

# Effect of incubation on the resolution of Tip-of-the-Tongue states and the relation with attention and concentration

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## Abstract

This study replicates Choi and Smith (2005) and Masselink (2012) and takes a closer look at the effect of incubation and tip-of-the-tongue (TOT) strength on the resolution of these “TOTs”. In other words, is it better to try to find the correct target word after an incubation period, or is it better to stay persistent and keep trying? Thirty participants were asked general knowledge questions. All questions were repeated, some immediately and some after an incubation period. Participant had to respond to each question not knowing the answer, knowing the answer or experiencing a TOT. If a TOT was experienced, the strength of the TOT had to be reported on a scale of 1-4, ranging from weak to very strong. In addition, the relation between attention and concentration and TOT resolution or TOT incidence was explored. The results replicated Choi and Smith (2005) and Masselink (2012), stating that there is a clear effect of incubation and TOT state. The resolution rate was higher for initially unsolved items that were retested after an incubation period. Results also showed that TOTs are more likely to be resolved than non-TOTs and stronger TOTs are more likely to be resolved than weaker TOTs. No relation was found between attention and concentration and TOT resolution or TOT incidence.

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## Introduction

Most often when you're being asked a general knowledge question, you either know the answer, or don't know the answer. However, sometimes you know you know something, but can't get to the right word. The word seems to be right there, on the tip of your tongue, but you just cannot recall it. This phenomenon is called the tip-of-the-tongue (TOT) phenomenon. When people are in a TOT state they have a feeling that the retrieval of a word is imminent, but they cannot recall it yet (Brown, 1991).

This study is a replication of Choi and Smith (2005) and Masselink (2012). In these studies, the relation between incubation and resolution, and TOT strength and resolution was studied. In other words, if someone is experiencing a TOT, what is the best way to achieve retrieval? Is it better to keep trying, or is it better to have an incubation period and to get back to the unrecalled target word after some time? Is a strong TOT more likely to be resolved than a weak TOT?

The TOT phenomenon is a rather unexplored and somewhat vague subject. Almost everybody experiences it from time to time, but where does it come from? And why does it even happen? In the search for answers to these questions, several theories have been developed over the past decades. According to Choi and Smith, there are three main theories when it comes to explaining TOTs: the blocking theory (e.g. Warriner & Humphreys, 2008), the partial activation theory (e.g. Meyer & Bock, 1992) and the metacognitive control theory (e.g. Schwartz, 2001). According to the blocking theory, the retrieval process is being disturbed by similar information that is blocking the path to the correct target word. According to the partial activation theory, a TOT arises when the level of activation of certain information to retrieve the target word, is not enough to surpass a certain threshold. This can result in finding only a part of the target word, for example the first letter (Cohen & Faulkner, 1986 in: Choi & Smith, 2005). The metacognitive control theory states that the strength of a TOT is determined by the amount of effort that is being put into retrieval of the correct target word (Schwartz, 2001).

When it comes to TOT strength and resolution, the blocking theory doesn't offer clear explanations. The blocking theory is more centered on TOT incidence and the nature of the blocking words. However, we might assume that a weak TOT might be caused by a high number or stronger influence of blocking words and a strong TOT by a lower number or weaker influence of blocking words. So, a strong TOT might seem "closer" to the target word because the number or strength of words blocking the path to the target word is low. The partial activation theory is clearer about the relation between TOT strength and resolution. This theory states that the level of activation is an indication for the TOT strength. So, if the level of activation is high, the TOT strength is high as well. This means that strong TOTs are closer to the activation threshold than the weak TOTs, thereby increasing the chance on resolution when a strong TOT is experienced (Choi & Smith, 2005). The metacognitive control theory also accounts for the relation between TOT strength and resolution, by stating that a strong TOT heightens the effort that is being put into retrieval of the target word. With more effort being put into retrieval, the chance of resolution is higher.

Choi and Smith derive hypotheses from these three theories concerning incubation. The blocking theory explains the disturbance of the retrieval process by other information. Now, if there is an incubation period between the repetitions of the question, the disturbing information that is blocking the correct target word will fade away because no attention will be paid to that information. Thus, according to the blocking theory, it is more likely to retrieve the correct target word after an incubation

period. The partial activation theory doesn't make a clear prediction when it comes to the effect of incubation. It would be logical to assume that the activation threshold for retrieval wouldn't differ much between the test and the retest. It would even be more logical to assume that the chance of resolution lowers when there is an incubation period, because the strength of activation would drop after an incubation period. The metacognitive control theory states that stronger TOTs increase the amount of effort that is being put into retrieval of the target word. Schwartz (1998) showed that TOT frequency decreases from initial attempts to answer questions compared to retests of the same questions a few minutes later. On the basis of this, Choi and Smith predicted that the TOT strength would decrease after an incubation period. According to the metacognitive control theory, this would result in a lower effort of retrieval and therefore a decrease in resolution rates.

In order to test the effect of an incubation period on the resolution of a TOT, Choi and Smith offered participants several general knowledge questions to answer. When participants experienced a TOT, they had to report the strength of this TOT. All questions were repeated, some immediately, but others after an incubation period. The results showed a significant effect of incubation and a significant effect of TOT strength. More TOTs were resolved after a delayed retest, compared to the immediately retested items. Stronger TOTs were also more likely to be resolved than weaker TOTs. There was also a marginal interaction effect between incubation and TOT strength. So, a stronger TOT is more likely to be resolved after an incubation period than a weaker TOT. These results seem to be in line with the blocking theory.

Masselink (2012) replicated the experiment from Choi and Smith and extended it further by adding several cognitive tests; a vocabulary test, a working memory test and a word fluency test. These tests were added to explore the relations between the occurrence and resolution of TOTs and several cognitive abilities. Concerning the TOT experiment, Masselink found the same results as Choi and Smith. The interaction effect with incubation and TOT strength was found significant, instead of marginally significant, as in the results of Choi and Smith. Correlation analysis did not show any significant relations between TOT incidence or resolution and the scores on the cognitive tests.

This study differs from Masselink (2012) in that the cognitive tests are replaced by the d2 attention and concentration test (Brickenkamp & Zillmer, 1998). So far, no research has been done on TOTs and attention, but there have been similar studies on attention and memory. For example, Nieves Pérez-Mata, Don Read, and Diges (2002) predicted "that the availability of recollective information about list items and elicited words in an immediate recall test is likely to be greater following full than divided attention" (p. 164). This was tested by dividing participants into two conditions, a Full Attention and a Divided Attention condition. The Full Attention condition could focus on the item list, while the Divided Attention condition was simultaneously presented another visual or auditory task. Both conditions were presented four item lists and were asked for written recall afterwards. The results showed that the Full Attention condition recalled significantly more items correctly. Also, a significantly higher number of nonpresented words were recalled in the Divided Attention condition. Recalling word lists and general knowledge isn't the same, but both tasks are based on the recall of information from memory. So a higher level of attention and concentration (as in the Full Attention condition) relates to more correctly recalled items. So, the recollection of information from memory seems to work better when more attention and concentration is paid to the recollection task. In another study, Naveh-Benjamin, Craik,

Guez and Dori (1998) clearly point out a similar relationship by stating that “retrieval processes are obligatory but do require attention resources for the execution” (p. 1091).

In this study, the participants are not presented with simultaneous tasks to evoke divided attention, but instead their attention and concentration performance will be measured. A higher level of attention and concentration is expected to result in a higher resolution rate. While a lower level of attention and concentration is expected to result in a higher TOT incidence.

Another reason why attention and concentration might have something to do with TOTs are neurological disorders, in particular fatigue. Fatigue is often seen as an everyday occurrence, but persistent and severe fatigue can be seen as a disorder. There are several forms of fatigue, but for this study the focus is only on the form called central fatigue. Central fatigue basically means an inability to provide the mental processes with enough energy (Allman & Rice, 2002). Central fatigue is a very broad concept and can have many causes and symptoms. But when mental processes are affected, language processing might be affected as well. For example, patients diagnosed with central or chronic fatigue syndrom often show speaking and word-finding difficulties (Chaudhuri & Behan, 2000; Chaudhuri & Behan 2004).

So, chronic or central fatigue is related to speaking and word-finding difficulties, but attention and concentration might mediate this effect. When there is less energy for mental processes, attention and concentration drops as well. So this theoretical relation might indicate that low attention and concentration can result in difficulties in word-finding, which should show a higher incidence of TOTs.

To conclude, the aim of this study is to replicate Choi and Smith (2005) and Masselink (2012). The following hypotheses will be tested: (i) the resolution of TOTs is higher than the resolution of non-TOTs, (ii) TOT strength is positively related to resolution, (iii) the resolution rate for delayed retest is higher than immediate retest, (iv) the score on the attention and concentration test is positively related to TOT resolution and negatively related to TOT incidence.

## Method

### Participants

A total of 30 undergraduate students of the University of Twente participated in this experiment. There were 13 males and 17 females, mean age was 21.2 years (SD: 3.13), range 18-30 years. Students signed up through an online sign-up system and participated for credit points. The experiment was conducted in three sessions in which 6, 9 and 15 participants were tested, respectively.

## Material

### TOT Stimuli

The TOT Stimuli of Choi and Smith consisted of a 48 general knowledge questions. These questions were divided into six categories of eight questions each. The categories were the same as in Choi and Smith and included questions about capital cities, names of diseases, names of male celebrities, names of female celebrities, names of politicians and geographical locations. Masselink (2012) translated the items into Dutch; these questions were again used for this experiment. The questions were presented using PowerPoint and a beamer screen. All questions were repeated, resulting in a total of 96 measurements. In order to study the effect of incubation as a within subjects variable the repetition of the questions was either immediately or delayed. Per category, questions were randomly assigned to either immediate or delayed repetition. This resulted in half of the questions being repeated immediately, while the other half of the questions were repeated after all the questions had been presented. This caused a delay between the initial question and the repetition of the question varying from 13 to 29 minutes with an average of 21 minutes. The reason for the varying time between the repetitions of questions was the difference in number of questions between the initial question and the repetition of the question. Therefore, the questions were counterbalanced in order to control for any sequence effects: in one half of the group, immediately repeated questions of the other were turned into delayed repeated questions.

With every question, the participant could respond in one of three ways. The first possibility was that the participant knew the answer and had to write it down. The second possibility was that the participant did not know the answer, he or she then had to mark the box “don’t know the answer”. The third possibility was that the participant experienced a TOT and then had to clarify the strength of this TOT. The strength of a TOT could be indicated into four categories; “weak”, “moderate”, “strong” and “very strong”. The participants needed to do this for every question, also if they knew the answer or answered with “don’t know the answer”. This was done to prevent any ambiguities and to ease the data processing. If a question showed up for the second time, the participant was asked to treat this question as if it is seen for the first time. After the second time the question was asked, the answer would show up on the next sheet. If the participant had reported to experience a TOT, the participant was asked to confirm or deny that the correct answer was the word that the participant was searching for. If the participant did not experience a TOT, this question did not have to be answered.

### d2 attention and concentration test

In order to test the attention and concentration of the participants, the d2 attention and concentration test was used (Brickenkamp & Zillmer, 1998). This test consists of 14 lines with 47 stimuli on each line.

Each stimulus consists of a combination of the letters d or p with one to four apostrophe signs. In each line, the d combined with two apostrophes must be marked with a pen. The participant has 20 seconds time for each line. After those 20 seconds they hear a beep signaling to move immediately to the next line. This procedure is repeated until the last line. Attention and concentration will be measured by counting the number of correct markings minus the incorrect markings within the given time.

## Procedure

At the start of the experiment, the participants were welcomed and given an introduction to the tests they would perform. The test for attention and concentration preceded the test on TOT states, to prevent the TOT states test possibly affecting the attention and concentration of the participants. The participants first read the instruction and practiced with an example. After that, the experimenter summarized the most important instructions and checked if all participants had filled in the example correctly. Possible questions from the participants were answered at that point and if everything was clear they were told to wait for the first beep as a sign to turn the page and start the test. After they finished the test the participants were asked to write their name and participant number on the front sheet of the test. Then the tests were taken in by the experimenter and the TOT stimuli test was handed out. The participants were asked to read the instruction of this test. Then the experimenter summarized the most important instructions and asked if there were any questions up to that point. Then the participants practiced with four exemplary questions. When this was finished, the participants were allowed a last time to ask any questions before the real test would start. After that the test started and TOT stimuli would run automatically as a PowerPoint-presentation. After the quiz, the participants were asked to hand in their test forms and had the opportunity to ask questions about the subject of the study. After that the experiment was finished.

## Scoring and data-analysis

All the answers from the TOT stimuli were processed and the same questions from the first test and the retest were then compared to each other. If the participant gave a wrong answer in the retest, the answer in the first test was scored as “don’t know the answer”. If a participant experienced a TOT in the first test or the retest, but the TOT wasn’t similar to the correct answer, the answer for both tests was scored as “don’t know the answer”. There were also cases when a TOT was reported in the first test, but during the retest the participant did not report a TOT anymore and also didn’t know the answer. In those cases the reported TOT in the first test was dismissed and scored as “don’t know the answer”. So only TOTs that are confirmed by the participant to be similar to the correct answer were processed, to exclude all false TOTs from the data.



## Results

Just as in Choi and Smith (2005) and Masselink (2012) significance level of  $p < .05$  was used on all statistical tests. An analysis of variance (ANOVA) was performed using incubation (immediate retest vs. delayed retest) and TOT state (TOTs rated as 1-4 vs. non-TOTs; where non-TOTs are the unanswered questions) as the independent variables and resolution as the dependent variable. Participants who did not experience any TOT during the first or second presentation were not included in the analyses. This was the case with one participant, so the results of 29 participants were used for analyses.

There was a significant effect of incubation  $F(1,28) = 6.79$ ,  $MSE=0.015$  and there was a significant effect of TOT state  $F(1,28) = 27.81$ ,  $MSE < 0.0001$ . This means a greater proportion of initially unsolved items were resolved when the retest was delayed, rather than immediate. Also, a greater proportion of initially unsolved items were resolved when the participants experienced a TOT compared to not knowing the answer. There also was a significant interaction effect between incubation and TOT strength  $F(1,28) = 4.78$ ,  $MSE = 0.037$ . Figure 1 shows the relationship between the different TOT strengths and resolution. The mean resolution rates for non-TOTs in the immediate and delayed condition were 2% and 5% respectively. The mean resolution rates for TOTs rated as 'weak' were 13% and 20% respectively. The mean resolution rates for TOTs rated as 'moderate' were 5% and 17% respectively. The mean resolution rates for TOTs rated as 'strong' were 5% and 21% respectively and the mean resolution rates

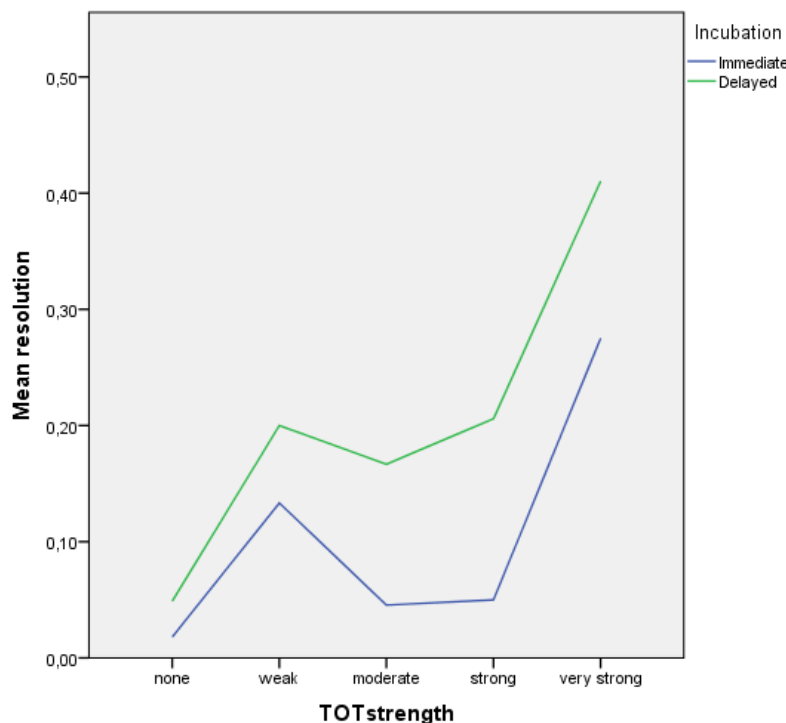


Figure 1. Relationship between TOT strength and resolution for immediate and delayed retest

for TOTs rated as 'very strong' were 28% and 41% respectively.

Paired t-tests showed that a significantly greater proportion of the initially unrecalled items was resolved in the delayed retest than in the immediate retest for TOTs,  $t(28) = 2.48$ ,  $p = .02$ , but no

significant greater proportion of the initially unrecalled items was resolved in the delayed retest than in the immediate retest for non-TOTs,  $t(28) = 1.51, p = .14$  (see Table 1).

Correlation analysis showed no significant relation between TOT incidence (total of all 96 questions) and the score on the attention and concentration test ( $r(30) = 0.29, p = 0.13$ ). Also no significant relation was found between the resolution rate and the score on the attention and concentration test ( $r(30) = -0.17, p = 0.36$ ).

Table 1. Mean resolution scores as a function of incubation and TOT state

TOT state	Incubation					
	Immediate			Delayed		
	M	SE	n	M	SE	n
non-TOTs	0.02	0.01	9.59	0.04	0.01	9.90
TOTs	0.14	0.04	4.03	0.29	0.06	3.86

## Conclusions and discussion

This study aimed to replicate Choi and Smith (2005) and Masselink (2012) by testing the effect of incubation and TOT strength on resolution. In addition to these studies, the relation between attention and concentration and TOT incidence and resolution was explored.

Analysis showed that the resolution of TOTs was significantly higher than the resolution of non-TOTs. The percentage of TOTs that are resolved was 21.8%, while the percentage of non-TOTs resolved was only 3.1%. Analysis also showed that TOT strength is related to resolution, but that doesn't count for all the TOTs. The TOTs rated as 'very strong' clearly show a higher resolution rate than TOTs rated as 'weak', 'moderate' and 'strong'. The resolution rate for delayed retest was higher than for the immediate retest. The percentage of initially unsolved items that were resolved in the immediate retest was 5.5%, while the percentage of initially unsolved items that were resolved in the delayed retest was almost twice as high with 10.9%. Correlation analysis showed no relation between attention and concentration and TOT resolution, nor did it show any relation between attention and concentration and TOT incidence.

All findings concerning incubation and TOT resolution are in line with the results that were found by Choi and Smith (2005) and Masselink (2012). The only difference that was found concerns the interaction effect between incubation and TOT state. Choi and Smith only found a marginal interaction, while Masselink found a significant interaction. This study also showed a significant interaction effect between incubation and TOT state. Masselink (2012) explored relations between cognitive abilities (vocabulary, working memory and word fluency) and TOT resolution or TOT incidence, but found no relations. This study explored the relations between attention and concentration and TOT resolution or TOT incidence, but also no relations were found.

Since the results replicate Choi and Smith (2005) and Masselink (2012), the consequences are the same for the three theories that were discussed in the introduction. The incubation effect that is found supports the blocking theory. The theory states that the correct target word is being blocked by other information, which will fade away after some time. The chance of retrieval is therefore bigger at the delayed retest, rather than at the immediate retest. The partial activation theory is not supported by these results, because the activation threshold is unlikely to be exceeded in the delayed retest, rather than the immediate retest. The metacognitive control theory does not make any concrete claims when it comes to incubation. However, this theory does state that the strength of a TOT is determined by the amount of effort put into retrieval. It would seem likely that the amount of effort put into retrieval is more intense in the immediate retest, rather than the delayed retest. In the delayed retest, the will and effort to achieve retrieval probably got less intense due to the other questions presented in the meantime. So the results from this study don't seem to support the metacognitive control theory.

The partial activation theory and the metacognitive control theory did predict the results concerning TOT state and TOT strength. The partial activation theory is about surpassing a threshold in order to retrieve the correct target word. When a strong TOT is reported, the threshold is closer to being exceeded compared to a weaker TOT. This results in a higher resolution rate for stronger TOTs, which is supported by the results. The metacognitive control theory is about the will and effort that is put into finding the correct target word. If a strong TOT is reported, the will to find the correct target word is bigger compared to a weaker TOT. But also the blocking theory is being supported by these results. The stronger the TOT, the less disturbing information is blocking the retrieval of the correct target word.

So the same conclusion can be drawn as in the research by Choi and Smith (2005) and Masselink (2012), that the blocking theory is the only theory that is fully supported by all the results. The partial activation and the metacognitive control theory did predict the effect of TOT strength on resolution. But these two theories also predicted a reversed incubation effect, while the results show a incubation effect instead.

Just as Masselink (2012) couldn't find any link between TOTs and cognitive abilities, this study also failed to find any relation between attention and concentration and TOT incidence or resolution. Maybe it is hard to relate a subjective introspective judgement from the participants about the experience of TOTs with cognitive abilities, attention and concentration. Maybe the answer lies more in the eagerness to answer questions correctly. The participant could be biased by the introduction to the TOT stimuli and suddenly become much more aware of TOTs than usual. Or the participant thinks he should know the answer to a certain question and therefor scores it as a TOT.

Even though the results of this study are in line with previous studies, there is still room for improvement. The significantly higher resolution rate for very strong TOTs is clear. But the fairly high resolution rate for weak TOTs, compared to the moderate and strong TOTs is suprising. In this study, false TOTs were processed as non-TOTs and changes in TOT strength couldn't be analyzed good enough because of the low number of reported TOTs for each category. Taking a closer look at false TOTs and changes in TOT strength might give even better insight in the process behind TOT resolution.

Another approach is to put the focus on the target words, instead of the participants and the resolution of TOTs. There were six different categories in the TOT stimuli, but the number of TOTs per category differed. The categories geographical locations and names of female celebrities show high amount of TOTs, while the category names of politicians show a low amount of TOTs compared to the other categories. Finding out which kind or what sort of words cause more TOTs may give more insight in the theories behind TOT resolution. So for example, does it matter if the word is long? Or if the word is unusual, or even very common? Do uncommon words cause more TOTs because those words are rarely used, or do they cause less TOTs because there hardly any similar target words blocking it?

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## Appendix A: Dutch protocol used during the experiment

Protocol voor 'Benieuwd naar je algemene kennis? Doe de Quiz!'

### Binnenkomst

"Hallo, welkom bij het onderzoek 'Benieuwd naar je algemene kennis? Doe de Quiz!'. Ik wil jullie allereerst vragen om de "geinformeerde toestemming" door te lezen en in te vullen. Daarna zal ik de eerste test, namelijk de aandacht- en concentratietest uitdelen. Jullie mogen de instructies lezen." Nadat de proefpersonen de instructies hebben gelezen: "Ik wil graag met jullie de instructie nog even mondeling doornemen om er zeker van te zijn dat jullie goed begrijpen wat de bedoeling is. Na afloop van deze test gaan we beginnen aan de quiz. Zijn er nog vragen?"

### De instructie voor de aandacht- en concentratietest

"Jullie hebben zojuist de instructie gekregen voor de aandacht- en concentratietest. Lees deze even rustig door en maak vervolgens de oefenregel". Nadat iedereen de oefenregel had gemaakt: "jullie hebben nu allemaal de oefenregel gemaakt en die wil ik graag even samen nakijken. Ik zal de nummers noemen die jullie doorgestreept moeten hebben: 1, 3, 5, 6, 9, 12, 13, 17, 19, 22. Heeft iedereen dit goed gedaan? Als de test straks begint zul je dus elke 20 seconden een piepje horen, zodra je dat piepje hoort stop je met de regel waar je mee bezig bent en ga je direct door naar de volgende regel. Dit doe je net zolang tot je bij het einde bent. Je mag het blad omslaan en met de test beginnen zodra je het eerste piepje hoort. Als er nog vragen zijn dan kun je die nu stellen, zo niet dan beginnen we met de test.

### TOT Quiz Instructie

Je krijgt zometeen een aantal quizvragen aangeboden. Dit gebeurt door middel van een PowerPoint presentatie. De vragen lees je van het scherm en de antwoorden kun je invullen op dit antwoordformulier. Voor het lezen én beantwoorden van elke vraag krijg je 20 seconden. Je kunt de bladzijde omslaan als de PowerPoint sheet dit aangeeft.

Het is de bedoeling dat je zoveel mogelijk vragen goed beantwoordt. Probeert zo volledig mogelijk antwoord te geven. Als er bijvoorbeeld naar de naam van een beroemdheid gevraagd wordt, geef je zowel de voornaam als de achternaam. Mocht je alleen op de voornaam of achternaam komen, dan moet je dat invullen. Ga niet gokken.

"TOT" staat voor "Tip of the Tongue" en betekent dat je in een toestand bent waarin je tijdelijk niet in staat bent op het woord te komen, maar waar je zeker van bent dat je het woord weet. Het is de toestand waarin het woord op het puntje van je tong lijkt te liggen.

Na elke vraag kun je één van deze drie dingen doen:

- 1) Je vult het antwoord in op de lijn als je het weet.
- 2) Je zet een kruisje in de tabel bij 'weet antwoord niet' als je het antwoord niet weet.
- 3) Heb je een TOT dan geef je in de tabel aan in welke mate. Bijv:

Weet antwoord niet	Ik ervaar een TOT			
	1 (zwak)	2 (matig)	3 (sterk)	4 (zeer sterk)
0 (geen)		X		

Er zijn 48 verschillende vragen die ieder twee keer worden aangeboden. De gehele quiz bestaat dus uit 96 vragen. Sommige vragen worden direct herhaald, andere pas na een tijdje. Behandel de herhaalde vraag net zo alsof je de vraag voor de eerste keer ziet.

Nadat een vraag voor de tweede keer is aangeboden, krijg je het antwoord. In het geval dat je een TOT ervaart (je hebt een kruisje gezet bij 1, 2, 3 of 4), geef je aan of het antwoord het woord was waar je naar zocht. Dit kan door 'JA' of 'NEE' te omcirkelen op het antwoordformulier. Je krijgt hier 8 seconden de tijd voor. Heb je geen TOT ervaren, dan hoef je deze vraag niet te beantwoorden.

Je krijgt zo eerst 2 voorbeeldvragen om te oefenen. Ze worden beide herhaald, hetzij direct of na een tijdje. Er zijn dus 4 voorbeeldvragen in totaal.

Let op: De Quiz loopt automatisch af!

Zijn er vragen? Stel ze dan nu.

Succes!

## **Einde**

“Ik wil jullie bedanken voor jullie deelname aan het onderzoek.” In het geval dat een proefpersoon geïnteresseerd was in het doel van het onderzoek: “Dit onderzoek heeft als doel het vaststellen van het effect van incubatie op de resolutie van Tip-Of-The-Tongue (TOT) toestanden. Met andere woorden: wanneer iemand niet op een woord kan komen en het gevoel heeft dat het woord op het puntje van zijn tong ligt, is het dan beter om het te laten rusten of beter om langer te blijven nadenken? Een bijkomend doel is het verkennen van het verband tussen cognitieve vaardigheden en het oplossen en/of oplossen van een TOT-toestand. Houdt TOT-incidentie en TOT-resolutie verband met aandacht en/of concentratie?”

## Appendix B: Dutch items used for the experiment

### Namen van hoofdsteden

#### Wat is...?

**1. De hoofdstad van Haïti die in 2010 getroffen werd door een zware aarbeving?**

Antwoord: Port-au-Prince

**2. De hoofdstad van Haïti die in 2010 getroffen werd door een zware aarbeving?**

Antwoord: Port-au-Prince

**3. De IJslandse hoofdstad en geboorteplaats van de zangeres Björk?**

Antwoord: Reykjavik

**4. De IJslandse hoofdstad en geboorteplaats van de zangeres Björk?**

Antwoord: Reykjavik

**5. De hoofdstad van Bosnie en Hersegovina? Tussen 1992 en 1995, tijdens de Bosnische Oorlog, werd deze stad zwaar gebombardeerd door Bosnisch-Servische troepen.**

Antwoord: Sarajevo

**6. De hoofdstad van Libië? Tijdens de opstand in 2011 was deze stad lange tijd het belangrijkste bolwerk van het Qadhafi-regime.**

Antwoord: Tripoli

**7. De hoofdstad en grootste stad van Oekraïne? Deze stad is onder andere thuisstad van een -uit de Europa Leage bekende- voetbalclub en de naam van deze voetbalclub bestaat gedeeltelijk uit de naam van de hoofdstad.**

Antwoord: Kiev

**8. De hoofdstad en grootste stad van Oekraïne? Deze stad is onder andere thuisstad van een -uit de Europa Leage bekende- voetbalclub en de naam van deze voetbalclub bestaat gedeeltelijk uit de naam van de hoofdstad.**

Antwoord: Kiev



**9. Hoofdstad van Kazachstan? Naar deze hoofdstad is ook een wielploeg vernoemd die onder andere Aleksandr Vinokoerov en Alberto Contador contracteerde.**

Antwoord: Astana

**10. De hoofdstad van de oud-nederlandse kolonie Suriname?**

Antwoord: Paramaribo

**11. De hoofdstad van Bolivia? Gelegen op 3600 meter is deze stad de “hoogste hoofdstad” ter wereld. De letterlijke nederlandse vertaling van de Spaanse naam van de stad is: ‘de vrede’.**

Antwoord: La Paz

### **Namen van ziektes**

#### **Hoe heet...?**

**1. De ziekte die gekenmerkt wordt door geheugenstoornissen? Wordt vooral bij 65+ ers vastgesteld en is beter bekend onder de naam dementie.**

Antwoord: Ziekte van Alzheimer

**2. De infectieziekte die wordt gekenmerkt door koorts en meestal hevige spier- en gewrichtspijn? De infectie is ook bekend als knokkelkoorts.**

Antwoord: Dengue

**3. Het virus dat griep veroorzaakt?**

Antwoord: influenza-virus

**4. Een ziekte die wordt gekenmerkt door vermoeidheid? De besmetting gebeurt naar men aanneemt vaak via speeksel, de reden waarom deze ziekte wel eens de kusziekte wordt genoemd.**

Antwoord: Ziekte van Pfeiffer

**5. De verzameling van verschillende vormen van bloedkanker, of preciezer kanker van witte bloedcellen?**

Antwoord: Leukemie

**6. De ziekte waarvoor ongecontroleerde spierbewegingen en het maken van geluiden kenmerkend zijn? Mensen die hieraan lijden hebben een onbedwingbare drang bepaalde bewegingen te maken of bepaalde geluiden of, vaak, scheldwoorden te uiten.**

Antwoord: Gilles de La Tourette

**7. De aandoening aan de nek of rug waarbij tussenwervelschijven uitstulpen en zenuwen beknelde kunnen raken? Hetgeen wat ernstige pijn kan opleveren en vaak operatief verholpen moet worden.**

Antwoord: Hernia

**8. De ziekte die wordt gekenmerkt door stijfheid, zwellingen en pijn in gewrichten bij het bewegen?**

Antwoord: Reuma

### **Namen van mannelijke bekendheden**

#### **Wie is/wie was...?**

**1. Een Amerikaanse rockzanger in zijn gelijknamige band? Hij werd in de jaren '80 bekend met nummers als 'Livin' on a Prayer' en 'You give love a bad name'. In 2000 had hij een comeback met het nummer 'It's My Life'.**

Antwoord: John Bon Jovi

**2. Een Amerikaanse acteur, speelt Michael in 'That 70's Show', presenteert 'Punk'D' en is te zien in onder andere 'Dude Where's My Car', 'The Butterfly Effect' en 'What Happenes in Vegas...'? Hij is getrouwd met Demi Moore.**

Antwoord: Ashton Kutcher

**3. Een Amerikaanse acteur en regisseur? Hij speelt onder andere in 'The Good, the Bad and the Ugly' en 'Dirty Harry'. Regisseerde en speelde in 'Million Dollar Baby'.**

Antwoord: Clint Eastwood

**4. Een Britse popzanger? Van 1990 tot en met 1995 maakte hij deel uit van Take That. Na die periode werd hij een succesvol solozanger met hits als 'Angels', 'Freedom' en 'Feel'.**

Antwoord: Robbie Williams

**5. Een Oostenrijks-Amerikaans bodybuilder, acteur en politicus? Van november 2003 tot januari 2011 was hij gouverneur van de Amerikaanse staat Californië. Bekend van onder andere 'Terminator'.**

Antwoord: Arnold Schwarzenegger

**6. Was de Amerikaanse zanger en gitarist van Nirvana? Hij pleegde op 5 april 1994 zelfmoord.**

Antwoord: Kurt Cobain

**7. De zanger en oprichter van Guns N' Roses?**

Antwoord: Axl Rose

**8. Een Amerikaanse filmacteur en speelt over het algemeen rollen met een komische inslag? Hij is**

**onder ander bekend van 'Beverly Hills Cop' en 'The Nutty Professor'. Sprak daarnaast de stem in van Donkey, de ezel van 'Shrek'.**

Antwoord: Eddie Murphy

#### **Namen van vrouwelijke bekendheden**

##### **Wie is/wie was...?**

**1. Een Amerikaanse actrice met de hoofdrol in 'Buffy the Vampire Slayer'?**

Antwoord: Sarah Michelle Gellar

**2. Een Amerikaanse actrice, onder andere bekend van '8 mile', 'Just Married' en het inspreken van de stem van Gloria in 'Happy Feet'? Ze overleed in december 2009.**

Antwoord: Brittany Murphy

**3. Een vrouwelijke Hollywood ster? Bekend van films als 'Entrapment', 'The Mask of Zorro' en 'Ocean's Twelve'. Ze is getrouwd met Michael Douglas.**

Antwoord: Catherine Zeta Jones

**4. De hoofdrolspeelster in 'Sex and the City'? Ze is getrouwd met acteur Matthew Broderick.**

Antwoord: Sarah Jessica Parker

**5. Een Amerikaanse actrice, bekend door haar rol Rachel in 'Friends'? Ze speelt onder andere in 'The Bounty Hunter', 'Love Happens' en 'The Break-Up'. Ze was getrouwd met Brad Pitt.**

Antwoord: Jennifer Aniston

**6. Een Amerikaanse zangeres en actrice? Ze speelde in musicals als 'Hello Dolly!' en scoorde in Nederland een hit met 'woman in love' en 'tell him', een duet met Celine Dion. In 2010 wordt de hit van Duck Sauce naar haar vernoemd.**

Antwoord: Barbara Streisand

**7. Een Amerikaanse popzangeres? Brak door in 2008 met het nummer 'I kissed a girl'. Ze is getrouwd met Russell Brand.**

Antwoord: Katy Perry

**8. Een Amerikaanse societyster, model, zangeres en actrice? Ze is de achterkleindochter van de oprichter van de gelijknamige Hotels Corporation. Speelde samen met Nicole Richie in 'The Simple Life'.**

Antwoord: Paris Hilton

**Namen van politici en/of politieke figuren**

**Wie is/wie was...?**

**1. Een Duitse christendemocratische politica? Ze is sinds 22 november 2005 bondskanselier van Duitsland en daarmee de eerste vrouwelijke regeringsleider van dat land.**

Antwoord: Angela Merkel

**2. Een Nederlandse politicus en econoom? Hij is namens het CDA minister van Financiën in het kabinet-Rutte.**

Antwoord: Jan Kees de Jager

**3. Een diplomaat afkomstig uit Ghana en was van 1997 tot en met 2006 de eerste zwarte secretaris-generaal van de Verenigde Naties? Hij geldt als een succesvol hervormer. Ontving in 2001 de Nobelprijs van de vrede.**

Antwoord: Kofi Annan

**4. De 43e president van Amerika en voorganger van Barack Obama? Hij is een zoon van de 41<sup>e</sup> president van Amerika.**

Antwoord: George W. Bush

**5. Een Nederlandse CDA-politicus geweest? Was van juli 2002 tot oktober 2010 minister-president van Nederland.**

Antwoord: Jan Peter Balkenende

**6. Een Nederlandse politicus en partijleider van de Partij voor de Vrijheid (PVV)?**

Antwoord: Geert Wilders

**7. Een Grieks politicus en vorige premier van Griekenland? Hij was veel in het nieuws te zien in verband met de economische crisis.**

Antwoord: Giorgos Papandreou

**8. Sinds 1578 de belangrijkste spiritueel leider in het Tibetaans boeddhisme?**

Antwoord: Dalai Lama

**Namen van geografische locaties**

**Hoe heet...**

**1. Het met heide begroeid Nederlands natuurgebied gelegen in Gelderland. Grote delen van dit gebied bestaan uit stuwwallen, die zo'n 150.000 jaar geleden ontstaan zijn in de voorlaatste ijstijd.**

Antwoord: De Veluwe

**2. De randzee van de Middellandse Zee tussen Italië en Kroatië?**

Antwoord: Adriatische zee

**3. De hoogste berg van Afrika? Deze berg steekt ruim 5 kilometer uit boven zijn omgeving en is daarmee de hoogste vrijstaande berg ter wereld.**

Antwoord: Kilimanjaro

**4. Een groot meer op de grens tussen Zwitserland in het noorden en Frankrijk in het zuiden? De naam van dit meer komt ook voor in een viertal verdragen getekend na belangrijke oorlogen.**

Antwoord: Meer van Genève

**5. Een grote rivier in Zuid-Amerika. Deze ontspringt in Peru en komt uit in de Atlantische Oceaan in Brazilië en stroom door het gelijknamige regenwoud.**

Antwoord: Amazone

**6. Het gebergte in het zuiden van Azië? Dit gebergte is onder andere bekend door de hoogste berg ter wereld, de Mount Everest.**

Antwoord: Himalaya

**7. De vulkaan aan de oostkant van het Italiaanse eiland Sicilië?**

Antwoord: Etna

**8. De eilandengroep in de Middellandse Zee, ten oosten van het Spaanse vasteland. Tot deze eilandengroep behoren onder andere Mallorca en Ibiza.**

Antwoord: Balearen