

Effect of difficulty of a language on intrinsic motivation to learn a language: Swedish and Hungarian

Stefanie Balzer, 4558294

Supervisor: Rob Bulterman

Master's thesis

Faculty of social sciences, Psychology

Radboud University, Nijmegen

08.08.2022

Abstract

The study examines the effect of the difficulty of a language on intrinsic motivation. The researched languages are Swedish and Hungarian. In total, 30 people between the ages of 18 and 30 participated in the research. They were randomly assigned to one of the two groups. The groups differed in the order the languages were presented. The first hypothesis was that it is expected that information gaps in the easy language Swedish might increase the intrinsic motivation of the participants to learn Swedish. The second hypothesis was that it is expected that information gaps in the difficult language Hungarian decreases intrinsic motivation of the participants to learn Hungarian. A study with a learning and testing phase was created to test this. To examine the hypotheses, two regression analyses were used. Three paired samples t-tests and one Wilcoxon Signed Rank test were conducted to get additional information about the intrinsic motivation, difficulty and competence. Concluding, both hypotheses of the study are not confirmed. However, the competence for Swedish and the intrinsic motivation to learn Swedish is increased. Explanations for the results are discussed in the light of the self-determination theory. The results can be widely used. For example, for refugees that want to settle in a new country or in the context of language learning in schools.

Keywords: language learning, information gap theory, intrinsic motivation, self-determination theory

Curiosity is one of many feelings humans have (Kang et al., 2009). It is a complex feeling accompanied by the wish to know what is unknown. Therefore, it plays a fundamental role in learning and discovery. For example, Einstein broadened humans understanding of the world because of his curiosity. Furthermore, curiosity also plays a role in memory. People are getting curious when surprising new information are presented. This curiosity increases the activity in memory areas. Consequently, surprising information can be recalled better. This effect was found in the study by Kang et al. (2009). In this research, the participants got a question they should answer for themselves. A used question in the study was: what instrument was invented to sound like a human singing? Thereafter, they got the right answer. In this case: violin. Participants who guessed incorrectly perceived the information as surprising which made them more curious. Furthermore, they could recall the answer to the question better. So, curiosity is crucial in a lot of important areas.

Loewenstein (1994) proposed that curiosity from an incongruity or a so-called information gap arises. This gap describes the discrepancy between what one wants to know and what one knows. For example, someone already knows about the translation of several Swedish verbs. Now, the person wants to learn the verb 'att veta', which means 'to know' in English. The deviation of the knowledge of other verbs and the unknowledge of the new verb is an information gap. Thus, an information gap is a gap in the knowledge base of a person (Singh & Manjaly, 2021). Information gaps can be small or big (Loewenstein, 1994). According to Pluck and Johnson (2011), people tend to try to fill the information gaps out of curiosity when they are small. Thus, when they already know the basics of a topic but miss specific information. So, knowing about several verbs already is knowing about the basics and not knowing a certain verb is missing this specific information. Thus, in this case, a person will try to fill this gap in information because it is small. The closer people get to close gaps in their information, the more curious they become (Loewenstein, 1994). However, if people don't notice that they have information gaps, curiosity is not triggered (Pluck & Johnson, 2011). Thus, when someone does not know he is unknowledged about the verb 'att veta', he will not get curios to find out about the translation. Whenever people gain knowledge, their aspired level of knowledge increases drastically. Thus, learning initiates the growth of information gaps (Kang et al., 2009). According to Gruber and Ranganath (2019), information gaps trigger appraisal processes that are supported by a brain area called the lateral prefrontal cortex. These processes help to determine further behaviour. Thus, if curiosity is sparked or if inhibition behaviour, anxiety, is shown. When a person feels capable to deal with the information gap, curiosity is enhanced. Anxiety is triggered when people don't feel competent to deal with the information gap. So, if a student appraises a certain information gap as impossible to solve, he will express inhibition behaviour. The same holds true if a student appraises an information gap as possible to solve. This leads to curiosity and information seeking. So, information gaps play a crucial role in learning

Murayama created a framework in 2019 which integrates information gaps in the explanation of the underlying mechanisms of learning. This framework proposes that people perform information-seeking behaviour when information gaps are recognized because a positive rewarding value is expected. Thus, learning serves as a reward and the main modulator for information-seeking behaviour is the expected feeling of reward (Murayama, FitzGibbon, & Sakaki, 2019). The new knowledge people get as a result of information-seeking behaviour is integrated into the already existing knowledge. Essentially, learning

actually creates the feeling of reward and curiosity. These feelings reinforce the behaviour to seek new information. This is because the expected reward value of gaining new knowledge is increased in the process. In addition, knowledge gaps are noticed more easily when the knowledge is broadened. This seems to motivate to perform further information-seeking behaviour. Thus, forming a positive feedback loop (Murayama et al., 2019). Assuming that someone already knows a lot about the translation of Swedish verbs. Because of his knowledge, he might notice that he does not know all of the verbs. For example, the verb 'att tänka', to think, may be new for him. He might learn this verb as he expects the feeling of reward after learning. In the process of learning, he could notice that he also does not know the translation of the verb 'att arbeta', to work. Due to an increased expected feeling of reward of learning something, he might also learn that verb. That could lead him again to verbs he does not know, carrying on the feedback loop. Thus, learning something new is sparking curiosity which is (intrinsically) motivating which leads people to learn more.

Curiosity is part of intrinsic motivation (Oudeyer, Gottlieb, & Lopes, 2016). Deci and Ryan (1985) propose that intrinsic motivation does not need consequences because the behaviour in itself is rewarding. Intrinsic motivation arises from within. Also, it is related to a sense of well-being and a person's identity. For example, when learning itself is a goal, students are intrinsically motivated. Tasks that are done with intrinsic motivation, are considered as interesting and challenging. People are rewarded with the feeling of enjoying the activity or with the feeling of competence, also known as self-efficacy. Self-efficacy describes a person's belief in their skill to perform certain actions (Bandura, 1997). When people have the feeling of self-efficacy, intrinsic motivation increases (White, 1959). So, intrinsic motivation is an intrinsic reward without the need for external appeals.

Intrinsic motivation is important in the light of learning a language. When people learn a language because of enjoyment, they are intrinsically motivated (Noels, Pelletier, Clément, & Vallerand, 2008). Highly motivated and successful language learners possess certain features. Among other factors, intrinsic motivation is one of them (Ehrman, Leaver, & Oxford, 2003). Next, this type of motivation can predict positive attitudes towards language learning and has an influence on the achievement in the language (Tachibana, Matsukawa, & Zhong, 1996). So, students who are intrinsically motivated might have positive attitudes towards learning a language and can be more eager to achieve higher scores in evaluations. Further, speaking and reading skills in a new language are acquired via intrinsic motivation (Lucas, 2010). Additionally, intrinsic motivation has a relation with reading comprehension. Namely, the higher the intrinsic motivation, the better the reading comprehension (Gottfried,

1990). That is because intrinsic motivation increases the motivation to read and the amount of things read in the foreign language (Takase, 2007). Also, gained knowledge is sustained longer when it is acquired with intrinsic motivation (Gopalan, Bakar, Zulkifli, Alwi, & Mat, 2017). So, if a student learns Swedish words because he is enjoying learning a language, he might remember them better compared to when he just learns them to pass a test. Also, people who are intrinsically motivated to learn English are more likely to continue their training compared to externally motivated people. That is because they enjoy doing activities that are related to language learning (Wu, 2003). Thus, intrinsic motivation facilitates language learning.

Next to English, other languages are learned too, for example, Japanese. According to de Burgh-Hirabe (2019), people who want to learn this difficult language are doing it for the means of feeling pleasure by developing knowledge and satisfying one's curiosity. So, they are intrinsically motivated. Additionally, learning a difficult language can be perceived as a task and thus intrinsically motivate people. However, other studies showed not so positive effects of a difficult challenge with regards to intrinsic motivation as the one by de Burgh-Hirabe (2019) did. For example, Lomas et al. (2017) found that difficulty decreases intrinsic motivation whereas moderate or easy difficult levels are most motivating. Furthermore, difficult tasks decrease competence (self-efficacy) (Bandura, 1982). This decrease in competence leads to a decrease in intrinsic motivation (White, 1959). So, difficult tasks decrease intrinsic motivation by lowering competence. Furthermore, information-seeking behaviour, and consequently intrinsic motivation, may decrease if a person fails to acquire knowledge (Durik, Shechter, Noh, Rozek, & Harackiewicz, 2015; Tanaka & Murayama, 2014). That is because people's information seeking behaviour is dependent on their perceived skill to gain the information (Murayama, et al., 2019). Thus, if a student needs to learn 10 new Swedish words in a week, he might experience it as doable and perceive his skills as sufficient. Consequently, he will initiate information-seeking behaviour and acquire the knowledge of the words, leading to more intrinsic motivation. However, if a student needs to read a statistics book in Swedish in two days, he will probably rate his abilities as not sufficient and not initiate information-seeking behaviour, not acquiring knowledge and decreasing his intrinsic motivation. When challenges are perceived as too high and the own skills are perceived as low, anxiety arises (Csikszentmihalyi, 1988). Anxiety decreases intrinsic motivation (Gottfried, 1982). So, when a student perceives reading a chapter of a Swedish book as difficult while perceiving his skills as low, anxiety is increases which in turn leads to a decrease in intrinsic motivation. However, when people can balance out their

abilities against challenges, they might get into a flow, intrinsic enjoyment (Csikszentmihalyi, 1990). Thus, the level of difficulty is an important factor in learning and intrinsic motivation. While doable tasks increase intrinsic motivation and learning, difficult tasks decrease both most of the time.

Until now, there is not much research done about the comparison of level of difficulty of languages and its effect on intrinsic motivation. Though, people have to face language learning early in life. For example, schools in North Rhine-Westphalia require students to learn English from the fifth grade on (Geltende Gesetze und Verordnungen (SGV. NRW.), 2022). So, language learning is a continuous task in school. A lot of research was done on English as a foreign language in the context of motivation and language learning. Other languages are considered less. Including English in the studies makes sense as it is a global language (de Burgh-Hirabe, 2019). Though, researching other languages may be interesting. That is, because English is not the only language people are exposed to learning, thus seeing results from other languages will expand the knowledge on this topic. Therefore, two other languages are studied in this research to add value to this topic. These languages are Swedish and Hungarian. Swedish is considered an easy language for Dutch and English-speaking people as all three languages are Germanic languages (Germanische Sprachen, n.d.). Thus, some words may look familiar and the translations are not completely new information for the participants. On the other hand, Hungarian is not a Germanic language but a Finno-ugric language (Finno-ugrische Sprachen, n.d). Therefore, neither the meaning nor the appearance of the words is common in the Netherlands. Thus, making it a harder language compared to Swedish. Until now, few research is done about information gaps. Furthermore, research on information gaps lacks in the context of language learning. Thus, this study aims to broaden the knowledge of these specific topics. Broadening the theoretical basis of language learning can help to develop better ways of teaching and learning. Ultimately, this may be helpful in many different contexts. For example, for students in classrooms or for refugees who need to learn the national language of their new home country (Abou-Khalil, Helou, Flangan, Pinkwart, & Ogata, 2019). Thus, it is important to research this topic because of the wide application of language learning.

This study aims to answer the question what the effect is of the level of difficulty of a language on intrinsic motivation. Participants are assigned to one of two groups. There, they have to do a learning and testing phase with both Swedish and Hungarian words. In the learning phase, the participants have to learn words of both languages. In the testing phase, they have to remember the words and write them down. The amount of intrinsic motivation is

measured during the learning phase and before and after the study. The amount of information gaps is measured during the learning phase. The difficulty of a language is measured one time at the post-measurement.

The first hypothesis is that it is expected that having information gaps in the easy language, Swedish, increases the intrinsic motivation of the participants to learn Swedish. It is expected that the participants can deduce a lot of the Swedish words because of their similarity to English words. This may result in smaller information gaps, probably leading the participants to try to fill the gap (Pluck & Johnson, 2011). So, the participants might gain new information about Swedish what might reward them, possibly making them curious to learn more (Murayama, 2019). The second hypothesis is that it is expected that having information gaps in the difficult language, Hungarian, will lead to a decrease in the intrinsic motivation to learn Hungarian. It is expected that the participants may not be able to deduce a lot of Hungarian words, resulting in big information gaps, not facilitating the increase of intrinsic motivation (Pluck & Johnson, 2011). Furthermore, it is expected that the difficult task will lower the intrinsic motivation of the participants (Lomas et al., 2017). An additional analysis was done to test the effect of competence on intrinsic motivation. Competence seems to be related to the difficulty of a task and intrinsic motivation. Namely, the difficulty of a task might decrease competence (self-efficacy) and a higher level of competence (self-efficacy) might increase intrinsic motivation (Bandura, 1982; White, 1959). Therefore, it is expected that learning Swedish increases competence and intrinsic motivation to learn Swedish.

Method

Participants

An a priori power analysis was conducted to calculate the required sample size. The desired power was .8 and the desired $R^2 = .13$. For these parameters, the advised sample size was 55- 68 participants. However, only 41 participants signed up for this study. Thus, making the study underpowered. Some of the participants registered themselves for the study via Sona. They were granted one point for participation. Other participants took part via a QR code that was distributed across several locations in North-Rhine Westphalia, Germany. The research was distributed in those two ways but only 41 participants responded. Therefore, the maximum number was reached that way. However, 11 participants were excluded. That was done because they did indicate that they do not want to participate, did not answer to the

informed consent or did not fill out any questions at all. So, 30 participants remained. These were 9 men and 21 women. They were between the ages of 18 and 30 ($M = 21,53$). Most of the participants were students, namely 26. The mother's tongues named most frequently were German, 10 times, and Dutch, 12 times. Of the participants, 8 grew up bilingual. Every participant could indicate that they want to take part in a lottery to get the chance to win a voucher worth 10 Euros.

Materials and Procedure

The researcher chose the Swedish and Hungarian words randomly by brainstorming. By taking her experience of already having learned several languages, she thought of words that novices of a language are commonly taught, like girl. Furthermore, she made sure to also include words that are taught on a more advanced level, like heart. This was done to ensure to not just include beginner-friendly words but to have a balanced-out level of difficulty in both languages. Some examples of Swedish words that were chosen are: flicka and pojke, girl and boy in English. In Hungarian, these words are called: lány and fiú. The foreign words were translated into English via DeepL. The participants of this study were either recruited online via Sona or via a QR code. The program Qualtrics was used to display and register the data. Firstly, an informed consent had to be accepted to be able to start the study. Then, the participants had to indicate their demographic data. The following things were asked: age, gender, if they study, their mother's tongue, if they grew up bilingual and how many languages they can speak. After that, they had to answer two questions about intrinsic motivation. These were the following questions: "Do you think you will enjoy learning Swedish?" and "Do you think you will enjoy learning Hungarian?". Both questions were asked before and after the experiment to get a baseline and see if intrinsic motivation changed over time. The reliability of this intrinsic motivation questionnaire for Swedish is poor ($\alpha = .58$). The reliability of the intrinsic motivation questionnaire of Hungarian is poor too ($\alpha = .57$). Then, competence was measured. The participants were asked the following questions at the beginning and the end of the study: "Do you think you will be able to achieve level B2 in Swedish?" and "Do you think you will be able to achieve level B2 in Hungarian?". This was done to be able to detect a difference in the level of competence after the study. The reliability of this questionnaire to measure competence in Swedish is questionable ($\alpha = .68$). The reliability of the questionnaire to measure competence in Hungarian is also questionable ($\alpha = .66$). After these questions, the learning phase started and Qualtrics assigned the participants randomly into group one or group two. There was a difference between group one and group two in the way in which order the languages were presented. Group one started with Swedish.

Consequently, group two with Hungarian, making it a counterbalanced design to avoid any order effects because of the languages. In total, the learning phase consisted of 100 blocks, each with three questions, per foreign language. So, it consisted of 50 Swedish and 50 Hungarian words. In the beginning, the participants were asked to guess the English translation of either a Swedish or a Hungarian. It was an open-ended question to not guide or limit people to a certain answer. Additionally, this question was aimed to make people aware of a possible information gap. Then, they got the English translation and were asked if they knew the translation. Possible answers were yes and no. This question measured the occurrence of information gaps. A ‘no’ indicated an information gap and vice versa. However, the variable information gap was transformed into a continuous variable by adding up all the information gaps for every participant. At the end of the block, the participants were asked if they want to learn more words of the language they were just exposed to. The answer had to be indicated on a 10-point Likert scale again. This question measured intrinsic motivation. So, intrinsic motivation was measured in two different ways. Namely, during the block and with the pre-and post-measurement which was been mentioned earlier. The first way of measurement was done to be able to detect every possible change in motivation during the experiment. Additionally, this measurement was used as a variable to test the main hypotheses, thus a high reliability is important. By asking often about the same topic, reliability is enhanced. The second way of measurement was done to see if there was a difference in the participant’s motivation after the experiment compared to before the experiment. For an example of a block, see Figure 1. After the learning phase was done, the testing phase started the participants saw the previously learned Swedish and Hungarian words again and had to write down their English translations. This was done to let the participants test themselves on how much they have learned. Though, their performance was not measured. Thereafter, they had to answer the same questions about intrinsic motivation and competence from the pre-measurement again to see if they changed over time. Additionally, the participants had to answer two questions regarding the difficulty of the languages. The difficulty of a language is measured in the following way. At the end of the study, the participants had to answer the questions: ‘How hard was it to learn Swedish’ and ‘How hard was it to learn Hungarian?’ via a 10-point Likert scale. The reliability of the difficulty measurements is unknown because reliability cannot be computed with a single item. After the participants completed the study, they were thanked and could close the website. The time span of the study was around 50 minutes. The participants completed the study on laptops as it was completely online. During the whole research, no researcher was

physically around. The main language of the material was English. Swedish and Hungarian are also used but at a lower frequency.

What do you think does the Swedish word "flicka" mean in English?

Did you know that the Swedish word "flicka" means "girl" in English?

- No
 Yes

Do you want to learn more Swedish words?

0 1 2 3 4 5 6 7 8 9 10

0= not at all; 10= totally

Picture 1. A block of the three questions

Data Analysis

To investigate the research questions, two regression analyses were done. The regression analysis that examined the prediction of the intrinsic motivation to learn Swedish from information gaps and difficulty rating had the following design. Intrinsic motivation to learn Swedish (quantitative) as the criterium. Information gaps in Swedish (quantitative) and difficulty of Swedish (quantitative) as predictors. The regression analysis that examined the prediction of intrinsic motivation to learn Hungarian from information gaps and difficulty rating had the following design. Intrinsic motivation to learn Hungarian (quantitative) as criterium and difficulty (quantitative) and information gaps (quantitative) as predictors. Also, three paired sample t-tests and one Wilcoxon Signed Ranks test were performed. They were used to compare the mean scores of difficulty between Swedish and Hungarian, to compare the means of intrinsic motivation to learn Swedish and Hungarian before and after the experiment and one to compare the mean scores of competence of Swedish and Hungarian after the experiment.

Results

The following analyses are confirmatory. Two multiple regression analyses examined the hypotheses. The multiple regression analysis requires the following assumptions to be met: linearity of criterion and predictors, no multicollinearity, independent value of residuals, homoscedasticity, normally distributed residuals and no outliers. Independence values of residuals were checked with the Durban-Watson statistic, outliers were checked with the Cook's distance. Both analyses met all assumptions. The following analysis was meant to test the first hypothesis, that it is expected that information gaps in Swedish might increase the intrinsic motivation to learn Swedish. The results showed that the variance clarification ($R^2 = .08$) was not significant ($F(2,27) = 1.152, p = .33$). The coefficients showed that with an increase in information gaps with consistent difficulty results in decreased intrinsic motivation to learn Swedish ($b = -.05$). An increase in difficulty with consistent information gaps leads to a decrease in intrinsic motivation to learn Swedish ($b = -.26$). So, difficulty and information gaps did not predict the intrinsic motivation in learning Swedish. The following analysis was used to test the second analysis, that it is expected that information gaps in Hungarian might increase intrinsic motivation to learn Hungarian. The variance clarification ($R^2 = .07$) showed non-significant results ($F(2,27) = .936, p = .40$). The coefficients showed that with an increase in information gaps with consistent difficulty, the intrinsic motivation to learn Hungarian decreases ($b = -.24$). An increase in difficulty with consistent information gaps led to increased intrinsic motivation to learn Hungarian ($b = .16$). This shows that difficulty and information gaps did not predict the intrinsic motivation to learn Hungarian.

The assumption for normality was checked for the paired samples t-test that compared difficulty. A Shapiro-Wilk test was performed to investigate normality. The difference scores of difficulty were significant normally distributed, $W(32) = .97, p = .437$. So, the assumption was met. Participants experienced Hungarian as significantly more difficult ($M = 7.38, SE = 2.47$) than Swedish ($M = 5.66, SE = 2.06$), $t(31) = -3.60, p = .001$. The assumption of normality was checked and not met for the paired sample t-test that compared intrinsic motivation from the pre-measurement. The differences scores of intrinsic motivation were significantly not normally distributed, $W(3) = .81, p = .000$. Therefore, a Wilcoxon Signed Rank test was performed. The intrinsic motivation for learning Swedish was significant higher ($M = 6.33$) than to learn Hungarian before the experiment ($M = 5.23$), $z = -3.16, p = .002$. The assumption of normality was checked and met for the paired sample t-test that compared intrinsic motivation from the post-measurement. The differences scores of intrinsic motivation were significant normally distributed, $W(28) = .97, p = .40$. Participants had significant more

intrinsic motivation to learn Swedish ($M = 6.04$, $SE = 2.36$) than to learn Hungarian after the experiment ($M = 3.96$, $SE = 2.52$), $t(27) = 3.84$, $p = .001$. The assumption of normality was checked and met for the paired sample t-test that compared competence. The difference scores of competence were significant normally distributed, $W(28) = .95$, $p = .158$. Participants had significantly more competence to achieve level B2 in Swedish ($M = 5$, $SD = 2.67$) than to achieve level B2 in Hungarian ($M = 2.90$, $SD = 2.3$), $t(27) = 4.82$, $p = .000$.

Discussion

This study can now answer the question of the effect of difficulty on intrinsic motivation to learn Swedish and Hungarian. As can be seen by the results, there was no effect of the difficulty of a language and information gaps neither on the intrinsic motivation to learn Swedish nor Hungarian. So, the first hypothesis of the study that having information gaps in learning the easy language, Swedish, might increase intrinsic motivation, was not confirmed. Also, the second hypothesis, that having information gaps in Hungarian might decrease intrinsic motivation, was also not confirmed. However, the intrinsic motivation to learn Swedish was increased compared to the intrinsic motivation to learn Hungarian after the study. As it was expected, learning Swedish increased the competence to achieve level B2 in that language compared to the competence to achieve level B2 in Hungarian. Additionally, the participants experienced Swedish as easier compared to Hungarian.

Contrary to the results by Lomas et al. (2017) and Murayama (2019), a low level of difficulty and the occurrence of information gaps did not have an effect on intrinsic motivation in the current study. Though, that could be explained as Lomas et al. (2017) researched difficulty and intrinsic motivation in computer games and Murayama (2019) did not relate his framework specifically to languages. So, it could be argued that different levels of difficulty might have different effects on intrinsic motivation in different contexts. Additionally, information gaps may have different effects on intrinsic motivation in different contexts. Furthermore, it was expected that the participants could deduce several Swedish words because of their similarity to English and Dutch which might increase their intrinsic motivation (Loewenstein, 1994; Pluck and Johnson, 2011). So, their information gaps in Swedish were expected to be small as they were expected to know some basics. However, the findings of Loewenstein (1994) and Pluck and Johnson (2011) did not fit to the results of this study as information gaps in Swedish did not increase intrinsic motivation. It is thinkable that the participants could not deduce as many Swedish words as expected which could have led to bigger information gaps than expected, not leading to increased intrinsic motivation. Contrary

to the findings of Lomas et al. (2017) and Pluck and Johnson (2011), learning a difficult language with the occurrence of information gaps did not lead to decreased intrinsic motivation. The result by Lomas et al. (2017) can be explained again by the fact that the studied difficulty and information gaps in the context of games instead of languages. Furthermore, the information gaps of the participants may have not been so big that they might have been able to have an effect on intrinsic motivation.

Though, the results by Durik et al. (2015) and Tanaka and Murayama (2014) fit this study. They found that intrinsic motivation can decrease when someone cannot acquire knowledge. Thus, the participants may not have been able to sufficiently gain knowledge about the foreign words which lead to a decrease in intrinsic motivation. This explanation may be especially applicable to Hungarian words since learning Hungarian led to a decrease in intrinsic motivation. Though, information gaps and difficulty were not the reason for that. It is thinkable that the participants noticed during the testing phase that they were not able to recall a lot of Hungarian words compared to Swedish words. That may have provided them with negative competence-related information regarding their performance, called negative feedback (Stone & Stone, 1984). Negative feedback is known to have a detrimental effect on intrinsic motivation (Fong, Patall, Vasquez, & Stautberg, 2018). That is because negative feedback can lead a person to feel less competent which hurts one of the three needs proposed by the self-determination theory (Fransen, Boen, Vansteenkiste, Mertens, & Broek, 2017; Ryan & Deci, 2000). So, another possible explanation for the decrease in intrinsic motivation in Hungarian may be that learning Hungarian led to more negative feedback than learning Swedish. The results by Gopalan et al., (2017) fit well into these two explanations. According to these researchers, gained knowledge, that is acquired with intrinsic motivation, is sustained longer. As the knowledge about the Hungarian words is probably not gained with much intrinsic motivation, it is maybe not long sustained. This may lead to not being able to recall many words in the testing phase, probably getting negative feedback, ultimately resulting in a possible decrease in intrinsic motivation. Additionally, when people had to recall the Hungarian words in the testing phase, people may have gotten the feeling of competence frustration. The feeling of inadequacy or failure is called competence frustration (Bartholomew, Ntoumanis, Ryan, & Thogersen-Ntoumani, 2011). Competence frustration decreases intrinsic motivation (Tsai, Kunter, Luedtke, Trautwein, & Ryan, 2008). This frustration may occur when people receive negative feedback or when challenges are too high (Ryan & Deci, 2017). So, because the participants may have received negative feedback and probably experienced learning Hungarian as too demanding, they might have experienced

competence frustration that may have led to a decrease in intrinsic motivation. Opposed to negative feedback, positive feedback is known to enhance competence (Henderlong & Lepper, 2002). So, the increased level of competence in Swedish might be explained as follows. The participants may have been able to remember more Swedish words. That might have led to much positive feedback and consequently to a higher feeling of competence. Additionally, the increased intrinsic motivation to learn Swedish might also be explained with the increased competence. When the feeling of self-efficacy, competence, is increased, intrinsic motivation increases (White, 1959). So, the increased competence might have led to the increased intrinsic motivation to learn Swedish.

The self-determination theory might help to explain the findings of this study. According to Deci and Ryan (1985), the theory proposes that the needs for autonomy, competence and relatedness have to be met to sustain intrinsic motivation. The need for autonomy is fulfilled when people execute behaviour voluntarily and self-endorsed. The participants were free to choose to take part in the experiment. Thus, it is expected that their need for autonomy has been met. The need for competence is met when people feel capable to reach a target. Thus, feeling competent to accomplish challenges. The participants of this study only felt competent to learn Swedish. Thus, the need for competence in Hungarian is not met. That may be one explanation for the decreased intrinsic motivation in Hungarian. The need for relatedness refers to the desire to relate to others through work. Though, there were probably no other people to relate to present during the study, possibly making it hard to fulfil that need. However, it cannot be sure in which way relatedness was met or not. Since all three needs have to be met to make people intrinsically motivated, whereas only one need was met for both languages, self-determination might be a good theory to explain why intrinsic motivation did not increase on this experiment.

Only 30 participants took part in the study, which is a small sample. Thus, the likelihood of a type 2 error is increased which decreases the power of the study. So, generalizability should be considered cautiously. Another possible limitation is the following. The experiment took relatively long and was likely to be demanding for the participants. When longer periods of challenging cognitive activities change the psychobiological state, mental fatigue occurs (Marcora, Staiano, & Manning, 2009). Intrinsic motivation seems to be reduced when people are mentally fatigued (Martin, Thompson, Keegan, Ball & Rattray, 2014). Thus, mental fatigue may have emerged in the experiment.

De Burgh-Hirabe (2019) found that people can have the intrinsic motivation to learn a language because of its different orthography compared other languages. Furthermore, enjoying the challenge to learn a difficult language can also be the reason for a person's intrinsic motivation to learn it. So, it can be interesting to study languages that are challenging to Western European people and that consist of radically different alphabets compared to Swedish and Hungarian. For example, Chinese or Ukrainian could be used. Considering the limitations of the study, other studies could replicate the study but try to reach more participants to get sufficient power. Additionally, one can think of using fewer words in each language to shorten the research to avoid mental fatigue.

The results of this study can be helpful in various context. For example, they can help students and teachers with that topic by helping to implement practical guidelines for teachers. Also, refugees can benefit from the result as they are also exposed to language learning. They need to learn a new language to settle in a new country. Because of the Russian invasion of Ukraine in February 2022, millions of Ukrainian refugees are fleeing (Marchese et al., 2022). So, facilitating the settling in a new country by learning the national language is an urgent topic at the moment. The results of the study could help the refugees to settle down more easily (Abou-Khalil et al., 2019). Additionally, the current study adds to the knowledge of language learning, information gaps and difficulty level of tasks. Several theories, like the one by Murayama (2019), were challenged if they hold true in a certain context, language learning. Thus, the current study adds the knowledge that the information gap framework may not be applicable in the context of language learning. Furthermore, this study helps to broaden the knowledge that difficult tasks may not have detrimental effects on intrinsic motivation, contrary as supposed by several researchers like Lomas et al. (2017).

To summarize, this research gave an important and new insight into the topic of difficulty and information gaps in the context of language learning. The results showed that the neither the level of difficulty nor having information gaps had an influence on intrinsic motivation in learning Swedish and Hungarian. Thus, the study does not support the proposed framework by Murayama (2019). Instead, the self-determination theory by Deci and Ryan (1985), seems to be a more promising theory to explain the increase in people's intrinsic motivation to learn Swedish. However, since the study was underpowered and mental fatigue may have been at stake, further research on this topic is required. As language learning is a topic people are often confronted with, it is important to investigate. The results can be applied in a wide range of context. For example, teachers can benefit from them. Furthermore,

the results can also be beneficial for refugees who try learn the national language of their new home country.

References

- Abou-Khalil, V., Helou, S., Flangan, B., Pinkwart, N., & Ogata, H. (2019). Language learning tool for refugees: Identifying the language learning needs of Syrian refugees through participatory design. *Languages*, 4. doi: 10.3390/languages4030071
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37, 122–147. doi: 10.1037/0003-066X.37.2.122
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman.
- De Burgh-Hirabe, R. (2019). Motivation to learn Japanese as a foreign language in an English speaking country: An exploratory case study in New Zealand. *System*, 80, 95-106. doi: doi.org/10.1016/j.system.2018.11.001

- Bartholomew, K. J., Ntoumanis, N., Ryan, R. M., & Thogersen-Ntoumani, C. (2011). Psychological need thwarting in the sport context: Assessing the darker side of athletic experience. *Journal of Sport and Exercises Psychology*, *33*, 75–102. doi: 10.1016/j.jate.2013.10.006
- Csikszentmihalyi, M. (1988). The flow experience and its significance for human psychology. In Csikszentmihalyi, M., & Csikszentmihalyi, I. S. (Eds.), *Optimal experience: Psychological studies of flow in consciousness* (pp. 15-35). Cambridge, UK: Cambridge University Press.
- Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York, NY: Harper and Ro.
- Deci, E. L., & Ryan, R. M. (1985) *Intrinsic motivation and self-determination in human behavior*. New York, NY: Plenum:
- Durik, A. M., Shechter, O. G., Noh, M., Rozek, C. S., & Harackiewicz, J. M. (2015). What if i can't? Success expectancies moderate the effects of utility value information on situational interest and performance. *Motivation and Emotion*, *39*, 104–118. doi: 10.1007/s11031-014-9419-0.
- Ehrman, M. E., Leaver, B. L., & Oxford, R. L. (2003). A brief overview of individual differences in second language learning. *System*, *31*, 313-330. doi: /10.1016/S0346-251X(03)00045-9
- Finno-ugrische Sprachen. (n.d.). Retrieved 20.07.2022 from: https://de.wikipedia.org/wiki/Finno-ugrische_Sprachen
- Fong, C. J., Patall, E. A., Vasquez, A. C., & Stautberg, S. (2018). A meta-analysis of negative feedback on intrinsic motivation. *Educational Psychological Review*, *31*, 121-162. doi: /10.1007/s10648-018-9446-6
- Fransen, K., Boen, F., Vansteenkiste, M., Mertens, N., & Vande Broek, G. (2017). The power of competence support: The impact of coaches and athlete leaders on intrinsic motivation and performance. *Scandinavian Journal of Medicine and Science in Sports*, *28*, 725–745. doi: 10.1111/sms.12950

- Geltende Gesetze und Verordnungen (SGV. NRW).* (2022). Retrieved from https://recht.nrw.de/lmi/owa/br_text_anzeigen?v_id=10000000000000000640
- Germanische Sprachen.* (n.d.). Retrieved 20.07.2022 from: https://de.wikipedia.org/wiki/Germanische_Sprachen
- Gopalan, V., Bakar, J. A. A., Zulkifli, A. N., Alwi, A., & Mat, R. C. (2017). A review of the motivation theories in learning. *Conference Proceedings, 1891*. doi: doi.org/10.1063/1.5005376
- Gottfried, A. E. (1982). Relationships between academic intrinsic motivation and anxiety in children and young adolescents. *Journal of School Psychology, 20*, 205-215. doi: [10.1016/0022-4405\(82\)90050-4](https://doi.org/10.1016/0022-4405(82)90050-4)
- Gottfried, A. E. (1990). Academic intrinsic motivation in young elementary school children. *Journal of Educational Psychology, 82*(3), 525-538. doi: [10.1037/0022-0663.82.3.525](https://doi.org/10.1037/0022-0663.82.3.525)
- Gruber, M. J., & Ranganath, C. (2019). How curiosity enhances hippocampus-dependent memory: The prediction, appraisal, curiosity, and exploration (PACE) framework. *Trends in Cognitive Sciences, 23*, 1014-1025. doi: [10.1016/j.tics.2019.10.003](https://doi.org/10.1016/j.tics.2019.10.003)
- Henderlong, J., & Lepper, M. R. (2002). The effects of praise on children's intrinsic motivation: A review and synthesis. *Psychological Bulletin, 128*, 774-795. doi: [10.1037/0033-2909.128.5.774](https://doi.org/10.1037/0033-2909.128.5.774).
- Kang, M. J., Hsu, M., Krajbich, I. M., Loewenstein, G., McClure, S. M., Wang, J. T., & Camerer, C. F. (2009). The wick in the candle of learning: Epistemic curiosity activates reward circuitry and enhances memory. *Psychological Science, 20*, 963-973. doi: [10.1111/j.1467-9280.2009.02402.x](https://doi.org/10.1111/j.1467-9280.2009.02402.x)
- Lepper, M. R., Corpus, J. H., & Iyengar, S. S. (2005). Intrinsic and extrinsic motivational orientations in the classroom: Age differences and academic correlates. *Journal of Educational Psychology, 97*, 184-196. doi: [10.1037/0022-0663.97.2.184](https://doi.org/10.1037/0022-0663.97.2.184)
- Loewenstein G. (1994). The psychology of curiosity: A review and reinterpretation. *Psychological Bulletin, 116*, 75-98. doi: [10.1037/0033-2909.116.1.75](https://doi.org/10.1037/0033-2909.116.1.75)

- Lomas, J. D., Koedinger, K., Patel, N., Shodhan, S., Poonwala, N., & Forlizzi, J. L. (2017). Is difficulty overrated?: The effects of choice, novelty and suspense on intrinsic motivation in educational games. *Conference on Human Factors in Computing Systems*, 1028-1039. doi: 10.1145/3025453.3025638
- Lucas. R. I. (2010). A Study on intrinsic motivation factors in second language learning among selected freshman students. *The Philippine ESL Journal*, 4, 6-23.
- Marchese, V., Formenti, B., Cocco, N., Russo, G., Testa, J., Castelli, F., & Mazzetti, M. (2022). Examining the pre-war health burden of Ukraine for prioritisation by European countries receiving Ukrainian refugees. *The Lancet Regional Health – Europe*, 15. doi: 10.1016/j.lanepe.2022.100369
- Marcora S. M., Staiano, W., Manning, V. (2009) Mental fatigue impairs physical performance in humans. *Journal of Applied Physiology*, 106, 857–864. doi:10.1152/jappphysiol.91324.2008
- Martin, K., Thompson, K. G., Keegan, R., Ball, N., & Rattray, B. (2014). Mental fatigue does not affect maximal anaerobic exercise performance. *European Journal of Applied Physiology*, 115, 715–725. doi: 10.1007/s00421-014-3052-1
- Murayama, K. (2019). A reward-learning framework of autonomous knowledge acquisition: An integrated account of curiosity, interest, and intrinsic-extrinsic rewards. doi: 10.31219/osf.io/zey4k.
- Murayama, K., FitzGibbon, L., & Sakaki, M. (2019). Process amount of curiosity and interest: A reward-learning perspective. *Educational Psychology Review*, 31, 875-895. doi: 10.1007/s10648-019-09499-9
- Noels, K. A., Pelletier, L. G., Clément, R., Vallerand, R. J. (2008). Why are you learning a second language? Motivational orientations and self-determination theory. *Language Learning*, 50, 57-85. doi: 10.1111/0023-8333.00111
- Oudeyer, P. Y., Gottlieb, J., & Lopes, M. (2016). Intrinsic motivation, curiosity, and learning: Theory and applications in educational technologies. *Process in Brain Research*, 229, 257-284. doi: 10.1016/bs.pbr.2016.05.005

- Pluck, G., & Johnson, H. L. (2011). Stimulating curiosity to enhance learning. *GESJ: Education Sciences and Psychology*, 2, 1512–1801.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well being. *American Psychologist*, 55, 68–78. doi:10.1037/0003-066X.55.1.68.160
- Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. New York, NY: Guilford Press.
- Singh, A., & Jaison, A. M. (2021). The effect of information gap and uncertainty on curiosity and its resolution, *Journal of Cognitive Psychology*, 33, 403-423. doi: 10.1080/20445911.2021.1908311
- Stone, E. F., & Stone, D. L. (1984). The effects of multiple sources of performance feedback and feedback favorability of self-perceived task competence and perceived feedback accuracy. *Journal of Management*, 10, 371–378. doi: 10.1177/014920638401000311
- Tachibana, Y., Matsukawa, R., Zhong, Q. X. (1996). Attitudes and motivation for learning English: A cross-national comparison of Japanese and Chinese high school students. *Psychological Reports*, 79, 691-700. doi: 10.2466/pr0.1996.79.2.691
- Takase, A. (2007). Japanese high school students' motivation for extensive L2 reading. *Reading in a Foreign Language*, 19, 1–18.
- Tanaka, A., & Murayama, K. (2014). Within-person analyses of situational interest and boredom: Interactions between task-specific perceptions and achievement goals. *Journal of Educational Psychology*, 106, 1122–1134. doi: 10.1037/a0036659
- Tsai, Y.-M., Kunter, M., Luedtke, O., Trautwein, U., & Ryan, R. M. (2008). What makes lessons interesting? The role of situational and individual factors in three school subjects. *Journal of Educational Psychology*, 100, 460–472. doi: 10.1037/0022-0663.100.2.460
- White, R. W. (1959). Motivation reconsidered: The concept of competence. *Psychological Review*, 66, 297-333. doi: 10.1037/h0040934

Wu, X. (2003). Intrinsic motivation and young language learners: The impact of the classroom environment. *System*, 31, 501 – 517. doi: 10.1016/j.system.2003.04.001