Influences on the use of the posture verbs *liggen* and *staan* in Dutch: an experimental research

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1. Abstract

In Dutch it is customary to use posture verbs not only to describe the positions of humans, but to describe the position of objects as well. In cases in which English would just use the verb "to be", Dutch would, in most cases, use one of the three posture verbs: '*zitten*', '*staan*,' and '*liggen*'. The question now is: which one to use when? Although there have been some articles on this subject, the exact processes behind the decision between these posture verbs is not completely clear. These articles mostly focus on the different posture verbs used with different object. This research, on the other hand, focuses on the effects of the canonicity of the location the object is in, the height of the location the object is on, and also on the functionality of both the object and its location. Due to the somewhat default status of the verb *zitten*, meaning it is mainly used when the two other verbs do not apply, this research focuses on those other two.

Via an experiment in which respondents are shown photos of different objects in different locations in which different factors are varied, an attempt is made to find a dissimilarity between how often a verb, *liggen* or *staan,* is used with the photographs of objects that have a certain factor or do not.

In the end it was found that indeed the canonicity of the location of the object, the functionality of the object, the height of the object and the perspective with which the object was viewed had their influence. The fact that all sorts of factors associated with the object influence the choice of posture verb supports the idea of prototype theory.

2. Introduction

2.1 Introduction to posture verbs in Dutch

Posture verbs are the verbs that describe the posture in which a human being can find himself, such as sitting, standing, lying, hanging, crouching. (Newman, 2002) Dutch, however, as do several other languages, uses posture verbs not only to describe the positions in which humans find themselves, but to describe the whereabouts of inanimate and even metaphorical objects as well. (Lemmens 2002, van Oosten 1984) For instance, where an Englishman would simply say: "The cups are on the table" or "The book is on the table" , a Dutchman would say:

1. *De kopjes staan op tafel.*
   The cups are standing on the table.
2. *Het boek ligt op tafel.*
   The book is lying on the table.

Not only do the Dutch use this type of expression regularly, it is the norm. Although a sentence as

3. *De kopjes zijn op tafel.*
    The cups are on the table

would be grammatical, it sounds rather odd and sentence 1 is preferred.

The type of locative expression where one indicates the place of an object with reference to another object is sometimes referred to as Figure-Ground. Talmy (2000) described the Figure as "a moving or conceptually movable entity whose path, site or orientation is conceived as a variable, the particular value of which is the relevant one "and the Ground is "a reference entity, one that has a stationary setting relative to a reference frame, with respect to which the Figure's path, site, or orientation is characterized. "

Many languages simply use a copula (such as English which uses a form of 'to be') to combine the Figure and the Ground. Other languages have an extensive amount of verbs to combine the two, such as the Mayan language Tzeltal that has a separate word meaning something like 'be located in hemispherical container' (Ameka, 2009). Dutch mainly uses these three: *zitten, liggen,* and *staan,* meaning "to sit", "to lie" and "to stand" respectively, although occasionally others can be found as well. This sets Dutch somewhere in the middle between the non-posture verb languages, and the posture verb languages.

When to use which posture verb, however, has caused many foreign students of Dutch problems. There are some ground rules, but to use the posture verbs correctly like a native speaker is rather intricate and subtle.

Most studies agree on the anthropocentric basis of the posture verbs: their meaning pertains to the three typical positions of a human being. So the main properties each posture verbs describes when applied to concrete objects is derived from the typical properties of a human when in a certain position.

2.2 The ground rules

I.   The three main factors causing *staan* to be used mentioned by most studies are:
Firstly: The object is in its canonical orientation as standing is the normal position of a human being, secondly: The object is considerably higher than it is wide and thirdly: the object is able to maintain its

position on its own accord (van Oosten, 1984). Examples of things that would typically stand are desktop lamps, cars, TV's, refrigerators and chairs. Although the third factor might make intuitive sense and is clear when speaking of humans, when given further thought this is actually quite an empty qualification. "Of its own accord" in humans means that muscles are being used to maintain the position, when speaking of objects, however, it is not this obvious. Strictly it is both possible to say that everything is able to maintain its position on its own accord or that nothing is. A puddle will stay still on the floor without any interference just as well as a TV will, but on the other hand they are both supported by the floor, or the table. This is why I would rather describe the third factor as: the object is in some sort of balance. One can think of objects with unusual shapes, quite often things with legs, that even though they can be wider than they are high, would nearly always go with *staan*, for example beds or couches.

II.   The three factors of *liggen* are then the opposites of *staan*, so:
<u>Firstly</u>: The object is out of its canonical orientation, <u>secondly</u>: it is wider than it is high and <u>thirdly</u>: it is not maintaining some sort of balance or is off-balance. This is why non-rigid things, such as things made out of cloth or fluid and fluid-like substances are usually lying. Examples of things that typically lie are books on their side, cutlery, folded clothes, mobile phones and coasters.

III.   So what about *zitten?* Van Oosten thinks it is just the word that is used when the other two cannot be used. If you look at the human being as an example, to lie and to stand are quite clearly defined, but you can sit in a number of ways; on a chair, on your knees, or with your legs crossed. Some parts of your body are touching surfaces (the Ground) some are not, and you are partly holding yourself up and partly being supported. Some evidence for this has always been suggested by Stoop (2010). He did some corpus research on the usage of *zitten*. His hypothesis was that because *zitten* was the most neutral, and actually some kind of default form, it should occur more frequently than the others. First all forms of *zitten* were found, and then all the verbs which were not used locatively had to be filtered out. Z*itten* did appear to be used more often.
Lemmens (2002) also notes that *zitten* has two main ways of using, namely CONTAINMENT-*zitten* and CONTACT-*zitten*. This is easily reconciled with van Oosten's views, because as Lemmens already mentions: when something is in a container, especially one that is being moved around such as bags and suitcases, it is unclear how exactly the object is oriented. In the case of CONTACT-*zitten* one could argue that the usage of *liggen* and *staan* are specific cases of contact. When unsure how exactly the Figure is in contact with the Ground or when it does not resemble the contact occurring when you are lying or standing, the choice falls on *zitten.*

Because of the default status of *zitten*, and because it simply usually is not used when describing the factors this research is focusing on, *zitten* will be mainly left out of the picture, except for some examples to illustrate a certain phenomenon.

3. Some other phenomena concerning posture verbs

There are some other phenomena concerning posture verbs and how they are used that have to be noted for a better understanding of posture verbs.

3.1 Metaphorical usage

Apart from the description of the location of physical objects, posture verbs are analogously also used in metaphorical objects. A couple of examples:

4. *Het is alsof de tijd hier heeft stilgestaan*
   It's like the time stood still here.
5. *Er zit vaak veel gevoel in jouw teksten*
   There's usually sitting a lot of feeling in your texts
6. *Het ligt nog vers in het geheugen*
   It still lies freshly in our memory.

Although there are some patterns that can be detected in the metaphorical usage (topographical locations, for example, use *liggen*,)it is largely dependent on how the object is conceptualized, which is a whole new area of study. Even after having ensured which metaphor is used it is rather hard to ascribe physical characteristics to metaphorical objects, especially as there more often than not are multiple ones. This is why the metaphorical usage of posture verbs will be discarded in this research as well.

3.2 The same object with plural posture verbs

From the three ground rules one might already have inferred that a single object can be used with multiple posture verbs. By using one or the other a speaker can give a (vague) indication of the orientation of the object. A very clear example can be given with books:

7. *De boeken liggen op tafel.*
   The books are lying on the table.
8. *De boeken staan op de plank.*
   The books are standing on the shelf.

In sentence 9, what is meant is that the books are in their tallest orientation, the way books are usually put on shelves. In 8, the books are in their flattest orientation. Something similar occurs in the following examples:

9. *De wijnflessen zitten in de auto.*
   The bottles of wine are sitting in the car.
10. *De wijnflessen staan in de auto*
    The bottles of wine are standing in the car.

Whereas 11 indicates that the bottles of wine are standing up straight in the car, perhaps in a box, 10 does not give this information and merely states that the bottles are in the car. It could be argued that by not using *staan*, in fact it is implied that the bottles are not standing, but are in disarray or in a bag for else the speaker would have used *staan.* It is therefore important to keep in mind that the reasons for the choice of a posture verb can be traced back to whether its counterparts could describe the situation better.

3.3 Metonymical usage

There is one small factor that has to be borne in mind, to make sure this does not account for a certain posture verb. Consider the following examples:

11. *Het glas staat op zijn kop.*
    The glass is standing upside down.
12. *De prullenbak ligt op zijn kop.*
    The trash can is lying upside down.

Both the glass and the trash can in 12 respectively 13 are out of their canonical orientation, but are higher than they are wide. Still there is a different posture verb used. It must be noted that 13 is not a very strong example. It would also be appropriate to use *staan* here, although a quick Google search showed 1 hit in which the trash can was lying upside down, and 0 in which it was standing upside down. It is likely that this is a case of metonymy(Lemmens, 2002), as is the case in the following examples:

13. *Het zout staat daar.*
    The salt is standing over there.
14. *Daar ligt een stapel papieren.*
    Over there is lying a stack of papiers

A little pile of salt is non-rigid and would therefore be described with *liggen*. In 14, however, the speaker is referring to the container that contains the salt. Another example, although slightly less evident is given in 15. The *liggen* in this case is not referring to the stack but to every paper by itself. This is supported by the fact that even when the stack becomes a lot higher than it is wide, in which case it is also balancing itself, *liggen* can be used. One might argue that metonymy is the factor causing *liggen* to be used in 13. Instead of referring to the trash can, the speaker has the trash in mind that is now lying all over the floor.

3.4 Objects that have only some factors

So there are three basic factors of the objects that are worth checking, as mentioned earlier: whether they are in their canonical position, the width/height ratio and whether they are in balance or not. But what when an object has some of the factors from *staan*, but some from *liggen*? Are some factors more important than others? Consider the following examples:

15. *De printer staat in het hoekje.*
    The printer is standing in the corner.
16. *Het potje basilicum staat op zijn kop op het aanrecht.*
    The jar of basil is standing on its head on the counter.

The first factor is not applying to the printer: It is wider than it is high, but does factor 2 apply? It has a clear canonical orientation and it is currently in this orientation. The jar of basil does the exact opposite: Factor 1 applies, but factor 2 does not (and factor 3 applies to neither of them). Both objects, however, appear to go with *staan* and there are plenty of other examples that could be found of this. Apparently there is more to it than just checking which factors apply. But even when the same factors apply there are difficulties:

17. *De borden staan op het bureau..*
    The plates are standing on the desk.
18. *De muis ligt op het bureau.*
    The (computer) mouse is lying on the desk.
19. *De stekkerdoos ligt op het bureau.*
    The multiple socket outlet is lying on the desk.

Plates for example have a clear canonical orientation, but they are a lot wider than they are high and even so *staan* is used. However, for both 19 and 20 the same is true: Both computer mouses and multiple socket outlets have a clear canonical orientation (and the mouse and the multiple socket outlet

are with their normal side up in these sentences), are wider than they are high and neither of them is balancing any less than the plate is. Metonomy is not used here and it is not that the multiple socket outlet or the mouse have a clear other orientation which the speaker wants to specify they are not in now (*liggen* would not necessarily indicate that the plate is upside down, it could also indicate it is with its normal side up and the computer mouse and the multiple socket outlet cannot be put in any orientation to make it go with *staan*). Furthermore one could say that the mouse would go with *liggen* because it refers to an actual mouse, but in actuality when speaking of a real life mouse, *zitten* is used.

So now we come to the point to be made: Which factors exactly are responsible for the choice of the posture verb is not so simple to discover. It is not possible to make a flowchart which will lead you to the right posture verbs, or as van Oosten puts it: There is no Boolean set of criteria to define the use of one of these verbs (van Oosten, 1984). So in the previous examples, the question is not whether a certain object has or does not have a certain factor, but rather how much it has it and how important this factor is for that posture verb.

4. Missing factors

4.1 Examples leading to questions
Apart from the differences in posture verb usage between different objects, something interesting happens when some objects are put in another place, which cannot be explained with all of the above. Consider the following sentences:

20. *De borden staan op tafel.*
    The plates are standing on the table.
21. *De borden liggen op de grond.*
    The plates are lying on the floor.
22. *De perforator staat op tafel.*
    The perforator is standing on the table
23. *De perforator ligt op de grond.*
    The perforator is lying on the floor

Though it must be noted that these posture verbs are not strictly obligatory and some speakers of Dutch would use another verb, the choices here would be preferred. Apparently it does not only matter what the Figure is and in which orientation the Figure finds itself, but the Ground on which it stands makes a difference as well.

4.2 Possible factors
Now if you look at the examples, there are a couple of difference that could be the causing factors for the shift from *staan* to *liggen* and vice versa:

a. **The absolute height of the Ground.**
b. **The perspective of the speaker:** The speaker sees the plate/perforator from its side in the first sentence, but from its top in the second. This means that the speaker actually sees two differently shaped objects
c. **The functionality of the Figure:** If plates are standing on a table, they are ready to use, contrary to when they are on the floor. The speaker is closer to envisioning himself using the object and so instead of seeing "just some object on the floor", he sees a plate, something he can eat from. (or that is what I think possible)
d. **The canonicity of the location of the Ground:** Plates and perforators are supposed to be on a desk, not on the floor. As *staan* is already more used when objects are in their canonical orientation, it is not such a weird thought that *staan* is more appropriate when they are in their canonical location.

e. **The prepositional object is a collocation with a certain posture verb:** There is the possibility that "lying on the floor" might act as a collocation. This would mean that the phrase "on the floor" would trigger the use of *liggen* rather than the sight of the object.

Or of course a combination of the above. As the difference between these sentences can be rather subtle and the usage of the other posture verb is not quite "wrong", the answer to the question which verb to use will expectedly not be *liggen* or *staan*, but rather that the one is more or less preferred over the other. To find out which factors influence which verb is used and give more insight in this "more or less", an experiment has been carried out to find out which postures verbs a group of respondents use.

5. The experiment

5.1 The basic idea

To see which factors matter to which degree, respondents were shown a series of photographs of objects which can go with both *liggen* and *staan* but with one factor varied, while keeping the other factors constant. The respondents were then asked to choose the right verb with every picture to see if their answers varied as well. An alternative to this was to just describe the situation, but as one cannot know what picture the respondent will form in his or her mind it was thought better to show them photographs so they would better be able to envision themselves in the scenarios.

5.2 The test set

The test set existed of photographs of objects that I myself have taken in and around my house. These were the objects:

Shoes
One shoe
A plate
A closed laptop
An open laptop (the laptops were treated as two different objects as the shapes differ drastically)
A car
A vacuum cleaner
A tin of Nivea cream
A pan

These are all objects with which both *liggen* and *staan* can be used, although some objects will more likely go with the first and some with the last. As there are no written rules to decide which posture verb to use, people might very well start changing their answers as they found out what this research was trying to investigate. Therefore the respondents were kept in the dark as much as possible about the idea of the test and the connection between the pictures. This is why there were also a couple of fillers borrowed from the Max Planck Institute (Felix, de Witte & Wilkings, 1999), existing of pictures of objects that would normally go with only one verb, but in which properties that did not have anything to do with the research were changed as a decoy. For example there were pictures of different amounts of shoes and balls and a couple of objects were turned upside down.

The factors that this research is focusing on (see above) were varied in the following way:

Factor a (height):
A lot of objects were placed on the floor, a table and a closet. This was not done with all objects as to not make the test set too large.

Factor b (perspective):
Most pictures were taken from approximately a 3 meter distance with the camera at a height of about 150 cm. See Appendix 10.1a for an example. To vary the perspective, some pictures were also taken with the camera resting on the floor, or with the camera hovering above the object. There were a couple of pictures taken of a car standing on the street, and a car at the bottom of a hill while the photograph was taken from the top of the hill. Lastly there was a picture of some of the objects on a table, and a picture of the same objects on a table one story below the camera.

Factor c (functionality):

Although it is not that hard to make objects more functional, it was not allowed to let them change shapes or sizes too much, as these are very important factors in the choice between *liggen* and *staan.* Eventually some ways were found to make objects more functional, e.g.:

- o A knife and a fork were added to the plate.
- o The lid of the Nivea tin was sometimes opened, sometimes closed.
- o The open laptop was turned on.
- o There were two pictures of the car at the bottom of the hill: one normal car, one broken.

Factor d (canonicity):
A plate was placed on an object outside that had the height of a table, but clearly was no table. As it was very hard to keep all other factors (mainly the height) of the location the same while changing the canonicity, unfortunately this was the only picture.

Factor e (collocations):
As the effect of collocations is something we are not interested in and would wish to avoid, certain measures were taken. See section 5.4 below.

The test set consisted of 45 pictures, the pictures shown to the respondents including the fillers came to a total of 69

5.3 The respondents

At the beginning the minimum amount of respondents was set to 40 per test, to be able to see smaller differences between the percentage of people that answered *liggen* versus *staan.* All the respondents naturally had to be a native speaker of Dutch, but it was also required that they did not have another native language or too much influence of other languages when they were young. This subject is such an intuitive one and something that most speakers of Dutch hardly realize they do, that it is easy to (perhaps or probably unnoticeably) become influenced by acquiring another language.

5.4 The survey

The experiment was done via an online survey (www.surveytool.com) The test set was divided into two as not to make the experiment boring and prevent the respondents from answering automatically. People were asked if their mother tongue was Dutch and if so if Dutch was their only mother language.
Then they were shown a picture, below which there would be a sentence like the following:

24. *Daar ... een bord.*
    There ... a plate.

After this sentence an exclusive choice had to be made between the conjugated forms of the two verbs. Every picture was on another page of the survey thereby making it impossible to change answers or compare pictures before answering.

At the end the participants were asked whether they had any idea what this test was about, whether this had affected their answers and whether they thought there were mistakes made (both by them or by the experimenter). Examples of the survey questions can be found in Appendix 10.1

6. The results

6.1 Results of the open questions.

The total number of respondents came to 46 for survey 1 and 47 for survey number 2. Naturally most respondents knew that the aim of the research was to determine what makes people choose between the two posture verbs. Some came quite close to the actual aim and said that they thought it had something to do with, e.g.: the intention of the object, perspective, height of the location. Some, however, were rather off, mostly because of the decoys.

A lot of the respondents mentioned that the test confused them, as they noticed themselves how inconsistently they were answering. They had the tendency to think that their earlier answers might be "wrong" as they came further along the test. Although the survey in the beginning clearly stated that they had to fill in the first answer that came to mind, apparently some respondents were not aware that Dutch has no prescriptive rules for the choosing of a posture verb, at least none that are written down and that this was a test without right or wrong answers. Of course it is still possibly that they thought that they would actually use another verb in real life and that that was what they meant by "wrong".

6.2 Processing the responses

In Excel, for every question was determined how many people had answered with *liggen*. The number of people answering with *staan* was just the complement (47 or 46 minus the times *liggen* was answered) and therefore does not contain any extra information and so will not be mentioned from here on.

Pairs of pictures that only differed in one factor were then compared and the differences were added up together. For example if you take the pictures that only differ in functionality: (actual results)

Table 6.3 Number of times *liggen* was answered per picture in which the functionality was varied.

Picture description	Number of times liggen	Picture description	Number of times liggen
A pan on the stove	3	A pan on the table	7
Laptop opened and turned on on the floor	10	Laptop opened and turned off on the floor	16
Laptop opened and turned on on the table	2	Laptop opened and turned off on the table	6
Normal car at the bottom of a hill	5	Broken car at the bottom of a hill	12
Plate with fork and knife on the floor	36	Plate without cutlery on the floor	39
Plate with fork and knife outside on object with the same height as a table	33	Plate without cutlery outside on object with the same height as a table	36
Total:	**89**	**Total:**	**116**

To make it easier to compare, the numbers have been translated to percentages. [1]

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[1] This is percentage is calculated as follows: L/T*100, where

L = The number of times people answered *liggen* to a picture with this factor

T = The total number of responses to these pictures, which is 46,5 *the number of pictures with this factor.

Table 6.4 Total percentages of times answered with *liggen* per factor

Factor	Percentage		Factor		Percentage	
1. Functional	31,9 %		Non-functional		41,6 %	
2. Canonical	45,2 %		Non-Canonical		71,0 %	
3. Low Ground	60,2 %		Middle Ground		34,7 %	
4. Middle Ground	23,2 %		High Ground		25,8 %	
5. Low Ground	54,7 %		High Ground		28,9 %	
6. Normal perspective	58,8 %		Perspective from below		44,4 %	
7. Normal perspective	32,8 %		Perspective from above		40,9 %	
8. Perspective from below	8,6 %		Perspective from above		30,1%	
9. Low Ground	17,2%	Middle Ground	23,7%	High Ground	46,2%	

Bear in mind that the percentages themselves mean nothing, as this is largely dependent on how often an object goes with *liggen* or *staan* in the first place. Only the differences between the percentages matter. For example cars will nearly always go with *staan*. The fact that in this research a car was used to test the functionality and was not used when testing for instance the perspective does not say anything about how often *staan* is used with non-functional objects. To see the exact numbers instead of percentages see appendix 10.3.

Some notes and explanations with this table:
- Because for a lot of objects pictures were not made from all three perspectives or heights, but only for two of them, all factors were measured in all available pairs. There was, for example, only one pair of pictures that was taken from both below and from above, namely the plate on the closet.
- For the canonical ground in factor 2 there was just one example, namely the picture of a plate on the table versus a picture of a plate on something the same height as a table. There is only one picture as it is very hard to keep every other factor, especially height, the same while only changing the canonicity of the Ground. By looking at the differences between the pictures that were varied in both height and canonicity of the Ground, we nevertheless hope to get some information, see the following chapter for how this was done. This is why we have separated these pictures into two groups.(factor 2 and factor 9). In factor 2 you have all the objects that belong on a table (and maybe on a closet), and in factor 9 you have all the objects that belong on the floor (shoes and a vacuum cleaner). These pictures coincidentally were taken with the objects on all three heights and are therefore displayed in a trio.

7. Discussion

7.1 Effects per factor

The following can be said about the factors and whether or not they had any influence:

Functionality

The results of factor 1 show that functionality most probably is a factor in the process of deciding which posture verb to use. It is not a big difference (89 versus 116), but big enough to be significant. A nice example:

Picture 7.2   ### Picture 7.3

No. of times liggen: 12   *No. of times liggen: 5*

Maybe it is less clear in the reduction, but in the first you can see a broken car and in the second a normal car. In picture 7.2 people answered with *liggen* 12 times as opposed to picture 7.3 to which people answered with *liggen* 5 times.

Canonicity of Ground + height

As mentioned earlier there was only one pair of pictures which only differed in canonicity, namely the following:

Picture 7.4   ### Picture 7.5

No of times liggen: 33   *No of times liggen: 21*

To picture 7.4 people answered with *liggen* 33 times, and to picture 7.5 only 21 times, suggesting that the more canonical an object is in that place, the more *staan* is used, but because one pair of pictures is

does not necessarily say a lot, we also looked at the pictures that differed both in height and canonicity of the Ground. These pictures were separated into two groups: One group of object that were supposed to be on the table: the laptop, the nivea tin, the plate and the pan, and another group of objects that belonged on the floor: the vacuum cleaner and the shoes. These two groups of objects all had pictures of them in different heights. An example:

Picture 7.6	**Picture 7.7**	**Picture 7.8**
No. of times liggen: 16	*No of times liggen:6*	*No of times liggen: 7*

The results of the group of objects that belong on the table are factor 3, 4 and 5. The results of the other group are factor 9. As you can see for the first group there is a substantial difference between the objects on the floor, which go with *liggen* the most and the middle and high Ground, which go with *liggen* a lot less. The difference between them does not seem significant. For the objects that belonged on the floor, however, something else seems to apply: The higher you get, the more *liggen* is being used. This suggests that it is the canonicity causing the use of the posture verb to change, not the height. It is precisely in line with what you would predict if you based your prediction solely on the canonicity: For the objects that belong on a table the lowest score is achieved when they are on the table, and for the objects that belong on the floor, the lowest score is achieved when they are on the floor.

Together with the fact that the one pair of pictures, although it was only one pair, differed quite a lot, the right conclusion to make seems that canonicity indeed is a factor and height is not, although there is of course a possibility that height is a very small factor that gets overruled by the canonicity factor.
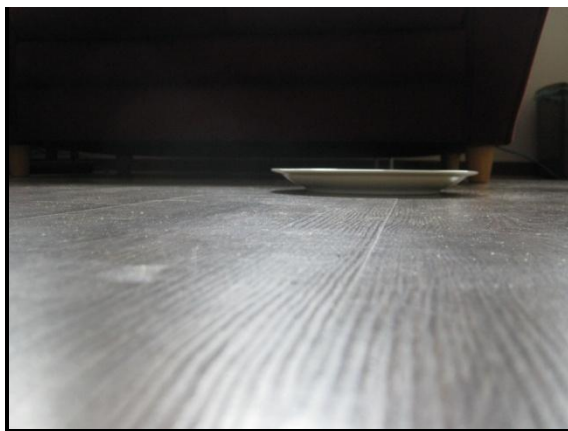
Perspective
All results concerning perspective indicate that the higher the observer is above the object, the more *liggen* is used, which is what was expected. An example

Picture 7.9	**Picture 7.10**
No. of times liggen: 29	*No. of times liggen: 39*

This makes sense, because the more the observer is above an object, the more the width is perceived and the less the height (Lemmens, 2002).

7.11 Some remarks concerning this research

It must be noted that there were a couple of pictures that were used in both of tests 1 and 2, meaning that the exact same picture was judged by two different groups of people. It appears that, unfortunately, the answers given differed quite a bit from group 1 to group 2:

Picture description	**Percentage *liggen* in Test 1**	**Percentage *liggen* in Test 2**
Pan on the floor	68,8 %	34,0 %
Plate on the closet	47,3 %	25,8 %
Plate on the floor	83,9 %	66,7 %

However, as you can see, the people in group 1consistently used *staan* less. Something else that came up was that the people in group 2 had answered the question of whether they knew what the survey was about notably more extensive and correctly. It therefore can be argued that the people in group 2 simply were more tend to use the verb *liggen* and that they were more aware of the rules in the back of their minds. In any case, when making comparisons between two pictures, it was made sure that these pictures always came from the same test.

A second point, related to the first, is that people did see the patterns and similarities and probably knew some of the factors searched for. It is therefore highly likely that they started using so called strategies, meaning that they had formed rules to answer the questions, which made them occasionally use different posture verbs than they would have in every-day life. I do think that this effect, although present, does not annihilate the effects of the factors. For instance; people noticed that the height was varied, but only one person mentioned the canonicity of the places the objects were and they still answered differently for the objects that belong on the ground than for the objects that belong on the table. Another reason to think this was that opposing pairs of which both of the pictures were in the beginning of the test, meaning that the respondents had not had the opportunity to form strategies yet, showed the same results.

7.12 Improvements

There are some improvements that could be made that perhaps could prevent some of the issues mentioned earlier, or things that would have been a good idea anyhow:

- It would be most desirable to ask every respondent only a couple of questions, so they would not be able to develop a strategy. This would of course mean that you would need a lot more respondents, and finding 90 was already rather hard.
- Randomization of the order of the pictures. This is something that surveytool.com unfortunately did not offer.
- Randomization of the order of the answers. In this research *liggen* consistently was the first answer and *staan* was the second.
- Lastly, a bigger number of pictures would of course also have been nice, but this would conflict with other things that have to be taken into account. You would have to ask every respondent to answer more questions, which again would increase the possibility of strategies, and it was rather hard to find objects that had the factors in the first place.

8. Conclusion

The fact that there are so many rules and factors involved in the choice between posture verbs, that it is not just a question of whether a certain factor is present but rather how much and that many people were not even aware of the factors they took into account suggests that the way to look at posture verbs is conform prototype theory. This theory states that deciding whether a certain something belongs to a certain category (or as in this case: whether it belongs to the category of *liggen* objects) does not depend on going down a list of criteria, but rather that you have one typical thing in that category, called the prototype, and that the more you digress from that thing, the less prototypical an object is for a category. People only have a vague idea of what the characteristics they ascribe to a human that is sitting, standing or lying are and come to their posture verb of choice via associations rather than actual rules, which seems to be very much in line with prototype theory.

8.1 The link with Artificial Intelligence

The most link with Artificial intelligence is that if we ever want to have a machine that can communicate in natural language with humans flawlessly, it will probably have to be aware of the rules concerning the use of posture verbs, but if you look at the foregoing paragraph it might be hard to find these rules; there might actually be none. This is why a group of researchers tried to let a couple of robots find the right posture verb in German via unsupervised machine learning (Spranger & Loetzsch, 2009). The robots were able to balance themselves and to see. In the first phase of the experiment they were themselves doing all kinds of postures to define the category for themselves via an algorithm, in the second phase they could communicate with other robots who had done the same to fine-tune their categories so that they were the same. In the end they did rather well, suggesting that this could be a better method to enable robots to speak natural language.

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10   Appendices

Appendix 10.1a

Test 2

> Testje 2

Plaatje 2

Daar ... een bord.

○ staat
○ ligt

Next

Appendix 10.1b

Test 2

Testje 2

Plaatje 7

Daar ... een pan.

○ staat
○ ligt

Next

Appendix 10.2: All test results without fillers or decoys

Picture description	From test no.	*liggen*	*staan*
Car at bottom of hill	1	5	41
Broken car at bottom of hill	1	12	34
Plate on object same height as table	1	36	10
Plate on floor	1	39	7
Plate on floor	2	31	16
Plate on floor, camera resting on floor	1	29	17
Plate on closet	1	22	24
Plate on closet	2	12	35
Plate on closet, camera at same height as plate	2	14	33
Plate on closet, camera resting on floor	2	4	43
Plate with knife and fork on object same height as table	1	33	13
Plate with knife and fork on table, camera one story higher	1	27	19
Plate with knife and fork on floor	1	36	10
Plate with knife and fork on table	1	21	25
Closed laptop on floor	1	45	1
Closed laptop on table	1	39	7
Opened laptop, turned on, on floor	1	10	36
Opened laptop, turned on, on table	1	2	44
Opened laptop, turned off, on floor	1	16	30
Opened laptop, turned off, on closet	1	7	39
Opened laptop, turned off, on table	1	6	40
Tin of Nivea, closed, on floor	2	36	11
Tin of Nivea, closed, on closet	2	11	36
Tin of Nivea, closed, on table	2	18	29
Tin of Nivea, opened, on floor	2	33	14
Tin of Nivea, opened, on closet	2	21	26
Tin of Nivea, opened, on table	2	20	26
Pan on stove	2	3	44
Pan on floor	1	32	14
Pan on floor	2	20	27
Pan on floor, camera hovering above plate	1	31	15
Pan on closet	2	9	38
Pan on table	2	7	40
Pan on table, camera resting on floor directly under table	1	24	22
Pan on floor, camera hovering above pan	2	13	34
Shoes on floor	2	3	44
Shoes on closet	2	12	35
Shoes on table	2	3	44
Shoe on floor	1	29	17

Shoe on table	2	16	31
Vacuum cleaner on floor	1	13	33
Vacuum cleaner on closet	1	31	15
Vacuum cleaner on closet, camera resting on floor	1	29	17
Vacuum cleaner on table	1	19	27

Appendix 10.3: Exact number of *liggen* per factor

1.	Functional	89	Non-functional	116
2.	Canonical	21	Non-canonical	33
3.	Low Ground	233	Ground in the middle	133
4.	Ground in the middle	54	High Ground	60
5.	Low Ground	178	High Ground	94
6.	Normal perspective	82	Perspective from below	62
7.	Normal perspective	61	Perspective from above	76
8.	Perspective from below	4	Perspective from above	14