependent intersective adjectives, differing from adjectives like *tall* only in the nature and extent of the contextual effects.' On the other hand, adjectives may be both vague and subsective like in (i), making this a genuine distinction.

      (i) very good as a diagnostican for someone with so little experience (Partee 2007: 154)

A related question is whether subsectivity in this sense is best analyzed in terms of intensionality. McConnell-Ginet (1982) has argued that substitution failure is not necessarily due to intensionality but can be due to a hidden relationality. Intuitively, the reason for why someone who is a skilful surgeon may not be a skilful violinist doesn't seem to consist in properties the person has in other possible worlds, but rather in a feature of his in the actual world, namely that he is skilful only in some, but not in all, respects. Furthermore, we can say that a skilful surgeon is skilful (as a surgeon). The following argument depends upon the presupposition that we, at least heuristically, accept the traditional picture, which, as noted, is not unproblematic. See also n. 16 and 19.

8. *The candidate is former/alleged.

In this article, I shall not say much about this last kind of adjective. The fact that most of them are modal or temporal may suggest that they require a special treatment.[10]

In order to capture the properties of subsective and non-subsective adjectives formally, they are standardly analyzed as properties, in the sense of 'property' developed by Montague (1969: 152), rather than as sets. That is, they are taken to be functions which map the intensions of noun phrases into such intensions of noun phrases. Subsective and non-subsective adjectives, therefore, modify the intension, rather than the extension, of a noun.

In part criticising her own earlier work, Partee (2007; 2009; 2010) argues that privative adjectives like *fake* and *counterfeit*, which have often been treated as a fourth class of adjectives, are not a special kind of adjective but 'normal' subsective ones.[11] Originally privative adjectives have been analyzed such that the combination of a privative adjective and a noun implies the negation of what the noun denotes. In set theoretic terms the intersection between the denotation of the noun and the denotation of the phrase is the empty set, as illustrated in (9). A fake gun, for example, is not a gun, as exemplified in (10).

9. *Privative Adjectives*
   $[[N]] \cap [[Adj\ N]] = \emptyset$
10. $\{x \mid fake\ gun(x)\} \cap \{x \mid gun(x)\} = \emptyset$

However, if these adjectives are indeed privative in this sense, the wellformedness of sentences like (11) is surprising.

11. Is this gun real or fake? (Partee 2007: 153)

Therefore, Partee suggests that 'in the absence of a modifier like *fake* or *real*, all guns are understood to be real guns' (Partee 2007: 156). But when such an adjective is there, the meaning of the noun is expanded such that the denotation of *gun* includes both fake and real ones.[12] Further evidence for treating privative adjectives as subsective comes from syntax: Polish, for example, disallows NP splitting only for non-subsective adjectives. In this respect, privative adjectives form a natural class with intersective and subsective adjectives. It could be added that many privative adjectives allow a predicative use.

Montague (1970), Parsons (1970), and Clark (1970) originally proposed a uniform treatment of lexical categories. To allow for this, every expression of a certain category has to be generalized

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[10] Schlenker (2006) argues that quantification over, and reference to, objects, times and possible worlds form different but structurally parallel systems in natural language. Sigurðsson (2004) has described such systems for objects and times from a grammatical point of view. In case it is possible to identify a similar system for modality, it could be argued that modal and temporal adjectives interact with these systems, which could explain their non-subsectivity in respect to individuals.

[11] Some of the privative adjectives could even be treated as intersective: Whilst we may riddle about the question of whether a fake gun is a gun, a fake gun is clearly a fake.

[12] An alternative explanation which Partee does not consider could be that the meaning of *gun* is not by itself definite enough to exclude fake guns. The fact that we usually mean *real gun* when we use *gun* in a sentence could then be due to a default which in turn could be pragmatic or grammatical. For the latter possibility compare fn. 10. See also Sheehan and Hinzen (2011)

to the 'worst case'. In the case of adjectives, this means that all adjectives have to be treated as non-subsective. Predicative occurrences of adjectives are treated as elliptical attributive occurrences. In order to capture the different inferential properties of the different classes of adjectives discussed above, additional specifications may be part of the lexical entry. These may be formulated as 'meaning postulates' (Kamp and Partee 1995; Partee 2007). An alternative way of capturing the data is to give up the aim of providing a unified treatment of lexical classes. In this case, intersective adjectives, for example, can be treated as normal sets (Siegel 1976).

In both cases, the difference between the different classes of adjectives is treated as lexical. There is, however, a phenomenon that suggests that the difference between subsective and intersective adjectives is not a lexical but rather a grammatical phenomenon: many adjectives which are traditionally classified as subsective also have an intersective reading and most, if not all, adjectives that are traditionally classified as intersective also have a subsective reading – even if in many cases one of the readings is marginal for pragmatic reasons. If this conjecture is correct, the lexicalist account of adjective classes introduces a high redundancy in the lexicon and misses out on an explanation for the systematicity of the phenomenon. Furthermore, in the semantic literature, there has been considerable disagreement about which adjectives belong to which of the classes mentioned above. Even though this is not a decisive point – different speakers may have different lexicons –, it could already put some initial doubt on the idea that adjectives belong to inferential classes qua their lexical entry.

2. Intersective and subsective occurrences of adjectives

As first noted in Bolinger (1967), deverbal adjectives exhibit an ambiguity when combined with a noun: they can either be used as attributing a temporal or as attributing a non-temporal, that is intrinsic, property. This contrast seems to coincide with the distinction between stage-level and individual-level predicates, discussed in Carlson (1980).[13] According to one reading of the adjective *visible* in (12), for example, Cappella is one of the stars that are in principle visible but perhaps not now. The sentences could in this sense truthfully be asserted at daytime when actually no stars are visible at all. In this case, the adjective tells us something about a general property of the referent of the phrase; it concerns the individual referred to irrespective of the current situation and is thus an individual-level predicate. However, (12) can also be used to say something about the current properties of Cappella. According to this reading, the sentence can only be truthfully asserted if Cappella is visible at the time of the assertion. Used in this way, the speaker is not committed to the claim that the predicate denoted by the adjective holds of the referent of the phrase in general. In this reading, (12) is true even if Cappella was not generally visible but only at the time of the assertion.[14] Used in this way, the adjective is therefore called a

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[13] Carlson's account is lexicalist. Furthermore, he argues for the existence of a third category which modifies kinds, which might correspond to the kind-level/individual-level dichotomy discussed below.

[14] Alexiadou et al. (2007: 297) provide the following example (which in part goes back to Bolinger 1967): Assume the X is not always navigable but has become so recently due to a flood. In this case (i) would be true, but (ii) would not be true:

stage-level predicate. In Germanic languages, only the stage-level reading is available for post-nominal adjectives, as shown in (13). Post-nominal and pre-nominal occurrences can be combined. In this case the pre-nominal adjective has to be an individual-level predicate (see 14). Furthermore, if the same (deverbal) adjective appears twice in pre-nominal position, the first occurrence will have a stage-level and the second an individual-level reading, as in (15).[15] In the examples (13) to (15), the stage-level predicates have been italicised.

    12. The visible stars include Cappella.
    13. The stars *visible* include Cappella.
    14. The visible stars *visible* include Cappella.
    15. The *visible* visible stars include Cappella.

Stage-level readings are taken to be intersective, but individual-level readings are not. Thus, the denotation of *stars visible* in (13) can be correctly described as the intersection between all stars and all visible things. However, this is not the case for the individual-level reading of (12). Interpreted in this way, (12) does not imply that Cappella is (currently) visible. If *visible* has an individual-level reading, the denotation of *visible star* can therefore not be a mere intersection. However, it can hardly be questioned that visible stars are stars. The individual-level readings of adjectives, thus, seem to follow the pattern of subsective adjectives.[16]

A close correlate to the individual-/stage-level distinction can also be found in adjectives which are not deverbal. In this case, the individual-level reading of the deverbal adjectives corresponds to a kind-level reading of the non-deverbal adjective and the stage-level interpretation of the

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    (i) The rivers navigable include the Amazon, the Nile, the Danube, the X.
    (ii) The navigable rivers include the Amazon, the Nile, the Danube, the X.
Furthermore, as Larson and Marušič (2004: 274) note, (iii) is odd, because redundant, whereas (iv) is fine:
    (iii) List all the stars visible, whether we can see them or not.
    (iv) List all the visible stars, whether we can see them or not.
It has to be noted though that for many English speakers postnominal adjectives like *visible* or *navigable* are not very good anyway which makes the distinctions very subtle if at all existent. The grammatical distinctions are much clearer in other languages (see section 3). Furthermore, heavy adnominal modifiers have to occur postnominally in English. It is not clear that all of them are stage-level predicates. Thus, (v) seems to be fine (thanks to Alex Drummond for pointing this out):
    (v) List all the stars visible to the naked eye/at night/tomorrow, whether we can see them or not.
[15] Larson (1999) concludes from this fact that 'the relevant syntactic contrast is not strictly one of linear order, but rather one of relative closeness to N.' This has first been noted in respect to data from Mokilese and Thai by Sproat and Shih (1988). The distinction between stage-level and individual-level occurrences allows us to make sense of sentences that otherwise would sound contradictory like (i) and (ii). Larson (1999) attributes the discovery of this phenomenon to B. Citko. ((ii) remains odd, though, since it attributes visibility to something genuinely invisible.)
    (i) The invisible visible stars include Cappella.
    (ii) The visible invisible stars include Cappella.
[16] There are, however, some problems with treating the stage-/individual-level distinction as an intensional phenomenon. It could be argued that the individual-level reading of adnominal modifiers is as intersective as the stage-level reading: since individual-level readings are in general available in predicative position (cf. n. 28), we could say that a visible (in the individual-level sense) star is indeed visible (in the individual-level sense). The distinction may then, following Chierchia (1995), be analyzed in terms of genericity rather than intensionality. The same strategy could be applied to the individual-/kind-level distinction discussed below. Reichard (in prep.) argues that the analysis in terms of genericity reduces straightforwardly to the grammar of determiner phrases, and indeed follows from more general grammatical organization.

deverbal adjective corresponds to an individual-level interpretation of the non-deverbal adjective. The most obvious interpretation of (16) is intersective. According to this reading, I assert that I own an object which is both a car and big (compared to other cars). And if I owned a Mercedes, for example, the sentence would be true. However, there is another reading such that I could truthfully assert (16) if the car I owned is just a small model (or version) of a Mercedes. Now *big* doesn't modify the individual car I own, but the kind of car I own. In this reading, the truth of (16) is compatible with that of (17). Germanic languages don't allow the intersective adjective to appear post-nominally in this case, as shown in (18). However, both uses of the adjectives can appear prenominally. In this case the first has an intersective and the second a subsective reading (see 19 and 20). This parallels exactly the case discussed above (15).

16. I have a big car.
17. I have a *small* car.
18. *I have a car *small*.
19. I have a *small* big car.
20. I have a *big* small car.

Subsective kind-level readings (or alternatively stage-level readings) can be found for most adjectives usually treated as intersective. When presented with a tepid cup of tea in a café, you may say to the waiter that you were hoping for a *hot* hot drink (if you are not too English an Englishman, anyway). And when you find tomatoes sorted in two boxes, one for the red and one for the green ones, you can ask for the reddest green tomato. Finally, when you find out that the truffles you have bought are made following a French recipe, but are actually produced in the UK, you may wish you had bought *French* French truffles.[17] In sum, the distinction seems to be a genuine one, even if the situations in which a kind reading of these adjectives is required are rather pragmatically special.[18]

If this is true, then most common adjectives can be used both intersectively and subsectively, although one or the other usage may be more common. And there is a further ambiguity which exhibits a pattern similar to the one just reviewed: when adjectives are combined with deverbal (and some other) nouns, they can exhibit two different readings. Thus *beautiful* in (21) can either modify the person or her dancing. Let's call the first of these readings adjectival and the second adverbial. In case the person is modified, the interpretation is (or at least can be) intersective. A beautiful dancer in the adjectival sense is a beautiful person who is also a dancer. And if we independently know that she is also a singer, she will also be a beautiful singer (in the adjectival sense). However, if *beautiful* modifies her dancing, the reading is not intersective but subsective, since not everyone who dances beautifully also looks beautiful. And even if we know that our

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[17] Larson (2000) notes that in expressions like 'I missed the *Thursday* Thursday lecture', the second instance of *Thursday* gets a generic interpretation and the first a deictic one: what I missed in this case is *this* Thursday's Thursday lecture. This seems to be another instance of the kind discussed here.

[18] It has to be noted, though, that the kind reading often exhibits a quotational character: when you were promised to see the fattest man ever, but when presented with him, you are not impressed, you may say to your friend afterwards: 'Hopefully we are going to see a fat "fat man" next time'.

beautiful dancer (in the adverbial sense) is also a singer, we cannot infer from this that she is a beautiful singer. As Kamp (1975: 125) notes, even if we assume that the singers and dancers are coextensive, we cannot infer form the fact that someone dances beautifully that she also sings beautifully.[19] Note that the adverbial reading is not available if the adjective appears in postnominal position, like in (22).[20]

    21. A beautiful dancer

    22. A dancer, more beautiful than her instructor (Cinque 2010: ch. 2)

In sum, for most adjectives, both intersective and subsective readings are available. The distinction between these readings is, furthermore, very systematic. This suggests that the distinction has a grammatical origin rather than a lexical one – otherwise we would have to assume a high redundancy in the lexicon. Furthermore, if we take the lexicalist view, we cannot account for the systematicity of the distinction. And finally, if the distinction is indeed grammatical rather than lexical, it is evident why there are many adjectives which are hard to classify.

3. Grammatical differences between intersective and subsective uses of adjectives

It has already been noted in the second section that there are grammatical differences between the intersective and subsective uses of adjectives discussed: in English, both intersective and subsective adjectives can occur prenominally, but only intersective adjectives can occur postnominally.[21] The distinction is not very clear cut in English, since not all intersective uses of adjectives can occur postnominally and some additional ones are marked for many speakers, but there is crosslinguistic evidence for a grammatical difference. As Cinque (2010) notes, in Romance languages, the pattern is complementary to that of English: prenominal adjectives can only get a subsective reading whereas postnominal adjectives are ambiguous between

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[19] A problem for the intensional analysis of the phenomenon is that, as Davies (1991) observes, even if the dancers and singers are necessarily coextensive, it does not follow that someone who dances beautifully also sings beautifully or vice versa (cf. n. 9). In this article, I heuristically adopt the subsumption of adverbial adjectives to subsective ones. I am, however, not convinced that their description in terms of intensionality is correct. First, it seems that the two distinctions discussed (stage-/individual-level and adjectival/adverbial) are quite different in nature. It is therefore not clear why they should receive the same semantic and syntactic treatment. Second, McConnell-Ginet (1982) has provided arguments against the proposed intensionality of adverbial adjectives. According to her, the failure of the inferential relation can also be due to a hidden relation. Larson (1998) suggests that for adverbial uses of adjectives this relation may be one to events. For a discussion of Larson's account and an idea about how to give a grammatical analysis of the phenomena when it is accepted that the two distinctions are different phenomena, see Reichard (in prep.).

[20] In English, evaluative adjectives like *beautiful* can only occur in postnominal position when they are made 'heavier' with the help of a complement. In general, 'heavy' modifiers like adjectives with complements, or rather, as Michelle Sheehan (p.c.) points out, right branching modifiers, have to appear postnominally in English.

[21] Originally, Bolinger (1967: 3-4) has proposed a rigid correspondence between interpretation and position for those modifiers that can occur both prenominally and postnominally. However, as Sadler and Arnold (1994) stress, and as is evident from the above examples, it is possible for a prenominal adjective in English to give rise to a stage-level interpretation. Bolinger seems to note this himself later in his article when he admits that 'there is a way for referent modification to become attributive' (1967: 21).

intersective and subsective readings.[22] For example, (23) exhibits only an individual-level reading in Italian, but (24) is ambiguous between an individual- and a stage-level reading.

23. Le **invisibili** stelle di Andromeda esercitano un grande fascino.
    the invisible stars of Andromeda have   a great fascination
24. Le stelle **invisibili** di Andromeda sono moltissime.
    the stars invisible of Andromeda are very many (Cinque 2010: ch. 2)

A similar pattern is found in respect to the adjectival/adverbial distinction. As noted above, in English a prenominal occurrence is ambiguous between the two readings, but in the postnominal position, only the adjectival reading is available. In contrast, in Italian, the prenominal position only allows adjectival readings, whereas the postnominal position is ambiguous between the two readings. Thus, (25) only exhibits the adverbial reading in Italian: 'A forward who is good at playing forward would never have done such a thing.' (26), however, is ambiguous between the adverbial and the adjectival reading: 'A good-hearted forward would never do such a thing.'

25. Un **buon** attaccante non farebbe mai una cosa del genere.
    a good   forward not would.do never a thing of the kind
26. Un attaccante **buono** non farebbe mai una cosa del genere
    a   forward   good not would.do never a thing of the kind (Cinque 2010: ch. 2)

In sum, the data from English and Italian jointly suggest that adjectives can be used in (at least) two different ways and that this is reflected in grammar. When adjectives are used in one of these two ways, the interpretation is (typically) intersective, whereas if they are used in the other way, the interpretation is typically non-intersective. Adopting the terminology from Sproat and Shih (1988), let's call the first use of adjectives *indirectly modifying* and the second *directly modifying*. In contrast to the semantic intersective/subsective distinction, I take direct/indirect modification to be an abstract grammatical phenomenon, which I, however, argue to coincide with the semantic distinction in the attributive domain. It has to be noted that even though both kinds of adjectives can occur in prenominal position in English, the indirectly modifying adjectives always precede the directly modifying ones, as is evident from (15). Again a similar pattern can be found in Italian for postnominal adjectives: the directly modifying adjectives are always closer to the noun than the indirectly modifying ones. There are additional ambiguities in Romance and Germanic which point into the same direction (for an overview see Cinque 2010: ch. 2).[23] Furthermore, there is crosslinguistic evidence for this phenomenon from many languages[24] involving different aspects of grammar[25] that space does not allow to be reviewed here.

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[22] In the literature, it is often suggested that the post-/pre-nominal distinction in Romance mirrors exactly the subsectivity/intersectivity distinction (cf. Alexiadou, et al. 2007).

[23] It seems, however, that most of these additional ambiguities can be analyzed as interaction effects of the ambiguities discussed here, in addition to the fact that the indirect modifier always outscopes the direct modifiers and the effects of quantification, negation and distribution.

[24] In addition to the ordering phenomena in Romance and Germanic, Cinque (2010) provides in his Appendix an overview and discussion of the relevant literature on Chinese, Maltese, Bosnian, Croatian, Serbian, Romanian,

Given that the assumption is correct that directly modifying and indirectly modifying adjectives differ grammatically and that this correlates with interpretation, there remains the question of what exactly the difference consists in and how it is related to interpretation. I shall address the first of these two questions in the remainder of this section and reserve the next section for a proposal about the latter question.

There is the very old observation that often attributive adjectives can be paraphrased with the help of relative clauses. Thus, already Arnauld and Lancelot (1660: 68-69) note in their 'Grammar of Port-Royal' that *visible god created the invisible world* can be paraphrased as *god who is invisible created the world which is visible*. They furthermore maintained that the former is a derivationally dependent abbreviation of the latter (cf. Chomsky 1966: 80), an idea that has been taken up in the generative tradition. Bolinger criticised this approach by showing mainly for non-intersective uses of adjectives that such a derivation is not plausible. Sproat and Shih, however, argue that the original intuition can be used in order to explain the difference of interpretation and grammatical behaviour between the two uses of attributive adjectives if only indirectly but not directly modifying adjectives are taken to originate in relative clauses. Furthermore, Alexiadou et al. (2007: 354) comment on Kayne's (1994, ch. 8) recent revitalisation of the old idea to derive all attributive adjectives from relative clauses that such an approach is strongly supported in respect to adjectives that appear postnominally in English 'by the fact that APs in postnominal position can only be predicative, i.e. they typically allow a paraphrase with postcopular APs. This follows naturally if syntactically postnominal adjectives originate as predicates in some kind of clause.' Thus, (27a) can be paraphrased as (27b) and (28a) as (28b). However, Alexiadou et al. also stress that the same is not true in respect to all prenominal adjectives, as many of them do not allow for such a paraphrase.[26] For example, we use expressions like (29a) but not (29b) and (30a) is fine, (30b) but is not.

Greek, Russian and German. Sproat and Shih (1988) provide additional evidence for their thesis from Japanese, Kannada, Arabic, Thai, Mokilese and Irish. Cf. also Alexiadou, Haegeman and Stavrou (2007).

[25] Sproat and Shih (1988) note that, in Chinese adjectives with the suffix -*de* do not obey the ordering restrictions of adjectives found in most languages (cf. Cinque 1999; Scott 2002). They argue that this finding is not restricted to Chinese but is characteristic of indirect modification in all languages which they review. Furthermore, Bosnian, Croatian and Serbian require different agreement morphology in the two cases (Leko 1988 and subsequent work). Moreover, Greek allows to 'spread' the determiner only in cases of indirect modification (Kolliakou 2004).

[26] In parallel to Kayne, Struckmeier (2010) argues for German that all attributive adjectives are clausal. He begins his analysis with present-participles which he shows to comprise full argument structure. Furthermore, he shows that anaphors can be bound within the attributive present-participle which suggests the existence of a subject position:

    (i)   der sich   sehende Mann
               the himself seeing man
               'the man who sees himself' (Struckmeier 2010: example 22)

Struckmeier furthermore argues that the same structure can be used to account for other adnominal modifiers: past-participles differ from present-participles in that *v*P is unaccusative, adjectival modifiers contain an AP instead of *v*P. The difference between relative clauses and attributive present-participles is the finite T-head in relative clauses. It is telling, however, that the most complex predicative modifiers which initially motivate Struckmeier's analysis, present-participles and relative clauses, cannot have a subsective reading in German whereas predicative adjectives can. Thus, even though there do not seem to be morpho-syntactic differences between subsective and intersective modifiers in German, the question is whether the largely empty functional structure in the case of adjectival

27. a) the students present
    b) the students (who) are present
28. a) dancer more beautiful than her instructor
    b) dancer who is more beautiful than her instructor
29. a) the present situation
    b) *the situation (which) is present
30. a) the mere detail
    b) *the detail is mere

Thus, the proposal, which has also been defended most recently by Cinque (2010), is that the meaning contrast in attributive adjectives is due to a difference in structure: indirectly modifying adjectives are reduced relative clauses whereas directly modifying adjectives do not have a clausal origin.[27] The details of the syntactic proposals differ between authors. The reduced relative clauses may be taken to be generated postnominally, perhaps along the lines of Kayne's theory of relative clauses, and then fronted if they occur prenominally. Alternatively, as Cinque most recently has argued, they may be generated prenominally like directly modifying adjectives. The order we find in the languages discussed can then be derived by cyclic NP movement. The main difference between English and Italian in this respect will then be the amount of obligatory and possible movement of NPs. I shall remain neutral in respect to these questions since nothing about my proposal hinges on these details. In the next section, I shall argue that if the proposal that indirectly modifying adjectives are clausal whereas directly modifying ones are not is indeed correct in any of its formulations, there may be an explanation for the intersectivity/subsectivity distinction which goes beyond the mere correlation that has often been argued for so far.[28]

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modification is always projected or whether it is only projected in the case of indirect modification – as the data of other languages suggest.

[27] An alternative proposed by Sadler and Arnold (1994) is that direct modifiers are X^0 adjunct whereas indirect modifiers are phrasal. If their analysis is right, my proposal will only work in case APs are phasal expressions.

[28] There is a potential problem with the idea just delineated: If indirect modifiers originate as relative clauses, they occupy a predicative position in the relative clause. We would then expect to find a close correlation between the distribution and possible readings of predicative adjectives and indirectly modifying attributive adjectives. Whereas the adjectival/adverbial distinction supports this conjecture (Larson 1999), judgements seem to differ as to whether the stage-/individual-level distinction does so too. In (28b), beautiful can only get an adjectival but not an adverbial reading. However, consider (ia, iia). According to Bolinger (1967), who is in accordance with my own judgement, both expressions are ambiguous between a stage-level and an individual-level reading. And although the individual-level reading is harder to get for relative clauses, the ambiguity does not go away (ib, iib). This phenomenon motivated Bolinger's suggestion that the copula itself is ambiguous between a stage-level and an individual-level version – a hypothesis which was supported by the fact that Spanish indeed seems to have two different copulas (cf. e.g. Sera 1992). However, Larson (1999) argues that predicative uses and occurrences in relative clauses only allow for the stage-level reading: 'it seems that when used as a predicate, […] *visible* can only have its "temporary property" meaning'. If this is true, that's good news for the clausal hypothesis.

    i.   a. This river is navigable.
            b. The rivers which are navigable include the Danube.
    ii.   a. This star is visible.
            b. The stars which are visible include Cappella.

4. A grammatical explanation for subsectivity and intersectivity

There are two kinds of implicational relations which have been described in section 1. First, the denotation of the combination of adjective and noun may or may not imply the denotation of the noun. Second, the combination may or may not imply the adjective. Intersective and subsective uses of adjectives do not differ in that both allow for the first kind of implication. They do differ, however, in that intersective adjectives do, but subsective adjectives do not allow for the second kind. As noted above, in formal semantics the inferential behaviour of expressions involving adjectives is often taken to be part of the lexical entry of the adjective. If this is the case, then all kinds of implications of expressions involving the relevant adjective will trivially have the same source: the lexical entry of the adjective.[29] However, if it is correct that the difference between intersective and subsective adjectives is grammatical, then it is possible that the different kinds of implications which adjectives allow for have different grammatical sources. I shall argue in the following that this is indeed the case.

From a grammatical point of view, it is not surprising that (in the absence of expressions which involve negation[30]) the first kind of implication holds, that is, that it is possible to drop the modifier in both the intersective and the subsective cases, whilst preserving the truth value. A grammatical object is complete without an adjective added to it: it is not selected for (Svenonius 1994: 442-43).[31] Moreover, adding an adjunct to a given syntactic object doesn't change anything categorically in that object. It is thus natural to assume that whatever semantic value an object has after specification by an adjunct (or specifier), it has already had before the addition of the adjunct. Therefore, when the adjunct is deleted from the structure, the semantic value of the host object should be unchanged (cf. Hinzen and Reichard 2011).

This rather trivial explanation relies on the grammatical asymmetry of adjunction (and in fact most if not all grammatical relations[32]). The host is what provides the semantic value, whereas the modifier only specifies this value and is thus always interpreted relative to its host. Such an asymmetry is unexpected if modification is essentially conjunction, which is a symmetrical

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[29] An alternative developed in Larson and Segal (1995) and Larson (1998) is to treat the ambiguity (at least as far as the adjectival/adverbial distinction is concerned) as a matter of the lexical structure of the noun modified. Note that this is still a lexicalist solution to the problem. The approach considered here takes the ambiguity to be one in grammatical structure.

[30] As already observed in the Middle Ages, negation changes an environment from downwards entailing to upwards entailing or vice versa. Ludlow (2002) shows how this relatively simple assumption can handle all kinds of quantification and can be integrated into the *syntax* of natural languages.

[31] Attributive adjectives therefore have often been taken to be adjuncts. As a result of Kayne's (1994) antisymmetry-thesis which assimilates specifiers and adjuncts, Scott (2002) and Cinque (2010), for example, assume adjectival modifiers to have more structure: in the extended projection of the noun, APs feature in the specifier position of functional heads which ensures the proposed universal order in which adjectives occur. This, however, does not change anything about the optionality of these modifiers – in principle, a structure is complete without them.

[32] Even in cases which seem symmetrical, a certain asymmetry seems to be necessary for a compositional interpretation. See Moro (2000) and Sheehan (2011) for small clauses and Bauke (2011) for compounds.

relation. Given the asymmetry, however, subsectivity of the modifier is expected.[33] What is puzzling from a grammatical point of view, then, is intersectivity, not subsectivity. But the assumed clausal nature of intersective adjectives may be taken to explain this fact in the light of current syntactic theory.

Chomsky (2001) proposes that the computational device of human language constructs syntactic representations in units which he calls phases. The motivation for phases is largely grammar-external and concerns, for example, memory limitations: phases reduce the computational burden. When the edge of a phase is reached in the computational derivation, the complement of the phase head is 'sent' to the conceptual-intentional interface, where it receives an interpretation, and to the phonological interface, where it is spelled out; the derivational device now can 'forget' about the complex structure of the expression generated. In *Derivation by Phase*, Chomsky takes CP and *v*P to be phases. Grammatical evidence for the existence of phases mainly comes from island conditions: CP and *v*P both 'are reconstruction sites and have a degree of phonetic independence' (Chomsky 2001: 12). Phases are in this sense 'impenetrable'.

What is important for our current purposes is that, as noted, phases are, inter alia, taken to be units of semantic valuation. If indirect modifiers are clausal and thus CPs, they will, thus, be such units of valuation. In this case, the semantic value of an indirect modifier is already fixed when it modifies its host. The host can, thus, not relativize the modifier in any way. And if the modifier is not interpreted relative to its modifee then intersectivity is the only possible interpretation left.[34]

5. Conclusion

It has first been argued that most adjectives have both intersective and subsective readings, even if often one of the two readings is marginal for pragmatic reasons. The different readings are, furthermore, systematically available. This suggests that the distinction is grammatical rather than lexical. Otherwise, the lexicon has to be taken to be highly redundant and there is no explanation for the systematicity of the phenomenon. A further argument for this conclusion has been the consistent problems of classifying adjectives into the relevant semantic classes. Second, some grammatical evidence for the thesis that the phenomenon is grammatical has been delineated in section 3: crosslinguistically, the different interpretations seem to correspond to syntactic position and structure. Thus, grammatical considerations suggest that there are two different kinds of modifiers which have been called direct and indirect modifiers. In accordance with recent syntactic theories, it has been assumed that indirect modifiers are reduced relative clauses whereas direct modifiers don't have a clausal origin. In a third step, it has been

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[33] In a certain sense, a similar conclusion was already reached by Bolinger (1967: 3) who argues that 'by itself the fact that many more adjectives are restricted to attributive position than to predicative position is suspicious; if anything the reverse should be true if we want to base attribution on predication.'

[34] Struckmeier (2010), for example, directly argues for the thesis that attributive modifiers are phasal in German. I would want to restrict this thesis to indirect modifiers, cf. n. 26.

demonstrated that, if this thesis is indeed correct, there may be a grammatical explanation for why direct modifiers are subsective while indirect modifiers are intersective. Whereas, due to the inherent asymmetry of language, subsectivity is expected, intersectivity follows from the clausal nature of the relevant occurrences of the modifiers: in current syntactic theory clauses are taken to be phases and phases are units of semantic valuation. If, because it is already fixed at the time of modification, the semantic value of the modifier cannot be relativized to that of the modifee, the only available interpretation left is intersective.

Most current theories of language, both in linguistics and in philosophy, take language to be in the periphery of our cognitive abilities: it is a device for the expression of our thoughts. However, if, as argued above, it is correct that the validity and invalidity of inferences may not only correlate with grammatical phenomena, but find an explanation in them, language may turn out to be more central for human cognition than this picture suggests (cf. Hinzen 2007; Hinzen 2006). Thus, the question arises which aspects of human-specific cognition can in principle be accounted for with the help of independently motivated grammatical assumptions. As noted, Ludlow (2002) has shown more generally how inferences involving quantification (but not non-intersective modification) can at least be integrated into current syntactic theory. In case this research programme turns out to be fruitful, further metatheoretical questions arise about the relation between the normativity of the validity and invalidity of inferences, which is intuitively non-psychological, and our psychological grasp of this normativity.

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