More Than and Scalar Implicatures

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1. Introduction

It has been assumed that modified numerical expressions such as numerals following more than (henceforth referred to as more than n) do not generate scalar implicatures. Many studies have been proposed to explain this absence. However, a new study has shown that these expressions give rise to scalar implicatures.

The purpose of this paper is to consider whether the modified numerical expression more than n gives rise to scalar implicatures. We discuss the new study and show more than n does not always scalar-implicate. This paper consists of three parts. Section 1 presents previous studies of scalar implicatures and discusses the problems of scalar implicatures derived from more than n. Section 2 first points out that more than n has two meanings and then analyzes two types of examples with more than n: cases with and without scalar implicatures. While considering examples with the background, we come to the conclusion.

2. Previous studies: Scalar implicatures

2.1. Standard accounts of scalar implicatures

We will begin by considering the standard account of scalar implicatures (Horn 1972). In recent years a considerable number of studies have been made on scalar implicatures. However, many of them generally depend on the standard account known as the classical approach. It proposes that scalar items are associated with linguistically available scales, called “Horn Scales” after Horn (1972). To generate implicatures of a sentence containing a scalar term, the speaker must consider the alternative sentences where the scalar term has been replaced with another term from its scale. All such sentences that are informationally stronger are implicated to be false. Let us look at and consider the example below:
(1) a. All of the boys went to the party.
   b. Some of the boys went to the party. (Levinson 1983: 133)

The utterance in (1b) implicates that the stronger statement in (1a) does not hold. The scalar terms *all* and *some* are on the same Horn Scale. (1b) is also true if (1a) is true. However, the converse is not always true, That is to say, *all* unilaterally entails *some*, so if the speaker is in a position to say (1b), the falsity of the stronger proposition expressed by (1a) is implicated.

The scalar implicature as shown in (1) is based on Grice’s maxim of Quantity and Horn’s Q principle. Upon the request of “say as much as you can,” saying a weaker expression that has less information implicates the falsity of the stronger expression that has more information than the weaker one.

The standard implicature illustrated by Horn that I showed above has still been adopted and discussed by many studies even though some questions on its validity have been pointed out.

2.2. Scalar implicatures of unmodified numerical expressions

The standard account of unmodified numerical expressions claims that they have an upper bound to their interpretation, that is to say, expressions containing numerals are also considered to convey scalar implicatures.

(2) a. John has three children.
   b. John has at least three children.
   c. John has at most three children. (Levinson 2000: 88)

(2a) normally means that “John has exactly three children.” The reason why (2a) is interpreted in this way is that (2a) conveys the scalar implicature in (2c). As seen above, neo-Gricean accounts consider that a cardinal number $n$ literally means “at least $n$,” and the reading “exactly $n$” is derived from both the literal meaning “at least $n$” and the scalar implicature “at most $n$.”
However, some researchers raise objections to the above account. For example, Sadock (1984) mentioned examples of the square root. He showed when you say that 3 is the square root of 9, you do not mean that it is “at least 3.” If that is the case, it is possible that you can say 4 is also the square root of 9. Furthermore, the order of the terms or numbers on a given numerical scale can be reversed. Consider a golf score. Improving your golf score means lowering it.

In this way researchers like Sadock (1984), Kempson (1975) and Atlas (1993b) raise objections to the approach trying to resolve the problems related to numerical expressions with Horn Scales.

2.3. Scalar implicatures of modified numerical expressions

2.3.1. Krifka (1999)

Krifka (1999) discusses numerals modified by “at least” and claims that they do not have an upper bound to their interpretation. Let us look at the examples below:

(3) John has at least three children.
(4) John has at least four children. (Krifka 1999: 259)

Krifka observes that (3) does not give rise to the implicature that (4) is false. Detailed account of the reason is given below: if the implicature was conveyed, the speaker of (3) would pragmatically imply that John has exactly three children. This is intuitively incorrect. Furthermore, scalar implicatures are based on the speaker’s knowledge that the stronger proposition is false. However, “at least” shows the speaker’s inability or unwillingness to give a precise answer. The notion of the speaker’s uncertainty is pragmatically derived from the choice of “at least $n$” rather than the bare numeral $n$, because the implicature of certainty would be carried by the bare numeral $n$. Krifka also reasoned that “at least $n$” does not participate in Horn Scales. For reasons shown above, Krifka argues that “at least $n$” typically does not give rise to a scalar implicature in an unembedded context.
2.3.2. Fox and Hackl (2006)

Fox and Hackl (2006) demonstrate that *more than n* does not have an upper bound to their interpretation. In addition, they show that it typically does not give rise to scalar implicatures in an unembedded context. They answer the question of the absence of scalar implicatures in *more than n* differently from the account of “at least n” proposed by Krifka. They explain it as follows:

> (5) John has 3 children.
> (6) John has *more than* 3 children. *(Fox and Hackl 2006: 540)*

The speaker of (5) conveys that John doesn’t have 4 children as a scalar implicature. If you consider (6) in the same way as (5), the speaker of (6) is supposed to convey that John doesn’t have *more than* 4 children as a scalar implicature. However, it is not intuitively correct, because uttering (6) would imply that John has exactly four children if the scalar implicature that John doesn’t have *more than* 4 children were triggered. They claim that a sentence with the numeral determiner *n* triggers a scalar implicature, while a sentence with the comparative determiner *more than n* does not. They also argue that the use of a complex comparative implies that the use of a simpler construction is impossible.

In addition to this, they exemplify, based on Fox (2004), that “the scalar implicature of a sentence can be stated explicitly with the use of a focus particle only that associates with the relevant scalar item.” Look at their claim and examples in the following

> (7) The only implicature generalization (OIG): Utterance of a sentence, S, as a default, licenses the inference/implicature that (the speaker believes) only S’, where S’ is (a minimal modification of) S with focus on scalar items

*(Fox and Hackl 2006: 541)*

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1 They observe that implicatures are available in the cases like the following: if the speaker is required to choose of responses “*more than 10,“ “more than 20,” “more than 30,” and “more than 40,“ then the speaker’s choice of “*more than 20“ implicates “not *more than 30." However, if the speaker uses “*more than 20“ out of the blue, the implicature does not arise.
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(8) a. John weighs 120 pounds.
    b. John weighs more than 120 pounds.
    c. *John only weighs more than 120 pounds. (ibid.: 541)

They say that the sentence in (8a) generates the scalar implicature that John only weighs 120 pounds. On the other hand, the comparative sentence in (8b) does not generate the scalar implicature in (8c), which is unacceptable.

They explain why (8b) lacks a scalar implicature in the following way. (8b) asserts that John weighs more than 120 pounds, 120 + ε pounds; that is to say, it is presupposed that John weighs more than 120 + ε pounds. This means that there is a degree, d, greater than 120 pounds such that John weighs more than d pounds. If this degree d is relevant for the meaning of (8c), the focus particle only cannot cover the domain of quantification. In other words, there must be something wrong with more than 120 in (8b) focused by only, although 120 in (8b) is defocused with more than. This is why (8c) is unacceptable. They assume degree scales as follows:

(9) The Universal Density of Measurements (UDM): Measurement scales needed for natural language semantics are always dense.

(Fox and Hackl 2006: 542)

They exemplify the UDM using the sentence in (6). If there was no UDM, the set of degrees relevant for evaluation would be possible cardinalities of children, for example, 1, 2, 3, 4... (6) might imply that John doesn’t have more than 4 children. Since it asserts that John has more than 3 children, it finally implies that John has exactly 4 children. The implication is not intuitively correct. Let us explain with another example. If there were an implicature in (8b), it would be the implicature that John weighs more than d pounds is false. This is because d showing 120 + ε pounds arises from (8b) as the meaning of the sentence according to the UDM. It means that the speaker believes that John weighs more than d pounds is false. However, the speaker asserted that John weighs more than 120 pounds. Given the
density of degrees, the implicature does not correspond to this assertion.

As seen from the above, they attribute the lack of scalar implicatures in *more than* \( n \) to the existence of the Universal Density of Measurement (UDM) and the failure of a covert exhaustivity operator.

2.3.3. Cummins et al. (2012): A new approach to *more than*

Modified numerical expressions have generally been considered not to convey scalar implicatures. However, in a recent research a new attempt to show that modified numerals do convey scalar implicatures has been made. Cummins et al. (2012) argue against Fox and Hackl (2006) and Krifka (1999), declaring that their claims that modified numerical expressions do not convey scalar implicatures are incorrect. They especially take up numerical expressions modified by *more than*.

They propose that *more than* \( n \) gives rise to scalar implicatures and they also argue that the implicature in question is restricted by the granularity of numerical scales and considerations of the contextual salience of numerals.

First of all, we have to inquire into the granularity of the numerical scale. They propose that granularity can be understood as the density of representation points on a measurement scale. The most frequently used granularity levels are based on divisibility by 10 and on operations of halving and doubling. Furthermore, the representation points are distributed equidistantly. The points on the finest-grained scale in (10a) and coarser-grained scales in (10b-f) are shown as follows:

\[
(10) \begin{align*}
a. & \quad 1 \cdots 2 \cdots 3 \cdots 4 \cdots 5 \cdots \\
b. & \quad 10 \cdots 20 \cdots 30 \cdots 40 \cdots \\
c. & \quad 5 \cdots 10 \cdots 15 \cdots 20 \cdots \quad [\text{derived from (10b) via halving}] \\
d. & \quad 20 \cdots 40 \cdots 60 \cdots 80 \cdots \quad [\text{derived from (10b) via doubling}] \\
e. & \quad 100 \cdots 200 \cdots 300 \cdots 400 \cdots \\
f. & \quad 50 \cdots 100 \cdots 150 \cdots 200 \cdots \quad [\text{derived from (10e) via halving}] \\
\end{align*}
\]

(Cummins et al. 2012: 141)
Cummins et al. adopt this observation and argue that the coarser-grained scales in (10b-f) consist of numbers we intuitively think of as more round.

Taking into account of the granularity of the numerical scale, look at the examples below:

(11) a. John’s birthplace has more than 1000 inhabitants.
    b. John’s birthplace does not have more than 1001 inhabitants.
    c. John’s birthplace does not have more than a million inhabitants.

(Cummins et al. 2012: 139)

According to the standard account of scalar implicatures, (11a) should implicate the falsity of the stronger statement in (11b). This entails that John’s birthplace has exactly 1001 inhabitants. It is intuitively incorrect.

However, Cummins et al. explain the lack of the scalar implicature in (11b) in different ways from the standard account. One of their reasons is that 1001 is not a scale point on the numeral scales of granularity 10, 100 or 1000. This means that 1001 is not on the same scale as 1000.

Cummins et al. also explain it with the consideration of relevance discussed by Sperber and Wilson (1986). They argue that the use of 1001 generates an additional cognitive cost for the reasons that scale points on coarser-grained scales can be used at a lower cognitive cost than finer-grained scales: the expressions referring to scale points on coarser-grained scales would be shorter than those referring to scale points on finer-grained scales. Therefore, they would be used at a lower cognitive cost and favored both in production and comprehension. Cummins et al. also point out the coarser-grained scales can be useful for face-saving purposes. That is to say, if one speaks in approximate terms, he/she is not committed to such high precision. Hence, the use of scale points on coarser-grained scales is supported by the consideration of relevance.

As seen above, the scale point 1000 on the coarser-grained scale rather than the scale point 1001 on the finer-grained scale can be used even if the speaker
knows that the expression more than 1001 holds.

By contrast, look at the following examples:

(12) a. More than 70 people got married today.
    b. More than 80 people got married today. (Cummins et al. 2012: 142)

They say that both more than 70 and more than 80 appear on the same Horn Scale, because both 70 and 80 correspond to scale points on the numeral scale of granularity 10. In addition, more than 80 is more informative than more than 70. Therefore, if the speaker is in a position to say (12b) instead of (12a), considerations of relevance allow him/her to do so. That is to say, because the speaker is not in a position to say (12b), uttering (12a) conveys (12b) does not hold.

All of these things make it clear that the modified numeral expression more than n gives rise to scalar implicatures. Cummins et al. claim that "more than n' gives rise to the implicature that 'more than m' does not hold, where m is any numeral such that m > n and the coarsest granularity level expressed by m is at least as coarse as that expressed by n" (p.143).

Now let us consider their second restriction, the contextual salience of numerals. Cummins et al. argue that scalar implicatures do not go through if a numerical quantifier has been previously activated or salient in the context. Cummins (2013) tests this prediction by presenting the following examples:

(13) a. This case holds (60) CDs. How many CDs do you own?
    b. I own more than 60 CDs. (Cummins 2013: 105)

In the cases of both uttering the numeral "(60)" and not uttering it in the preceding context of (13a), participants are asked to judge the meaning of the subsequent quantifier. The result is that the numeral that is mentioned beforehand gives rise to

They note that 100 is a scale point for several granularity levels such as 100s, 50s and 10s simultaneously. For example, the scalar implicature of the utterance more than 100 people got married today would be in some sense under-determined.
a greater range of interpretation; that is to say, *more than* 60 in (13b) neither has an upper bound to its interpretation nor scalar implicatures when the numerical quantifier "60" is previously activated in the context.

Moreover, Cummins (2013) points out exceptional cases. He argues that numerals from 1 to 9 following *more than* do not give rise to scalar implicatures because numerals from 1 to 9 are all salient: that is to say, the roundness of each number is the same. For example, numeral 4 is at least as round as numeral 3 (Jansen and Pollmann 2001). Therefore, you cannot appeal to considerations of numeral salience.

As seen above, Cummins et al. have taken a position against the classical theory of scalar implicatures that has been adopted by many researchers for a long time. They assume that modified numerical expressions such as *more than n* and "at least n" generally give rise to scalar implicatures in unembedded declarative contexts restricted by granularity and contextual salience with some exceptions.

### 2.4. Problems of scalar implicatures in *more than*

Contrary to the standard account claiming that modified numerical expressions do not convey scalar implicatures, in recent research Cummins et al. (2012) make a new prediction that scalar implicatures from modified numerical expressions are available, given the restriction of granularity and contextual salience. The results of their experiment are entirely different from those of Krifka and Fox and Hackl.

However, the study by Cummins et al. does not appear to be adapted to all situations containing *more than n*. In view of their study, look at (14):

(14) *More than* 50 people have held a candle-lit vigil outside Kidderminster Hospital to protest against proposed government changes to the NHS.

(http://www.bbc.co.uk/news/uk-england-hereford-worcester-14837482)

Given Cummins et al.'s analysis, it is predicted that the modified numerical expression *more than* 50 scalar-implicates *not more than* 60, which expresses the
falsity of the scalar alternative of \textit{more than 50}. It is generated by considering the granularity level and the appropriate scalar alternative. The number of 60 stems from the observation of granularity. It is based on divisibility by 10. Furthermore, \textit{more than 50} in (14) is used in the situation where the speaker does not know the exact number, but knows that the amount is greater than 50. This means that \textit{more than 50} is used as a round number. That is to say, Cummis et al.'s argument is a valid one when \textit{more than n} expresses a round number.

However, their is another example which seems to be problematic. Let us consider it from the point of view that Cummins et al. discuss:

(15) Baggage weighing \textit{more than} 45kg (100 lbs.) will not be accepted as checked baggage. (http://www.jal.co.jp/)

According to Cummins et al., modified numerical expressions such as \textit{more than} 45 in (15) give rise to scalar implicatures by considering granularity and contextual salience against the observation of standard scalar implicatures. Consider the granularity level in the case of (15). The points on the coarser-grained scale are considered to be 45...50...55...60...etc., because 45 is based on divisibility by 5. That is to say, \textit{more than 45} in (15) would give rise to the scalar implicature \textit{not more than 50}, which expresses the falsity of the scalar alternative of \textit{more than 45}. However, it appears to be intuitively incorrect. \textit{More than 45} in (15) conveys not roundness, but a critical threshold. Furthermore, \textit{more than 45} in (15) does not appear to have an upper bound, that is to say, the modified numerical expression \textit{more than 45} in (15) does not seem to generate a scalar implicature even if the granularity of 45 is taken into account.

The problem is that modified numerical expressions such as \textit{more than n} can be used in two conflicting cases: one is with a scalar implicature, and the other is without a scalar implicature. \textit{More than n} shows a round number when it seems to convey a scalar implicature, while \textit{more than n} shows a critical number when it does not seem to convey a scalar implicature. I suppose that generating scalar implicatures
depends on the feature and the context of the description. Given these, it would be incorrect to say that all of the modified numerical expressions of more than $n$ without some exceptions have scalar implicatures. This assumption is different from the one of Cummins et al. In the next chapter, I will discuss why this is so.

3. Analysis of more than

In this chapter, I will analyze the modified numerical expression more than $n$ based on the observation by Cummins et al. (2012). As discussed in the previous section there seem to be cases with and without scalar implicatures. That is to say, the analysis should be divided into two cases: one is concerned with the more than $n$ with scalar implicatures and the other the more than $n$ without scalar implicatures. Then I will make clear what differences are between them. As I pointed out in the previous section, I assume that generating scalar implicatures depends on the feature and the context of the description. I will illustrate what context and feature of the description generate scalar implicatures and what context and feature of the description do not. I will also discuss whether the scalar implicature of more than $n$ is calculated only according to the consideration of the appropriate granularity level and numerical salience as discussed by Cummins et al. in the case with scalar implicatures. Before analyzing examples of more than $n$, we will look at certain background assumptions for the argument about whether scalar implicatures arise or not in more than $n$.

3.1. Background assumptions

In order to solve the questions discussed above, the consideration of the meaning of more than $n$ both in English and in Japanese is necessary. Our background assumption stems from the consideration of how more than $n$ is interpreted and how it is translated into Japanese. More than $n$ sometimes makes it hard for speakers of Japanese to understand its interpretation and may be misunderstood unless they interpret it properly. In order to understand the meaning of more than $n$ and the differences between English and its Japanese translation, consider the example below:
(16) One secret report showed that just by updating Android software, a user sent *more than* 500 lines of data about the phone’s history and use onto the network.


Just to be sure, the phrase *more than* *n* is defined in *Oxford Advanced Learner’s Dictionary* as “a larger number or amount of.” In this case, the numerical modified expression *more than* 500 conveys not a critical number, but just a round number. *More than* 500 in (16) is thus used in a situation where the speaker does not know an exact number. Compare (16) with (17):

(17) The person was working for *more than* 30 hours each week before their incapacity.  

(www.brightgrey.com/)

(17) is stated by an insurance company about the condition to receive medical benefits. The person that works *more than* 30 hours before his/her incapacity will be paid by the insurance company. In this case *more than* in (17) does not show roundness, but a critical number. *More than* 30 in (17) is used in a situation where the speaker knows a critical number as a lower bound. From the consideration of examples in (16) and (17), it is clear that two meanings on the cognitive level can be conveyed with one term of *more than*, depending on the feature and the context of the description. That is to say, speakers and hearers seem to understand *more than* *n* by relating it to two meanings on the cognitive level.

The fact that the Japanese translation of *more than* *n* lexically distinguishes the two cognitive meanings can be confirmed by considering how you find two meanings of *more than* *n* in English on the cognitive level. As I mentioned above, there are some differences between English and its Japanese translation and they sometimes make it hard for Japanese speakers to understand its interpretation. Unlike in the case of *more than* *n* in English that has two meanings and ambiguous on the cognitive level,
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Japanese expresses the two meanings in question with different lexical items. Consider the following Japanese translations of more than n. The relevant pairs of English examples are repeated below for convenience:

(14) More than 50 people have held a candle-lit vigil outside Kidderminster Hospital to protest against proposed government changes to the NHS.

More than n is usually translated as n ijo (「n 以上」) in Japanese as in (14). However, it is not strictly accurate, because more than shows that the number following it is not included, while in Japanese the number before ijo (「以上」) is included. As just described, more than n sometimes causes troubles for Japanese speakers when it shows a critical number as a lower bound as in (15). Given what I have shown above, I assume that the translation must be divided into two Japanese expressions clearly to avoid confusion when more than n is translated into Japanese. That is to say, ijo (「以上」) is used as a translation when more than n conveys a round number as in (14), and koeru (「超える」) is used when it conveys a critical number as in (15). The word koeru (「超える」) is defined in Kojien as “exceeding or being greater” (my translation). Koeru (「超える」) literally has the same meaning as more than. Despite some difference between more than n in English and its translation ijo (「以上」), the word ijo (「以上」) which means the number before it is included is typically used in translating more than n into Japanese. To avoid confusion, I assume that ijo (「以上」) is used when it does not matter if the number following more than is included or not, and Koeru (「超える」) is used when it matters if the number following more than is included or not in light of the context.

Beginning from the consideration of the relation between the two meanings of more than n and its Japanese translations, the Japanese lexical distinction leads us
further into the consideration of the meaning of *more than* \( n \) in English. In this way, I expand this assumption into another one that *more than* \( n \) in English is ambiguous and expresses two cognitive meanings, which are differentiated lexically in Japanese. It will be useful to keep these points in mind as we examine scalar implicatures of *more than* \( n \). That is to say, these assumptions will offer the key to discuss the question about when *more than* \( n \) can be used in two conflicting cases: one is with a scalar implicature and the other without a scalar implicature, contrary to Cummins et al. I will take examples to discuss the question using my assumptions in the next section.

### 3.2. Cases with scalar implicatures

Let us discuss *more than* \( n \) in detail and focus on cases in which scalar implicatures seem to arise. It is useful to look more closely at some of the important features and the context of the description. I illustrate what context and feature of the description generate scalar implicatures. Moreover, I discuss whether the scalar implicature of *more than* \( n \) is calculated only according to the consideration of the appropriate granularity level as claimed by Cummins et al. It is worthwhile to examine the features of units following *more than* \( n \) to answer the question. As examples with scalar implicatures, let us consider cases in which *more than* \( n \) shows a round number and is used in a situation where the speaker does not know an exact number. The relevant example is repeated below for convenience:

(14) *More than 50 people* have held a candle-lit vigil outside Kidderminster Hospital to protest against proposed government changes to the NHS.

*More than 50* in (14) shows roundness considering the context of the description. Upon the request of "say as much as you can," uttering *more than 50* shows that the speaker is not in a position to say an exact number. According to Cummins et al., *more than 50* conveys the scalar implicature *not more than 60*, which conveys the falsity of the scalar alternative of *more than 50*. The number of 60 stems from the
observation of granularity unlike in the case of standard scalar implicatures. It is based on divisibility by 10. The points on the coarser-grained scale are considered to be 50...60...70...80...etc. As shown above, modified numerical expressions of *more than n* give rise to scalar implicatures by considering the granularity level and the appropriate scalar alternative. This observation seems to hold for the example in (18) as well:

(18) There are the health problems that still elude doctors *more than 50 years* after the first spaceflight.


*More than 50* in (18) shows roundness considering the context of the description. Like the example in (14), uttering *more than 50* shows that the speaker is not in a position to say an exact number. According to Cummins et al., *more than 50* conveys the scalar implicature *not more than 60* that implies the falsity of the scalar alternatives of *more than 50* by considering the appropriate granularity level.

The question is whether scalar implicatures are only to be considered with the appropriate granularity level. It is also necessary to examine the features of units following *more than n*, because these units work with it and form part of the meaning that *more than n* conveys.

Compare *more than 50 years* in (18) with *more than 50 people* in (14). The unit of *year* can be divided into the unit of *month*, while that of *people* cannot. Moreover, the unit of *month* can be divided into that of *day*. That is to say, the unit of *year* has an internal structure, while that of *people* does not and cannot be broken into any smaller units. As shown above, one *year* consists of twelve months or three hundred and sixty five days. This means that the unit of *year* can be marked with scales, while that of *people* cannot. It may not be appropriate for different units with different degrees to be argued on the same granularity level. That is to say, I assume that scalar implicatures of *more than n* cannot be calculated only by granularity of numerals.
following *more than*. The units following *more than n* should also be considered.

Now, consider the scalar implicature in (18) again. *More than 50 years* in (18) would scalar-implicate *not more than 51 years* by considering the appropriate granularity level. The reason is as follows: the number of 51 is based on divisibility by 1. The points on the coarser-grained scale are considered to be 50...51...52......etc. They seem to be on the finest-grained scale. However, they can be considered to be the coarser-grained since the unit of *year* can be marked with scales, that is, one *year* means three hundred and sixty-five days. In this way, it is possible to say that *more than 50 years* in (18) scalar-implicates *not more than 51 years* considering the appropriate granularity level and the unit. However, the scalar implicature *not more than 51 years* in (18) seems to be intuitively incorrect. In this context, *not more than 60 years* derived only by the consideration of the appropriate granularity level seems to be the suitable upper bound. That is to say, the consideration of units following *more than* would not be useful and may generate wrong scalar implicatures.

In sum, the modified numerical expression *more than n* generates scalar implicatures by considering the appropriate granularity level when *more than n* shows roundness. To justify what Cummins et al. discuss, I consider units following *more than n* to observe if the scalar implicatures of *more than n* are judged only by the consideration of the appropriate granularity level. However, I have come to the conclusion that considering units following *more than n* would generate wrong scalar implicatures. As seen above, *more than n* generates scalar implicatures by considering the appropriate granularity level as discussed by Cummins et al. in cases where some roundness is concerned.

Furthermore, the numerical quantifiers n in *more than n* in this section are not salient in the preceding contexts. Cummins et al. also observe that scalar implicatures are weakened if the numeral has been previously activated or salient in the context. That is to say, *more than n* does not give rise to scalar implicatures when the numerical quantifier n is previously activated in the context. As discussed by Cummins et al. the modified numerical expression *more than n* gives rise to scalar implicatures that are conditioned by granularity and mention of the numeral in the prior context.


3.3. Cases without Scalar Implicatures

Now we will focus on cases in which scalar implicatures do not seem to arise. Here let us look at an example in which *more than n* shows a critical number and does not seem to generate a scalar implicature. I repeat the relevant example below:

(15) Baggage weighing *more than* 45kg (100 lbs.) will not be accepted as checked baggage.

The example in (15) is about excess baggage in an airline's regulation. In this case, the company needs to show a clear distinction about the amount of weight between what is accepted and what is not. Therefore, *more than n* in (15) clearly shows a critical number. As observed in the previous section, *more than 45* would scalar-implicate not *more than 50* considering the appropriate granularity level if we followed the observation by Cummins et al. However, *more than 45* in (15) does not appear to have an upper bound. It seems to show only a lower bound. Therefore, it is incorrect to say that *more than 45* scalar-implicates not *more than 50* in this context. This is contrary to the observation by Cummins et al.

However, given one's encyclopedic knowledge about what people generally have, *more than 45* in (15) would have a covert upper bound that depends on what people experience and what they think. The covert upper bound in (15) would be 60kg or 70kg which are derived from one's encyclopedic knowledge. That is to say, the hearer would potentially have knowledge about baggage that people do not normally check in at the airport with baggage weighing *more than 60kg* or 70kg. Hence, *more than 45kg* in (15) would covertly generate scalar implicatures.

As observed above, *more than 45* in (15) shows a critical number and only a lower bound, and does not seem to generate scalar implicatures. However, even if *more than 45* in (15) does not seem to have an upper bound, it would exist behind the appearance of the context. That is, the scalar implicature in (15) does not arise from the consideration of the appropriate granularity level but one's encyclopedic knowledge. This implicature is completely different from what Cummins et al. argue.
4. Conclusion

In this paper, I have examined a new approach presented by Cummins et al. (2012). Contrary to standard accounts of scalar implicatures, Cummins et al. have argued that more than n generates scalar implicatures.

Starting with the observation that more than n can be translated into two Japanese terms such as *ijo* (「以上」) and *koeru* (「超える」), I have assumed that more than n in English also has those two sorts of meanings on the cognitive level. Bringing this into my analysis as a background assumption, I have analyzed examples with more than n based on the accounts by Cummins et al. Contrary to them, I have shown that more than n does not always generate scalar implicatures. My conclusion is summarized as follows:

(19) More than n that shows a round number generally generates scalar implicatures with the help of the appropriate granularity level and the contextual salience of numerals.

(20) More than n that shows a critical number generally does not generate scalar implicatures.
(However, there would be covert scalar implicatures derived from one’s encyclopedic knowledge.)

References


