The Limited Gradability of *"knows"*

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Abstract

The debate over epistemic contextualism has recently raised the question whether propositional knowledge attributions were gradable predicates. Contrary to Stanley (2005), I argue that they exhibit genuine constructions of degree. However, these constructions are limited in several important ways; most importantly, they only include what I call "qualitative modifications" (*well / better than*) as opposed to "quantitative modifications" (*much / a lot / more*). Drawing on the work of Kennedy and McNally (2005), I argue that the absence of quantitative modifications shows that *know* itself is not gradable, but that *know well* is. An interpretation of these constructions is put forward, according to which know well operates on degrees of epistemic justification which is not at the same time degrees of knowledge. I explore an extension of the account into a unified semantics for the various gradable constructions that occur with *know*, and indicate its distinctive predictions. I conclude by listing several unsolved issues.

[*] The putative gradability of propositional knowledge ascriptions has recently been the subject of a debate among philosophers. Epistemic contextualists such as Cohen (1999) have drawn an analogy between *know* and context-sensitive gradable adjectives like *tall*.[1] Stanley (2005) has ar-

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[1]The analogy was first made by Unger (1975). However, Unger argued that *know* was analogous to gradable adjectives that have context-*in*sensitive standards because they denote a limiting point on the relevant scale, like *flat* or *empty*.

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gued on linguistic grounds that (propositional) *know* is not a gradable term. As far as I know, everybody has accepted Stanley's linguistic arguments, while some have claimed that their significance was limited. Halliday (2006) has replied that they fail if the right analogy is with *tall enough*, and Ludlow (2005) and Stainton (forthcoming) point out that the non-gradability of *know* does not settle the case against epistemic contextualism.

In this paper, I will argue *contra* Stanley that propositional knowledge attributions do exhibit a limited form of gradability. I will explore an hypothesis about its semantics that is inspired from Kennedy and McNally (2005)'s work on the gradual modification of deverbal adjectives, and I will point out several unsolved questions raised by the linguistic data.

The two linguistic criteria for gradable predicates are degree modifiers and comparative constructions. In sections (1) and (2), I will argue that propositional knowledge attributions accept genuine degree modifiers and comparatives, albeit only of the quantitative kind (*well* and *better*). In section (3), I will reject Stanley's claim that the lack of negation of degree and degree questions shows that propositional *know* is not gradable. In section (4), I will put forward a rough semantics for *know well that* attributions based on Kennedy and McNally (2005), outline a unified account of the gradability of the various constructions of know, and list several remaining issues.

1 *Know-that* accepts genuine qualitative degree modifiers

1.1 Gradable predicates and qualitative vs. quantitative degree modifiers

Gradable predicates attribute a property which can be measured on a scale, or, equivalently, a property which is associated with an order on the domain of objects.[2] For instance, the adjective *flat* not only divides objects into flat ones and non-flat ones (at least relative to a context), but it also orders them in terms of their respective flatness. The two linguistic criteria

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[2]See Kennedy (1999a,b) for a defence of scalar analyses of gradable predicates over alternatives.

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for gradable predicates are degree modification and comparative constructions, as shown in (1) and (2):

(1)   a.   Nixon is a very unpopular president.
       b.   *Nixon is a very former president. (Kennedy and McNally, 2005)

(2)   a.   Nixon is a less popular president than Kennedy.
       b.   *Nixon is a less former president than Kennedy.

Core degree modifiers and comparatives come into two groups: *very / much / a lot / more than* on the one hand (call them the *quantitative*), and *good / well / better than* on the other hand (call them the *qualitative*). By calling the second class of modifiers "qualitative", I do not mean that their measure is not a quantity, but that what they measure has some axiological value: it is a degree of goodness. Quantitative and qualitative modifiers have different distributions and semantics, but the differences between them are not well understood (though see Kennedy and McNally (2005)). I will return to that question in section (4). From the time being, it will be enough to assume that all those terms modify the extension of a predicate along an order or a scale.

Further adverbs like *really*, *hardly*, *perfectly* seem to act as degree modifiers. However, it is unclear that they do. They might be "slack regulators" like *it is true that* or *strictly speaking* which do not affect a sentence's truth conditions, but indicate that its truth-conditions are intended to be taken literally (Lasersohn, 1999), or "hedges" which indicate that they should not be taken litterally (*so to speak*, *more or less*). Thus I will leave them largely aside.

1.2   Quantitative modification of *know that* is marginal

Objectual knowledge attributions (corresponding to the *german* kennen and the french *connaître*) can occur both with quantitative and qualitative modifiers, and knowledge attributions with embedded questions can occur with qualitative modifiers. However those can be explained away without postulating a knowledge scale, and I will leave them aside. (See Appendix A.)

By contrast, propositional knowledge attributions do not normally occur with *not much / a lot / more than*:

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(3) a. I *know / regret a lot that he left.
     b. He doesn't *know / regret much that she left.[3]
     c. I *know / regret that he left more than you do.

There are some caveats, though: locutions like "more than ever", marginal occurrences, and the possibility of building such constructions by using propositional anaphora (see Appendix B). But here I will grant that *know-that* does not accept quantitative modifications.

1.3 Qualitativative degree modification of *know-that* is genuine

However, propositional knowledge attributions seem to accept the qualitative degree modifiers *well / very well*:

(4)   Hannah knows very well that Bush is president.

Stanley (2005, 39–40) argues that *very well* does not act as a genuine modifier here, but as what he calls a *pragmatic indicator*. Such terms have no effect on the truth-conditions of the sentence, but indicate something to the hearer: for instance, that the sentence should be taken literally (*strictly speaking*), or that it shouldn't (*so to speak*), or that the hearer asserts something that was doubted (*really*) and so on.[4] Thus, according to Stanley, *very well* in (4) would be like *very much* and *really* in (5):

(5)   a. 2 is very much an even number. (Stanley, 2005, 38)
      b. The exit is really on the left.

Three replies to Stanley.

First, it must be conceded that many uses of *very well knows* do have such a flavour. For instance, sentences such as (6) are commonly used that somebody knows something even though they appear or pretend to ignore it: to ignore

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[3]The phrase " to regret much that", common in the XIXth century ("I regret much that you have made so little progress today in the pursuit of the enemy", General Lee 1862) seems now to have been superseded by "to regret very much that". However, I prefer to use it here because "very much" is not always a genuine degree modifier and thus introduces unclear data (cf. "2 plus 2 is very much 4" (Stanley, 2005)).

[4]See Lasersohn (1999).

(6)   Mike knows very well that Judith does not like him.

However, things might go the other way round. A genunine degree modifier can be used to pragmatically indicate a confirmation[5], for instance:

(7)   Wasn't he nice ?
       Oh yes, very nice!

  Second, there are uses of *know well* or *know very well* which do not fit into the pragmatic indicator view:

(8)   a. Tim **knows well** that we must have no illusions that somehow the danger has passed. (Dick Cheney)
       b. But Chirac **knows well** that, while times change, an unchanging rule of politics is this: you say whatever you have to say to get elected. (International Herald Tribune)
       c. And he **knows very well** that it requires work to get past old grievances. (GW Bush)

The sentences in (8) are not plausibly understood as mere confirmations that the subjects know. Instead, they mean that the subject's knowledge has some good quality: that it is more robust, or involves a deeper understanding, or is more readily applied to particular cases, or better leads to action.

  Let me make a remark here. One may wonder whether the degrees involved here really are degrees *of knowledge*: for instance, the fact that an item of knowledge motivates one to act is a valuable feature of it, but it does not seem to make it better *qua* knowledge. That is an important question, but the present issue is only whether the linguistic mechanisms of gradability can be applied to propositional *know*. The only thing we need to care about for that is whether the semantics of the resulting constructions involve some degree modification. And that seems clearly to be the case in exemples (8). Which degrees are modified is a further question, to which I will return in section (4).

  Third, there are good reasons to think that *very well* is not a pragmatic indicator at all. It cannot commonly be used as such, while *very much* can:

(9)   *2 is well an even number. (Stanley, 2005, 38)

(10)   *The exit is very well on the left.

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[5]Cf. also uses of terms like *absolutely* or *definitely*.

(11) a. He very much believes that she will come.
      b. *He very well believes that she will come.

Note that a good test for the redundant use of *very much* is that it cannot be substituted by *much*:

(12) a. He very much believes/suggests that she will come.
      b. *He much believes that she will come.

Further evidence comes from French. In French, a close analogue of *very much* is *bien* which can be used as a degree modifier (*well*) but also as a pragmatic indicator synonymous with *indeed*. However, its variant *très bien* cannot be used as such — just as *much*, as opposed to *very much*, cannot be used as a pragmatic indicator in English:

(13) a. 2 est bien un nombre pair.
          2 is indeed an even number
      b. *2 est très bien un nombre pair.
          2 is very well an even number

I suggest that the possibility of using *très bien* is a criteria for the degree meaning of *bien*. *Savoir* (*know*) passes the test, as opposed to *croire* (*believe*):

(14) a. Il croit bien qu'elle est partie.
          He very much believes that she left
      b. *Il croit très bien qu'elle est partie.
          He very well believes that she left

(15) a. Il sait bien / très bien qu'elle est partie.
          He knows well / very well that she left

I conclude that *well / very well* is genuine degree modifier when used in combination with know.

2 *Know-that* accepts genuine qualitative comparatives

2.1 Evidence

If *know-that* accepts degree modifiers, it should occur in genuine comparatives as well. Stanley claims that propositional knowledge attributions do

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not occur with *better than* except in quasi-idioms such as *better than anyone*. He rightly points out that some *better-than* comparatives built with propositional knowledge attributions are unfelicitous (Stanley, 2005, 39):

(16) a. ??Hannah knows better than three people that she is poor.
      b. ??Hannah knows better than Frank that she is poor.
      c. ??John knows that Bush is president better than Mary does.
      d. ??John knows that Bush is president better than Bill knows that Clinton is a democrat.

However, some such constructions do occur, as the following data gathered from the Internet show (further cases are listed in the Appendix):

(17) Myers **knows better than** Mr. Kennedy that our military will have "the will to win." (Letter to the Washington Times)

(18) It works, but Julie **knows better than** Sarah that she cannot let Frank off the hook. (Alan C. Shaw, MIT Prof.)

(19) Mike Matthews **knows even better than** Norton that durability is the name of the game for the lefty reliever. (Cincinnati Post)

Such comparisons can also be built with propositional anaphora, which provides a lighter syntax:

(20) Women's basketball has come a long way since then. The coach **knows that better** than her players. (Knoxville News Sentinel)

(21) To be from somewhere means that one can still be hurt by the place. Didion **knows that better** than does Whitehead, at least at the level of personal (Nicholas Howe, review of two books, Dissent Magazine)

Thus non-idiomatic comparatives can be built out of propositional knowledge attributions. One may still try to argue that they do not involve genuine gradability. But in order to do so, one would have to argue that a they mean either the both subjects know, or that one knows and the other does not.[6] The choice between the two readings will plausibly depend on the context.

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[6]A similar interpretation would have to be used to account for *better than anyone* and similar locutions.

I find both interpretations difficult to fit on the cases. In (17), the speaker does not seem to mean that Kennedy does not know that the military will have the will to win; nor does he seem to mean simply that Myers knows it just as Kennedy does. More strikingly, the phrase "knows even better than" used in (19) indicates clearly that the speakers means that even though both Matthews and Norton know that durability is the name of the game, Matthews' knowledge of it is better.

2.2 Why some such constructions are unfelicitous

Let us grant, then, that such constructions are genuine degree comparisons. (Again, I postpone the question of how to interpret those degrees.) How should we account for Stanley's unfelicitous cases in (16 ? There are two points here.

First, language does not seem to allow one to compare knowledge of two distinct propositions. One can imagine settings in which it would make sense: for instance, an inquiry in which different pieces of evidence are weighted. But that cannot be formulated straightforwardly:

 (22)   ??Holmes knows that the butler left early better than he knows that the maid was in her room.

There might be syntactic of semantic explanations for this, but I will leave the issue open.

Second, other sentences are because it is difficult to imagine a context in which they would make sense. The relevant proposition may not be the kind about which one can improve one's knowledge. Working in the White House does not improve one's knowledge that G.W. Bush is president. By contrast, having been a women basketball coach for twenty years improves one's knowledge of the fact that women basketball has come a long way (20). Study history improves one's knowledge of the fact that no war is easily won; driving a motorbike improves one's knowledge of the fact that driving a motorbike is dangerous, and so on.

Similarly, comparing Hannah's knowledge with the knowledge of "three persons" fails to make sense unless a relevant context is provided, as is the case in (20).

3 The absence of degree negation and degree questions do not show that *know-that* is not gradable

Stanley (2005) points out that the *know-well-that* constructions cannot be negated or used in questions, as opposed to other gradable verbs like *regret* do (Stanley, 2005):

(23) a. John knows very well that Bush is president.
      b. *John doesn't know very well that Bush is president.
      c. ??Do you know very well that Bush is president?

(24) a. Hannah regrets very much that she is unemployed.
      b. Hannah doesn't regret very much that she is unemployed.
      c. Does Hannay regret very much that she is unemployed?

I grant the fact, but I doubt that it has anything to do with gradability.

First, the data is not easy to explain on the view that *very well* is a pragmatic indicator. Pragmatic indicators like *really* can occur within negations and questions:

(25) a. Brian did not really know that his parents were having an argument.
      b. *Brian did not know very well that his parents were having an argument.

(26) a. Does Brian really know that his parents had an argument?
      b. *Does Brian know very well that his parents had an argument?

One may add that *very well* is also a positive polarity item (like *rather* or *already*). That would explain why it cannot occur within negations, not why it cannot occur within negations.

Second, there might be a more general pattern here. Degree negations and questions are also awkward with other verbs that one might want to treat as gradable:

(27) a. You see very well that he is lying.
      b. ?You do not see very well that he is lying.
      c. ?Do you see very well that he is lying?

(28)   a.   The results show very well that the company fares better.

         b.   ?The results show very well that the company fares better.

         c.   ?Do the results show very well that the company fares better?

There might be a more general pattern here, either for factive verbs or verbs that allow embedded questions. Several hypotheses can be made, though I must owe that I have not found a satisfactory one so far. The striking contrast between *know* and *understand* is particularly difficult to account for:

(29)   The Freshmen don't understand / *know very well that they still can make a choice in dorms.

Third, there are other ways in which genuine degree negations and questions can be formulated with *know*. Questions of degree can be formulated with the construction *how well do you know*:

(30)   How well do you know that the results can generalize?

(31)   How well do you know that the system meet its design goal? What insights have you learned from the testing?

Degree negations can sometimes be expressed by using the corresponding embedded-question construction:

(32)   a.   *He doesn't know well that this trend began in the 80s.

         b.   He doesn't know well when this trend began.

(33)   a.   *They don't very well know that she did have a ministry.

         b.   They don't very well know whether or not she did have a ministry.

And they can always be formulated by using comparatives:

(34)   a.   We do not know as well as we should that Burke was also a Freemason.

         b.   Others might not know as well as this audience that there is no health without mental health.

         c.   He did not know as well as we now do that the human body is itself a macrocosm of tiny elements of life - bacteria, parasites, viruses...

As before, it is implausible to interpret those sentences as meaning either that one subject knows just as the other does, or that one knows while the other doesn't.

So while the data does indeed show a contrast between *know* (and related verbs) and other gradable verbs (notably *understand*), it is whether that results form the non-gradability of know. In fact, *how well* questions and comparatives allow one to build genuine degree questions and negation with propositional *know*.

4   How to interpret the gradability for *know*

I have argued that *know* occurs in several genuine degree constructions. I now turn to the question of how to interpret them; and in particular, whether they provide any support for epistemic contextualism. It is beyond the scope of the paper to discuss that point fully. Instead, I will put forward an interpretation that I find plausible, and which partly relies on the work of Kennedy and McNally (2005).

4.1   Quantitative and qualitative modifiers operate on different scales

Kennedy and McNally (2005) argue that the adjective modifier *well* is "not of the same syntactic and semantic category" as *very* and *much*. They note that while *very*- and *much*-modification result in a non-gradable adjective, the output of well-modification is a new gradable adjective, as is shown by :

(35)   4.1 They remained very/quite/only too/hardly well aware of the difficulties that might arise from their analysis.

The crucial question is whether the resulting gradable predicate operates on the same scale as the original one. Kennedy and McNally argue that it does not. That can be shown with the adjective *written*, for instance. *Written* is associated with a scale:

(36)   Her thesis is partially/half/completely written.

But *written* denotes the maximal endpoint of that scale: if the thesis is written, it is completely written. If it's half-written, then it's not written.

Now *written* can also be modified by *well*:

(37)   Her thesis is well written.

Since *written* already denotes the maximal point on its scale, one cannot understand *well written* as denoting a higher point on that scale. That suggests that well introduces a new scale.

Kennedy and McNally's interpretation is, in rough terms, that *well* takes a gradable predicate *G* and returns a new gradable predicate which says that (1) its argument is G, and (2) the G-related event in which its argument participated was *good* to some contextually relevant degree. For instance, a thesis is well written if (1) it is written, (2) the writing event that produced it was good.

The account has two crucial features. First, the two scales are in principle orthogonal. The scale over which one measures *how much* of the thesis is written is orthogonal to the scale over which one measures *how well* the thesis is written. Second, the relevant scale for applying the basic predicate is the quantitative scale (*very / much*), not the qualitative one.

The same points seem to hold for verbs. The scale over which we measure whether John works *a lot* is orthogonal to the scale over which we measure whether he works *well*. And the relevant scale for saying whether he worked or not is the quantitative one.

4.2   Application to *know*

4.2.1   Propositional knowledge does not have degrees

Applied to *know*, the two-scales account is bad news for the contextualist. First, it implies that the scale over which *know well* and *know better* are evaluated is not the scale over which unmodified *know* is ascribed. So the existence of qualitative degree modification of *know-that* cannot account for the alleged context-sensitivity of *know*.

Second, it implies that unmodified *know-that* is evaluated along a scale only if it occurs with *quantitative* degree modification. But as we have seen, it does not, as opposed to other verbs like *work*:

(38)   a. Bob has worked a lot.
       b. Bob has worked well.

(39)   a. *Bob knows a lot / much that the city is unsafe.

b. Bob knows well that the city is unsafe.

Related evidence is that the deverbal *known* does not allow quantitative degree modification when applied to propositions:

(40)   The story is completely known now.

(41)   *That brocoli prevents cancer is completely known now.

I conclude that propositional knowledge does not have degrees.

4.2.2   Qualitative modification of *know* denotes degrees of justification

Now, if qualitative modification of *know* does not denote degrees of knowledge, what does it denote? A first point that seems clear is that the relevant degrees are *epistemic*. When we say, for instance, that *The astronomer knows very well that the solar system is big*, we do not mean that her knowledge is more prudentially, morally or esthetically good.

A plausible suggestion is the following: one knows better if and only if one has more evidence. Assuming Williamson (2000)'s knowledge account of evidence, we can in turn reduce it to unmodified propositional knowledge: one knows p better if one knows more propositions from which one derives p.

The account can be illustrated with cases in which the known proposition itself includes a gradable predicate. Suppose that the solar system is big if it is bigger that some size k. If I know that it is as least of size m and if $m > k$, then I know that it is big. But suppose that the astronomer knows that it is at least of size n, where $n > m$: then he can derive that it is big from not only the same propositions as me, but also from the proposition that it is at least $m + 1$, at least $n + 2$ and so on. According to the present account, that implies that the astronomer knows better than me that the solar system is big.

That account fits well with our data. In 8, Chirac knows well the relevant "rule of politics" because he knows more instances of it. Cheney's collaborator knows better that we must have no illusions that the danger has passed because he knows several actual dangers. And so on.

4.2.3 Integrating the account with passive, objectual and embedded-question ascriptions

Passive ascriptions. The foregoing account of well-modification of propositional knowledge ascriptions implies an unorthodox account of passive propositional knowledge attributions such as 42:

(42) That brocoli prevents cancer is well known. (Stanley)

A natural extension of the foregoing account is that (42) means that our knowledge of the proposition is well supported by evidence. Stanley (2005) objects that on that view (43) would be contradictory, contrary to fact:

(43) That brocoli prevents cancer is well known, but poorly understood. (Stanley)

I disagree: one can have good evidence for the truth p without understanding why p is the case. By contrast, the account predicts the oddity of (44):

(44) ?? That brocoli prevents cancer is well known, but not certain.

So I disagree with the common view that *well known* means known *by many people*. Stanley favours that view, and rightly points out the unfelicity of (45):

(45) ?? That brocoli prevents cancer is well known, but few people know it. (Stanley)

I agree with the data, but the right explanation is that "well known" has undivided reference. (45) is analogous to (46):

(46) ?? Hannah is much loved, though few people love her.

Much combined with love is clearly gradable. I take it that the first part of (46) can be asserted even though only Hannah's parents love her. But the implicit argument of "love" seems to have a undivided reference to some contextually relevant domain (the parents), it is not possible to maintain the sentence if the domain is extended to people who do not love Hannah. (The implicit subject would be analogous to plurals or the French "on").

Objectual knowledge ascriptions. Objectual knowledge ascriptions allow both quantiative and qualitative modifications. Kennedy and McNally (2005)'s remarks on the deverbal adjective *known*, which can express objectual knowledge ascriptions, are relevant here. They point out that the

kind of scale that it relies on depends on its argument. When the argument denotes a bounded entity, the scale is itself bounded; but it is unbounded if the entity is unbounded. That is shown respectively by the felicity and unfelicity of *completely / partially*:

(47)   a. The story / continent is completely known.

        b. *Wine was completely known in Ancient Greece.

        c. Wine was much known in Ancient Greece.[7]

Kennedy and McNally thus propose that the quantitative modification of know ranges over parts of the object. Roughly: one knows x more if and only if one knows more parts of x.

The account is quite plausible for knowledge of stories or continents, but less for countries or persons, unless one extends the relevant notion of "part". On the other hand, knowing a person a lot is not just knowing a lot of propositions about her: for instance, knowing that a picture of Martin Luther King is in Bob's room does not improve my knowledge of Martin Luther King. A more plausible account is that the relevant "parts" for a person are the events in which she took part.

From that account of objectual knowledge and the foregoing account of *well*-modification of propositional knowledge, one can derive an account of qualiative degrees of objectual knowledge: one knows x well if and only if one knows *well* what one knows about x. The account predicts a contrast between *a lot* and *well*:

(48)   a. I know Sarah a lot.

        b. I know Sarah well.

The prediction is that the second sentence can be true even if one does not know many things about Sarah. My intuitions are unclear about this. But it must be conceded that the following sounds odd:

(49)   ?I know Sarah well, though I do not know her a lot.

That might be explained with the present account, however. It might be argued that having good evidence for one's knowledge about Sarah plausibly implies knowing a lot about her. If that is so, the account implies that one cannot know Sarah well without knowing her a lot.

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[7]According to (Kennedy and McNally, 2005), *much* applies to gradable adjectives whose scale has a minimal endpoint but no maximal endpoint.

Embedded questions. With respect to embedded questions, the account of propositional knowledge can be applied straightforwardly, provided we assume that embedded-questions ascriptions attribute propositional knowledge Stanley and Williamson (2001). The resulting view is that: one knows well why-*q* only if one knows a proposition *p* that is an answer to why-*q*, and one knows *p* well.

The analysis differs from that of Stanley (2005). Stanley suggests that *A* knows better that *B* wh-*p* if and only if *A* knows a better or more precise answer to the question wh-*p*. By contrast, the present view predicts that *A* can know better than *B* wh-*p* even if *A*'s answer is less precise, provided that it is better supported. Here is a case in favour on the present account. Ann has seen Smith driving a Ford once, and thereby knows that he owns a Ford. Bob, on the other hand, has numerous highly reliable testimonies that Smith owns a car, but nobody mentioned the brand. Does Bob knows better than Ann whether Smith owns a car? My intuition is that he does, but on Stanley's view we would have to say that Ann knows better.[8]

To sum up, I have sketched a unified account of the semantics of gradable modifications of knowledge attributions (*p* denotes a proposition, *q* a question, *x* an object):

- *S knows that p* is basic and non-gradable.

- *S knows well / better that p* if and only if one knows that *p* on the basis of a good number of / more propositions.

- *S knows wh-q* only if there is some *p* which is an answer to the question wh-*q* such that S knows that *p*.[9]

- *S knows well wh-q* only if there is some *p* which is an answer to the question wh-*q* such that S knows well that *p*.[10]

- *S knows x* only if one knows some "part" (in the relevant sense) of *x*.[11]

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[8] I suspect, however, that intuitions on these kinds of cases are highly dependent on context; more precisely on what range of answers to the embedded question are of interest to the attributor.

[9] The condition is plausibly insufficient, at least in many contexts.

[10] Same remark as above.

[11] There plausibly are further necessary conditions as well as context-sensitive conditions here.

- *S knows x more / a lot* if and only if S knows more / a lot of "parts" of *x*.

- *p is well known* if and only if a contextually relevant set of subjects know well that *p*.

- *x is well known* if and only if a contextually relevant set of subjects know *x* well.

- *x is much known* if and only if a contextually relevant set of subjects know *x* a lot.

5 Conclusion

I have argued that propositional knowledge attributions are genuinely gradable, but that their gradability is limited. First, they only allow qualitative modifications (*well / better*), not quantitative ones (*a lot / more*). Second, they do not allow comparison between different propositions. Third, their gradual modifications are not readily understandable out of context. Fourth, they do not enter in the full range of negation and question constructions. Despite these limits, we have seen several genuine cases of gradability involving propositional knowledge attributions.

I have sketched a semantic account of those constructions, according to which unmodified *know that* is not gradable predicate at all. This is shown by the fact that it cannot occur with quantitative modifiers. By contrast, the output of *well*-modification (*know well that*) is a gradable predicate that operates a scale of evidence or epistemic justification.

The account can be extended to provide a unified semantics of other degree modifications of *know*. I have outlined it and indicated its specific predictions: that *well known* does not mean *known by many*, that *know someone a lot* and *know someone well* are not synonymous, and that *know better wh-* does not mean having a more accurate answer.

Several issues are still to be explored. First, the role of propositional anaphora. Do they allow a wider range of degree constructions with *know-that*, such as degree negations, comparison between different propositions, or quantitative modification? (Degree negation? Comparison between different propositions? Quantitative modification?) Second, how to account for the absence of degree negations and degree questions with *know that*?

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Is that a more general phenomenon among factive verbs? Is that correlated with the acceptability of embedded-question clauses? Third, the relations between the various degree constructions outlined in section (4) should be tested further, and related to more general account of the semantics of verbs and gradability.

6   Appendix A: Objectual and interrogative-clause knowledge attributions are fully gradable

In its objectual construction (corresponding to the german *kennen* or the french *connaître*), *know* occurs with *not much / a lot / more than* as well as with *well / better than*:

(50)   a.   She got to know him a lot / well.

 b.   He doesn't know her much. (But: *He knows her much.)[12]

 c.   He knows him more / better than I do.

(51)   a.   She didn't know much what he had in mind. (But: *She knew much where he was.)

 b.   His prophet knows more than we do where we should serve. (http://www.lds.org/conference/talk/display/0,5232,89-1-520-15,00.html)

 c.   I would love to get emails from people that know more than me why there is such a bias against Asian American men. (http://www.411mania.cor

 d.   He knows well/better than you where the problems are.

In its embedded-question construction, *know* occurs with *well / better than*, and, more marginally, with *not much / a lot / more than* :

(52)   a.   I guess Bush knows better than our parents whether our district is working. (Milwaukee Journal Sentinel)

 b.   In general the patient knows better than we what is good for him.

 c.   Your body knows better than your mother about when you should eat and when not.

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[12]Preverbal *much* of degree seems to be a negative polarity item. See Arnold Zwicky's blog post, http://itre.cis.upenn.edu/ myl/languagelog/archives/003157.html

d. How dare Apple think it knows better than me how I want to find my music.

e. Although Gonzales is the sitting Attorney General, he believes that the Senate knows better than him why he fired 8 US attorneys.

(53) She didn't know much what he had in mind. (But: *She knew much where he was.)

His prophet knows more than we do where we should serve. (http://www.lds.org/conference/talk/display/0,5232,89-1-520-15,00.html)

b. I would love to get emails from people that know more than me why there is such a bias against Asian American men. (http://www.411mania.com

The distributions of modifiers for the embedded-questions attribution is close to its distribution for propositional knowledge attributions: qualitative modifiers occur commonly, quantitative ones very marginally.

Those constructions can be explained away without postulating a knowledge scale. Knowing somebody "more" or "better" can be analysed as knowing more things about her. And Stanley (2005, 43) suggests that "Hannah knows where Texas is better than Jones does" means that both know an answer to the question, but that Hannah's answer is better (e.g., more precise) than John's.

However, one can unifiy the semantics of *know* in the following way, in line of the hypothesis put forward in the paper. *Know-that* and *know-wh* are qualitatively gradable on the same scale. The gradability of objectual attributions is derived from propositional attributions as follows: one knows an object *a lot* iff one has many items of propositional knowlege about it, and one knows an object *well* when those items are themselves qualitatively good.

At any rate, the similarity in the distributions of modifiers between propositional and embedded questions suggests that they should not receive a different treatement.

7 Appendix B: *know-that* and *more* comparatives

Propositional knowledge attributions do not normally occur *not much / a lot / more than*:

(54)   a. I *know / regret a lot that he left.
        b. He doesn't *know / regret much that she left.[13]
        c. I *know / regret that he left more than you do.

There are some caveats, though. First, there are widespread uses of locutions such as "more than ever", "more than anybody", "more than me", "no one knows more than you that" and so on:

(55)   a. Now we know more than ever that there's an increased risk of heart disease.
        b. Children of divorce know more than anybody that love is not enough.
        c. Mr Spiteri knows more than me that playing futures on the stock exchange is a risky business (www.maltadata.com/debate.htm)
        d. No one knows more than Donnetta that diabetes and depression too often go hand in hand. (www.utexas.edu/features/2006/diabetes/index

However, those cases might be explained away as being idiomatic rather than genuine comparatives (Stanley, 2005, 39–40). I will thus leave them aside.

Second, I found some marginal cases of *more*-comparative propositional knowledge attributions:

(56)   a. It seems that these poor people know - more than you - that health insurance does not equal health care! (ezraklein.typepad.com/blog/2007/(
        b. I'd go back to before my sister died and let her know more than she did that I love her. (leahmumfordlang.blogspot.com/2007/03/somewhere-in-time-thursday-13-15.html)
        c. I know more than you can possibly imagine that he has not stopped mourning Yuris. (halo-productions.com/LastExile/Fics/Gravity-4.htm)
        d. I know more than you that weight loss controls you. (godis-awesome.spaces.live.com/blog/cns!B48C5CED50F2178D!147.entry)

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[13]The phrase " to regret much that", common in the XIXth century ("I regret much that you have made so little progress today in the pursuit of the enemy", General Lee 1862) seems now to have been superseded by "to regret very much that". However, I prefer to use it here because "very much" is not always a genuine degree modifier and thus introduces unclear data (cf. "2 plus 2 is very much 4" (Stanley, 2005)).

Finally, *more*-comparative propositional knowledge attributions become felicitous as soon as anaphora are used:

(57) a. Yes it is life......we know that more than you will ever understand. (www.discovervancouver.com/forum/topic.asp?TOPIC$_I$D=71379&which

b. You both have talent; you know that more than you should. (www.kotorfanmedia.com/?p=7547&page=2)

c. He is already aware of the fact that nicotine is unhealthy; in fact smokers probably know that more than you!

In 57, *that* does not plausibly refer back to life or talent, but to the propositions. Thus anaphora seem to be a way to build comparative propositional knowledge attributions.[14] However, one might think that the anaphoric pronoun coerces its antecedent into a fact (as it is explicitly in 57c) which is treated as the object of objectual knowledge; thus we would not have genuine comparative *propositional* knowledge here. I am skeptical of that way out because the French and German*** equivalent are built with *savoir / wissen* and not *connaître / kennen*, but I will leave the matter at that.

Despite these caveats, it should be conceded that *more*-comparatives are extremely marginal with know-that ascriptions. One hardly ever hears such things as (58), for instance, even though that might be a way to say that Ann has more information about Denis' present state:

(58) ?Ann knows more than Bob and Clarice that Denis is sick.

8 Appendix C: Data

Collected in autumn 2006; the quotes are still online as of may 2007.

8.1 know more than ... that

Apart from a set of quasi-idiomatic phrases, the *know more than ... that ...* construction is extremely rare.

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[14]One may even speculate that the reason why such comparatives are forbidden except through anaphora is that the resulting sentences would often be syntactically ambiguous: cf. " I know that he likes Bill more than you do".

- It seems that these poor people **know - more than** you - that health insurance does not equal health care!
(ezraklein.typepad.com/blog/2007/03/as$_t$he$_p$oll$_t$ur.html)

- I'd go back to before my sister died and let her **know more than** she did that I love her.
(leahmumfordlang.blogspot.com/2007/03/somewhere-in-time-thursday-13-15.html)

- I know more than you can possibly imagine that he has not stopped mourning Yuris. (halo-productions.com/LastExile/Fics/Gravity-4.htm)

- I know more than you that weight loss controls you. (godisawesome.spaces.live.com/blog/cns!B48C5CED50F2178D!147.entry)

However, they are more felicitous when built out of propositional anaphora:

(59) a. Yes it is life......we know that more than you will ever understand. (www.discovervancouver.com/forum/topic.asp?TOPIC$_I$D=71379&which

     b. You both have talent; you know that more than you should. (www.kotorfanmedia.com/?p=7547&page=2)

     c. He is already aware of the fact that nicotine is unhealthy; in fact smokers probably know that more than you!

Other occurrences are idiom-like. ("more than ever", "more than anybody" and so on.)

8.2   know well that . . .

1. In this time of testing for the nation, the President and I have been grateful to have Tim by our side. He understands that our greatest responsibility is the active defense of the American people. He **knows well** that even though it has been more than two years now since 9/11, that we must have no illusions that somehow the danger has passed. (Dick Cheney) (url/http://www.whitehouse.gov/news/releases/2004/02 8.html)

2. But Chirac **knows well** that, while times change, an unchanging rule of politics is this: you say whatever you have to say to get elected. (Roger Cohen, International Herald Tribune) (select.nytimes.com/iht/2006/10/28/wor 28globalist.html?n=Top%2FNews%2FWorld%2FColumns%2FRoger%20Cohen

3. While the American male grows slightly taller with each generation, Mr. Anders **knows well** that men are also growing wider – and probably at a more rapid rate. (Wall Street Journal, feb 6, 2002) (http://www.shortsupport.org/News/0283.html)

4. Every sane man in the country **knows well** that there is not one word of justification that can truthfully be adduced for Mr. Wilson's statement that the Progressive programme was agreeable to the monopolies. (Theodore Roosevelt: An Autobiography, 1913) (http://www.bartleby.com/55/15

5. But Mr. McNally **knows well** that his characters protest far too much. (New York Times) (theater2.nytimes.com/mem/theater/treview.html?pagewanted=pr

6. (NB: Russian speaker) ... say, the axiom on parallels from Euclid's axiom system (since today every set theorist **knows well** that two parallels don't intersect), or say, ... (Alexander A. Zenkin, mathematician, on a NYU mailing list) (cs.nyu.edu/pipermail/fom/2003-January/006124.html)

8.3 know very well that ...

1. And he **knows very well** that it requires work to get past old grievances. (G.W. Bush) (www.whitehouse.gov/news/releases/2005/11/20051108-5.html)

2. Scheidemann **knows very well** that he has a serious enemy in the person of Lenin. (translation by John G. Wright of a speech by Gregory Zinoviev) (www.marxists.org/archive/zinoviev/works/1918/lenin/ch14.htm)

3. [Wes Clark] knows very well that the admnistration can't adopt a winning strategy. (US blog) (http://digbysblog.blogspot.com/$2005_08_21_d$igbysblog$_a$rchi

4. [Abu Musab al-Zarqawi] **knows very well** that he can never oust the Americans from Iraq by military force. (William Rusher, Distinguished Fellow of the Claremont Institute for the Study of Statesmanship and Political Philosophy) (http://www.townhall.com/columnists/WilliamRu

5. Our military **knows very well** that, ultimately, the best way to "improve the survivability" of a soldier is to eliminate the enemy. (Alan H. Goldstein, biologist) (www.salon.com/tech/feature/2005/10/20/soldier/)

6. Armand Arief **knows very well** that the customer is king. He started out in hospitality, having learned about attending to the peccadilloes of guests at the national hotel institute in Bandung. A few decades and an MBA later he is still worried about keeping customers happy. Only now, the stakes are higher. As vice-president and director of Indonesia's Bank Danamon, Arief is responsible for the bank's consumer business, as well as its marketing services and credit card divisions. That means he presides over a customer base of nearly 2 million individuals across Indonesia's 17,000 island archipelago. (Adam Lincoln, senior writer at CFO Asia) (http://www.cfoasia.com/archives/200011-46.htm)

7. Olmert **knows very well** that he presides over a very fragile coalition (James D. Besser, Washington correspondent of Jewish Week) (www.thejewishweek.com/news/newscontent.php3?artid=12477)

8. My father **knows very well** that his realtives are not gentle to him. (US teenager) (http://experts.about.com/q/Teenage-Problems-1458/plz-help.htm)

9. (NB: non-native?) Olmert **knows very well** that if Israel doesn't win this war, it is global Zionism that is defeated, he knows as well that without the backing of global (Gilad Atzmon) (http://mailman.mit.edu/pipermail/leb articles/2006-August/000658.html)

10. (NB: non-native?) Khouri **knows very well** that what has happened in Jordan in recent years is indeed a series of "cosmetic changes", not anything even close to "genuine democracy". He also **knows very well** that no serious opposition will be tolerated in Jordan by either the monarchy or the army; and that "elections" are a mere facade and palliative. (might not be a native speaker; the source only indicates "Washington") (http://www.hartford-hwp.com/archives/51/070.html)

11. (NB: non-native) I believe–and Congressman Diaz-Balart **knows very well** that the situation in Cuba is a situation that the embargo has created. (Alfredo Duran, cuban-born, US resident) (www.pbs.org/newshour/bb/latin$_a$me june98/cuba$_3$-20.html)

8.4   know better than . . . that . . .

1. Mike Matthews **knows even better than** Norton that durability is the
   name of the game for the lefty reliever. (Marc Lancaster, Cincinnati
   Post reporter) (www.cincypost.com/2004/02/27/reds02-27-2004.html)

2. Samson **knows better than** his father that the problem is not his loss
   of glory or God's, which does not depend on him; (C.W. Slights, Pro-
   ceedings of the Mordern Language Association) (http://www.jstor.org/view/0030812

3. It works, but Julie **knows better than** Sarah that she cannot let Frank
   off the hook. (Alan C. Shaw, MIT Prof.) (www.francois-ozon.com/popup$_a$nalyseSP.htm

4. Even Bayer **knows better than** Blair that the British public don't
   want GM here. (Eve Mitchell, Trade campaigner, Friends of the Earth)
   (www.foe.co.uk/campaigns/global$_t$rade/news/argentinian$_e$mbassy.html)

5. Myers **knows better than** Mr. Kennedy that our military will have
   "the will to win." (Letter to the Washington Times) (www.washtimes.com/op-
   ed/20030913-112119-6146r.htm)

6. But Caliban **knows better than** Antonio that it is imprudent to resist
   grace and he declares it, (sunflower.singnet.com.sg/ yisheng/notes/tempest/artnatu2.
   - not online anymore)

7. the hunter **knows better than** his nonhunting friends that pork chops
   and drumsticks do not grow on trees. (202.118.68.249:8082/flc/tm/m5328.htm
   - not online anymore)

8. Wilson, worn away by a decade's straining at the gasoline pump,
   pitied even by Tom, **knows better than** Klipspringer that the econ-
   omy's real law is unavailing drudgery (student essay on the Great
   Gasby) (http://www.123helpme.com/view.asp?id=15828)

9. He [Bill Gates] **knows better than** we do that most of his wealth is
   tied into his company. (www.coolermaster.com/phpBB2/viewtopic.php?t=4831&sid=a

10. Undoubtedly, God himself, **knows better than** ourselves that there is
    a certain way that can be used at every moment to give him the great-
    est possible glory. (www.stpeter.ptdiocese.org/newsletter2.html - not
    online anymore)

11. (non-native?) the BBC **knows better than** myself that 70% of the readers never see more than the title and the photo with the capture. (Endre Mozes, chairman of www.take-a-pen-org) (www.take-a-pen.org/english/Articles/Art20112005.htm)

12. (indian speaker?) Kamarajar **knows better than** Rajaji that education will make people not to become fools. (http://dondu.blogspot.com/2005/04/3$_2$8.html)

With propositional anaphora:
to be completed

8.5 How well do you know

8.6 Not know as well as X that

8.7 Negative data

8.7.1 know-that

Quantitative modification:

- *S knows a lot that p. Never occurs. ***CHECK

- *S knows partially/completely that p. Never occurs.

- *S knows more than S' that p. Marginally occurs.

- S does that p better than she knows that q. Never occurs.

- *S does not know well / very well that p. Never occurs. (Stanley, 2005).

- *Does S know well / very well that p. Never occurs. (Stanley, 2005).

- *S knows partially/completely well that p. Never occurs.

8.7.2 know-wh

- *S does not know well / very well wh-p . Never occurs in English. However, it is felicitous in French!

26

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