# 'At least' and her Prosodics

*The influence of the epistemic and deontic interpretation of superlative quantifiers on their prosodic structure*

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# Introduction

When studying the semantics of superlative quantifiers,[1] it is relevant to take into account their prosodic structures. In natural, daily speech, different prosodic structures can be applied to superlative quantifiers. It is possible to accentuate the modifier,[2] the numeral that follows the modifier, and the NP that follows the numeral, as is shown in (1).[3]

(1)     Ten minste drie jongens
        *At least three boys*

        a. Ten MINSTE drie jongens
        *At LEAST three boys*

        b. Ten minste DRIE jongens
        *At least THREE boys*

        c. Ten minste drie JONGENS
        *At least three BOYS*

Both (1.a), (1.b) and (1.c) will immediately be approved of by native speakers of Dutch and can be found in spontaneous speech. Although this may not seem surprising according to our intuitions, this is not something that is mentioned in – recent or any – literature on this subject and it is completely unclear what rule underlies these possibilities.

If these prosodic structures follow a logical pattern, knowledge of this pattern can be extremely valuable for research in different fields. In this paper, it will be explored whether it is possible to detect a pattern that provides this accentuation based on the semantic knowledge of superlative quantifiers[4] in Dutch. To explore this possibility, insight in the semantics of superlative quantifiers, and in the relation between prosody and semantics, is required. Therefore, the first two sections of this paper will exist of a small literature study on these subjects. Based on this literature study, a method to detect a pattern in an experimental setting is searched for and an experiment was designed and conducted. The paper will end with a discussion in which the results will be cautiously linked to the theory, the quality of the experiment will be discussed, and suggestions for further research will be given.

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[1] In this paper, the term quantifier refers to a modifier in combination with a numeral. For example, *'At least three'*. The definition of superlative quantifier will be given later.
[2] In this paper, the term modifier refers to the word that modifies the numeral. For example, *'At least'*.
[3] In this paper, CAPS will refer to syllables that are marked with pitch accent.
[4] To be as precise as possible, this study will only concentrate on superlative quantifiers that describe a lower bound.

# 1    The semantics of superlative quantifiers

To provide insight in the semantics of superlative quantifiers, a clear definition needs to be given. A superlative quantifier is a scalar quantifier consisting of superlative morphology, and occurs in natural speech in combination with an NP, such as in (2) (Geurts & Nouwen, 2007).

(2)    Ten minste / Minstens drie jongens
       *At least three boys*

The semantic properties of superlative quantifiers can be considered as complex, regarding various aspects. The first complexity is related to the way superlative quantifiers behave semantically in relation to the other type of scalar quantifiers: comparative quantifiers. Comparative quantifiers are provided by comparative morphology, such as in (3).

(3)    Meer dan drie jongens
       *More than two boys*

From a naive perspective, the semantic properties of these two types of quantifiers are straightforward and may even be interchangeable, in the sense that both DP's refer to the same amount of boys. It seems that a phrase such as '*at least n* can be interpreted as '*more than n*' (Geurts & Nouwen, 2007). From this naive perspective, (4.a) and (4.b) would be equivalent.

(4)    a. Milou heeft minstens drie vrienden.
           *Milou has at least three friends.*
       b. Milou heeft meer dan twee vrienden.
           *Milou has more than two friends.*

Whilst (4.a) and (4.b) indeed do appear synonymous, there are different situations in which superlative and comparative quantifiers cannot be used interchangeably. There are different problems that occur when superlative quantifiers are analyzed from the naive perspective.
       One of these problems concerns specificity.

(5)     a. Milou heeft minstens drie vrienden, namelijk Gideon, Bram en Liesbeth.

*Milou has at least three friends, namely Gideon, Bram and Liesbeth.*

b. ?Milou heeft meer dan twee vrienden, namelijk Gideon en Liesbeth.

*Milou has more than two friends, namely Gideon and Liesbeth.*

In both (5.a) and (5.b), the rider *'namely'* can be identified with the amount of friends that is specified. In (5.a), the numeral three corresponds with the amount of friends that is named (Gideon, Bram and Liesbeth) and in (5.b) the numeral two corresponds with the amount of friends (Gideon and Liesbeth) too. The cardinality of the names of friends corresponds perfectly with the numeral that *'namely'* identifies, but (5.b) is not acceptable, while (5.a) is. It is not clear what causes this difference, but we can draw strong conclusions from it. When we take an utterance containing a superlative quantifier and add a specific number that corresponds with the numeral within the quantifier, we have an acceptable sentence. But when we do the exact same thing with an utterance with a comparative quantifier, we do not get an acceptable sentence. Analyzing from the naive perspective, we would not expect a difference like this (Geurts & Nouwen, 2007).

The second problem concerning the naive perspective relates to the inference patterns. Arguing from the naive perspective, the expectation would be that superlative quantifiers and comparative quantifiers follow the same inference patterns. If this is true, it would be expected that (6.b), as well as (6.c), are judged to be valid conclusions of premise (6.a). But (6.c) is not a valid conclusion to draw from accepting (6.a) as a premise, as it suggests that Gideon may have had more than three vodkas.

(6)     a. Gideon dronk drie wodka's.

*Gideon had three vodkas.*

b. Gideon dronk meer dan twee wodka's.

*Gideon had more  than two vodkas.*

c. ?Gideon dronk ten minste drie wodka's.

*Gideon had at least three vodkas.*

This is problematic analyzing from the naive perspective. In this case, superlative and comparative quantifiers cannot be used interchangeably. There is a difference that occurs when reformulating (6.a) into (6.b) and (6.c). It is not clear what underlies this difference, but the fact is that the naive theory is too simple. It could be defended that this contrast is due to the fact that (6.c) allows for the possibility that, or even suggests that, Gideon had more than three vodka's, while (6.b) does not. But when adopting this idea, the question *'why not?'* needs to be answered. *'More than two'* does not mean *'exactly three'*, thus the comparative quantifier

should allow for *'more than three'* as well. This is problematic for the naive perspective, from which we would not expect any problems here.

Another problem with the naive theory concerns the range of the distribution. In general, superlative quantifiers have a wider range of distribution than comparative quantifiers. However, in special situations, for example in the scope of negation, they are more restricted.

(7)     a. Ik heb niet ten minste drie spijkerbroeken.
        *I do not have at least three pairs of jeans.*
        b. Ik heb niet meer dan drie spijkerbroeken.
        *I do not have more than three pairs of jeans.*

The problem here is why the distribution of superlative expressions is more free in general and more restricted in certain special cases (Geurts & Nouwen, 2007). We can consider a difference, which we cannot explain, but which is strong enough to reject the naive theory.

Another situation in which superlative and comparative quantifiers cannot be analyzed from the naive perspective appears in the following examples.

(8)     a. De serveerster kan hoogstens negentien glazen dragen.
        *The waitress can carry at most nineteen glasses.*
        b. De serveerster kan minder dan twintig glazen meenemen.
        *The waitress can carry less than twenty glasses.*
        [Geurts & Nouwen, 2007]

Both sentences can be read with the implication that the waitress is not able to carry more than nineteen glasses, but only (8.b) can also be read without this implication (Nouwen, 2010).

There is another difference between the way comparative quantifiers and superlative quantifiers can be used. It is acceptable to use comparative quantifiers to refer to precise and definite amounts, while superlative quantifiers relate to ranges of values. This difference is shown in (9) and (10).

(9)     a. ? Ik weet precies hoeveel geheugen mijn laptop heeft en het is ten minste 512 MB.
        *I know exactly how much memory my laptop has and it's at least 512 MB.*
        b. Ik weet precies hoeveel geheugen mijn laptop heeft en het is meer dan 512 MB.
        *I know exactly how much memory my laptop has and it's more than 512 MB.*
        [Nouwen, 2010]

(10)    a. Jan vond ten minste 50 fouten in de tekst, #62 om precies te zijn.
        *Jan found at least 50 errors in the text, #62 to be precise.*
        b. Jan vond meer dan 50 fouten in de tekst, 62 om precies te zijn.
        *Jan found more than 50 errors in the text, 62 to be precise.*

Example (10) shows that superlative quantifiers are not able to relate to definite amounts, like sixty-two, but that comparative quantifiers, like in (10.b), are perfectly able to do so. Sentence (9.a) shows that it is not possible to express a certainty with a superlative quantifier. It seems that uncertainty about the precise amount is implied when using superlative quantifiers (Nouwen, 2010). Again, it is not clear what causes this difference, but it can be concluded that superlative and comparative quantifiers behave differently in this situation.

Based on the complexities have been discussed, it can be concluded that there is something particular about superlative quantifiers. Their behavior differs from that of comparative quantifier in different ways. Many technical implementations of the ways in which superlative quantifiers are special can be found in the literature. However, the focus of this paper will not lie on these implementations, but on one specific specialty, namely the association with modality. It is shown in (8.a), that there is something special about modals and in (9) the link with epistemics is made. For this paper, the main aspect to consider is the difference between deontic and epistemic superlative quantifiers. Deontic superlative quantifiers provide a deontic bound, while epistemic superlative quantifiers introduce the bound of the knowledge of the speaker. The difference between these two interpretations of quantifiers may be clarified by the following example.

(11)    Om de titel 'bachelor' te krijgen moet je ten minste 150 ECTS behalen.
        *To get a bachelor´s degree, you have to get at least 150 ECTS.*

The expression in (11) allows both the deontic, and the epistemic interpretation. Interpreting 11 as deontic, one would get a bachelor´s degree after having obtained a total of 150 ECTS. Next to this the possibility to obtain more than 150 ECTS exists. So if you obtain 160 ECTS, you would get your bachelor´s degree with 10 more ECTS than would have been strictly necessary. Following the epistemic interpretation, the speaker does not just make an assertion on what the rules say about when you get your degree. Rather, the speaker provides

information on his or her knowledge about those rules. To be precise, on such a reading, the speaker is not sure. To show that these two readings are semantically different, insofar as they come with different truth-conditions, let us assume for a moment that the university board has determined that students get their bachelor degrees at the point where 155 ECTS have been obtained, but that it is possible to gain extra ECTS. In this case, the deontic interpretation of (11) is false, but the epistemic reading is not. It is not possible to determine the truth-value of the epistemic reading, because no information about the speaker was provided.

There are different semantic elements that influence the prominence of the epistemic or the deontic interpretation. When no such elements are used, the superlative quantifier will be interpreted as epistemic. This may explain why (9.a) was not an acceptable sentence. (9.a) gets an epistemic interpretation, which is contrary with the addition '*I know exactly*'. Next to the fact that the epistemic interpretation is standard, there are also elements that make the epistemic reading prominent. For example, adding a sentence that implies the speaker is not sure, foregrounds an epistemic interpretation. When sentences containing a superlative quantifier are produced in combination with a sentence that clarifies that the speaker has no precise knowledge, like in (12), the epistemic interpretation applies.

(12)     Ik weet niet hoeveel Gideon heeft gedronken, maar het zijn ten minste 3 wodka's.
         *I don't know how much Gideon has drank, but he had at least 3 vodkas.*

The epistemic interpretation can also be inhibited. Inhibition of the epistemic interpretation takes place if it became clear in the context that the speaker wants to show the deontic possibilities, as in (13).

(13)     Wat betreft de lengte is het toegestaan het minimale woordenaantal te overschrijden,
         maar de bachelorscriptie moet ten minste 7000 woorden bevatten.
         *Considering the length, it is allowed to exceed the number of words, but the bachelor thesis
         has to contain at least 7000 words.*

Other elements that have the power to contribute to the interpretation of superlative quantifiers are deontic modals. The presence of a deontic modal[5] provides a deontic meaning, with which the superlative quantifier interacts. When deontic modals are used in combination with superlative quantifiers, there are two possibilities. In the first place, it is possible to get a deontic reading, in which the lower bound for deontic possibilities is given, as in (14).

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[5] In this paper, modal verbs are used to illustrate the influence of deontic modals. Examples of such verbs are: *Have to, will/ is necessary/ must.*

(14)    Vanuit veiligheidsoverwegingen moet het wachtwoord uit ten minste 8 karakters
        bestaan.
        *For safety reasons, the password has to contain at least 8 characters.*

In the second place, it is possible that the presence of a deontic modal describes the lower or upper bound of the epistemic possibilities, as in (15).

(15)    Het is onduidelijk wat voor straf Jan precies zal krijgen, maar hij moet ten minste 6
        maanden de gevangenis in.
        *It's unclear what kind of punishment Jan will get, but he has to go to jail for at least 6 months.*

In (15), the deontic modal *'has to'* is used, and a sentence is used to foreground the epistemic interpretation. In this case, the modal is used to describe the bounds of the epistemic possibilities. The interpretation of the superlative quantifier, is an epistemic one, but with a deontic character, because the bounds are described in a deontic way by the modal (Nouwen, 2012).

The aim of this paper is to explore if it is a semantic pattern that provides the prosodic structure of superlative quantifiers. It has been made clear that there is an elemental difference between the deontic and the epistemic interpretation of superlative quantifiers. Summarizing, the epistemic interpretation implies information about the speakers knowledge. This is the interpretation you get when there is no deontic context and no deontic modals are used. This interpretation can be made prominent by using sentences that show the ignorance of the speaker. The deontic interpretation implies a deontic lower bound and does not provide information about the speaker. This interpretation can be foregrounded by a deontic modal, such as a modal verb, or by a strong deontic context. Next to these two interpretations of superlative quantifiers, there are constructions in which an epistemic interpretation gets a deontic character. This type of superlative quantifier will be treated as a different type.

It can be suggested, that the difference between epistemic and deontic interpretations and our third type, epistemic quantifiers in combination with a modal verb, provide the different prosodic structures of superlative quantifiers. It is too early to speculate about what pattern would correlate with deontic or epistemic superlative quantifiers. However, it can be suggested that these semantic differences, come with different prosodic structures. To be able to explore this suggestion, there is a need for more than just an analysis of the semantic properties of these quantifiers. Insight in the relation between prosody and semantics is required to explore this possibility properly.

## 2    Prosody and Semantics

Despite the fact that the relation between prosody and semantics is understudied, there are some subjects that dominate the literature and that need to be considered in this study.

The first area of importance concerns focus, an information structural property that an expression may have and that can be so strong that the truth-conditions of this expression can be affected (Beaver & Clark, 2008). Focus can be expressed through different linguistic instruments, for example syntax, and prosody is one of the most important ones. In English prosodic focus is marked by a nuclear pitch accent, as in image (1). Image (1) is a prosodic transcription of an utterance in which the second part gets pitch accent, for example (16).

(16)    Minstens DRIE jongens
        *At least THREE boys*



*Image (1) Nuclear Pitchline with ToDi transcription (Gussenhoven, 2002).*

Pitch is a strong factor that can influence the interpretation of language in different ways. For example, pitch accent can influence the disambiguation of syntactic ambiguity, as in (17) (Hirschberg, 2006).

(17)    a. Stir in rice wine and seasonings.
        b. Stir in RIce [pause]  WIne and seasonings
        c. Stir in rice WIne and seasonings
        [Hirschberg. 2006]

In (17), it is the pitch accent that differentiates between adding two ingredients, namely wine based on rice and seasonings, as in (17.c), and three ingredients, namely rice, wine and seasonings, as in (17.b).

Next to disambiguating full sentences, pitch also conveys the structure of complex nominals, as in (18) (Liberman and Proat, 1992; Sproat, 1994, as cited in Hirschberg, 2006).

(18)    a. German teachers

        b. GERMAN teachers

        c. German TEACHERS

        [Hirschberg. 2006]

The ambiguity of (18.a) disappears when one of the two words gets stressed. In (18.b), when the word '*German*' is pitched, teachers of the subject German are meant. In (18. c), when the word '*teacher*' is pitched, teachers with the German nationality are meant.

        Pitch is not only a very powerful factor in syntax, it can also influence semantics. There are different ways in which pitch expresses meaning. For example, in question-answer discourse, the focused element corresponds with the wh-phrase in the question. As is shown in (19) and (20), when the subject is questioned by 'what', the subject will be focused in the answer. However, when the time is questioned by 'when', the timestamp will be focused in the answer.

(19)    a. When does David wear a bow tie?

        b. What does David wear when teaching?

(20)    a. David (only) wears a bow tie when TEACHING.

        b. David (only) wears a BOW TIE when teaching.

        [Beaver & Clark, 2008]

Another example of semantic information that focus can express is contrast, as is shown in (21).

(21)    a. John only did the illustrations for the book . . .

        b. MARY wrote the story.

        [Beaver & Clark, 2008]

With regard to superlative quantifiers, Krifka (1999) has stated that the semantic distribution of superlative quantifiers is influenced by focus, in contrast to other quantifiers, like comparative ones.

(22)    a. At least THREE boys left.

        b. At least three BOYS left.

        [Krifka, 1999]

The different interpretations of this sentence are provided by the pitch accent on the different words. In example (22.a), it is meant that the number of boys that left is at least three, while (22.b) means that amongst the persons that left, there were three boys. (22.b) implies the possibility that there were other persons that have left, which is contrary to (22.a).

The difference between these two readings is testable. These two utterances appear in different contexts and answer different questions. Sentence (22.a) would be a fitting answer to the question 'How many boys left?', while sentence (22.b) would not be an appropriate answer to that question. Sentence (22.b) is an answer to the question *'Who left?'* to which sentence (22.a) would be inappropriate. This shows that focus can have a direct influence on the meaning of superlative quantifiers. It is noticeable that this counts for superlative quantifiers, but not for other types of quantifiers, like comparatives (Krifka, 1999).

The examples are able to clarify that pitch is an instrument that can express focus. However, the relation between pitch and focus is far from straightforward and has received considerable attention in the literature. Different rules have been designed in which the effects of pitch accents have been tried to be caught. For our analysis, a simplified version of a part of Selkirk's law will be used.

(23)     ***Selkirk's law*[6]**

A constituent without focus must be given.

The rule presented in (23) can be illustrated by the following, negative example.

(24)     a. Who danced with Barbara?

b. ?Emre danced with BARBARA

As we can see, (24.b) is not an appropriate answer to (24.a). According to Selkirk, this inappropriateness can be explained by the fact that constituents without focus must be given. It is the constituent *'Emre'* here, that does not get focus, but *'Emre'* is new in the discourse, and not given.

There is one problem that occurs when analyzing from this part of Selkirk's law, namely the meaning of *given*. In this case, *given* means more than *'mentioned before'* or *'common sense'* and it has been a much debated topic in contemporary literature. In addition to Selkirk's law, the principle of *activation* is designed. Next to new information and givenness, focus can also be used to level prominence and to emphasize certain parts of an expression (Beaver & Clark, 2008). *Activation* relates to the amount of attention being paid to a particular concept or discourse referent. The most important aspect of *activation* is that it allows to differentiate between various degrees of activation, and not only between *given* or not *given* (Beaver & Clark, 2008).

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[6] As is mentioned in the main text, we use a simplified version of a *part* of Selkirk's law. When referring to Selkirk's law in this paper, the simplified version that can be found in (23) is meant.

The concept of contrast is already used as an example of a situation in which focus can influence discourse. Contrast is also a typical situation in which a given word still gets focus, like in (25).

(25)    a. SANdy fed FIdo this morning.
        b. Uhm, wait, she DIDn't feed FIdo,
        c. she fed BUTCH
        [Beaver & Clark, 2008]

Something else that needs to be mentioned in the case of superlative quantifiers is focus sensitivity. An expression can be considered as focus sensitive if its interpretation correlates with the location of focus (Beaver & Clark, 2002). In the case of focus-sensitive situations, there is a certain amount of potential items for prominence and one of them will be focused, given or not given (Beaver & Clark, 2008). In the case of superlative quantifiers, there are indeed more potential items for prominence, namely the modifier, the numeral and the NP, and as Krifka showed, the location of the pitch correlates with the way they are interpreted. Thus, superlative quantifiers can be considered as focus-sensitive.

It can be concluded that there are different, syntactic and semantic, situations in which pitch can influence the way language will be interpret. With regard to superlative quantifiers, it is shown that they are focus-sensitive, in that way that focus can differentiate between their different interpretations. In this paper it will be explored whether this focus-sensitivity only counts for the different interpretations Krifka (1999) named, or that the difference between the deontic and epistemic interpretation also correlates with the location of the pitch. To answer this question, some sub questions are formulated: Is it possible to prove that both the modifier and the numeral that follows the modifier, are able to be pitched in natural speech? And, if so, is this caused by the difference between deontic and epistemic interpretations? In the first chapter is has been made clear that it is possible to differentiate between three different kinds of superlative quantifiers, namely epistemic superlatives, deontic superlatives, and epistemic superlatives in combination with a modal verb. In this chapter it is shown that superlative quantifiers are focus-sensitive. Consequently, it is possible to cautiously hypothesize that epistemic and deontic superlative quantifiers provide different prosodic patterns. To prove this cautious hypothesis, an experiment was designed and conducted.

# 3      Methods

What is needed to make generalizations about the prosodic structures of the different categories of superlative quantifiers is data consisting of natural utterances of items belonging to these categories. Twelve test items have been designed, four of each category, thus four epistemic items, four deontic items and four epistemic items with a modal verb. A total of fifteen participants were asked to read them out.[7] The items were designed as deontic or epistemic by using the earlier discussed elements that were able to influence the prominence of the interpretations. Thus, the epistemic items were designed by adding sentences in which ignorance of the speaker is implied. Deontic items were designed by adding a modal verb and by inhibiting the epistemic interpretation through a strong deontic context. Epistemic items with a modal verb were designed by adding a modal verb to a epistemic item. For example, to provoke an utterance of a deontic superlative quantifier, (26) was included in the experiment. To let the participants read as natural as possible, and avoid reciting, the items were hidden in a natural text, around a common theme.

(26)     Vanuit veiligheidsoverwegingen moet het wachtwoord uit ten minste 8 karakters bestaan.
        *For safety reasons, the password has to consist of at least 8 characters.*

The participant group consisted of native speakers of Dutch aged between nineteen and forty-eight. All participants were high-educated (higher professional education or university students or graduates). Next to that, participants that had problems with the development of sight, hearing or reading were excluded. Both men and women were tested.

It is assumed that there are three possible scenarios in which participants will produce the test items. It is expected that participants put focus on the modifier, the numeral or the NP that follows the numeral. For (26), this implies the possible that are included in (27).

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[7] A list of testi tems and the full text of the experiment can be found in the appendix.

(27)    a. ten MINSTE acht karakters
        *at LEAST eight characters*
        b. ten minste ACHT karakters
        *at least EIGHT characters*
        c. ten minste acht KARAKTERS
        *at least eight CHARACTERS*

The recordings were analyzed using Praat. Based on the pitch-line drawn automatically by Praat, ToDi[8] transcriptions of the test items were made. Next to nuclear pitch, high pitch and low pitch are marked as focus.

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[8] Transcription of Dutch Intonation

# 4    Results

On the basis of the ToDi transcriptions, a limited statistical analysis of the data has been made. The prediction that participants would stress the modifier, the numeral or the NP, is correct in that way that either the modifier or the numeral always gets focus. Before generalizing about when the modifier, and when the numeral is stressed, it needs to be pointed out that there were two participants that stressed the numeral in all cases. The results of these two participants will be discussed later, but will be disregarded in the further analysis. Furthermore, there were no other specialties concerning individual participants. Processing the transcriptions, the variable *pitch*, which can get the values 0 and 1, is marked. 1 will be assigned when the modifier is pitched, while 0 will be assigned when the numeral is pitched. The results are included in table (1) below.

**Table 1[9] – Experiment results**

| Participants | Item 1 | Item 2 | Item 3 | Item 4 | Item 5 | Item 6 | Item 7 | Item 8 | Item 9 | Item 10 | Item 11 | Item 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| **2** | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | * | 1 | 1 |
| **3** | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 |
| **4** | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **5** | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| **6** | 0 | * | 1 | * | 1 | * | 1 | 1 | 1 | 1 | 1 | 1 |
| **7** | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |
| **8** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | * | 0 | 1 |
| **9** | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 |
| **10** | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 |
| **11** | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |
| **12** | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| **13** | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **n Pitch = 1** | 6 | 4 | 11 | 6 | 5 | 9 | 10 | 10 | 7 | 8 | 11 | 8 |
| **n Pitch = 0** | 7 | 8 | 2 | 6 | 8 | 3 | 3 | 3 | 6 | 3 | 2 | 5 |

First and foremost, the goal of this experiment is obviously to see whether there is a difference in the prosodic structure of the different types of superlative quantifiers. To do so, a significant difference between three categories, the deontic items (item 1-item 4), the epistemic items (item 5-item 8) and the epistemic items in combination with a modal verb (item 9-item 12), is searched for. No significance is found between these categories. In fact, the distribution seems to be random. The same applies to differences between the items.

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[9] The test item number in the table corresponds with the test item number in the appendix. To see the complete test item that corresponds with the scores in the table, check the appendix.

There are only two items that are noticeable, compared to the rest of the items. These two items are marked grey in table 1, and will be discussed later.

The distribution of the participants is something that stands out immediately. It is not just the variation between and within the three groups of items that is large. The participants also seem to disagree on individual items. The two noticeable items that were just mentioned, are different from the rest only because these are the only items in which participants significantly agreed on where the pitch-accent should be. Except from these two, the standard deviation of the individual test items always lies between 0,42 and the 0,5 - based on the earlier mentioned values of 0 and 1. The strong deontic test item in 24 gets an average of 0,5, with a standard deviation of 0,5. This means that it is not possible for participants to be more divided about this item than they are.

In the case of the two earlier mentioned items, the participants are less divided and, in both, a significant majority decided to pitch the modifier. It is remarkable that these two significant items are not part of the same semantic category. The first item can be considered as deontic, while the other one is epistemic in combination with a modal verb.

# 5    Discussion

Before analyzing the results, and using them as a basis to draw conclusions from, different remarks on the experiment need to be made. The first element of the experiment that possibly has detracted the quality of the results is the used method. Although reading can be considered a good method to provoke speech, it may not be applicable to the superlative quantifiers. Research has showed that there are different types of prosodic processing that can be adopted when reading aloud. Kondo and Mazuka (1996) stated that to read a text fluently, participants do not generate the most informative prosody. They rather produce a more limited kind of prosody that reflects the limited information that is available to them as they read. Kondo and Mazuka (1996) assumed that this limited prosody would lack specific contrasts that would be present in carefully read sentences or spontaneous speech. It is in spontaneous speech that prosody is richest in its informativeness (Kondo & Mazuka, 1996).

The fact that participants were asked to read out, without time to prepare, may strengthen the risk that the main focus of the participants was on being fluent and that they adopted the limited prosody, instead of the one that is generated in spontaneous speech. Next to this, the possibility exists that the readability of the text itself contributed to a strong focus on being fluent. The text appeared to be difficult to read and provided a lot of stuttering and slips of the tongue. This could have influenced the results in that way that participants were, in the first place, concentrated on reading fluently. Taking into account the possibility of adopting a limited prosody when reading, the used method may have not been the perfect one to research prosody in the field of superlative quantifiers. It could indeed be the case that there is a difference between the prosody of deontic and epistemic superlative quantifiers, but that this can only be found in spontaneous speech, or at least in carefully read texts.

Another problem with the experiment concerns the quality of the test items. In the experiment the three different types of superlative quantifiers are compared. To make a fair comparison, the test items need to be interpretable only in the way they are tested. If an item is tested as epistemic, the risk that the item will be interpreted as deontic needs to be excluded for 100 percent. The fact that the items were placed in a context did not contribute to a fair comparison. The context may have, more than expected, influenced the interpretations of the participants. It cannot be stated that within the conducted experiment other interpretations of the tested items were 100 percent excluded.

Another deficiency of the experiment, that may have influenced the quality of the results, concerns givenness. In section 1, different theories on givenness have been discussed. According to Selkirk's law, for example, an element that does not get focus must be given (Beaver & Clark, 2008). Disregarding the definition of givenness, his theory cannot be true for

our experiment. For the majority of the tested items, neither the modifier, nor the numeral or the NP, were given and it is not the case that they all get focus. It is possible that this can be explained by the fact that no clear definition of *'element'* is given, but this is not something that will be discussed here. The importance for this paper lies in the fact that one of the elements always gets focus. The modifier, the numeral and the NP compete for pitch, and by conducting the experiment, it is tried to clarify this competition by simulating one. However, to research this competition properly, a fair competition needs to be simulated and givenness needs to be excluded. In the conducted experiment there were cases in which, for example, the numeral was given before the item was tested. Therefore, it cannot be said that givenness is always excluded and therefore there cannot be spoken of a fair competition.

Eventually, for an optimal experiment more attention should have been paid to prosodic patterns in general. In this paper, the focus was on the relation between semantics and prosody. However, before exploring whether it is a semantic pattern that underlies prosodic structure, information on other factors that can provide or influence prosodic structure is needed. It could be possible that there are certain sentence structures, or phonological elements that cause the different prosodic patterns of superlative quantifiers. It is shown in the literature that these factors are able to determine prosodic structures (Wagner & Watson, 2010). In the conducted experiment, other factors have not been taken into account.

In the view of these deficiencies, the results are depreciated and no strong conclusions can be drawn from them. This paper should therefore be seen as a part of the path to the perfect experiment to test this, and not as a source of valuable new information on the prosody of superlative quantifiers. Despite of this, some theoretical things can cautiously be said, on the basis of the results.

The first thing that stands out, analyzing the test items, is the fact that participants did not follow a rule, or at least not the same rule. On individual test items, there was a high level of disagreement in the participant group and no pattern could be found. The expectation was that there would be a pattern or rule that would be followed by the participants. The possibility that participants would not follow the semantic pattern that was tested, was taken into account. For example, participants could have followed a syntactic or a phonetic pattern. However, in these cases, participants would not have disagreed on the test items. Considering the quality of the experiment, it could be the case that the prosodic patterns of superlative quantifiers do follow a semantic pattern, and maybe even the pattern suggested in this paper, but that participants have interpreted the items in different ways, because they were not strong enough, as is explained above.

Fortunately, there are the two significant test items, on which the participants did agree. Since they do not belong to the same semantic category, it is difficult to draw conclusions out

of their significance. To explore why the participants did agree on these items, they will be discussed individually.

(28)    Wat betreft de lengte is het toegestaan het minimale woordenaantal te overschrijden, maar de bachelorscriptie moet ten minste 7000 woorden bevatten.
*Considering the length, it is allowed to exceed the minimum number of words, but the bachelor thesis has to contain at least 7000 words.*

In the case of (28), eleven participants put focus on the modifier *'minstens'*. This test item can, standing on itself, be interpreted as both deontic and epistemic. It is possible to have the epistemic interpretation '*I am not sure how many words the thesis has to contain, but it has to be 7000,*' which provides information about the speaker. However, it is also is possible to interpret this item as deontic, '*The minimum is 7000, but it is possible to overreach this lower bound.*' However, this item is tested as 'deontic' and it is tried to make a deontic reading prominent through the context. The context mentions elements that suggest a deontic lower bound, like 'minimum' and 'overreach'. In this way, the notion of a deontic bound is triggered, before producing the test item. It could be the case that this strong, contextual, focus on the lower bound has provided the agreement to pitch the modifier. Unfortunately, there were no other test items designed in which this strong lower bound was provided by the context. Thus, to claim this theory, further research is needed.

There is another significant item, to which it may be possible to apply this theory of an explicit lower bound providing pitch on the modifier.

(29)    Als plagiaat wordt gesignaleerd, wordt het studentenaccount onmiddellijk geblokkeerd. De lengte van de periode waarin het studentenaccount geblokkeerd wordt, is afhankelijk van de ernst van het plagiaat, maar betreft ten minste drie weken.
*If plagiarism is detected, the student account will be blocked immediately. The period for which the student account will be blocked, depends on the severity of the   plagiarism, but will be at least three weeks.*

In (29) there is no explicit mention of a lower bound, by words like 'minimum' or in another way. This item is tested as an epistemic item, containing a modal verb. Theoretically, this is a good example of an epistemic item with a modal verb. However, on second thought, in this context it is almost impossible to get the epistemic interpretation. This sentence is in general interpreted as '*There are different periods of possible blocking. If the plagiarism is not severe, the account will be blocked for three weeks. The worse the plagiarism gets, the longer the period of blocking gets.*'. The three weeks function here as an absolute minimum, without epistemic effects. The most salient interpretation of this sentence is the deontic one. Although there was

a clear difference between (28) and the other items, and its significance therefore could be explained, this is not the case in (29). It is tempting to suggest that the deontic lower bound may provide the focus on the modifier '*minstens*'. However, suggesting this, it needs to be explained why the other deontic items were not significant. The only thing that can be concluded based on this, is that more research is needed.

Next to these two significant items, there is more information that can be extracted from the results. This information is provided by an inaccuracy regarding to givenness in the experiment, which details will be discussed later. As Selkirk's law and the principle of activation are considered, new elements in discourse are more sensitive for focus (Beaver & Clark, 2008). As is shown in (30, the numeral 60 is given, or highly activated, before the actual test item has to be read out. The chance that the numeral 60 will be pitched shrinks considerably by the fact that the numeral is already given, because the other elements are new.

(30)    De aanwezigheidsnorm is vastgelegd op 60%. Dus om een cursus te halen dient de student bij ten minste 60% van de aangeboden colleges aanwezig te zijn.
        *The attendance standard is set at 60%. So in order to pass a course, the student has to attend at least 60% of the offered lectures.*

To get reliable results, the attractiveness of pitching a modifier should equal that of pitching a numeral. Within this item, there is no fair competition between the numeral and the modifier. The modifier is more sensitive for focus, because it has not been mentioned earlier in the discourse. However, the responses of the participants were not different from the cases in which no mistakes concerning givenness were made. To be precise, six participants stressed to the modifier, and seven participants put focus on the given numeral 60. This is remarkable, because from the theoretic perspective of this paper, the expectation would be that the majority of the participants would put focus on the new element, the modifier '*ten minste*'. Although this is an unexpected result, it is hard to draw conclusions from it. However, testing this on a bigger scale could contribute to the existing theories on givenness and activation.

There is one more substantive thing to say about the results. Reflecting to the hypothesis, the possibility that participants would put focus on the NP in the test item, was included. However, not one participant in one item did so. Going back to the theoretical perspective, givenness and activation are important factors to decide what part of a sentence gets focus (Beaver & Clark, 2008). The majority of the test items were constructed in the same way, as 'There is something about x, there are at least n x's'. Thus, the NP's were given, or at least activated till a high level. Next to this, Krifka (1999) stated that different prosodic structures provided different meanings, and different answers to different questions. Most of the test items were preceded by a literal question, mostly to make it possible to force the

epistemic reading. Apart from the fact that the text contained literal questions, the experiment was in general designed to question quantity. The literal questions and the fact that the whole text concerned quantity, explain why the participants did not stress the NP. For example, (31) relates to Krifka (1999) as is shown in (32).

(31)    Mij is gevraagd hoeveel boeken er in de bibliotheek staan opgeslagen. Ik denk niet dat iemand weet hoeveel boeken er precies in de bibliotheek staan, maar er zijn minstens 8000 boeken.
*I've been asked how many books are stored in the library. I don't think anyone knows how many books there are stored in the library, but there are at least 8000 books.*

(32)
a. How many boys left?                        b. How many books are stored in the library?
At least THREE boys left.                     At least EIGHT THOUSSAND books are stored in the library.
                                              at LEAST eight thousand books are stored in the library.

Who left?                                      What is stored in the library?
At least three BOYS left.                      At least eight thousand BOOKS are stored in the library.

Based on this, the results can contribute to Krifka's theory (1999). First, because they provide evidence for his statement that the prosodic structure influences the way in which questions are asked. In seven of the twelve items, a literal question is asked, as in 33, or a question is embedded in the item.

(33)    Er is momenteel met name veel discussie over hoeveel ECTS deeltijdstudenten voor een honours-traject moeten krijgen. Waar men het wel over eens is: het moeten minstens 15 ECTS zijn.
*At the moment, there is a lot of discussion about how many ECTS part time students should get for taking the honours track. On what they do agree: It should be at least 15 ECTS.*

Next to the fact that the results provide evidence for his theory, something can be added to it. When the asked question concerns the amount, not only the numeral can get focus, but also the modifier. Unfortunately, this experiment has not clarified why the modifier gets focus, but it did show that the possibility exists.

Except from these small conclusions, nothing theoretical can be said about the results and the hypothesis cannot be rejected or adopted, on account of the strength of the experiment. To explore the possibility of a semantic pattern providing different prosodic structures of superlative quantifiers, more research is needed.

In the first place, it could be useful to redo the experiment with some adjustments. The method of reading has appeared to be suitable for the research question of this paper until a certain level. The fact that participants responded like we expected, in that way that they stressed the elements we expected them to, and that there were significant items, proves that this method can be valuable. The most important thing that needs to be avoided is participants adopting the limited prosody, to speak fluently (Kondo & Mazuka, 1996). Letting participants prepare the text, and ensure readability of the text would probably contribute to participants adopting a more detailed prosody. Next to this, other factors that may influence prosodic structures need to be concerned. This can include phonological or even phonetic details, but also syntactic structures. However, Kondo and Mazuka (1996) stated that prosody in spontaneous speech was the richest and most informative prosody. Therefore, it would be better to suggest new methods to research superlative quantifiers.

To research the prosodic effects of the difference between epistemic and deontic superlative quantifiers, one of the most important things is to exclude other interpretations of the items. To make sure an item that will be tested as deontic, is indeed deontic, it is advisable to pretest the items. This pretesting can be done without complex methods, just by asking participants what they think the item means. It is possible to pretest participants by giving them an item with a deontic and an epistemic reformulation and let them decide which one is the right translation of the item. Only the items on which the participants significantly agreed, should be tested. A pretest like this would increase the value of the results.

With regards to a method, one of the possibilities consists of testing the ambiguous items, like 28, but then without the context. Items like this can be recorded in three different versions, in which the prosodic structure differs. In the first version the modifier gets pitch, in the second version the numeral and in the last one the NP.

(34)     a. Ten MINSTE zevenduizend woorden
         *at LEAST seventhousand words*
         b. Ten minste zevenDUIZEND woorden
         *At least sevenTHOUSAND words*
         c. Ten minste zevenduizend WOORDEN
         *At least seventhousand WORDS*

There are different experiments that can be designed around these recordings. It is possible to let participants hear these items and let them explain what they mean, for example by presenting them different translations of the sentences and let them pick the best one. The translations would consist of an epistemic and a deontic interpretation, as in (35).

(35)     a. The speaker is not sure about the precise word number, but he thinks it is not under 7000.
         b. It is possible to exceed the number of words, but a thesis will only be graded if it consists of 7000 words.

Another option is to let participants place these recordings in discourses. For every recording, different discourses are given, in which the epistemic or the deontic interpretation will be made prominent, as in (36), in which the epistemic interpretation is foregrounded in (36.a) and the deontic interpretation is made prominent in (36.b).

(36)     a. John was not sure about the precise word number that his thesis had to contain. 'At least seven thousand words' he said.
         b. Considering the length, it is allowed to exceed the minimum number of words, but the bachelor thesis, has to contain at least seven thousand words

The results of both methods will show whether participants associate a prosodic pattern with the interpretations. The discourse-placing method will probably be more sensitive, because it comes closest to natural speech.

It can be useful to use the recordings with pitch on the NP in the experiments, although it is not to be expected that participants will pick this recording when the experiment is designed around quantity, as the experiment that is discussed in this paper. It will test the reliability of the method. In this paper, and in other literature, the difference between pitch on the NP, and pitch on the modifier or numeral, is proved. The expectation for this method will be that the recordings with stress on the NP will correspond with different answers and discourses than the recordings with stress on the numeral or modifier. If this indeed is the case, the new data will be more valuable, because the method then proves its reliability.

Another thing that can be done to answer the research question is to conduct reaction time tasks. It is possible to let participants hear three different recordings of a strong deontic item, as in (37), and let them decide whether it sounds natural or not.

(37)    a. Het wachtwoord moet uit ten MINSTE tien karakters bestaan.
*The password has to contain at LEAST ten characters.*
b. Het wachtwoord moet uit ten minste TIEN karakters bestaan.
*The password has to contain at least TEN characters.*
c. Het wachtwoord moet uit ten minste tien KARAKTERS bestaan.
*The password has to contain at least ten CHARACTERS.*

The prosodic differences between epistemic and deontic superlative quantifiers are probably too subtle to test trough grammatically judgement tasks. Participants will probably allow for different prosodic structures and it is possible that they respond that all the options are grammatical. To research a difference, the reaction times of the participants can be measured. The expectation for this experiment will be that there will be a difference in reaction times between deontic and epistemic test items, when they are pronounced like (37.a) or (37.b). It is too early to speculate about which prosodic structure will correspond with which semantic structure, but a difference can be expected. The longest reaction times are expected for items like (37.c), in which the NP is stressed.

Summarizing, there are different unexplored methods that may be suitable to test the hypothesis in a more reliable way than the described experiment. To explore whether there is a semantic pattern providing different prosodic structures in superlative quantifiers, and to explore whether this pattern could be the difference between epistemic and deontic superlative quantifiers, new methods are required. The used method has not provided results that were valuable enough to draw strong conclusions from. Therefore, the focus in the discussion was on reflecting the conducted experiment and to suggest new methods. Thus, the function of this paper is not to present new results, but to provide a first step in research on '*at least*' and her prosodics, in the hope that other researchers will take a second.

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# Appendices

## Appendix 1 – Experiment Text

### Presentatie voor de onderwijsinspectie, Universiteit Utrecht

Beste genodigden,

Het is voor mij, als vice-decaan, een grote eer u welkom te mogen heten op onze prachtige Universiteit. In de komende week zal u ontvangen worden door onderzoekers, docenten, studenten en ondersteunend personeel. U zal rondgeleid worden door de verschillende bibliotheken en faculteiten, mag onze complete administratie doorspitten en zal zelfs colleges bijwonen.

Voordat dit alles gaat beginnen, zal ik openen met een korte presentatie over het onderwijs aan onze universiteit. Ik heb u van tevoren in de gelegenheid gesteld vragen te stellen. Ik hoop in mijn presentatie zo helder mogelijk antwoord te geven op de door u gestelde vragen. Mochten er na de presentatie nog onduidelijkheden zijn, dan kunt u altijd bij mij, of één van mijn collega's terecht voor meer vragen.

### Bachelor

Ik zal beginnen met een kort overzicht van de structuur van de bachelor. De bachelor bestaat, zoals internationaal is bepaald, uit 180 ECTS. Deze ECTS worden verkregen door het voltooien van cursussen. Aan de Universiteit Utrecht telt iedere cursus voor 7,5 ECTS. Een cursus wordt behaald door de toetsing te doorstaan en door aan de aanwezigheidsplicht te voldoen. De toetsing bestaat uit het maken van een tentamen, het houden van een presentatie of het schrijven van een werkstuk. De aanwezigheidsnorm is vastgelegd op 60%. Dus om een cursus te halen dient de student bij ten minste 60% van de aangeboden colleges aanwezig te zijn. Er is mij gevraagd hoe hoog wij presenteren in het vaandel hebben staan. Ik moet bekennen dat ik niet weet hoeveel er gepresenteerd wordt binnen de bachelor, maar er moeten minstens 5 presentaties gehouden worden. Er wordt dus zeker aandacht besteed aan deze belangrijke academische vaardigheid.

Er worden cursussen aangeboden op niveau 1, 2 en 3. Cursussen op niveau 1 zijn in de regel inleidende cursussen, waarbij meestal alleen een tentamen gemaakt moet worden. Bij cursussen op niveau 2 staan kritisch denken en academische vaardigheden centraal en binnen cursussen op niveau 3 is het doel dat studenten een wetenschappelijke houding aannemen en dat ze bekend raken met de literatuur. Voor een cursus op niveau 3 moeten bijvoorbeeld minstens 4 wetenschappelijke artikelen samengevat worden.

Naast het volgen van cursussen kunnen er ook ECTS worden verkregen door het lopen van een stage en krijgen studenten 7,5 ECTS voor het schrijven van hun bachelorscriptie.

Deze wordt geschreven aan het einde van de bachelor. Het is belangrijk dat er in de scriptie naar voren komt dat een student over academische vaardigheden en basiskennis beschikt. Daarnaast moet aangetoond worden dat de student in staat is wetenschappelijke literatuur te zoeken en te gebruiken. De scriptie moet professioneel begeleid worden, en er moet door een student 200 uur aan worden besteed. Wat betreft de lengte is het toegestaan het minimale woordenaantal te overschrijden, maar de bachelorscriptie moet ten minste 7000 woorden bevatten.

Wat betreft de begeleiding: een junior onderzoeker is verplicht 2 scripties per jaar te begeleiden. Hoogleraren zijn vrijgesteld van begeleiding, maar kunnen er wel voor kiezen scripties te begeleiden. Het is onduidelijk hoeveel masterscripties een universitair docent per jaar moet begeleiden. Hij of zij moet er ten minste vijf doen.

Eén van de dingen waar we erg trots op zijn is ons honours-traject. Dit is een traject dat is ontworpen voor excellente studenten, waar veel aandacht is voor onderzoeksvaardigheden en een link is met de praktijk. Niet iedere student krijgt evenveel ECTS na het volgen van het honours-traject. Er is momenteel met name veel discussie over hoeveel ECTS deeltijdstudenten voor een honours-traject moeten krijgen. Waar men het wel over eens is: het moeten minstens 15 ECTS zijn.

Er zijn verschillende redenen waarom de bachelor kan worden stopgezet. De student kan kiezen om te stoppen, maar ook de universiteit heeft inspraak in de voortgang van de bachelor. De bachelor kan stopgezet worden als het Bindend Studie Advies niet wordt behaald. Dit houdt in dat er in het eerste jaar ten minste 45 ECTS moeten worden gehaald. Ook bij plagiaat kan de bachelor tijdelijk of definitief stopgezet worden. Als plagiaat wordt gesignaleerd, wordt het studentenaccount onmiddellijk geblokkeerd. De lengte van de periode waarin het studentenaccount geblokkeerd wordt, is afhankelijk van de ernst van het plagiaat, maar betreft ten minste drie weken.

### Voorzieningen

De voorzieningen die we voor onze studenten aanbieden zijn onze grote trots, maar zijn tegelijkertijd problematisch. We zijn trots op onze twee prachtige universiteitsbibliotheken en de onderwijsgebouwen. In het centrum zijn de onderwijsruimten historisch, sfeervol en inspirerend. Het probleem met de voorzieningen is ten eerste het aantal werkplekken. Ik weet niet wat het precieze tekort aan werkplekken tijdens de tentamenweek is, maar er zijn ten minste 150 plekken te weinig.

Via verschillende wegen, zoals evaluaties en de nationale studentenenquête, komen hier dan ook veel klachten over binnen. Als universiteit zijn we hard aan het werk om meer werkplekken te creëren. Zo zijn er in de UB Binnenstad het afgelopen jaar zo'n 50 nieuwe plekken verzorgd. Ook over de secundaire voorzieningen komen wel eens klachten binnen. Zo zijn de koffieapparaten soms defect en zijn er veel klachten over lege printers. Niemand

weet hoe vaak de printers worden bijgevuld met inkt en papier, maar het is minstens 3 keer per dag. Ook de toiletten zijn niet altijd even schoon. Daarnaast worden defecte computers of in- en uitleen apparatuur niet altijd snel genoeg gerepareerd.

Ingeschreven studenten hebben recht op een abonnement op de bibliotheek. Zij kunnen gebruik maken van werkplekken, eetvoorzieningen en beschikken over alle literatuur die in de bibliotheek staat opgeslagen. Mij is gevraagd hoeveel boeken er in de bibliotheek staan opgeslagen. Ik denk niet dat iemand weet hoeveel boeken er precies in de bibliotheek staan, maar er zijn minstens 8000 boeken.

Naast studenten en docenten, is het voor iedereen mogelijk tegen betaling een abonnement op de bibliotheek te nemen. De kosten voor een abonnement bij de UB voor niet studenten verschillen, maar er moet ten minste 20 euro aan administratiekosten betaald worden.

Alle voorzieningen waar gebruik van gemaakt kan worden, de werkplekken, het uitleensysteem en de eetvoorzieningen, zijn gekoppeld aan een account. Dit is hetzelfde account dat wordt gebruikt voor Blackboard, Osiris en alle andere systemen waar een student gebruik van maakt. De gebruikersnaam van dit account is het studentnummer, en het wachtwoord wordt gekozen. Vanuit veiligheidsoverwegingen moet het wachtwoord uit ten minste 8 karakters bestaan.

### Slot

Ik hoop dat ik met deze presentatie een klein beetje duidelijk heb gemaakt hoe het er hier aan toe gaat. Ik weet zeker dat u de komende week hartelijk ontvangen zal worden en ik wens u dan ook vooral veel plezier bij het leren kennen van onze Universiteit.

## Appendix 2 – Test items

### Deontic

1. Dus om een cursus te halen dient de student bij ten minste 60% van de aangeboden colleges aanwezig te zijn.

   *In order to pass a course, a student needs to attend at least 60% of all offered lectures.*

2. Voor een cursus op niveau 3 moeten bijvoorbeeld minstens 4 wetenschappelijke artikelen samengevat worden.

   *For a level 3 course, for example, at least four scientific articles need to be summarized.*

3. Wat betreft de lengte is het toegestaan het minimale woordenaantal te overschrijden, maar de bachelorscriptie moet ten minste 7000 woorden bevatten.

   *Regarding length, it is allowed to exceed the maximum number of words, but the bachelor thesis must contain at least 7000 words.*

4. Vanuit veiligheidsoverwegingen moet het wachtwoord uit ten minste 8 karakters bestaan.

   *For safety reasons, the password must consist of at least 8 characters.*

### Epistemic

5. Ik moet bekennen dat ik niet weet hoeveel er gepresenteerd wordt binnen de bachelor, maar er moeten minstens 5 presentaties gehouden worden.

   *I have to confess that I do not know how often presentations are held in the bachelor, but one must have at least 5 presentations.*

6. Ik weet niet wat het precieze tekort aan werkplekken tijdens de tentamenweek is, maar er zijn ten minste 150 plekken te weinig.

   *I do not know the exact shortage of working spaces during exam week, but we are at least 150 places short.*

7. Niemand weet hoe vaak de printers worden bijgevuld met inkt en papier, maar het is minstens 3 keer per dag.

   *No-one knows how often the printers are being refilled with ink and paper, but it is at least 3 times per day.*

8. Ik denk niet dat iemand weet hoeveel boeken er precies in de bibliotheek staan, maar er zijn minstens 8000 boeken.
*I do not think that anyone knows exactly how many books we have in our library, but there are at least 8000 books.*

### *Epistemic + Modal Verb*

9. Het is onduidelijk hoeveel masterscripties een universitair docent per jaar moet begeleiden. Hij of zij moet er ten minste vijf doen.
*It is unclear how many master theses a university teacher has to supervise per year. He or she must do at least 5.*

10. Niet iedere student krijgt evenveel ECTS na het volgen van het honours-traject. Er is momenteel met name veel discussie over hoeveel ECTS deeltijdstudenten voor een honours-traject moeten krijgen. Waar men het wel over eens is: het moeten minstens 15 ECTS zijn.
*Not every student will obtain the same amount of ECTS after following an honours track. There is a lot of discussion about how many ECTS a part-time student should get for the honours track. What we do agree on: it has to be at least 15 ECTS.*

11. De lengte van de periode waarin het studentenaccount geblokkeerd wordt, is afhankelijk van de ernst van het plagiaat, maar betreft ten minste drie weken.
*The length of the period of blocking the student account is dependant on the severity of the plagiarism, but will be at least 3 weeks.*

12. De kosten voor een abonnement bij de UB voor niet studenten verschillen, maar er moet ten minste 20 euro aan administratiekosten betaald worden.
*The university library membership costs for non-UU students differ, but at least 20 euros of administrative costs have to be paid.*

## Appendix 3 – Transcriptions

*Participant 1*

1. ten MINSTE zestig procent
2. minstens VIER wetenschappelijke artikelen
3. ten minste ZEVENduizend woorden
4. ten MINSTE acht karakters
5. minstens VIJF presentaties
6. ten MINSTE honderdvijftig plekken
7. MINSTENS drie keer
8. MINSTENS achtduizend boeken
9. ten MINSTE vijf doen
10. MINSTENS vijftien ects
11. ten MINSTE drie weken
12. ten minste TWINTIG euro

*Participant 2*

1. ten MINSTE zestig procent
2. MINSTENS vier wetenschappelijke artikelen
3. ten minste ZEVENduizend woorden
4. ten minste ACHT karakters
5. minstens VIJF presentaties
6. ten minste honderdVIJFTIG plekken
1. 7 minstens DRIE keer
7. minstens ACHTduizend boeken
8. ten minste VIJF doen
9. minstens VIJFTIEN ects
10. ten MINSTE drie weken
11. ten MINSTE twintig euro

*Participant 3*

1. ten MINSTE zestig procent
2. minstens VIER wetenschappelijke artikelen
3. ten MINSTE zevenduizend woorden
4. ten MINSTE acht karakters
5. minstens VIJF presentaties
6. ten MINSTE honderdvijftig plekken
7. MINSTENS drie keer

8. MINSTENS achtduizend boeken

9. ten minste VIJF doen

10. minstens VIJFTIEN ects

11. ten MINSTE drie weken

12. ten minste TWINTIG euro

### Participant 4

1. ten minste ZESTIG procent

2. minstens VIER wetenschappelijke artikelen

3. ten MINSTE zevenduizend woorden

4. ten minste ACHT karakters

5. MINSTENS vijf presentaties

6. ten MINSTE honderdvijftig plekken

7. MINSTENS drie keer

8. MINSTENS achtduizend boeken

9. ten MINSTE vijf doen

10. MINSTENS vijftien ects

11. ten MINSTE drie weken

12. ten MINSTE twintig euro

### Participant 5

1. ten minste ZESTIG procent

2. minstens VIER wetenschappelijke artikelen

3. ten MINSTE zevenduizend woorden

4. ten minste ACHT karakters

5. minstens VIJF presentaties

6. ten minste honderdVIJFTIG plekken

7. minstens DRIE keer

8. minstens ACHTduizend boeken

9. ten minste VIJF doen

10. MINSTENS vijftien ects

11. ten MINSTE drie weken

12. ten minste TWINTIG euro

### Participant 6

1. ten minste ZESTIG procent

2. MINSTENS VIER wetenschappelijke artikelen

3. ten MINSTE zevenduizend woorden

4. ten minste acht karakters

5. MINSTENS vijf presentaties

6. ten minste honderdvijftig plekken

7. MINSTENS drie keer

8. MINSTENS achtduizend boeken

9. ten MINSTE vijf doen

10. MINSTENS vijftien ects

11. ten MINSTE drie weken

12. ten MINSTE twintig euro

## Participant 7

1. ten MINSTE zestig procent

2. minstens VIER wetenschappelijke artikelen

3. ten MINSTE zevenduizend woorden

4. ten minste ACHT karakters

5. MINSTENS vijf presentaties

6. ten minste honderdVIJFTIG plekken

7. MINSTENS drie keer

8. MINSTENS achtduizend boeken

9. ten minste VIJF doen

10. MINSTENS vijftien ects

11. ten minste DRIE weken

12. ten minste TWINTIG euro

## Participant 8

1. ten MINSTE zestig procent

2. MINSTENS vier wetenschappelijke artikelen

3. ten MINSTE zevenduizend woorden

4. ten MINSTE acht karakters

5. MINSTENS vijf presentaties

6. ten MINSTE honderdvijftig plekken

7. MINSTENS drie keer

8. MINSTENS achtduizend boeken

9. ten minste VIJF doen

10. MINSTENS VIJFTIEN ects

11. ten minste DRIE weken

12. ten MINSTE twintig euro

## Participant 9

1. ten minste ZESTIG procent
2. minstens VIER wetenschappelijke artikelen
3. ten MINSTE zevenduizend woorden
4. ten minste ACHT karakters
5. minstens VIJF presentaties
6. ten MINSTE honderdvijftig plekken
7. MINSTENS drie keer
8. MINSTENS achtduizend boeken
9. ten MINSTE vijf doen
10. minstens VIJFTIEN ects
11. ten MINSTE drie weken
12. ten MINSTE twintig euro

## Participant 10

1. ten minste ZESTIG procent
2. minstens VIER wetenschappelijke artikelen
3. ten MINSTE zevenduizend woorden
4. ten minste ACHT karakters
5. minstens VIJF presentaties
6. ten MINSTE honderdvijftig plekken
7. MINSTENS drie keer
8. MINSTENS achtduizend boeken
9. ten minste VIJF doen
10. minstens VIJFTIEN ects
11. ten MINSTE drie weken
12. ten MINSTE twintig euro

## Participant 11

1. ten minste ZESTIG procent
2. MINSTENS vier wetenschappelijke artikelen
3. ten MINSTE zevenduizend woorden
4. ten MINSTE acht karakters
5. minstens VIJF presentaties
6. ten MINSTE honderdvijftig plekken
7. minstens DRIE keer
8. minstens ACHTduizend boeken
9. ten MINSTE vijf doen

10. MINSTENS vijftien ects
11. ten MINSTE drie weken
12. ten MINSTE twintig euro

### Participant 12

1. ten minste ZESTIG procent
2. MINSTENS vier wetenschappelijke artikelen
3. ten MINSTE zevenduizend woorden
4. ten minste ACHT karakters
5. minstens VIJF presentaties
6. ten MINSTE honderdvijftig plekken
7. MINSTENS drie keer
8. MINSTENS achtduizend boeken
9. ten MINSTE vijf doen
10. MINSTENS vijftien ects
11. ten MINSTE drie weken
12. ten minste TWINTIG euro

### Participant 13

1. ten minste ZESTIG procent
2. minstens VIER wetenschappelijke artikelen
3. ten MINSTE zevenduizend woorden
4. ten MINSTE acht karakters
5. MINSTENS vijf presentaties
6. ten MINSTE honderdvijftig plekken
7. MINSTENS drie keer
8. MINSTENS achtduizend boeken
9. ten MINSTE vijf doen
10. MINSTENS vijftien ects
11. ten MINSTE drie weken
12. ten MINSTE twintig euro

## Appendix 4 – Transcriptions for removed participants

### Participant A

1. ten minste ZESTIG procent
2. minstens VIER wetenschappelijke artikelen
3. ten minste ZEVENduizend woorden
4. ten minste ACHT karakters

5. minstens VIJF presentaties
6. ten minste honderdVIJFTIG plekken
7. minstens DRIE keer
8. minstens ACHTduizend boeken
9. ten minste VIJF doen
10. minstens VIJFTIEN ects
11. ten minste DRIE weken
12. ten minste TWINTIG euro

### Participant B

1. ten minste ZESTIG procent
2. minstens VIER wetenschappelijke artikelen
3. ten minste ZEVENduizend woorden
4. ten minste ACHT karakters
5. minstens VIJF presentaties
6. ten minste honderdVIJFTIG plekken
7. minstens DRIE keer
8. minstens ACHTduizend boeken
9. ten minste VIJF doen
10. minstens VIJFTIEN ects
11. ten minste DRIE weken
12. ten minste TWINTIG euro