SEVERITY OF ANOMIA
severity rating by people with aphasia and experts, using the Dutch Naming Test

Name student:	M. Hofs – van Kats (Marije)
Student number:	5951739
Course:	Afstudeeronderzoek
Status:	final version
Date:	27-06-2019
Number of words:	3799
Number of words abstract:	294
Reference style:	Vancouver
Course mentor:	Dr. Lizet van Ewijk
Course lecturer:	Dr. Rob Zwitserlood
Organisation of internship:	Lectoraat Hogeschool Utrecht
Intended journal:	Aphasiology
Maximum words intended journal:	7500
Transparent reporting criteria:	STROBE

Clinical Language, Speech and Hearing Sciences, program in Clinical Health Sciences, Faculty of Medicine, Utrecht University, the Netherlands

List of abbreviations and relevant definitions

AAT	**Aachen Aphasia Test**
ASRS	**Aphasia Severity Rating Scale**
DNT	**Dutch Naming Test; in Dutch: Nederlandse Benoem Test**
PWA	**People With Aphasia**
SLT	**Speech Language Therapist**
ICC	**Intraclass Correlation Coefficient**

Abstract

Title: Severity of anomia, severity rating by people with aphasia and experts, using the Dutch Naming Test

Background: Anomia is one of the most frequent deficits in aphasia and is detected with picture naming tests like the Dutch Naming Test (DNT). Although determining severity of anomia is important to have a baseline for therapy and measure progress, severity scores are not yet part of the DNT. It is unclear how anomia, as measured on the DNT, relates to severity of anomia in spontaneous speech and the severity rating of people with aphasia (PWA) and speech language therapists (SLTs).

Aim: To determine the level of agreement between severity ratings of Dutch PWA, SLTs and provisional severity scores on the DNT in the rating of severity of anomia, and to produce severity scores for the DNT.

Method: A cross-sectional, multicentred study was conducted in 114 PWA in the rehabilitation or chronic phase. SLTs and PWA rated the severity of anomia based on semi-spontaneous speech and the DNT was conducted. Correlations and interrater reliability were determined. Linear regression was applied to calculate severity scores for the DNT based on the cumulative severity scores of PWA, SLTs and provisional severity scores of the DNT.

Results: There is a moderate agreement between PWA and SLTs (ICC 0.58) on severity of anomia. Interrater reliability between SLTs and researcher is almost perfect (ICC 0.88). Severity scores for the DNT were calculated by combining the reported severity ratings and the scores on the DNT.

Conclusion and recommendations: PWA have a different perspective than SLTs on the severity of anomia. Anomia in spontaneous speech correlates to the scores on the DNT. The severity scores for the DNT can be introduced in SLT practices.

Key words: aphasia, anomia, Dutch Naming Test (DNT), severity

Samenvatting

Titel: Ernstbepaling van woordvindstoornissen, door personen met afasie, logopedisten, en de Nederlandse Benoem Test (NBT)

Achtergrond: Woordvindstoornissen zijn één van de meest voorkomende problemen bij afasie en worden gediagnosticeerd met benoemtests zoals de NBT. Hoewel het bepalen van de ernst van woordvindstoornissen belangrijk is om de voortgang te meten en een startpunt te bepalen voor therapie, zijn ernstscores nog geen onderdeel van de NBT. Het is onduidelijk hoe woordvindstoornissen, zoals gemeten middels de NBT, verband houden met woordvindstoornissen in spontane spraak en de ernstbeoordeling van personen met afasie (PMA) en logopedisten.

Doel: Bepalen van het niveau van overeenstemming tussen ernstscores van PMA, logopedisten en voorlopige ernstscores van de NBT en het produceren van ernstscores voor de NBT.

Methoden en procedures: Een cross-sectioneel, multicenter onderzoek werd uitgevoerd bij 114 PMA in de chronische en revalidatiefase. Deelnemende logopedisten en PMA scoorden de ernst van de woordvindstoornissen op basis van semi-spontane spraak en de NBT werd afgenomen. Correlaties en de interbeoordelaarsbetrouwbaarheid werden bepaald. Lineaire regressie werd gebruikt om ernstscores voor de NBT te berekenen op basis van de cumulatieve score van de PMA, logopedisten en voorlopige ernstscores van de NBT.

Resultaten: Er is een matig niveau van overeenstemming tussen PMA en logopedisten (ICC 0,58) over de ernst van woordvindstoornissen. De interbeoordelaarsbetrouwbaarheid tussen de logopedist en de onderzoeker is bijna perfect (ICC 0,88). PMA met ernstige woordvindstoornissen beoordelen hun woordvindstoornissen minder ernstig en vice versa. Ernstscores van de NBT werden berekend middels het combineren van de ernstscores en de ruwe score op de NBT.

Conclusie, implicaties en aanbevelingen: PMA hebben een ander perspectief dan logopedisten op de ernst van woordvindstoornissen. Woordvindstoornissen in spontane spraak correleren met scores op de NBT. De berekende ernstscores voor de NBT kunnen worden geïmplementeerd in de logopedische praktijk.

Kernwoorden: afasie, woordvindstoornissen, Nederlandse Benoem Test (NBT), ernstbepaling

Introduction

The incidence of stroke in the Netherlands currently is 40.000 and this number is increasing through aging.[1,2] In 21 to 38% initial stroke patients aphasia occurs, an acquired language disorder caused by damage in the brain.[3–6] A word finding deficit, or anomia, is the most prevalent, and sometimes the only, component of aphasia.[7] Anomia has a severe impact on communication, as people with anomia have problems retrieving specific words during conversation and are therefore limited in participating in society.[8]

Anomia is usually diagnosed by using picture naming tests.[9] These tests generally use a cut-off point for the presence of anomia. A cut-off point indicates whether there is a disorder but does not give information about the severity of this disorder. In the Netherlands, the Dutch Naming Test (DNT) is used to diagnose anomia.[10] The DNT, a confrontational naming test, was published in 2018 and demonstrates good validity and reliability, however it does not provide a severity rating of anomia yet.[11]

Fucetola et al. found that the severity of aphasia has an important influence on functional communication and is a predictor of rehabilitation outcomes.[12] Additionally, the Dutch aphasia guideline states that severity of aphasia has to be determined.[5] It provides a base line for therapy, allows for measurement of progress and provides insight for patients and their relatives.[5,6,13] Having an indication of the severity of anomia, as a part of aphasia, is therefore important.

Determination of severity of anomia is far from straightforward. Various important aspects need to be taken into consideration. First of all, it is unclear how the presence of anomia, as measured on a picture naming test, relates to anomia in spontaneous speech. Although some studies show that picture naming tests may give an indication of the word finding problems in conversation, certain aspects of word finding are missed when using these tests.[14] In connected speech, word retrieval is influenced by syntactic structure and intonation.[15,16] Asking people with aphasia (PWA) to produce bare nouns through a picture naming test can therefore artificially influence their performance and could give a false impression about the anomia.

A second aspect to consider is the perspective of the PWA on their anomia. The Dutch Aphasia guideline states that speech language therapy should always be customized to the PWA and their (subjective) problems and needs.[5] Research shows that when asking SLTs, PWA and their relatives about perceived communication (dis)abilities, there is limited agreement between the judgement of the PWA and their relative.[17] Moderate agreement in the ratings of the verbal communicative ability of PWA has been found between SLTs and relatives of PWA, especially in milder cases.[18] The extend of agreement on verbal communicative abilities and on anomia between SLTs and PWA has not previously been studied. The aforementioned findings suggest an insufficient agreement between SLTs and PWA on the judgement of

anomia, highlighting the importance of directly including the PWA in judging their communication, and in this case their anomia.

Thirdly, there is no consensus in test theory on how to determine severity rating. In some tests the test scores are equally divided over different severity scores, using a proportional distribution, in other tests the severity is determined by dividing the participants of the study population in different severity groups assuming a representative severity distribution.[19,20] None of the aforementioned methods include the perceived level of severity by the PWA in the determination of the severity scores.

Finally, it is currently unknown which personal factors might influence rating the severity of anomia. In other research domains, the level of agreement in the rating of severity between clinician and patient varies and is influenced by several personal factors such as educational level, financial status, and inpatient versus outpatient treatment.[21] Factors that may influence rating of severity of anomia are presumably the age of the PWA, educational level and the presence of apraxia of speech. Apraxia of speech often occurs with aphasia, influences fluency and is hard to distinguish from phonemic errors in aphasia.[22]

In conclusion, in determining severity ratings for anomia, severity should be investigated from several angles: word finding problems in spontaneous speech; the perspective of the PWA; possible influencing factors, as well as a more objective and common measure: performance on a naming test.

Aim

The aim of this study is to determine the level of agreement on the severity of anomia, between SLTs and Dutch PWA - in the chronic or rehabilitation phase - based on spontaneous speech, in comparison with performance on the DNT. In addition, an overall level of severity will be estimated based on a combination of the severity ratings of the PWA, SLTs, and the performance on the DNT. Influences of educational level, age and apraxia of speech on rating the severity of anomia will be investigated.

Method

Study design

This study has an exploratory, quantitative design. It concerns a cross-sectional, multicentred study.

Population & domain

Dutch adults, diagnosed with aphasia were eligible for participation. Subjects had to be: native Dutch speakers; aged over 18 years; diagnosed with aphasia (token test score ≥ 7 or ScreeLing score < 68) due to stroke or trauma; in the rehabilitation or chronic phase (at least two weeks after the occurrence of aphasia).[23,24] The presence of aphasia of all participants during data collection was based on the expertise of trained SLTs contributing in this research project to prevent unnecessary testing of the PWA.[5]

Patients in the acute phase after stroke were excluded for the possible rapid improvement of the anomia and therefore the inability to rate the severity of the anomia at the moment of data collection. Patients were excluded in case of: serious comorbidity, such as dementia; visual problems resulting in the inability to recognise pictures; hearing problems resulting in the inability to understand instructions even with hearing aids or inability to rate severity of anomia due to severe comprehension deficits.

Data collection

SLTs experienced in working with aphasia and included in the register of aphasia therapists in the Netherlands or "AfasieNet" were contacted by the researcher.[25,26] The SLTs were approached by a recruitment email, in which they were asked to forward the information to their SLT colleagues. Participants were recruited from SLTs in hospitals, rehabilitation centres, nursing homes, aphasia centres, and private SLT-practices throughout the Netherlands. Assessments of the PWA took place between January and April 2019. A total of 45 SLTs and 2 research assistants (bachelor students SLT) contributed to this study and followed a test protocol (appendix 1).

Materials

Likert scales to report on (self-)perceived severity of anomia

The severity of aphasia, in general, can be displayed by using the Aphasia Severity Rating Scale (ASRS) as part of the Boston Diagnostic Aphasia Examination.[27] Measuring severity of aphasia and anomia in spontaneous speech is possible using the part "spontaneous speech" of the Aachen Aphasia Test which is based on the ASRS.[23]

The ASRS consists of a 6 point severity scale. However, recent studies on Likert scales show that increasing the number of points on Likert scales results in a closer approximation of the underlying distribution, and hence normality and interval scales.[28,29] These studies suggest using 11-point Likert scales from 0 to 10, a natural and easily comprehensible range for SLTs and participants. Variables on 11-point Likert scales can be considered as interval or continuous variables and are therefore suitable for parametric tests.[29]

In this study two 11-point Likert scales purposefully developed for this study, based on the ASRS, were used to rate the severity of the anomia.

1) The Likert scale for the rating of wordfinding difficulties by the SLT and researcher ran from 0 (very severe disorder) to 10 (no disorder) (appendix 2).
2) The Likert scale for the PWA was similar but was made "aphasia friendly" adding colours and icons (appendix 3).

The Dutch Naming Test

The DNT consists of 92 coloured pictures which are displayed in a booklet. Patients are instructed to name the displayed picture in one word. Utterances are scored on a 4-point ordinal scale in which the score becomes lower due to semantic errors: "3" is correct and "0" is incorrect. Total scores on the DNT range from 0 to 276.

Test procedure

Assessments were carried out independently by the SLT or a research assistant and consisted of the following parts:

Spontaneous Speech was elicited in a 10-min semi-standardized interview according to the Aachen Aphasia Test procedure with 4 topics: beginning and course of the disease, occupation, family and housing conditions, and hobbies.[23] Spontaneous speech was audio recorded with a voice recorder.

Severity rating of anomia by the SLT or research assistant was conducted on the 11point Likertscale.

The researcher rated the word finding of every participant in the same way as the SLT based on the audiotape of the spontaneous speech.

Severity rating by the PWA, was conducted on the aphasia friendly Likert scale. PWA were asked: "How is word finding, what rating would you give yourself for word finding?", where "0" represented "very severe problems with wordfinding" and "10" "no problems with wordfinding".

Subsequently *the DNT* was administered following the testmanual.[10]

Ethical issues

The research proposal was vetted and deemed exempt from review by HU University of Applied Sciences in Utrecht. This study was conducted according to the principles of the Declaration of Helsinki and in accordance with the General Data Protection Regulation (in Dutch Algemene Verordening Gegevensbescherming (AVG)).[30] The information letter and informed consent form were adjusted for aphasic patients (appendix 4).[31] Participants gave written informed consent before participation. All data was anonymously processed.

Data analysis

Data was analyzed using IBM SPSS Statistics 23. All data were visually inspected for assumptions of normality and linearity. Due to the large sample size, normality can be assumed.[32,33] Prior to analysis, a provisional severity measure, based on a proportional distribution of the scores over severity measures was connected to the raw scores on the DNT. Scores on the DNT were divided into 11 equal parts (with a correction due to the cut-off score of 246) and rated with a score from "0" to "10", corresponding with the Likert scales. In this way provisional severity scores were obtained to be able to compare the severity ratings of the PWA and the SLTs with the performance on the DNT.

Descriptive statistics were used to display participant characteristics, the severity ratings of the PWA, SLTs, and DNT, and the raw DNT-scores.

Correlations between severity ratings and the DNT

Correlations were determined by calculating an Intraclass Correlation Coefficient (ICC-agreement for average measures, two way random) between the severity rating of the PWA, the severity rating of the SLT and provisional severity scores on the DNT.

An ICC was used instead of Kappa or a Pearson's correlation since the parameters can be considered as continuous and an ICC gives more reliable information then a Pearson's correlation.[29,33] ICC values <0.5 are indicative of a poor level of agreement, values between 0.5 and 0.75 indicate a moderate level of agreement, values between 0.75 and 0.9 indicate a good level of agreement and values greater than 0.90 indicate an excellent level of agreement.[34,35]

T-tests were performed on the mean differences in severity rating between PWA, SLT and provisional severity-scores on the DNT to test if there were significant differences in the ratings of PWA, SLTs and the DNT.

Interrater reliability

The level of agreement between the SLT and the researcher was determined by calculating the ICC-agreement for average measures, two way random.

Severity scores for the DNT

Severity scores for the DNT were calculated based on a combination of the severity ratings of the PWA, SLTs, and the performance on the DNT in which the influence of the PWA, the SLT and the proportional distribution of severity scores was equal. The combination of these three factors allows for a more realistic reflection of severity, as argued in the introduction. A linear regression was therefore performed, in which the raw DNT score was used as the independent variable and the cumulative severity score ((rating PWA + rating SLT + provisional rating DNT) / 3) was the dependent variable. The equation underlying the linear regression is then used to propose a single measure of severity of anomia in the DNT.

The suitability of the calculated severity scores was determined by calculating the explained variance of the raw DNT scores on the calculated severity scores.

Additional analyses

To examine how the severity rating of PWA related to their performance on the DNT, a Pearson's correlation analysis was conducted on the differences between the severity scores of the PWA and the provisional severity scores of the DNT, in relation to the raw DNT-scores. Secondly, level of education, age and the presence of apraxia of speech were considered as independent variables and it was analysed to what extent these variables influenced the differences in the severity rating of the PWA and the provisional severity scores by producing a prediction model.

Results

Participants

A total of 117 PWA participated in this study. Three participants were excluded because in retrospect they did not meet the inclusion criterium of native Dutch speakers. The characteristics, scores and severity ratings from the remaining 114 PWA (54 males, 60 females) are presented in tables 1 and 2. Age ranged from 43 till 97 years (M:70; SD:12). Raw scores on the DNT ranged from 0 till 273 points (M:196.49; SD: 69.46).

[Table 1]
[Table 2]

All data used in the analysis were visually inspected and met the assumptions of normality and linearity.

Correlations between severity ratings and the DNT

The ICC between the ratings of the PWA and the SLT is 0.58 (CI:0.40–0.71), indicating a moderate agreement. There was no significant mean difference (*p*:0.85) between the ratings of PWA and SLTs. The ICC between the ratings of the PWA and the provisional severity rating of the DNT was 0.36 (CI:0.04–0.57), indicating poor agreement. The ratings of PWA were significantly lower (*p*<0.001) than the provisional severity rating of the DNT with a mean difference of 1.83. The ICC between the ratings of the SLTs and the provisional severity rating of the DNT was 0.70 (CI:0.09–0.87) indicating a moderate agreement, with a mean difference of 1.77 (*p*<0.001) in which SLTs ratings were lower than provisional severity rating of the DNT.

Interrater reliability

The ICC between the ratings of the SLT and the researcher was 0.88 (CI:0.83–0.92), indicating good agreement.

Severity scores for the DNT

A linear regression model (figure 1) showed an explained variance of $r^2 = 0.74$ between the cumulative severity score of the PWA, SLT, provisional severity scores of the DNT and the raw score on the DNT. Therefore, a severity rating can be calculated by the following equation:

Severity rating DNT=1.6 + 0.023 * raw score DNT

The calculated severity scores of the DNT range from 1 (very severe to severe anomia; 0-17 points) till 7 (mild to minor anomia; 235–276 points) as are displayed in table 3.

[Figure 1]
[Table 3]

Additional analyses

A Pearson's correlation analysis (r:0.75, $p<0.001$) on the differences between the provisional severity rating of the DNT and the severity rating of the PWA in relation to the raw DNT-scores shows that PWA with lower raw DNT-scores tend to rate their anomia less severe than the provisional severity of the DNT. On high raw DNT-scores the opposite occurs: PWA tend to rate their anomia as more severe than is shown in proportional severity rating (figure 2).

[Figure 2]

No significant influences of level of education, age and the presence of apraxia of speech were found in a prediction model. For the influence of age, however, a non-significant trend was found (p:0.051) showing a decrease in the difference between the ratings of PWA and provisional severity on the DNT as age increases.

Discussion

This study aimed to examine the level of agreement in the rating of severity of anomia between Dutch PWA in the rehabilitation or chronic phase and SLTs in comparison with performance on the DNT. Additionally we aimed to produce severity scores for the DNT which would not only be based on the raw scores of the DNT (as more traditional language tests like the CAT-NL use), but would have self-reported rating of anomia and SLT reported rating of anomia incorporated in the statistical model underlying the calculation of severity.[20]

The results show that the level of agreement on the severity of anomia between the rating of PWA and SLTs is moderate. The level of agreement between the rating of the PWA and the provisional severity rating of the DNT was poor, and both ratings of PWA and SLTs were significantly lower than the provisional severity rating of the DNT. There was a better level of agreement between the ratings of the SLT and the provisional severity scores of the DNT than between the PWA and provisional DNT scores.

SLTs were shown to be capable to rate the severity of anomia based on a semi-structured conversation with their client, as the level of agreement between the SLTs and the DNT was substantial. In addition, the level of agreement between SLTs and the researcher was almost perfect.[36] This high level of agreement is in line with a study of Strand et al. in severity rating in apraxia of speech.[36]

The results are in line with our hypothesis that the judgement on the severity rating of anomia between PWA and SLTs does not align.[17,18] Furthermore, although performance on the DNT did correlate with the perceived severity of anomia based on connected speech by the SLT, both SLTs and PWA rated the anomia in connected speech as more severe than the raw scores on the DNT would indicate. This may be a consequence of the suspected difference in wordfinding in connected speech and picture naming, due to the influence of intonation and syntactic structure on wordfinding in connected speech.[15,16]

The moderate agreement between the scores of PWA an SLTs may be caused by various factors. In other studies on agreement between clinicians and patients an influence of educational level and economic status was found.[21] In our study we looked at educational level, age and the presence of apraxia of speech. These factors did not significantly influence the severity rating.

There is an interesting interaction between the severity of the anomia and the perspective of the PWA. PWA with severe anomia tend to rate their anomia less severe and PWA with minor anomia tend to rate their anomia more severe than the provisional severity scores of the DNT. One of the explanations could be that patients with mild anomia frequently have less severe additional consequences of their brain damage. Anomia is the only residual problem, and therefore possibly more noticeable and frustrating, than when anomia is just one of the many other consequences of severe stroke. Even when test scores show minor, or no deficits, the anomia might still impede on daily life.

Another explanation could be that PWA with severe anomia might also have more prominent comprehension problems, and may have had problems in comprehending how to rate their anomia. This seems unlikely, as recent research shows that even PWA with severe comprehension deficits are able to reliably provide self-ratings.[37] Due to the lack of research on factors influencing the rating of anomia further research is needed to explain the discrepancies in rating anomia by PWA.

The need for incorporation of (self) reported rating in severity rating is very clear from the results discussed above. The equation that was used to calculate the severity rating of anomia therefore incorporated these ratings, whilst using the raw DNT score as a baseline. Results show that the produced severity rating of the DNT is a very strong estimate of the severity of the anomia. In clinical practice this means the severity scores on the DNT can be used as a good indicator of wordfinding difficulties in the broader definition, rather than just capturing a confrontational naming deficit.

To appreciate the findings of this study, some aspects require further consideration. First of all, the DNT is a new naming test and the cut-off score was calculated based on 30 healthy adults and 50 PWA.[10] In the current study, the majority of the participants had a relatively high score on the DNT and 25% of the participants scored above the cut-off score of the DNT. Possibly these PWA were not aphasic after all, since in most cases the PWA had not a recent diagnosis of aphasia, but it is more likely that the cut-off score may be too strict and needs to be recalculated. Furthermore, the mean severity score showed that mainly patients with less severe anomia participated in this study.

Second, scoring of the DNT could lead to noise in the data for scoring criteria were not always clear to SLTs. To reduce bias all DNT test forms were checked and corrected by the researcher.

Thirdly, there was a chance of bias because in some cases the researcher was acquainted with the severity ratings of the PWA and SLT before judging the audio recording. This was

caused by the fact that sometimes the researcher received the test forms and the audio recordings at the same time or because the SLT told the researcher the severity scores. Therefore audio recordings were judged in sets of 10 recordings.

Lastly, because of the high number of participating SLTs the chance on human errors was larger. However, errors were reduced by following a test protocol but in some cases SLTs used a different order of testing.

The strength of the present study is its generalizability, as a large group of PWA in the rehabilitation or chronic phase throughout the Netherlands was included. There was a large range of time post-onset and PWA were sampled from different settings (hospitals, rehabilitation centres, nursing homes, and private SLT-practices). Another strength is that the newly produced severity rating of the DNT is based on the ratings of the PWA, SLT and the scores of the DNT and therefore connects better with the perspectives of PWA and SLTs.

In conclusion, this study shows that PWA have a different perspective than SLTs and the DNT on the severity of anomia. There is a moderate level of agreement between SLTs and PWA in rating anomia and PWA tend to rate severe anomia less severe and mild anomia more severe. This gives SLTs insight in the perspectives of PWA with regards to their anomia. The use of a picture naming test correlates to wordfinding in semi-spontaneous speech as rated by the SLT. This means SLTs can use the severity rating, using the developed 11-point Likert scale, to judge the severity of anomia of their patients. Lastly, it is recommended to implement the severity scores for the DNT to diagnose the severity of anomia. This will give SLTs and PWA a more precise diagnosis of anomia, gives a base line for therapy and allows for measurement of progress.

References

1. Volksgezondheidenzorg.info [Internet]. RIVM, Bilthoven. 2018 [cited 2018 Sep 10]. Available from: https://www.volksgezondheidenzorg.info/onderwerp/beroerte/cijfers-context/trends#!node-toekomstige-trend-beroerte-door-demografische-ontwikkelingen

2. Prince MJ, Wu F, Guo Y, Gutierrez Robledo LM, O'Donnell M, Sullivan R, et al. The burden of disease in older people and implications for health policy and practice. Lancet. 2015 Feb 7;385(9967):549–62.

3. Engelter ST, Gostynski M, Papa S, Frei M, Born C, Ajdacic-Gross V, et al. Epidemiology of aphasia attributable to first ischemic stroke: incidence, severity, fluency, etiology, and thrombolysis. Stroke. 2006;37(6):1379–84.

4. Berthier ML. Poststroke aphasia: Epidemiology, pathophysiology and treatment. Drugs and Aging. 2005;22(2):163–82.

5. Berns PEG, Jünger N, Boxum E, Nouwens F, van der Staaij MG, van Wessel S, et al. CBO. 2015. Logopedische richtlijn 'Diagnostiek en behandeling van afasie bij volwassenen.

6. Brady MC, Kelly H, Godwin J, Enderby P, Campbell P. Speech and language therapy for aphasia following stroke. The Cochrane Library. Wiley Online Library; 2016.

7. Wisenburn B, Mahoney K. A meta-analysis of word-finding treatments for aphasia. Aphasiology. 2009;23(11):1338–52.

8. Adbegovic I, Visch-Brink E. De effectiviteit van cognitief-linguïstische versus communicatieve therapie op het benoemen. Stem-, Spraak- en Taalpathologie. 2014;19:19–41.

9. Boyle M. Test–Retest Stability of Word Retrieval in Aphasic Discourse. J Speech, Lang Hear Res. 2014 Jun 1;57(3):966–78.

10. van Ewijk L, Dijkhuis L, Hofs - van Kats M, Hendrickx - Jessurun M, Wijngaarden M, de Hilster C. Nederlandse Benoem Test. Houten: Bohn Stafleu van Loghum; 2018.

11. de Hilster C. The psychometric properties of the Dutch Naming Test II Studied in an aphasic population. unpublished thesis. Utrecht University; 2017.

12. Fucetola R, Connor LT, Perry J, Leo P, Tucker F, Corbetta M. Aphasia severity, semantics, and depression predict functional communication in acquired aphasia. Aphasiology. 2006;20(5):449–61.

13. Wallace SJ, Worrall L, Rose T, Dorze G Le. Core outcomes in aphasia treatment research: An e-Delphi consensus study of international aphasia researchers. Am J Speech-Language Pathol. 2016 Dec 1;25(4):S729–42.

14. Herbert R, Hickin J, Howard D, Osborne F, Best W. Do picture-naming tests provide a

valid assessment of lexical retrieval in conversation in aphasia? Aphasiology. 2008;22(2):184–203.

15. Mayer JF, Murray LL. Functional measures of naming in aphasia: Word retrieval in confrontation naming versus connected speech. Aphasiology. 2003 Jan 18;17(5):481–97.

16. Pashek G V., Tompkins CA. Context and word class influences on lexical retrieval in aphasia. Aphasiology. 2002 Mar;16(3):261–86.

17. Doyle PJ, Hula WD, Austermann Hula SN, Stone CA, Wambaugh JL, Ross KB, et al. Self- and surrogate-reported communication functioning in aphasia. Qual Life Res. 2013;22(5):957–67.

18. De Jong-Hagelstein M, Kros L, Lingsma HF, Dippel DWJ, Koudstaal PJ, Visch-Brink EG. Expert versus proxy rating of verbal communicative ability of people with aphasia after stroke. J Int Neuropsychol Soc. 2012;18(6):1064–70.

19. Blomert L, Koster C, Kean M-L. Antat: Amsterdam-Nijmegen Test voor Alledaagse Taalvaardigheden. Swets & Zeitlinger; 1995.

20. van der Staaij - Mulder MG, Visch-brink EG, Mariën P, Vandenborre D, Kerkmeer M, Leemans GI. White paper CAT-NL, Ernstbepaling Kritieke Waarden. Pearson. 2016.

21. Lyu D, Wu Z, Wang Y, Huang Q, Wu Z, Cao T, et al. Disagreement and factors between symptom on self-report and clinician rating of major depressive disorder: A report of a national survey in China. J Affect Disord. 2019;253:141–6.

22. Haley KL, Jacks A, Cunningham KT. Error Variability and the Differentiation Between Apraxia of Speech and Aphasia With Phonemic Paraphasia. J Speech, Lang Hear Res. 2012;56(3):891–905.

23. Graetz P, De Bleser R, Willmes K. Akense afasie test. Harcourt Test Publishers; 2005.

24. Visch-Brink EG, van de Sandt-Koenderman WME, El Hachioui H. ScreeLing. Houten: Bohn Stafleu van Loghum; 2010.

25. Afasieregister NVLF [Internet]. [cited 2019 Jan 12]. Available from: https://www.nvlf.nl/inschrijving-afasie

26. Afasienet zorgzoeker [Internet]. [cited 2019 Jan 12]. Available from: https://www.afasienet.com/mensen/zorgzoeker/

27. Goodglass H, Kaplan E, Barresi B. BDAE-3: Boston Diagnostic Aphasia Examination–Third Edition.

28. Hodge DR, Gillespie DF. Phrase completion scales: a better measurement approach than Likert scales? J Soc Serv Res. 2007;33(4):1–12.

29. Wu H, Leung S-O. Can Likert scales be treated as interval scales?—A Simulation study. J Soc Serv Res. 2017;43(4):527–32.

30. THE WORLD MEDICAL ASSOCIATION , INC . DECLARATION OF HELSINKI Ethical Principles for Medical Research Involving Human Subjects. 2008.

31. Thissen MPE. Aangepaste leesvormen voor personen met afasie: De bekendheid onder zorgverleners. 2016;

32. Twisk JWR. Inleiding in de toegepaste biostatistiek. Maarssen: Elsevier gezondheidszorg; 2007.

33. de Vet HCW, Terwee CB, Mokkink LB, Knol DL. Measurement in medicine: a practical guide. Cambridge University Press; 2011.

34. De Vocht A. Basishandboek SPSS 23. Bijleveld Press; 2015.

35. Koo TK, Li MY. A Guideline of Selecting and Reporting Intraclass Correlation Coefficients for Reliability Research. J Chiropr Med. 2016;15(2):155–63.

36. Strand EA, Duffy JR, Clark HM, Josephs K. The apraxia of speech rating scale: A tool for diagnosis and description of apraxia of speech. J Commun Disord. 2014;51:43–50.

37. Raven-Takken E, Ter Wal N, Van Ewijk L. What minimum level of language comprehension is required for reliable administration of the SAQOL-39NLg? Aphasiology. 2019;00(00):1–14.

38. CBS; Divisie Sociale en ruimtelijke statistieken Sector Sociaal-economisch totaalbeeld. Standaard Onderwijsindeling 2016 [Internet]. Den Haag; 2018. Available from: https://www.cbs.nl/nl-nl/onze-diensten/methoden/classificaties/onderwijs-en-beroepen/stand.

Tables and figures

Table 1: Characteristics of the participants

Participants (n= 114)	N (percentage (%))
Gender	
Female	60 (52.6)
Male	54 (47.4)
Handedness	
Right-handed	101 (88.6)
Left-handed	7 (6.1)
Ambidextrous	4 (3.5)
Unknown	2 (1.8)
Level of education[a]	
Low	51 (44.7)
Medium	34 (29.8)
High	26 (22.8)
Unknown	3 (2.6)
Apraxia of speech	
Present	23 (20.2)
Presumably present	14 (12.3)
Not present	77 (67.5)
Clinical localization of lesion	
Left hemisphere	90 (78.9)
Right hemisphere	7 (6.1)
Other	10 (8.8)
Unknown	7 (6.1)
Age in years, mean (SD), median [range]	70 (12), 71 [43-97]
Time post-onset in months, mean (SD), median [range]	29 (55), 7 [1-408]]

Note[a] Categories are based on the Central Agency for Statistics[38]

Table 2: Raw scores and provisional severity scores on the DNT, severity ratings of PWA, SLT and researcher

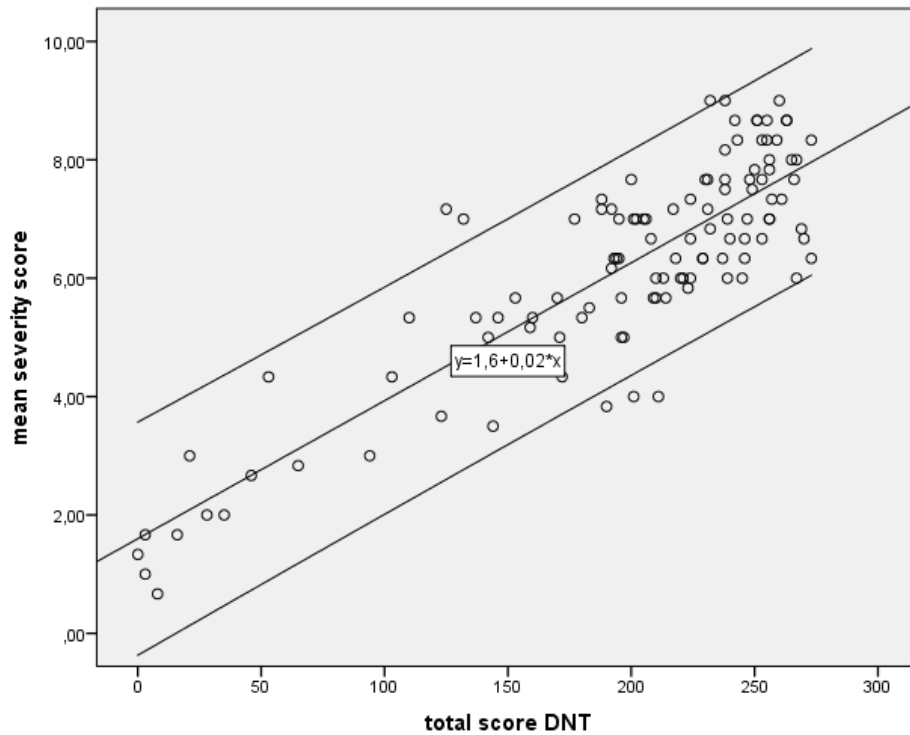|	N	Mean (SD)	Range
Score DNT (0-276)	114	196.49 (69.46)	0 - 273
Severity rating DNT (0-10)	114	7.41 (2.79)	0 - 10
Severity rating PWA (0-10)	114	5.58 (2.02)	0 - 10
Severity rating SLT (0-10)	114	5.54 (2.13)	0 - 9
Severity rating researcher (0-10)	106	5.76 (2.24)	0 - 10

Figure 1: Linear regression model on the mean (cumulative) severity scores versus the raw DNT scores

Table 3: Severity scores of the DNT

Score DNT	Severity score	Severity of anomia
0 -17	1	very severe to severe
18 – 60	2	severe
61 – 104	3	severe to moderate
105 – 147	4	moderate
148 – 191	5	moderate to mild
192 – 234	6	mild
235 – 276	7	mild to minor
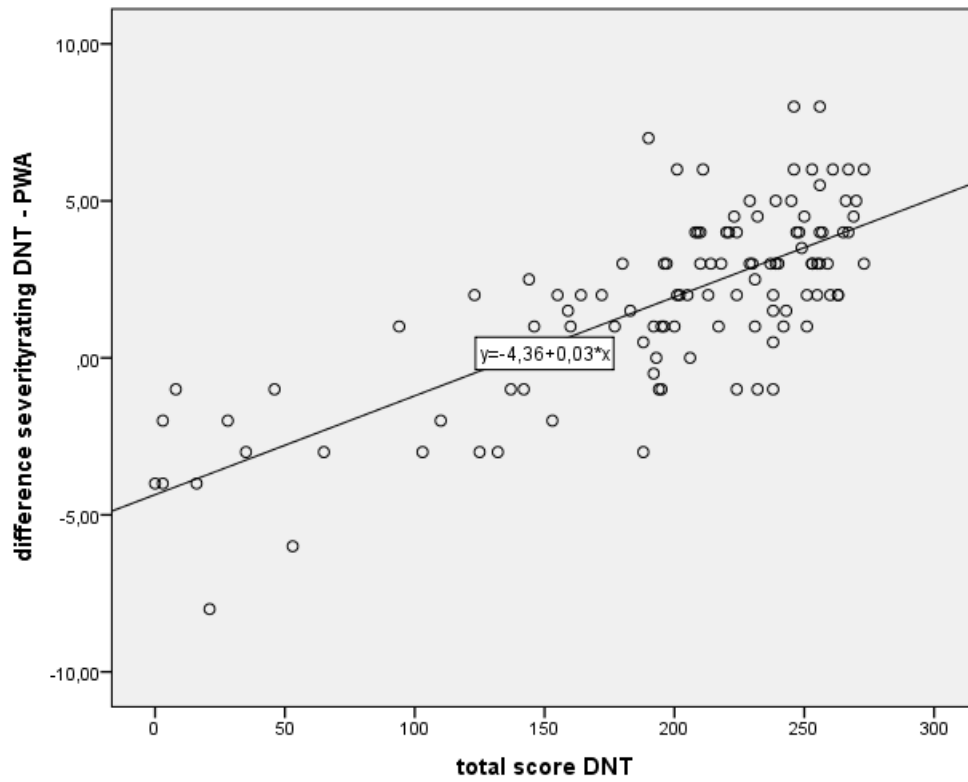
Figure 2: Scatterplot visualizing the correlation of the differences in severity rating between PWA and DNT in relation to raw DNT-scores as severity decreases (r=0.75, p<0.001)

Appendix 1: testprotocol

Protocol testafname woordvindstoornissen

De testafname bestaat uit 3 onderdelen die in één sessie in gegeven volgorde afgenomen dienen te worden: Eerst worden algemene gegevens genoteerd en vervolgens de volgende onderdelen afgenomen:

1. Spontane taal, audio-opname; score woordvindstoornissen
2. Beoordeling woordvindstoornissen door client
3. Nederlandse Benoem Test

De ingevulde scoreformulieren (bijgeleverd formulier en formulier van de NBT) overhandigen/sturen naar de onderzoeker. De audio-opname ook overhandigen/sturen naar de onderzoeker. Alleen de patiënt code vermelden op de scoreformulieren.

1. Score woordvindstoornissen

Maak een audio-opname van het gesprek, duur ongeveer 10 minuten. De vragen die worden gesteld bij de audio-opname zijn identiek aan het onderdeel Spontane taalproductie van de Akense Afasie Test.

De vragen kunnen anders geformuleerd worden. Elk van de vier onderwerpen moet echter aan de orde komen, in principe in de aangegeven volgorde. Taalgerichte hulp is niet toegestaan.

1. Kunt u mij, om te beginnen, zo uitvoerig mogelijk vertellen hoe u ziek geworden bent? Welke problemen met praten waren er in het begin? Hoe is het nu met praten?

2. Welk beroep heeft u (gehad)? Waar hebt u voor het laatst gewerkt? Kunt u daar iets meer over vertellen? Hoe bent u tot die beroepskeuze gekomen

3. Waar woont u? Kunt u mij iets over uw familie vertellen? Kunt u mij iets over uw kinderen vertellen?

4. Wat doet u graag in uw vrije tijd? Heeft u hobby's? Kunt u daar iets meer over vertellen? (Kijkt u graag televisie? Heeft u een lievelingsprogramma?)

Voor de scoring dient alleen gescoord te worden op de ernst van de woordvindstoornissen (zie scoringsformulier). De client mag geen inzage hebben in de score van de logopedist aangezien dit de score van de client zou kunnen beïnvloeden.

Scoringsformulier Woordvindstoornissen

Welke score (welk cijfer) geeft u voor de woordvinding van de cliënt op basis van het gesprek (directe beoordeling)?

Score		
10 / 9	Geen woordvindproblemen	Normale communicatie
8 / 7	Minimale woordvindproblemen	Verlies van vloeiendheid, haperingen, korte denkpauzes
6 / 5	Lichte woordvindproblemen	Communicatie beperkt door woordvindproblemen, denkpauzes, gebruik van synoniemen
4 / 3	Matige woordvindproblemen	Communicatie fors beperkt door woordvindproblemen, lange denkpauzes, semantische parafasieën
2 / 1	Ernstige woordvindproblemen	Fragmentarische uitingen
0	Zeer ernstige woordvindproblemen	Geen adequate uiting

2. Beoordeling woordvindstoornissen door client

Geef de client de volgende bladzijde: "woorden vinden". Instrueer de client aan te geven welk (rapport)cijfer hij/zij zou geven voor hoe het gaat met het vinden van de woorden. Daarbij staat een 10 voor *geen enkel probleem, vinden van woorden gaat perfect* en een 0 voor *zeer ernstig probleem, het lukt niet om ook maar één woord te vinden.*
Het staat de logopedist vrij om de instructie aan te passen aan de client, het doel is om tot een betrouwbare beoordeling door de client te komen. Het is niet toegestaan om te sturen/de eigen beoordeling aan de client te geven, daardoor kan er een vertekening ontstaan waardoor het onderzoek niet meer betrouwbaar is.

3. Afname Nederlandse Benoem Test

De Nederlandse Benoem Test dient afgenomen en gescoord te worden volgens de handleiding.

Appendix 2: Severity rating of anomia

	Dutch Naming Test		Likert scale for PWA's	Wordfinding in spontaneous speech	
Rating	Severity scores	Scores	Severity scores	Severity scores	Description
10	No anomia	276 – 246	No problems	No anomia	Normal communication
9		245 – 225			
8	Minor anomia	224 – 200	Minor problems	Minor anomia	Loss of fluency, hesitations, short thinking pauses
7		199 – 175			
6	Mild anomia	174 – 150	Mild problems	Mild anomia	Communication limited by word problems, thinking pauses, use of synonyms
5		149 – 125			
4	Moderate anomia	124 – 100	Moderate problems	Moderate anomia	Communication greatly limited by word problems, long thinking pauses, semantic paraphasias
3		99 – 75			
2	Severe anomia	74 – 50	Severe problems	Severe anomia	Fragmentary utterances
1		49 – 25			
0	Very severe anomia	24 – 0	Very severe problems	Very severe anomia	No adequate expression

Woorden vinden

10	Geen problemen
9	
8	Minimale problemen
7	
6	Lichte problemen
5	
4	Matige problemen
3	
2	Ernstige problemen
1	
0	Zeer ernstige problemen
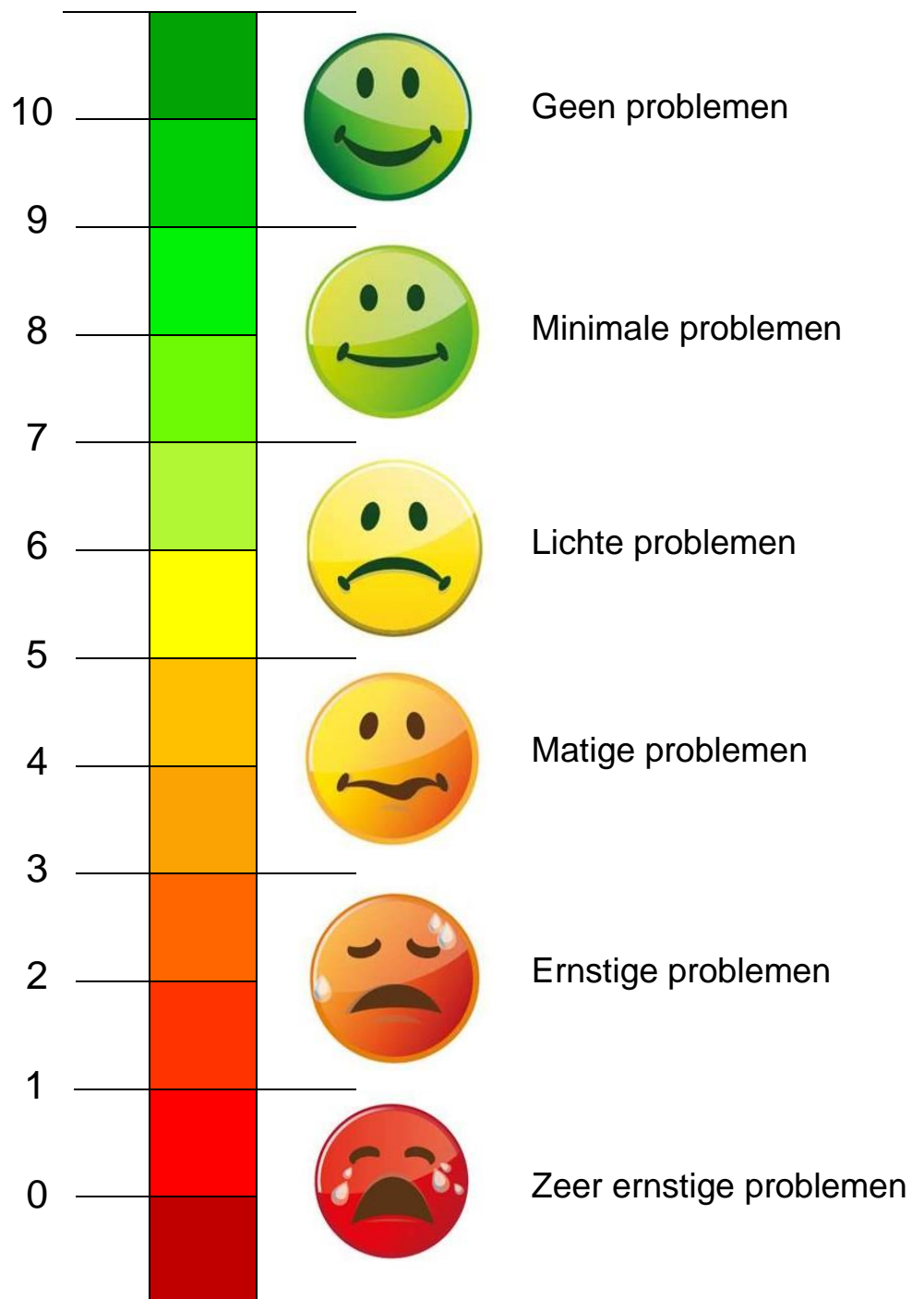
Bepalen van **ernst** van **woordvindstoornissen**

Bedankt voor uw interesse in dit onderzoek!

Dit document geeft u meer informatie over:

- **Waarom** we dit onderzoek doen
- **Wat we van u vragen**, als u besluit mee te doen
- **Wat** het onderzoek **inhoudt**

Deelnemer:

Onderzoeker: Marije Hofs – van Kats

Masterstudent Logopediewetenschap
Universiteit Utrecht
m.vankats@students.uu.nl

Waarom we dit **onderzoek** doen:

Uw **hersenen** zijn **beschadigd**,

Hierdoor heeft u **afasie**,
problemen met de **taal**.

U heeft misschien **moeite**
met het **vinden** van **woorden**:

woordvindproblemen.

Hoe ernstig zijn uw
woordvindproblemen?
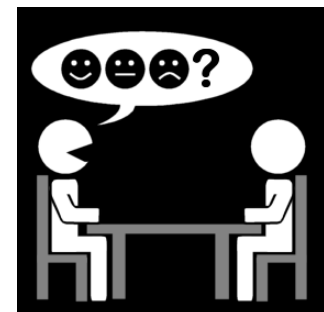
We willen **onderzoek** doen:
Hoe **bepalen** we de **ernst**
van **woordvindstoornissen.**

Wat we van u vragen:

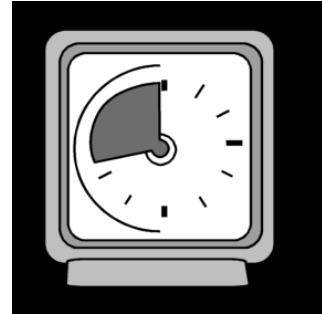Het **beantwoorden** van **vragen**
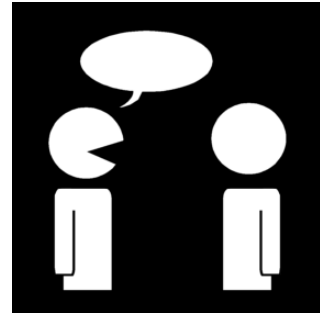
Het **beoordelen** van de **woordvindproblemen**

Het **benoemen** van **afbeeldingen**.
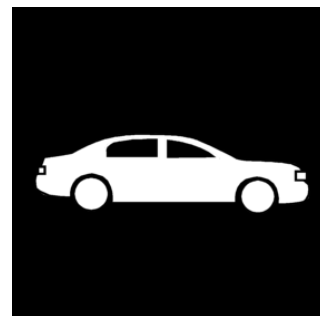
Wat het onderzoek inhoudt

Het **onderzoek** duurt
ongeveer **30 tot 45 minuten**.

Als u **moe** wordt, **stopt** u even.
U kunt **later verdergaan**.

Waar?

De **logopedist of onderzoeksassistent** bezoekt u op de
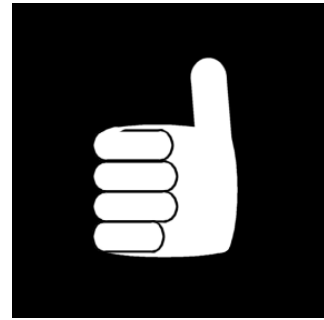**locatie** waar u bent

Wie?

Onderzoeker: Marije Hofs – van Kats

Uw eigen logopedist

Voordelen

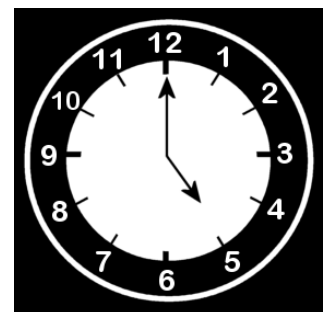Er zijn **geen risico's** verbonden
aan dit onderzoek.

Door mee te doen aan het onderzoek:

- **Helpt u mee** met het **beter beoordelen**
  van **woordvindproblemen**
  bij **mensen met afasie.**

- **Draagt u bij** aan
  wetenschappelijk onderzoek.
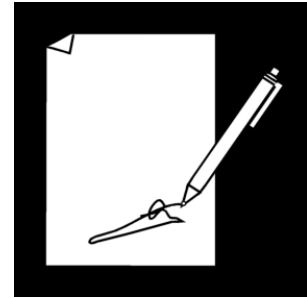
Nadelen

Het **afnemen** van het **onderzoek**
kost u **tijd**

Toestemming

Als u besluit **mee te doen**,

moet u een **formulier ondertekenen.**

Met uw **handtekening:**

- **Bevestigt** u dat u **voldoende informatie**
  heeft **ontvangen**
- Geeft u **toestemming** om het **onderzoek**
  bij u **uit te voeren**

U kunt **altijd stoppen** met het **onderzoek.**

Hier hoeft u **geen reden** voor te geven.

Stoppen heeft **geen invloed**
op uw verdere **behandeling.**

Wie is er nog meer betrokken bij het onderzoek?

Met uw **toestemming** vragen we

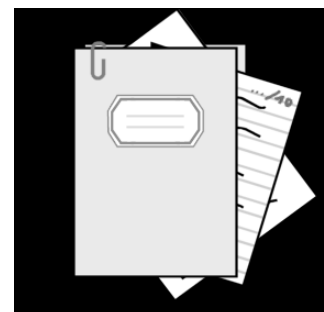**meer informatie** over uw **afasie**

aan uw **behandelaar**.

Wat gebeurt er met mijn gegevens?

Uw **gegevens** worden

vertrouwelijk behandeld.

Uw **naam** zal **niet gebruikt** worden.

Resultaten

De **resultaten** van het onderzoek

worden **opgeschreven**.

Ze worden **bewaard** aan de

Hogeschool Utrecht.

Toestemmingsformulier

Informed consent

De **informatie** op de vorige bladzijden is aan mij **uitgelegd**.

✔ ☐ JA   ✖ ☐ NEE

Ik heb een **kopie gekregen** van dit **document**.

✔ ☐ JA   ✖ ☐ NEE

Ik ga **akkoord** met **deelname** aan dit **onderzoek**.

✔ ☐ JA   ✖ ☐ NEE

Naam:_____   Datum: _____

Handtekening:_____

_____

Logopedist: _____   Participantencode: _____

Handtekening: _____