

# “You click and hold the move button”

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*A study on Incidental L2-Vocabulary Learning whilst playing video games*

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## **Abstract**

The goal of the study was to investigate if there were any advantages acquiring verbs from playing video games instead of watching them. The theoretical framework suggested that supplementary input from elsewhere is needed in order to explain how second language learners learn English. However, theories also state the importance of awareness when it comes to supplementary L2-input. Therefore, a presentation and discussion surrounding awareness is included. Furthermore, the ideas surrounding embodied language and how it affects language processing are discussed.

40 children with a mean age of 12.2 were given a vocabulary assessment task, before either playing or watching a recorded video game. A post-test of their vocabulary was then initiated right after the gameplay session. The results showed no conclusive evidence to support the notion that playing produces better results when it comes to vocabulary retention, as opposed to watching. Contrary to the theoretical framework, the study also found no evidence to suggest that captioning was beneficial for vocabulary learning. The only significant result was the general increase in vocabulary in the participant group as a whole with a positive increase of 7.1 %.

This study presents thoughts surrounding the results, other small findings. In addition, considerations regarding the lack of significant results, and a presentation of possible improvements to the test, that in turn could have caused the study to yield better results.

**Keywords:** Incidental Language Learning, Vocabulary Acquisition, Implicit Learning, Video Games, Second Language Acquisition, Informal Learning, Embodiment



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## 1. Introduction

Video games have become an enormous industry in recent years. It has surpassed other entertainment mediums in revenue on certain products, an example being that in 2013 the game GTA5 became the fastest selling entertainment product of all time (Lynch, 2013). Hence, it is evident that video games impact on society should not be easily disregarded. In fact, its impact ought to be explored even more, considering how immensely popular they have become. I would like to investigate what kind of impact it has had on our society. More specifically, look at its impact on Norwegian second language learners born into this digital age.

In a recent study looking at Norwegian kids and young adults' video gaming habits, it was uncovered that many of them spent a substantial amount of their spare time in front of their computer- and video games (Vaage, 2012). Boys playing video games spent on average almost two hours in front of a screen daily. Girls in comparison played on average an hour a day. Furthermore, the statistics showed a general increase in time spent playing video games over the time period 1995-2007, with almost a doubling. It is easy to assume that this number may have increased even further as handheld gaming devices have become more popular over the following eight years. Children and young adults are interacting and getting exposed to this substantial amount of language input and most of this input is in English. One would suspect that this exposure would have an impact on their *Second Language Acquisition* (SLA). This would further lead to the assumption that their levels in a foreign language such as English would improve due to this amount.

In 2001 Marc Prensky popularized the term *Digital Natives* as a description of today's youth being subjected to digital input, and becoming skilled with digital tools. Although the term is vague in what qualifies to be a digital native, it still introduces a notion that children today have their lives shaped by the digital media, whether it is navigating the internet, acquiring information using Google or simply finding entertainment from it. Following the reasoning of Prensky, I could in turn view myself as a *Digital Native*, seeing that I too have been living in an omnipresent digital society almost all my life, and this has also been the seed for my thesis idea.

I have always had a feeling or rather a hunch long before my academic pursuits, that video games made me a better English speaker. Hence, the topic concerning video games and SLA has continually fascinated me. As a future English teacher, I find it very interesting to

look at the effects that video games may have on future pupils. These two have been my initial reasons for choosing to write my master on this topic concerning SLA.

A final reason for why I would like to look more at this topic is; theoretically there have been multiple accounts of how playing computer games are beneficial for different aspects of our neural network. Just recently, a publication revealed that playing a certain genre action video games enhanced the functional connectivity. There was also an increase of grey matter in the insular cortex of the brain, as it is related to the hand-and-eye motor centre (Gong et al., 2015). However, it appears to be limited research on how *second language* (L2) learners might benefit from playing video games, and therefore it would be very interesting to look in to it. As presented above, these reasons are why I believe this should be more looked into. So in many ways, this thesis has been a question I have longed to find the answer to for quite some time.

This study will focus on L2-vocabulary acquisition, and more specifically on how an L2-vocabulary might be acquired as a by-product from the entertainment medium of video games. The thought is that video games lends themselves better for teaching L2-vocabulary, than other non-interactive mediums such as television, and it would be interesting to see if the anecdotal assumptions of video games are transferable into any quantitative findings. Moreover, as stated by Milton and Donzelli, the research on the contribution of vocabulary knowledge to foreign language learning had been down-played until recently, as its now considered a core component all the language skills (Milton & Donzelli, 2013). Therefore, the phenomenon of vocabulary acquisition will be the centre of focus in this study, looking at how vocabulary might be learnt from either playing or viewing video games.

The main objective of the study is to explore the possibility of being an active agent when playing video games is beneficial when it comes to learning an L2-vocabulary, rather than being a spectator of the same input. In addition to this, the current theoretical development is asking whether the role one has with the presented language input has an important role. That is why the study will see if there are any differences in when it comes to learning verbs from active tasks vs. passive tasks. Additionally, awareness surrounding the input will also be discussed at length, as it is considered to be crucial for any language learning. The several terms used within that area of research will be presented in order to give the reader an understanding of its relevance when it comes to video games and language learning.

The primary focus of the study will therefore be to determine the legitimacy of the following statements:

- Players of video games with L2-input acquire this input through Incidental Language Learning.
- L2-vocabulary is acquired easier by the means of video games than regular video due to its interactive nature. By adding an additional layer of tactile context it will presumably facilitate better vocabulary recollection.

In addition to these two statements, an added thesis statement is included which has been proven to facilitate vocabulary learning on several occasions.

- Captioning facilitates better vocabulary retention.

This study is separated into two sister-theses, where one deals with verbs and the other with nouns. This study will look at the vocabulary acquisition of L2-verbs, whilst co-student Jørgen Theodorsen will be investigating the data material in relation to how L2-nouns are recollected. Therefore, quite naturally, the studies have used the same data material. The tests that have been used in this study have been created in co-operation with supervisor, and my co-student.

The study contains a presentation of the theories that have been used as framework for this thesis, followed by a chapter with a detailed description of the tests themselves. Then the results are presented. And the study concludes with a data analysis and a discussion surrounding limitations.



## 2. Theories

Vocabulary acquisition has an enormous scope; this thesis could be looked at from multiple perspectives. The thesis is focalized on the processing of an L2-vocabulary with further emphasis on how the learner's awareness plays a part.

This chapter is divided into five sections presenting different aspect on the issue of vocabulary acquisition in relation to playing or watching video games. The first sub-chapter will relate to the aspects concerning *Incidental Language Learning* (ILL), and the many terms that surround it. Having a clear differentiation between the terms is needed to clear up some of the confusion surrounding the topic. Terms such as learning and acquisition, implicit and explicit learning and formal and informal learning appears quite distinct in their own respective pairs, but mixed together with the others, their distinctions can intersect with one another. Secondly, the theoretic framework concerning the issue of cognitive awareness will be presented and furthermore, to what extent it is required for learning an L2. More specifically, looking at how the quality of processing input may affect the vocabulary retention and recollection.

There will be a presentation on the mental lexicon regarding vocabulary knowledge, concepts and lexemes, as this is considered an important aspect of vocabulary storage. In addition, a section presenting language embodiment will highlight how the body and mind are interacting during language processing, with a focus on action-verbs.

Subsequently, a section related to video games and learning will be presented, this sub-chapter will present some theories on video games. Furthermore, present some of the aspects of video games that might be beneficial for acquiring new vocabulary. Finally, a brief look at captioning and its effects on language learning, with emphasis on both ILL and SLA.

### 2.1 The Difference in Terminology

This specific study on L2-vocabulary learning is founded on a set of different hypotheses and a fair share of these are closely related to cognitive psychology. In the field of linguistics, the general assumption regarding L2-vocabulary acquisition is that the amount of input presented in formal learning is considered too small to be influential; hence L2-learners need additional input to become fluent in the target-language. The linguists Vee Harris and David Snow suggest that "few words are retained from which are learned or taught by direct instruction" (Harris & Snow, 2004:55), and although the comment to a certain degree appears to be discrediting educational systems, it also highlights their view on the necessity of

supplementary input. Moreover, another controversial statement follows when they suggest that learners “extend their vocabulary through sub-conscious acquisition”(Harris & Snow, 2004:61). By stating that learners are unaware of actual vocabulary language acquisition entails that every auditory language input is to be considered meaningful at all times. The topic of discussion revolves in large extent on whether or not this is true, and to what extent people are able to acquire vocabulary in such a manner.

As an initial way of establishing the framework, the basic distinctions proposed by Stephen Krashen forms a suitable starting point (1985). He distinguishes between two forms of early language learning, namely acquisition and learning. Acquisition was proposed as a sub-conscious process of acquiring language knowledge, whilst learning referred to being a conscious process of developing the language. These two terms create the general distinction between two different processes. Although, the terms were considered a bit simplistic, they are still used in literature as they explain the difference of learning language with or without a conscious effort. Over the years, new distinctions have appeared, causing explanations to become more nuanced. Examples of terms that circle around the topic with similar connotations are: *Implicit* and *Explicit learning*, *Formal* and *Informal learning*. These two pairs are both terms that induce the separation between an active and passive form of learning/acquiring a language to different degrees.

### **2.1.1 Implicit and Explicit Learning**

Implicit learning is a term borrowed from psychology and denotes the absence of conscious operations in the learning process and explicit learning in turn refers to a conscious active presence (Milton & Donzelli, 2013). This is similar to Harris and Snow’s differentiation of the two learning models, with two distinct definitions in opposition to one another.

Richard Schmidt argues with his Noticing Hypothesis that there needs to be some form of awareness when it comes to implicit learning as “...attention appears to play a crucial role in both implicit and explicit learning” (Milton, 2008, p. 219). The sentence might appear contradictory to some, in relation to what perspective they might have on the term implicit. If implicit is another way of saying unconscious, then yes. However, the implicit learning Schmidt refers to is being in a state of awareness, without necessarily paying attention. Schmidt proposes two categories of language awareness. The first one looks at mere perceptual awareness. By simply noticing things while being awake is enough to fit into this form of awareness. This is the process of which language is more or less subconsciously



acquired through the input, while on the other hand, you have the more extensive attention based learning process, where the person is consciously focusing his/her attention towards learning language. Listening to and viewing a video game would require a basal noticing awareness to the language and environment in the game. However, video game players are not usually attempting to actively learn a language, as they are predominantly playing for entertainment purposes.

### **2.1.2 Formal and Informal Learning**

Formal and informal learning are both types of explicit learning, as these refer to learning language from a sociolinguistic perspective instead of the neurolinguistic. The terms are more focused on the actual setting where the learning appears than those mentioned above. James Milton (2013) refers to informal learning as the process of acquiring language outside of the classroom, and mentions activities such as listening to pop music, reading books and watching foreign films. Video games would also fit into this group. Although the terms do not connote any degree of active or passive process, a natural entailment is that formal learning usually is considered to be a more active learning activity in contrast to informal learning. From this perspective, Informal learning bears strong similarities with another popular term coined Incidental Language Learning (ILL), and this term will be the term used throughout this study to refer to the fortuitous acquisition of an L2-vocabulary.

### **2.1.3 Incidental Language Learning**

Incidental Language Learning is considered quite an elusive term in linguistics, not in the sense that the meaning differs, but rather that the term encompasses a broad area with various interpretations. It appears to be touching a grey area on both the terms *language acquisition* and *language learning*, and it might in some cases be presented as both. The general differences and the most common separations are as previously discussed, learning vs. acquisition. Where you on one hand have language acquisition described as an unconscious process of acquiring language knowledge, and the more conscious and active form of learning as the other. These terms seem to criss-cross with one-another whilst attempting to specify the meaning of ILL.

The popular term coined to express the notion of acquiring language seemingly unaware and informal, fits as the most suitable for this study is *Incidental Language Learning*. The term describes the phenomenon of vocabulary being acquired in fortuitous fashion outside of the classroom just as explained as informal learning. The linguists Thomas

Huckin and James Coady (1999) define this incidental learning as the by-product of other language related activities. As an example, they consider acquiring new vocabulary through reading literature as incidental, where vocabulary learning is not considered the target of the activity, however new words are still acquired. Whether or not language is part of an active cognitive process or passive appears to be irrelevant. Schmidt argues that incidental and implicit are two different terms that must not be confused with one another, as incidental learning relates to intentionality, and implicit relates to awareness.

Hence, ILL might be in some cases more explicit than others. If the reader should stop and evaluate unknown words he/her encounters, then it may be interpreted as more of an explicit process. Should the learner on the other hand simply acquire a new word without making a big conscious effort, then it could in turn be called an implicit process. In that sense, there is a sort of “Que sera, sera” attitude towards the process. It should however be noted that Huckin and Coady (1999) initially state that vocabulary learning is not the target of the activity, but they do however discuss the possibility of gaining knowledge concerning the phenomenon which in turn can be used to create more efficient language learning tactics.

## **2.2 The Form and Processing of the Vocabulary**

Various sets of hypotheses have been presented over the years concerning how vocabulary is best acquired, and most of them support the claim that, attention to the language input is crucial. More so, the aspect concerning attention at all seems to be the focal point of the research conducted. Below are different sets of models explaining how the attention to the input is important in order of retaining it in the vocabulary. First, a brief look at the work of Craik and Lockhart (1972) and the argument of there being a depth structure when it came to input processing. Secondly, further details on Schmidt’s Noticing Hypothesis (1995) which follows much of the ideas of Craik and Lockhart (1972), Third, Laufer and Huljstin’s Involvement Load Hypothesis (2001) will be presented, looking at the three different factors in input processing, and its three different sub-levels. Finally, two examples studies conducted on processing levels of vocabulary.

### **2.2.1 Depth of Processing**

Craik and Lockhart published in 1972 their model concerning levels of processing, in which they presented the notion of having two cognitive levels of processing language input, shallow and deep processing. A shallow processing of a word meant only processing the orthographical and phonological properties of a word. A deeper level of processing would

happen if the person additionally attempted to figure out its semantic meaning. A problem regarding this initial hypothesis was how to distinguish between the processing levels and what actually constituted a deeper level from another. However, the focus on attention and processing levels continued to be researched. It should also be noted however, that processing is not the same as learning. Learning would in this case be explained as retaining said processed information.

### **2.2.2 Noticing Hypothesis**

Returning to Schmidt (1995), as mentioned when presenting the terms Implicit and Explicit learning, he argues that attention is necessary for any learning to occur. Without attention, learning cannot occur. His Noticing Hypothesis states that attention is regarded as a crucial starting point when attempting to learn a second language.

Schmidt discusses the term consciousness at great length, stating the problem of using it due to vague meanings. He explains this how the term is used in multiple contexts referring to different usages the word might have. In some cases, unconscious actions are regarded actions done without effort, and other times unconscious learning are things learnt without attention. Furthermore, the term unconscious might sometimes be seen as a synonym for subconscious, further mudding the definitions of the term.

One must note that the low attention does not presuppose unconsciousness. The important aspect is to highlight the fact that attention not only refers to the subjective experience of the self, but also includes the complete cognitive process of sensory input. Schmidt calls this by assigning distinctions between the different terms in order to be able to explain them better. The perceptual awareness is then the inattentive mode in which little effort is made to notice language details. The other category links up with explicit learning as being metalinguistically aware of the language input presented. In this case, playing a video game and consciously looking out for unknown words in the game, attempting to understand their meaning. It should also be noted that Ellis (1995) has suggested a similar division called a peripheral and focal attention, which mirrors the ideas of Schmidt.

### **2.2.3 The Involvement Load Hypothesis**

Jan Hulstijn (2001) emphasizes that quality of elaboration or cognitive engagement is central when acquiring an L2-vocabulary, more so than the intention of actually learning. Once more the importance of awareness is highlighted as the pivotal factor of L2-vocabulary learning.

Batia Laufer and Jan Hulstijn (2001) presents in their article regarding task-induced involvement, a set of three different factors with three gradients that explains different depths of processing. The two linguists proposes that the three factors are; Need, Search, and Evaluation, all of which are thought to be present during any vocabulary learning, and if combined, would optimize vocabulary retention. The hypothesis seems to be especially centred on L2-learning.

Need is presented as the motivating factor of vocabulary computation, with three distinct levels of processing depths. If there is little or no need/motivation to learn the unknown word, the chance of vocabulary retention is considerably smaller, than when the need for knowing a word is high. Furthermore, if the need for attaining the new vocabulary has its source from the learner, the chance for retention is higher than those being required to learn the unfamiliar word. The Search factor looks at how one might notice words and attempt to attribute them form and meaning. Evaluation is the third and final part of the fundament on which the involvement load hypothesis rests on. It looks at process of comparing newly acquired words to others to further develop and expand their lexical knowledge.

As mention whilst presenting the need factor, the three factors, are also divided into three sub-categories high, medium, and low cases of involvement. It attempts to nuance the level of processing, similar to Lockhart and Craik (1972). The higher the involvement load is the higher the chance of vocabulary retention. Casual readings of literature are in this case considered to have low involvement, which in turn can be termed as shallow processing.

#### **2.2.4 Example studies**

Different sets of studies have been conducted where participants have been instructed to be attentive of unknown vocabulary, where the goal has been to see how fast they can acquire it. In one study, a participant read one specific Lucky Luke comic magazine with an estimated total of 6000 words. Over an 8 week period, the participant acquired about 30 words per hour during these reading sessions (Horst & Meara, 1999). It also showed that nouns were easier to learn than other word classes.

A similar study looked at Greek ballads and vocabulary learning, and the results were very similar (Horst & Meara, 1999). These studies cannot be considered proof of ILL, as the participants were said to be instructed, the vocabulary they learned became less and less a by-product, and more the actual goal of the activity. In addition, it is anything but implicit learning, as the participants were instructed to be aware of the language. It does however

show the effects on awareness, seeing how informal learning might work, and that higher involvement load yields better results in terms of vocabulary.

### **2.3 Vocabulary Knowledge**

When testing participants of their vocabulary knowledge, one major issue is: What defines when a word is learnt? And so defining what meets these requirements are naturally important. For a simple yet quite effective explanation, one can use Levelt's (1993) quarter-partitioned model of lexical items, as words are a sub-category of lexical items. In Levelt's model, the lexical items have four different properties: Phonological/Orthographical, Semantic, Syntactical, and Morphological. The entries of information/properties in the lexical items are of course learned individually, and lexical items will differ from person to person due to how they have been acquired. In many cases, some entries in the lexicon might differ from what is considered to be correct. One example could be the word "Albeit", which is a word L2- learners commonly have trouble pronouncing. If it has only been encountered whilst reading, the information regarding pronunciation may be processed different than what is considered the correct pronunciation. In this case, this could then be explained as a lexical item with phonological information deviating from the norm. As mentioned by Craik and Lockhart (1972), they referred only the initial items (phonological/orthographical) in Levelt's model to be part of shallow processing. This implies that they consider the three other items to be part of a deeper processing level.

Vocabulary knowledge is not just recollecting words and their meaning. They denote different concepts; they include associations to the word. Therefore, it is so much more (Milton & Donzelli, 2013).

In this thesis, a central aspect of the study relies on to what extent the participants are able to recollect the presented vocabulary during a video game session.

### **2.4 Embodiment**

"The notion, that cognition is grounded in perception and action is encapsulated in the term "Embodiment"" (Fischer & Zwaan, 2008). The quote presents the idea, that our experience and interaction with the world is affecting our cognitive processes.

Upon initial viewings concerning how certain actions might be shaping the mind, it appears to be a field of research that has been neglected for many years, according to Fischer & Zwaan (2008). However, this notion seems to have shifted in recent years, so that the interplay between brain and environment has become widely studied. Different studies now

suggest that the mind is wired to identify action words/sentences with respective physical actions. Upon hearing the word kick, I might not actually kick my leg, but research seems to suggest that my brain has already primed my body for the action, in an anticipatory fashion. Evidence to support such a claim has for example been shown under what is called an Action-sentence Compatibility Effect (ACE). These ACE tests- are usually created as a sentence-judgement task. In one such study, half of the participants were given a dial to rotate clockwise if the sentence sounded sensible, and counter-clockwise if it sounded wrong. The other half were given the opposite direction for confirmation. The results showed that, if the participants were subjected to sensible sentences where the action described matched the rotation direction, the response was faster (Zwaan & Taylor, 2006). Sentences like “he turned the volume down” would generate faster response time to the group turning counter-clockwise to confirm the sensibility, as they would presumably have linked the action with turning down the volume on a stereo. Similar ACE-tests have been done with very similar results (Glenberg & Kaschak, 2002).

The effect of these experiments is known as motor resonance, in which neural firings in the motor system of the brain appears to integrate into the language processing. The neural network fires a set of mirror neurons that simulate the action, without acting them out. Furthermore, this type of motor resonance can occur by both being subjected to auditory or orthographical sentences and single words. More specifically, the action words appear to increase the activity of motor resonance the most.

Fischer & Zwaan (2008) draw two conclusions on motor resonance in their review on the subject: first, that action comprehension may not be an all-or-none phenomenon. Second, motor resonance results in deeper, higher resolution, comprehension. Whether or not motor resonance is necessary for comprehension is not mentioned, but it certainly suggests that it should enhance the comprehension. This study theorises, the idea will apply to the idea of added comprehension.

In terms of context, this study theorizes that video games will add an extra layer of context for the language learner to add the word into the mental lexicon. The word pull for example, will not only be depicted as an active motion where one drags himself forward. The player will in addition perform the move actively using the word, thusly adding an actual tactile cue to the target word. Therefore, the study’s hypothesis is that these words should be more easily learnt than others.

It is important to emphasize the fact, that the theories concerning motor resonance appears to be looked at solely from a first language perspective, as little research seems to have been done with regards to L2-processing. If motor resonance plays such a role of comprehension, then perhaps it should play a part when it comes to L2- learning as well.

## **2.5 Computer Games and Learning**

There are some publications revolving around language learning and video games, but they are however limited. As presented in the introduction, Norwegian children are spending, more and more time in front of video games (Vaage, 2012). A recent Swedish study also confirmed the impact English video games had on Swedish children. Furthermore, the study appeared to have found evidence to support the fact that video games are a viable source of L2-input (Sundqvist & Sylvén, 2014).

A publication with a similar goal of looking at how video games might be beneficial for language learning, presented evidence to suggest that video games had an ideal environment for increasing English proficiency, and especially that it was a good tool for acquiring vocabulary (Rankin, Gold, & Gooch, 2006). The results even stated that there was a 35% chance of vocabulary recollection of words only stated once by non-playable characters in the game. If the words were repeated more than once, the chance of recollection was even higher. They stated however that they believed it to be most beneficial if the learner already had an intermediate understanding of English, and furthermore stated that beginners with limited proficiency probably were better suited playing a more traditional game developed with the purpose of being educational. It should be noted that their participants appear to have been a lot older than in this study, so their results might not be as replicable.

Regardless of which term or processing hypothesis one looks to, a crucial aspect regarding incidental language learning is its possibility of being beneficial on the affective filter in the language learner. Whilst being entertained, the L2-learners are seldom in a mental state that hinders the L2-input to be processed. Stephen Krashen (1985) theorized when learners are situated in a low-anxiety environment it causes more input to be absorbed rather than being blocked. This would in turn support the claim of any learning. The stark contrast to many educative arenas where the performances occur in front of others can cause unwanted effects, being stressed and nervous are two components that hinders such language learning in general (Ganschow & Sparks, 1996). Video games like other entertainment mediums are

usually enjoyed in a leisurely environment and it should then be considered an ideal learning setting.

Jim Ranalli (2008) shows in his study on video games, the potential they can have as a tool for L2-learners, by making the participants play a video game with an additional program designed to add an educational frame around the gaming session.

When looked at from the perspective of the Involvement Load Hypothesis the need factor as presented by Laufer and Hulstijn (2001) will hopefully be present throughout the video gaming session. Motivation and entertainment are of course two aspects of video games that are crucial for a game's popularity, as the factors are constantly dependent on each other. If either of them subsides, the player's interest of the game ceases and the player will quit. If the player does not feel compelled to continue playing, there is little chance of him feeling compelled to find out what the unknown words in the game mean. The video game used in this study has a very task-centred design, and will require the learner to be motivated to learn the words they do not know ahead of the gaming session. In terms of embodiment, the player playing the video game becomes more personified with the avatar, as the player uses a proxy body to navigate the digital environment, this can in turn become very meaningful, causing the player to invest much of their personal interest in the game.

## **2.6 Captioning and Language Learning**

Captioning is usually used as a service to aid hearing impaired in the same language as the audio from different visual media. Subtitling is in turn usually referred to a translated text of the audio. This study focuses on the usage of captioning.

The effects on captioning will be studied as well, which in turn requires some additional theoretic background. The usage of captioning for presenting language in different mediums can be a great asset when it comes to incidental language learning, and several studies have shown that captioned videos have in comparison to non-captioned videos, a considerable better effect on the word recollection for L2-learners (Danan, 2004; Garza, 1991; Neuman & Koskinen, 1992). Some reports have even shown it to be almost twice as effective as opposed to sound-only depictions of television (Baltova, 1994).

Neuman and Koskinen (1992) used the specific term incidental word learning during their study, to see if captioning attributed to learning the vocabulary. This was done by not telling the participants they were testing them language related matters, the participants were



simply told to just pay attention to the story. The results of the study showed supporting evidence in a set of bilingual children enrolled in US 7<sup>th</sup> and 8<sup>th</sup> grade.

The main argument for captioning effects is that captioning provides another contextual support system, and is easy to access. This coincides with the notions that “reading materials with informative contextual supports will most likely lead to greater incidental learning of word knowledge” (Nagy, Anderson, & Herman, 1987). Furthermore, in Martine Danan’s (2004) study on captioning, it is argued that subtitling can increase the language comprehension and lead to additional cognitive benefits, such as greater depth of processing. This argument in turn seems to mirror the different processing hypotheses as mentioned earlier, that the additional orthographical input facilitates a more extensive language processing.

## **2.7 Summary**

To summarize, the efficiency of ILL appears to boil down to the level of attention the learner has to the presented language input, more than the actual intent of the learner. The more cognitive power being attributed to the unknown lexical item, the higher the chance is for recollection later. Whether or not the cognitive actions are implicit or explicit is not that important. Embodiment in the language processing appears to increase comprehension of certain words. Video games do appear to have some positives when it comes to presenting novel vocabulary due to their normally task-based designs. Furthermore, the Need aspect from the Involvement Load Hypothesis is presumably present when playing an engaging video game. And finally, captioning has been shown to be beneficial when it comes to learning new vocabulary by adding an additional layer of information to be processed by the language learner.



### 3. Method

#### 3.1 Participants

The selected participants were 7<sup>th</sup> and 8<sup>th</sup> grade pupils at three Norwegian elementary schools in Nord-Trøndelag and Sør-Trøndelag. They were born in 2000 and 2001, with a mean age of: 12 years, 2 months. All participants were born in Norway and monolingual. Prior to testing, an initial consultation with the class teacher was required. The goal of the conversation was to assess and identify if any of the pupils had any form of learning disabilities. Due to the participant group being only 40 children, the goal was to get the most homogenous sample group as possible, and learning disabilities such as dyslexia could cause discrepancies to the result material. The pupils themselves were not notified of said conversation, as everyone was encouraged to partake in the experiment. In total 42 pupils were tested. 40 were used in the results (21 girls). 1 pupil's results were retracted after the testing as the pupil had been diagnosed with dyslexia, whilst the other pupil wanted to withdraw the test results. The participants were randomly divided into four groups, however keeping an equal gender distribution. The groups would be subjected to 4 different game conditions, each group consisting of 10 participants.

<b>Playing Conditions</b>	<b>Play Game</b>	<b>Watch Game</b>
<b>Captioning</b>	Group A	Group C
<b>No Captioning</b>	Group B	Group D

#### 3.2 Materials

##### 3.2.1 The Video Game

PC was the preferred choice of gaming system, as it was considered the most practical system with regards to this study. In early discussions with regards of selecting a video game for which to base the study upon, numerous games were mentioned as possible candidates, however the video game that appeared best suitable for the study was the video game "Black and White". The game fulfilled a number of criteria set in these early discussions. These will be presented below.

"Black and White" is a critically acclaimed video game created by Lionhead Studios that was released in 2001. It gives the player the opportunity to play as a virtual god. The

game's perspective is set in a first person view, giving the player the impression that they are the actual god. The player is only manifested as a flying hand on the screen; the hand again functions as player's instrument to interact with the digital environment.

Authenticity was one of the first criteria when it came to game selections. Choosing a game that was actually designed for entertainment and not for learning a second language, was a crucial feature we wanted, as we were attempting to recreate authentic gaming just as the children would experience in their spare time. One positive side of the game is its easy and intuitive way of steering and manipulating the environment and changing camera angles throughout the play session. Black and White also fulfilled the criterion of child friendliness, as the game needed to be suited for 12 year old children. An additional criterion for selecting a suitable video game was the issue of replicating the same auditory input in several playthroughs. Many games usually have a tutorial section in the beginning of the game, where the player gets to learn the basics. Some games can give the player many things to do right off the bat, whilst other games follow a stricter path during the tutorial. Black and White belongs in the latter category, having a quite rigid tutorial structure.

Black and White would then as addressed above, suit the needs of being a game that fulfilled the criteria of being:

- Authentic
- Intuitive
- Child friendly
- Easy to replicate

Another argument for choosing a game released in 2001 was due to being easy to install and run on today's ordinary laptops. This in turn would result in the experiment being cost efficient, and us being able to run the test on several computers at a time if needed.

### **3.2.2 Video of the Game**

As 20 participants were going to play the video game, the remaining 20 would be set to watch a gameplay video of the same game instead. This video would include the same input as those playing the game. For this purpose, two videos were made, one with captioning and one without. These videos were created by recording two separate playthroughs using the video capture program Fraps (Beepa, 2013). Therefore, there were minor differences in the two videos. The videos were recorded to resemble each other as much as possible. The differences were only timing of the different actions, slight differences in camera angles and different

loading times. The captioned video was 23:06 minutes long, and the non-captioned video was 22:35 minutes long.

### 3.2.3 Vocabulary Assessment and Word Selection

In advance, the words for the vocabulary assessment test<sup>1</sup> had to be selected as the participants would be asked to translate a set of words from English to Norwegian. In total, 40 words were selected to be in the test. Out of these, 28 of them were from the gameplay itself 14 verbs (see table below), 14 nouns. In addition, 12 words were added filler words chosen by us. The selected filler words (6 verbs, 6 nouns) were derived from discussions with supervisor and fellow MA student. These were a set of basic words that were to be expected from a 12 year old and added not to discourage the participants, should the actual assessment words be too difficult. None of the filler words appeared in the actual gameplay.

Selected Assessment Verbs						
Arrive	Change	Drop	Expect*	Forget	Hunt	Leave
Pray**	Provide	Pull	Retrieve*	Search	Suffer*	Worship**

\* Words considered to be advanced for the participant group.

\*\* Words considered being in a specialized lexical group.

The test words from the gameplay were selected with a set of deductive parameters. Derived from a transcription of the entire gameplay, we were looking for suitable words only mentioned once in the gameplay. Nouns and verbs appearing multiple times in the gameplay were therefore removed first. Furthermore, words were also eliminated if being considered unsuitable due to being too advanced. Initially, they were done individually, and then in cooperation with supervisor and MA student to discuss those with dissimilar grading. Words with similar appearance to their Norwegian equivalent were removed, as they would presumably be easier to infer the meaning from the orthography. Compound words were also discarded during the elimination process.

Of the 14 verbs that appeared in the gameplay, 8 verbs were presented in the story without any explicit presentation. 5 verbs were part of instructional commands given by the game to the player: Pull, Drop, Provide, Retrieve, and Search. All of these were part of orders the player needed to do in order to continue playing. 1 verb was explicitly depicted, with a

<sup>1</sup> See appendix 2, for further information

man lying on the ground making sounds of distress, whilst a voiceover stated: My brother is *suffering* a fever.

Out of the 14 verbs chosen for this specific study, 7 of these verbs were considered to be familiar to the participants, 4 verbs were thought to be somewhat familiar to some, and 3 verbs were considered unlikely to be familiar for the participants. The verbs that we considered to be advanced or containing any specialized language were therefore excluded from the assessment, with the exception of: *Provide, Expect, Worship, Pray, and Suffer*.

During the testing, the participants would be exposed to the selected words a total of three times, once in the pre-test assessment, then in the playthrough itself and finally in the post-test assessment.

### **3.2.4 Additional Assessment**

In addition of the translation task, two additional questionnaires were added to the study, as we wanted general information regarding their computer gaming habits. This consisted of how much they played games in their spare time, what kind of gaming system they had at disposal, whether or not they played any English games<sup>2</sup>. All of these answers were graded into: Every day, Often, Several, Rarely, and Never. The questionnaire was sent out to the participants alongside the permission slips a day in advance of the study, and was therefore answered ahead of the testing.

Secondly, a sheet of paper with two purposes was added. It contained three questions regarding the gameplay; this was used to determine if the participants had understood the contents of the presented gameplay. It also contained a set of tasks to pass the time, allowing us to have multiple participants in one test session.

### **3.2.5 The Test Equipment**

During the study, a set of different tools were used to streamline and make the study as replicable as possible. In order to minimize external input, the participants were seated by a desk in a cubicle created of separation walls in a vacant office. These cubicles were placed in by the walls of the room, which meant the participants would be facing away from each other. The computers used during testing were laptops with either with a 16" screen or a 15.6" screen. The screen resolution however was the same on all screens. The video recordings used during the tests had the same resolution as the game. The headsets used during testing

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<sup>2</sup> See appendix 1, for further information

were of different make. All of them were however over-ear headsets that had a noise cancelling effect, and were also calibrated to the same volume and set to stereo sound before testing. Those playing the game were also supplied with an optical computer mouse of the same make.

### **3.3 Procedure**

The study was approved by Norsk Samfunnsvitenskapelig datatjeneste (NSD). Following the approval of the study, the pupils were given permission slips for parental consent<sup>3</sup>.

The participants were seated at a desk with the laptop in front of them with the computer screen tilted forwards. When they were seated they were given the instructions both spoken and written in Norwegian, but not told the actual purpose of the testing. They were encouraged to take their time with the translation task. When the assessment test started, they put their headphones on for further isolation of sensory input, and to avoid disturbing them. The participants would then be given the time they needed to try and translate the presented English test words into equivalent Norwegian words. When they had finished it, they were given a written message urging them to pay attention to the story of the game. Half of the participants were told they would play a video game, and the other half, were told they were going to watch a video of the video game. The participants would then proceed to either watch or play the game. After viewing the video, or playing the game, the participants were handed an identical assessment test as before the gameplay. They were only instructed with a written message. When finished, the final paper asking questions about the gameplay was given to them. If testing multiple participants, those who had finished had the opportunity of doing some activities on the back of the last questionnaire (draw, crossword or sudoku). This was due to avoid disturbing the participants still being tested. When the participant(s) had finished the test, they were given a diploma as a token of appreciation.

### **3.4 Data Interpretation and Analysis**

After the testing, the data material consisting of both the vocabulary test, and the questionnaires were graded. This grading system was again a co-created grading system designed together with supervisor and fellow MA-student. When coding the results into Excel, the translations were graded by correctness into five different categories:

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<sup>3</sup> See appendix 1, for further information

2. Blank: A blank entry.
3. Wrong: The translation was completely wrong. No relation to target word.
4. Far: The translation had some notion of correctness. Slight relation to target word.
5. Close: The translation was in a similar word category. Closely related to target word
6. Perfect: The translation was correct.

The translations from both translation tasks were graded into these 5 different categories of correctness. Blank translations meant no attempt of translating. Wrong translations showed wrong recollection of the target word. Far translations were seen as translations with a conceptual understanding quite far from the target word. An example would be that “push” is far from a perfect translation of “pull”. Both words do include the notion of applying force onto an object in order to move it and only the direction of where this force is exerted differs. A close translation shows there is a close conceptual relation between the target word and the attempted translations, however the difference is big enough to be categorized on its own. An example of this is the word “believe” in relation to “expect”, where both words can be used as gradients in describing probability. Perfect meant a translation that was considered to be equivalent with the target word. Learning was defined as a positive change in vocabulary knowledge, which could range from Wrong/Blank translations to Far/Close/Perfect translations.

When the grading was finalized the results were entered into an Excel spreadsheet. From there on the data was plotted into and analysed with SPSS ("IBM SPSS Statistics for Windows," 2012).



## 4. Results

This section describes the noteworthy results that were extracted from the data-analysis, with the results from both the additional assessment questionnaires, as well as the results from the pre and post-test results.

### 4.1 Participants

The first result was taken from the additional information sheet we had handed out to the participants<sup>4</sup>. This revealed that our participants was just as Vaage had predicted (2012). The results showed that 50 % of the participants played video games every day. Furthermore, almost 40 % played either every other day or two days a week. Even still, 90 % of the participants in the study answered they played video games that were in English, and where 75 % played English games several times per week.

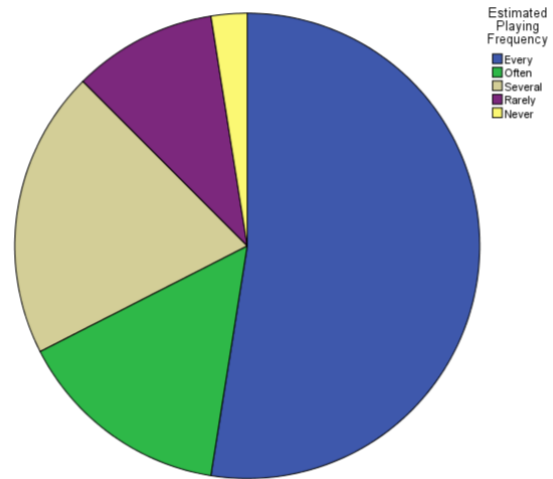


Figure 1

### 4.2 Pre and post-test results

Post-test positive change		
	Frequency	Percentage
<b>No Learning</b>	1040	92,9 %
<b>Learning</b>	80	7,1 %
<b>Total</b>	1120	100 %

As seen in the table above, the initial comparison between the pre and post-test showed that there were noteworthy results in terms of general improvement with a total of 80 cases (7, 1%) of learning. This confirms that it was an actual positive change overall. However, the statistical calculations done afterwards showed that there were no significant differences when it came to the various conditions, neither playing nor watching the video game proved being more beneficial than the other. Surprisingly, it should be noted that out of the four different

<sup>4</sup> See appendix 2, for further information

conditions, the participant group watching the game with no captioning, turned to be the group with highest increase of words learnt. This was of course the polar opposite of what we expected to see.

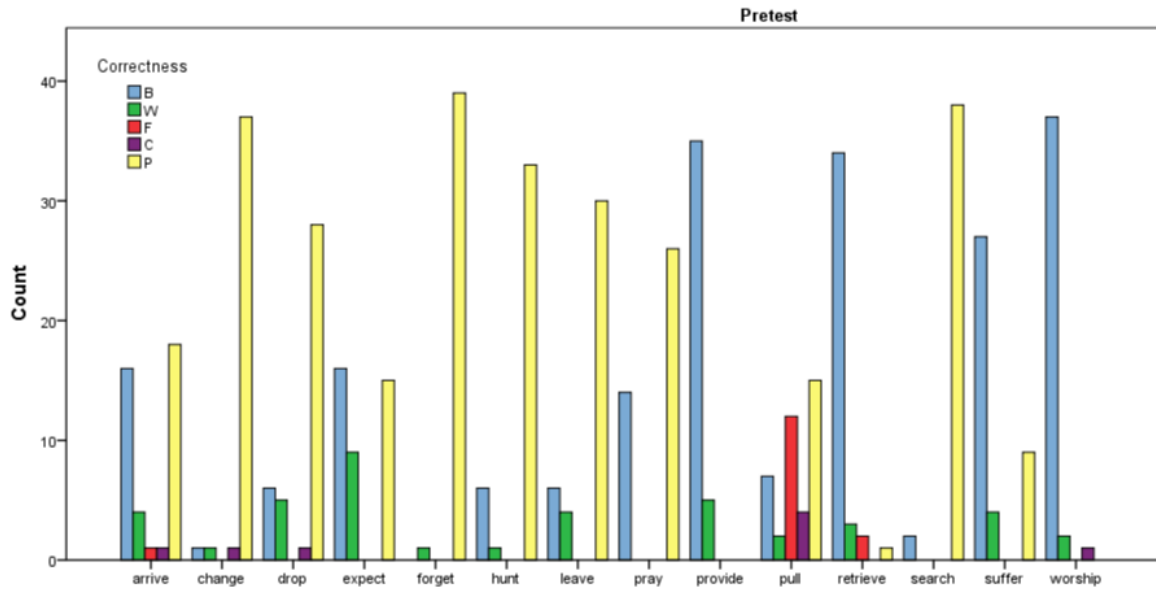


Figure 2

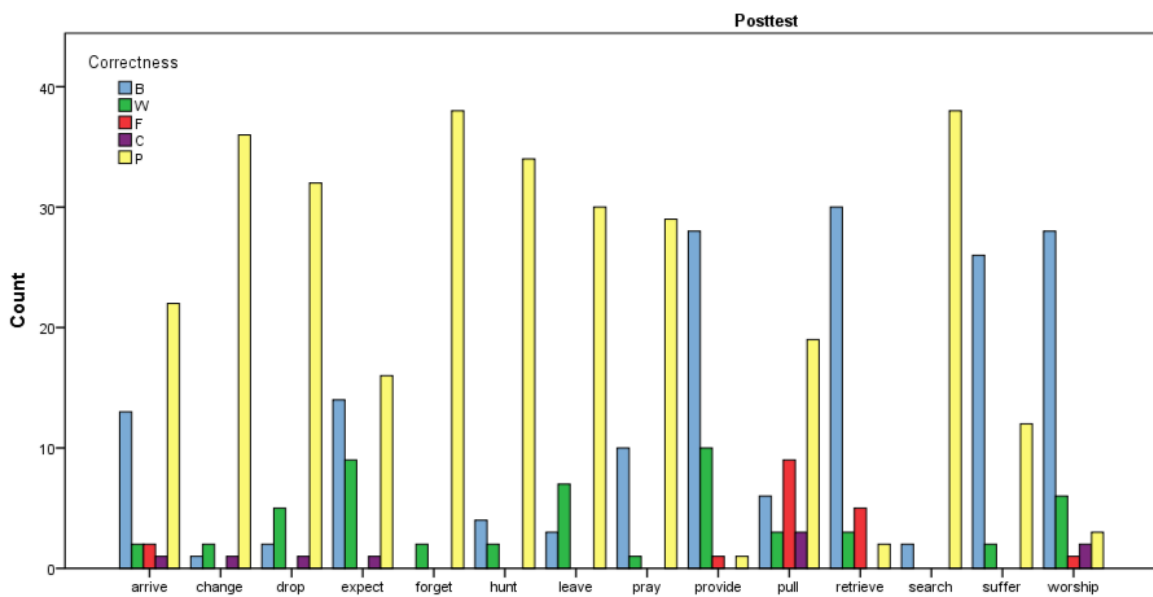


Figure 3

Figure 2 and 3 depicts the verb results of the pre-test and post-test regardless of test-conditions, and are sorted into their five respective grades as presented in Chapter 3.4.

The yellow columns represent words with perfect translation, and one can already see that many of the assessment words were already quite familiar to the participants. In contrast, the blue columns represent words the participants had no knowledge of. The decrease in blue

columns shows that the percentage of attempted translations increased. In fact there was a 6.6 % decrease in blank answers, which in turn translated to 74 more attempts of translations than pre-testing. However with that increase, it also resulted in being an increase in wrong translations in the post-test by 1.7 %. A slight increase in translations categorized as far by 0.4 %. Similar to the far translations, close translations had an increase of 0.5 %. The amount of perfect translations increased 4.2 % from the baseline, which in numbers totals to 47 more perfect translations.

Looking at the verbs that turned out to be more difficult for the participants, one may see a portion of them have “far” and “close” translations. These words need to be presented as they can shed some light on a couple of oddities. To start with, a translation in the post-assessment that often occurred was how the participants had difficulties distinguishing the difference between the words Dra (Pull) and Dytte (Push). On 8 occasions, participants would still answer Dytte, even though they had been shown the motion of pulling oneself forward in a sense of movement whilst hearing the word.

Secondly, with the exception of the verb “arrive”, the other verbs that had best improvement from the baseline were verbs that were part of commands given to the player, and were also active tasks the player had to do in order to continue. It should be noted that the

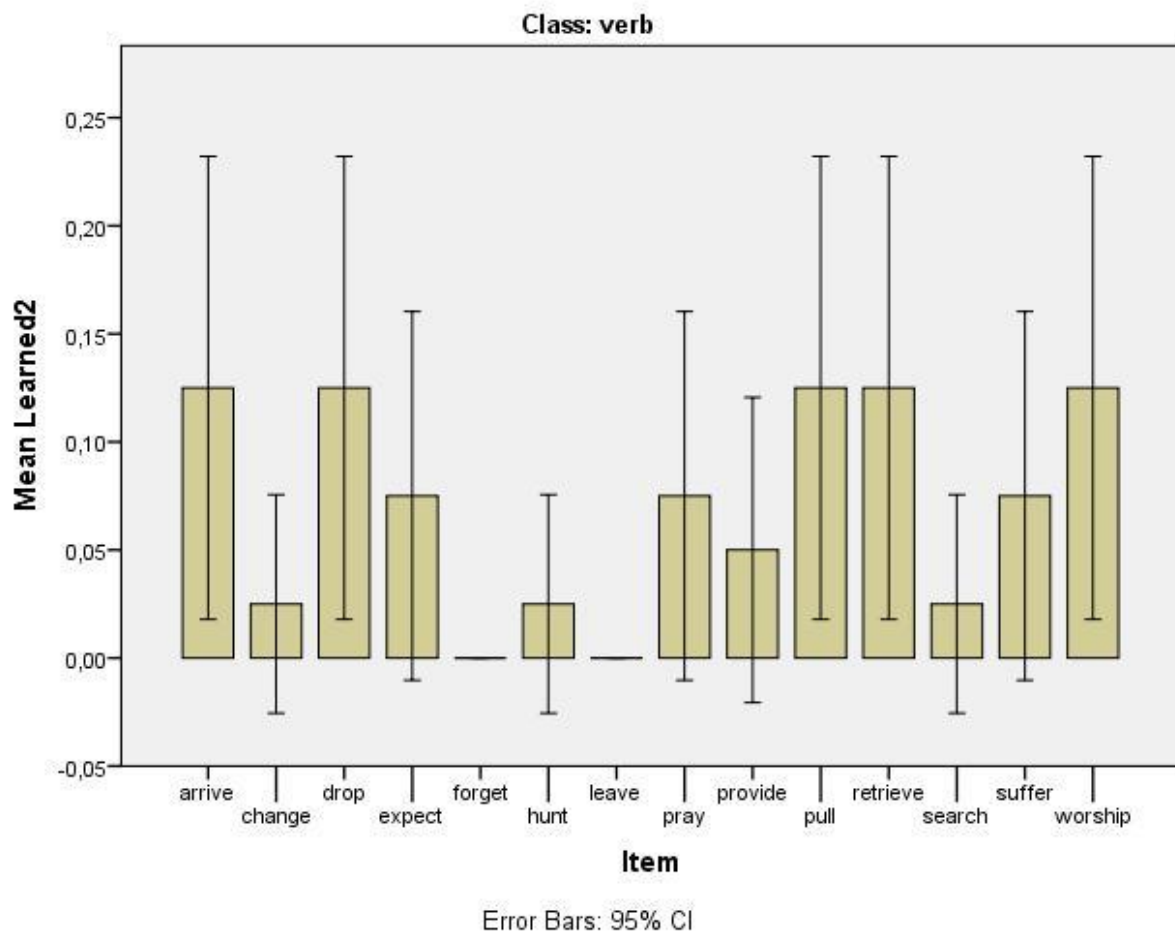


Figure 4

word “arrive” could be perceived to be presented twice as the noun arrival was mentioned in the gameplay.

### 4.3 Captioning

The results concerning captioning were rather surprising, as the participant group with the highest mean positive change was the group that watched the game with no captioning. Figure 5 shows how the group with no captioning, learned more verbs than those with captioning.

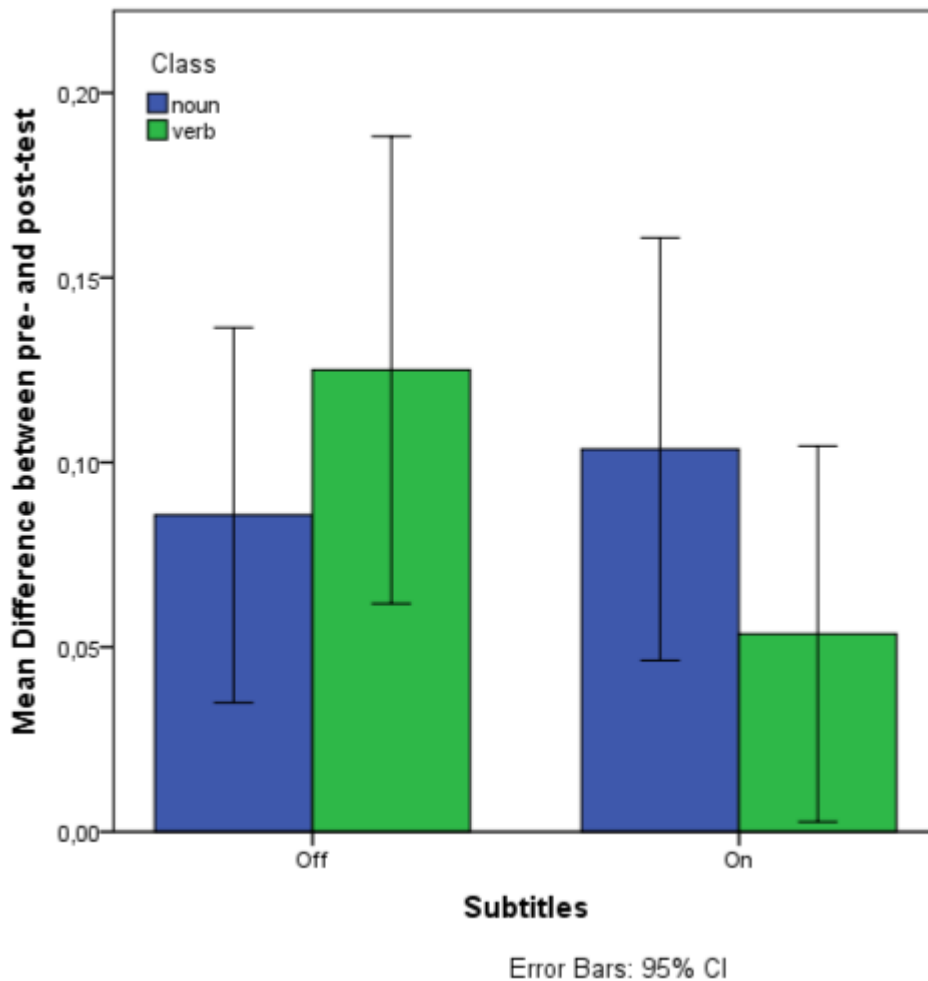


Figure 5

Naturally, the amount of results to show for in this study is quite small when one looks at how little was of significance. As a consequence of the result material, the next chapter will not only discuss the findings from the test, but it will also attempt to give an explanation for why any significant result was absent.

## **5. Discussion**

### **5.1 Results**

Although the initial results were not overwhelming, they did however show signs of language learning occurring. The comparison between pre and post results showed a beneficial tendency, with a total of 80 cases categorized as learning. This translates to a mean score of 2 words learnt per participant during a play session lasting on average 29 minutes.

#### **5.1.1 Incidental Language Learning**

From the set of multiple terms discussed in the theory chapter, a brief look at their relevance to the results is in order. In terms of whether or not the results were due to implicit or explicit learning is of course impossible to assess from two simple vocabulary tests, and therefore there is no way to say for certain whether or not the words the participants learnt, were due to implicit or explicit learning. However, considering whether or not participants were consciously attempting to learn new words, implicit learning may appear as a viable method. Throughout the playing session, the participants appeared more invested in the actual gameplay, than of the language they were exposed to. None of the participants ever stopped during the testing asking for word meaning. It appeared as though the participants played the game like any other game they were used to.

In relation to the two terms of informal and formal, it was quickly established that the video gaming session was a very informal way of acquiring new words to the vocabulary. The setting was outside the regular classroom, and in accordance with James Milton's (2008) definition, this study fulfilled the criteria. It was however centred on vocabulary as they were given a test ahead of gaming.

From the perspective of Huckin and Coady (1999), the words learnt from video game session, were acquired as a by-product from a language related activity, and thereby one can argue that Incidental Language Learning occurred. And as the intentionality is the important aspect of ILL The participant's perceived intention of the study, was to play the game not learn new words.

#### **5.1.2 Vocabulary Processing**

When discussing the depth of processing in relation to the experiment, I believe that the results were actually quite impressive. Awareness of language input does appear to play a role in vocabulary retention. Compared to the studies presented in the theoretic chapter, the result

was not quite as impressive. Milton's (2008) study regarding reading a Lucky Luke comic resulted in 15 words being learnt on average in a 30 minute time span, compared to 2 words per 30 minutes in this experiment. However, one needs to remember that the Lucky Luke experiment was conducted with the participant actively attempting to learn words. In this study however, no guidelines were given to the participant about paying attention to the vocabulary.

Additionally, one could have not expected much more either, considering we only looked at a fraction of the actual input presented in the gameplay, and that the words were then again only appeared once in the half hour session. With this in mind, the results do become a bit more impressive. Had the words in the vocabulary test been repeated more than once, it is fair to assume that the learning percentage would have increased in the post-test, just like the study conducted by Rankin, Gold and Gooch (2006).

### **5.1.3 Embodiment**

The assumption that the interaction between player and virtual environment should have facilitated to better vocabulary retention appears to have been inconclusive, as there were no differences when it came to either watching or playing. However, I think one thing that has been interesting to see, is the understanding of the action-verb "Pull" was translated. The relatively high amounts of "far" translations were solely caused by the mix-up between "Pull" and "Push". The interesting thing is the fact that this was one of the words which was depicted very explicitly, and would presumably have added this tactile cue. Yet the fact that 12 participants (30 %) had mistranslated the same word into its antonym in the pre-test, does suggest that there are some aspects of the word that has been perceived as difficult by the 12 year old participants.

The studies done on motor resonance and language processing appears to have mainly been focused on actual actions done in real life, and not on manipulating an object through an artificial filter. One could argue that the movement performed by the player in-game was too different from the real action movement, by stating that pulling is not the same as clicking a computer mouse, and moving it towards you, but rather to grasp with the whole hand. However, other ACE-tests have showed motor resonance on even more abstract movements that only mildly resembled the actual physical movement.

As noted in the results, the result that was the closest of being fascinating came with the regard to the verb Pull, and was used early in the game. The contextual surroundings when

the word occurred were very explicit; the player was given information about how to move his/her avatar in a forward motion. By clicking and holding the mouse button and subsequently pulling the mouse towards themselves, their avatar would move forwards. First of all it is a quite common word, meaning that the word “Pull” itself has been heard a number of times during their lives. By using the internet as corpus to assess how common the words were Push and its antonym Pull had almost an almost identical set of hits, with both at approximately 150 million hits.

Although quite a farfetched assumption, the result on why so many associated the word with its antonym might be relatable to the participants not having the same underlying link between their second language and motor resonance. Motor resonance appears to be quite intertwined with the first language when presented by Zwaan and Taylor (2006), but that does not directly mean it is transferable to the L2 equivalent. Perhaps, motor resonance can be linked to the semantic properties of a word.

Pull was by far the most extensively portrayed verb in the entire gameplay session, yet the results showed the relatively large misconception about the verb as 9 out of 12 participants having a far pre-test translation, would still translate pull as push even though they had performed or seen the actual movement being portrayed. The pull motion denotes the action in which an object is being moved in the direction towards the agent.

It is quite probable that, the significance of such motor resonance has been overstated in this study. Most likely is fact that its effects are too small to be detected, especially when using a simple vocabulary test. Furthermore, if the results had showed promising results from gaming, it would not have necessarily meant that embodied language was the cause. One also needs to take into account the plethora of other mechanisms at work at the same time, and to argue that motor resonance would be the sole contributor in this comprehension process might be fairly naïve. Moreover, the study was never initially designed to look at this aspect in such a detailed manner.

#### **5.1.4 Video Games**

I believe that our selected game proved to be a very appropriate game to use in the study. Having chosen a game with positive critical reception was considered beneficial as an entertaining game the chance of keeping the motivation level high, could in turn benefit the execution of the testing. The game’s appeal to the young participants became evident during the testing, and especially two peculiar observations were noted. Two participants had been

emulating the movements using a mouse whilst watching the game. Even though they were only watching, they still wanted to learn the means of manipulating the environment. This would at least appear to show that the game was interesting for the sample group, and that they were motivated to either watch or play. These video games are a motivation driven entertainment medium. If the video game did not create a wish to continue the game loses its value for the consumer. Of course, Black and White might not have been a motivating game for every participant, causing some to be less attentive which consequently could affect the test results, but judging from the observations made during the testing, it did not appear to be the case.

This could be an argument for the games ability to attract the attention of the young participants, as the game continuously demands the player directly to perform different tasks, its picking up a rock, fetching a stick or providing some villagers with food. The player is always part of an interaction with the game, whether or not the participant had been playing or watching.

### **5.1.5 Captioning**

The study's third aim of looking at captioning was added by my supervisor, as the claim had been tested multiple times with positive results. In this study, the results proved to be somewhat unexpected. The data analysis showed that the group with no captioning had a higher positive mean difference, as opposed to those with captioning. Most noticeable, was the difference between the captioned verbs and non-captioned verbs, as these were quite dissimilar in their mean difference. It would appear as though the non-captioned groups were able to pay more attention to the events presented on the screen and map them on to the verbs.

Even though one of the most interesting results were found regarding captioning, the decision of studying captioning in the first place might have been a double-edged sword. The objective of the additional captioning-statement was the premise of it working as a litmus test. If it was to show results along the lines of other captioning experiments, then we would get an indication on whether or not the test was actually working. Additionally, having captioning added to the study, would presumably get a more nuanced picture of the results.

However, a nuanced picture is perhaps not ideal when dealing with a limited set of participants. So as presented above the inclusion of captioning, might not have been too beneficial to the study as it increased the influence the outliers would have on the result



material. The one thing it confirmed was that the test results did not appear to fit the theoretical assumptions made ahead of the study.

## **5.2 Limitations**

As the results from this study are inconclusive, it is evident that there needs to be a discussion surrounding the possible limitations of the study, and how it was conducted. This troubleshooting segment seeks to identify the errors in the experiment that could have caused the study to become less reliable.

### **5.2.1 Participants**

First of all, the participant group was quite representative in accordance to the statistics concerning the gaming habits of young children, as they on average played almost every day. However, there are other parts of the sample group that needs to be discussed in order to highlight some of the discrepancies that could have had consequences for the study.

One of the biggest issues of the study was the small size of the sample group. When conducting studies with such sample groups, the risk of encountering outliers is quite high. Outliers are signified as scores that are on either end of the spectrum, and will affect the results drastically. On one hand, there might have been participants that scored way above the average, and likewise there could have been those scoring far below the average. This makes it difficult to get any conclusive evidence to support any of the claims regarding video gaming (Ringdal, 2013). Initially the sample group was split into 2 groups consisting of 20 participants in each, those playing and those watching.

When captioning was added as an additional theoretical claim, the sample groups were reduced even more, into 10 participants in each group. So the study's effort of looking at multiple effects in sync resulted in the groups becoming too small for any significant data to appear.

Their mean age could have been more homogenous, as they could have all been either born in 2000 or 2001; instead there was a 50/50 split. If having to choose only one of the age groups, those born in 2001 would have been the desirable sample age. Moreover, there was a slight geographical separation between the three participating schools, as one of the schools was situated in a neighbouring county. The difference was however not considered to be of particular significance, although only schools from one specific city would have been more preferable. It should also be noted that there also was a difference in the split of genders as 21

of the 40 were girls. This is however such a minor difference that which in turn does not seem to have weakened the sample group.

During the introduction to the participants, we attempted to prevaricate some of the study's objectives. The participants were informed that the study was examining the effects video games might have on learning, but they were never informed during the study that language acquisition was the focal point. Just as the participants in Koskinen and Neuman's study (1992), these participants were not specifically told they were being tested for vocabulary skills, they were however told to pay attention to the video game. It is necessary to take into consideration the fact that the participants might have become affected in some shape or form during the testing.

One of these, and perhaps very likely, is the event of priming the participants of their own vocabulary awareness during the initial assessment task. As the participants tried to translate the words in the assessment, they would become aware of words they knew and those they did not know. When they subsequently were subjected to the gameplay containing the words they were tested for, it is fairly easy to assume the possibility of them recognising some of the words from the vocabulary assessment. Even still, there could also have been a case of the participants remembering their translations from the pre-test while filling out the post-test. Due to the tests being conducted within a short time frame, a consequence of this could be that the participants answered the same as the pre-test regardless of how the words were presented in the gameplay. The fact many participants still answered "dytte" as opposed to "dra" in the post-test can be attributed to their short term memory actually remembering the pre-test answer. A possible solution for this predicament could have been having the participants take the pre-test a day in advance of the gameplay. This would presumably have eliminated most of the possible priming effects.

This highlighting of vocabulary awareness could in turn make the participants recognise the selected words in the gameplay faster, as they remembered them from the assessment task. Just as Schmidt (1995) noted in his noticing hypothesis. The simple act of noticing the test words could lead to a higher level of attention towards the presented assessment words. This would work as an argument to explain that a certain degree of attention towards the unknown test words was an advantage.

An additional issue that could have caused more awareness regarding language, was the information sheet supplied to the participants ahead of the study, as it stated some parts of the study was focused on learning. If the participants were able to infer the intention of the

study, they might in turn have been more attentive of the presented input, than they would have been in a more natural setting.

In retrospect, this study might have been even more interesting if the participants were of a more homogenous group, more specifically to further research on only gamers, these so-called digital natives. Taking into consideration, if the test group were more adept in terms of computer games could have been pivotal point to further research. In relation to the involvement load, participants with a background of gaming, would maybe be more liable to have higher need factor, due to wanting to continue gaming.

### **5.2.2 Vocabulary assessment**

In terms of how to assess the vocabulary knowledge of the participants, there were numerous methods to find out if a word was learnt. The vocabulary translation task created by us might in hindsight be viewed as naïve choice of method. Still, a reason for opting for a translation task assessment was due to it being considered a robust test, which in turn would require substantial amount of lexical knowledge regarding each word. However, on that note it could be claimed that the translation task was in turn asking for too much. Another possible way of assessing the participants' vocabulary knowledge could have been using a different assessment test. The type used by Horst and Meara (1999) during their studies looking at Lucky Luke readings and vocabulary learning could have been a suitable option. They used a vocabulary rating system, where their participant would rate their own knowledge of the presented words on a scale from 0 to 3, 0 being no knowledge of a specific word and 3 being complete knowledge. The test is beneficial as it does not require the participant to show a complete knowledge about the semantics of each test word, such as a translation task does. It only requires that the participant has a slight notion of the word in general. The downside for this type of assessment test however, is its dependency on trustworthiness. The increased chance of the participants being able to lie during the assessment is probably its most notable weakness. The set of young participants in this study might have felt more obliged to actually rate the words higher during a post-test in order to be perceived as good participants, rather than actually being honest.

Even still, perhaps the best way of assessing the vocabulary of the participants, would have been to use a test along the lines of the Wesche and Paribakht's Vocabulary Knowledge Scale (VKS) (1996). This test is commonly used in linguistic research, and is considered to be one of the best suited tests for checking the vocabulary of language learners. The scale is

divided into five levels of vocabulary knowledge. The first level would indicate that the participant has no knowledge of the word. The second level requires only the participant to recognize the word, but does not need to know its meaning. The third level on the vocabulary knowledge scale is the one which is used in this study, as it asks for the meaning of the word, and nothing else. The fourth level would require the participant to use the word in a sentence, which requires further knowledge on the word, and finally the fifth level would require the sentence to be appropriate and grammatically correct. In relation to Levelt's model of lexical items, the fourth and fifth translation levels in the VKS would also show if the participants had a grammatical understanding of the words, and not just testing them on orthographical and semantic knowledge.

If we had opted to use the VKS instead of the simple translation task in this study, the results might have been dramatically different. First of all, some of the blank and wrong translations in the results would have been graded at the second level on the VKS. Given the fact that so many of the translations, were considered to be a perfect translations, it would have been interesting to see how much more knowledge they had regarding those words. We might have discovered that the knowledge of these perfect translations actually had been quite limited, or that some of the participants had extensive knowledge on some of the words.

One error with far-reaching consequences was set into motion when we decided the set of assessment words. Deciding to opt for words considered to be within the reach of 12 year olds L2-vocabulary proved to be a mistake, as predicting what words are known and not known to a 12 year old was difficult to assess. Words such as Forget, Change and Hunt became irrelevant for the study as the majority of the participants had extensive knowledge of these verbs. Furthermore, this carried over into the analysis, as these verbs were then graded as there being no learning. The consequence was a lowering of the baseline for learning, as the percentage of possible accounts of learning in the study was reduced.

A suitable solution for said problem would have been to have tested the assessment words ahead of the actual experiment. By knowing which words already was familiar to the age group; the easy words could have been removed and replaced with words being a bit more difficult. A substitution of the easy words with more advanced ones may not have altered the results, but at least there would have been the opportunity to learn new words, instead repeating the pre-existing vocabulary knowledge.

### 5.2.3 Data Grading

The decision for opting for a grading scale with five different grades was a challenging one. The reason for choosing this was due to it feeling necessary to divide the translations into five, and to get a more nuanced view of the results. The disadvantage of such a nuanced grading system however, was the fact it became more difficult to see clear results in the following data analysis.

They could also been divided into only three categories. Wrong, Some and Perfect. However this would also entail some consequences as well. To a certain degree, one can argue that a blank translation, and a wrong translation, should not be placed in the same category. A single category termed “Wrong” would include both blank and wrong translations and both would then be seen as translation showing no word recollection. Wrong does however show an attempt, which can be seen as some form of recollection occurring. A blank translation shows no sign of lexical knowledge of one specific word. Maybe, because it does not appear in the subject’s lexicon, or because the lexical knowledge is so low it cannot be completely recollected. A wrong translation can in contrast be seen as a word containing wrongly stored lexical information, meaning that in this case the semantic meaning of the word has been processed incorrect on a previous event.

The same argument works when deciding whether or not to use distinction between translations graded as far or close. In this case as well, the lexemes’ correctness of its semantics was what decided what type of grading the translation would in turn get. “Far” translations were notably less complete, than “close” translations. There was however an argument for having a unified category for these two translation categories, as none of the participants had either a Far or Close translation going to the other of these translations.

As the study was conducted over three different places, I was responsible for coding 32 of 42 into the Excel sheet while my fellow student coded the remaining. A potential danger of this might have been differences when plotting into Excel. However, I believe that we had come to a very similar understanding of the grading system through a series of discussions.

### 5.2.4 Test Surroundings

As mentioned in the method chapter, the issue of the testing not being authentic could have many consequences. Although it might not appear as a significant issue, I believe it is important to discuss the questionable authenticity in the environment the tests were conducted, to understand if they could have played a part in the results as well.

First, referring to Krashen's (1985) thoughts concerning being susceptible for language learning and his proposal of the affective filter. Even though the goal was to create an authentic gaming environment, the pupils were aware they were being tested in an artificial gaming scenario. This awareness could in turn have affected the results from the testing, just like Krashen stated that stress has been argued to hinder language learning. The location, was perhaps perceived as awkward by some, the unknown researcher, and the notion of actually being measured in vocabulary, and furthermore not knowing in what context the data would be used, could all have caused some of the participants to feel a bit uncomfortable, and as consequence become unsure of the testing, in turn affecting the result material.

### **5.2.5 One time exposure-premise**

One initial premise of the study was to have the participants only be exposed to the words once, looking at one time exposure. This did happen by exposing them to the auditory input only once, and as earlier mentioned, there was 80 cases of words learnt, from only hearing the word once in the gameplay. However, the participants were also subjected to the orthographical representation of the assessment words two times during the vocabulary assessment tasks. And furthermore, those with captioning, was subjected to the orthographical representation three times. Therefore, the one-time exposure aspect of the study did not occur. As mentioned when discussing the participants the exposure of the vocabulary test might have caused a repetitive priming of words, causing them to be more quickly identified in the game, as the participants may have recognised the assessment words in the playthrough. If multiple repetitions of words are considered beneficial for word retention as then it probably would have been more suitable to check for words being uttered multiple times throughout the gaming session.

## 6. Conclusion

Regardless of the lack of results in this experiment, the impact this genre of entertainment is going to have in the coming years is indisputable. It is rapidly becoming the main supplementary input of English for many L2-learners, and I believe the role of video games as a main source of input will only increase. Taking into the account the amount of time children spend playing video games, and how the entertainment business is evolving. Further research on the subject is needed in order to determine this genre's effects on language learning.

Using the term Incidental Language Learning, was considered the most appropriate term of calling what was studied, as attempting to find out if participants whether or not were learning through implicit or explicit was hard to measure only through a translation task. What can be said about the study is that ILL seemed to have been observed considering how there was a significant increase from Pre to Post vocabulary assessment, regardless of input conditions.

The study yielded very few results that were of any notice, besides that being subjected to L2-input caused a minor increase in vocabulary regardless of playing/viewing condition. The anecdotal evidence that video games lend themselves better for vocabulary retention still appears to be just that, anecdotal. However, I am still indecisive regarding the statement. Having improved the design of the study, or using a different approach may still have produced other results. Video games could still be better when it comes to learning verbs as opposed to other mediums. This due to the previously mentioned interactive nature, as video games with L2-input constantly demands the player or viewer to be attentive of the gameplay in order to continue. The only clear fact from this study is that the notion was neither dismissed nor confirmed.





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## Appendix 1

### Bakgrunnsinformasjon for forskningsprosjekt om språklæring

Navn: \_\_\_\_\_

Har du lyst til å være en deltaker i denne forskningen?

Ja  Nei

Tusen takk for at du har sagt ja til å delta i vårt forskningsprosjekt. Vi trenger å vite litt om deg, så svar på spørsmålene nedenfor.

Alle svarene du gir her vil bli behandlet slik at ingen vet at det er deg. Det er kun vi som jobber direkte med prosjektet som ser opplysningene. Det vil ikke være mulig å kjenne igjen noen når vi publiserer prosjektet.

Legg merke til at skjemaet har 2 sider.

Skjemaet leveres direkte til oss.

Med takknemlig hilsen,

Jørgen Haug Theodorsen og Tor Emil Fløan

Masterstudenter ved institutt for moderne fremmedspråk, NTNU

#### Del A: Personlig informasjon

Klassetrinn: \_\_\_\_\_

Fødselsdato: \_\_\_\_\_

Kjønn:  Jente  Gutt

#### Del B: Språklig bakgrunn

##### Morsmål

Hvilket språk snakker du med din mor? \_\_\_\_\_

Hvilket språk snakker du med din far? \_\_\_\_\_

**Hvor ofte spiller du spill på PC / Ipad / mobil / nettbrett / konsoll? Sett en ring rundt svaret som passer best.**

hver dag    flere ganger per uke    et par ganger i uken    av og til    aldri

**Hva spiller du mest på? Sett ett kryss for hver type**

	Spiller aldri på	Spiller noen ganger i måneden	Spiller noen ganger i uken	Spiller hver dag
PC / MAC				
Ipad / Nettbrett				
Mobiltelefon				
Konsoll (PS3, XBoX, Wii, og lignende)				
Andre håndholdte (Vita, Nintendo DS, og lignende)				

**Hvor ofte spiller du spill på engelsk? Sett en ring rundt svaret som passer best.**

Aldri            noen ganger i måneden            noen ganger i uken            hver dag

**Engelsk og andre fremmedspråk**

Har du bodd i, eller vært lenge i, et land hvor engelsk er hovedspråk? (lengde = mer enn to måneder)

Ja  Nei

Hvis ja, ca hvor lenge var du der? \_\_\_\_\_

Har du bodd i, eller hatt lengre opphold i, et land hvor annet enn engelsk er hovedspråk?

Ja  Nei

Hvis ja, ca hvor lenge var du der?  
\_\_\_\_\_

**Del C: Annet**

Er du venstrehendt?

Ja  Nei

## Appendix 2

### Oversettelsesoppgave 1

I denne oppgaven ønsker vi at du skal oversette ord fra engelsk til norsk. Oppgaven inneholder både verb (å gjøre) og substantiv (et tre). Prøv så godt du kan å oversette alle. Oppgaven er på tre sider.

Når du er ferdig leverer du arkene til meg. Lykke til!

**ENGELSK****NORSK OVERSETTELSE**

to ask: \_\_\_\_\_

bird: \_\_\_\_\_

mountain: \_\_\_\_\_

to forget: \_\_\_\_\_

edge: \_\_\_\_\_

to pull: \_\_\_\_\_

education: \_\_\_\_\_

to remember: \_\_\_\_\_

motion: \_\_\_\_\_

evil: \_\_\_\_\_

to search: \_\_\_\_\_

quarry: \_\_\_\_\_

to drop: \_\_\_\_\_

rumour: \_\_\_\_\_

to forgive: \_\_\_\_\_

ground: \_\_\_\_\_

to hunt: \_\_\_\_\_

to arrive: \_\_\_\_\_

power: \_\_\_\_\_

to expect: \_\_\_\_\_

to write: \_\_\_\_\_

truth: \_\_\_\_\_

to protect: \_\_\_\_\_

entrance: \_\_\_\_\_

to change: \_\_\_\_\_

moment: \_\_\_\_\_

to worship: \_\_\_\_\_

signpost: \_\_\_\_\_

to suffer: \_\_\_\_\_

car: \_\_\_\_\_

to explain: \_\_\_\_\_

aeon: \_\_\_\_\_

to leave: \_\_\_\_\_

tribe: \_\_\_\_\_

to pray: \_\_\_\_\_



mercy: \_\_\_\_\_

to retrieve: \_\_\_\_\_

justice: \_\_\_\_\_

to teach: \_\_\_\_\_

cloud: \_\_\_\_\_

direction: \_\_\_\_\_

to provide: \_\_\_\_\_