UNIVERSITETET I AGDER

Investigating tip-of-the-tongue states in Norwegian-English bilinguals

Effects of word frequency, cognate status and noun type in word retrieval, in relation to the bilingual profile

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Abstract

The current study aimed to explore the effects of frequency, cognate status and noun type in tip-of-the-tongue occurrences in Norwegian-English bilinguals. In what manner the bilingual profile may exert influence on the matter was of additional interest. This study also attempted to relate results to the varying approaches presented by the weaker links hypothesis and the competition hypothesis. Stimuli sets were created consisting of target words controlled for the aforementioned manipulations and randomly dispersed throughout experiment blocks. Predictions were made based on language production models and results from similar studies performed previously. Upon completing bilingual profile questionnaires (LEAP-Q), participants were tested by being given definitions aiming to induce TOTs in both languages. In order to investigate the effect of difference in language profile on our findings, the results from the LEAP-Q factor analysis were included in the mixed effects model. Correctly predicted was that participants experienced greater TOT occurrences in their non-dominant language and showed higher TOT rates for low-frequency words. Participants of lower proficiency produced more TOTs, showing English proficiency to be the only factor to predict TOTs. Controversially, results showed that more TOTs were experienced for cognate words, specifically proper nouns. Future studies are required to further dissect the underlying retrieval processes pertaining to the tip-of-the-tongue states in bilinguals.

Introduction

The frustrating feeling of being incapable of retrieving a familiar word is experienced by all language speakers alike across all languages (Brown, 1991; Brown & McNeill, 1966; Schwartz, 1999). This also applies to sign-language users, who experience tip-of-the-finger moments (Thompson, Emmorey, & Gollan, 2005). However, a plethora of studies have indicated a greater occurrence of tip-of the-tongue (TOT) states in bilingual language speakers in comparison to monolingual speakers worldwide (Gollan & Silverberg, 2001; Gollan & Acenas, 2004; Gollan et. al., 2014). The history of each individual bilingual differs from another in a myriad of ways, largely affecting bilingual performance. Multiple additional factors have been considered to be influential to the experience and several theories have been developed in an attempt to shed light on the matter. Previous studies have indicated that aspects such as word frequency (Gollan and Acenas, 2004), cognate status, syllable position, word length (Pureza, Soares & Comesaña, 2016), translation priming (Gollan, Ferreira, Cera & Flett, 2014) and word form (Gollan, Bonanni & Montoya, 2005) may play significant roles on tip-of-the-tongue occurrences in bilinguals. The current study examines bilingual word retrieval, as well as whether factors such as language proficiency and dominance may play a role and how they may relate to key theories. The intention is to further investigate the effects that higher vs lower frequency words, cognate vs non-cognate words, and common nouns vs proper nouns may have when attempting to induce TOT states in Norwegian-English bilinguals. Additionally, the bilingual profiling of the individual participants of the study is important to take into account and will therefore be considered throughout all aspects of constraint.

What is a Bilingual?

Currently the norm rather than the exception in the world today, bilingualism is complicated to define and highly contended by experts (Harris & McGhee-Nelson, 1992). Being bilingual involves more than just having learned two languages from birth. It may be said that a bilingual is capable of speaking and understanding two languages or maintains the ability to use more than one language on a regular basis. Furthermore, bilinguals differ vastly from one another in multiple factors. Competence levels, proficiency and preference differ for varying subsets and registers of use in each of their languages. While some bilinguals practice one language in a larger context (dominance), others engage in both languages more equally balanced in frequency. Age of acquisition, type and amount of input received, as well as the situation in which each language is spoken, vary greatly and affect proficiency. Both first and second language domains are dynamic in nature and ever-changing throughout the life of a bilingual (Birdsong, 2014). These differences between bilinguals make the study of bilingualism a fascinating, yet challenging feat.

Previous research has often yielded inconsistent findings regarding bilingual cortical organization (e.g., Kim, Relkin, Lee & Hirsch, 1997; Marian, Spivey & Hirsch, 2003; Perani et al., 1998) and lexical processing (e.g., Chen, 1992; Kroll & de Groot, 1997) as well as phonological and orthographic processing (e.g., Macnamara & Kushnir, 1971; Doctor & Klein, 1992; Grainger, 1993). These aspects have been found to vary significantly between individual bilinguals, depending on when and how they acquired their languages, their history of language use as well as their degrees of proficiency (Marian et al., 2007). While language self-assessment measures have generally proved indicative of linguistic ability, these tools spanned both domain general and domain specific proficiency. For example, Delgado et al. (1999) revealed that their bilingual participants assessed their first language (L1) proficiency more accurately than their second language (L2) skills. Woodcock & Muñoz-Sandoval (1993) found that self-ratings of (L2) reading and writing skills were more precise than self-ratings of speaking and understanding in (L2). Additional research indicated that ratings related to language dominance were highly correlated with performance on certain tasks (e.g., recognition of vocabulary and generating category) but were minimally correlated with other tasks, such as oral comprehension (Bahrick et al., 1994).

Early research employed varied methods of determining proficiency, from self-rating to reliance on the experimenter's subjective judgment (e.g., Goggin, Estrada, & Villarreal, 1994; Talamas, Kroll, & Dufour, 1999). Bilingual history factors such as early language exposure, current language use, speed of instruction execution and picture-naming speed have been used by researchers in order to establish language dominance (Marian et al., 2007). Previous studies have often rated bilinguals' language proficiency based on performance results from only one or two tasks (e.g., Jia et al., 2002; Flege et al., 1999) rather than a larger range of behavioral tasks. Snow & Hoefnagel-Höhle (1978) found evidence suggesting that certain variables regarding language history apply differently across performance domains, such as age of acquisition not applying as much to morphosyntax as it does to phonology. The lack of uniformity of assessment methods in previous studies prompted the requirement of a comprehensive assessment of behavioral language performance for the purpose of establishing an accurate account of the interrelation of bilinguals' self-assessments and reports (Marian et al, 2007). It was proposed that ratings of proficiency alone cannot suffice in the determination of the language status of bilinguals, and that language learning and use largely influence and shape bilinguals' competence (Grosjean, 1998).

Grosjean comprised the following index of critical factors with the intent of building an accurate bilingual profile:

1. Language history and language relationship: Age of exposure to L1 and L2, context of language acquisition, years of education in L1/L2
2. Language stability: The process of the language acquisition, language restructuring (access to L1/L2 due to context)

3. Language use: Is L1/L2 spoken at home, work, school? Daily life use of L1/L2 (watch TV, read a book, listening to the radio)
4. Language competence: L1/L2 skills in listening, reading, writing and speaking (Proficiency)
5. Language modes: Percentage of L1/L2 use in a monolingual and bilingual context (language switching experience)
6. Biographical data: Age, socio-economic and educational status, etc (Grosjean, 1998, p. 141).

This index has since been developed into a Language Experience and Proficiency Questionnaire (LEAP-Q) using a two-part study. The purpose of the LEAP-Q study was to develop a method of bilingual history assessment that was able to reliably predict connections between self-reported proficiency and behavioral performance (Marian et al, 2007). This study, along with the questionnaire, will be returned to in greater detail below.

Monolingual Word Production

When investigating language processes in the mind, however, uncertainty has been aroused as to how bilinguals process their two languages compared to monolingual processes. Whether a bilingual mind is simply equivalent to two monolingual systems in one mind was a topic of contention between early researchers in the field (e.g., Kolers, 1963; McCormack, 1977; Weinreich, 1953). Prior to spoken word production in monolinguals, processes occur in the human brain which facilitate speech. Primarily, a message is conceptualized in the brain, followed by selection of relevant information prepared by the speaker with the intention of conveying an utterance (Levelt, 1989). While many of the details of this process have yet to be ascertained, it is presumed that subsequent to conceptualization, a process of formulation (word retrieval) occurs prior to articulation. A speaker selects a sub-lexical concept (lemma) containing semantic and syntactic properties from the mental lexicon in order to produce words. This process, referred to as lexicalization, includes a stage in which the selected lemmas are converted to sounds with correct pitch, loudness, rhythm and intonation, referred to as phonological encoding (Bock, 1995; Levelt, Roelofs & Meyer, 1999; Starreveld & La Heij, 1996).

Several studies of word production have produced evidence suggesting that the process is at least two-staged, with the first being meaning-based and the second being phonologically based (eg., Caramzza, 1997; Dell, 1986; Levelt, 1989; Levelt, Roelofs & Meyer, 1999). Additionally, neuropsychological research affirms that different regions of the brain show activation in sequence, demonstrating that separate processes occur (Indefrey & Levelt, 2000). Although the word production process is widely considered to be two-staged, the information flow between lemmas and lexemes and their relation to one another remains widely debated. Whether the lexeme selection process only commences once lemma selection has been entirely concluded or whether these processes interact and overlap to some degree, with simultaneously activated information in both stages before an utterance occurs, is a matter that continues to be disputed. A discrete information flow model proposed that one single item containing semantic information is selected first, before retrieval of phonological information occurs (e.g., Levelt, 1989; Levelt et al., 1999; Roelofs, 1992; Schriefers, Meyer & Levelt, 1990). This manner of information flow suggests that seeing an image of a sheep with the intention to use information about it in an utterance, for example, would induce a selection process of competition between semantically similar concepts, such as "cow" and "goat". After elimination of the alternatives, "sheep" would then be accessed, and this stage completed before access of phonological information would ensue (Levelt, 1989). A cascading (interactive) model suggests continuous flow and an incomplete lemma selection process with multiple active alternatives even after the phonological retrieval of information has commenced (e.g., Caramazza, 1997; Dell, 1986, Harley, 1993; Peterson & Savoy, 1998). An additional theory presents an idea of information cascading from semantic to phonological form, and then reversing, with information fed back into the semantic selection stage. This interactive feedback model advocates that "goat", "cow" and "sheep" are all still active during the selection process of phonological form (Levelt, 1991a). (See figure 2.)

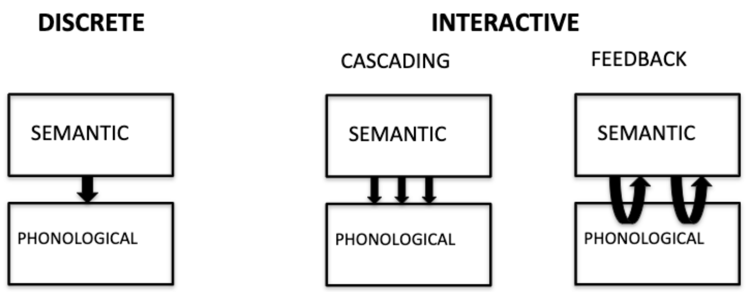

Figure 1: Depiction of information flow involving interactive feedback (Dell, 1986)

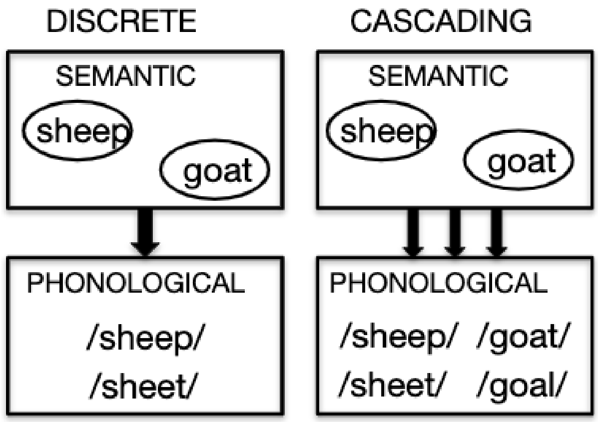

Figure 2: Depiction of discrete and cascading activation flow (Levelt, 1991a)

Certain types of speech errors observed in monolinguals also indicate a two-fold process. Fay and Cutler (1977) found that whole-word errors, for instance, consist primarily of two types: semantic substitutions and form-based substitutions. Saying "toes" instead of "fingers" or "wife" when intending "husband" are illustrations of semantically based errors, having no similarity in sound but related in syntax and meaning. Producing "equivocal" when meaning "equivalent" or "hysterical" rather than "historical" however, are examples of form-based errors, similar only in sound. It was proposed that items in the lexicon are arranged according to phonology for recognition purposes, with similar sounding words close together (Fay & Cutler, 1977). Semantic errors were assumed to occur within a so-called decision tree while phonological errors occur during selection of the final phonological form. The authors maintained that these types of word substitutions indicated that word production and comprehension processes use the same lexicon but occur in opposite directions. They proposed that semantic and phonological processes were independent. It was argued that due to the nature of these errors, they must occur at different stages of the word retrieval process (Fay & Cutler, 1977).

Another type of error in word retrieval and the main focus of this study is the tip-of-the-tongue (TOT) phenomenon, a noticeable temporary difficulty of lexical access (Brown & McNeill, 1966). As mentioned, this study examines this phenomenon in Norwegian-English bilinguals, beginning by giving an account for the manner in which bilingual word production differs from monolingual production.

Bilingual Language Production

In a bilingual's mind, word processes are fundamentally different in that bilinguals must manage two languages rather than one, comprehending and producing words in each appropriate language. Bilingual word production is a domain that has been considerably less researched than bilingual comprehension. Word recognition and word production may be governed by the same lexicon, but the initiation and demands of the lexical processes on the processing resources may constrain certain tasks differently in performance. Only more recently have psycholinguistic studies focusing on speech production expanded to the bilingual case (Kroll & Tokowicz, 2005). Using an adopted spoken production model from Poulisse and Bongaerts (1994) later extended by Hermans (2000), Kroll and Tokowicz (2005) present three levels of representation engaged in translating a concept into spoken word. As in the monolingual domain (Levelt, 1991a), an idea is initially represented as a concept, where a language cue is represented, indicating which language is meant to be spoken. A level of lemma (semantic and syntactic information) activation proceeds which, in the case of bilinguals, requires distinct lemmas in each language due to syntactic constraints. The phonology of the word utterance is then specified, selected from a shared pool of phonological features. The assumption is that the phonological system is shared by the two languages and that common elements will activate similar representations (Poulisse & Bongærts; Hermans, 2000; Kroll & Tokowicz, 2005).

If representations for both languages are activated in parallel sequence, proficient bilinguals will have at least two words available for each concept. The model suggests that candidates in both languages are activated at the lemma level, with selection occurring at this level. It assumes that phonology is only activated for the purpose of intended language (Poulisse & Bongærts; Hermans, 2000).

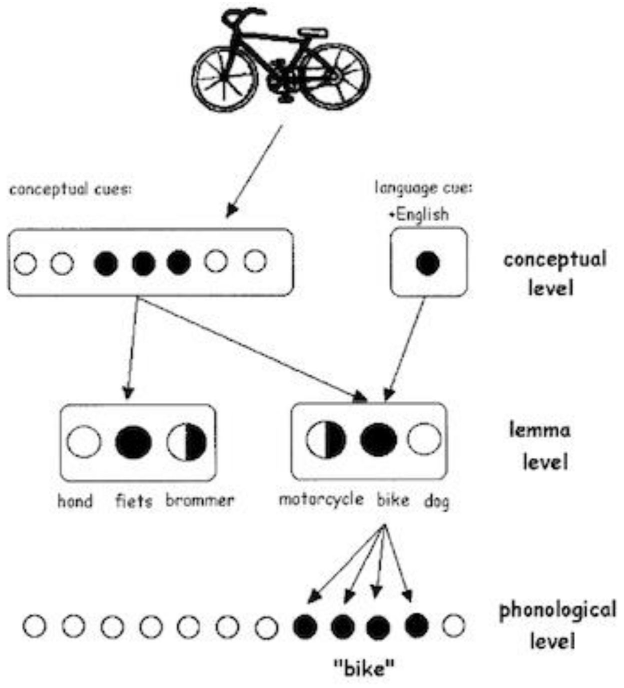

Figure 3: A model of bilingual language production, adapted from Poulisse and Bongærts (1994) and Hermanns (2000).

Non-Selectivity in Bilingual Language Production

Cross-Language Activity

In order to understand the main theories that attempt to justify the TOT occurrences in bilinguals in the current study, additional aspects of bilingual word production must be taken into account. A number of studies of bilingual word production have indicated that language activation is non-selective, meaning that although task and context specify that only one language be used, a bilingual's two languages are continuously active (e.g., Dijkstra, 2005, Marian & Spivey, 2003 and Kroll, Bobb & Wodniecka, 2006). Unlike word comprehension, the process of word production is initiated by a conceptual event, such as describing a picture, expressing a thought or translating a word or sentence (Kroll, 2008). Since listening and reading involve "bottom-up" processes initiated by the presentation of speech or text, questions arose as to whether properties of input may be sufficient reason for a bilingual's inability to switch off a language. If so, bilinguals should be able to switch off a language in order to select the other when the intention is word production (Kroll, 2008). Yet, even in simple tasks such as naming words, picture naming and recognizing spoken words, co-activation of a bilingual's two languages has been demonstrated (Kroll, Dijkstra, Janssen & Schriefers, 2008).

In a study with proficient Dutch-English bilinguals using a cued naming paradigm, participants were first required to name the picture in language A or B according to which tone they heard with the picture (Kroll, et al., 2008). This condition was considered a mixed language condition. Secondly, the participants were cued with one of their two languages signaled by a tone while the other tone indicated a "no" response. It was assumed that if both languages remained active regardless of usage requirement, then performance under both blocked and mixed conditions should be similar. The aim was to demonstrate that if language planning in bilinguals was selective with activation only in one language, candidates should experience a processing cost in the mixed conditions (Kroll et al., 2008). The results revealed a language effect difference for first and second languages. Little consequence of language mixture for the second language implied that both languages were active even though only one language was required. Contrastingly, a cost effect was indicated for the first language when both languages were required to be active, proposing that the first language is ordinarily produced without significant second language influence. Surprisingly, the results also showed that under mixed conditions where both languages were required to be active, the latencies in picture-naming were greater in the first language than in the second language. These reversed results of processing advantage suggested that when the second language was active, the dominant language was inhibited. It was asserted that the results of this experiment indicated that language production in bilinguals must be largely non-selective (Kroll, 2008).

Language-Specific and Language Non-Specific Selection

Addressing the role of the existence of lexical and sub lexical representations belonging to the language not in use, Costa (2005) compared two views of bilingual speech production: language specific and language non-specific. Two models were proposed to illustrate both theoretical views of activation flow. In language specific selection, depicted in *Figure 4a,* suggests that the only lexical nodes available for selection are the ones pertaining to the intended language, in this case, English. According to his hypothesis, lexical selection proceeds in the same manner as it would for monolingual speakers. In other words, translation equivalents from the second language would be considered irrelevant and have no impact on selection processes. Alternatively, the language non-specific hypothesis (*Figure 4b*) propounds that during lexical selection, activation levels of all lexical nodes are considered, regardless of the language they pertain to. The highest level of activation from lexical nodes in both languages would then be selected, causing an element of competition in this process (Costa, 2005). The activation level of words in both languages would then directly affect the level of difficulty of selection of the target lexical node (e.g., Hermans, 2000; Hermans et al, 1998).

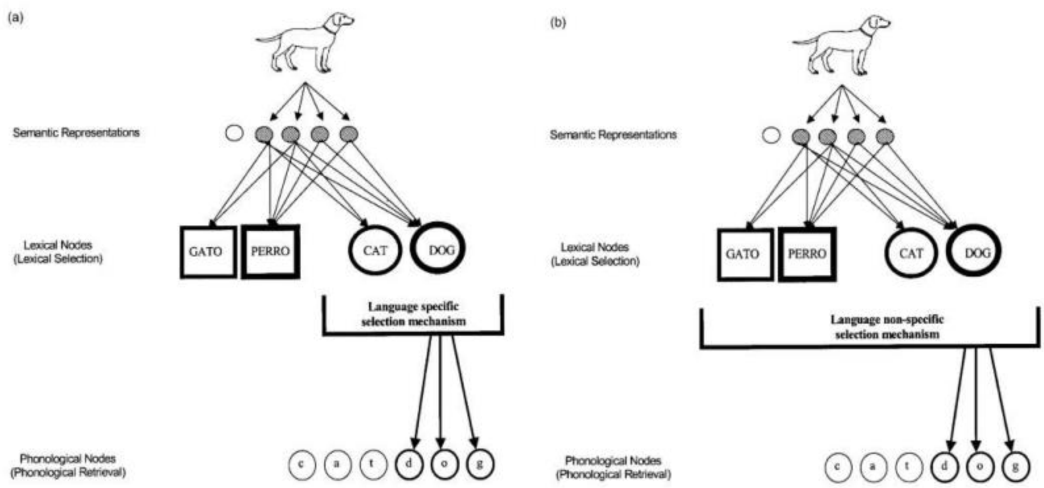

Figure 4 (a): Bilingual language-specific production model (Costa, 2005).
(b): Bilingual non-specific language production model (Costa, 2005).

The Bilingual Activation Model (+) and the Inhibitory Control Model (ICM)

A central issue in bilingual production research is how bilinguals might be capable of processing in each of their languages without multiple interruptions from the other while speaking. Experiments suggest that in spite of bilinguals being fully aware of which language they are expected to produce, they are unable to fully switch off other language alternatives (e.g., Costa, Caramazza & Sebastian-Gallés, 2000: Kroll et al., 2006). Bilinguals also appear to be capable of code-switching from one language to the other seemingly effortlessly in certain appropriate settings, raising questions as to how language production processes in a bilingual mind may differ from monolinguals processes. Several key issues present themselves when attempting to clarify these questions in point. As referred to previously, early hypotheses presumed language access to be selective, with only representations from the relevant language activated (Gerard & Scarborough, 1989). The non-selective language access hypothesis has later asserted that word activation from both languages is continually present. The underlying theoretical issue is whether there is competition for selection between all activated information or whether the language cue is sufficient to guide the process of selection (Kroll & Tokowicz, 2005).

Although several language processing models address characterization of bilingual lexicon, they offer insufficient clarification as to how bilinguals manage to speak the intended language with another language present in the cognitive system. The Bilingual Interactive Activation plus model (BIA+) shown in *figure 5,* illustrates how bilingual word recognition may take place within a word identification system (Dijkstra & van Heuven, 2002). It assumes that a bilingual's two languages exist in an integration lexicon with separate representations for each language that are parallel to each other. The model demonstrates that presentation of a word in one language will activate corresponding orthographic, phonological and semantic candidates in all other known languages. The BIA+ also suggests that frequency of use is reflected in the resting level activation of words and is thus dependent on the bilingual's proficiency in both of their languages. Infrequency of usage of a given word will also decrease its resting activation level. This aspect of word frequency is explored further in this study. While this model solves the issue of control by means of language nodes within the lexicon itself, it does not influence word activation (Dijkstra & van Heuven, 2002).

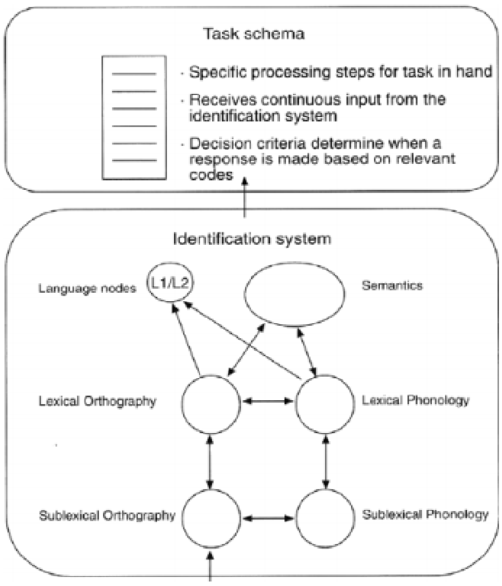

Figure 5: BIA+ Model (Dijkstra & van Heuven, 2002)

Green (1998) introduced the Inhibitory Control Model (*figure 6*) as a proposed mechanism with the purpose to modulate the competition and control performance. Like many other models of language production, the ICM assumes that initiated by conceptual representation, both the lexico-semantic system as well as a supervisory attentional system (SAS) are activated. The role of the SAS is to control the activation of task schemas for the purpose of language processing. Picture-naming in L1 would thus have a different task schema than picture-naming in L2, or in translation of a word from L1 to L2. The ICM proposes further that lemmas are tagged according to language membership and assumes that the task schemas both inhibit lemmas in the unintended language while activating lemmas in the appropriate language (Kroll & Tokowicz, 2005).

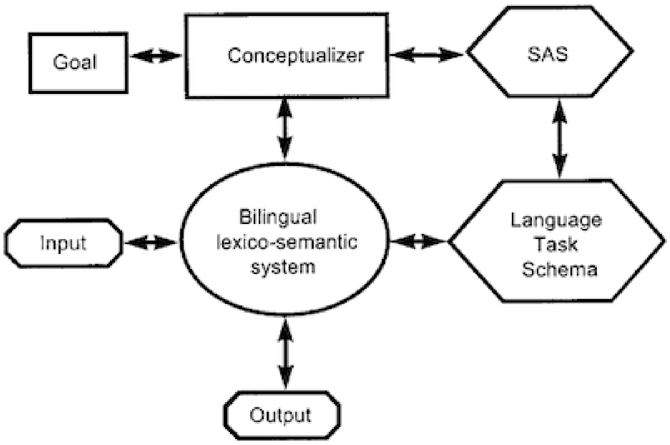

Figure 6: Inhibitory Control Model. Adapted from Green (1998)

Due to the level of competition this process incurs, attentional resources are required. The inhibitory processes required to modulate must then correspond directly to the degree of lemma activation in each language. For instance, inhibitory control processes will be greater when a bilingual speaker ventures to name a picture in L2 compared to L1 due to competition modulation requirements from L1 to L2. Experiments specifically designed to generate language switching provide evidence for inhibitory control and show that bilingual switching costs (higher latencies) are greater when switching to L1 compared to L2 (Meuter & Allport, 1999). The ICM proposes that the trials directly preceding the switch, which prompts an abundance of competition, will incur the greatest switch cost due to the measure of inhibition subsequently required. While naming pictures in L2, a cost will be produced due to inhibition of L1 lemmas when the intended language of the subsequent trial is L1 (Kroll & Tokowicz, 2005). It was later suggested that the level of inhibition for one language depends directly on the speaker's level of proficiency in that language, and that speakers who have achieved a level of high proficiency may not require inhibitory mechanisms (Costa & Santesteban, 2004). However, the manner in which factors such as context of language use, language proficiency and language dominance modulate components of inhibitory control processes remains unidentified.

Cognate Facilitation Effect

Depending on language overlap and the model of acquisition, the manner in which two languages are represented may differ in semantics, orthography, phonology and syntax. Some memory selections may be shared within each word identification system. Cognate words (translation equivalents sharing similar phonology, spelling, pronunciation and meaning, such as ‘bus’ in Spanish and English) have been shown to facilitate lexical access whether given in context or not (Dijkstra & van Heuven, 1998). In theory, cognates presented in isolation would activate both languages and heighten ambiguity as to which language should be selected. Top-down information (task schema) would be necessarily utilized in pursuance of language selection for target output (Kroll et al., 2015).

In order to better understand models of language production, multiple studies have employed the use of cognates to constrain models depicting bilingual language processing (e.g., de Groot, Dannenburg, & van Hell, 1994; Dijkstra, Grainger, & van Heuven, 1999; Gerard & Scarborough, 1989; Kroll & Stewart, 1994). The effects demonstrated from applying cognate constraints in bilingual language studies may also present complications for monolingual language processing models, suggesting that language production models must incorporate activation in a cascading manner (e.g., Colomé, 2001; Peterson and Savoy, 1998).

In a study set out to determine whether non-selected lexical nodes activate their phonological information, Costa et al. (2000) tested Catalan-Spanish bilinguals and predicted that if this was indeed the case, bilinguals should experience shorter latencies when performing photo naming tasks with cognate words. The results supported these predictions, also finding that this difference was not present in monolinguals. Costa et al. asserted that for cognate words such as *guitarra* and *guitar*, the target lexical representation and its non-response language translation would both provide activation of phonological features. For non-cognate words, there would be separate activations of phonological representations of the target lexical node and its corresponding translation. Two proposals were advocated due to these findings: that the flow of activation from the semantic level to the lexical level is language non-specific (language blind), and that non-response language lexical nodes spread to the phonological segments. (Costa et al., 2000).

Distributed Feature Model

Van Hell and de Groot (1998) developed a model that assumed a word's lexical category defines the degree of sharedness of semantic representations across languages. The distributed feature model (*figure 7*) proposes that concrete nouns and cognates share representations across languages while abstract nouns and non-cognates are represented more distinctly. This translation equivalent overlap should also dictate translation processing times in bilingual speakers. Several studies ensued, testing recognition, lexical decision, word association and production in translation. The majority of results found that recognition and production latencies of translation equivalents were minimized when the target word pairs were concrete nouns or cognates. It was also demonstrated that word associations across languages were more similar for concrete words than abstract words, as well as for cognates as opposed to non-cognates (van Hell & de Groot, 1998; Kroll & Tokowicz, 2005). These results are especially pertinent to this study's interest in the effect of noun type on word retrieval.

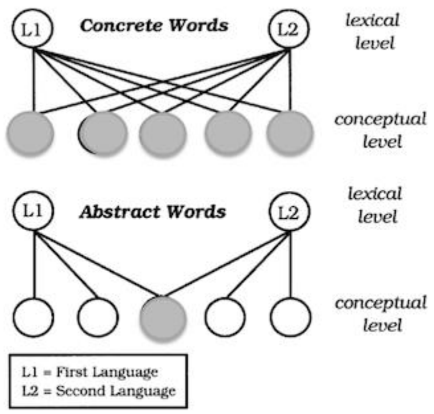

Figure 7: Distributed Feature Model. Adapted from van Hell and de Groot (1998).

Adaptive Control Hypothesis

Studies in the neuroimaging domain suggest that while sharing the same neural tissue, requirements of selection between two languages for the purpose of production may engage several different areas of the brain (e.g., Brown, Reynolds & Braver, 2007; Cools & D'Esposito, 2011; Grady, Luk, Bialystok, & Craik, 2015). The differences in activation between L1 and L2 that have been observed most likely reflect proficiency level corresponding to each of the languages. L2 activation has proved to require increased cognitive control (Abutelabi, Cappa, & Perani, 2005; Abutelabi & Green, 2007).

Expanding on the hypothesis of inhibitory control, adaptive control hypothesis (*figure 8*) proposes that language control processes adapt themselves to the interactional context demands placed on them (Green & Abutelabi, 2013). Essentially, adapting entails changing the parameters of neural efficiency or capacity according to the connectedness with other control processes. Bilingual speakers are presumably able to make use of adaptive control in response to the interactional context they find themselves in. Depending on the given socio-contextual situation involving either their first or second language, bilinguals would fundamentally be capable of determining in what manner language selection may ensue. Single language use, dual language use and dense code-switching are considered the three main interaction contexts that impose demands on the following categorized control processes within the realm of language production: salient cue detection, goal maintenance, conflict monitoring, interference suppression, selective response inhibition, task engagement and disengagement and opportunistic planning (Green & Abutelabi, 2013). The authors of the hypothesis suggest language and non-language action control may be simultaneously active, but that differences between bilingual and monolingual speakers call for specified tests linked to detailed profile information regarding the speakers' use of their languages (Green & Abutelabi, 2013).

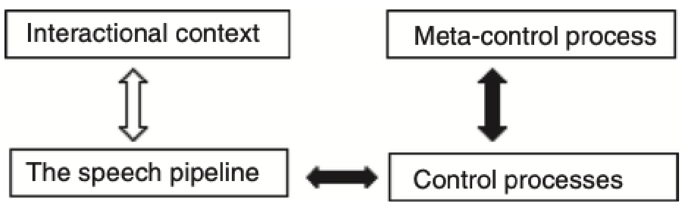

Figure 8: Architecture of the Adaptive Control Hypothesis. Filled arrows depict internal processes of control (Green & Abutelabi, 2013).

The Bilingual Advantage

Many bilinguals enjoy non-cognitive benefits such as intercultural understanding and interactions, social well-being both at home and abroad, as well as political and economic advantages. Besides possessing the ability to communicate in more than one language, evidence can be found that bilinguals' "juggling" of two languages may incur cognitive benefits as well as enhanced attention performance and executive function (Kroll et al., 2015). The complex task relating to managing high levels of cross-language activation in language production inherent in bilingualism, may prove to be a feature that can be exploited rather than presenting an obstacle. At all points of language development, bilinguals have exhibited differences from monolinguals regarding switching abilities between tasks. Negotiating competition transversely to alternative responses while simultaneously managing to disregard unrelated information, also appears to be a feat bilinguals manage superior to monolinguals (Bialystock et al., 2012). Evidence from non-verbal cognitive tasks that present conflict such as the Stroop, Flanker and Simon tasks (see Blumenfeld & Marian, 2011 for in-depth discussions) suggests that bilinguals are better capable of engaging control mechanisms than monolinguals (Abutelabi et al., 2012).

The Bilingual Disadvantage

However, in spite of overt benefits, bilingualism also endures particular detriments. While bilinguals possess a larger vocabulary across their languages than do monolinguals, a slight inferiority to monolinguals in performance on vocabulary tests has been persistently detected (Pearson, Fernandez, & Oller, 1993). Bilinguals have also been known to demonstrate higher picture-naming latencies in their non-dominant language as compared to their dominant language, even in tasks when performance is only expected in one language. These results have persisted over several repetitions and are also applicable to highly proficient bilinguals. (Ivanova & Costa, 2008). Further experiments relating to bilingual word production have found that in timed verbal fluency tasks with a requirement to produce as many words as possible within a specific category (food, furniture) or with words beginning with a particular letter onset (P, A, S), bilinguals generate fewer items than monolinguals (Bialystock, Craik, &

Luk, 2008b). Additionally, and most pertinent to the current study, bilinguals have been shown to be more prone to the frustrating tip-of-the-tongue (TOT) experience during speech production (Brown & McNeill, 1966; Gollan & Acenas, 2004; Gollan & Silverberg, 2001).

The Weaker Links Hypothesis and the Competition Hypothesis

Two main theories have been developed with the intent to provide explanation for bilingual disadvantages. The weaker links hypothesis, also referred to as the frequency lag account, suggests that compared to monolinguals, bilinguals experience a disadvantage on speaking tasks due to lower frequency of use for each of their languages. This reduced use of language has an indirect effect on lexical retrieval (Gollan & Silverberg, 2001; Gollan & Acenas, 2004; Gollan, Bonanni et al., 2005). Essentially, word finding processes in each of a bilingual's languages are exercised less frequently causing bilinguals to become less adept in accessing a given word than monolinguals. Reduced access results in increased difficulty of word finding both in L2 and in L1 (Gollan & Brown, 2006). The term weaker links refers to the bonds between the semantic and the phonological system becoming weaker over time, due to reduced frequency of use (Gollan et al., 2008).

The dual-language activation hypothesis, hereafter referred to as the competition hypothesis, centers on the processes that occur at the time of comprehension and production. This account is in line with the previously outlined ICM model and focuses mainly on the processes that arise due to simultaneous co-activation of a bilingual's two languages when only one language is intended (Herman, Bongærts, De Bot & Schreuder, 1998). It suggests that production in the target language is hindered due to competition from language elements from the non-target language. Additionally, the competition hypothesis asserts that access to target language becomes reduced with increased prior exposure of non-target language elements, heightening their competitiveness. This is in line with the assumption that prior exposure requires inhibition of the target language (Green, 1998), which in turn requires increased effort and recovery time (for elaborated argumentation see Kroll, Bobb, & Wodneicka, 2006; Van Assche, Duyck, & Gollan, 2013).

A clear case for the weaker links hypothesis is that bilinguals display disadvantages especially when retrieving words with low frequency while there appears to experience minimal or no disadvantage to the production of high-frequency words. Gollan et al. (2008) argue that weaker links should be weaker at the same point in the stage of the production system where frequency effects are the strongest in all speakers. In both bilingual comprehension and production, latencies related to language dominance in the retrieval of low-frequency words have been observed (Duyck, Vanderelst, Desmet, & Hartsuiker, 2008, Gollan et al., 2008).

Bilinguals have been known to demonstrate difficulty in accessing low-frequency names in their L2 (Ecke, 2004). This appears to be contradictory with regard to the competition account since it does not explain why bilinguals would experience disadvantage for these words (Gollan et al., 2005, 2008). Yet, with the assumption that interference may largely affect low-frequency word retrieval, the two theories may merge to some degree. Although the weaker links hypothesis was motivated in pursuance of clarifying data the competition theory left unexplained, experts maintain that the two are in fact compatible to some extent (Gollan et al., 2008). Accommodating both views is the suggestion that while bilingual production processes may be language selective in some tasks, cross-language competition may present in others (Kroll, et al., 2006).

The Tip-of-the-Tongue Phenomenon

Blocked Phonological Retrieval

The tip-of-the-tongue phenomenon, knowing a word but being unable to retrieve in a given moment, is experienced by monolinguals and bilinguals alike. This experience of blocked access supports the cascading model (unrestricted, feed-forward flow of activation) in the lexicalization process. In an early study by Brown & McNeill (1966), monolingual participants were given definitions of low frequency words, some of which induced a TOT experience in participants. While unable to produce the exact target word corresponding with the given definition, participants were occasionally able to retrieve some information about the word, such as initial sounds, stress patterns and number of syllables (Brown & McNeill, 1966). The tip-of-the-tongue phenomenon study essentially demonstrated that while the concept stage of word production had been fully retrieved and completed as well as other semantic and phonological aspects partially accessed, the full phonological form corresponding with the concept is partially blocked, hindering complete articulation (Brown & McNeill, 1966).

Word Frequency and Bilingual Word Retrieval

As mentioned, the current study controlled for word frequency with the intent of examining whether low frequency words have an effect on word retrieval in bilinguals, and how this may be explained by previous theories. In a study aiming to test the weaker links hypothesis, Gollan, Montoya, Cera & Sandoval (2008) conducted two experiments using young and old English monolinguals and bilinguals (English and Spanish) who were required to name pictures with high and low frequency words in the languages known to them. Results from the first experiment indicated that latencies in picture-naming were greater for both younger and older bilinguals than both groups of monolinguals, when producing lower than higher frequency names (Gollan et al., 2008). The second experiment showed that when speaking their non-dominant language, older participants were slower in producing higher frequency names, but named pictures with lower frequency names just as quickly as the younger bilinguals. Importantly, when speaking their dominant language, older bilinguals named pictures more quickly than in their non-dominant language. It was also found that the latencies due to older age were restricted to higher frequency names (Gollan et al., 2008). These results demonstrated that cognitive mechanisms general to monolingual and bilingual speakers alike may elicit processing differences between groups. The researchers maintained that this study challenged theories of bilingual disadvantage in language production based on between-language interference (e.g., Hernandez & Kohnert, 1999) (Gollan et al., 2008).

Cognate Status and Bilingual TOTs

As mentioned previously, several studies have determined that bilinguals are more likely to fall into the TOT state than monolinguals (Gollan & Silverberg, 2001, Gollan & Acenas, 2004, Gollan & Brown, 2006). Speech production is believed to begin with access to semantic information, followed by syntactic and phonological information.

Through observation of bilinguals and TOT interaction, Gollan and Acenas (2000, 2004) sought to gain a clearer understanding of what retrieval failure in TOTs encompasses. In one study, it was found that bilingual speakers fell into TOT states less frequently for cognate words than for non-cognate words. They reported results claiming that lexical nodes from non-target language activate phonological features (Gollan & Acenas, 2000). It was argued that the cognate effect occurs because the translation equivalent of the target word sends activation to the phonological components of the target word. Essentially, phonological properties of cognate words would be more available than those of non-cognate words, supporting models of language non-specific activation flow (Gollan & Acenas, 2000). Further constraint of heightened TOT rates in bilinguals was investigated by using picture stimuli with cognate and non-cognate names with the purpose to induce TOT states in Spanish-English and Tagalog-English bilinguals. The authors found that bilinguals experienced more TOTs than monolinguals with the exception of trials consisting of target pictures with translatable cognate names. Yet, fewer TOTs were induced when trials contained target pictures with translatable non-cognate names. Due to these results, it was maintained that cross-language interference cannot be responsible for increased TOT rates in bilinguals and that the two prevalent TOT accounts required modification in order to give account for cognate and translatability facilitation effects (Gollan & Acenas, 2004). Although manipulated in a different manner, the current study also controlled for cognate words and intends to discuss what effect cognate status may have on Norwegian-English bilingual participants' word retrieval.

Proper Names and Bilingual TOTs

Interestingly, further studies of TOTs have indicated that bilinguals retrieve proper names with greater ease than monolinguals (Gollan, Montoya & Bonanni, 2005). It was assumed that if the bilingual disadvantage was driven by an increased generalized load, given that there are approximately double the number of representations in the lexical system compared with monolinguals, bilinguals should find retrieval of proper names especially difficult. Alternatively, in that proper names are essentially shared across languages, bilinguals may experience facilitation in their retrieval. In a study consisting of two parts, researchers first required bilinguals and monolinguals alike to document naturally occurring tip-of-the-tongue experiences over a period of time. Later, Spanish-English bilinguals and monolinguals were required to name pictures of objects as well as names of people according to their given descriptions. Despite proper names being more difficult to retrieve for monolinguals than object names, bilinguals experienced fewer TOTs than the monolinguals in producing proper names, yet more TOTs for the object-naming tasks. The authors concluded that since proper names have essentially identical form across languages, bilinguals experienced improved naming, suggesting that disadvantages associated with bilingualism may be limited to individual meanings being represented by multiple forms (Gollan et al., 2005).

Competition Hypothesis vs Weaker Links Hypothesis to explain TOTs

Researchers of language processing typically adopt one of two theories dealing with bilingual disadvantage when attempting to explain the greater TOT rate observed in bilinguals, as well as other processing differences between monolinguals and bilinguals. Possibly more plausible is the account appealing to the notion of having two competing languages in the brain, the competition account. Outlined previously in this thesis, this hypothesis maintains that the bilingual lexicon contains an abundance of translation equivalent pairs, overlapping largely in near-identical meaning. As many existing language processing models claim, various information belonging to lexical representation in one language is consistently activated when bilinguals aim to produce the corresponding word in the intended language. It is imperative to consider that while language non-selectivity is generally agreed upon by researchers in the field (i.e., dual-language activation is constant and it is not possible to "switch off" other known languages), discrepancies endure as to whether or not this activation causes interference. This potential interference may occasionally elicit a TOT response due to unintended language activation (James & Burke, 2000; Meyer & Bock, 1992).

This theory offers two prevailing alternatives to explain higher TOT occurrence in bilinguals than monolinguals. The first is that while a bilingual speaker may have already fully accessed the correct intended response in the target language, the interference from the translation equivalent creates competition across languages, causing momentary blockage of retrieval (Hermans, Bongaerts, de Bot, & Schreuder, 1998). The second alternative explanation suggests that dual-language activation may actually aid a bilingual speaker who would otherwise fail in accessing the target response. The activated translation equivalent would thereby induce a partial successful retrieval as opposed to a "don't know" response (Costa, Miozzo, & Caramazza, 1999; Gollan & Acenas, 2004; Gollan & Silverberg, 2001). However, the competition account cannot explain why bilinguals often have TOTs for words they only know in one language. If one of the lexical representations of translation equivalents is not present, it cannot produce competition for selection (Gollan & Acenas, 2004).

The weaker links hypothesis largely supports the latencies bilinguals exhibited in picture-naming tasks in and out of context. As mentioned previously, bilinguals' naming times for low-frequency names were delayed significantly compared to monolinguals' naming times

(Gollan et al., 2008). Thus, the word-frequency effect in TOTs observed in bilinguals supports the weaker links hypothesis. Low frequency words, which are difficult for monolinguals to access, should be difficult for bilinguals to retrieve at all. This is supported by Gollan and Brown's (2006) findings that bilinguals have fewer TOTs for very-low frequency words than monolinguals. Proper names have proven to be a word class that causes particular retrieval difficulty for monolinguals (Cohen & Burke, 1993; Valentine, Brennan & Brédart, 1996). Since they are generally shared across languages (e.g., Michelle Obama is called Michelle Obama both in English *and* Norwegian), proper names may share a single lexical representation across languages, much like cognates. Bilinguals may effectively be converted to monolinguals with regard to processing proper names and should therefore be equally successful as monolinguals, according to the weaker links hypothesis (See Gollan, Bonanni and Montoya's study summary and results further in this thesis.)

The competition and weaker links hypotheses provide different explanations for the observation of more frequent TOT occurrence in bilinguals. In regard to this domain as well, these theories may not be mutually exclusive. Applicable to both theories is the assumption of the so-called "ceiling effect" on performance. Low-frequency words begin to catch up in activation levels with high-frequency words as language use increases, resulting in decreased frequency effects (e.g., Griffin & Bock, 1998; Oldfield & Wingfield, 1965). The question remains whether both dual-language activation in addition to reduced frequency of use may simultaneously have an impact, potentially explaining the substantial effect bilingualism has been shown to have on TOT rates (Gollan, Ferreira, Cera & Flett, 2014).

Bimodal Bilinguals and TOT Source

Early studies have endorsed that partial failed retrieval for words they are sure they know is experienced by all language users, including tip-of-the-fingers (TOF) for ASL signers (Thompson et al., 2005). It was speculated that studying bilinguals who speak one language and sign another (bimodal bilinguals) may aid in clarifying TOT origin due to the lack of phonological overlap between their languages. Varying accounts of the source of TOTs (semantic and/or phonological cross-language interference and weaker links hypotheses) prompted a picture-naming study that attempted to shed more light on the matter. ASL-English bilingual participants in the experiment produced more TOTs than English monolingual participants and equally matched the TOTs Spanish-English bilingual (unimodal) participants produced. The authors claimed that their data eliminated blocked phonological interference as the solitary source of bilingual disadvantage, endorsing semantic interference as a more likely source. Additionally, it was advocated that lower frequency of use (weaker links theory) more thoroughly substantiates TOT rates in all bilinguals alike (Pyers, Gollan & Emmorey, 2009).

Effects of Language Similarities

The degree of similarities between a bilingual's two languages has been shown to be of little consequence with regard to non-selectivity in cross-language activation. Co-activation has proved to persist, even in cases where two languages have different scripts (Hoshino & Kroll, 2008) or when one language is spoken and the other signed (Morford et al, 2011). Obvious cross-language differences such as having two separate alphabets, as in Chinese and English, have not been able to demonstrate exploitation of contextual language cues that allow for language selectivity, making the problem of language selection complex (Kroll et al., 2015). As mentioned earlier, however, certain features of cross-language overlap such as cognates, likely provide a facilitatory effect on lexical access (Dijkstra et al., 1998). Given the aforementioned culmination of research indicating cognate effects in TOT states experienced by bilinguals, it may be suggested that bilinguals with two languages sharing alphabets (as well as abundance of overlapping words such as cognates) likely encounter the phenomenon to a greater extent.

In the case of the current study, relatively proficient Norwegian-English bilingual participants were used. These two languages (together with German, Dutch, Flemish, Afrikaans, Danish, Swedish and Icelandic) both belong to the Germanic branch deriving from the Indo-European language family. It is important to note that the way cognates are used in psycholinguistic studies differs from how historical linguists use the term. Historical linguistic experts throughout history have found that a substantial amount of the core vocabulary in this family of languages is considered to be cognate by way of having evolved from the same historical source or having common etymological origin. Cognates share many structural features such as morphology, syntax and phonology and the more closely languages are related, the more vocabulary items they share (Katamba, 2005). In psycholinguistics, loanwords between languages are also included within the cognate definition, as well as loanwords from additional languages shared by the two (e.g., both languages have Latin loanwords).

Examples of modern Germanic cognates from the Germanic family:

German	English	Norwegian
Herzen	heart	hjerte
Finger	finger	finger
Hand	hand	hånd
Schule	school	skole
Sport	sport	sport
Pfeffer	pepper	pepper
Papier	paper	papir

In early history, related languages not only shared vocabulary stemming from the same historical source, but also ended up borrowing from each other through language contact. For instance, subtle changes occurred in the phonology of Old English, resulting in the consonant cluster [sk] becoming obsolete. At the end of the 9th century, however, the invasion of the Norsemen resulted in English borrowing many words containing this extinct consonant combination from North Germanic words such as skirt, sky, skin and skill, resulting in [sk] being reintroduced by the 11th century. Multiple words which are still in use today were borrowed and integrated into the English language from Old Norse resulting from the populous settlement of Norsemen in areas of England (Katamba, 2005).

*Example*s:

aloft	ME<ON: á = on + lopt =air
anger	ME<ON: angr = grief, sorrow. Whence adj. angry
bag	ME: bagge < ON: baggi
bang	(to beat violently) ON: banga
club	ME: clubbe, clobbe = ON: klubba
die	ME: deghen < ON: deyja
flat	ME: flat = ON: flatr
gift	ME: geten < ON: geta
husband	Late OE: hūsbōnda < ON: húsbóndi = householder

ill	ME: ille < ON: illr
ken	ON: kenna (know, discern as in beyond one's ken', obsolete except in Scotland)
knife	ME: knif < ON: knifr
leg	ME: legge < ON: leggr
outlaw	Late OE: utlag < ON: útlagi = one who is outside the law
sky	ME: skie = cloud < ON: sky

(Based on Geipel, 1971)

Note: ON=Old Norse; OE=Old English; ME=Middle English

More recently, due to the increase of globalization, English has had a significant influence on many other languages (including Norwegian) through television and the film industry, business relations and social media. This has led to the escalation of lexical borrowing from English, resulting in a broadened selection of overlapping words and cognates across the English and Norwegian languages.

Overview of the Current Study

The current study consists of two parts. First, the participants completed the bilingual questionnaire, Language Experience and Proficiency Questionnaire (LEAP-Q), as previously mentioned. The purpose for this was to gather pertinent details regarding the bilingual history of the study's participant group in order to evaluate how the bilingual profile may relate to the results of the second part of the study, tip-of-the-tongue experiments. The second part of the study was executed in the form of TOT experiments, first in Norwegian and then in English, to explore this particular bilingual disadvantage. The stimuli words were manipulated in three areas of interest; range in frequency, cognate and non-cognate proper nouns, cognate and non-cognate common nouns dispersed randomly throughout each block of stimuli in both languages.

LEAP-Q Description

The LEAP-Q was developed with a goal of establishing an efficient, communal questionnaire that allowed for valid and reliable assessment of bilinguals' linguistic profiles (Marian, Blumenfeld & Kaushanskaya, 2007). It was formulated for a target population of adolescent and adult bilinguals and multilinguals, primarily for the assessment of first and second language (L1 and L2) proficiency of research participants. The LEAP-Q accommodates simultaneous bilinguals, late bilinguals, balanced bilinguals and unbalanced bilinguals alike, but requires a minimum of literacy skills at high school education level for at least one of their languages. This classification of participants was specified for the 5 following reasons:

a) to be representative of bilingual (and multilingual) populations most commonly assessed for the purpose of research
b) to integrate the most diverse selection of this target population
c) to allow for questionnaire completion with minimal external aid, while still yielding valid data
d) to include the most relevant documented variables for language surveys, according to accredited language experts
e) to allow for simultaneous collection of bilingual proficiency status and additional relevant evaluations

Two separate studies were conducted to substantiate the validity of the LEAP-Q. The first study addressed the internal validity of the questionnaire by implementing factor analysis and multiple regression analysis to responses given by a diverse group of bilinguals. The questionnaire was revised accordingly for the second study in which a more homogeneous selection of bilinguals was used. Correlation, factor analysis and regression analysis were employed in this study to confirm the comparison of self-reported to the standardized proficiency evaluations. Although constructed to incorporate all languages, the LEAP-Q was formulated, normed and administered in English only.

Predictions for the Current Study

Based on the results found in previous studies outlined earlier in this introduction, predictions were as follows:

1. Regarding frequency: Participants should have higher TOT rates for lower frequency words (See Gollan et al, 2008).
2. Regarding cognate status: Participants should have lower TOT rates for cognates than non-cognates (See Gollan & Acenas, 2004; Costa, 2000).

3. Regarding word form: Participants should have lower TOT rates for proper nouns than for common nouns (See Gollan, Montoya & Bonanni, 2008). The Distributed Feature Model also supports this facilitation of retrieval for proper nouns, as they are always concrete nouns.
4. Regarding word form crossed with cognate status due to possible dual facilitation effect: Participants should have lower TOT occurrences over-all for cognate proper nouns (See Gollan & Acenas, 2004; Gollan, Montoya & Bonanni, 2008).

The weaker links theory predicts that participants would produce more TOTS in their non-dominant language than in their dominant language, especially for low-frequency words. (Decreased access of words leads to weaker links.) Cognates and proper nouns, however, should elicit fewer TOTs than non-cognates and common nouns, as these representations are essentially shared between languages and therefore do not bear consequences of weakened links. Costa's non-specific language model is key to this prediction in that phonological representations from both languages are activated in the word production process.

The competition account predicts that participants with higher English proficiency and participants with more balanced use of Norwegian and English would experience more TOT occurrences due to increased competition from higher activation levels in L2. (This would necessarily assume that known words in L2 were higher for these participants, as words not known in a second language cannot provide competition.) Another view for this prediction is that "don't know" responses may become false TOT responses due to activation of competing translation equivalents. Regarding word frequency, the interference account predicts either no significant effect or fewer occurrence of TOTs for low-frequency words.

Methods

Participants

51 candidates between the ages of 18 and 35 years old participated in this study, all of whom were Norwegian-speaking bilinguals who considered themselves to be reasonably proficient in English as their second language. Potential candidates were excluded if it became clear that they were also proficient in a third language. This was communicated in an initial information letter that informed the potential candidates of qualifications for participation in this study.

The letter further informed requirements that candidates have normal or corrected-to-normal vision and hearing and have no diagnosed cognitive impairments or language impairments such as dyslexia or stuttering. Candidates were also informed of the procedure of personal information and data collection related to the study. A consent form followed the information letter, which each candidate signed their name to affirm that they were indeed qualified according to the criteria. All candidates were given vouchers of 150 NOK to Sørbok at UiA as incentive and token of appreciation for their cooperation. (See appendix A for consent form and information letter.)

Stimuli

In total, 16 lists of stimuli were assembled, consisting of 10 target words each. 8 of the lists contained Norwegian words and 8 contained English words. The first set of 80 target words contained 10 of each non-cognate nouns, cognate nouns, non-cognate proper nouns and cognate proper nouns in English, and the same in Norwegian. (40 Norwegian and 40 English target words.) Each of the sets contained frequency rates per million ranging from 0.01 (at the lowest point) and 9.76 (at the highest point.) Databases NoWac (Norwegian words) and Subtlex (English words) were searched for the obtainment of frequency data for each individual word. For each target word, number of syllables, number of phonemes, number of letters, number of hits in the respective language database, and frequency per million were calculated and indicated, as in the following example.

Example Set (1 of 8):

	Examples: NOR	*ENG*
10 Cognate common nouns (CCN)	*hieroglyf*	*mutiny*
Number of syllables	*4*	*3*
Number of phonemes	*3*	*7*
Number of letters	*9*	*6*
Number of hits in database	*101*	*269*
Frequency per million	*0.14*	*1.34*
10 Non-cognate common nouns (NCN)	*ingefær*	*eavesdropper*
Number of syllables	*3*	*3*
Number of phonemes	*6*	*8*
Number of letters	*7*	*11*
Number of hits in database	*1227*	*6*
Frequency per million	*1.61*	*0.03*
10 Cognate proper nouns (CPN)	*Winston*	*Chernobyl*
Number of syllables	*2*	*3*
Number of phonemes	*6*	*7*
Number of letters	*7*	*9*

Number of hits in database	*1772*	*139*
Frequency per million	*2.53*	*0.69*
10 Non-cognate proper nouns (NPN)	*Karlsvogna*	*Dolittle*
Number of syllables	*3*	*3*
Number of phonemes	*9*	*7*
Number of letters	*10*	*8*
Number of hits in database	*92*	*66*
Frequency per million	*0.13*	*0.33*

Precise and coherent definitions were provided for each target word. In addition, three foils were created for each of the target words: one semantically similar, one similar in form or phonology, and one random.

Example Definitions and Foils:

CCN

hieroglyf: Gammel, egyptisk bildeskrift (foils: helleristninger, hiragana, sanskrit)

mutiny: An open rebellion against the proper authorities, especially by soldiers or sailors against their officers (foils: revolution, matinee, mutation)

NCN

ingefær: En rot brukt som smakstilsetning i mat og drikke, ofte i frisk, tørket, malt eller syltet form. Blir også brukt til å lindre sår hals og mageproblemer (foils: anis, ginseng, lakris)

eavesdropper: A secret listener to private conversations, for instance outside someone's door (foils: sleuth, earworm, auditor)

CPN

Winston: Fornavnet til Storbritannias statsminister under andre verdenskrig. Han var kjent for å bruke begrepet "jernteppet" for å referere til delingen av Europa under den kalde krigen (foils: Chamberlain, Wilson, Windsor)

Chernobyl: The worst nuclear disaster in history, caused by an explosion at a nuclear power plant in Ukraine in 1986 (foils: Hiroshima, Chernabog, Pribyl)

NPN

Karlsvogna: Navnet på et stjernemønster som utgjør en del av stjernebildet Store Bjørn (foils: Orion, Kavalragnar, Lillebjørn)

Dolittle: The last name of the doctor in a series of children's novels who learns to talk to animals and becomes their champion around the world. (foils: Popper, Delamotte, Littleborough)

Across the sets in each constraint, average of frequency rate per million for each target word was maintained as similar as possible, as well as similar averages for number of letters per word, number of phonemes, number of syllables, and number of hits in the respective databases. (See *Table 1*.) When counting phonemes, British English transcription was used. The second set of target words was included as a control, to avoid the effect of the set. This set contained the same number of target words in each constraint as the first set and was kept as similar as possible to the first set in all constraints, other than using completely new words.

Table 1: Means of stimuli sets

Set 1 Norwegian

Mean	No. Of Syllables	No. Of Phonemes	No. Of Letters	Hits in Database	Freq. Per Million
CCN	3.4	8.2	8.6	1661	2.37
NCN	2.2	5.8	6.5	1071.1	1.51
CPN	2.6	6.4	7.6	1394.4	1.99
NPN	2.6	6.7	7.4	1056.9	1.54

Set 2 Norwegian

Mean	No. Of Syllables	No. Of Phonemes	No. Of Letters	Hits in Database	Freq. Per Million
CCN	3.2	7.8	8.4	1830.8	2.42
NCN	2.3	6.1	6.4	1074.9	1.54
CPN	2.3	6.4	7.1	1133.1	1.62
NPN	3.2	8.5	9.1	1066.9	1.52

Set 1 English

Mean	No. Of Syllables	No. Of Phonemes	No. Of Letters	Hits in Database	Freq. Per Million
CCN	3	7	7.4	376.2	1.87
NCN	2.7	6.4	7.2	438.7	2.13
CPN	2.2	6	7.1	479.7	2.38
NPN	2.4	6.2	6.9	376.9	1.87

Set 2 English

Mean	No. Of Syllables	No. Of Phonemes	No. Of Letters	Hits in Database	Freq. Per Million
CCN	2.8	7.1	8.1	416.6	2.13
NCN	3	6.6	7.6	409.6	2.03
CPN	2.1	5.8	6.5	502.4	2.46
NPN	2.3	6.2	7	410.2	2.04

When choosing target words for the stimuli sets, several features were taken into consideration. Single words were exclusively used as targets in order to ensure accurate frequency rate results.

Homophones were not included in order to avoid irregularities when hypothesizing about syntactic versus phonetic retrieval processes. Words with multiple synonyms were also left out to avert obscurity of the target word. For the sake of simplifying definitions for the target words, concrete nouns were favoured over abstract nouns. When selecting Norwegian and English cognates, only obviously similar target words were allowed while during selection of non-cognates, only evidently dissimilar words were authorized. Although word selection criteria allowed the use of borrowed words, very few were actually included.

Stimuli sets models were adopted from a previous master thesis (Mollestad, 2018) investigating tip-of-the-tongue states in Norwegian-English bilinguals, making multiple amendments. The words that were adopted from this previous project were clearly indicated in the set lists as 2018 next to each word, while new words were marked as 2020. Unique definitions were created for all target words alike. Current frequency rate database results were used rather than incorporating previously gathered information from 2018.

When searching the NoWac database, results often displayed additional word forms, such as adjective or verb, as well as noun form hit count. In cases where the lemma was identical, the number of hits was added for both forms.

With the purpose of attaining "got" rather than "not", it was endeavoured to choose target words that participants most likely knew. "Trivia" words were evaded as far as possible, which proved especially challenging when selecting non-cognate proper noun targets. Whereas Mollestad admitted several Harry Potter themed target words in this set, this study sought to vary themes in order to avoid undesired effects due to dependence of participants' interest and knowledge of one specific theme. (See full sets of stimuli with definitions in Appendix D.)

Experiment Design

For the experiment, the previously accumulated stimuli were placed into sets for each language, each of which included equal numbers of each condition (high and low frequency, cognate and non-cognate, common and proper noun) in random order. For both Norwegian and English, 4 sets were created, 1a, 1b, 2a, and 2b. Each set contained 40 words separated into 2 blocks of 20, with a trial number given to each word within the set. The "b" sets consisted of identical definitions, words and foils as the “a” sets but appeared in reverse order. These were created as a reliability check to avoid order and tiredness or boredom effects.

Experimental Procedure

Prior to testing, participants presented a signed consent form and completed a modified version of the previously introduced LEAP-Q, described as follows:

LEAP-Q Modifications

Adjustments were made to the original language proficiency questionnaire (LEAP-Q) for the purpose of optimal relevance for the current study. The questions dealing with language background were shortened and simplified for the current study. (For example, instead of “When choosing to read a text available in all your languages, in what percentage of cases would you choose to read it in each of your languages? Assume that the original was written in another language, which is unknown to you. Your percentages should add up to 100%” became “Please list what percentage of the time you typically spend reading in each language. All your answers should add up to 100%”.) An original question requiring the participant to state a date of immigration to the United States (if applicable) was excluded due to lack of relevance. A question instructing participants to list any vision problems, hearing impairments, language disabilities and/or learning disabilities was excluded as this information was previously collected. Candidates with these issues were eliminated from the current study.

Questions 7, 8 and 9 regarding language culture and identity were added to the language background section, which the original did not include:
Q7: What cultures do you identify with (e.g., Norwegian, British, American etc.)? Please list each culture below (up to 5) and use the scale from 1-10 to rate the degree of identification, whereby 0=no identification, 5=moderate identification, 10=compete identification.
Q8: Do you feel that you were once better in one of your languages and that you have become less fluent? If yes, which one? At what age did you become less fluent?
Q9: In which language do you usually do the following tasks? Simple math (counting, adding), dream, express anger or affection and talk to yourself.

The original section dealing with language proficiency included a separate section of questions dealing with self-report of foreign accent. The current study adapted these questions slightly and included them in a broadened in an L1 and L2 self-reported proficiency section. In the section where questions were asked regarding participants' immersion in each language environment, the current study added further query to workplace (not included in the original LEAP-Q) as well as requiring participants to distribute time spent in school and working environments where each language was spoken SOME of the time and ALL of the time. The sections concerning factors contributing to L1 and L2 language learning and exposure to L1 and L2 were edited to incorporate modern elements. The section also excluded radio and added "TV/streaming" and "listening to music/media" while "independent study" was adjusted to "self-instruction (e.g., language learning videos or apps)". (See appendix B for the original LEAP-Q, and appendix C for the modified version used in this study.)

Upon completing the modified LEAP-Q, participants were each assigned one Norwegian and one English set. For example, if participant 1 was tested with Norwegian set 1a (Nor1a), they were tested with corresponding number and letter of the English set. (Eng1a). The sets were assigned in rotation to participants to endure equal numbers per set.

Some experiments were conducted live, via Microsoft Teams or Zoom, with screen/window-sharing for the digital alternatives, and some were conducted in person. In all cases, Norwegian tests were run first, followed by English tests on a separate day. At the time of testing, participants were first briefly informed of how the testing would proceed and the definition of "tip-of-the-tongue" state was clearly specified before proceeding with trial questions. The participants were reassured that the words chosen were intentionally slightly difficult. The program 'Open Sesame' was used for testing and data collection purposes, which gathered all responses into stored files. During a trial, target word definitions appeared on the participant's screen followed by the question "Do you know this word?" with options 1 (Yes), 1 (No) and 3 (TOT). If the participant answered yes, the following slide required them to say the word, before continuing with the subsequent trial. When the word was not known (2), the testing proceeded promptly. When a participant responded that the word was on the tip of their tongue, they were requested to comment on whether they knew any letters or sounds in the word or not. If yes, they were asked whether they knew in which place in the word this sound or letter was. (1=beginning, 2=middle, 3=end or 0, don't know.) If more than one sound was known, the experimenter plotted in which sound was thought to be in which place. (e.g., r, s then 3, 2.) The following question inquired whether the participant knew how many syllables this word had or not. The final screen presented 5 options (3 foils and the target word in random order along with an option of "none of the above") and required the participant to indicate whether one of the options was the word they had on the tip of their tongue or not. Any additional comments or responses, (such as sudden target word retrieval after selecting TOT state but before reaching the final screen revealing the target word) were recorded by hand by the experimenter. The tests varied in duration, depending on the length of time individual participants spent on their answers, ranging from approximately 15 minutes to 40 minutes.

Results

LEAP-Q Results

Participants

The 51 candidates (36 of whom were female) between the ages of 18 and 34 that participated in the study were relatively uniform regarding their proficiency in Norwegian, all but 1 having been born in Norway. None of the participants reported language impairments or abnormal (uncorrected) vision and all but 3 were right-handed. All participants had completed at least 12,5 years of education ranging to a maximum 23 years of schooling completed, with a majority of 35 participants having completed between 16-19 years. The levels of education reported ranged from high school to master level. 33 participants had either completed a bachelor's degree or were currently working on one, while 12 had, or were currently working on completing a master's degree. The remaining 6 listed either high school or 'other' as their highest level of education.

Language background and dominance

3 participants considered English to be their first language whereas the remaining participants listed Norwegian as their first language. 18 of the participants indicated a 3rd spoken language: 7 German, 4 Spanish, 3 French, 2 Danish, 1 Swedish and 1 Japanese. The participant with Japanese as a 3rd language also had NSL (Norwegian Sign Language) as a 4th language. In all cases, the order of language dominance corresponded to order of language acquisition.

34 of the participants reported exclusive identity to Norwegian culture. The remaining 17 participants identified to Norwegian culture to a degree of at least 7. (7 participants to a degree of 9, 5 to a degree of 8 and 5 to a degree of 7). 1 participant identified equally at a degree of 8 with both American and Norwegian and 1 identified to British culture at a degree of 8 compared to Norwegian culture at 7. Participants reported varying additional identifications with American, British, Swiss, German, Korean, Australian, Sámi, Canadian and French cultures, ranging from degrees of 2 to 8.

32 participants reported having once been better at one of their languages. 15 of these stated that this language was English, 6 Norwegian, 4 German, 3 French, 2 Spanish, 1 Japanese and 1 Danish. Of those who reported this experience, 2 stated that this decrease in fluency occurred between age 10 and 15, 13 between age 15 and 20 while 17 reported that this decrease had occurred after the age of 20.

All but 2 participants did simple math (counting and adding) in Norwegian and 44 dreamed in Norwegian while the remaining 7 reported English dreams. 35 participants stated that they expressed anger or affection in Norwegian, 15 spoke English for this purpose and 1 resorted to speaking German. Norwegian was the language 33 of the participants used when talking to themselves while the remaining 18 held these one-way conversations in English.

Language Exposure

Variables pertaining to participants' language exposure are displayed in *Table 2*.

Table 2: Language Exposure

Language Exposure	**Norwegian**		**English**	
	Mean	**Range**	**Mean**	**Range**
Time exposed to language (%) e.g., Talking, listening, reading, incl. TV, movies, music	59.6	30-95	39.2	5-75
Time spent speaking language (%)	76.2	20-100	19.7	0-80
Time spent reading language (%)	52.6	10-99	46.7	1-90
Occurence of spoken language choice when given the choice (%)	82.2	10-100	17.4	0-90

Extent of language exposure (0-10 scale)				
Interacting with friends	9.1	4-10	3.8	0-10
Interacting with family	9.4	0-10	1.1	0-9
Reading	5.3	0-10	6.9	1-10
Self-instruction	1.1	0-10	1.7	0-10
TV	3.4	0-10	8.1	4-10
Music/Media	3.3	0-10	8.0	4-10

As shown in *Table 2*, exposure to Norwegian is greater than English for all factors, with choice of spoken Norwegian and time spent speaking Norwegian showing the highest means. Reading is shown to be the highest English exposure factor. The extent of language exposure for Norwegian is greatest in interaction with others while TV, music and media are shown to be the greatest sources of English exposure.

Language Learning and Proficiency

Table 3a: Self-reported Language Mixing and Intrusion

Language Mixing and Intrusion (Self-reported)	Mean	Range
Proficiency in language switching	8.1	4-10
Intentional use of English when speaking Norwegian (1-10 scale) 46 participants	4.4	1-10
Intentional use of Norwegian when speaking English (1-10 scale) 46 participants	2.1	1-9
Accidental intrusion of Norwegian when speaking English (1-10 scale) 44 participants)	1.7	1-7
Accidental intrusion of English when speaking Norwegian (1-10 scale) 44 participants	3.7	1-8

As can be seen in *Table 3a*, the majority of participants considered themselves to be proficient language switchers, with both intentional and accidental intrusion of words and sentences being significantly more frequent in English while speaking Norwegian than vice versa.

Table 3b: Language Learning and Self-Reported Proficiency

Language Proficiency	**Norwegian**		**English**	
	Mean	**Range**	**Mean**	**Range**
Number of years:months spent in language environment				
In a country	24:11	17:9-30:11	1:6	0:0-17:3
In a family	25:3	18:8-34:11	1:11	0:0-34:11
In a school (spoken all the time)	15:7	1:0-27:0	0:9	0:0-13:00
In a school (spoken some of the time)	5:3	0:0-27:0	6:7	0:0-18:1
In a workplace (spoken all of the time)	5:4	0:0-17:0	0:1	0:0-3:0
In a workplace (spoken some of the time)	2:1	0:0-12:0	1:5	0:0-10:0
Contributing factors to language learning (0-10 scale)				
Interaction with friends/colleagues	7.7	0-10	6.1	0-10
Interaction with family	9.3	5-10	2.5	0-10
Reading	6.8	0-10	7.2	2-10
Education	7.5	2-10	7.6	1-10
Self-instruction	1.3	0-10	2.7	0-10
TV	3.9	0-10	7.5	2-10
Music/Media	3.3	0-10	6.4	0-10
Self-reported proficiency (0-10 scale)				
Speaking	9.5	5-10	7.8	4-10
Pronunciation	9.5	6-10	7.0	2-10
Listening	9.8	6-10	8.5	6-10
Reading	9.5	3-10	8.3	3-10
Writing	9.1	5-10	7.8	5-10
Grammar	8.4	4-10	6.9	3-10
Vocabulary	8.7	6-10	7.2	4-10
Spelling	8.7	4-10	7.0	3-10
Age milestones (years)				
Started hearing	0.1	0-3	7.1	0-14
Attained speaking fluency	4.3	0-16	13.9	6-23
Started reading	5.2	3-7	7.8	5-13
Attained reading fluency	8.1	5-19	13.2	7-22

Results from the remaining questions regarding language learning and self-reported proficiency ratings from the LEAP-Q are shown in *Table 3b*. As is shown, the means of years and months participants spent in Norwegian language environments is significantly higher than for an English language environment in general. Interaction with family, friends and colleagues is shown to be the highest contributing factor to Norwegian language learning, while education, TV and reading contribute most for learning English. The means for all aspects of English proficiency are lower than for Norwegian but nevertheless very high, with the highest ratings for listening and reading. Across all age factors, participants became fluent in Norwegian several years earlier than in English, with fluency in speaking and reading being attained latest.

Factor Analysis

The LEAP-Q data were prepared for a factor analysis in order to investigate which groupings of variables best explained the variance in the data set. First those questions with categorial (written) answers and those showing minimal or no variation were removed from the data set. These included Norwegian proficiency variables, as there was not sufficient variation within the group of participants, as previously mentioned. (For the full list of excluded variables see Appendix E.)

A correlation matrix was made of the remaining 46 variables. The variable indicating occurrence of intentional Norwegian substitution when speaking English showed no correlations of at least 0.3 with any other variables and was therefore excluded due to insufficient co-variation (Question 8b). In cases of variables that correlated highly (>0.8), such as use of L1 related to use of L2, one was removed to avoid redundant information. In the case of language exposure, speaking, reading and choice between L1 and L2 (all of which had correlation of -0.9 or more), it is self-evident that the less one uses one language, the more one uses the other correspondingly. Due to the current project's interest in use of English as L2, data relating to Norwegian (L1) usage and proficiency was removed. Three additional variables showing at least 0.81 or higher with other variables were considered redundant and removed due to their high correlation. These variables were English grammar to spelling, contribution of Norwegian TV to music and exposure of Norwegian TV to music. (Questions 4n, 2f and 3e).

The remaining 38 variables were entered into the factor analysis. The output of the factor analysis is reported in *Tables 4a* and *4b*, showing which variables grouped to form 4 main factors, together accounting for nearly 50% of the variance in the data (cumulative variance). *Table 4a* and *4b* also report which variables load positively and negatively onto each factor and the weight of the loading. Hence, these values indicate the degree to which variables contribute to the factor they are listed under and whether that contribution is positive or negative.

Table 4a: Factor Analysis for English Proficiency and Spoken English Proficiency

English Proficiency		**Spoken English Proficiency**	
L2 Grammar Proficiency	0.84	Speaking L2	0.68
L2 Writing Proficiency	0.82	Age Fluent in Speaking Age L1	0.60
L2 Reading Proficiency	0.82	Age Fluent in Reading L1	0.59
L2 Vocabulary Proficiency	0.78	Occurrence of L2 Choice	0.59
L2 Listening Proficiency	0.74	L2 Exposure	0.57
L2 Speaking Proficiency	0.71	Contribution of Interaction w/Family L2	0.44
L2 Pronunciation Proficiency	0.69	Exposure of Interaction w/Friends in L2	0.41
Exposure to L2 Reading	0.65	Frequency of Accidental Word Mixing	0.37
Language Switching Proficiency	0.60	L2 Vocabulary	0.33
L2 Reading Contribution	0.59	L2 Pronunciation	0.33
L1 Contribution from School	0.43	L2 Reading	0.33
Frequency of Accidental Word Mixing	0.41	L1 Contribution of Reading	-0.37
Contribution of L1 Reading	0.41	L1 Contribution of School	-0.40
Time spend Reading L2	0.38	L1 Exposure to Reading	-0.44
Age Fluent in Speaking L1	0.36	L1 Exposure to TV	-0.71
Age Fluent in Reading L1	0.35		
Exposure of Interaction w/Friends in L2	0.35		
L2 Exposure to Music	0.35		
Contribution of L2 School	0.33		
Occurrence of L2 Choice	0.31		
Contribution of Interaction w/Family in L2	0.31		

Exposure to L2 from TV	0.31		
Proportion Var	**0.19**	**Proportion Var**	**0.11**
Cumulative Var	**0.19**	**Cumulative Var**	**0.30**

Table 4b: Factor Analysis for Informal Learning of English and Age of English Acquisition

Informal Learning of English		**Age of English Acquisition**	
Contribution of TV in L2	0.74	Age Fluent in Reading L2	0.69
Contribution from Music in L2	0.65	Age Started Hearing L2	0.65
Exposure to L2 TV	0.61	Age Fluent in Speaking L2	0.62
Exposure to L2 Music	0.56	Age Started Reading L2	0.61
Contribution from L2 Reading	0.49	Contribution of Interaction w/Friends in L2	0.51
L2 Exposure	0.46	Contribution of L1 Reading	0.48
Language Switching Proficiency	0.44	Contribution of L1 TV	0.47
Exposure of Interaction w/Friends L2	0.35	Accidental Intrusion of L1 on L2	-0.37
Contribution of L2 Self-Instruction	0.35	Intentional L2 Substitution	-0.58
L2 Reading	0.31		
Age Fluent in Speaking L1	-0.30		
Age Fluent in Reading L2	-0.40		
Proportion Var	**0.09**	**Proportion Var**	**0.09**
Cumulative Var	**0.39**	**Cumulative Var**	**0.47**

All of the variables listed under the ***English Proficiency*** factor are shown in elements of general English proficiency such as grammar, reading, writing and vocabulary. Lower loadings of variables such as interaction with friends and family members, and exposure to English music and TV also relate to English proficiency as a whole.

The factor of ***Spoken English Proficiency*** includes both positively and negatively loaded variable values. As would be expected, speaking English loads highest onto this factor while attaining fluency in speaking and reading Norwegian follow closely behind. Variables such as exposure to Norwegian TV and reading in Norwegian load negatively onto spoken English proficiency.

The ***Informal Learning of English*** factor is composed of variables pertaining to informal aspects of English language learning, such as contribution of and exposure to English music, TV and general exposure to English. The negative values shown here indicate age in becoming fluent in speaking and reading English. In this case, the lower the age of English fluency, the greater the influence on informal learning of English.

For ***Age of English Acquisition***, variables such as age of attained fluency in reading and speaking English, as well as age of beginning to hear and read L2 load highly. Contribution of reading in general and English TV-watching also relate to this factor. Accidental intrusion of Norwegian while speaking English has been listed as a negatively loaded influence relating to age of English acquisition, in addition to the expected negative significance of intentional English substitution.

Tot Experiment Results

Vocabulary Knowledge

The data for both lists were analyzed together as they both behaved similarly. The first analysis investigated the effects of language, cognate status, noun-type and frequency on participants' vocabulary knowledge. The dependent variable was probability of the participants' known words (their vocabularies) in both of their languages, relative to all of the trials that were run. Following several language production models, retrieval entails at least two stages of processing, the first in which involves activation of meaning based representations and the second, form-based representations (e.g., Levelt et al, 1999; Caramazza, 1997; Dell, 1986). As outlined earlier, TOTs indicate successful first stage retrieval and failed full retrieval of the second stage. Hence, stage one completion is indexed by positive TOTs and "yes" responses, relative to all trials. This data includes results from answers of "yes", meaning the participant knew the target word, and TOT answers, or words included in their vocabularies that couldn't be retrieved at the moment. Answers that did not result in a true TOT were not considered part of a participant's vocabulary. This measure was calculated by coding "yes" answers and TOTs as 1, and all other responses as 0. Cognate status (Cognate, -0.5 vs. Non-Cognate, 0.5), Type of Noun (Common, -0.5 vs. Proper, 0.5) and Language (English, -0.5 vs. Norwegian. 0.5) were fixed effects (centered) as well as frequency (zipf, continuous). A linear mixed-effects model was run which produced the output displayed in *Table 5*. (Significant effects for all tables are presented in **bold script**.)

Table 5: Vocabulary Knowledge Statistics

Probability of know and +TOT relative to all trials				
	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	1.02	0.13	7.62	0.00
language [en, -0.5; no, 0.5]	**0.58**	**0.16**	**3.57**	**0.00**
typeName [common, -0.5; proper, 0.5]	**0.31**	**0.16**	**1.90**	**0.06**
Cognate [cognate, -0.5; proper, 0.5]	-0.01	0.16	-0.09	0.93
frequency [continuous from -1.89 to 0.23]	**0.30**	**0.12**	**2.45**	**0.01**
language:frequency	-0.09	0.25	-0.35	0.73
typeName:frequency	-0.23	0.25	-0.93	0.35
Cognate:frequency	0.21	0.25	0.84	0.40
language:typeName	-0.33	0.32	-1.01	0.31
language:Cognate	0.02	0.32	0.05	0.96
typeName:Cognate	0.48	0.32	1.49	0.14
language:typeName:frequency	0.84	0.50	1.69	0.09
language:Cognate:frequency	0.44	0.50	0.88	0.38
typeName:Cognate:frequency	0.12	0.50	0.23	0.82
language:typeName:Cognate	-0.26	0.65	-0.40	0.69
language:typeName:Cognate:frequency	-0.77	0.99	-0.77	0.44

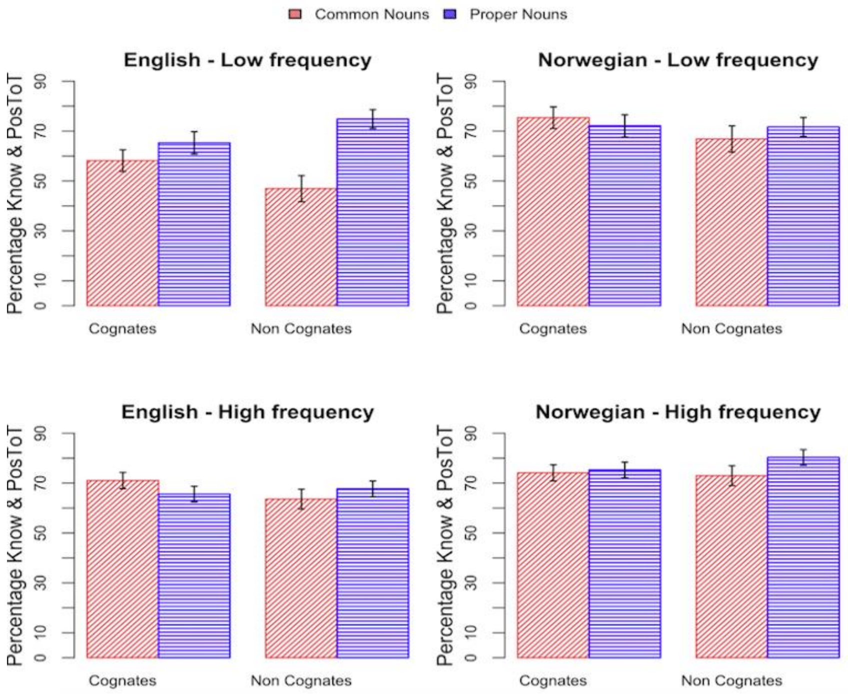

Figure 9: The Means of Vocabulary Knowledge Statistics

As shown in *Table 5*, the analysis yielded a significant effect of language and word frequency. In other words, participants knew more Norwegian words (had larger vocabularies in Norwegian) and had more knowledge of high frequency words in general across languages. Although within the parameters of being considered significant, common nouns vs proper nouns only indicate a borderline effect of showing different patterns of behaviour, meaning that participants showed no significantly greater knowledge of either proper or common nouns. The means of this measure by condition are illustrated in the graphs in *Figure 9.*

TOT Proportion Analyses

Table 6 shows experiment results measuring true tip-of-the-tongue occurrences relative to known words. Positive TOTs and "yes" responses both reflect successful first stage of retrieval while positive TOTs are the only response that indicates successful first stage retrieval but failed retrieval in stage two (Gollan and Brown, 2006). To calculate the proportion that reflect failed retrieval exclusively, "don't know" trials (28%) and negative TOTs (3.27%) were first discarded. The positive TOTs were coded as 1 and "yes" responses as 0. This data was then submitted to a similar mixed effects model as above.

Table 6: Probability of positive TOT relative to "yes" responses.

Probability of positive TOT relative to Know				
	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	-2.69	0.16	-17.01	<
language	**-0.43**	**0.19**	**-2.24**	**0.03**
typeName	0.20	0.19	1.06	0.29
Cognate	**-0.42**	**0.19**	**-2.22**	**0.03**
frequency	**-0.33**	**0.15**	**-2.27**	**0.02**
language:frequency	0.08	0.30	0.26	0.80
typeName:frequency	0.09	0.29	0.31	0.76
Cognate:frequency	0.06	0.29	0.20	0.84
language:typeName	0.14	0.38	0.36	0.72
language:Cognate	0.30	0.38	0.79	0.43
typeName:Cognate	**-1.05**	**0.38**	**-2.75**	**0.01**
language:typeName:frequency	0.60	0.59	1.00	0.32
language:Cognate:frequency	0.24	0.59	0.41	0.68
typeName:Cognate:frequency	-0.67	0.59	-1.14	0.25
language:typeName:Cognate	-0.13	0.76	-0.18	0.86
language:typeName:Cognate:frequency	1.71	1.20	1.43	0.15

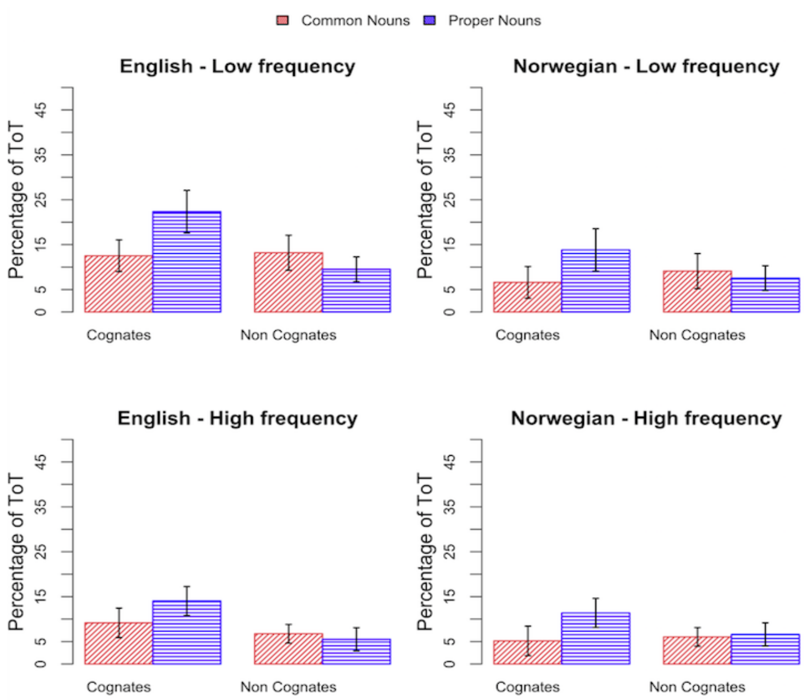

Figure 10: Means of probability of positive TOTs relative to "yes" responses

Table 6 shows a significant effect of language, with participants having more TOT occurrences in English than Norwegian. There is a significant effect of frequency signifying that participants experienced greater occurrence of TOTs for low-frequency words. The results also indicate an effect of cognate status, meaning that participants actually had more TOTs for cognate words. Lastly, cognate status was shown to have interacted with noun type which is to say that participants had more TOTS for cognates when they were proper nouns. *Figure 10* provides a graph depiction of means for this table.

As demonstrated in the following tables, no significant effects of sounds or sound placement in target words (*Table 7*), or syllable effects (*Table 8*) were found, meaning that there were no clear patterns of partially successful retrieval in TOT states. See *Figure 11* for graph illustration of means for *Table 7*.

Table 7: Access to TOT Phonology Analysis

Mean Phon_Correct				
	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	1.68	0.12	14.23	<1e-04
language	0.15	0.20	0.75	0.46
typeName	-0.03	0.21	-0.14	0.89
Cognate	-0.08	0.21	-0.39	0.70
Nowac_Subtlex_Zipf	-0.18	0.16	-1.09	0.28
language:typeName	0.13	0.41	0.32	0.75
language:Cognate	-0.04	0.42	-0.10	0.92
typeName:Cognate	0.30	0.42	0.72	0.47
language:Nowac_Subtlex_Zipf	0.14	0.32	0.43	0.67
typeName:Nowac_Subtlex_Zipf	0.07	0.34	0.20	0.84
Cognate:Nowac_Subtlex_Zipf	0.31	0.35	0.89	0.37
language:typeName:Nowac_Subtlex_Zipf	-0.77	0.67	-1.14	0.25
language:Cognate:Nowac_Subtlex_Zipf	-0.11	0.69	-0.15	0.88
typeName:Cognate:Nowac_Subtlex_Zipf	0.12	0.66	0.18	0.85
language:typeName:Cognate	-0.78	0.84	-0.93	0.35

Table 8: Access to TOT Syllables Analysis

	Raw counts							
	= cognate	= EN	= non-Cognate	= EN	= cognate	= NO	= non-Cognate	= NO
	common	proper	common	proper	common	proper	common	proper
0	7	22	10	4	7	11	11	6
1	6	9	4	6	5	11	3	5
2	4	4	4	7	2	3	5	2
3	11	6	4	4	3	6	4	5
4	1	8	2	1	5	9	5	3

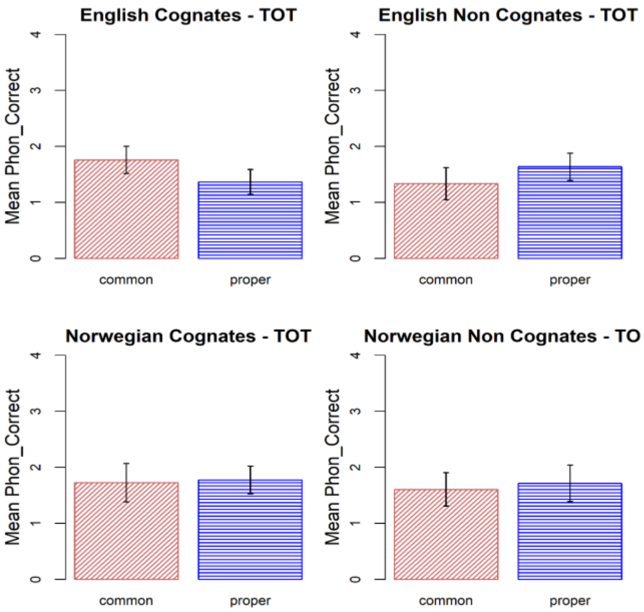

Figure 11: Means of Access to TOT Phonology Analysis

Individual Differences Analyses

In order to investigate the effect of difference in language profile on our findings, participant individual measures for each of the 4 factors from the LEAP-Q factor analysis were included in the mixed effects model. English proficiency, spoken English proficiency, informal English learning and age of English acquisition were added as covariates to assess individual differences.

a.) Probability of Known Words

Responses were TOT, "yes" and "don't know". 124 of the total number of responses were true TOTs. These were coded together with "yes" as 1 and "don't know" as 0. Cognate status (cognate, -0.5 vs non-cognate, 0.5) was fixed effect (centered). A logistic regression was fitted to assess the likelihood of knowing words (know + TOTs). The results for these differences are shown in *Table 9.*

Table 9: Individual Differences- Analysis of 'know' + TOT to 'don't know' responses.

Probability of know and +TOT relative to I don't Know				
	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	0.87	0.17	5.04	<0.01
EngProficiency	**0.50**	**0.13**	**3.92**	**<0.01**
SpokenEngProficiency	**0.39**	**0.13**	**2.96**	**<0.01**
InfEngLearning	-0.15	0.12	-1.25	0.21
AoAEng	**0.27**	**0.12**	**2.23**	**0.03**
Cognate	0.01	0.26	0.00	1.00
EngProficiency:Cognate	**0.25**	**0.12**	**2.19**	**0.03**
SpokenEngProficiency:Cognate	0.13	0.13	1.03	0.30
InfEngLearning:Cognate	-0.15	0.11	-1.36	0.17
AoAEng:Cognate	-0.19	0.11	-1.68	0.09

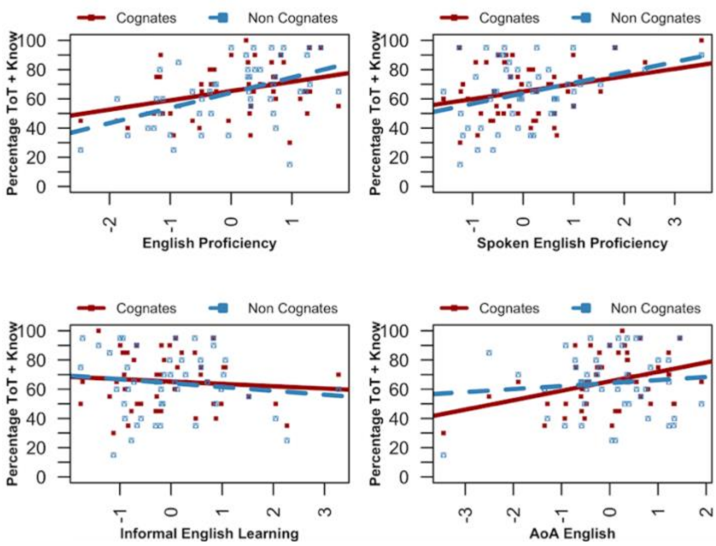

Figure 12: Individual Differences- Analysis of 'know' + TOT to 'don't know' responses

These results demonstrate significant effects of overall English proficiency and spoken English proficiency, meaning that the more proficient participants knew more words in general. Age of acquisition appears to indicate a slightly significant effect of known words, indicating that participants who learned English later knew more English words. This effect appears to be slightly stronger for cognates than for non-cognates but presents no significant interaction. A significant effect of language proficiency for non-cognates is indicated, implying that participants with higher English proficiency knew more non-cognate words than participants with lower proficiency. A graph illustration of *Table 9* data can be seen in *Figure 12*.

b.) Probability of TOT Occurrences

Next, to calculate the probability of TOTs relative to "yes" and TOT responses, "don't know" trials (32%) and negative TOTs (when participants were in a TOT state but the target word was not the actual TOT). TOTs were then coded as 1 and "yes" responses as 0. A logistic regression was fitted to assess the likelihood of TOTs to known words. The results are displayed in *Table 10*.

Table 10: Individual differences: TOTs relative to 'know' + TOT responses

Probability of TOT relative to Know				
	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	-2.71	0.22	-12.41	< 2e-16
EngProficiency	**-0.48**	**0.17**	**-2.75**	**0.01**
SpokenEngProficiency	0.01	0.16	0.06	0.95
InfEngLearning	-0.08	0.16	-0.48	0.63
AoAEng	0.13	0.18	0.72	0.47
Cognate	**-0.59**	**0.30**	**-1.98**	**0.05**
EngProficiency:Cognate	-0.31	0.23	-1.32	0.19
SpokenEngProficiency:Cognate	0.00	0.20	0.00	1.00
InfEngLearning:Cognate	-0.02	0.22	-0.07	0.94
AoAEng:Cognate	-0.11	0.24	-0.45	0.65

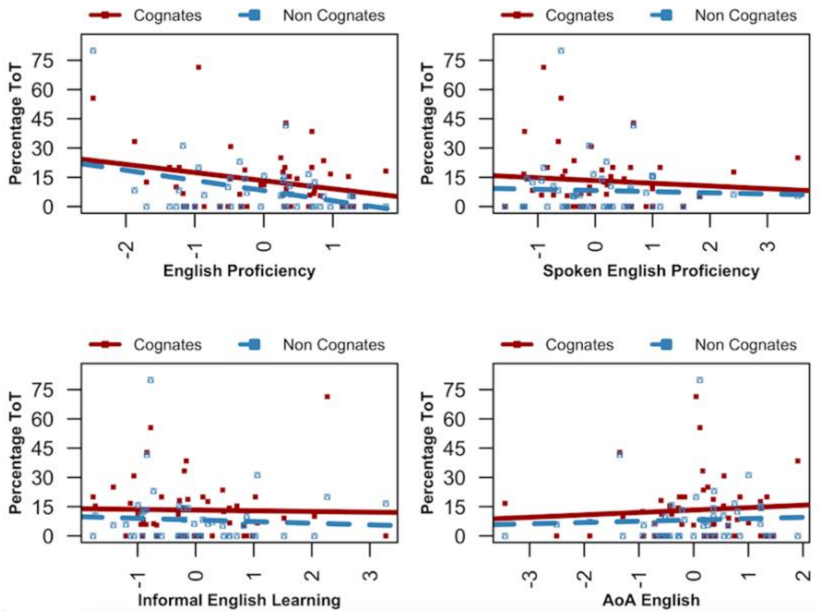

Figure 13: Individual differences: TOTs relative to 'know' + TOT responses

As shown in *Table 10*, the only significant factor that appears to predict more occurrences gathered from the given data appears to be English proficiency (inverse correlation), meaning that participants that were less proficient in English had more TOTs. Additionally, cognates were shown to have incurred a higher TOT occurrence in this analysis. *Figure 13* depicts the means of these individual differences.

Discussion

The aim of this study was to investigate whether aspects such as word frequency, cognate status and noun type may have a faciliatory effect on the tip-of-the-tongue experience in Norwegian-English bilinguals, as had been found previously in similar studies. The effect of factors related to participants' individual differences was an additional objective. Therefore, experiments were performed that controlled for word frequency, cognate status and noun type for both languages in a similar manner to past studies. Cognate status and noun type (proper noun and cognate) were crossed as an additional manipulation. The results from the TOT experiments were then crossed with the results of the bilingual profile questionnaire (LEAP-Q) results.

The results of the experiments of this study presented the following findings: Regarding vocabulary, (1) participants of higher English proficiency had greater knowledge of non-cognate words, (2) participants knew more Norwegian words and frequent words. Additionally, (3a) increases in English proficiency and (3b) age of acquisition were shown to predict higher vocabulary knowledge. Regarding TOT occurrences, (4) participants had more TOTs in English than in Norwegian and (5) more TOTs were observed for low-frequency words. 6a) Participants had more TOTs for cognate words than for non-cognate words, (6b) especially for cognate proper nouns. Regarding individual differences related to TOTs, (7) English proficiency was shown to be the only factor that predicted TOTs in that participants of lower proficiency had more TOTs.

A borderline effect of noun type was indicated, meaning that proper nouns and common nouns behaved in slightly different patterns within participants' vocabularies, however with no significant differences. Analyses of TOTs showed a general effect of frequency although this effect did not appear to interact with any other factors. Although the experiments in this study checked for possible access to phonological components when participants were in TOT state (see methods section), this was not a principal interest to the main goal of this study. Results showed no significant effects of phonology, placements of sounds or syllables, meaning there were no clear patterns of partially successful retrieval, and will therefore not be discussed in further detail here. (*See Tables 7 and 8.*) A possible reason for the lack of significant results from this data may be that the registration of responses varied between multiple experimenters. Future studies may explore this partial access further by securing a uniform method of data registration.

While not specifically mentioned in predictions for this study, the significance indicated with regard to non-cognate words being benefitted English proficiency (1) is not unexpected and suggests that proficiency is more predictive of how many non-cognates a speaker knows. Naturally, non-cognate words in L2 are more difficult to learn as they are not in L1 or similar to L1 translation equivalents. Participants were shown to have larger vocabularies in Norwegian than in English as well as greater knowledge of high frequency words (2). Although not mentioned in predictions for this study, this result would be generally anticipated for this group of individuals with Norwegian as their first language. (See *Table 3b*.) Also not explicitly predicted was the effect of English proficiency (3a) found to be significant to knowledge of words. In other words, higher proficiency correctly predicted how many words participants knew. This was shown in where patterns of general and spoken English proficiency increased, as did "yes" answers as well as TOT answers. Larger vocabularies are nonetheless largely inherent to increased proficiency in a language (Pearson, et al., 1993) and is therefore an expected result. Not expected, however, was the age of acquisition of English factor shown to correspond to greater knowledge of English (3b). This finding could potentially be explained by the possibility that learning English in school may contribute significantly to broadened English vocabulary. However, more studies with specific focus on effects of learning English in school related to vocabulary knowledge and age of acquisition would be needed in order to make legitimate hypotheses.

As predicted in support of the weaker links theory outlined previously, participants were shown to have greater TOT occurrences in their non-dominant language (4). Also predicted was the finding of higher TOT rates for low-frequency words (5), in line with the findings of similar studies (Gollan, et al., 2008; Gollan & Brown, 2006).

The general lack of cognate effect (6a) demonstrated throughout the results section is unusual and deviates from this study's predictions based on the models and studies described earlier. Particularly surprising is the increase of TOTs for cognate words especially for proper nouns (6b), a seemingly reversed effect to the predicted increase of TOT occurrences for this crossed constraint. The patterns here are unclear and do not provide a straightforward explanation. However, when creating matching stimuli sets for this study, proper nouns proved to be problematic. As specified in the methods section, the current study employed the use of definitions to attempt inducing TOT states. Creating transparent definitions for names of cities, countries, and people that would most likely be known to participants was particularly challenging. Definitions for target words that were names of famous persons often required mention of distinguishing features to avoid confusing them for a different famous person. While a participant may have known of the target person's name (answering "yes" or TOT), their response may have resulted in "don't know" if the distinguishing feature mentioned was unfamiliar to them. For example, the following definition was given for target word (cognate, proper noun) *Streep,* for Meryl Streep: *American actress often described as the best of her generation, most famous for roles in The Devil Wears Prada, Mamma Mia and for her role as British Prime Minister in Iron Lady.* In this case, most famous movies were listed in order to separate Streep from other actresses who may also be considered "the best of her generation". While a participant may have known of Meryl Streep, they may have been answered "don't know" if they had no knowledge of the movies listed. Similarly, names of places, (particularly cities and countries) were difficult to provide definitions for without including geographical features or specific attractions pertaining the given place which set them apart from other places of similar location. "Yes" or TOT results may thus have depended more specifically on the participants' knowledge of geography or other attractions, rather than knowledge of the name of the place. Future studies investigating effects of crossing proper nouns and cognate words in attempt to induce TOTs in bilinguals should consider using visual stimuli (e.g., photographs, maps, flags) as an alternative to word definitions. This may reduce ambiguity of target words considerably and likely produce different results from those of this study.

The finding that participants with lower English proficiency had greater TOT occurrences (7) challenges the prediction of the competition hypothesis, where higher activation levels of English words due to higher proficiency would cause greater competition and therefore more TOT occurrences. However, these results alone cannot completely rule out the competition hypothesis for this effect, given that it also predicts balanced use of L1 and L2 as potential cause for TOTs (Hermans, et al., 1998). This finding does not directly challenge nor directly support the weaker links hypothesis, in that this hypothesis focuses on language dominance and frequency of language use rather than proficiency to explain word retrieval processes for speaking (Gollan, Bonanni, & Montoya, 2005). Since the participant group in this study was comparatively unvaried in proficiency and dominance factors (as shown in *Table 3b*), a so-called ceiling effect may have influenced results, increasing obscurity as to which theory the current findings may support. Future studies may aim to further pull apart these two theories by testing bilinguals with a larger range of both proficiency and dominance than the uniform group used in this study.

Conclusion

The current study aimed to explore the effects of frequency, cognate status and noun type in tip-of-the-tongue occurrences in Norwegian-English bilinguals. Additionally, factors from the participants' bilingual profile were included, to investigate in what manner they may exert influence on the matter. This study also attempted to relate results to the varying approaches presented by the weaker links hypothesis and the competition hypothesis. As predicted and in line with similar studies, participants experienced greater TOT occurrences in their non-dominant language and showed higher TOT rates for low-frequency words, in support of the weaker links hypothesis. Participants of lower proficiency produced more TOTs, showing

English proficiency to be the only factor to predict TOTs. Controversially, results showed that more TOTs were experienced for cognate words, specifically proper nouns. While the results of this study did not provide markedly novel evidence pertaining to facilitated word retrieval processes in bilinguals, challenges that were faced with when creating experiments involving cognate proper nouns, as well as testing a uniform participant group may provide valuable foundations for future studies. Generally, further research is required to continue the dissection of the underlying retrieval processes pertaining to the tip-of-the-tongue states in bilinguals.

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APPENDICES

Appendix A: Information Letter and Participant Consent Form

INVITATION TO PARTICIPATE IN A RESEARCH PROJECT

English as a second language: language processing and bilingual profile

We are looking for Native speakers of Norwegian to take part in a study investigating the relationship between bilingualism and language processing.

In order to participate in this study you need to be between **18 and 35 years of age** and a **Native speaker of Norwegian** with no other home languages (excluding perhaps English). You should have a reasonable proficiency in **English as your second language**. You should have normal or corrected-to-normal vision and hearing and have no diagnosed cognitive impairments or language impairments such as dyslexia or stuttering.

This research is conducted in the Experimental Linguistics Research groups at the University of Agder, headed by Professor Linda Wheeldon (linda.r.wheeldon@uia.no), Professor Allison Wetterlin (Allison.wetterlin@uia.no).

The study is run by our Masters students Ellinor Skjerli (ellinor.skjerli@gmail.com), Karethe Nilsen (karethe.nilsen@gmail.com), Renate Gjetnes (renatg16@student.uia.no), Helene Øya (heleno15@student.uia.no), Heidi Baardsen (heidi.baardsen@gmail.com), and Yvonne Møtteberg Karlsen (yvonmk15@student.uia.no). Please contact them if you have any queries about the study.

WHAT IS THE STUDY ABOUT?

This study is designed to investigate the use of English as a second language. We are interested in how aspects of bilingual learning and language-use relate to language processing. The study has two components:

1. A questionnaire asking questions about your language background and about how you rate your own level of proficiency in different aspects of the languages that you speak.
2. Some simple tests assessing language processing in Norwegian and English. These tests are designed to investigate word finding, sentence production and sentence comprehension.

If, after having read the information below, you agree that you are eligible, and you decide to take part in the study, you will be sent a consent form to be filled out and signed.

VOLUNTARY PARTICIPATION AND THE POSSIBILITY TO WITHDRAW CONSENT (OPT-OUT)

Participation in the study is voluntary. If you wish to take part, you will need to sign the declaration of consent. This will allow us to process your data. You can, at any given time and without reason withdraw your consent. If you decide to withdraw participation in the project, you can ask that your test results and personal data be deleted, unless the data and tests have already been analysed or used in scientific publications.

So long as you can be identified in the collected data you have the right to:

- access the personal data that is being processed about you
- request that your personal data is deleted
- request that incorrect personal data about you is corrected/rectified
- receive a copy of your personal data (data portability), and
- send a complaint to the Data Protection Officer or The Norwegian Data Protection Authority regarding the processing of your personal data.

If you at a later point, wish to withdraw consent or have questions regarding the project, you can contact the principal investigator (Linda Wheeldon). Questions about the study or withdrawing consent can also be directed to the University of Agder's Data protection officer Ina Danielsen ina.danielsen@uia.no or NSD (Norsk senter for forskningsdata AS) by email personvernombudet@nsd.no or telephone: 55 58 21 17.

WHAT WILL HAPPEN TO YOUR INFORMATION?

The study will collect and record personal information about you. However, you will never at any time be mentioned as an individual in relation to this study. The information that is recorded about you will only be used as described in the purpose of the study. Your personal data will be assigned a number code related to your name and stored on a non-networked, password protected PC. Only the laboratory directors and experimenters will have access to your data and to the key relating your data number to your name. In addition, we will record the responses you produce during the experiment, this includes key strokes and speech. These data will be also be anonymised and treated as described above.

The results derived from the pooled data will be published. In the interest of being open to the scientific community and others interested in this research we would also like, with your permission, to publish the anonymised data to an open access database. If you agree to this, please sign the consent form. The decision you make does not affect your eligibility for this study.

All information will be processed and used without your name or personal identification number, or any other information that is directly identifiable to you.

The principal investigators have the responsibility for the daily operations/running of this research project and that any information about you will be handled in a secure manner. Information about you will be anonymised or deleted a maximum of 5 years after the project end date (20.12.2021).

FINANCE In appreciation for your time and effort, you will receive a voucher for 300 NOK on completion of this study.

Participant consent form

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Participant Identification Number for this study

ID#

1) I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2) I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason. I understand that I can withdraw my data at any time during the experiment and for the duration of one month after my completion of the study.

3) I understand that data collected during the study will be looked at by researchers from the University of Agder. I give permission for these individuals to have access to my data. Upon completion of the study, the data may be placed on an appropriate repository for data-sharing and be accessed by researchers not affiliated with the University of Agder. I understand that all my data will be stored anonymously.

4) I agree to take part in the study.

Name of Participant (BLOCK LETTERS)	Date	Signature
Name of Researcher (BLOCK LETTERS)	Date	Signature

date Participant's Signature

Appendix B: Language Experience and Proficiency Questionnaire (LEAP-Q)

(Marian, Blumenfeld, & Kaushanskaya, 2007).

Last Name		First Name		Today's Date	
Age		Date of Birth		Male ☐	Female ☐

(1) Please list all the languages you know in order of dominance:

1 Language A	2 Language B	3 Language C	4 Language D	5 Language E

(2) Please list all the languages you know **in order of acquisition** (your native language first):

1 Language A	2 Language B	3 Language C	4 Language D	5 Language E

(3) Please list what percentage of the time you are *currently* and *on average* exposed to each language.
(*Your percentages should add up to 100%*):

List language here:	Language A	Language B	Language C	Language D	Language E
List percentage here:					

(4) When choosing to read a text available in all your languages, in what percentage of cases would you choose to read it in each of your languages? Assume that the original was written in another language, which is unknown to you.
(*Your percentages should add up to 100%*):

List language here	Language A	Language B	Language C	Language D	Language E
List percentage here:					

(5) When choosing a language to speak with a person who is equally fluent in all your languages, what percentage of time would you choose to speak each language? Please report percent of total time.
(*Your percentages should add up to 100%*):

List language here	Language A	Language B	Language C	Language D	Language E
List percentage here:					

(6) Please name the cultures with which you identify. On a scale from zero to ten, please rate the extent to which you identify with each culture. (Examples of possible cultures include US-American, Chinese, Jewish-Orthodox, etc.):

List cultures here	Culture A (click here for scale)	Culture B (click here for scale)	Culture C (click here for scale)	Culture D (click here for scale)	Culture E (click here for scale)

(7) How many years of formal education do you have?____________________
Please check your highest education level (or the approximate U.S. equivalent to a degree obtained in another country):

☐ Less than High School
☐ High School
☐ Professional Training
☐ Some College
☐ College
☐ Some Graduate
☐ Masters
☐ PhD/MD/JD
☐ Other:

(8) Date of immigration to the United States, if applicable: ____________________
If you have ever lived in another country, please provide name of country and dates of residence:
____

(9) Have you ever had a vision problem ☐, hearing impairment ☐, language disability ☐, or learning disability ☐? (Check all applicable).
If yes, please explain (including any corrections): ____________________

Language: Language X

This is my (please select from scroll-down menu: First, Second, Third, etc.) language.
All questions below refer to your knowledge of Language X.

(1) Age when you…:

began acquiring Language X:	*became fluent* in Language X:	*began reading* in Language X:	*became fluent reading* in Language X:

(2) Please list the number of years and months you spent in each language environment:

	Years	Months
A country where Language X is spoken		
A family where Language X is spoken		
A school and/or working environment where Language X is spoken		

(3) On a scale from zero to ten, please select your *level of proficiency* in speaking, understanding, and reading Language X from the scroll-down menus:

Speaking	(click here for scale)	Understand spoken language	(click here for scale)	Reading	(click here for scale)

(4) On a scale from zero to ten, please select how much the following factors contributed to you learning Language X:

Interacting with friends	(click here for scale)	Language tapes/self instruction	(click here for scale)
Interacting with family	(click here for scale)	Watching TV	(click here for scale)
Reading	(click here for scale)	Listening to the radio	(click here for scale)

(5) Please rate to what extent you are currently exposed to Language X in the following contexts:

Interacting with friends	(click here for scale)	Listening to radio/music	(click here for scale)
Interacting with family	(click here for scale)	Reading	(click here for scale)
Watching TV	(click here for scale)	Language-lab/self-instruction	(click here for scale)

(6) In your perception, how much of a foreign accent do you have in Language X?
(click here for scale)

(7) Please rate how frequently others identify you as a non-native speaker based on your accent in Language X:
(click here for scale)

Appendix C: LEAP-Q Revised Edition

REMEMBER TO 'SAVE AS' Y + SUBJECT NUMBER (E.G., Pp_01) FIRST!!

General note: cells are locked to prevent formula being changed (you can unlock if necessary by removing the worksheet protection).

Participant number: | **Date of testing:**

SCREENING QUESTIONNAIRE

Experimenter: Ask participant the following questions and fill in the yellow boxes with their responses.

1	What is your age? (in years)			
2	What is your gender?			
3	Are you a native speaker of Norwegian?			
4	Is Norwegian the only language you speak at home (aside from English)?		*If no, please specify other home language*	
5	Are you a reasonably good speaker of English?			
6	Do you have normal vision or vision that is corrected to normal with glasses or contact lenses?			
7	Can you confirm that you have no language impairments such as dyslexia, stuttering etc.?			
8	Do you have normal hearing or hearing that is corrected to normal?			
9	Are you left or right handed?			
10	What is your country of birth?			
11	What is your current country of residence?			
12	How many years of education do you have?			
13	What is the highest education level you have? (Select from the drop-down options)		*If other, please specify*	
14	Have you participated in any experiments here before?			

2. LANGUAGE BACKGROUND

Participant: please answer these questions below about the different languages you speak.
Please fill in your responses in the appropriate yellow boxes, and ask the experimenter if you have any questions.

Q1 Please list all the languages you speak in order of DOMINANCE (up to 5).

1	
2	
3	
4	
5	

Q2 Please list all the languages you speak in order of ACQUISITION (up to 5).

1	
2	
3	
4	
5	

Q3 Please list what percentage of the time you are on average exposed to each language (e.g. exposure in terms of talking, listening, and reading, including TV, films and music).
(All your answers should add up to 100%)

	Language	%
1		
2		
3		
4		
5		
	Total:	0

Please make sure your answer adds up to 100%

Q4 Please list what percentage of the time you spend speaking each language.
(All your answers should add up to 100%)

	Language	%
1		
2		
3		
4		
5		
	Total:	0

Please make sure your answer adds up to 100%

Q5 Please list what percentage of the time you typically spend reading in each language.
(All your answers should add up to 100%)

	Language	%
1		
2		
3		
4		
5		
	Total:	0

Please make sure your answer adds up to 100%

Q6 When choosing a language to speak, with a person who is equally fluent in all your languages, what percentage of time would you choose to speak each language? Please report percentage of total time.
(All your answers should add up to 100%)

	Language	%
1		
2		
3		
4		
5		
	Total:	0

Please make sure your answer adds up to 100%

Q7 What cultures do you identify with (e.g., Norwegian, British, American, etc)? Please list each culture below (up to 5) and use the scale from 0-10 to rate the degree of identification, whereby 0 = no identification, 5 = moderate identification, 10 = complete identification.

	Culture	Identification
1		
2		
3		
4		
5		

Q8 Do you feel that you were once better in one of your languages and that you have become less fluent?

If yes, which one? *And at what age did you become less fluent?*

Q9 In which language do you usually do the following tasks?

Task	Language
Simple maths (count, add)	
Dream	
Express anger or affection	
Talk to yourself	

3. NORWEGIAN AND ENGLISH PROFICIENCY

Participant: please answer these questions below about your experience with Norwegian and English.
Please fill in your responses in the appropriate yellow boxes, and ask the experimenter if you have any questions.

Q1 Please list the number of years and months you have spent in each language environment.

	Norwegian		English	
	Years	Months	Years	Months
A country where this language is spoken				
A family where this language is spoken				
A school where this language is spoken ALL of the time				
A school where this language is spoken SOME of the time				
A workplace where this language is spoken ALL of the time				
A workplace where this language is spoken SOME of the time				

Q2 Please rate how much the following factors contributed to your learning of each language on a scale of 0-10 whereby 0 = not a contributor, 5 = moderate contributor and 10 = most important contributor.

	Norwegian	English
Interacting with friends / colleagues		
Interacting with family		
Reading (e.g., books, magazines, online material)		
School and education		
Self-instruction (e.g., language learning videos or apps)		
Watching TV / streaming		
Listening to music/media		

Q3 Please rate to what extent you are currently (e.g. in the last month or so) exposed to each language on a scale of 0-10 whereby 0 = never, 5 = half of the time and 10 = almost always.

	Norwegian	English
Interacting with friends		
Interacting with family		
Reading (e.g., books, magazines, online material)		
Self-instruction (e.g., language learning videos or apps)		
Watching TV / streaming		
Listening to music/media		

Q4 Please rate your level of proficiency in the following aspects of each language on a scale of 0-10 whereby: 0 = none; 1 = very low; 2 = low; 3 = fair; 4 = slightly less than adequate; 5 = adequate; 6 = slightly more than adequate; 7 = good; 8 = very good; 9 = excellent; 10 = perfect.

	Norwegian	English
Speaking (general fluency)		
Pronunciation (accent)		
Listening (understanding spoken language)		
Reading		
Writing		
Grammar		
Vocabulary		
Spelling		

Q5 Please list the AGE (in years) you were when the following occurred for each language.

	Norwegian	English
Started hearing this language on a regular basis		
Became fluent in speaking this language		
Started learning to read in this language		
Became fluent in reading this language		

Q6 Please rate your level of proficiency in switching between your languages when you need to, on a scale of 0-10 whereby: 0 = none; 1 = very low; 2 = low; 3 = fair; 4 = slightly less than adequate; 5 = adequate; 6 = slightly more than adequate; 7 = good; 8 = very good; 9 = excellent; 10 = perfect.

Q7 When you are speaking do you ever find yourself accidentally mixing words or sentences from Norwegian and English?

(a) If yes, how often does English accidentally intrude in your Norwegian on a scale of 0-10 (whereby 0 = never, 5 = half of the time, 10 = all of the time)?

(b) And how often does Norwegian accidentally intrude into your English on a scale of 0-10 (whereby 0 = never, 5 = half of the time, 10 = all of the time)?

Q8 When you are speaking with a person who also knows both Norwegian and English do you ever find yourself intentionally mixing words or sentences from Norwegian and English?

(a) If yes, how often do you intentionally use English words when speaking Norwegian on a scale of 0-10 (whereby 0 = never, 5 = half of the time, 10 = all of the time)?

(b) And how often do you intentionally use Norwegian words when speaking English on a scale of 0-10 (whereby 0 = never, 5 = half of the time, 10 = all of the time)?

END OF QUESTIONNAIRE - THANK YOU FOR YOUR TIME!

Appendix D: Full TOT Stimuli Sets

block	trial	item	Condition	List	Lang	Definition	Target	Foil1	Foil2	Foil3	None of the above	Syllables	Phonemes	Letters	NoWac	FreqPM
1	1	25	3	1	1	Etternavnet til den Amerikanske talkshow-vertinnen som sto frem som homofil i 1997 i sitt eget humor-talkshow, kjent for sitt korte blonde hår.	Degeneres	Winfrey	Degrassi	Banks	None of the above		4	9	9	1554	2.22
1	2	5	1	1	1	Læren om forestilte forbindelser mellom himmellegemene og jorden og kunsten å spå fremtidige hendelser og skjebner ut fra stjernenes stilling	astrologi	astronomi	analogi	horoskop	None of the above		4	8	8	1189	1.7
1	3	31	4	1	1	hovedrollene.	Dagboken	Titanic	Dagsturen	Inferno			3	8	8	53	0.07
1	4	14	2	1	1	En rot brukt som smakstilsetning i mat og drikke, ofte i frisk, tørket, malt eller syltet form. Blir også brukt til å lindre sår hals og mageproblemer	ingefær	anis	ginseng	lakris	None of the above		3	6	7	1227	1.61
1	5	15	2	1	1	Skål med spiss tut til å ha middagstilbehør av den flytende typen i.	sausenebb	mugge	Flauseredd	øse	None of the above		3	9	9	7	0.01
1	6	29	3	1	1	Den rosa sjøstjernevennen til Svampebob	Patrick	Bleke	Henrik	Sandy	None of the above		2	6	7	5876	8.39
1	7	8	1	1	1	Et dyr i kamelslekten med én pukkel	dromedar	kamel	dromund	gazelle	None of the above		3	8	8	295	0.42
1	8	21	3	1	1	Etternavnet på verdenskjente den britiske BBC naturprogramlederen spesielt kjent for dokumentarene "Our planet" og "Blue Planet".	Attenborough	Irwin	Battenburg	McGraw	None of the above		4	7	12	127	0.18
1	9	35	4	1	1	Den snakkende trefigurvennen til Lillebror i bøkene til Anne-Cath Vestly	Knerten	Karoline	Kvisten	Tretyting	None of the above		2	6	7	896	1.28
1	10	28	3	1	1	Etternavnet til den norske programlederen og komikeren kjent fra blant annet Nytt på Nytt og Side om Side.	Almaas	Tufte	Vesaas	Lyngbø	None of the above		2	5	6	835	1.19
1	11	11	2	1	1	Spredningen av stoffer til luft, vann eller jord som fører til ulempe eller skade på helse eller trivsel for mennesker, dyr og planter	forurensning	utslipp	forutsetning	tilsetning	None of the above		4	10	11	5458	7.8
1	12	34	4	1	1	Havet mellom Europa, Afrika og Asia	Middelhavet	Rødehavet	Alanterhaver	Dødehavet	None of the above		4	10	11	2243	3.49
1	13	9	1	1	1	regler for skikk og bruk i selskapslivet, særlig ved hoffet og i diplomatiet	etikette	manerer	sukett	etymologi	None of the above		4	7	8	252	0.36
1	14	19	2	1	1	Samlebetegnelse på små, buskformede planter i skogen hvor det vokser blant annet blåbær og tyttebær.	lyng	mose	lav	kvae	None of the above		1	3	4	2456	3.5
1	15	4	1	1	1	Gammel, egyptisk bildeskrift	hieroglyf	helleristninger	hiragana	sanskrit	None of the above		3	8	9	101	0.14
1	16	24	3	1	1	Fornavnet til Storbritannias statsminister under andre verdenskrig. Han var kjent for å bruke begrepet "jernteppet" for å referere til delingen av Europa under den kalde krigen	Winston	Chamberlain	Wilson	Windsor	None of the above		2	6	7	1772	2.53
1	17	18	2	1	1	Den hinnen som danner seg på varme, ofte melkeholdige væsker som får stå i ro uten å bli rørt i eller ristet på under nedkjøling	snerk	hinne	skurk	verk	None of the above		1	5	5	104	0.15
1	18	39	4	1	1	Navnet på et stjernemønster som utgjør en del av stjernebildet Store Bjørn	Karlsvogna	Orion	Kavalragnar	Lillebjørn	None of the above		3	9	10	92	0.13
1	19	38	4	1	1	Eselvennen til Ole Brum	Tussi	Kristoffer	Tassen	Tralte	None of the above		2	4	5	399	0.57
1	20	1	1	1	1	Betegnelsen på en person som er nominert av et politisk parti til å representere partiet ved valg	mandat	representant	kandidat	tjenestemann	None of the above		2	6	6	6007	8.58
2	1	10	1	1	1	En maskin som skiller væsker med forskjellig massetetthet eller skiller væske fra faste stoffer ved hjelp av rask rotasion.	sentrifuge	sentralmål	sugekopp	fugemasse	None of the above		4	10	10	54	0.08
2	2	2	1	1	1	Navnet på luftlaget som omgir jorden	atmosfære	stratosfære	atmometer	ozonlag	None of the above		4	9	9	5385	7.69
2	3	22	3	1	1	Hovedstaden i Portugal.	Lisboa	Porto	Libya	Ankara	None of the above		3	6	6	1804	2.58
2	4	27	3	1	1	sin hvite hest og har både en kake og en krig oppkalt etter seg	Bonaparte	DeGaulle	Beauport	Bernadotte	None of the above		3	8	9	891	1.27
2	5	36	4	1	1	baklengs inn i fuglekassa"	Solan	Mysil	Sonny	Simon	None of the above		2	5	5	450	0.64
2	6	7	1	1	1	En lærling som i religiøs sammenheng ble regnet som en religionsstifters tilhenger. Feks: Jesu 12 tilhengere.	disippel	tilhenger	disiplin	apostel	None of the above		3	7	8	489	0.7
2	7	30	3	1	1	Mowglis bjørnevenn i Jungelboken	Baloo	Shere Kahn	Balto	Kaa	None of the above		2	4	5	57	0.08
2	8	17	2	1	1	Et støtteapparat eller stativ til å holde bilder eller annet flatt materiale stødig, særlig under arbeid med malerier	staffeli	canvas	stafett	stimuli	None of the above		3	6	7	62	0.09
2	9	23	3	1	1	Etternavnet til den kanadiske skuespilleren kjent for roller i filmer som "Deadpool", "The Proposal" or "Detective Pikachu".	Reynolds	Gosling	Randalls	Harris	None of the above		2	7	8	961	1.34
2	10	16	2	1	1	En tynn treskive som en kunstmaler bruker til å blande og tynne ut malerfarger på	palett	skala	paliett	polet	None of the above		2	5	6	314	0.45
2	11	37	4	1	1	Norsk stop-motionfilm om Reodor Felgen, hans venner og byggingen av Il Tempo Gigante	Flåklypa	Biler	Flokem	Rotfløyta	None of the above		3	8	8	536	0.77
2	12	40	4	1	1	Prinsessen som sov i hundre år etter å ha stukket seg i fingeren på en rokk	Tornerose	Snøhvit	Rapunzel	Ariel	None of the above		3	8	9	556	0.79
2	13	3	1	1	1	Betegnelsen på en større gruppe instrumentalmusikere (inkludert strykere, blåseinstrumenter, og slagverk), vanligvis innenfor klassisk musikk	orkester	korps	orkan	band	None of the above		3	8	8	2799	4
2	14	12	2	1	1	Stramt plagg til å bruke omkring anklene for å forhindre for eksempel å få snø i skoen.	gamasjer	anklets	masjete	pulsvanter	None of the above		3	6	7	69	0.09
2	15	26	3	1	1	Fornavnet til broren til Gaus og Roms Dal Fra NRK-serien Brødrene Dal	Brumund	Nitte	Bernard	Gudbrand	None of the above		2	6	7	67	0.1
2	16	20	2	1	1	Frontlokket på en bil	panser	dashbord	pinsett	støtfanger	None of the above		2	6	6	620	0.89
2	17	32	4	1	1	Fornavnet på barnebok-karakter som er kjent for bo sammen med faren sin og fantasivennen. Skybert	Albert	Åge	Alfred	Petter	None of the above		2	5	6	5198	7.42
2	18	33	4	1	1	Navnet på Disneyfilmen om den skotske prinsessen Merida	Modig	Rømmen	Mathilda	Havfruen	None of the above		2	4	5	146	0.2
2	19	13	2	1	1	Betegnelse på fiskeegg	rogn	kaviar	tegn	selje	None of the above		1	3	4	998	1.42
2	20	6	1	1	1	En sykkel laget for mer enn én person hvor man sitter etter hverandre	tandemsykkel	trehjulssykkel	tannhjulsykkel	terrengsykkel	None of the above		4	11	12	39	0.06

block	trial	item	Condition	List	Lang	Definition	Target	Foil1	Foil2	Foil3	None of the above	Syllables	Phonemes	Letters	NoWac	FreqPM
1	1	10	1	1	1	En maskin som skiller væsker med forskjellig massetetthet eller skiller væske fra faste stoffer ved hjelp av rask rotasjon.	sentrifuge	sentralmål	sugekopp	fugemasse	None of the above	4	10	10	54	0.08
1	2	2	1	1	1	Navnet på luftlaget som omgir jorden	atmosfære	stratosfære	atmometer	ozonlag	None of the above	4	9	9	5385	7.69
1	3	22	3	1	1	Hovedstaden i Portugal.	Lisboa	Porto	Libya	Ankara	None of the above	3	6	6	1804	2.58
1	4	27	3	1	1	kjent for sin hvite hest og har både en kake og en krig oppkalt etter seg	Bonaparte	DeGaulle	Beauport	Bernadotte	None of the above	3	8	9	891	1.27
1	5	36	4	1	1	"Dra meg baklengs inn i fuglekassa"	Solan	Mysil	Sonny	Simon	None of the above	2	5	5	450	0.64
1	6	7	1	1	1	En lærling som i religiøs sammenheng ble regnet som en religionsstifters tilhenger. Feks: Jesu 12 tilhengere.	disippel	tilhenger	disiplin	apostel	None of the above	3	7	8	489	0.7
1	7	30	3	1	1	Mowglis bjørnevenn i Jungelboken	Baloo	Shere Kahn	Balto	Kaa	None of the above	2	4	5	57	0.08
1	8	17	2	1	1	Et støtteapparat eller stativ til å holde bilder eller annet flatt materiale stødig, særlig under arbeid med malerier	staffeli	canvas	stafett	stimuli	None of the above	3	6	7	62	0.09
1	9	23	3	1	1	Etternavnet til den kanadiske skuespilleren kjent for roller i filmer som "Deadpool", "The Proposal" or "Detective Pikachu".	Reynolds	Gosling	Randalls	Harris	None of the above	2	7	8	961	1.34
1	10	16	2	1	1	En tynn treskive som en kunstmaler bruker til å blande og tynne ut malerfarger på	palett	skala	paljett	polet	None of the above	2	5	6	314	0.45
1	11	37	4	1	1	Norsk stop-motionfilm om Reodor Felgen, hans venner og byggingen av Il Tempo Gigante	Flåklypa	Biler	Flokern	Rotfløyta	None of the above	3	8	8	536	0.77
1	12	40	4	1	1	Prinsessen som sov i hundre år etter å ha stukket seg i fingeren på en rokk	Tornerose	Snøhvit	Rapunzel	Ariel	None of the above	3	8	9	556	0.79
1	13	3	1	1	1	Betegnelsen på en større gruppe instrumentalmusikere (inkludert strykere, blåseinstrumenter, og slagverk), vanligvis innenfor klassisk musikk	orkester	korps	orkan	band	None of the above	3	8	8	2799	4
1	14	12	2	1	1	Stramt plagg til å bruke omkring anklene for å forhindre for eksempel å få snø i skoen.	gamasjer	anklets	masjete	pulsvanter	None of the above	3	6	7	69	0.09
1	15	26	3	1	1	Fornavnet til broren til Gaus og Roms Dal Fra NRK-serien Brødrene Dal	Brumund	Nitte	Bernard	Gudbrand	None of the above	2	6	7	67	0.1
1	16	20	2	1	1	Frontlokket på en bil	panser	dashbord	pinsett	støtfanger	None of the above	2	6	6	620	0.89
1	17	32	4	1	1	Fornavnet på barnebok-karakter som er kjent for bo sammen med faren sin og fantasivennen, Skybert	Albert	Åge	Alfred	Petter	None of the above	2	5	6	5198	7.42
1	18	33	4	1	1	Navnet på Disneyfilmen om den skotske prinsessen Merida	Modig	Rømmen	Mathilda	Havfruen	None of the above	2	4	5	146	0.2
1	19	13	2	1	1	Betegnelse på fiskeegg	rogn	kaviar	tegn	selje	None of the above	1	3	4	998	1.42
1	20	6	1	1	1	En sykkel laget for mer enn én person hvor man sitter etter hverandre	tandemsykkel	trehjulssykkel	tannhjulsykkel	terrengsykkel	None of the above	4	11	12	39	0.06
2	1	25	3	1	1	Etternavnet til den Amerikanske talkshow-vertinnen som sto frem som homofil i 1997 i sitt eget humor-talkshow, kjent for sitt korte blonde hår.	Degeneres	Winfrey	Degrassi	Banks	None of the above	4	9	9	1554	2.22
2	2	5	1	1	1	Læren om forestilte forbindelser mellom himmellegemene og jorden og kunsten å spå fremtidige hendelser og skjebner ut fra stjernenes stilling	astrologi	astronomi	analogi	horoskop	None of the above	4	8	8	1189	1.7
2	3	31	4	1	1	McAdams i hovedrollene.	Dagboken	Titanic	Dagsturen	Inferno		3	8	8	53	0.07
2	4	14	2	1	1	En rot brukt som smakstilsetning i mat og drikke, ofte i frisk, tørket, malt eller syltet form. Blir også brukt til å lindre sår hals og mageproblemer	ingefær	anis	ginseng	lakris	None of the above	3	6	7	1227	1.61
2	5	15	2	1	1	Skål med spiss tut til å ha middagstilbehør av den flytende typen i.	sausenebb	mugge	Flauseredd	øse	None of the above	3	9	9	7	0.01
2	6	29	3	1	1	Den rosa sjøstjernevennen til Svampebob	Patrick	Bleke	Henrik	Sandy	None of the above	2	6	7	5876	8.39
2	7	8	1	1	1	Et dyr i kamelslekten med én pukkel	dromedar	kamel	dromund	gazelle	None of the above	3	8	8	295	0.42
2	8	21	3	1	1	Etternavnet på verdenskjente den britiske BBC naturprogramlederen spesielt kjent for dokumentarene "Our planet" og "Blue Planet".	Attenborough	Irwin	Battenburg	McGraw	None of the above	4	7	12	127	0.18
2	9	35	4	1	1	Den snakkende trefigurvennen til Lillebror i bøkene til Anne-Cath Vestly	Knerten	Karoline	Kvisten	Tretyting	None of the above	2	6	7	896	1.28
2	10	28	3	1	1	Etternavnet til den norske programlederen og komikeren kjent fra blant annet Nytt på Nytt og Side om Side.	Almaas	Tufte	Vesaas	Lyngbø	None of the above	2	5	6	835	1.19
2	11	11	2	1	1	Spredningen av stoffer til luft, vann eller jord som fører til ulempe eller skade på helse eller trivsel for mennesker, dyr og planter	forurensning	utslipp	forutsetning	tilsetning	None of the above	4	10	11	5458	7.8
2	12	34	4	1	1	Havet mellom Europa, Afrika og Asia	Middelhavet	Rødehavet	Alanterhaver	Dødehavet	None of the above	4	10	11	2243	3.49
2	13	9	1	1	1	regler for skikk og bruk i selskapslivet, særlig ved hoffet og i diplomatiet	etikette	manerer	sukett	etymologi	None of the above	4	7	8	252	0.36
2	14	19	2	1	1	Samlebetegnelse på små, buskformede planter i skogen hvor det vokser blant annet blåbær og tyttebær.	lyng	mose	lav	kvae	None of the above	1	3	4	2456	3.5
2	15	4	1	1	1	Gammel, egyptisk bildeskrift	hieroglyf	helleristninger	hiragana	sanskrit	None of the above	3	8	9	101	0.14
2	16	24	3	1	1	Fornavnet til Storbritannias statsminister under andre verdenskrig. Han var kjent for å bruke begrepet "jernteppet" for å referere til delingen av Europa under den kalde krigen	Winston	Chamberlain	Wilson	Windsor	None of the above	2	6	7	1772	2.53
2	17	18	2	1	1	Den hinnen som danner seg på varme, ofte melkeholdige væsker som får stå i ro uten å bli rørt i eller ristet på under nedkjøling	snerk	hinne	skurk	verk	None of the above	1	5	5	104	0.15
2	18	39	4	1	1	Navnet på et stjernemønster som utgjør en del av stjernebildet Store Bjørn	Karlsvogna	Orion	Kavalragnar	Lillebjørn	None of the above	3	9	10	92	0.13
2	19	38	4	1	1	Eselvennen til Ole Brum	Tussi	Kristoffer	Tassen	Tralte	None of the above	2	4	5	399	0.57
2	20	1	1	1	1	Betegnelsen på en person som er nominert av et politisk parti til å representere partiet ved valg	mandat	representant	kandidat	tjenestemann	None of the above	2	6	6	6007	8.58

block	trial	Condition	List	Lang	Definition	Target	Foil1	Foil2	Foil3	None of the above	Syllables	Phonemes	Letters	NoWac	FreqPM
1	1	3	2	1	Panteren som finner og redder Mowgli i Jungelboke	Bagheera	Akela	Balenciaga	Scar	None of the above	3	6	8	27	0.04
1	2	2	2	1	Indisk krydder i pulverform med sterk gulfarge, som	gurkemeie	karri	ginseng	enebær	None of the above	4	8	9	227	0.32
1	3	1	2	1	Årlig kalender som utgis i bokform og innerholder in	almanakk	notisbok	anorakk	almisse	None of the above	3	7	8	91	0.13
1	4	4	2	1	Den første boka i Suzanne Collins triologi om Katniss	Dødslekene	Panem	Dødslagene	Konkurransen	None of the above	4	10	10	20	0.02
1	5	3	2	1	Etternavnet til den britiske forfatteren som særlig e	Tolkien	Rowling	Token	Meyer	None of the above	2	7	7	638	0.91
1	6	4	2	1	Tegneseriefiguren som blir sterk av å spise spinat	Skippern	Stomperud	Skoppum	Kipster	None of the above	2	6	8	115	0.16
1	7	3	2	1	Fornavnet til Tysklands forbundskansler (statsminist	Angela	Erna	Angelika	Heidi	None of the above	3	6	6	1727	2.47
1	8	4	2	1	Barnebokkarakter kledd i blå bukse,briller og rød og	Willy	Frans	Waldo	Finn	None of the above	2	4	5	4450	6.36
1	9	4	2	1	Jordklodens største hav, som dekker nesten en tred	Stillehavet	Atlanterhavet	Stormhavet	Indiahavet	None of the above	4	10	11	1940	2.77
1	10	1	2	1	Fransk gjenstand tidligere brukt til å utføre henrette	giljotin	bøddel	gelatin	bue	None of the above	3	8	8	44	0.06
1	11	2	2	1	Svært produktive økosystemer i havet bygd opp av k	korallrev	anemone	kalkrev	krystall	None of the above	3	8	9	827	1.18
1	12	3	2	1	Etternavnet til den unge svenske klimaaktivisten og	Thunberg	Ernman	Tumkrans	Andersson	None of the above	2	7	8	69	0.1
1	13	2	2	1	Små guloransje bær som vokser i høyfjellet, regnet s	molte	krekling	svartsurbær	aronia	None of the above	2	5	5	123	0.18
1	14	3	2	1	Etternavnet til Sherlock Holmes' venn, assistent og b	Watson	John	Watergate	Philips	None of the above	2	6	6	2166	3.09
1	15	4	2	1	Lilla spøkelse fra Mummidalen	Hufsa	Hattifnatten	Hufflepuff	Casper	None of the above	2	5	5	62	0.09
1	16	1	2	1	behandlingen av et lik med urter for å forhindre at d	balsamering	konservering	balsamine	kremering	None of the above	4	10	11	33	0.04
1	17	1	2	1	En latterliggjørende etterligning hvor man gjør narr	parodi	herming	melodi	ironi	None of the above	3	6	6	2084	2.98
1	18	2	2	1	Fremkomstmiddel som ligner på en stol med skinne	spark	kjelke	spor	slede	None of the above	1	5	5	5824	8.32
1	19	1	2	1	En vedvarende vekst i det generelle prisnivået som r	inflasjon	priskrig	inkubasjon	infiltrering	None of the above	3	8	9	5477	7.82
1	20	2	2	1	En utendørs solskjerm som kan rulles opp og ned	markise	persienne	marsjandise	verandadør	None of the above	3	7	7	124	0.18
2	1	1	2	1	Et plagg som benyttes for å gi overkroppen en ønske	korsett	midje	mansjett	akvedukt	None of the above	2	5	7	285	0.41
2	2	1	2	1	En gjenkallelig viljeserklæring hvor en person bester	testament	arv	arrangement	miljø	None of the above	3	9	9	2490	1.63
2	3	4	2	1	Fornavnet til det pessimistiske pinnsvinet i Flåklypa,	Ludvig	Reodor	Lukas	Molo	None of the above	2	6	6	3542	5.06
2	4	4	2	1	Hjemstedet til Ole Brum og vennene hans	Hundremeterskogen	Bøkeskogen	Hakkebakkeskogen	Sherwoodskogen	None of the above	6	17	17	159	0.22
2	5	2	2	1	Det største medlemmet av mårfamilien, som kan lig	jerv	grevling	ulv	oter	None of the above	1	4	4	2866	4.09
2	6	3	2	1	Etternavnet til Donald Trumps visepresident	Pence	Nickle	Spencer	Johnson	None of the above	1	4	5	67	0.1
2	7	2	2	1	Fotstykke på vinglass.	stett	kropp	stativ	krakk	None of the above	1	4	5	70	0.1
2	8	2	2	1	Typisk materiale brukt til emballering av takeaway-r	isopor	papp	isotop	plastikk	None of the above	3	6	6	472	0.67
2	9	3	2	1	Etternavnet til Norges første kvinnelige statsministe	Bruntland	Solberg	Brunstad	Jensen	None of the above	2	8	10	3332	4.76
2	10	3	2	1	Etternavnet til den italienske politikeren som grunnl	Mussolini	Fanco	Missouri	Rossi	None of the above	4	8	9	1188	1.7
2	11	4	2	1	Etternavnet til gutten som bor alene med faren sin c	Åberg	Atkins	Borg	Alfred	None of the above	2	5	5	341	0.49
2	12	1	2	1	Lysebrunt krydder i pulverform som brukes til å gi d	kardemomme	kanel	kommode	nellik	None of the above	4	9	10	669	0.96
2	13	1	2	1	En skuespillsjanger av alvorlig karakter med en sørg	tragedie	dramaserie	tragus	torget	None of the above	4	8	8	3464	4.95
2	14	3	2	1	Fornavnet til skaperen av kjente karakterer som Do	Walt	John	Whit	Hank	None of the above	1	4	4	1305	1.86
2	15	3	2	1	Navnet på flåten som Thor Heyerdahl brukte på sin	Kon-Tiki	Ra	Kentucky	Titanic	None of the above	3	8	8	812	1.16
2	16	1	2	1	En påstand eller uttalelse som er virkelig eller sann,	paradoks	motsetning	parafin	ortodoks	None of the above	3	8	8	3671	5.25
2	17	2	2	1	Betegnelse på hunnrein.	simle	søye	gimle	lemen	None of the above	2	5	5	27	0.04
2	18	2	2	1	En person som har overoppsyn med serveringen og	hovmester	tjener	hovmod	byggmester	None of the above	3	9	9	189	0.27
2	19	4	2	1	Vennen til mummitrollet med grønn hatt og frakk sc	Snusmumrikken	Sniff	Stinkesnufs	Hemulen	None of the above	4	12	13	22	0.03
2	20	4	2	1	Boken som handler om en ung, hvit kvinne og henne	Barnepiken	Butler	Bondepike	Gjøkeredet	None of the above	4	10	11	18	0.02

block	trial	Condition	List	Lang	Definition	Target	Foil1	Foil2	Foil3	None of the above	Syllables	Phonemes	Letters	NoWac	FreqPM
1	1	1	2	1	Et plagg som benyttes for å gi overkroppen en ønsk	korsett	midje	mansjett	akvedukt	None of the above	2	5	7	285	0.41
1	2	1	2	1	En gjenkallelig viljeserklæring hvor en person beste	testament	arv	arrangement	miljø	None of the above	3	9	9	2490	1.63
1	3	4	2	1	Fornavnet til det pessimistiske pinnsvinet i Flåklypa,	Ludvig	Reodor	Lukas	Molo	None of the above	2	6	6	3542	5.06
1	4	4	2	1	Hjemstedet til Ole Brum og vennene hans	Hundremeterskogen	Bøkeskogen	Hakkebakkeskogen	Sherwoodskogen	None of the above	6	17	17	159	0.22
1	5	2	2	1	Det største medlemmet av mårfamilien, som kan lig	jerv	grevling	ulv	oter	None of the above	1	4	4	2866	4.09
1	6	3	2	1	Etternavnet til Donald Trumps visepresident	Pence	Nickle	Spencer	Johnson	None of the above	1	4	5	67	0.1
1	7	2	2	1	Fotstykke på vinglass.	stett	kropp	stativ	krakk	None of the above	1	4	5	70	0.1
1	8	2	2	1	Typisk materiale brukt til emballering av takeaway-r	isopor	papp	isotop	plastikk	None of the above	3	6	6	472	0.67
1	9	3	2	1	Etternavnet til Norges første kvinnelige statsministe	Bruntland	Solberg	Brunstad	Jensen	None of the above	2	8	10	3332	4.76
1	10	3	2	1	Etternavnet til den italienske politikeren som grunnl	Mussolini	Fanco	Missouri	Rossi	None of the above	4	8	9	1188	1.7
1	11	4	2	1	Etternavnet til gutten som bor alene med faren sin	Åberg	Atkins	Borg	Alfred	None of the above	2	5	5	341	0.49
1	12	1	2	1	Lysebrunt krydder i pulverform som brukes til å gi d	kardemomme	kanel	kommode	nellik	None of the above	4	9	10	669	0.96
1	13	1	2	1	En skuespillsjanger av alvorlig karakter med en sørg	tragedie	dramaserie	tragus	torget	None of the above	4	8	8	3464	4.95
1	14	3	2	1	Fornavnet til skaperen av kjente karakterer som Dor	Walt	John	Whit	Hank	None of the above	1	4	4	1305	1.86
1	15	3	2	1	Navnet på flåten som Thor Heyerdahl brukte på sin	Kon-Tiki	Ra	Kentucky	Titanic	None of the above	3	8	8	812	1.16
1	16	1	2	1	En påstand eller uttalelse som er virkelig eller sann,	paradoks	motsetning	parafin	ortodoks	None of the above	3	8	8	3671	5.25
1	17	2	2	1	Betegnelse på hunnrein.	simle	søye	gimle	lemen	None of the above	2	5	5	27	0.04
1	18	2	2	1	En person som har overoppsyn med serveringen og	hovmester	tjener	hovmod	byggmester	None of the above	3	9	9	189	0.27
1	19	4	2	1	Vennen til mummitrollet med grønn hatt og frakk sc	Snusmumrikken	Sniff	Stinkesnufs	Hemulen	None of the above	4	12	13	22	0.03
1	20	4	2	1	Boken som handler om en ung, hvit kvinne og henn	Barnepiken	Butler	Bondepike	Gjøkeredet	None of the above	4	10	11	18	0.02
2	1	3	2	1	Panteren som finner og redder Mowgli i Jungelboke	Bagheera	Akela	Balenciaga	Scar	None of the above	3	6	8	27	0.04
2	2	2	2	1	Indisk krydder i pulverform med sterk gulfarge, som	gurkemeie	karri	ginseng	enebær	None of the above	4	8	9	227	0.32
2	3	1	2	1	Årlig kalender som utgis i bokform og innerholder ir	almanakk	notisbok	anorakk	almisse	None of the above	3	7	8	91	0.13
2	4	4	2	1	Den første boka i Suzanne Collins triologi om Katnis	Dødslekene	Panem	Dødslagene	Konkurransen	None of the above	4	10	10	20	0.02
2	5	3	2	1	Etternavnet til den britiske forfatteren som særlig e	Tolkien	Rowling	Token	Meyer	None of the above	2	7	7	638	0.91
2	6	4	2	1	Tegneseriefiguren som blir sterk av å spise spinat	Skippern	Stomperud	Skoppum	Kipster	None of the above	2	6	8	115	0.16
2	7	3	2	1	Fornavnet til Tysklands forbundskansler (statsminis	Angela	Erna	Angelika	Heidi	None of the above	3	6	6	1727	2.47
2	8	4	2	1	Barnebokkarakter kledd i blå bukse,briller og rød og	Willy	Frans	Waldo	Finn	None of the above	2	4	5	4450	6.36
2	9	4	2	1	Jordklodens største hav, som dekker nesten en tred	Stillehavet	Atlanterhavet	Stormhavet	Indiahavet	None of the above	4	10	11	1940	2.77
2	10	1	2	1	Fransk gjenstand tidligere brukt til å utføre henrette	giljotin	bøddel	gelatin	bue	None of the above	3	8	8	44	0.06
2	11	2	2	1	Svært produktive økosystemer i havet bygd opp av	korallrev	anemone	kalkrev	krystall	None of the above	3	8	9	827	1.18
2	12	3	2	1	Etternavnet til den unge svenske klimaaktivisten og	Thunberg	Ernman	Tumkrans	Andersson	None of the above	2	7	8	69	0.1
2	13	2	2	1	Små guloransje bær som vokser i høyfjellet, regnet	molte	krekling	svartsurbær	aronia	None of the above	2	5	5	123	0.18
2	14	3	2	1	Etternavnet til Sherlock Holmes' venn, assistent og	Watson	John	Watergate	Philips	None of the above	2	6	6	2166	3.09
2	15	4	2	1	Lilla spøkelse fra Mummidalen	Hufsa	Hattifnatten	Hufflepuff	Casper	None of the above	2	5	5	62	0.09
2	16	1	2	1	behandlingen av et lik med urter for å forhindre at d	balsamering	konservering	balsamine	kremering	None of the above	4	10	11	33	0.04
2	17	1	2	1	En latterliggjørende etterligning hvor man gjør narr	parodi	herming	melodi	ironi	None of the above	3	6	6	2084	2.98
2	18	2	2	1	Fremkomstmiddel som ligner på en stol med skinne	spark	kjelke	spor	slede	None of the above	1	5	5	5824	8.32
2	19	1	2	1	En vedvarende vekst i det generelle prisnivået som	inflasjon	priskrig	inkubasjon	infiltrering	None of the above	3	8	9	5477	7.82
2	20	2	2	1	En utendørs solskjerm som kan rulles opp og ned	markise	persienne	marsjandise	verandadør	None of the above	3	7	7	124	0.18

block	trial	item	Condition	List	Lang	Definition	Target	Foil1	Foil2	Foil3	None of the above	Syllables	Phonemes	Letters	NoWac	FreqPM
1	1	18	2	3	2	A town or district that has local government. Norw	municipality	community	multiplicity	metropolis	None of the above	6	13	12	24	0.12
1	2	9	1	3	2	a fake drug that people think is real but that doesn	placebo	panacea	gazebo	folio	None of the above	3	7	7	106	0.52
1	3	31	4	3	2	The last name of the doctor in a series of children's	Dolittle	Popper	Delamotte	Littleborough	None of the above	3	7	8	66	0.33
1	4	25	3	3	2	A pre-historic monument in Wiltshire, England. Cor	Stonehenge	Rushmore	Strasbourg	Avebury	none of the above	2	8	10	602	2.99
1	5	19	2	3	2	A deep-bowled, long-handled spoon used for servi	ladle	colander	meddle	lever	None of the above	2	4	5	329	1.63
1	6	38	4	3	2	Last name of the headmaster of Hogwarts in the H	Dumbledore	Slughorn	Dimbledork	Pampledore	None of the above	3	9	10	55	0.27
1	7	4	1	3	2	The first performance of a musical or theatrical wo	premiere	debut	premium	investigation	None of the above	3	6	8	681	3.38
1	8	24	3	3	2	Last name of English television personality, most k	Cowell	Mendel	Corell	Jones	none of the above	2	4	6	817	4.06
1	9	31	4	3	2	The 1975 American thriller film about killer sharks,	Jaws	Underwater	Jagged	Chops	None of the above	1	3	4	1286	6.38
1	10	11	2	3	2	The ceremony or formal admission of someone to	inauguration	accolade	incubation	graduation	None of the above	5	10	12	12	0.06
1	11	21	3	3	2	Capital and largest city of the Czech Republic	Prague	Kiev	Perugia	Munich	None of the above	1	4	6	401	1.99
1	12	8	1	3	2	A person who neither believes or disbelieves in a g	agnostic	atheist	antagonist	apathy	None of the above	3	8	8	66	0.33
1	13	29	3	3	2	Last name of the Norwegian experimental archaeo	Heyerdahl	Erikson	Nytterdal	Amundsen	None of the above	3	6	9	5	0.02
1	14	35	4	3	2	The country on the eastern coast of the Baltic Sea i	Estonia	Pretoria	Sedonia	Estland	None of the above	4	7	7	270	1.34
1	15	14	2	3	2	a tall, rounded vase used for storing the ashes of a	urn	casket	urim	crate	None of the above	1	3	3	331	1.64
1	16	34	4	3	2	Winnie the Pooh's pink friend	Piglet	Tigger	Pinker	Jiggler	None of the above	2	6	6	316	1.56
1	17	5	1	3	2	An extreme or irrational fear of or aversion to a pa	phobia	anxiety	phoneme	repulsion	None of the above	3	5	6	315	1.56
1	18	1	1	3	2	A person who prepares, stuffs, and mounts the ski	taxidermist	embalmer	tamoxifen	taxonomy	None of the above	4	12	11	45	0.22
1	19	28	3	3	2	The worst nucelar disaster in history, caused by an	Chernobyl	Hiroshima	Chernabog	Pribyl	none of the above	3	7	9	139	0.69
1	20	15	2	3	2	a soft quilt filled with down, feathers, or a syntheti	duvet	comforter	dove	cover	None of the above	2	5	5	498	2.42
2	1	26	3	3	2	Sleeping Beauty's first name	Aurora	Ariel	Leona	Alana	None of the above	3	5	6	275	1.37
2	2	27	3	3	2	First name of the founder of the fashion brand Cha	Coco	Betty	Cora	Carola	none of the above	2	4	4	400	1.99
2	3	3	1	3	2	The branch of science which deals with celestial ob	astronomy	physics	astrology	aquarius	None of the above	4	9	9	716	3.56
2	4	40	4	3	2	The ancient Hebrew religion defined as belief in on	Judaism	Christianity	Juxism	Islam	None of the above	3	7	7	269	1.33
2	5	36	4	3	2	The large fat orange cartoon cat who loves lasagna	Garfield	Heathcliff	Ginger	Felix	None of the above	2	7	8	147	0.73
2	6	33	4	3	2	The American Disney cartoon about six elementary	Recess	Simpsons	Rugrats	Filmore	None of the above	2	5	6	487	2.41
2	7	6	1	3	2	An open rebellion against the proper authorities, e	mutiny	revolution	matinee	mutation	None of the above	3	7	6	269	1.34
2	8	30	3	3	2	The last name of the British actor who played Sher	Cumberbatch	Bale	Bumbercrotch	Hoult	none of the above	3	11	8	62	0.31
2	9	7	1	3	2	the medieval forerunner of chemistry, concerned w	alchemy	algebra	alcove	chemistry	None of the above	3	6	7	164	0.81
2	10	17	2	3	2	a type of claw, especially one belonging to a bird o	talon	paw	tarot	crook	None of the above	2	5	5	51	0.25
2	11	16	2	3	2	a slow-moving tropical mammal that hangs upside	sloth	mammoth	slob	scythe	None of the above	1	4	5	303	1.57
2	12	10	1	3	2	A mythical creature with the head, arms, and torso	centaur	hybrid	centurian	avatar	None of the above	2	5	7	37	0.18
2	13	12	2	3	2	A vertical channel or pipe which conducts smoke u	chimney	furnace	chimenia	grate	None of the above	2	5	7	1609	7.99
2	14	20	2	3	2	A secret listener to private conversations, for insta	eavesdropper	sleuth	earworm	auditor	None of the above	3	8	11	6	0.03
2	15	13	2	3	2	The meat from a deer	venison	pork	venom	vision	None of the above	3	7	7	1224	5.58
2	16	22	3	3	2	Last name of the British singer and actress most fa	Andrews	Hepburn	Anderson	Garbot	None of the above	2	6	7	1785	8.86
2	17	37	4	3	2	First part of the name of the fairy friend of Peter P	Tinker	Adelina	Timper	Bella	None of the above	2	5	6	369	1.83
2	18	23	3	3	2	Last name of American actress often described as t	Streep	Fonda	Streuss	Mirren	None of the above	1	5	6	311	1.54
2	19	2	1	3	2	The remains of a building, city, etc., that has been	ruins	wreckage	driuds	remnants	None of the above	2	5	5	1363	6.77
2	20	32	4	3	2	The disney movie about the adventures of Rapunz	Tangled	Snarled	Target	Braids	None of the above	2	6	7	504	2.5

block	trial	item	Condition	List	Lang	Definition	Target	Foil1	Foil2	Foil3	None of the above	Syllables	Phonemes	Letters	NoWac	FreqPM
1	1	26	3	3	2	Sleeping Beauty's first name	Aurora	Ariel	Leona	Alana	None of the above	3	5	6	275	1.37
1	2	27	3	3	2	First name of the founder of the fashion brand Cha	Coco	Betty	Cora	Carola	none of the above	2	4	4	400	1.99
1	3	3	1	3	2	The branch of science which deals with celestial ob	astronomy	physics	astrology	aquarius	None of the above	4	9	9	716	3.56
1	4	40	4	3	2	The ancient Hebrew religion defined as belief in on	Judaism	Christianity	Juxism	Islam	None of the above	3	7	7	269	1.33
1	5	36	4	3	2	The large fat orange cartoon cat who loves lasagna	Garfield	Heathcliff	Ginger	Felix	None of the above	2	7	8	147	0.73
1	6	33	4	3	2	The American Disney cartoon about six elementary	Recess	Simpsons	Rugrats	Filmore	None of the above	2	5	6	487	2.41
1	7	6	1	3	2	An open rebellion against the proper authorities, e	mutiny	revolution	matinee	mutation	None of the above	3	7	6	269	1.34
1	8	30	3	3	2	The last name of the British actor who played Sherl	Cumberbatch	Bale	Bumbercrotch	Hoult	none of the above	3	11	8	62	0.31
1	9	7	1	3	2	the medieval forerunner of chemistry, concerned w	alchemy	algebra	alcove	chemistry	None of the above	3	6	7	164	0.81
1	10	17	2	3	2	a type of claw, especially one belonging to a bird of	talon	paw	tarot	crook	None of the above	2	5	5	51	0.25
1	11	16	2	3	2	a slow-moving tropical mammal that hangs upside	sloth	mammoth	slob	scythe	None of the above	1	4	5	303	1.57
1	12	10	1	3	2	A mythical creature with the head, arms, and torso	centaur	hybrid	centurian	avatar	None of the above	2	5	7	37	0.18
1	13	12	2	3	2	A vertical channel or pipe which conducts smoke u	chimney	furnace	chimenia	grate	None of the above	2	5	7	1609	7.99
1	14	20	2	3	2	A secret listener to private conversations, for insta	eavesdropper	sleuth	earworm	auditor	None of the above	3	8	11	6	0.03
1	15	13	2	3	2	The meat from a deer	venison	pork	venom	vision	None of the above	3	7	7	1224	5.58
1	16	22	3	3	2	Last name of the British singer and actress most fa	Andrews	Hepburn	Anderson	Garbot	None of the above	2	6	7	1785	8.86
1	17	37	4	3	2	First part of the name of the fairy friend of Peter P	Tinker	Adelina	Timper	Bella	None of the above	2	5	6	369	1.83
1	18	23	3	3	2	Last name of American actress often described as t	Streep	Fonda	Streuss	Mirren	None of the above	1	5	6	311	1.54
1	19	2	1	3	2	The remains of a building, city, etc., that has been	ruins	wreckage	driuds	remnants	None of the above	2	5	5	1363	6.77
1	20	32	4	3	2	The disney movie about the adventures of Rapunz	Tangled	Snarled	Target	Braids	None of the above	2	6	7	504	2.5
2	1	18	2	3	2	A town or district that has local government. Norw	municipality	community	multiplicity	metropolis	None of the above	6	13	12	24	0.12
2	2	9	1	3	2	a fake drug that people think is real but that doesn	placebo	panacea	gazebo	folio	None of the above	3	7	7	106	0.52
2	3	31	4	3	2	The last name of the doctor in a series of children's	Dolittle	Popper	Delamotte	Littleborough	None of the above	3	7	8	66	0.33
2	4	25	3	3	2	A pre-historic monument in Wiltshire, England. Cor	Stonehenge	Rushmore	Strasbourg	Avebury	none of the above	2	8	10	602	2.99
2	5	19	2	3	2	A deep-bowled, long-handled spoon used for servi	ladle	colander	meddle	lever	None of the above	2	4	5	329	1.63
2	6	38	4	3	2	Last name of the headmaster of Hogwarts in the H	Dumbledore	Slughorn	Dimbledork	Pampledore	None of the above	3	9	10	55	0.27
2	7	4	1	3	2	The first performance of a musical or theatrical wo	premiere	debut	premium	investigation	None of the above	3	6	8	681	3.38
2	8	24	3	3	2	Last name of English television personality, most k	Cowell	Mendel	Corell	Jones	none of the above	2	4	6	817	4.06
2	9	31	4	3	2	The 1975 American thriller film about killer sharks,	Jaws	Underwater	Jagged	Chops	None of the above	1	3	4	1286	6.38
2	10	11	2	3	2	The ceremony or formal admission of someone to	inauguration	accolade	incubation	graduation	None of the above	5	10	12	12	0.06
2	11	21	3	3	2	Capital and largest city of the Czech Republic	Prague	Kiev	Perugia	Munich	None of the above	1	4	6	401	1.99
2	12	8	1	3	2	A person who neither believes or disbelieves in a g	agnostic	atheist	antagonist	apathy	None of the above	3	8	8	66	0.33
2	13	29	3	3	2	Last name of the Norwegian experimental archaeol	Heyerdahl	Erikson	Nytterdal	Amundsen	None of the above	3	6	9	5	0.02
2	14	35	4	3	2	The country on the eastern coast of the Baltic Sea i	Estonia	Pretoria	Sedonia	Estland	None of the above	4	7	7	270	1.34
2	15	14	2	3	2	a tall, rounded vase used for storing the ashes of a	urn	casket	urim	crate	None of the above	1	3	3	331	1.64
2	16	34	4	3	2	Winnie the Pooh's pink friend	Piglet	Tigger	Pinker	Jiggler	None of the above	2	6	6	316	1.56
2	17	5	1	3	2	An extreme or irrational fear of or aversion to a pa	phobia	anxiety	phoneme	repulsion	None of the above	3	5	6	315	1.56
2	18	1	1	3	2	A person who prepares, stuffs, and mounts the ski	taxidermist	embalmer	tamoxifen	taxonomy	None of the above	4	12	11	45	0.22
2	19	28	3	3	2	The worst nucelar disaster in history, caused by an	Chernobyl	Hiroshima	Chernabog	Pribyl	none of the above	3	7	9	139	0.69
2	20	15	2	3	2	a soft quilt filled with down, feathers, or a syntheti	duvet	comforter	dove	cover	None of the above	2	5	5	498	2.42

block	trial	item	Condition	List	Lang	Definition	Target	Foil1	Foil2	Foil3	None of the abov	Syllables	Phonemes	Letters	NoWac	FreqPM
1	1	34	4	4	2	Country bordered by Russia, Ukraine, Poland, Lithuania and L	Belarus	Belize	Benin	Lebanon	None of the abov	3	7	7	292	1.45
1	2	14	2	4	2	The watery liquid secreted into the mouth by glands, aiding c	saliva	urine	cylinder	sliver	None of the abov	3	6	6	386	1.92
1	3	8	1	4	2	A game played by two teams of players using a long stick with	lacrosse	rugby	lactose	carousel	None of the abov	2	6	8	87	0.43
1	4	1	1	4	2	The basic principles and laws of a nation that determine the p	constitution	legislation	constipation	continuance	None of the abov	4	12	12	1711	8.77
1	5	18	2	4	2	Each of the branched horns on the head of a male adult from	antler	beak	mantle	altar	None of the abov	2	5	6	105	0.52
1	6	29	3	4	2	Last name of the British film star and humanitarian who starr	Hepburn	Carroll	Napburn	Hepford	none of the abov	2	6	7	281	1.4
1	7	39	4	4	2	The name of Garfield's dog	Odie	Nermal	Odo	Dio	None of the abov	2	3	4	48	0.24
1	8	28	3	4	2	Famous outdoor rock festival held in the US in 1969. It was or	Woodstock	Stonewall	Woodruff	Rostock	None of the abov	2	7	9	157	0.78
1	9	25	3	4	2	Last name of the female French Canadian singer. Famous for	Dion	Lavigne	Dina	Winslet	None of the abov	2	4	4	237	1.18
1	10	19	2	4	2	An animal or person that eats a variety of food of both plant a	omnivore	herbivore	carnival	omnious	None of the abov	3	6	8	17	0.08
1	11	11	2	4	2	A person walking on a pavement rather than travelling in a ve	pedestrian	gallivanter	pedestal	wanderer	None of the abov	4	10	10	394	1.95
1	12	38	4	4	2	The name of the 1984 film that centers on a group of eccentri	Ghostbusters	Scooby-Doo	Ghosted	Gremlins	None of the abov	3	11	12	122	0.6
1	13	21	3	4	2	Last name of the South African anti-apartheid activist who wa	Mandela	Freeman	Mandala	Nelson	none of the abov	3	7	7	1015	5.04
1	14	9	1	4	2	An angel that is represented in art as a beautiful, fat, naked cl	cherub	cupid	chinook	seraph	None of the abov	2	5	6	107	0.53
1	15	39	4	4	2	Name of the house elf who becomes Harry Potters friend	Dobby	Hedwig	Buddy	Hagrid	None of the abov	2	4	5	25	0.12
1	16	5	1	4	2	A person who is killed because of their religion or other belief	martyr	scapegoat	martian	mormon	None of the abov	2	4	6	334	1.66
1	17	35	4	4	2	The name of the tough but loveable stray dog who falls in lov	Tramp	Pongo	Trump	Tripp	None of the abov	1	5	5	651	3.23
1	18	24	3	4	2	First name of the influential thinker of the early twentieth cer	Sigmund	Immanuel	Sigurd	Siegfried	None of the abov	2	7	7	98	0.14
1	19	15	2	4	2	An optical instrument with a lens for each eye, used for	binoculars	telescope	binomial	magnifier	None of the abov	4	9	10	777	3.86
1	20	4	1	4	2	The mammal known for its ability to spray a liquid with a stro	skunk	possum	stink	porcupine	None of the abov	1	5	5	416	2.2
2	1	33	4	4	2	The name of the orphan girl who lives with her evil step moth	Cinderella	Belle	Salmonella	Candace	None of the abov	4	9	10	706	3.51
2	2	6	1	4	2	A human egg during the period from approximately week 2 to	embryo	nucleus	embroidery	brioche	None of the abov	3	6	6	261	1.5
2	3	3	1	4	2	A system of institutionalised racial segregation that existed in	apartheid	discrimination	apathy	halocaust	None of the abov	3	7	9	715	3.55
2	4	17	2	4	2	**A time in which there is not enough food for a great number**	famine	drought	forrage	harvest	None of the abov	2	5	6	834	4.14
2	5	2	1	4	2	A dummy used to display clothes in a shop window.	mannequin	model	ramekin	manifold	None of the abov	3	7	9	127	0.63
2	6	7	1	4	2	A long-standing rival or an arch-enemy that cannot be conque	nemesis	feud	menestrel	anomaly	None of the abov	3	7	7	361	1.79
2	7	22	3	4	2	British claymotion character who is a cheese-loving inventor	Wallace	Homer	Willis	Walter	None of the abov	2	5	7	1731	8.6
2	8	23	3	4	2	Last name of African American actor known for his distinctive	Freeman	Jackson	Foreman	Nelson	None of the abov	2	6	7	618	3.07
2	9	12	2	4	2	A speech that praises someone or something highly, especiall	eulogy	obituary	eunuch	etymology	None of the abov	3	5	6	70	0.34
2	10	36	4	4	2	Mickey Mouse's tall and clumsy dog friend	Goofy	Donald	Gruffy	Foggy	None of the abov	2	4	5	155	0.77
2	11	13	2	4	2	A small woodland animal with a coat of sharp spines on its ba	hedgehog	groundhog	fledgling	penguin	None of the abov	2	6	8	1061	5.2
2	12	16	2	4	2	Refers to general loss of memory, such as facts, information a	amnesia	dementia	amnesty	anesthesia	None of the abov	3	6	7	191	0.95
2	13	30	3	4	2	Last name of the British host of American talkshow The Late L	Corden	Colbert	Gorden	Kimmel	None of the abov	2	6	6	133	0.66
2	14	10	1	4	2	A person who is excessively and unduly worried about having	hypochondriac	arachnophobia	mitochandria	hypocrite	None of the abov	5	12	13	47	0.23
2	15	40	4	4	2	Last name of a cartoon character who lives in a pineapple unc	Squarepants	Plankton	Squareface	Patrick	None of the abov	2	9	10	40	0.19
2	16	37	4	4	2	Name of the creature in Lord of the Rings who refers to the o	Gollum	Bilbo	Gurran	Gandalf	None of the abov	2	5	6	97	0.48
2	17	20	2	4	2	A moving staircase consisting of an endlessly circulating belt c	escalator	elevator	accelerator	scallion	None of the abov	4	8	9	261	1.3
2	18	27	3	4	2	First name of the Cuban revolutionary and politician who serv	Fidel	Marrero	Fido	Delfo	None of the abov	2	5	5	232	1.15
2	19	26	3	4	2	Last name of American actress and cultural icon from the 50s,	Monroe	Patula	Myrna	Medusa	none of the abov	2	5	6	522	2.59
2	20	32	4	4	2	The four-legged animal who talks non-stop in the Shrek-movi	Donkey	Mule	Dinker	Jackass	None of the abov	2	5	6	1966	9.76

block	trial	item	Condition	List	Lang	Definition	Target	Foil1	Foil2	Foil3	None of the abov	Syllables	Phonemes	Letters	NoWac	FreqPM
1	1	33	4	4	2	The name of the orphan girl who lives with her evil step moth	Cinderella	Belle	Salmonella	Candace	None of the abov	4	9	10	706	3.51
1	2	6	1	4	2	A human egg during the period from approximately week 2 tc	embryo	nucleus	embroidery	brioche	None of the abov	3	6	6	261	1.5
1	3	3	1	4	2	A system of institutionalised racial segregation that existed in	apartheid	discrimination	apathy	halocaust	None of the abov	3	7	9	715	3.55
1	4	17	2	4	2	**A time in which there is not enough food for a great number**	famine	drought	forrage	harvest	None of the abov	2	5	6	834	4.14
1	5	2	1	4	2	A dummy used to display clothes in a shop window.	mannequin	model	ramekin	manifold	None of the abov	3	7	9	127	0.63
1	6	7	1	4	2	A long-standing rival or an arch-enemy that cannot be conque	nemesis	feud	menestrel	anomaly	None of the abov	3	7	7	361	1.79
1	7	22	3	4	2	British claymotion character who is a cheese-loving inventor	Wallace	Homer	Willis	Walter	None of the abov	2	5	7	1731	8.6
1	8	23	3	4	2	Last name of African American actor known for his distinctive	Freeman	Jackson	Foreman	Nelson	None of the abov	2	6	7	618	3.07
1	9	12	2	4	2	A speech that praises someone or something highly, especiall	eulogy	obituary	eunuch	etymology	None of the abov	3	5	6	70	0.34
1	10	36	4	4	2	Mickey Mouse's tall and clumsy dog friend	Goofy	Donald	Gruffy	Foggy	None of the abov	2	4	5	155	0.77
1	11	13	2	4	2	A small woodland animal with a coat of sharp spines on its ba	hedgehog	groundhog	fledgling	penguin	None of the abov	2	6	8	1061	5.2
1	12	16	2	4	2	Refers to general loss of memory, such as facts, information a	amnesia	dementia	amnesty	anesthesia	None of the abov	3	6	7	191	0.95
1	13	30	3	4	2	Last name of the British host of American talkshow The Late L	Corden	Colbert	Gorden	Kimmel	None of the abov	2	6	6	133	0.66
1	14	10	1	4	2	A person who is excessively and unduly worried about having	hypochondriac	arachnophobia	mitochandria	hypocrite	None of the abov	5	12	13	47	0.23
1	15	40	4	4	2	Last name of a cartoon character who lives in a pineapple unc	Squarepants	Plankton	Squareface	Patrick	None of the abov	2	9	10	40	0.19
1	16	37	4	4	2	Name of the creature in Lord of the Rings who refers to the o	Gollum	Bilbo	Gurran	Gandalf	None of the abov	2	5	6	97	0.48
1	17	20	2	4	2	A moving staircase consisting of an endlessly circulating belt c	escalator	elevator	accelerator	scallion	None of the abov	4	8	9	261	1.3
1	18	27	3	4	2	First name of the Cuban revolutionary and politician who serv	Fidel	Marrero	Fido	Delfo	None of the abov	2	5	5	232	1.15
1	19	26	3	4	2	Last name of American actress and cultural icon from the 50s,	Monroe	Patula	Myrna	Medusa	none of the abov	2	5	6	522	2.59
1	20	32	4	4	2	The four-legged animal who talks non-stop in the Shrek-movi	Donkey	Mule	Dinker	Jackass	None of the abov	2	5	6	1966	9.76
2	1	34	4	4	2	Country bordered by Russia, Ukraine, Poland, Lithuania and L	Belarus	Belize	Benin	Lebanon	None of the abov	3	7	7	292	1.45
2	2	14	2	4	2	The watery liquid secreted into the mouth by glands, aiding cl	saliva	urine	cylinder	sliver	None of the abov	3	6	6	386	1.92
2	3	8	1	4	2	A game played by two teams of players using a long stick with	lacrosse	rugby	lactose	carousel	None of the abov	2	6	8	87	0.43
2	4	1	1	4	2	The basic principles and laws of a nation that determine the p	constitution	legislation	constipation	continuance	None of the abov	4	12	12	1711	8.77
2	5	18	2	4	2	Each of the branched horns on the head of a male adult from	antler	beak	mantle	altar	None of the abov	2	5	6	105	0.52
2	6	29	3	4	2	Last name of the British film star and humanitarian who starr	Hepburn	Carroll	Napburn	Hepford	none of the abov	2	6	7	281	1.4
2	7	39	4	4	2	The name of Garfield's dog	Odie	Nermal	Odo	Dio	None of the abov	2	3	4	48	0.24
2	8	28	3	4	2	Famous outdoor rock festival held in the US in 1969. It was or	Woodstock	Stonewall	Woodruff	Rostock	None of the abov	2	7	9	157	0.78
2	9	25	3	4	2	Last name of the female French Canadian singer. Famous for	Dion	Lavigne	Dina	Winslet	None of the abov	2	4	4	237	1.18
2	10	19	2	4	2	An animal or person that eats a variety of food of both plant a	omnivore	herbivore	carnival	omnious	None of the abov	3	6	8	17	0.08
2	11	11	2	4	2	A person walking on a pavement rather than travelling in a ve	pedestrian	gallivanter	pedestal	wanderer	None of the abov	4	10	10	394	1.95
2	12	38	4	4	2	The name of the 1984 film that centers on a group of eccentri	Ghostbusters	Scooby-Doo	Ghosted	Gremlins	None of the abov	3	11	12	122	0.6
2	13	21	3	4	2	Last name of the South African anti-apartheid activist who wa	Mandela	Freeman	Mandala	Nelson	none of the abov	3	7	7	1015	5.04
2	14	9	1	4	2	An angel that is represented in art as a beautiful, fat, naked cl	cherub	cupid	chinook	seraph	None of the abov	2	5	6	107	0.53
2	15	39	4	4	2	Name of the house elf who becomes Harry Potters friend	Dobby	Hedwig	Buddy	Hagrid	None of the abov	2	4	5	25	0.12
2	16	5	1	4	2	A person who is killed because of their religion or other belief	martyr	scapegoat	martian	mormon	None of the abov	2	4	6	334	1.66
2	17	35	4	4	2	The name of the tough but loveable stray dog who falls in lov	Tramp	Pongo	Trump	Tripp	None of the abov	1	5	5	651	3.23
2	18	24	3	4	2	First name of the influential thinker of the early twentieth cer	Sigmund	Immanuel	Sigurd	Siegfried	None of the abov	2	7	7	98	0.14
2	19	15	2	4	2	An optical instrument with a lens for each eye, used for	binoculars	telescope	binomial	magnifier	None of the abov	4	9	10	777	3.86
2	20	4	1	4	2	The mammal known for its ability to spray a liquid with a stro	skunk	possum	stink	porcupine	None of the abov	1	5	5	416	2.2

Appendix E: Full Data Set (LEAP-Q)

file_name	date_of_test	subject_number	Age	Gender	Handedness	Birth_Country	Resident_Country	Education_years	Education_level	L1	L2	L3	L4
LEAP-Q_MA2021_S44.xlsx	25/1/2021	44	27	Female	Right	Norway	Norway	16	BA completed	Norwegian	English	nan	nan
LEAP-Q_MA2021_S41.xlsx	nan	41	33	Female	Right	Norway	Norway	17	BA completed	Norwegian	English	German	nan
MA2021_S51.xlsx	2021-01-19 00:00:00	51	24	Female	Left	Norway	Norway	17	MA current	English	Norwegian	French	nan
MA2021_S50 .xlsx	2021-01-19 00:00:00	50	25	Female	Right	Norway	Norway	16	BA completed	Norwegian	English	nan	nan
LEAP-Q MA2021_S31 - Filled in.xlsx	2021-01-27 00:00:00	31	28	Female	Right	Norway	Norway	16	BA completed	Norwegian	English	nan	nan
MA2021_S16.xlsx	12.01.2021	16	24	Female	Right	Norway	Norway	18	MA current	Norwegian	English	nan	nan
LEAP-Q_MA2021_S38.xlsx	2021-01-27 00:00:00	38	21	Female	Right	Norway	Norway	15,5	BA current	Norwegian	English	German	nan
LEAP-Q_MA2021_S14.xlsx	2021-01-22 00:00:00	14	24	Male	Right	Norway	Norway	18	BA current	Norwegian	English	nan	nan
LEAP-Q_MA2021_S42.xlsx	25/1/2021	42	30	Male	Right	Norway	Norway	17	BA completed	Norwegian	English	Spanish	nan
MA2021_S30.xlsx	2021-01-18 00:00:00	30	22	Female	Left	Norway	Norway	16	BA completed	Norwegian	English	Spanish	nan
MA2021_S24.xlsx	2021-02-05 00:00:00	24	26	Male	Right	Norway	Norway	17	BA completed	Norwegian	English	nan	nan
LEAP-Q MA2021_S49 - Filled in.xlsx	2021-01-27 00:00:00	49	22	Male	Right	Norway	Norway	15,5	BA current	Norwegian	English	French	nan
LEAP-Q MA2021_S33 - Filled in.xlsx	2021-01-26 00:00:00	33	24	Female	Right	Norway	Norway	18,5	BA completed	Norwegian	English	nan	nan
LEAP-Q MA2021_S47 - Filled in.xlsx	2021-01-28 00:00:00	47	25	Male	Right	Norway	Norway	17	BA current	Norwegian	English	German	nan
LEAP-Q_MA2021_S39.xlsx	2021-01-25 00:00:00	39	22	Female	Right	Norway	Norway	16,5	MA current	Norwegian	English	French	nan
MA2021_S53.xlsx	nan	53	23	Female	Right	Norway	Norway	17,5	MA current	Norwegian	English	nan	nan
MA2021_S26.xlsx	2021-01-25 00:00:00	26	23	Female	Right	Norway	Norway	17	BA current	Norwegian	English	nan	nan
LEAP-Q MA2021_S32 - Filled in.xlsx	27.01.2021	32	26	Female	Right	Norway	Norway	18	MA completed	Norwegian	English	nan	nan
LEAP-Q_MA2021_S10.xlsx	2021-02-02 00:00:00	10	20	Female	Right	Norway	Norway	15	BA current	Norwegian	English	nan	nan
LEAP-Q_MA2021_S13.xlsx	nan	13	26	Female	Right	Norway	Norway	20	MA completed	Norwegian	English	nan	nan
MA2021_S17.xlsx	2021-01-18 00:00:00	17	23	Female	Right	Norway	Norway	17	BA current	Norwegian	English	nan	nan
LEAP-Q MA2021_S06 - Filled in.xlsx	25.01.2021	6	34	Male	Right	USA	Norway	23	MA completed	Norwegian	English	nan	nan
MA2021_S54.xlsx	08.02.2021	54	22	Female	Right	Norway	Norway	16	BA current	Norwegian	English	nan	nan
LEAP-Q_MA2021_S03.xlsx	25.01.2021	3	31	Female	Right	Norway	Norway	16,5	Other	Norwegian	English	German	nan
LEAP-Q MA2021_S45 - Filled in.xlsx	2021-01-25 00:00:00	45	32	Female	Right	Norway	Norway	18	BA completed	Norwegian	English	nan	nan
MA2021_S28.xlsx	nan	28	24	Female	Right	Norway	Norway	18	MA completed	Norwegian	English	nan	nan
LEAP-Q_MA2021_S19.xlsx	nan	19	25	Female	Right	Norway	Norway	18	BA current	Norwegian	English	nan	nan
MA2021_S23.xlsx	2021-01-26 00:00:00	23	19	Male	Right	Norway	Norway	13	BA current	Norwegian	English	Spanish	nan
LEAP-Q_MA2021_S40.xlsx	2021-01-25 00:00:00	40	22	Female	Right	Norway	Norway	16	MA current	Norwegian	English	nan	nan
LEAP-Q_MA2021_S58.xlsx	23/01/2021	58	27	Female	Right	Norway	Norway	14	High school	Norwegian	English	nan	nan
LEAP-Q_MA2021_S43.xlsx	nan	43	27	Female	Right	Norway	Norway	19	BA completed	Norwegian	English	nan	nan
MA2021_S29.xlsx	nan	29	21	Male	Right	Norway	Norway	13,5	Other	Norwegian	English	nan	nan
LEAP-Q_MA2021_S18.xlsx	2021-01-30 00:00:00	18	22	Female	Right	Norway	Norway	15	BA current	Norwegian	English	nan	nan
LEAP-Q_MA2021_S55.xlsx	21/1/2021	55	33	Female	Right	Norway	Norway	15	BA completed	Norwegian	English	nan	nan
LEAP-Q MA2021_S36 - Filled in.xlsx	2021-01-28 00:00:00	36	22	Male	Right	Norway	Norway	15	BA current	Norwegian	English	nan	nan
MA2021_S21.xlsx	2021-01-28 00:00:00	21	27	Female	Right	Norway	Norway	18	BA current	Norwegian	English	Japanese	NSL
MA2021_S22.xlsx	2021-01-25 00:00:00	22	34	Female	Right	Norway	Norway	17	MA current	Norwegian	English	Swedish	nan
LEAP-Q MA2021_S37 - Filled in.xlsx	2021-01-25 00:00:00	37	32	Female	Right	Norway	Norway	18	BA completed	Norwegian	English	nan	nan
LEAP-Q MA2021_S08 - Filled in.xlsx	2021-01-26 00:00:00	8	22	Female	Right	Norway	Norway	15,5	BA current	Norwegian	English	nan	nan
LEAP-Q_MA2021_S12.xlsx	2021-01-21 00:00:00	12	24	Male	Right	Norway	Norway	18	BA current	English	Norwegian	nan	nan
LEAP-Q MA2021_S48 - Filled in.xlsx	2021-01-25 00:00:00	48	27	Male	Right	Norway	Norway	19	BA completed	Norwegian	English	Spanish	nan
LEAP-Q_MA2021_S05.xlsx	25/01/2021	5	29	Female	Right	Norway	Norway	16	BA completed	Norwegian	English	nan	nan
LEAP-Q MA2021_S07 - Filled in.xlsx	2021-01-26 00:00:00	7	23	Male	Right	Norway	Norway	20	MA current	Norwegian	English	Danish	nan
LEAP-Q_MA2021_S56.xlsx	23/01/2021	56	23	Female	Right	Norway	Norway	16,5	BA current	Norwegian	English	German	nan
LEAP-Q MA2021_S35 - Filled in.xlsx	2021-01-27 00:00:00	35	25	Female	Right	Norway	Norway	18	MA current	Norwegian	English	nan	nan
LEAP-Q_MA2021_S11.xlsx	2021-01-23 00:00:00	11	24	Male	Right	Norway	Norway	15,5	BA current	Norwegian	English	nan	nan
LEAP-Q_MA2021_S02.xlsx	22.01.2021	2	26	Male	Right	Norway	Norway	16	BA completed	Norwegian	English	German	nan
LEAP-Q_MA2021_S09.xlsx	2021-01-20 00:00:00	9	18	Female	Right	Norway	Norway	12,5	Other	English	Norwegian	nan	nan
LEAP-Q_MA2021_S04.xlsx	nan	4	22	Male	Right	Norway	Norway	16	BA current	Norwegian	English	German	nan
LEAP-Q_MA2021_S20.xlsx	2021-01-21 00:00:00	20	26	Female	Right	Norway	Norway	18	BA current	Norwegian	English	nan	nan
LEAP-Q_MA2021_S01.xlsx	2021-01-25 00:00:00	1	23	Female	Left	Norway	Norway	17	BA current	Norwegian	English	Danish	nan

FULL DATA SET

L5	Q1a Dom_1	Q1b Dom_2	Q1c Dom_3	Q1d Dom_4	Q1e Dom_5	Q2a Acq_1	Q2b Acq_2	Q2c Acq_3	Q2d Acq_4	Q2e Acq_5	Q3a Exposure_L1	Q3b Exposure_L2	Q3c Exposure_L3
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	80	20	0
nan	Norwegian	English	German	nan	nan	Norwegian	English	German	nan	nan	70	29	1
nan	English	Norwegian	French	nan	nan	Norwegian	English	French	nan	nan	50	50	0
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	50	50	0
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	70	30	0
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	70	30	0
nan	Norwegian	English	German	nan	nan	Norwegian	English	German	nan	nan	70	30	0
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	60	40	0
nan	Norwegian	English	Spanish	nan	nan	Norwegian	English	Spanish	nan	nan	70	30	0
nan	Norwegian	English	Spanish	nan	nan	Norwegian	English	Spanish	nan	nan	45	50	5
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	70	30	0
nan	Norwegian	English	French	nan	nan	Norwegian	English	French	nan	nan	60	39	1
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	50	50	0
nan	Norwegian	English	German	nan	nan	Norwegian	English	German	nan	nan	40	50	10
nan	Norwegian	English	French	nan	nan	Norwegian	English	French	nan	nan	75	24	1
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	85	15	0
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	80	20	0
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	60	40	0
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	60	40	0
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	60	40	0
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	30	70	0
nan	Norwegian	English	nan	nan	nan	English	Norwegian	nan	nan	nan	40	60	0
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	40	58	2
nan	Norwegian	English	German	nan	nan	Norwegian	English	German	nan	nan	70	28	2
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	50	50	0
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	75	25	0
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	60	40	0
nan	Norwegian	English	Spanish	nan	nan	Norwegian	English	Spanish	nan	nan	64	35	1
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	60	40	0
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	90	10	0
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	70	30	0
nan	nan	nan	nan	nan	nan	Norwegian	English	nan	nan	nan	50	50	nan
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	50	50	0
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	85	15	0
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	25	75	0
nan	Norwegian	English	Japanese	NSL	nan	Norwegian	English	Japanese	NSL (Norwegian Sign Language)	nan	70	25	5
nan	Norwegian	English	Swedish	nan	nan	Norwegian	English	Swedish	nan	nan	50	40	10
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	40	60	0
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	60	40	0
nan	English	Norwegian	nan	nan	nan	Norwegian	English	nan	nan	nan	40	60	0
nan	Norwegian	English	Spanish	nan	nan	Norwegian	English	Spanish	nan	nan	54	45	1
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	70	30	0
nan	Norwegian	English	Danish	nan	nan	Norwegian	English	Danish	nan	nan	50	45	5
nan	Norwegian	English	German	nan	nan	Norwegian	English	German	nan	nan	95	5	0
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	30	70	0
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	40	60	0
nan	Norwegian	English	German	nan	nan	Norwegian	English	German	nan	nan	49	50	1
nan	English	Norwegian	nan	nan	nan	Norwegian	English	nan	nan	nan	55	35	10
nan	Norwegian	English	German	nan	nan	Norwegian	English	German	nan	nan	90	10	10
nan	Norwegian	English	nan	nan	nan	Norwegian	English	nan	nan	nan	50	50	0
nan	Norwegian	English	Danish	nan	nan	Norwegian	English	Danish	nan	nan	65	30	5

Page 2

Q3d Exposure_L4	Q3e Exposure_L5	Q4a Speaking_L1	Q4b Speaking_L2	Q4c Speaking_L3	Q4d Speaking_L4	Q4e Speaking_L5	Q5a Read_L1	Q5b Read_L2	Q5c Read_L3	Q5d Read_L4	Q5e Read_L5
0	0	90	10	0	0	0	95	5	0	0	0
0	0	90	9	1	0	0	80	20	0	0	0
0	0	20	80	0	0	0	80	20	0	0	0
0	0	70	30	0	0	0	50	50	0	0	0
0	0	80	20	0	0	0	60	40	0	0	0
0	0	99	1	0	0	0	70	30	0	0	0
0	0	80	20	0	0	0	50	50	0	0	0
0	0	70	30	0	0	0	50	50	0	0	0
0	0	90	10	0	0	0	80	20	0	0	0
0	0	60	35	5	0	0	40	58	2	0	0
0	0	80	20	0	0	0	30	70	0	0	0
0	0	85	15	0	0	0	40	60	0	0	0
0	0	90	10	0	0	0	15	85	0	0	0
0	0	60	20	20	0	0	60	30	10	0	0
0	0	90	9	1	0	0	80	18	2	0	0
0	0	90	10	0	0	0	80	20	0	0	0
0	0	95	5	0	0	0	50	50	0	0	0
0	0	75	25	0	0	0	40	60	0	0	0
0	0	90	10	0	0	0	70	30	0	0	0
0	0	95	5	0	0	0	60	40	0	0	0
0	0	90	10	0	0	0	10	90	0	0	0
0	0	50	50	0	0	0	25	75	0	0	0
0	0	40	60	0	0	0	99	1	0	0	0
0	0	90	9	1	0	0	40	58	2	0	0
0	0	90	10	0	0	0	70	30	0	0	0
0	0	95	5	0	0	0	60	40	0	0	0
0	0	80	20	0	0	0	40	60	0	0	0
0	0	89	10	1	0	0	50	50	0	0	0
0	0	90	10	0	0	0	90	10	0	0	0
0	0	90	10	0	0	0	50	50	0	0	0
0	0	90	10	0	0	0	10	90	0	0	0
nan	nan	70	30	nan	nan	nan	20	80	nan	nan	nan
0	0	90	10	0	0	0	70	30	0	0	0
0	0	100	0	0	0	0	80	20	0	0	0
0	0	25	75	0	0	0	35	65	0	0	0
0	0	70	20	7	3	0	20	75	5	0	0
0	0	80	10	10	0	0	80	15	5	0	0
0	0	70	30	0	0	0	10	90	0	0	0
0	0	70	30	0	0	0	40	60	0	0	0
0	0	80	20	0	0	0	20	80	0	0	0
0	0	60	40	0	0	0	55	45	0	0	0
0	0	70	30	0	0	0	90	10	0	0	0
0	0	70	28	2	0	0	28	70	2	0	0
0	0	90	9	1	0	0	60	39	1	0	0
0	0	80	20	0	0	0	10	90	0	0	0
0	0	65	35	0	0	0	40	60	0	0	0
0	0	95	5	0	0	0	40	60	0	0	0
0	0	45	55	0	0	0	80	15	5	0	0
0	0	80	20	0	0	0	50	50	0	0	0
0	0	75	25	0	0	0	40	60	0	0	0
0	0	90	10	0	0	0	90	10	0	0	0

FULL DATA SET

Q6a Choice_L1	Q6b Choice_L2	Q6c Choice_L3	Q6d Choice_L4	Q6e Choice_L5	Q7a Culture_1	Q7b Culture_2	Q7c Culture_3	Q7d Culture_4	Q7e Culture_5	Q7f Ident_Cult_1	Q7g Ident_Cult_2	Q7h Ident_Cult_3
100	0	0	0	0	Norwegian	Canadian	nan	nan	nan	10	2	0
100	0	0	0	0	Norwegian	nan	nan	nan	nan	10	0	0
50	50	0	0	0	Norwegian	British	French	nan	nan	8	7	3
50	50	0	0	0	Norwegian	American	Australian	nan	nan	7	6	4
100	0	0	0	0	British	Norwegian	nan	nan	nan	8	7	0
100	0	0	0	0	Norwegian	nan	nan	nan	nan	10	0	0
95	5	0	0	0	Norwegian	German	American	nan	nan	10	2	3
70	30	0	0	0	Norwegian	American	British	nan	nan	10	6	4
70	30	0	0	0	Norwegian	American	nan	nan	nan	10	3	0
80	20	0	0	0	Norwegian	American	nan	nan	nan	10	3	0
100	0	0	0	0	Norwegian	nan	nan	nan	nan	10	0	0
90	10	0	0	0	Norwegian	British	American	French	nan	9	6	5
100	0	0	0	0	Norwegian	nan	nan	nan	nan	10	0	0
100	0	0	0	0	Norwegian	nan	nan	nan	nan	10	0	0
100	0	0	0	0	Norwegian	nan	nan	nan	nan	10	0	0
100	0	0	0	0	Norwegian	nan	nan	nan	nan	10	0	0
90	10	0	0	0	Norwegian	American	nan	nan	nan	10	5	0
95	5	0	0	0	Norewgian	nan	nan	nan	nan	10	0	0
95	5	0	0	0	Norwegian	nan	nan	nan	nan	10	0	0
95	5	0	0	0	Norwegian	Australian	nan	nan	nan	10	4	0
90	10	0	0	0	Norwegian	nan	nan	nan	nan	10	0	0
50	50	0	0	0	American	Norwegian	nan	nan	nan	8	8	0
98	2	0	0	0	Norwegian	British	nan	nan	nan	7	3	0
50	50	0	0	0	Norwegian	Australian	nan	nan	nan	7	3	0
80	20	0	0	0	Norwegian	nan	nan	nan	nan	10	0	0
100	0	0	0	0	Norwegian	nan	nan	nan	nan	10	0	0
90	10	0	0	0	Norwegian	nan	nan	nan	nan	10	0	0
97	2	1	0	0	Norwegian	nan	nan	nan	nan	10	0	0
90	10	0	0	0	Norwegian	nan	nan	nan	nan	10	0	0
100	0	0	0	0	Norwegian	nan	nan	nan	nan	10	0	0
90	10	0	0	0	Norwegian	nan	nan	nan	nan	10	0	0
100	0	nan	nan	nan	Norewgian	British	American	nan	nan	10	0	5
95	5	0	0	0	Norwegian	American	nan	nan	nan	9	1	0
98	2	0	0	0	Norwegian	nan	nan	nan	nan	10	0	0
50	50	0	0	0	Norway	American	nan	nan	nan	7	3	0
50	35	10	5	0	Norwegian	Sámi	nan	nan	nan	9	1	0
100	0	0	0	0	Norwegian	nan	nan	nan	nan	8	0	0
80	20	0	0	0	Norwegian	nan	nan	nan	nan	10	0	0
60	40	0	0	0	Norwegian	nan	nan	nan	nan	10	0	0
10	90	0	0	0	Norwegian	British	American	nan	nan	9	3	4
90	10	0	0	0	Norwegian	nan	nan	nan	nan	10	0	0
70	30	0	0	0	Norwegian	American	nan	nan	nan	9	3	0
70	30	0	0	0	Norwegian	Birtish	American	Danish	nan	9	2	4
95	5	0	0	0	Norwegian	nan	nan	nan	nan	10	0	0
70	30	0	0	0	Norwegian	British	American	nan	nan	10	5	5
80	20	0	0	0	Norwegian	British	American	nan	nan	10	3	6
95	5	0	0	0	Norwegian	American	British	German	Swiss	9	6	3
35	65	0	0	0	Norwegian	British	American	nan	nan	8	5	2
80	15	5	0	0	Norwegian	American	German	Korean	British	7	3	4
60	40	0	0	0	Norwegian	American	nan	nan	nan	10	2	0
90	10	0	0	0	Norwegian	nan	nan	nan	nan	10	0	0

Q7i Ident_Cult_4	Q7j Ident_Cult_5	Q8 Once_Better	Q8a Better_Which	Q8b Better_Age	Q9a Maths_Lang	Q9b Dream_Lang	Q9c Anger_Lang	Q9d Selftask_Lang	Q1a Country_Norsk	Q1b Family_Norsk
0	0	Yes	English	23	Norwegian	Norwegian	Norwegian	Norwegian	26:0	26:0
0	0	Yes	english	19	norwegian	norwegian	norwegian	Norwegian	32:7	33:7
0	0	Yes	French	20	Norwegian	Norwegian	Norwegian	Norwegian	23:	24:
0	0	Yes	Norwegian	18	Norwegian	nan	nan	nan	23:0	23:6
0	0	Yes	English	26	Norwegian	English	English	English	27:10	28:10
0	0	No	nan	nan	Norwegian	Norwegian	Norwegian	Norwegian	24:1	24:4
0	0	Yes	English	18	Norwegian	Norwegian	Norwegian	English	20:0	20:4
0	0	Yes	English	22	Norwegian	Norwegian	Norwegian	Norwegian	24:5	24:6
0	0	Yes	Spanish	30	Norwegian	Norwegian	Norwegian	Norwegian	30:10	30:11
0	0	Yes	Spanish	17	Norwegian	English	English	English	22:1	22:
0	0	Yes	Norwegian	14	Norwegian	Norwegian	Norwegian	Norwegian	26:	26:
1	0	Yes	French	19	Norwegian	Norwegian	Norwegian	Norwegian	22:10	22:10
0	0	Yes	English	24	Norwegian	Norwegian	Norwegian	Norwegian	22:6	22:6
0	0	Yes	English	24	Norwegian	Norwegian	Norwegian	Norwegian	25:	25:
0	0	Yes	French	18	Norwegian	Norwegian	Norwegian	Norwegian	22:2	22:2
0	0	No	nan	nan	Norwegian	Norwegian	Norwegian	Norwegian	23:	23:
0	0	No	nan	nan	Norwegian	Norwegian	Norwegian	Norwegian	23:6	23:6
0	0	No	nan	nan	Norwegian	Norwegian	Norwegian	Norwegian	26:5	26:5
0	0	No	nan	nan	Norwegian	Norwegian	Norwegian	English	20:2	20:2
0	0	No	nan	nan	Norwegian	Norwegian	Norwegian	Norwegian	26:9	26:9
0	0	Yes	Norwegian	17	Norwegian	Norwegian	English	English	23:4	23:4
0	0	No	nan	nan	English	English	English	English	17:9	34:11
0	0	Yes	Norwegian	16	Norwegian	Norwegian	English	Norwegian	22:	22:8
0	0	Yes	German	19	Norwegian	Norwegian	Norwegian	English	28:6	28:6
0	0	No	nan	nan	Norwegian	Norwegian	Norwegian	Norwegian	31:	32:
0	0	Yes	English	19	Norwegian	Norwegian	Norwegian	Norwegian	24:	24:
0	0	No	nan	nan	Norwegian	Norwegian	English	Norwegian	25:1	25:1
0	0	No	nan	nan	Norwegian	Norwegian	Norwegian	Norwegian	19:6	19:10
0	0	Yes	English	18	Norwegian	Norwegian	English	Norwegian	22:11	22:11
0	0	No	nan	nan	Norwegian	Norwegian	Norwegian	Norwegian	26:6	26:6
0	0	No	nan	nan	Norwegian	Norwegian	Norwegian	English	26:6	26:6
nan	nan	No	nan	nan	Norwegian	Norwegian	Norwegian	Norwegian	21:00	21:00
0	0	No	nan	nan	Norwegian	Norwegian	Norwegian	English	22:1	22:1
0	0	Yes	English	25	nan	Norwegian	English	Norwegian	32:7	33:3
0	0	Yes	Norwegian	21	Norwegian	English	English	English	22:5	22:2
0	0	Yes	Japanese	23	Norwegian	Norwegian	English	Norwegian	27:	27:6
0	0	Yes	English	30	Norwegian	Norwegian	Norwegian	Norwegian	29:	34:
0	0	No	nan	nan	Norwegian	English	Norwegian	English	30:11	30:11
0	0	Yes	English	19	Norwegian	Norwegian	English	English	21:3	21:3
0	0	Yes	English	22	Norwegian	English	English	English	22:0	23:2
0	0	No	nan	nan	Norwegian	Norwegian	Norwegian	Norwegian	26:6	27:
0	0	No	nan	nan	Norwegian	Norwegian	Norwegian	Norwegian	29:0	29:0
7	0	Yes	Danish	18	Norwegian	Norwegian	Norwegian	English	20:1	23:7
0	0	Yes	German	21	Norwegian	Norwegian	Norwegian	Norwegian	23:4	23:4
0	0	Yes	English	21	Norwegian	Norwegian	English	English	24:6	24:6
0	0	Yes	Norwegian	17 or 18	Norwegian	Both	Both	Both	24:11	24:11
1	2	Yes	German	20	Norwegian	Norwegian	German	Norwegian	26:9	26:9
0	0	No	nan	nan	Norwegian	English	English	English	18:8	18:8
3	1	Yes	German	19	English	Norwegian	Norwegian	Norwegian	22:4	22:4
0	0	Yes	English	10	Norwegian	Norwegian	Norwegian	Norwegian	24:2	26:0
0	0	No	nan	nan	Norwegian	Norwegian	Norwegian	Norwegian	23:	23:

Q1c School_ALL_Norsk	Q1d School_SOME_Norsk	Q1e Work_ALL_Norsk	Q1f Work_SOME_Norsk	Q1g Country_Eng	Q1h Family_Eng	Q1i School_ALL_Eng	Q1j School_SOME_Eng	Q1k Work_ALL_Eng
16:0	0:0	11:0	0:0	1:0	1:0	0:0	0:0	1:0
17:0	0:0	4:0	1:0	0:3	0:2	0:0	13:0	0:0
13:	4:	2:	:	1:	:	1:	4:	:
13:	:	10:	:	2:0	1:6	1:6	1:	:
13:0	2:0	10:0	0:0	1:0	0:0	1:0	2:0	0:0
:	15:	3:	5:	:3	:	:	15:	:
14:6	0:0	1:5	0:0	1:2	0:10	0:10	11:0	0:0
13:0	0:0	5:0	5:0	0:2	0:1	0:0	14:0	0:0
15:11	15:11	12:11	12:11	0:1	0:0	0:0	0:0	0:0
10:	:	2:4	:4	:8	:4	:4	6:	:
17:	0:	:17	2:	:	:	:	:	:
15:6	0:0	7:0	0:0	0:0	0:0	0:0	13:0	0:0
17:5	0:0	9:0	0:0	1:6	1:6	1:6	17:5	0:0
17:0	1:6	1:6	0:0	0:0	0:0	0:0	1:6	0:0
16:5	0:0	3:2	4:0	0:0	0:0	0:0	10:0	0:0
6:	17:	9:	0:	:3	:1	:2	0:0	0:0
16:6	0:0	1:0	0:0	0:0	0:0	1:0	0:0	0:0
13:0	5:6	0:0	1:6	0:1	0:0.75	0:0	5:6	0:0
13:0	0:0	0:4	0:6	0:0	0:1	0:0	13:0	0:0
20:	:	10:	:	1:6	:	1:6	:	:
17:	17:	2:	2:	:	:	:	2:	:
5:	8:	5:10	:	17:3	34:11	13:	8:	:5
16:3	3:3	2:0	2:0	:7	22:8	0:0	3:3	0:0
16:0	0:0	0:0	0:0	2:6	2:6	1:0	0:0	1:0
17:6	:	13:	:	1:	0:	:6	:	:6
23:	0:	5:	0:	0:	0:	0:	12:	0:
10:	3:	3:	:	:	:	:	3:	:
12:0	0:0	2:0	0:0	0:1	0:0	0:0	12:0	0:0
16:5	0:0	2:9	0:0	1:6	11:0	0:0	11:0	0:0
14:0	0:0	5:0	5:0	0:0	0:0	0:0	14:0	0:0
18:0	0:0	8:6	8:6	0:0	0:0	0:9	0:0	0:0
21:	21:	5:1	1:11	1:	0:	0:	0:	0:
15:5	0:0	2:1	0:0	0:1	0:1	0:0	12:0	0:0
12:0	4:0	6:0	3:6	0:5	2:0	0:0	4:0	0:0
14:0	0:0	2:0	0:0	0:0	0:3	0:6	1:0	0:0
18:	:	2:	:	:6	:	:4	:6	:
17:	0:	10:	0:	3:	:	:6	:	3:
12:	:	14:	:	1:4	:	1:2	4:6	:
16:5	15:0	3:1	0:10	0:10	0:10	0:10	2:3	0:0
13:0	0:0	1:0	7:0	2:0	0:10	2:0	17:0	0:0
27:	27:	:	:	:	:	:	6:	:
16:0	16:0	9:0	9:0	0:3	0:3	0:0	0:0	0:0
20:1	23:7	5:1	1:11	15:7	0:0	0:0	15:7	0:0
13:0	3:5	8:0	0:0	0:0	0:0	0:0	3:5	0:0
1:0	18:1	9:8	9:8	0:6	0:0	0:4	18:1	0:2
0:	15:4	0:	4:	17:X	17:X	0:	14:4	0:
13:0	16:0	2:6	2:6	0:0	0:0	3:0	9:0	0:0
10:0	0:0	2:0	0:4	0:0	0:0	2:6	12:5	0:0
16:4	16:4	6:4	6:4	0:0	0:0	0:0	16:4	0:0
16:0	0:0	10:0	0:0	2:0	0:0	2:0	16:0	0:0
17:	:	7:	1:	:	:	:	:	:

Q1l Work_SOME_Eng	Q2a Contrib_InteractFriend_Norsk	Q2b Contrib_InteractFamily_Norsk	Q2c Contrib_Reading_Norsk	Q2d Contrib_School_Norsk	Q2e Contrib_Selfinstruct_Norsk	Q2f Contrib_TV_Norsk
0:0	10	10	8	9	0	3
1:0	10	10	5	5	1	1
:3	7	10	10	9	0	5
5:	8	10	6	7	5	8
3:0	6	6	8	10	3	4
5:	9	10	8	4	2	6
0:0	3	8	9	8	0	3
0:0	0	10	7	5	0	2
1:6	5	7	3	8	6	4
:4	10	10	8	10	1	4
2:	9	9	10	10	0	9
0:0	8	10	8	8	6	7
1:0	10	10	5	4	0	1
0:0	8	10	5	3	0	1
4:0	5	10	5	5	0	5
0:0	9	10	8	5	0	0
0:0	10	10	10	10	0	5
1:6	5	10	8	5	0	0
0:6	7	10	6	8	0	4
:	10	10	10	10	3	5
:	5	10	6	10	0	0
:8	7	10	6	5	0	5
2:0	6	10	8	8	0	8
1:0	10	10	10	10	0	10
:	10	10	10	10	10	10
0:	10	10	5	10	0	5
:1,5	8	9	10	8	0	4
0:0	7	10	6	6	0	2
2:9	10	7	6	10	5	3
2:3	5	8	9	10	0	1
1:0	6	8	10	9	2	0
0:	10	10	0	5	0	0
1:0	7	9	5	8	2	3
3:6	9	10	9	10	0	2
0:6	8	9	7	7	0	0
:	3	8	5	10	0	6
0:	8	10	8	8	2	9
:	7	8	5	8	0	3
0:10	6	10	8	7	4	5
6:0	9	9	3	6	1	4
:6	10	10	2	2	3	5
1:6	10	10	4	7	0	5
3:0	9	10	9	10	0	5
1:0	5	5	2	3	0	0
0:0	10	10	5	5	0	5
4:	5	9	5	5	6	1
2:6	10	8	7	9	0	1
0:4	10	10	8	9	0	8
1:1	8	10	8	7	0	4
10:0	8	9	8	9	0	4
1:4	10	10	8	10	3	5

Q2g Contrib_Music_Norsk	Q2h Contrib_InteractFriend_Eng	Q2i Contrib_InteractFamily_Eng	Q2j Contrib_Reading_Eng	Q2k Contrib_School_Eng	Q2l Contrib_SelfInstruct_Eng	Q2m Contrib_TV_Eng	Q2n Contrib_Music_Eng
3	10	0	2	1	0	7	7
1	8	1	5	8	1	8	8
1	7	4	10	9	0	5	3
6	9	10	6	9	2	5	5
3	5	2	7	7	8	10	10
7	8	9	7	10	6	7	7
1	5	7	7	7	2	10	3
3	10	1	7	7	0	10	8
4	4	2	6	8	9	6	6
6	10	8	9	10	7	7	5
9	2	2	10	4	0	9	9
6	3	6	8	7	4	7	7
0	8	0	5	10	5	5	5
0	8	0	5	10	0	7	0
5	5	0	5	8	1	5	5
0	1	0	2	0	0	2	6
10	10	2	10	8	5	10	10
1	5	2	8	9	1	5	5
1	2	1	7	8	0	10	6
4	7	0	10	10	3	5	6
0	7	0	10	10	0	7	10
5	8	10	9	10	0	8	8
6	10	7	9	2	5	9	9
10	9	0	7	4	0	3	2
10	10	0	10	10	5	10	10
5	0	0	5	10	0	5	5
6	6	2	8	7	1	10	10
0	5	1	8	10	0	6	3
0	5	2	6	8	7	8	4
1	4	0	10	8	0	9	9
0	3	0	10	8	6	9	6
0	3	0	5	5	10	10	10
2	3	6	7	9	6	7	7
1	10	0	8	8	0	9	8
0	2	1	5	8	0	9	8
4	8	2	7	9	0	7	6
7	9	0	6	6	0	10	8
4	5	0	8	6	0	9	7
3	9	2	10	6	4	8	7
2	4	4	8	10	4	9	5
3	5	2	5	7	7	5	6
2	6	6	3	7	0	8	4
2	3	0	8	7	3	8	8
0	4	0	4	4	0	4	3
5	5	10	10	10	10	10	5
4	5	0	8	5	10	9	10
2	6	2	10	5	0	9	7
4	10	1	5	10	1	7	5
2	2	7	7	7	0	7	5
0	9	5	8	10	0	7	7
5	8	0	7	10	5	9	2

Q3a Expos_InteractFriend_Norsk	Q3b Expos_InteractFamily_Norsk	Q3c Expos_Reading_Norsk	Q3d Expos_SelfInstruct_Norsk	Q3e Expos_TV_Norsk	Q3f Expos_Music_Norsk	Q3g Expos_InteractFriend_Eng
10	10	5	0	5	5	2
10	10	10	10	2	5	1
10	10	2	0	0	2	0
10	10	4	4	4	4	7
10	10	9	0	8	7	5
10	10	6	0	5	5	0
7	10	5	0	2	1	3
10	10	8	0	0	3	5
5	3	6	5	4	4	2
8	10	9	0	0	1	8
10	10	0	0	4	5	0
10	10	8	0	6	3	8
10	10	10	10	5	5	3
7	10	5	0	2	1	3
10	10	10	0	8	5	0
10	10	8	0	6	3	0
10	10	5	0	5	3	3
10	10	10	0	10	8	10
9	10	5	0	4	6	1
10	10	10	3	10	10	5
10	10	3	0	3	3	10
8	7	3	0	1	2	5
4	9	0	0	0	1	6
8	10	2	0	4	2	2
10	10	10	10	5	5	5
10	10	5	0	3	4	0
10	10	4	0	3	2	2
10	10	5	0	1	2	3
10	10	6	0	4	5	2
10	10	6	0	5	5	3
10	10	4	0	4	3	3
10	10	0	5	0	0	5
10	10	6	3	4	3	2
10	10	8	0	5	5	2
5	5	3	0	1	0	5
8	10	2	0	0	0	7
10	10	7	0	7	7	2
5	8	3	0	2	0	5
10	5	7	0	2	3	10
9	10	2	0	2	3	1
10	10	5	2	4	2	8
10	10	8	0	5	3	2
8	10	1	0	1	1	6
9	10	5	0	4	5	1
10	10	5	0	0	0	10
9	0	0	2	1	2	7
9	10	1	0	0	0	1
8	10	4	0	2	2	8
10	10	6	0	3	6	0
10	10	7	0	3	3	1
10	10	8	3	5	5	2

Q3h Expos_InteractFamily_Eng	Q3i Expos_Reading_Eng	Q3j Expos_SelfInstruct_Eng	Q3k Expos_TV_Eng	Q3l Expos_Music_Eng	Q4a Speaking_Norsk	Q4b Pronoucing_Norsk	Q4c Listening_Norsk	Q4d Reading_Norsk
0	5	0	5	5	10	9	10	9
1	1	4	9	5	10	9	10	10
0	9	0	10	9	10	10	10	10
3	8	3	10	10	10	10	10	10
0	7	0	10	10	10	10	10	10
0	4	0	5	5	10	10	10	10
0	5	0	8	9	9	10	9	9
0	4	0	10	10	10	10	8	8
0	4	8	7	8	10	10	10	10
1	9	0	10	10	10	10	10	10
0	10	0	9	8	10	10	10	10
4	10	0	10	10	9	9	10	9
0	10	10	10	10	10	10	10	10
0	5	0	8	9	9	10	10	9
0	4	0	8	7	10	10	10	10
0	2	0	4	7	10	10	10	10
2	7	0	10	10	10	10	10	10
2	10	0	10	9	10	10	10	10
0	5	0	7	4	10	10	10	10
0	10	1	10	10	10	10	10	10
0	10	0	5	10	10	10	10	10
7	9	0	9	5	10	10	10	10
1	10	10	10	9	9	8	9	9
0	8	0	6	8	10	10	10	10
0	5	5	10	10	10	10	10	10
0	5	0	7	6	9	7	9	9
2	9	0	9	10	9	9	10	10
0	5	0	9	8	10	10	10	10
1	2	0	4	5	10	9	10	10
1	5	4	8	8	9	10	10	10
2	10	0	10	10	9	9	9	10
0	10	0	10	10	10	10	10	10
2	8	3	7	9	10	10	10	9
4	5	5	10	5	10	10	10	10
5	7	0	9	10	6	6	10	8
0	10	0	7	4	10	9	10	10
0	3	0	8	7	10	10	10	10
0	7	0	8	7	10	10	10	10
0	8	2	9	7	8	7	9	9
1	6	2	10	8	8	7	9	9
1	9	8	4	7	9	8	10	9
9	6	0	5	8	10	10	10	9
0	10	0	9	9	10	10	10	10
0	5	0	6	5	10	10	10	10
5	10	0	10	10	8	10	10	9
0	5	3	8	8	5	8	6	3
0	9	10	10	10	10	10	10	10
0	9	0	9	8	10	10	10	10
0	10	0	5	5	10	9	10	10
0	3	0	8	9	10	10	10	10
2	7	8	6	8	10	10	10	10

Q4e Writing_Norsk	Q4f Grammar_Norsk	Q4g Vocab_Norsk	Q4h Spelling_Norsk	Q4i Speaking_Eng	Q4j Pronoucing_Eng	Q4k Listening_Eng	Q4l Reading_Eng	Q4m Writing_Eng	Q4n Grammar_Eng	Q4o Vocab_Eng
7	7	8	7	7	5	10	9	4	3	6
10	10	8	10	4	3	7	5	5	5	4
10	9	10	9	8	8	9	10	10	8	10
10	7	8	7	9	9	8	9	7	6	8
10	7	9	9	8	8	10	9	8	7	6
10	9	9	9	7	6	6	8	8	7	6
9	7	7	8	8	8	8	7	7	7	7
9	8	9	9	10	6	7	8	8	6	7
10	10	9	10	10	7	9	10	9	8	7
10	10	10	10	9	8	10	10	10	10	9
10	9	10	9	7	6	10	10	10	9	9
8	8	8	8	7	7	9	9	9	8	8
10	8	9	9	8	7	9	9	9	6	8
8	9	9	9	7	6	7	7	6	5	7
10	10	9	10	4	3	6	6	6	6	5
10	9	9	10	7	6	8	8	7	6	5
9	9	9	9	8	8	9	8	8	8	8
10	10	10	10	9	8	9	9	9	9	8
10	9	9	10	9	9	9	9	9	7	8
10	10	10	10	9	7	10	10	10	10	8
10	9	10	10	10	8	10	10	10	9	10
7	7	8	6	10	10	10	10	10	8	10
9	10	9	8	9	7	9	8	8	9	7
10	9	10	10	9	8	9	9	8	7	8
10	9	9	9	8	8	8	8	8	8	8
9	9	9	9	5	2	7	7	5	5	5
9	10	9	10	8	8	9	8	8	8	7
10	10	9	9	8	7	7	8	7	8	7
10	9	8	9	7	6	8	7	7	7	6
9	8	8	8	7	7	9	9	6	6	7
9	9	9	9	8	7	9	10	9	7	8
10	10	10	10	5	8	10	10	10	5	5
9	9	9	8	8	8	9	8	7	6	6
10	9	9	9	7	5	8	8	7	5	7
9	6	7	7	8	8	9	8	7	6	8
10	9	9	9	9	8	9	10	9	8	9
10	7	9	9	7	6	6	5	5	5	6
9	8	8	9	9	7	9	9	9	8	7
6	5	7	5	9	8	8	9	7	6	6
7	8	6	7	8	8	9	8	8	6	9
8	7	9	7	8	7	8	8	7	7	8
10	9	8	9	8	7	8	6	7	6	5
8	6	7	9	7	7	8	9	10	7	9
9	9	9	9	7	7	8	7	6	6	6
8	8	7	8	9	9	10	10	9	8	9
5	4	6	4	5	5	6	3	5	4	6
8	9	9	9	8	7	8	9	7	7	5
10	9	10	10	10	8	10	9	8	8	8
7	5	7	6	6	6	8	8	7	7	7
10	9	9	10	8	9	10	9	9	9	7
10	10	10	10	7	7	7	7	7	6	6

Q4p Spelling_Eng	Q5a StartHearing_Age_Norsk	Q5b FluentSpeaking_Age_Norsk	Q5c StartReading_Age_Norsk	Q5d FluentReading_Age_Norsk	Q5e StartHearing_Age_Eng	Q5f FluentSpeaking_Age_Eng
3	0	3	7	8	13	18
5	0	4	5	6	8	17
9	0	12	6	13	6	15
6	1	5	6	8	14	17
8	0	2	5	8	8	15
6	0	2	6	8	12	16
7	0	2	3	6	6	10
7	0	6	5	10	7	13
8	0	3	7	9	7	10
9	0	16	5	13	7	21
9	0	2	6	7	7	13
8	0	4	5	7	6	11
6	0	2	4	8	5	11
6	0	4	4	7	8	23
5	0	4	5	6	8	13
8	1	8	6	8	6	16
8	0	3	5	8	5	12
8	0	3	4	7	6	15
8	0	5	4	8	6	10
9	0	3	4	6	8	12
10	0	3	5	7	7	11
7	0	15	7	19	0	9
8	0	4	4	5	0	13
7	0	2	5	8	13	19
8	0	4,5	6	8	10	15
5	0	4	8	8	6	13
8	0	4	4	6	5	12
8	0	3	6	9	10	12
7	0	3	5	6	7	13
6	0	4	6	7	7	15
7	0	6	6	12	8	19
5	0	4,5	4	7	8	12
4	0	4	4	10	5	13
5	0	2	6	6	8	13
8	1	4	4	7	8	12
10	0	8	6	10	5	13
6	0	2	6	8	8	15
8	0	4	6	8	12	14
6	0	7	6	10	6	16
6	0	3	4	8	7	12
7	0	3	6	10	5	10
5	0	3	5	8	6	15
7	3	4	4	7	8	20
7	0	2	5	6	6	15
8	0	10	6	11	4	17
4	0	4	6	8	7	14
7	0	4	3	5	6	11
8	0	4	3	7	6	12
7	0	6	5	9	6	19
8	0	3	6	7	6	6
6	0	2	5	7	7	11

Q5g StartReading_Age_Eng	Q5h FluentReading_Age_Eng	Q6 Switch_Proficiency	Q7 Accient_Mix_Words	Q7a Accident_Mix_Words_Freq	Q7b Accident_Norsk_Intrude_Eng	Q8 Intentional_Mix_Words
10	18	7	No	0	0	No
8	10	4	No	0	0	No
6	15	9	Yes	4	0	No
11	17	8	Yes	5	0	No
8	15	9	Yes	4	7	No
12	16	5	No	0	0	Yes
8	11	8	Yes	2	1	Yes
9	13	10	Yes	2	1	Yes
9	12	7	No	0	0	Yes
7	16	10	Yes	8	2	Yes
11	15	10	Yes	3	0	Yes
6	9	8	Yes	7	2	Yes
9	12	8	Yes	4	2	Yes
8	17	8	Yes	3	1	Yes
8	12	7	Yes	3	1	Yes
6	20	6	Yes	2	4	Yes
6	12	7	Yes	4	4	Yes
8	15	9	Yes	2	1	Yes
6	11	7	Yes	4	1	Yes
7	12	10	Yes	5	1	Yes
7	12	9	Yes	3	3	Yes
5	9	9	Yes	5	3	Yes
6	11	10	Yes	1	1	Yes
10	22	8	Yes	2	2	Yes
10	15	8	Yes	2	1	Yes
8	15	5	Yes	2	2	Yes
7	12	9	Yes	6	0	Yes
6	12	7	Yes	3	1	Yes
7	13	7	Yes	3	1	Yes
8	12	8	Yes	2	0	Yes
8	14	8	Yes	4	1	Yes
6	8	10	Yes	2	5	Yes
7	14	9	Yes	7	2	Yes
9	13	8	Yes	5	0	Yes
6	12	9	Yes	8	2	Yes
13	14	8	Yes	8	4	Yes
9	12	8	No	0	0	Yes
10	14	8	Yes	3	2	Yes
12	14	8	Yes	7	4	Yes
7	10	9	Yes	4	1	Yes
9	12	8	Yes	8	5	Yes
7	14	8	Yes	3	4	Yes
8	14	8	Yes	8	3	Yes
6	13	6	No	0	0	Yes
7	17	10	Yes	5	0	Yes
7	12	8	Yes	5	5	Yes
7	12	8	Yes	1	1	Yes
6	13	10	Yes	2	1	Yes
6	14	8	Yes	8	3	Yes
6	7	10	Yes	8	3	Yes
7	11	7	No	0	0	Yes