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# **To do or not to do – Which factors contribute to spending cognitive effort?**

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**Master of Science in Psychology**

Specialisation in learning – brain, behaviour, environment

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## Preface

I contacted Gerit Pfuhl, affiliated to the Norwegian University of Science and Technology, to see if she had any relevant topics for a master thesis within motivation. As there is little research on traits and states regarding cognitive effort relating to academic performance, she suggested that this was a possible topic. I have had the opportunity to take part of this research project from start to finish, including planning, literature research, data gathering, analyses and writing the master thesis. Through this I got the chance to gain better insight into psychological science and experience first-hand how challenging, but at the same time fun, interesting and educational, a research project can be. This assignment is not a part of a larger research project, but about 20% of the introduction is from the specialisation assignment from last semester (fall 2018). Thank you to my supervisor, Gerit Pfuhl, for great help through this whole process and its different stages. Gerit has been especially helpful regarding the theory, design of the study and the statistics. I would also like to thank the participants of this study, because without them, this survey would have been difficult to carry out.

## Abstract

Motivation is a central aspect of human life and is thought to be one of the factors that influences academic performance. An important aspect of motivation is cognitive effort, which is a subjective state that people have introspective access to. There is little research on whether motivation in the academic context is considered a trait or a state, so that is the focus of this paper. The purpose of the experiment was to look at different factors that could possibly affect cognitive effort spent, including feeling of control, anxiety, curiosity, procrastination and personality. A total of 38 participants completed the online survey and the results indicated a tendency towards feeling of control, which is a state, affecting cognitive effort spent. The results also indicated that states, such as anxiety, affected cognitive effort. In addition, we found that curiosity partially correlated positively with openness to experience, and that cognitive effort partially correlated negatively with conscientiousness.

Keywords: Motivation; cognitive effort; feeling of control; anxiety; curiosity; procrastination; personality (big five: neuroticism, openness to experience, conscientiousness, extraversion, and agreeableness)

## Sammendrag

Motivasjon er et sentralt aspekt av menneskelivet og antas å være en av faktorene som påvirker akademisk prestasjon. Et viktig aspekt ved motivasjon er kognitiv innsats, som regnes som en subjektiv tilstand som personer har introspektiv tilgang til. Det er lite forskning på om motivasjon i den akademiske konteksten kan regnes som et trekk eller en tilstand. Dette vil derfor være fokuset for denne oppgaven. Meningen med eksperimentet var å se på ulike faktorer som muligens påvirker kognitiv innsats, inkludert følelse av kontroll, angst, nysgjerrighet, prokrastinering og personlighet. Totalt 38 deltakere fullførte nettundersøkelsen og resultatene indikerte en tendens mot at følelse av kontroll, som er en tilstand, påvirker kognitiv innsats. Resultatene indikerte også at tilstander, som for eksempel angst, kan påvirke kognitiv innsats. I tillegg fant vi at nysgjerrighet delvis korrelerte positivt med åpenhet for erfaring, og at kognitiv innsats delvis korrelerte negativt med planmessighet.

Nøkkelord: Motivasjon; kognitiv innsats; følelse av kontroll; angst; nysgjerrighet; prokrastinering; personlighet (femfaktormodellen: nevrotisisme, åpenhet for erfaring, planmessighet, ekstrovertsjon, og medmenneskelighet).

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## Introduction

Personally, I have never given much thought to what motivation really implies. It is a concept I have grown up with and it is one of those words I take for granted that people know. Motivation is a word most people are familiar with and have a relationship to, and we often talk about motivation, or the lack of motivation, to do this or that, but what does this really mean? How do we define motivation?

There are multiple aspects and understandings of motivation, depending on the chosen psychological perspective. Instinct, drive-reduction, arousal, incentives, cognition and the hierarchy of needs are all different aspects of this concept (Feldman, 2011, p. 315). These aspects show that motivation is a central part of human life, and hence, an increased level of understanding and knowledge on this area is beneficial. The first motivational theories were published in the early 20<sup>th</sup> century, and since then, many different perspectives have been proposed (Feldman, 2011, p. 309).

Motivation is commonly understood as factors that control the behaviour of people and animals. Psychology of learning, biological psychology and personality psychology all have different definitions of motivation (Teigen, 2018). There is current research within all these fields, and one central research area is related to academic performance, such as the students motivation to learn (Rugutt & Chemosit, 2009), self-regulation and procrastination (Senécal, Koestner, & Vallerand, 1995), and achievement motivation and ability (Nicholls, 1984). These are just a couple of examples to show that there is a variety of different angles to motivation related to academic performance, and naturally, some areas have been more popular within research than others.

Research on the relationship between motivation and academic performance could facilitate students to reach their educational goal, stay in school and prevent drop outs. Research does not have a precise definition of academic performance, and it is often used interchangeably with terms such as academic success and academic achievement. In addition, academic performance often includes multiple factors, such as grades, educational goals and GPA (York, Gibson, & Rankin, 2015). Here, academic performance will be defined as something that captures the student's ability to meet a certain performance criterion (York, Gibson, & Rankin, 2015).

Motivation is an important aspect of academic performance. Previous research has examined anxiety (Spitzer, Kroenke, Williams, & Löwe, 2006) and achievement (Weiner & Kukla, 1970) separately, but also looked at the relationship between both factors (Elliot, J., &

McGregor, 1999). Research has also studied anxiety and achievement in relation to conditions such as stress and depression (Andrews & Wilding, 2010), and curiosity (Gonida, Voulala, & Kiosseoglou, 2009). However, the research is rather thin on whether motivation in the academic context is considered as a trait or a state. Personality tests including the known relationship between neuroticism and mental health problems would be sufficient if it is a trait. If it is a state, then teaching interventions and alike can boost or harm academic performance. I will come back to the difference between trait and state.

To assess if motivation in the academic context is a trait or a state, I will use a simple cognitive effort task as proxy for motivation to do well. In addition, I will measure personality, including anxiety and procrastination, as well as I manipulate feeling of control (Whitson & Galinsky, 2008) to see how one's current state effects performance.

Motivation is a complex and multifaceted term, which is why I will start by including a theoretical background. Here, research related to motivation and the factors I find most interesting and studied in this thesis will be reviewed. Second, I will review a study on motivation in the academic context and lastly, through my own research, I will look into if motivation in the academic context can be considered as a state or a trait.

## **Theoretical background**

### **Motivation**

There are multiple ways to understand motivation. It influences behaviour related to direction, persistence and vigour of goal-directed behaviour (Passer, et al., 2009, p. 475). The instinct approach was the first motivational perspective, followed by the drive-reduction approach. This was later replaced by the arousal approach, which again got outdated when the incentive approach came. Lastly the cognitive approach and Maslow's hierarchy of needs was proposed. It is easy to focus on one understanding at a time, but these motivational theories should ideally be seen as complimentary perspectives to understand motivation. One should not argue that one perspective accounts for more of the understanding of motivation than the others (Feldman, 2011, p. 315). Due to my research questions, the cognitive approach, which focuses on thoughts, expectations and goals (Feldman, 2011, p. 313), seems most relevant, hence it will be the main focus.



## Self-determination theory: A macro theory

I have chosen to use Edward Deci and Richard Ryan’s self-determination theory (SDT) (2008) as a base for my research. It is a cognitive approach to motivation which focuses on different types of motivation (Deci & Ryan, 2008) and fundamental psychological needs (Passer, et al., 2009, p. 478).

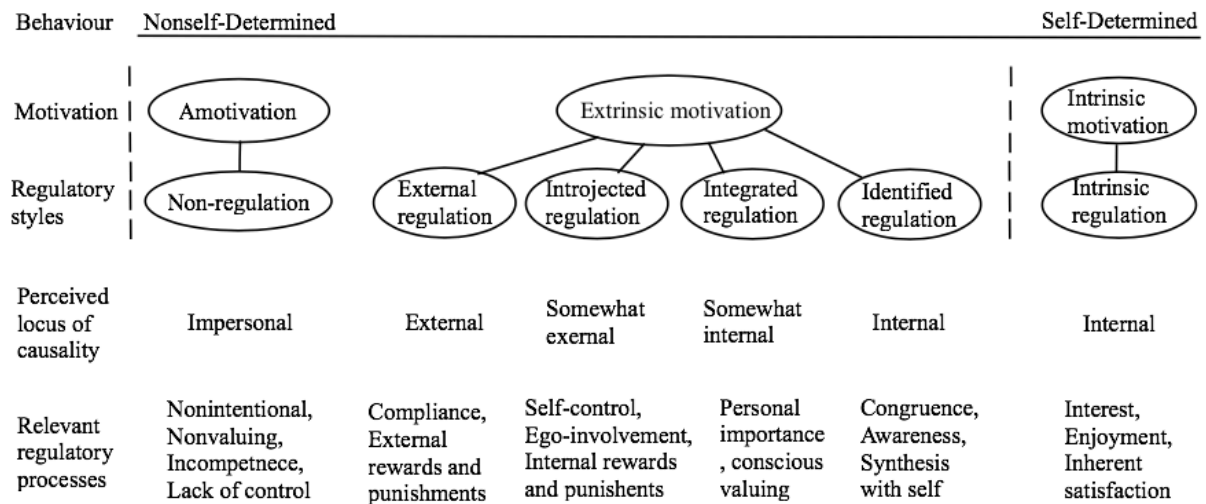


Figure 1: Self-Determination Theory, based on Ryan and Deci (2000, p. 72).

According to Deci and Ryan (2008), there is a difference between autonomous and controlled motivation. “Autonomous motivation involves the experience of volition and choice, whereas controlled motivation involves the experience of being pressured or coerced” (Vansteenkiste, Lens, & Deci, 2006). These different types of motivation have very different implications. Autonomous motivation seems to result in greater psychological health and more effective performance on activities involving heuristics, and controlled motivation results in feeling of pressure and tension (Ryan, 1982).

To understand how autonomous and controlled motivation works, SDT is partially based on basic psychological needs, illustrating that the different motivational perspectives are complimentary. In this case, SDT is related to Maslow’s hierarchy of needs, which is about how humans are motivated to strive for psychological needs to achieve self-actualization (Passer, et al., 2009, pp. 477-478). SDT focuses on the degree to which the needs are satisfied and assumes that needs are learned. As a result, some people develop stronger needs than others. This contributes to individual differences (Deci & Ryan, 2008).

The most relevant concept within individual differences is causality orientations. This refers to “the way people orient to the environment concerning information related to the

initiation and regulation of behavior, and the extent to which they are self-determined in general, across situations and domains” (Deci & Ryan, 2008, p. 183). Causality orientations are divided into three orientations: autonomous, controlled and impersonal. The autonomous orientation results from ongoing satisfaction of all three basic needs; i.e. satisfaction of need for competence, autonomy and relatedness. Controlled orientation results from some satisfaction of the need for competence and relatedness, but thwarting of the need for autonomy, while impersonal orientation results from thwarting of all three basic needs (Deci & Ryan, 2008). SDT assumes that people have some level of all three orientations, and that they can be used to make predictions about psychological and behavioural outcomes (Deci & Ryan, 2008).

Another crucial part of SDT is the role of social context, which is a part of the Cognitive Evaluation Theory (CET). This sub-theory of SDT claims that social-contextual events that enhances the feeling of competence increases intrinsic motivation, which is a part of autonomous motivation. Intrinsic motivation refers to doing something because it is enjoyable or interesting (Ryan & Deci, 2000). Examples of such events are rewards, feedback and communication. These events are assumed to enhance intrinsic motivation because they satisfy the need for competence, which is considered as a basic human need. In addition, to maintain or enhance intrinsic motivation, the behaviour has to be experienced as self-determined (Ryan & Deci, 2000). Feeling of competence is a keyword for intrinsic motivation, which is where the manipulation of feeling of control comes in. How can one manipulate feeling of competence to see how it affects effects performance? Whitson and Galinsky (2008) tested if lack of control increase illusionary pattern perceptions, and found that participants who lacked control were more likely to perceive a variety of illusory patterns. Based on this research it might be possible to manipulate feeling of competence through feeling of control, which will be elaborated later.

### **Cognitive effort**

It is common to hear people say: “It is important to pay attention in this or that lecture” or “How much effort did you put into this assignment?”, but what does this mean? Just like the motivation, the concept of cognitive effort needs clarifying. It is a complex concept influenced by multiple factors, such as stress, mental effort, and time pressure (Longo & Barrett, 2010), and these factors should be seen as complimentary.

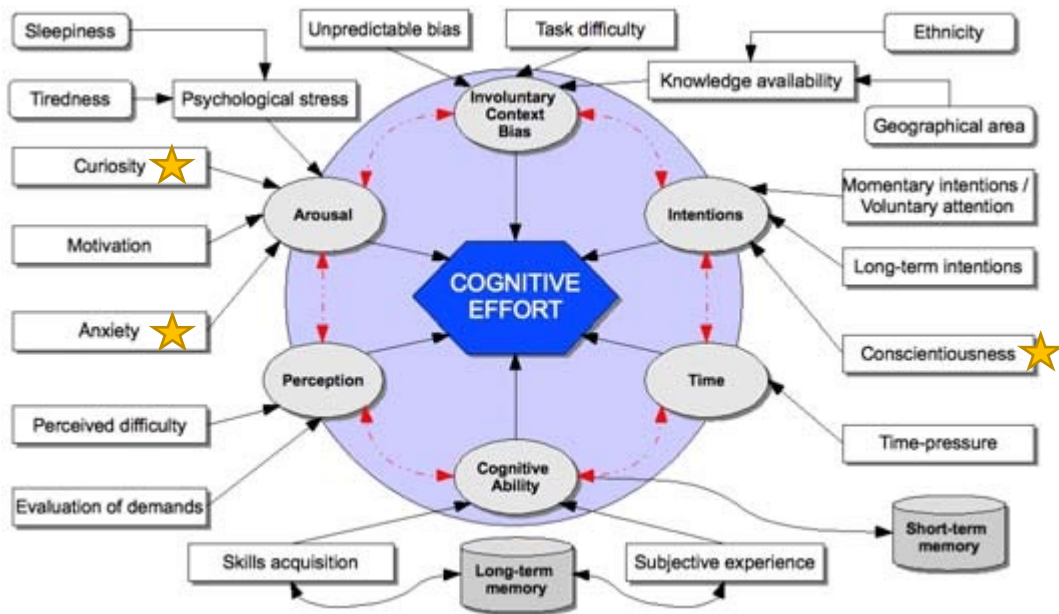


Figure 1: Overview of cognitive effort and influencing factors by Longo & Barrett (2010, p. 67). My research will look at curiosity, anxiety and conscientiousness.

The role of attention, which is “the act or faculty of attending, by directing the mind to an object or thought” (Longo & Barrett, 2010, p. 65), is an important part of both cognitive effort and motivation. If one does not enjoy being a student and is not interested in the subjects, chances are that the attendance on lectures and participation at seminars are lower than it would have been if one is happy with being a student and love the subjects. That is, they have less attention to pay and engage in less cognitive effort than those who enjoy being a student and are satisfied with the chosen study. This shows that cognitive effort is a dynamic construct that can change within individuals in response to environmental and individual factors (Longo & Barrett, 2010).

In relation to SDT, this example could be explained by controlled motivation. If the student is unsatisfied with the chosen study, but still feel coerced to continue, and pressured to getting good grades, this could be a reason for spending low cognitive effort. On the other hand, to engage in less cognitive effort could also be explained by autonomous motivation. The low cognitive effort would then be a conscious decision based on free will. One might have the attitude that “I have to get through this study to get a job”, but because it is not that interesting, one chooses to spend less cognitive effort. Motivation could be used to explain why people pay more or less attention and put in more or less cognitive effort.

Within personality psychology there is an important difference between traits and states. Traits are consisting and long-lasting behaviours, while states are temporary behaviours depending on the situation and motive at a particular time. Cognitive effort is a

subjective state that people have introspective access to (Longo & Barrett, 2010). A person's cognitive ability could affect their academic performance. People with high abilities often have more cognitive resources and hence need to make fewer adjustments to achieve the same outcome as those who have lower abilities and less cognitive resources. People with higher cognitive abilities could also perceive a task as less difficult (Longo & Barrett, 2010). If this is true one could assume that individuals with less cognitive abilities, who potentially perceive a task as more difficult, would perform lower academically because they have to put in more effort and use more of their resources than individuals with higher cognitive abilities.

As seen, cognitive effort is very complex and all the different factors influencing this construct is connected one way or another. I will use the beads counting task (Dean & Neligh, 2018) to measure cognitive effort. The next part will take a closer look at how feeling of control, anxiety, stress, personality, and curiosity could affect student performance. Some of these factors are considered part of cognitive effort, as seen in figure 1.

### **Feeling of control**

Perceived feeling of control seems to affect academic performance directly (Stipek & Weisz, 1981), which could be related to the SDT. Deci and Ryan talk about intrinsic motivation, which more precisely is defined as “the inherent tendency to seek out novelty and challenges, to extend and exercise one's capacities, to explore and to learn” (2008, p. 70). People experience reading a book as more enjoyable when they choose to read it, rather than when they are required to read it. Students often choose what to study, but they rarely choose which books are included in the curriculum. This could decrease the feeling of control which potentially could contribute to lower academic performance, but the relationship between perception of control and academic performance is not empirically clear cut (Stipek & Weisz, 1981).

Being able to structure information makes it easier to feel in control, which is closely related to need for structure. Our cognitive resources are limited, so we want to reduce the complexity and quantity of information to be as effective as possible. This could be done through cognitive structuring, which according to Neuberg and Newson is “the creation and use of abstract mental representations...representations that are simplified generalizations of previous experiences” (1993, p. 113). Here one could assume that those with lower cognitive abilities have to spend more effort to process information, which would affect the effort they have to put into learning the curriculum and studying for exams. Indeed, research has found

that measures of academic performance correlate highly with measures of cognitive ability (Ceci, 1996). This shows that cognitive ability is a good predictor for academic performance.

People also have a desire for certainty and being in control, both of which are considered as primary and fundamental motivating forces in human beings. When people fail to achieve this, that is people become uncertain and feel that they are not in control, it triggers an unsettling and aversive state (Whitson & Galinsky, 2008). This activates the amygdala, a crucial part of motivational and emotional responses, particularly fear (Passer, et al., 2009, p. 145), and could explain why some students feel increased stress and anxiety related to performance. I will measure feeling of control through a task based on Whitson and Galinsky (2008).

## **Anxiety**

Anxiety is “the state of tension and apprehension that is a natural response to perceived threat” (Passer, et al., 2009, p. 787), and the anxiety response has four components: A subjective-emotional, cognitive, physiological, and behavioural component. Here I will focus on the cognitive component, which includes both a sense of inability to cope, and worrisome thoughts (Passer, et al., 2009, p. 787). There are different forms of anxiety and I will focus on general anxiety disorder, which is defined as “a chronic (ongoing) state of diffuse, or free-floating, anxiety that is not attached to specific situations or objects” (Passer, et al., 2009, p. 790).

A study by de Lijster et al. (2018) concluded that anxiety disorders within adolescents results in problems with academic functioning such as getting good grades, concentrating on their work, performing on tests and doing homework. This could potentially lead to drop-out in higher education, such as university or college. There is also the possibility that people with anxiety disorder choose not to continue their education after high school because of their feeling of impairment. Early research does indeed support that anxiety disorders account for more failure to enter and complete college compared to mood- and substance use disorders (Kessler, Foster, Saunders, & Stang, 1955). Later research seems to contradict this. Substance use disorders are associated with dropping out of college and anxiety and mood disorders are not statistically significant (Breslau, Lane, Sampson, & Kessler, 2008). However, research has also found that 46% of failure to complete school is due to psychiatric disorders, including anxiety (Stoep, Weiss, Kuo, Cheney, & Cohen, 2003). One research group found that 49% of the participants dropped out of school, where 24% of these had anxiety as the

primary reason (Van Ameringen, Mancini, & Farvolden, 2003). This shows that anxiety definitely contributes to the drop-out rates, even though it might not be the primary reason.

Anxiety is considered as one of the influencing factors of cognitive effort, so there is a possibility that anxiety's effect on student performance could be related to this. The attentional control theory (ACT) of anxiety assumes that anxiety affect functions related to the central executive, which is involved in successful task performance (Eysenck, Derakshan, Santos, & Calvo, 2007). This is supported by studies showing that highly anxious individuals exhibit greater cognitive effort to maintain performance effectiveness (Ansari & Derakshan, 2011). This also indicates that anxiety and attention are connected, and that the different contributing factors of cognitive effort should be seen as complimentary. I will measure anxiety by using the Beck Anxiety Inventory (BAI) (Nordhagen, 2001).

## **Stress**

Just like motivation and cognitive effort, stress is also a concept which is understood in different ways. It could be seen as a stimulus, a response or as an ongoing interaction between an organism and its environment. Stress is considered as a stimulus when we make statements about how stressed we are about upcoming exams and as a response when we are feeling stressed about upcoming exams. The response includes cognitive and behavioural components (Passer, et al., 2009). This way of looking at stress combines stimulus and response, and stress is then “a pattern of cognitive appraisals, physiological responses and behavioural tendencies that occur in response to a perceived imbalance between situational demands and the resources needed to cope with them” (Passer, et al., 2009, p. 722).

Pupils are used to a structured everyday life from upper secondary school where they are closely followed up by teachers. Moving on to university can result in a less structured everyday life where you are expected to be more independent, and the workload increases significantly. The transition from pupil to student could therefore cause a lot of stress. Problems arise when the stressors become long-lasting. This could lead to a breakdown and exhaustion and can cause both physical and mental illness (Welle & Graf, 2011). If it gets that far, there is no surprise that this could affect a student's academic performance and could result in dropping out of school.

The ability to handle stress varies with the individual, and people exposed to the same situation and the same level of a stressor can respond differently. Some feel stress strongly, while others do not feel it as much (Izutsu, Tsutsumi, Asukai, Kurita, & Kawamura, 2004).

There are also people who enjoy and work better under stress, while others do not handle it that well. This is known as stress tolerance and it is affected by multiple factors, such as genetics, coping strategies and a strong social network. These factors are strongly associated with high stress tolerance (Welle & Graf, 2011).

Stress tolerance could be connected to the SDT through controlled motivation. There are a lot of new situations, such as the study situation, making new friends, potentially moving and getting familiar with a new place and so forth. Academic performance in first year students and the transitional period is not relevant for my thesis, but taken together, these factors could result in the feeling of pressure and tension, which is a part of controlled motivation. In addition, stress tolerance includes how people cope with stress. This is related to how they orient to the environment, which is a part of causality orientations. I will measure stress through the five-dimensional curiosity scale (5DC) (Kashdan, et al., 2018).

## Personality

Personality is the “distinctive and relatively enduring ways of thinking, feeling and action that characterize a person’s responses to life situations” (Passer, et al., 2009, p. 662) while personality traits are a person’s usual ways of responding to the world (Passer, et al., 2009, p. 661). There are multiple models for understanding personality, and one of the most used ones within personality psychology is the Big Five factor model (Passer, et al., 2009). It is given that personality traits are traits and not states, and hence should be somewhat stable over time. However, that does not mean that they are unchangeable (Passer, et al., 2009).

Big Five factors	Behaviours (facets)
E: Extraversion vs. introversion	Gregariousness (sociable), assertiveness (forceful), activity (energetic), excitement-seeking (adventurous), positive emotions (enthusiastic), warmth (outgoing)
A: Agreeableness vs. antagonism	Trust (forgiving), straightforwardness (not demanding), altruism (warm), compliance (not stubborn), modesty (not show-off), tendermindedness (sympathetic)
C: Conscientiousness vs. lack of direction	Competence (efficient), order (organized), dutifulness (not careless), achievement striving (thorough), self-discipline (not lazy), deliberation (not impulsive)

N: Neuroticism vs. emotional stability	Anxiety (tense), angry hostility (irritable), depression (not contented), self-consciousness (shy), impulsiveness (moody), vulnerability (not self-confident)
O: Openness vs. closedness to experience	Ideas (curious), fantasy (imaginative), aesthetics (artistic), actions (wide interests), feelings (excitable), values (unconventional)

Figure 3: The Big Five personality factors and their behavioural facets, based on McCrae and Costa (2008, p. 685).

Research shows that personality traits are an important predictor for academic performance (Chamorro-Premuzic & Furnham, 2003; Poropat, 2009; Judge & Ilies, 2002). As seen in figure 3, conscientiousness relates behaviours relevant to academic performance, making it an important factor, and research seems to agree that conscientiousness is the personality trait that is most consistently associated with academic performance (Costa & McCrae, 1992; Chamorro-Premuzic & Furnham, 2003). In addition, a study found that conscientiousness was related to success at all academic levels, from freshman to senior year (Wagerman & Funder, 2007). Considering the overall agreement about the relationship between conscientiousness and academic performance, it seems like a substantial predictor for academic performance.

In addition, anxiety and curiosity will be measured in my experiment. Hence, neuroticism and openness to experience will also be included even though research suggests that these two factors are not consistently associated with academic performance compared to for example conscientiousness (Chamorro-Premuzic & Furnham, 2011). Chamorro-Premuzic and Furnham (2002) indicate that a negative association between neuroticism and academic performance could be connected to anxiety. Neurotic individuals are indeed prone to anxiety and psychological distress (Reber, Allen, & Reber, 2009). This could potentially result in difficulties with spending cognitive effort efficiently on wanted behaviours, such as learning discipline. How individuals handle this could affect their academic performance.

As for openness to experience where people are more receptive to new ideas, varied sensations and intellectuality (Busato, Prins, Elshout, & Hamaker, 2000), multiple studies have not found a significant relationship between this trait and academic performance (e.g. Busato, Prins, Elshout, & Hamaker, 2000; Chamorro-Premuzic & Furnham, 2002). However, some research such as de Raad and Schouwenburg (1996) claim that the Big Five factors, including openness to experience, contribute to academic performance. It might be that a negative connection between openness to experience and academic performance results from



openness to experience being connected to higher intelligence, but not higher academic performance (Chamorro-Premuzic & Furnham, 2002). If that is the case, openness to experience may not have a direct effect on academic performance where students have to be systematic and organized. However, it could still have a direct effect where students have to be creative, imaginative or artistic. I will use the Norwegian version of the short Big Five Inventory (BFI-20) (Engvik & Clausen, 2011) to measure personality.

## **Curiosity**

Curiosity is nested under openness to experience and is defined as “the recognition, pursuit, and desire to explore novel, uncertain, complex and ambiguous events” (Kashdan, et al., 2018, p. 130). The individual has a feeling of interest in a situation where one could potentially learn something and seek out new experiences and reactions, both one’s own and other’s reactions (Kashdan, et al., 2018). There have been quite a few distinctions within curiosity, such as: Epistemic vs. perceptual curiosity, which is the “drive to know” (Berlyne, 1954, p. 187) vs. the “drive to experience and feel” (von Stumm, Hell, & Chamorro-Premuzic, 2011). There is also a distinction between stretching and embracing, which is wanting new knowledge and experience, and wanting to accept the unpredictable and complex of nature of daily life (Kashdan, et al., 2018). In addition, feeling of interest vs. deprivation is wanting to know something for its own sake vs. wanting to know something because not knowing it is frustrating (Litman, 2005). A contributing element to be a curious person and experiencing curiosity is the ability to tolerate stress that arises in new, complex and uncertain territory (Silvia, 2008). This insinuates a link between curiosity and stress, supporting the claim about looking at the different factors as complimentary.

Kashdan et al. (2018) found that people scoring high on joyful exploration, which is a subcategory of curiosity, derived positive meaning from learning new information and experiences, and this correlated positively with well-being. There is a possible link to the autonomous motivation part of Deci and Ryan’s SDT, and it supports that autonomous motivation has a beneficial effect on psychological health. In addition, it is reasonable to assume that scoring high on curiosity could be beneficial for learning, which again might affect academic performance positively. There is also the possibility that encouraging and stimulating student’s curiosity could have a positive effect on academic performance and it may work as an indicator for potential and ability related to university admission (von Stumm, Hell, & Chamorro-Premuzic, 2011). If so, this could also affect the drop-out and

completion rate at universities. To measure curiosity, I will use the 5DC questionnaire (Kashdan, et al., 2018).

## **Measuring academic performance**

There are multiple ways to measure academic performance, and grades or GPA are commonly used (Fan & Chen, 2001; Pintrich & De Groot, 1990; Richardson, Abraham, & Bond, 2012). Due to cultural differences related to the pressure of performing in America and Europe and given that the sample for my experiment is Norwegian participants, this section will review a European study that has measured academic performance combining both questionnaires and a task.

Dupeyrat and Mariné (2005) tested and extended a social-cognitive theory of motivation by Dweck (1988). This theory proposed that implicit theories of intelligence determine the way students approach learning and achievement situations, in addition to the kind of goals students adopt, and their achievement through the mediation of effort expenditure and persistence.

The participants were 72 French students that returned to school, which seems to be a suitable sample considering that returning to study is a conscious decision, and to succeed, they have to be motivated to spend time and effort. Dupeyrat and Mariné (2005) hypothesised that the influence of motivational beliefs on achievement behaviour and outcomes would be important for this population.

The researchers tested the influence of implicit theories of intelligence and goal orientation on measures of students' cognitive engagement in learning and achievement. This was done using a self-report measure and a behavioural indicator of effort. The self-report was a questionnaire consisting of 121 items. It assessed the frequency of use of learning strategies, more specifically; student motivation and academic engagement. The behavioural component was measured by the number of completed voluntary homework exercises by the students during the academic year as an indicator of how much effort the students effectively spent. They predicted that goal orientations influence achievement through the mediation of strategy use and effort. Dupeyrat and Mariné (2005) also assumed that deep-processing strategies and effort have a positive influence on achievement. To measure achievement, the researchers used the students' final examination grade. This could range from 0-80, where you needed at least 40 to pass (Dupeyrat & Mariné, 2005).

When it comes to the behavioural measurement, participants completed a little more than three homework exercises throughout the year, on average. The effort spent varied a lot, where 10% did not complete any exercises, 54% completed one to four, and 36% completed eight or less. In total, 61% of the participants passed, but the average grade was 38.86 (Dupeyrat & Mariné, 2005).

The researches also ran a correlation analysis (table 1) where the mastery goal orientation (a part of the incremental theory of intelligence where individuals are willing to spend the necessary effort, seek out challenging situations to encourage learning, and to overcome possible setbacks) predicted high, positive correlations with deep-processing strategies, effort and achievement. Correlations between shallow strategies and effort and achievement was not significant, and in a negative direction, with  $p = -.11$  and  $p = -.05$ , and the incremental theory of intelligence, which claims that students want to improve their competence and acquire new knowledge, was not related to cognitive effort or achievement (Dupeyrat & Mariné, 2005).

Table 1

Pearson-moment correlations among motivational variables, cognitive engagement, and achievement

	1	2	3	4	5	6	7	8	9
1. Entity	—								
2. Incremental	-.55***	—							
3. Mastery goal	-.31**	.27*	—						
4. Performance goal	-.18	.13	.40***	—					
5. Work avoidance	.29*	-.33**	-.46***	-.43***	—				
6. Deep strategies	-.23*	.14	.61***	.45***	-.51***	—			
7. Shallow strategies	.04	-.10	.23*	.33**	-.30**	.35**	—		
8. Effort	-.23*	.13	.33**	.02	-.16	.26*	-.11	—	
9. Achievement	-.14	.12	.30**	.13	-.14	.11	-.05	.35**	—

\*  $p < .05$ .

\*\*  $p < .01$ .

\*\*\*  $p < .001$ .

Table 1: Results from correlation analysis by Dupeyrat & Mariné (2005, p. 51).

The final analysis was a path analysis (table 2). Dupeyrat and Mariné (2005) did three sets of analyses, but only two of them are relevant here. One analysis tested the relative effects of implicit theories and goal orientation on learning strategies and effort, while the other tested the respective influences of implicit theories, goal orientation and cognitive effort measures on achievement. For the first analysis, effort was the dependent variable, the entity theory (a part of the implicit theory which holds the belief that intelligence is a trait that is fixed and uncontrollable) and mastery goal orientation explained a significant amount of

variance, but when the mastery goal was combined with the entity theory, the entity theory was no longer significant. This result could be due to the positive effect a mastery goal orientation has on effort spent (Dupeyrat & Mariné, 2005). As for the second analysis, achievement was the dependent variable, and both mastery goals and effort were significant predictors, but when controlling for effort, mastery goals did not have a direct effect on achievement. Dupeyrat and Mariné (2005) assume that this could be due to effort mediating mastery goals and achievement.

Table 1

Multiple regression results					
DV	Predictor	$R^2$	$\Delta R^2$	$\beta$ on step	Final $\beta$
Goal orientation	Mastery goal	.097**	.097**	-.311**	-.311**
	Performance goal	/			
	Work avoidance	.095**	.095**	-.307**	-.307**
Cognitive engagement	Deep strategies	.375***	.375***	.612***	.481***
	Work avoidance	.439***	.064**	-.285**	-.285**
	Shallow strategies	.106**	.106**	.326**	.326**
Effort	Entity	.053*	.053*	-.231*	-.144
	Mastery goal	.124**	.071*	.280*	.280*
	Achievement	.088**	.088**	.297**	.206
Achievement	Mastery goal	.088**	.088**	.297**	.206
	Effort	.158**	.070*	.279*	.279*

Note. DV, dependent variable.

\*  $p < .05$ .

\*\*  $p < .01$ .

\*\*\*  $p < .001$ .

Table 1: Results from path analysis by Dupreyat & Mariné (2005, p. 52).

The results of this study were in general consistent with Dweck's (1988) theory and is appropriate for examining achievement motivation and academic performance in returning students. Mastery goals was strongly related to spending effort on deep processing strategies, effort and achievement; in addition to the path model providing support that mastery goals mainly influence effort spent. Effort was the only mediator of the relationship between mastery goals and achievement, which could be due to the nature of the behavioural component. That is, effort was assessed by a task meant to prepare students for the final exams, so they were very similar. The results of the processing strategies and achievement was not significant, and according to the authors, one possible reason could be that the questionnaire was the only measure of learning strategies (deep and shallow processing strategies). Credibility of the respondents could explain why it was not significant, i.e. social

desirability, a tendency to agree to statements, and misperception of what strategies they believe they used compared to what they actually use. Dupeyrat and Mariné (2005) found that effort was a better predictor for achievement, which could support this statement.

As seen from this review, the advantage of combining questionnaires and tasks is that it is possible to compare responses to performance, which could give a stronger indication of the relationship between how people perceive themselves on given factors, such as stress, anxiety and curiosity, compared to their actual physical effort and motivation. In addition, a literature search showed that there was hardly any research from European universities using experimental tasks related to anxiety, cognitive effort and academic performance.

To sum up, cognitive effort, feeling of control, anxiety, personality traits and curiosity are complimentary, and it is difficult to look at the factors individually. As seen, previous research has found that they are all contributing factors to student performance and according to Chamorro-Premuzic and Furnham (2002), most research has focused on the Big Five and not primary traits, such as anxiety. By the look of it, literature lacks research that has investigated both perspectives and included an experimental component. Based on this, the following six hypotheses will be further investigated, where the last one is an additional hypothesis:

- 1) We predict that feeling of control, a state, affects cognitive effort spent. Feeling not in control reduces cognitive effort.
- 2) We predict that cognitive effort spent is higher in those showing more stress tolerance, more study well-being and lower anxiety.
- 3) We predict that anxiety, a trait, affects cognitive effort spent specifically in the low control condition.
- 4) We predict that study satisfaction is lower among those scoring high on anxiety, low on stress tolerance, high on neuroticism and low on openness to experience and high on procrastination.
- 5) We predict that curiosity correlates positively with openness to experience.
- 6) We predict that conscientiousness, a trait, affects cognitive effort spent, specifically in the low control condition.

# Method

## Participants

A total of 38 participants (13 male, majority 22-29 years old) were recruited for this study. 2 participants studied theology, 16 social sciences, 10 health care, 2 technology, 2 medicine, 4 humanities, and 2 did not study. The participants were randomly divided into two groups, where each group received either the high (appendix A, pp. 1-28) or the low control condition first (appendix A, pp. 29-59), followed by the opposite condition. This equals a total of 19 participants in each condition. For this experiment the target population was Norwegian individuals who were 18 years or older.

## Sample size

For this master project there is a limited amount of time, and the data collection was to be terminated in December 2018. This makes the sample size constrained by time. Costs could also constrain the sample size. The survey is quite lengthy and repetitive, but the participants have the possibility to win a voucher for participating. This could counteract the possible negative effect of having a long repetitive survey. In addition, based on Whitson and Galinsky (2008), we expected a medium effect size, requiring approximately  $N=34$  in a within design (Faul, Erdfelder, Buchner, & Lang, 2013).

## Sampling procedure

### Procedure.

The participants were recruited face-to-face, via Instagram or through Facebook by asking friends and family to participate, in addition to ask if they knew someone who might be willing to join. Everyone received the consent form when they were asked to participate. In practice, the participants received the second link after completing the first one. This was to make sure they took the two-part survey in the right order. This applies for those with personal attendance who took it on my computer, and for those who took the survey through the links on Facebook and used another computer.

### Inclusion and exclusion criteria.

The purpose of the experiment is to study people's cognitive effort and how anxiety might affect their motivation. Hence, people diagnosed with a mental disorder, such as OCD, depression or anxiety, were excluded. In addition, the participants had to be over 18 years old

and be fluid in Norwegian. Participants who report that they have not studied will be excluded from the analysis for the second hypothesis, because they cannot answer the demographic question about satisfaction with study programme.<sup>1</sup> To be able to use the results, participants who were familiar with the feeling of control task by Whitson and Galinsky or participants who did not answer at least 80% of the items in the questionnaires were excluded from the study.

### **Ethics.**

The consent form included general information about the study. In addition, it contained information about anonymity, saving of data, and contact information in case there were any questions. Because of the nature of the experiment, the consent form did not disclose the full purpose of the study, but after completing the survey, the participants were informed that they could receive their results by the beginning of 2019. This guaranteed full disclosure. The consent form also stated the opportunity to win a voucher. After completing the survey, the participants were asked if they had any questions, and as a result, some participants got debriefed immediately.

The experiment was nonclinical and did not demand any sensitive information from the participants. Hence, it was not necessary with approval from *Regional Committees for Medical and Health Research Ethics* (REK) or *Norsk Senter for Forskningsdata* (NSD). The participants randomly received an ID between 100-138 based on when they agreed to take the survey, which was kept in a separate notebook along with their name and e-mail address. In addition, the full survey consisted of four separate surveys, which equals four different links, so to be able to compare each participant's answers from the high control condition with the low control condition, it was practical to keep track of it in a notebook. The notebook was destroyed after completion of the study.

## **Measures**

### **Feeling of control.**

The feeling of control task is based on Whitson and Galinsky (2008) (appendix A, pp. 2-17/30-50). The participants get to see different shapes and have to find a pattern and guess which of the next shapes will be the right one. There are 15 trials. In the low control

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<sup>1</sup> This was not included in the pre-registration because non-students were not expected to be recruited.

condition, one receives random feedback, and in the high control condition, one receives no feedback. Hence, feeling of control is the manipulated variable.



Figure 4: Concept identification to manipulate the feeling of control, based on Whitson & Galinsky (2008).

### **Beads counting.**

The Beads Counting task (appendix A, pp. 17-25/50-54) is inspired from Dean, M. and Neligh, N. (2018), and measures cognitive effort. The subjects are shown a 10x10 grid of beads where about half of which are blue and the other half of which are red. The majority colour is to be stated, which requires that subjects have to count the amount of red and blue beads. The Cognitive effort score for each condition is measured by the proportion of correct bead majority ranging from 0-1. There is a total of 10 trials, two easy and eight difficult ones. Guessing correct in the 8 difficult trials has a probability of  $p = .5^8 = .004$ . Those who have all correct, or only maximally 2 of the difficult trials wrong, are categorized as having counted, the other is treated as having guessed. In addition, participants who answers “Ingen/vet ikke” and “Kombinasjon” in the low control condition will be treated as having answered correctly. Any other responses will be treated as guessing and that they were most likely not affected by the manipulation. The subjects will complete this 5x2 times, with some question items between each round. This task is done in both blocks, i.e. in the high control and the low control condition and is the dependent variable of the experiment.





Figure 5: The Beads Counting task (1: 51 blue, 49 red; 2: 48 blue, 52 red; 3: 51 blue, 49 red), inspired by Dean & Neligh (2018, p. 50).

### Five-Dimensional Curiosity Scale.

The 5DC is based on Kashdan, T. B. et al. (2018) (appendix A, pp. 18-26), and is a self-report questionnaire measuring curiosity, consisting of 25 items. The scale has 5 subscales and answer options range from 1 = does not describe me at all, to 7 = completely describes me.<sup>2</sup> Total score range is from 25 to 175, and each subscale has a range from 5 to 35. The five subscales are: Joyful exploration, sensitivity to deprivation, stress tolerance, social curiosity, and sensation seeking. These will be measured by taking the sum of the scores for each subscale and divide it by the number of items. Because the survey was in Norwegian, the 5DC was back and forward translated from English to Norwegian and back to English by Martin Jensen Mækele from the University of Tromsø and me. Previous research provides evidence that the 5DC is reliable and shows validity (Kashdan, et al., 2018; Schutte & Malouff, 2019). Our study indicated good reliability ( $\alpha = .801$ ).

### Procrastination.

To measure procrastination, the Norwegian version of the short Pure Procrastination Scale (sPPS) (appendix A, pp. 18-26) (Svartdal, 2015) was used. It is a self-report questionnaire consisting of 8 items where answer options range from 1 = very seldom or not true of me, to 5 = very often true or true of me. The score range is from 8 to 40 and will be measured by taking the sum of the scores and divide it by number of items. The sPPS has good reliability (Svartdal, 2015), and in our study the reliability can be considered as good ( $\alpha = .935$ ).

<sup>2</sup> In the pre-registration it says that the range was from 1-5.

### **Anxiety.**

A Norwegian version of BAI (appendix A, pp. 26-27) (Nordhagen, 2001) was used to measure general anxiety. It is a self-report questionnaire consisting of 21 items. This was used to measure anxiety and answer options range from 0 = not at all, to 3 = severely/I could barely stand it. Participants can get a total score ranging between 0 and 63, where higher score equals higher level of anxiety. The score is measured by taking the sum of the scores and divide it by number of items. The test has previously shown satisfactory reliability (Nordhagen, 2001), and in our study it had good reliability ( $\alpha = .923$ ).

### **Personality.**

To assess personality, a self-report questionnaire consisting of 20 items, the Norwegian version of the short BFI-20 (appendix A, pp. 51-57) (Engvik & Clausen, 2011), was used. The participants answer on a seven-point Likert scale ranging from 1 = does not fit, to 7 = completely fits. Score range is 20 to 140. The scale has 5 subscales: Openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. The subscale score ranges from 4 to 28. Some of these scores are reverse coded, and the questionnaire will be measured by taking the sum of the scores for each subscale and divide it by the number of items. Considering the short format, previous research shows acceptable reliability for BFI-20 (Engvik & Clausen, 2011), and our study replicated this finding with extraversion ( $\alpha = .817$ ), agreeableness ( $\alpha = .640$ ), conscientiousness ( $\alpha = .787$ ), and neuroticism ( $\alpha = .740$ ). However, openness to experience had poor internal reliability ( $\alpha = .410$ ).

### **Demographics.**

The independent variables are questions about demography. Participants answer questions about age, gender and education, including study satisfaction and study worrying if they did not complete the study (appendix A, p. 58). The latter two are binary measures.

### **Procedure**

After agreeing to participate and signing the consent form by clicking “continue” on the survey, all participants got information about the feeling of control task by Whitson and Galinsky (2008). Both conditions included five trials to make sure the participant understood the task before continuing to the real task where they received, or did not receive, feedback. After completing the feeling of control task, the participants read instructions on the beads

counting task and completed this mixed with questionnaires. The first condition, independent of it being the high or the low controlled one, included the effort task combined with the CS and the sPPS. It also included BAI at the end and a control question for the feeling of control task. The second condition, independent of it being the high or the low controlled one, included the effort task combined with the BFI-20 questionnaire. It also included demographic questions at the end, in addition to a control question for the feeling of control task.

## **Research design**

The experiment consists of two levels and two treatment groups. Because the same group of subjects are exposed to the same conditions, this is a randomized within-subject design. To reduce the chances of the treatment order influencing the results, the order of the conditions was counterbalanced. Participants were randomly assigned to receive the high control condition followed by the low control condition, or vice versa. Randomization of the two conditions was through giving every other participant the high control and the low control survey first, and the participants did not know the treatment group to which they had been assigned.

## **Data analysis**

The study was pre-registered on Open Science Framework (OSF) (<https://osf.io/>). After the data gathering was completed, all data was transferred into excel for coding. When the coding was finished the excel file was saved in a cvs file, which was loaded into JASP for the analyses. The data from all the analyses was directly copied from the output files from JASP.

For the first prediction, that feeling of control, a state, affects cognitive effort spent, and not feeling in control reduces cognitive effort, a mixed ANOVA was run to compare cognitive effort in the high and low feeling of control condition, and to compare the order of the conditions. The high and low feeling of control is the within factor, while the order of the conditions is the between factor. This hypothesis is directional; hence, a one-tailed test was appropriate.

For the second prediction, that cognitive effort spent was higher in those showing more stress tolerance, more study well-being and lower anxiety, a multivariate regression analysis was run. Stress tolerance, study satisfaction and anxiety score were predictor variables, and effort score was the outcome variable. Stress tolerance is a part of the curiosity

scale, while study satisfaction is binary and was dummy coded as 0 or 1. The hypothesis is directional, so a one-tailed test was run.

For the third prediction, that anxiety, a trait, affects cognitive effort spent, specifically in the low control condition, a correlation between the low control effort score and BAI score was done. This is a unidirectional hypothesis, in which a two-tailed test was run.

For the fourth prediction, that study satisfaction was lower among those scoring high on anxiety, low on stress tolerance, high on neuroticism and low on openness to experience and high on procrastination, a logistic regression analysis was done with BAI-, stress tolerance, neuroticism, openness to experience, and sPPS score as predictor variables, and study satisfaction as outcome variable. Neuroticism and openness to experience is a part of the BFI-20 questionnaire. Because this is a directional hypothesis, a one-tailed test was run.

For the fifth prediction, that curiosity correlates positively with openness to experience, a correlation between the curiosity scale score and the score on the openness to experience scale was done. Because the hypothesis is directional, a one-tailed test was run.<sup>3</sup>

For the sixth prediction, that conscientiousness, a trait, affects cognitive effort spent, specifically in the low control condition, a correlation between the low control effort score and a subscale of BFI-20, conscientiousness, was done. This is a unidirectional hypothesis, so a two-tailed test was run.

The results from the analyses was interpreted by using p-values and effect sizes as the criteria for inference, except from the demography and correlation analyses. A p-value less than .05 and medium effect sizes will be seen as supporting my hypotheses and given the small sample size there are no outliers in the analyses. For demography, the mean and standard deviation (SD) was used, and Spearman's rho was used for the correlation analyses.

## Results

All 38 participants completed the survey. Randomization yielded 9 male and 11 female participants in the group who received the low feeling of control first.

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<sup>3</sup> In the pre-registration, it was not mentioned that a one-tailed test was run.

## Questionnaires

Table 2

Questionnaire	Mean	Median	SD	Range	
				Min.	Max.
sPPS	2.720	2.668	1.089	1.125	5000
BAI	11.95	10.00	9.300	0.000	35.00
BFI-20: Extraversion	4.689	5.000	1.323	2.250	7.000
BFI-20: Agreeableness	5.138	5.375	0.9961	2.000	6.750
BFI-20: Neuroticism	3.704	3.750	1.237	1.500	6.000
BFI-20: Conscientiousness	4.967	5.250	1.145	1.750	6.750
BFI-20: Openness to experience	4.632	4.625	0.8498	3.000	6.750
CS: Joyful exploration	5.095	5.100	0.9762	3.200	7.000
CS: Sensitivity to deprivation	4.486	4.600	1.104	1.800	6.400
CS: Stress tolerance	3.563	3.600	1.061	1.800	6.000
CS: Social curiosity	4.763	5.000	1.074	1.600	6.600
CS: Sensation seeking	3.818	3.700	1.181	1.800	6.400

Table 3: Descriptive statistics of the questionnaires.

Based on table 3, we see that on average, participants scored right below average on the sPPS ( $M = 2.720$ ,  $SD = 1.089$ ). On average, the participants scored generally low on BAI ( $M = 11.95$ ,  $SD = 9.300$ ). As for BFI-20, participants on average scored lowest on neuroticism ( $M = 3.704$ ,  $SD = 1.237$ ), and highest on agreeableness ( $M = 5.138$ ,  $SD = 0.9961$ ). Conscientiousness ( $M = 4.967$ ,  $SD = 1.145$ ) was also high compared to neuroticism, while the scores on extraversion ( $M = 4.689$ ,  $SD = 1.323$ ) and openness to experience ( $M = 4.632$ ,  $SD = 0.8498$ ) was in-between neuroticism and agreeableness. The score from the 5DC indicates that participants on average scored lowest on stress tolerance ( $M = 3.563$ ,  $SD = 1.061$ ) and sensation seeking ( $M = 3.818$ ,  $SD = 1.181$ ), and highest on joyful exploration ( $M = 5.095$ ,  $SD = 0.9762$ ). The scores on sensitivity to deprivation ( $M = 4.486$ ,  $SD = 1.104$ ) and social curiosity ( $M = 4.763$ ,  $SD = 1.074$ ) was in-between joyful exploration, sensation seeking and stress tolerance.

## Hypothesis 1

We predicted that feeling of control, a state, affects cognitive effort spent and that feeling not in control reduces cognitive effort.

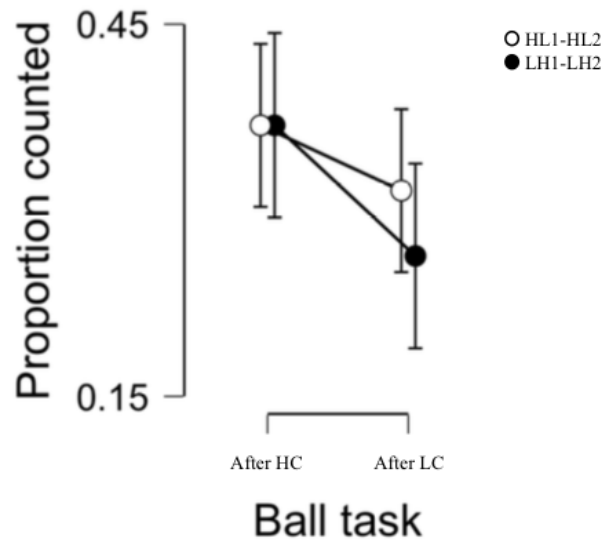


Figure 6: Mean, error bars are standard error of the mean (SEM).

A mixed ANOVA was conducted to compare the effect of cognitive effort in the high and low feeling of control condition, and to compare the effect of the order of the conditions. There was no statistically significant main effect of feeling of control on cognitive effort,  $F(1,34) = 3.241$ ,  $p = .081$ ,  $\eta^2 = .082$ , though with an as predicted tendency of more cognitive effort in the high feeling of control condition, the main effect of order was not statistically significant either,  $F(1, 34) < 1$ ,  $p = .923$ . There was no also no interaction effect between cognitive effort and order,  $F(1,34) < 1$ ,  $p = .917$ , suggesting that cognitive effort was the same for both groups of participants. The co-variates, anxiety and sPPS, did not have a statistically significant effect on cognitive effort. However, the higher one's procrastination score was, the higher effort one had on the beads counting task, and the more anxious one was, the lower effort one had on the beads counting task.

## Hypothesis 2

Here, we predicted that cognitive effort spent is higher in those showing more stress tolerance, more study well-being and lower anxiety.

Table 3

**Coefficients**

Model		Unstandardized	Std. Error	Standardized	t	p	95% CI	
							Lower	Upper
1	(Intercept)	-0.134	0.537		-0.250	0.804	-1.230	0.961
	CS Stress Tolerance	0.047	0.107	0.091	0.435	0.666	-0.172	0.265
	Anxiety	-0.004	0.012	-0.077	-0.378	0.708	-0.028	0.019
	Satisfaction	0.572	0.382	0.265	1.497	0.144	-0.207	1.350

Table 4: Multivariate regression analysis with stress tolerance, study satisfaction and anxiety as predictors, and effort score as outcome.

A multivariate regression analysis was conducted to predict the effect of stress tolerance, study well-being and anxiety on cognitive effort. Three of the respondents was not included in this analysis. These are participants who answered “Har ikke studert”. The relationship between cognitive effort and the predictors seems to be positive, but only slightly, with  $R = .266$ . Hence, cognitive effort could be higher for people showing more stress tolerance, satisfaction with their study and lower anxiety. Because adjusted  $R^2$  (adj.  $R^2$ ) takes the number of predictors into consideration, this is used for further interpretation instead of  $R^2$ . Adj.  $R^2$  is negative, which indicates that the predictor variables are not significant (Adj.  $R^2 = -0.19$ ). For the coefficients, none of the predictors is considered statistically significant ( $p > .05$ ).

**Hypothesis 3**

Here, we predicted that anxiety, which is a trait, affects cognitive effort spent, specifically in the low control condition.

Table 4

**Correlation Matrix**

**Spearman Correlations**

		Spearman's rho	p	Lower 95% CI	Upper 95% CI
Effort LC	- Anxiety	-0.072	0.667	-0.383	0.253
After LC	- Anxiety	-0.099	0.555	-0.406	0.228
Total After LC	- Anxiety	-0.008	0.962	-0.327	0.312

Table 5: Correlation between cognitive effort and anxiety.

Correlational analyses were used to examine the relationship between anxiety and cognitive effort. The results suggest that the correlation between effort LC and anxiety has an inverse relationship because Spearman's rho is negative. This could indicate that people who performed better on the cognitive effort task also were lower on anxiety. The strength of the relationship was minimal ( $\rho = -.072$ ). The relationship between after LC and anxiety was also inverse and the strength of the relationship was hardly larger than the first one ( $\rho = -.099$ ). This indicates that people who performed better on the cognitive effort task, after the low control condition, was lower on anxiety. For the last correlation, total after LC and anxiety, the results suggest a negative relationship, and almost no relationship exists ( $\rho = -.008$ ). This implies that the two variables do not have any relationship. However, none of the correlations was statistically significant, so anxiety did most likely not affect cognitive effort spent.

#### **Hypothesis 4**

Here, we predicted that satisfaction is lower among those scoring high on anxiety, low on stress tolerance, high on neuroticism and low on openness to experience and high on procrastination. However, only 2 participants answered no on study satisfaction.

Unfortunately, due to the small sample size and given the convenience sampling, which can be considered as a non-probability or random sampling (Farrokhi & Mahmoudi-Hamidabad, 2012) where participants are selected based on how easy they are to obtain for your sample (Saunders, Lewis, & Thornhill, 2009), there was a ceiling effect where the variable reached the highest value, so this analysis was excluded.

#### **Hypothesis 5**

Here, we predicted that curiosity correlates positively with openness to experience.



Table 5

## Correlation Matrix

### Spearman Correlations

		Spearman's rho	P	Lower 95% CI	Upper 95% CI
CS Joyful Exploration	- BFI-20 Openness to experience	0.449	0.005	0.151	0.672
CS Sensitivity to Deprivation	- BFI-20 Openness to experience	0.408	0.011	0.102	0.644
CS Stress Tolerance	- BFI-20 Openness to experience	-0.071	0.670	-0.382	0.254
CS Social Curiosity	- BFI-20 Openness to experience	0.010	0.951	-0.310	0.329
CS Sensation Seeking	- BFI-20 Openness to experience	0.356	0.028	0.041	0.607

Table 6: Correlation between the 5DC scale and openness to experience.

Correlational analyses were used to examine the relationship between curiosity and openness to experience. The results showed a positive relationship between joyful exploration and openness to experience, which indicates a direct relationship. This suggests that people who reported higher levels of joyful exploration also scored higher on openness to experience. The strength of the relationship was close to medium ( $\rho = .449$ ), and the correlation was statistically significant ( $p = .005$ ). The relationship was also positive for sensitivity to deprivation and openness to experience, meaning that people who reported higher levels of sensitivity to deprivation also indicated higher levels of openness to experience. The strength of the relationship was slightly smaller than the first one ( $\rho = .408$ ), and this correlation was also statistically significant ( $p = .011$ ). As for the relationship between stress tolerance and openness to experience, the correlation was negative and indicated an inverse relationship. That is; people with higher scores on stress tolerance reported lower levels of openness to experience. The strength of the relationship was close to non-existent ( $\rho = -.071$ ), suggesting that these two variables do not have any relationship. In addition, the results can be considered not statistically significant ( $p = .670$ ). Social curiosity and openness to experience seems to have a positive relationship, indicating that people who reported higher levels of social curiosity also reported higher levels of openness to experience. The strength of the relationship was close to zero ( $\rho = .010$ ), implying that there is no relationship between the two variables. Also, the result was not statistically significant ( $p = .951$ ). For the

last correlation, sensation seeking and openness to experience, there was a positive relationship. This indicates that people who scored high on sensation seeking also scored high on openness to experience. The strength of the correlation was close to medium ( $\rho = .356$ ) and the correlation can be considered statistically significant ( $p = .028$ ).

## Hypothesis 6

We predicted that conscientiousness, a trait, affected cognitive effort spent, specifically in the low control condition.

Table 6

## Correlation Matrix

### Spearman Correlations

		Spearman's rho	p	Lower 95% CI	Upper 95% CI
Effort LC	- BFI-20 Conscientiousness	-0.367	0.023	-0.614	-0.053
After LC	- BFI-20 Conscientiousness	-0.301	0.066	-0.566	0.020
Total After LC	- BFI-20 Conscientiousness	-0.313	0.055	-0.575	0.007

Table 7: Correlation between cognitive effort and conscientiousness.

Correlational analyses were used to examine the relationship between conscientiousness and cognitive effort. The results suggest that the correlation between effort LC and conscientiousness has an inverse relationship because Spearman's rho is negative. This could indicate that people who performed better on the cognitive effort task also scored lower on conscientiousness. The strength of the relationship was relatively low ( $\rho = -.367$ ) and can be considered as statistically significant ( $p = .023$ ). After LC and conscientiousness also had an inverse relationship where the strength can be considered relatively low ( $\rho = -.301$ ). This indicates that people who performed better on the cognitive effort task, after the low control condition, scored lower on conscientiousness. The correlation was marginally not statistically significant ( $p = .066$ ). The last correlation, between total after LC and conscientiousness, had an inverse relationship as well. Like the two other correlations, the strength of this one was also relatively low ( $\rho = .313$ ). This indicates that people who performed better on the cognitive effort task, in total after the low control condition, also

scored lower on conscientiousness. The correlation was marginally not statistically significant ( $p = .055$ ).

## **Discussion**

We predicted that feeling of control, a state, affected cognitive effort spent, and that feeling not in control reduced cognitive effort. A second prediction was that cognitive effort spent was higher in those who showed more stress tolerance, more study well-being and lower anxiety. In addition, we predicted that anxiety, a trait, affected cognitive effort spent, specifically in the low control condition. A fourth prediction was that study satisfaction was lower among those who scored high on anxiety, low on stress tolerance, high on neuroticism and low on openness to experience and high on procrastination. Another prediction was that curiosity correlated positively with openness to experience. The last and additional prediction was that conscientiousness, a trait, affected cognitive effort spent, specifically in the low control condition. The first four hypotheses were not supported by the results of this experiment. As for the fifth and sixth predictions, the results partially supported the hypotheses.

Even though most of the results from this experiment were considered not statistically significant, they did indicate a small tendency towards feeling of control affecting cognitive effort spent. Those who received the low control condition first did have fewer beads counts correct than those who received the high control condition first. This supports that cognitive effort is dynamic and can change within individuals as a response to environmental and individual factors (Longo & Barrett, 2010), and that there is a possibility that states affect cognitive effort. Lower intrinsic motivation in the low control condition could potentially have affected the results because they got random feedback which could have decreased their feeling of competence (Ryan & Deci, 2000). In addition, if cognitive abilities affect academic performance, and feeling of control affect cognitive effort, one can assume that feeling of control affects academic performance, at least indirectly. However, it is important to keep in mind that the relationship between perception of control and academic performance is not clear cut (Stipek & Weisz, 1981). Given that it is true that states affect cognitive effort, increased knowledge on this topic could make it easier to come up with more appropriate and effective ways of teaching. In addition, students might find better coping mechanisms to prevent the feeling of not being in control, which could increase cognitive effort spent, and potentially also affect their academic performance. One last factor that could have affected the

results is attention, which is important for cognitive effort and motivation (Longo & Barrett, 2010). The beads counting task was repetitive, and if the participants became bored or uninterested in addition to feeling low intrinsic motivation, specifically in the low control condition, that might have caused them to pay less attention and engage in less cognitive effort, even in the high control condition.

Because there was no significant effect of order, the covariates sPPS ( $p = .079$ ) and anxiety ( $p = .078$ ) were not the main focus in the result section, but they were both marginally statistically significant ( $p < .05$ ). The reason why the results ended up as it did, that is; showing a small tendency that was not statistically significant, could be because of the strict alpha level and the small sample size. Because of the small sample size, one could have chosen a larger alpha level, such as  $p < .1$ . This would have resulted in feeling of control having a statistically significant effect on cognitive effort spent and the covariates, would have been statistically significant as well. If this was the case, it would have provided support for Whitson and Galinsky's (2008) claim that failing to achieve certainty and being in control triggers an unsettling and aversive state instead of only showing possible support for their claim. However, increasing the alpha level could also increase the chance of accepting that cognitive effort had an effect when in fact it does not have any. Hence, to avoid this, a larger sample size would be more appropriate to be able to make a statement with more certainty.

Procrastination had no statistical significance, but our results indicated that higher procrastination leads to higher effort in the beads counting task. Procrastination is occasionally used in a positive sense, and the results could be explained by active procrastination. This is a form of positive procrastination where one makes a deliberate decision to procrastinate because one prefers to work under pressure (Steel, 2007). Chu and Choi (2005) found that active procrastinators are similar to non-procrastinators in terms of coping styles, use and control of time, and academic performance. This indicates that just because one procrastinates, one does not necessarily invest less cognitive effort than non-procrastinators, which could explain why we found a positive relationship between procrastination and cognitive effort.

In addition, though not statistically significant, our results indicated that the more anxious one was, the lower effort one had on the beads counting task. This seems to contradict the assumption that highly anxious individuals exhibit greater cognitive effort to maintain performance effectiveness (Ansari & Derakshan, 2011). An explanation for this could be that the experimental tasks in the current study was not made to directly increase or decrease anxiety.

Another factor worth mentioning is regarding the feeling of control task. The question “Hvilken bokstav tror du er den riktige?” was asked twice, once after the feeling of control task and again at the end of the survey. The order of the alternative answers was randomized for both questions to differentiate those who took a wild guess and those who made an effort to get the “correct” answer. Strictly speaking, only the participants who answered “Ingen/vet ikke”, which is the preferred answer, was affected by the manipulation. However, using this strict criterion would have reduced the sample size by at least 50%, which would further lead to an even smaller sample size. A small sample size increases the chance to make type II error. To avoid this, participants answering “Ingen/vet ikke” and “Kombinasjon” in the low control condition was treated as having answered correctly. Any other response was treated as guessing and that they most likely was not affected by the manipulation.

The results of the second hypothesis was not significant, but it is interesting that they yielded a slightly positive relationship between cognitive effort and the predictors stress tolerance and satisfaction with study programme. Even though the current experiment did not measure learning strategies, it seems to contradict the results by Dupeyrat and Mariné (2005) who found a negative correlation between shallow learning strategies and effort and achievement. However, it is worth noticing that Dupeyrat and Mariné (2005) assessed effort by a task meant to prepare students for their final exams. The current study assessed effort by a beads counting task, which was not related to the participant’s exams. The differences of the results could potentially be related to autonomous and controlled motivation. Even though both effort tasks was measured multiple times, Dupeyrat and Mariné’s (2005) effort task was related to the exams which could result in a higher feeling of controlled motivation compared to the beads counting task.

In addition, for the second analysis, the  $R^2$  ( $R^2 = .071$ ) was low, which is an indicator of a poor model. This could explain why adj.  $R^2$  was negative. Again, an increased sample size could change the non-significant results. It would most likely make adj.  $R^2$  and  $R^2$  approach each other, and a larger sample size would increase  $R^2$ , hence adj.  $R^2$  would also be affected. In retrospect, even though only three of the participants answered “Har ikke studert” and it might not affect the results, excluding them from this analysis made the sample size smaller than it already is. This could also partially explain the value of  $R^2$  and adj.  $R^2$ .

For the third hypothesis, the results suggest that there is in general no relationship between cognitive effort and anxiety. That is; anxiety, which is a trait, does not affect cognitive effort spent. The result is not in line with figure 2 (Longo & Barrett, 2010) in which anxiety is considered as one of the components of cognitive effort. According to the figure

one would expect anxiety to correlate one way or another with cognitive effort. It is worth noticing that there seemed to be a negative relationship between cognitive effort and anxiety when stress tolerance and study satisfaction was included. This indicates that anxiety alone might not have a relationship with cognitive effort, but taken together with other factors, it does have a relationship with cognitive effort spent. Still, the negative relationship between cognitive effort and anxiety does not support Ansari and Derakshan's (2011) findings that higher anxiety results in higher cognitive effort. Like the first hypotheses, this one could have benefited from a larger sample size to be able to make a more conclusive statement about how the anxiety trait affects cognitive effort.

As for the fourth hypothesis, which was excluded, sample size was again an issue and the main reason as to why the analysis was not possible to implement. If this analysis were to be conducted it would end up underpowered and uninterpretable. A larger one would increase the chance of a more equal distribution for the question about study satisfaction, and hopefully have provided interpretable results. In addition, convenience sampling created a ceiling effect, and the non-probability sample could lead to biased results that cannot be considered as representative of the population (Farrokhi & Mahmoudi-Hamidabad, 2012). Convenience sampling could have been avoided by not recruiting participants familiar to the researcher. In addition, this was the only hypothesis which explicitly included procrastination. When data for this hypothesis proved to not work out, the sPPS questionnaire became unnecessary. The sPPS was used for the first analysis but knowing that it would not be used for the current prediction, it would not have been a problem to exclude it from the survey.

The results of the fifth hypothesis yielded some significant results. Specifically, joyful exploration, sensitivity to deprivation and sensation seeking all significantly correlated positively with openness to experience. Hence, the results partially supported the hypothesis that curiosity correlated positively with openness to experience. Curiosity is considered as an influencing factor of cognitive effort, which indicates that openness to experience could impact cognitive effort spent. In addition, the results support previous research (Kashdan, et al., 2018) showing that people scoring high on joyful exploration derives positive meaning from learning new information and experiences. An issue with this hypothesis is that it is not directly related to the rest of the hypotheses and the research questions, which makes the results difficult to interpret in relation to the rest of the assignment.

As a result, we added an additional hypothesis which yielded some significant results. Cognitive effort in the low control condition had a statistically significant negative correlation with conscientiousness. That higher performance on the cognitive effort task means lower

scores on conscientiousness could be explained by the manipulation task. The low control condition was supposed to make the participants feel like they were not in control, hence the participants might have entered the beads counting task and questionnaires with a feeling of uncertainty. Because the participants did not get any feedback on the beads counting task, the state of feeling uncertain could result in underreporting when answering the BFI-20. If this is true, then states can bias self-report measures, which is in line with previous research on issues with self-report measures (Podsakoff & Organ, 1986).

## **Conclusion**

The purpose of this study was to assess if motivation in the academic context was a state or a trait through cognitive effort and its influencing factors, in addition to see if one's current state affects cognitive effort. Judging by the results it seems that both states and traits affect cognitive effort spent. Feeling of control affected cognitive effort and there was a relationship between cognitive effort, stress tolerance, study satisfaction and anxiety. However, cognitive effort and anxiety alone did not have any relationship. This supports the previous statements made in this assignment that cognitive effort is a complex concept where the different components of cognitive effort are complementary. Lastly, it seems that cognitive effort affects how one reports on conscientiousness, and that one's current state could mediate this relationship. If both states and traits affect cognitive effort spent, more research on the topic of state vs. trait in the academic context is needed. More research on states could for example help improve teaching interventions and alike to boost academic performance and help students increase their intrinsic motivation, which is important to succeed in the academic world. In addition, though not statistically significant, there was a tendency towards one's current state, such as anxiety, affecting cognitive effort. The overall challenge for this experiment seems to be that the sample size was too small to be able to make any statements with certainty. To gain a deeper and better understanding of whether motivation in the academic context can be considered as a trait or a state, future research could replicate a version of this experiment with a larger sample size, adjusted hypotheses where procrastination is included, as well as only focusing on relationships regarding cognitive effort. In addition, academic achievement should be explicitly measured to be able to make direct conclusions about the relationship between state and traits and academic achievement.

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## Appendices

### Appendix A: Survey

## Appendix A: Survey



HL1

### ID-nummer

ID\* The value must be between 100 and 150, inclusive.



HL1

### Velkommen!

Mitt navn er Celine Rognskaug, og jeg går sisteåret på masterstudiet i psykologi ved NTNU.

Formålet med denne studien er å undersøke nysgjerrighet og studenttrivsel hos norske studenter, og jeg setter stor pris på at akkurat du hjelper meg med dette.

Data som samles inn vil være anonyme, og det er kun veilederen min og jeg som vil ha tilgang til opplysningene som samles inn. Informasjon og data vil ikke videresendes eller deles med andre, men du vil få mulighet til å få tilgang til dine resultater etter at datainnsamlingen er avsluttet.

Prosjektet vil avsluttes mai 2019, men data vil fortsatt være lagret for fremtidig forskning på området. Data vil lagres trygt, og vil kun brukes i forbindelse med min masteroppgave.

Om du velger å delta får du en del oppgaver hvor noen kan oppleves som vanskelig, i tillegg til spørreskjemaer. Vennligst les teksten nøye for å forsikre deg om at du har forstått oppgavene riktig, og svar på alt så godt som mulig. Studien tar omtrent 30-35 minutter å gjennomføre.

Alle som fullfører studien er med i trekningen av et gavekort på 300 kroner fra Gavetorget. Det deles ut flere gavekort, og de kan brukes i hele Norge.

Deltakelse er frivillig, og du kan når som helst trekke deg fra studien uten å oppgi grunn.

Ved å gå videre samtykker du til delta i studien.

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Kontaktopplysninger:

Navn: Celine Rognskaug

Mail: celiner@stud.ntnu.no

### Identifisering av konsept

Dette er en oppgave der du skal identifisere et konsept. Programmet velger et konsept, og ved hjelp av tilbakemeldingene fra programmet er det din oppgave å avgjøre hva konseptet er.

Du vil få presentert et par med bokstaver ("T" og "A"). I hvert bokstavpar representerer den ene bokstaven konseptet valgt av programmet, og den andre bokstaven representerer feil konsept. Din oppgave er å avgjøre hvilken side av skjermen som viser den riktige bokstaven.

Hver gang du velger en bokstav vil programmet fortelle deg om du har valgt riktig eller galt svar, og deretter presentere et nytt par med bokstaver. Du vil totalt eksponeres for 15 par. Riktig svar vil være på bakgrunn av type bokstav (T eller A), størrelse (f.eks. t eller A), eller farge (rød eller svart). Du lærer det riktige svaret basert på programmets tilbakemelding. Velg riktig så ofte som mulig.

Du vil få en prøverunde hvor du presenteres for fem par med symboler. Dette er for å gi deg en mulighet til å bli vant til oppgaven.

Lykke til!



Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"  
 Bokstaven "a"

HL1

**Tilbakemelding prøverunde 1**

Riktig svar var bokstaven "a", gjeldende konsept er fargen rød.



HL1

**Prøverunde 2**

Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"
- Bokstaven "a"



HL1

**Tilbakemelding prøverunde 2**

Riktig svar var bokstaven "T", gjeldende konsept er fargen rød.



**Prøverunde 3**

Hvilken bokstav tror du er den riktige?\*

- Bokstaven "t"
- Bokstaven "A"

**Tilbakemelding prøverunde 3**

Riktig svar var bokstaven "A", gjeldende konsept er fargen rød.

**Prøverunde 4**



Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"
- Bokstaven "a"



**HL1**

#### **Tilbakemelding prøverunde 4**

Riktig bokstav var "a", gjeldende konsept er fargen rød.



**HL1**

#### **Prøverunde 5**



Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"  
 Bokstaven "a"



**HL1**

### Tilbakemelding prøverunde 5

Riktig svar var bokstaven "T", gjeldende konsept er fargen rød.

---

Prøverundene er nå over. På neste side starter 15 oppgaver. Du har blitt valgt ut til å være i en baseline-gruppe der du ikke får tilbakemelding på om svarene dine er riktige eller ikke. Det vil si at prestasjonen din ikke har noe å si, jeg ønsker bare at du skal følge instinktene dine. Det er normalt å kunne bli litt forvirret under oppgaveløsingen.

VIKTIG: I tillegg til konseptene bokstav, farge og størrelse kan noen av bokstavene ha en BLÅ RING rundt seg. Dette er et konsept på lik linje med de andre.

Lykke til!

**Oppgave 1**

Hvilken bokstav tror du er den riktige?\*

- Bokstaven "t"
- Bokstaven "A"

**Oppgave 2**



Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"
- Bokstaven "a"

**HL1****Oppgave 3**

Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"
- Bokstaven "a"

**HL1****Oppgave 4**

Hvilken bokstav tror du er den riktige?\*

- Bokstaven "t"
- Bokstaven "A"

**HL1****Oppgave 5**



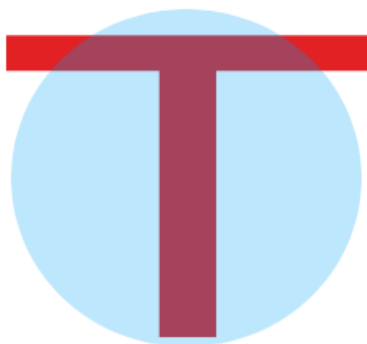
Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"
- Bokstaven "a"

**HL1****Oppgave 6**

Hvilken bokstav tror du er den riktige?\*

- Bokstaven "t"  
 Bokstaven "A"

**HL1****Oppgave 7**

Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"  
 Bokstaven "a"

**HL1****Oppgave 8**





Hvilken bokstav tror du er den riktige?\*

- Bokstaven "t"
- Bokstaven "A"



**HL1**

### Oppgave 9



Hvilken bokstav tror du er den riktige?\*

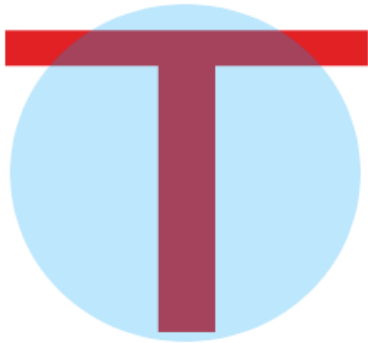
- Bokstaven "T"  
 Bokstaven "a"

**HL1****Oppgave 10**

Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"  
 Bokstaven "a"

**HL1****Oppgave 11**



a

Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"  
 Bokstaven "a"



HL1

### Oppgave 12



a

Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"
- Bokstaven "a"

**HL1****Oppgave 13**

Hvilken bokstav tror du er den riktige?\*

- Bokstaven "t"
- Bokstaven "A"

**HL1****Oppgave 14**



Hvilken bokstav tror du er den riktige?\*

- Bokstaven "t"
- Bokstaven "A"

**HL1****Oppgave 15**

Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"
- Bokstaven "a"

**HL1**

### Flott, du er nå ferdig med del 1!

Hvilket konsept tror du var riktig?/Hvilket konsept har du valgt?\*

- Farge
- Type bokstav
- Størrelse på bokstav
- Ingen/Vet ikke
- Blå ring
- Kombinasjon

---

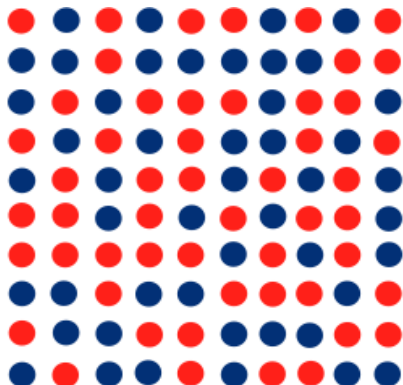
Videre vil du få en del oppgaver kombinert med noen spørreskjemaer. Noen av oppgavene kan oppleves som krevende, men svar på alt så godt som mulig. Ta utgangspunkt i hverdagen når det gjelder spørreskjemaene.

Lykke til!

**HL1**

### Oppgave 1

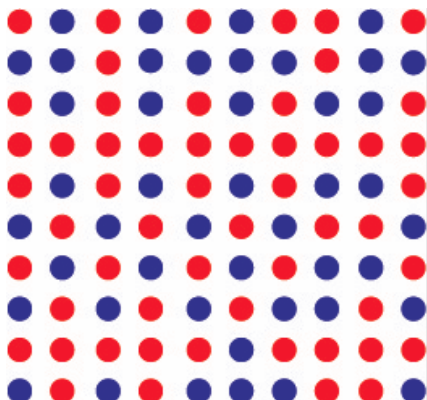
Under ser du et brett med blå og rød baller. Angi hvilken farge det er mest av.



Hvilken farge er det mest av?\*

- Mest blå baller
- Mest rød baller

Under ser du et brett med blå og rød baller. Angi hvilken farge det er mest av.



Hvilken farge er det mest av?\*

- Mest blå baller
- Mest rød baller

### Spørsmål del 1

Nedenfor finner du noen påstander om hvordan du vanligvis arbeider, liker å angripe oppgaver, og hvordan du er innstilt til utfallet av ulike hendelser. Vurder i hvilken grad disse utsagnene passer deg best. Gi din ærlige og oppriktige mening, og angi det du vanligvis gjør - det som er typisk for deg. Det er ingen rette eller gale svar.

(1 = Beskriver meg ikke i det hele tatt; 7 = Beskriver meg helt)\*

	1	2	3	4	5	6	7
Jeg ser på utfordrende situasjoner som en mulighet for å vokse og lære	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Å tenke på løsninger til vanskelige konseptuelle problemer kan holde meg våken om natten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Den minste tvil kan stoppe meg fra å oppsøke nye opplevelser	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg liker å lære om andres vaner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Angsten ved å gjøre noe nytt får meg til å føle meg spent og levende	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Nedenfor finner du noen påstander som angår din evne til å fullføre oppgaver og treffe beslutninger. Vurder i hvilken grad disse utsagnene passer til deg ved å velge det alternativet som passer best.

(1 = Passer ikke i det hele tatt; 5 = Passer svært godt)\*

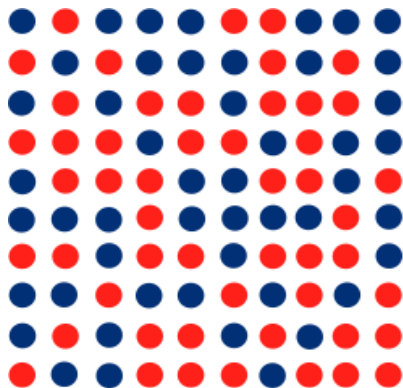
	1	2	3	4	5
Jeg utsetter å bestemme meg inntil det er for sent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Selv etter at jeg har bestemt meg, venter jeg med å gjøre det jeg har bestemt meg for	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



HL1

## Oppgave 2

Under ser du et brett med blå og rød baller. Angi hvilken farge det er mest av.



Hvilken farge er det mest av?\*

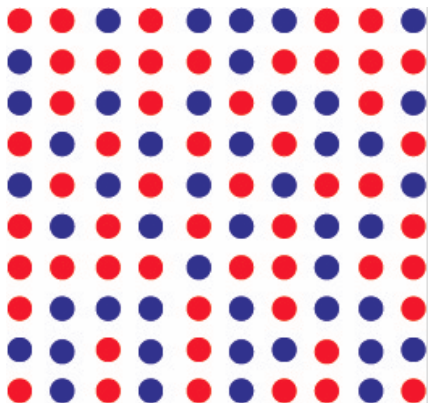
- Mest blå baller  
 Mest rød baller



HL1

Under ser du et brett med blå og rød baller. Angi hvilken farge det er mest av.





Hvilken farge er det mest av?\*

- Mest blå baller  
 Mest rød baller



**HL1**

## Spørsmål del 2

Nedenfor finner du noen påstander om hvordan du vanligvis arbeider, liker å angripe oppgaver, og hvordan du er innstilt til utfallet av ulike hendelser. Vurder i hvilken grad disse utsagnene passer deg best. Gi din ærlige og oppriktige mening, og angi det du vanligvis gjør - det som er typisk for deg. Det er ingen rette eller gale svar.

(1 = Beskriver meg ikke i det hele tatt; 7 = Beskriver meg helt)\*

	1	2	3	4	5	6	7
Jeg er alltid på utkikk etter opplevelser som utfordrer hvordan jeg tenker om meg selv og verden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg kan bruke timer på et enkelt problem fordi jeg ikke kan hvile uten å vite svaret	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg klarer ikke å håndtere stresset som kommer fra å komme inn i usikre situasjoner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg liker å finne ut hvorfor folk oppfører seg slik de gjør	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Risikotaking er spennende for meg	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Nedenfor finner du noen påstander som angår din evne til å fullføre oppgaver og treffe beslutninger. Vurder i hvilken grad disse utsagnene passer til deg ved å velge det alternativet som passer best.

(1 = Passer ikke i det hele tatt; 5 = Passer svært godt)\*

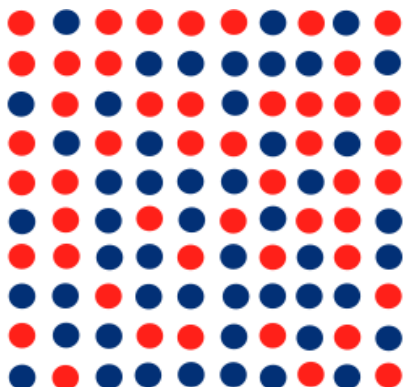
	1	2	3	4	5
Jeg sløser bort mye tid på trivielle ting før jeg endelig bestemmer meg	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



HL1

### Oppgave 3

Under ser du et brett med blå og rød baller. Angi hvilken farge det er mest av.



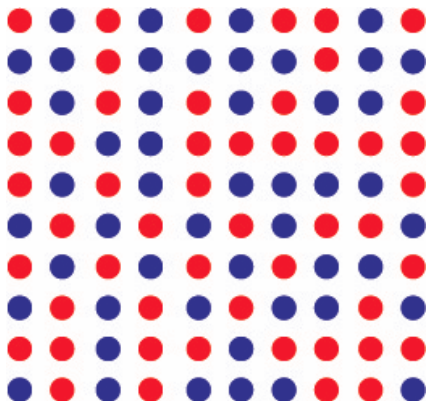
Hvilken farge er det mest av?\*

- Mest blå baller
- Mest rød baller



HL1

Under ser du et brett med blå og rød baller. Angi hvilken farge det er mest av.



Hvilken farge er det mest av?\*

Mest blå baller

Mest rød baller



**HL1**

### Spørsmål del 3

Nedenfor finner du noen påstander om hvordan du vanligvis arbeider, liker å angripe oppgaver, og hvordan du er innstilt til utfallet av ulike hendelser. Vurder i hvilken grad disse utsagnene passer deg best. Gi din ærlige og oppriktige mening, og angi det du vanligvis gjør - det som er typisk for deg. Det er ingen rette eller gale svar.

(1 = Beskriver meg ikke i det hele tatt; 7 = Beskriver meg helt)\*

	1	2	3	4	5	6	7
Jeg oppsøker situasjoner der det er sannsynlig at jeg må tenke i dybden om noe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg føler meg frustrert hvis jeg ikke kan finne løsningen på et problem, så jeg jobber enda hardere for å løse det	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg synes det er vanskelig å utforske nye steder når jeg mangler tillit til mine egne evner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Når andre mennesker har en samtale, liker jeg å finne ut hva den handler om	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
På fritiden min vil jeg gjøre ting som er litt skumle	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

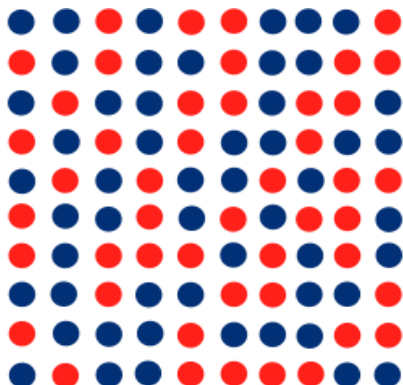
Nedenfor finner du noen påstander som angår din evne til å fullføre oppgaver og treffe beslutninger. Vurder i hvilken grad disse utsagnene passer til deg ved å velge det alternativet som passer best.

(1 = Passer ikke i det hele tatt; 5 = Passer svært godt)\*

	1	2	3	4	5
Når jeg har en tidsfrist, sløser jeg ofte bort tiden med å gjøre andre ting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Selv ting jeg skal gjøre som bare krever at jeg setter meg ned og gjør dem, kan bli utsatt i dagevis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Oppgave 4**

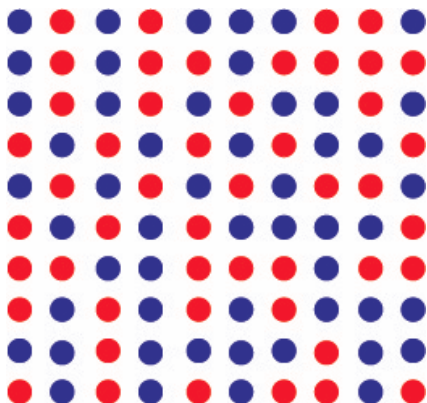
Under ser du et brett med blå og rød baller. Angi hvilken farge det er mest av.



Hvilken farge er det mest av?\*

- Mest blå baller
- Mest rød baller

Under ser du et brett med blå og rød baller. Angi hvilken farge det er mest av.



Hvilken farge er det mest av?\*

- Mest blå baller
- Mest rød baller

### Spørsmål del 4

Nedenfor finner du noen påstander om hvordan du vanligvis arbeider, liker å angripe oppgaver, og hvordan du er innstilt til utfallet av ulike hendelser. Vurder i hvilken grad disse utsagnene passer deg best. Gi din ærlige og oppriktige mening, og angi det du vanligvis gjør - det som er typisk for deg. Det er ingen rette eller gale svar.

(1 = Beskriver meg ikke i det hele tatt; 7 = Beskriver meg helt)\*

	1	2	3	4	5	6	7
Jeg liker å lære om temaer som er ukjente for meg	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg jobber nådeløst med problemer som jeg føler må løses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg fungerer ikke godt hvis jeg er usikker på om en ny erfaring er trygg	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Når jeg er rundt andre mennesker liker jeg å høre på samtalene deres	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Å skape et eventyr mens jeg går er mye mer tiltalende enn et planlagt eventyr	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

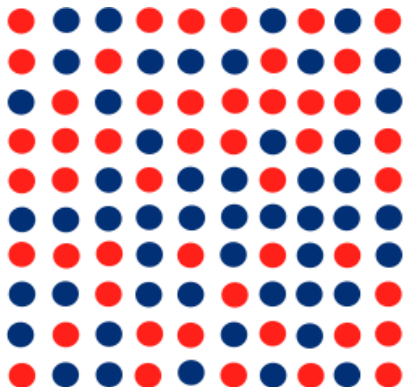
Nedenfor finner du noen påstander som angår din evne til å fullføre oppgaver og treffe beslutninger. Vurder i hvilken grad disse utsagnene passer til deg ved å velge det alternativet som passer best.

(1 = Passer ikke i det hele tatt; 5 = Passer svært godt)\*

	1	2	3	4	5
Jeg tar meg ofte i å gjøre ting som jeg skulle gjort for flere dager siden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Oppgave 5

Under ser du et Brett med blå og rød baller. Angi hvilken farge det er mest av.

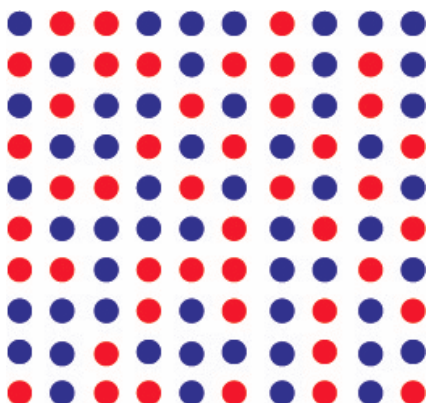


Hvilken farge er det mest av?\*

- Mest blå baller
- Mest rød baller

**HL1**

Under ser du et brett med blå og rød baller. Angi hvilken farge det er mest av.



Hvilken farge er det mest av?\*

- Mest blå baller
- Mest rød baller

**HL1**

### Spørsmål del 5

Nedenfor finner du noen påstander om hvordan du vanligvis arbeider, liker å angripe oppgaver, og hvordan du er innstilt til utfallet av ulike hendelser. Vurder i hvilken grad disse utsagnene passer deg best. Gi din ærlige og oppriktige mening, og angi det du vanligvis gjør - det som er typisk for deg. Det er ingen rette eller gale svar.

(1 = Beskriver meg ikke i det hele tatt; 7 = Beskriver meg helt)\*

	1	2	3	4	5	6	7
Jeg synes det er fascinerende å lære ny informasjon	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Det frustrerer meg å ikke ha all den informasjonen jeg trenger	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Det er vanskelig å konsentrere seg når det er en mulighet for at jeg vil overraskes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Når folk krangler, liker jeg å vite hva som skjer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg foretrekker venner som er spennende uforutsigbare	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Nedenfor finner du noen påstander som angår din evne til å fullføre oppgaver og treffe beslutninger. Vurder i hvilken grad disse utsagnene passer til deg ved å velge det alternativet som passer best.

(1 = Passer ikke i det hele tatt; 5 = Passer svært godt)\*

	1	2	3	4	5
Jeg sier hele tiden «Jeg skal gjøre det i morgen»	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg venter vanligvis med å begynne å gjøre noe jeg skal gjøre	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



**HL1**

## Flott, du er nå ferdig med del 2!

Helt til slutt vil du få et par korte spørreskjemaer. Svar så godt som mulig, og ta utgangspunkt i hverdagen.



**HL1**

## Angst

Nedenfor finner du noen påstander relatert til angst. Angi i hvilken grad du er påvirket av hvert symptom. Gi din ærlige og oppriktige mening, og angi det du vanligvis føler - det som er typisk for deg. Det er ingen rette eller gale svar.

(0 = Ikke i det hele tatt; 3 = Alvorlig, jeg kan så vidt holde ut)\*

	0	1	2	3
Nummenhet eller kribling	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hetetokter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Skjelving i bena	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ute av stand til å slappe av	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Redd for at det verste kan/skulle skje	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Svimmel eller ør	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bankende eller galopperende hjerte	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ustø	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vettskremt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nervøs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kvelningsfølelser	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Skjelving på hender	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Skjelven	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Redd for å miste kontrollen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vansker med å puste/pustevansker	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Frykt for å dø	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Skremt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mage- eller tarmbesvær	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Svimling	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ansiktsrødme	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Svetteing (som ikke skyldes varme)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Siste spørsmål

Hvilket konsept valgte du som riktig for del 1?\*

- Type bokstav
- Størrelse på bokstav
- Ingen/Vet ikke
- Kombinasjon
- Farge
- Blå ring



**Tusen takk for at du deltok i undersøkelsen!**

Dersom du har noen spørsmål eller er interessert i å vite noe mer om undersøkelsen kan du kontakte meg på mail.

---

Kontaktopplysninger:

Navn: Celine Rognskaug

Mail: celiner@stud.ntnu.no



HL2

**ID-nummer**

ID\* The value must be between 100 and 150, inclusive.



HL2

**Velkommen!**

Mitt navn er Celine Rognskaug, og jeg går sisteåret på masterstudiet i psykologi ved NTNU.

Formålet med denne studien er å undersøke nysgjerrighet og studenttrivsel hos norske studenter, og jeg setter stor pris på at akkurat du hjelper meg med dette.

Data som samles inn vil være anonyme, og det er kun veilederen min og jeg som vil ha tilgang til opplysningene som samles inn. Informasjon og data vil ikke videresendes eller deles med andre, men du vil få mulighet til å få tilgang til dine resultater etter at datainnsamlingen er avsluttet.

Prosjektet vil avsluttes mai 2019, men data vil fortsatt være lagret for fremtidig forskning på området. Data vil lagres trygt, og vil kun brukes i forbindelse med min masteroppgave.

Om du velger å delta får du en del oppgaver hvor noen kan oppleves som vanskelig, i tillegg til spørreskjemaer. Vennligst les teksten nøye for å forsikre deg om at du har forstått oppgavene riktig, og svar på alt så godt som mulig. Studien tar omtrent 30-35 minutter å gjennomføre.

Alle som fullfører studien er med i trekningen av et gavekort på 300 kroner fra Gavetorget. Det deles ut flere gavekort, og de kan brukes i hele Norge.

Deltakelse er frivillig, og du kan når som helst trekke deg fra studien uten å oppgi grunn.

Ved å gå videre samtykker du til delta i studien.

---

Kontaktopplysninger:

Navn: Celine Rognskaug

Mail: celiner@stud.ntnu.no

### Identifisering av konsept

Dette er en oppgave der du skal identifisere et konsept. Programmet velger et konsept, og ved hjelp av tilbakemeldingene fra programmet er det din oppgave å avgjøre hva konseptet er.

Du vil få presentert et par med bokstaver ("T" og "A"). I hvert bokstavpar representerer den ene bokstaven konseptet valgt av programmet, og den andre bokstaven representerer feil konsept. Din oppgave er å avgjøre hvilken side av skjermen som viser den riktige bokstaven.

Hver gang du velger en bokstav vil programmet fortelle deg om du har valgt riktig eller galt svar, og deretter presentere et nytt par med bokstaver. Du vil totalt eksponeres for 15 par. Riktig svar vil være på bakgrunn av type bokstav (T eller A), størrelse (f.eks. t eller A), eller farge (rød eller svart). Du lærer det riktige svaret basert på programmets tilbakemelding. Velg riktig så ofte som mulig.

Du vil få en prøverunde hvor du presenteres for fem par med symboler. Dette er for å gi deg en mulighet til å bli vant til oppgaven.

Lykke til!



Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"  
 Bokstaven "a"

HL2

**Tilbakemelding prøverunde 1**

Riktig svar var bokstaven "a", gjeldende konsept er størrelse.



HL2

**Prøverunde 2**

Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"
- Bokstaven "a"



HL2

**Tilbakemelding prøverunde 2**

Riktig svar var bokstaven "a", gjeldende konsept er størrelse.

**Prøverunde 3**

Hvilken bokstav tror du er den riktige?\*

- Bokstaven "t"
- Bokstaven "A"

**Tilbakemelding prøverunde 3**

Riktig svar var bokstaven "t", gjeldende konsept er størrelse.

**Prøverunde 4**



Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"
- Bokstaven "a"



**HL2**

#### **Tilbakemelding prøverunde 4**

Riktig bokstav var "a", gjeldende konsept er størrelse.



**HL2**

#### **Prøverunde 5**



Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"  
 Bokstaven "a"



**HL2**

### Tilbakemelding prøverunde 5

Riktig svar var bokstaven "a", gjeldende konsept er størrelse.

---

Prøverundene er nå over. På neste side starter 15 oppgaver. Du kommer kun til å få en enkel tilbakemelding om svaret ditt er riktig eller feil.

VIKTIG: I tillegg til konseptene bokstav, farge og størrelse kan noen av bokstavene ha en BLÅ RING rundt seg. Dette er et konsept på lik linje med de andre. Benytt tilbakemeldingene til å endre strategiene dine.

Lykke til!

## Oppgave 1



Hvilken bokstav tror du er den riktige?\*

- Bokstaven "t"
- Bokstaven "A"

 Feil svar



**Oppgave 2**

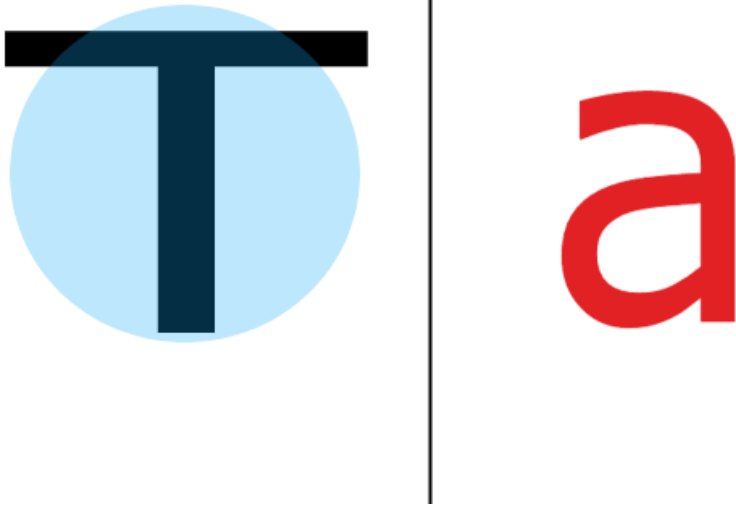
Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"
- Bokstaven "a"

**HL2**

 **Riktig svar!**

**HL2****Oppgave 3**



Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"
- Bokstaven "a"



HL2

**X** Feil svar



HL2

**Oppgave 4**



Hvilken bokstav tror du er den riktige?\*

- Bokstaven "t"
- Bokstaven "A"



HL2

 **Riktig svar!**



HL2

**Oppgave 5**



Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"
- Bokstaven "a"



HL2

**X** Feil svar



HL2

**Oppgave 6**



Hvilken bokstav tror du er den riktige?\*

- Bokstaven "t"
- Bokstaven "A"



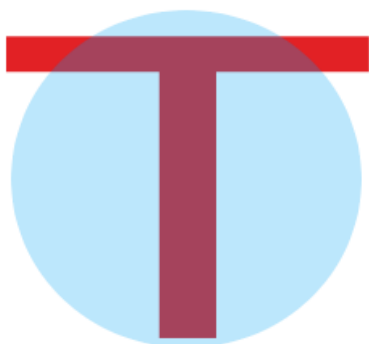
HL2

**X** Feil svar



HL2

**Oppgave 7**



a

Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"
- Bokstaven "a"



HL2

✓ Riktig svar!



HL2

**Oppgave 8**



Hvilken bokstav tror du er den riktige?\*

- Bokstaven "t"
- Bokstaven "A"



HL2

 **Riktig svar!**



HL2

**Oppgave 9**



Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"
- Bokstaven "a"



HL2

 **Riktig svar!**



HL2

**Oppgave 10**





Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"
- Bokstaven "a"



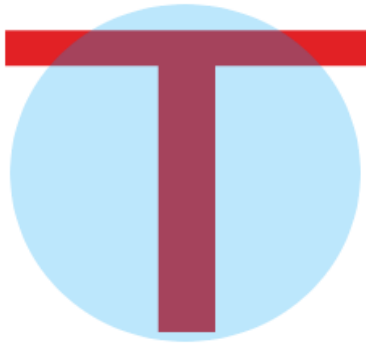
HL2

 Feil svar



HL2

**Oppgave 11**



a

Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"
- Bokstaven "a"



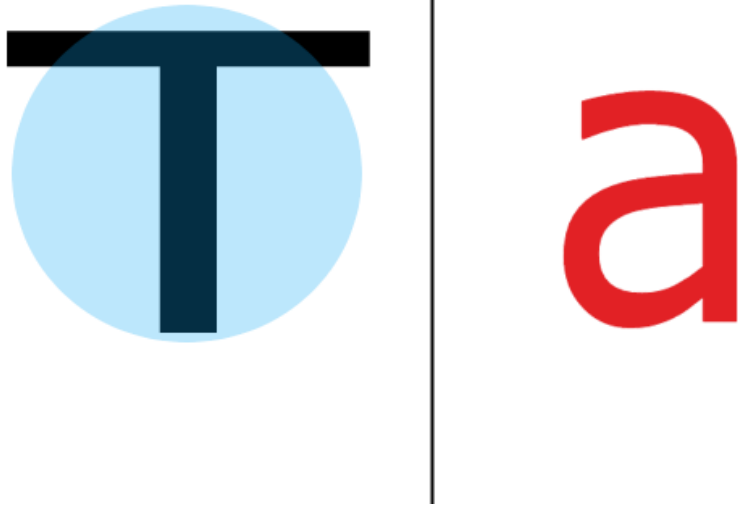
HL2

✓ Riktig svar!



HL2

**Oppgave 12**



Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"
- Bokstaven "a"



HL2

**X** Feil svar



HL2

**Oppgave 13**



Hvilken bokstav tror du er den riktige?\*

- Bokstaven "t"
- Bokstaven "A"



HL2

 Riktig svar!



HL2

**Oppgave 14**



Hvilken bokstav tror du er den riktige?\*

- Bokstaven "t"
- Bokstaven "A"



HL2

 Feil svar



HL2

**Oppgave 15**



Hvilken bokstav tror du er den riktige?\*

- Bokstaven "T"
- Bokstaven "a"



HL2

 Feil svar



HL2

**Flott, du er nå ferdig med del 1!**

Hvilket konsept tror du var riktig?/Hvilket konsept har du valgt?\*

- Type bokstav
- Blå ring
- Størrelse på bokstav
- Ingen/Vet ikke

- Farge
- Kombinasjon

---

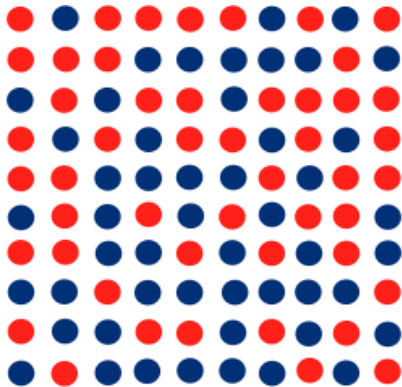
Videre vil du få en del oppgaver kombinert med noen spørreskjemaer. Noen av oppgavene kan oppleves som krevende, men svar på alt så godt som mulig. Ta utgangspunkt i hverdagen når det gjelder spørreskjemaene.

Lykke til!

**HL2**

### Oppgave 1

Under ser du et brett med blå og rød baller. Angi hvilken farge det er mest av.

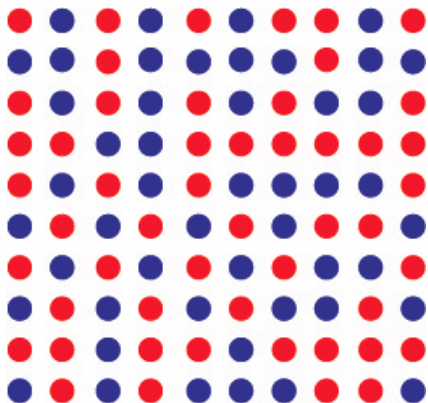


Hvilken farge er det mest av?\*

- Mest blå baller
- Mest rød baller

**HL2**

Under ser du et brett med blå og rød baller. Angi hvilken farge det er mest av.



Hvilken farge er det mest av?\*

- Mest blå baller
- Mest rød baller



HL2

### Spørsmål del 1

Nedenfor finner du noen påstander som passer mer eller mindre godt for ulike mennesker. Kryss av i den ruten som passer best for deg slik du vanligvis er. Ikke tenk for mye på hver oppgave, men sett et kryss i ruten du umiddelbart synes stemmer best. Sett ett kryss per linje.

(1 = Passer ikke; 7 = Passer helt)\*

	1	2	3	4	5	6	7
Er pratsom	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kan være kald og fjern	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gjør en grundig jobb	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Er deprimeret, nedtrykt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

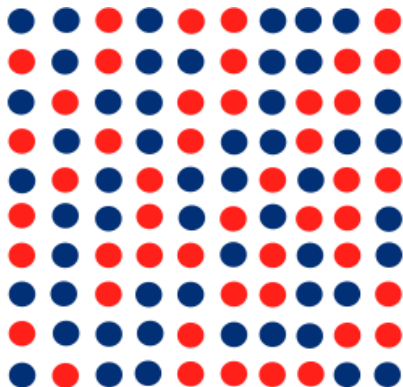


HL2

### Oppgave 2

Under ser du et brett med blå og rød baller. Angi hvilken farge det er mest av.





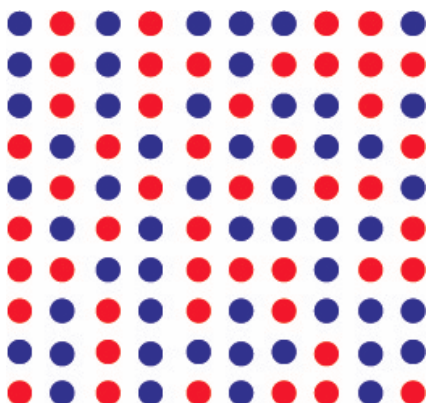
Hvilken farge er det mest av?\*

- Mest blå baller
- Mest rød baller



**HL2**

Under ser du et brett med blå og rød baller. Angi hvilken farge det er mest av.



Hvilken farge er det mest av?\*

- Mest blå baller
- Mest rød baller



**HL2**

### Spørsmål del 2

Nedenfor finner du noen påstander som passer mer eller mindre godt for ulike mennesker. Kryss av i den ruten som passer best for deg slik du vanligvis er. Ikke tenk for mye på hver oppgave, men sett et kryss i ruten du umiddelbart synes stemmer best. Sett ett kryss per linje.

(1 = Passer ikke; 7 = Passer helt)\*

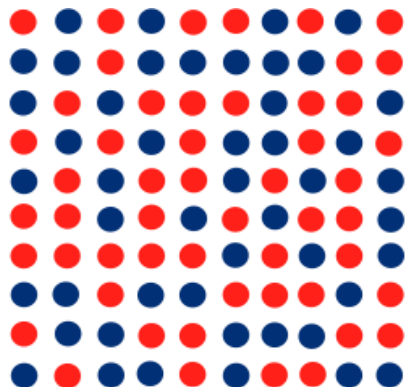
	1	2	3	4	5	6	7
Er original, kommer med nye ideer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Har en tendens til å være stille av seg	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Er hjelpsom og uegoistisk i forhold til andre	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Har en tendens til å ha lite orden på tilværelsen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



HL2

**Oppgave 3**

Under ser du et brett med blå og rød baller. Angi hvilken farge det er mest av.



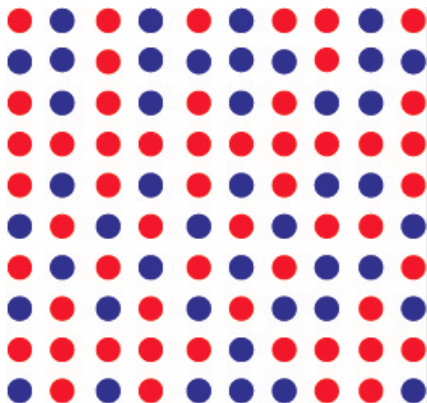
Hvilken farge er det mest av?\*

- Mest blå baller
- Mest rød baller



HL2

Under ser du et brett med blå og rød baller. Angi hvilken farge det er mest av.



Hvilken farge er det mest av?\*

- Mest blå baller  
 Mest rød baller



HL2

### Spørsmål del 3

Nedenfor finner du noen påstander som passer mer eller mindre godt for ulike mennesker. Kryss av i den ruten som passer best for deg slik du vanligvis er. Ikke tenk for mye på hver oppgave, men sett et kryss i ruten du umiddelbart synes stemmer best. Sett ett kryss per linje.

(1 = Passer ikke; 7 = Passer helt)\*

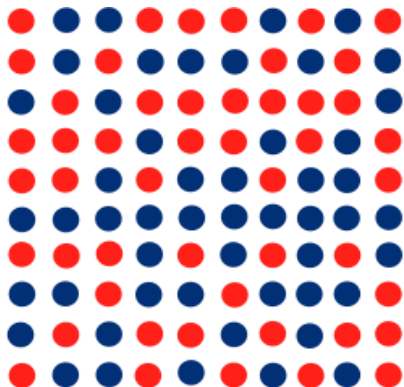
	1	2	3	4	5	6	7
Er avslappet, takler stress godt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Har livlig fantasi	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Er utadvendt og sosial	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kan noen ganger være uhøflig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



HL2

### Oppgave 4

Under ser du et Brett med blå og rød baller. Angi hvilken farge det er mest av.

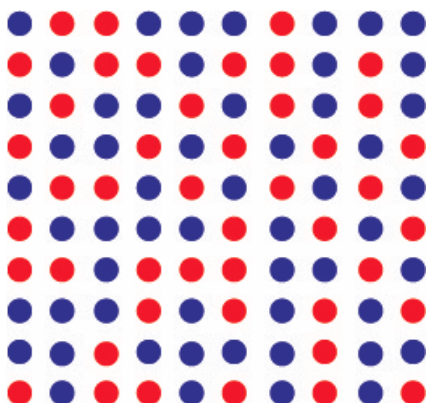


Hvilken farge er det mest av?\*

- Mest blå baller
- Mest rød baller

**HL2**

Under ser du et brett med blå og rød baller. Angi hvilken farge det er mest av.



Hvilken farge er det mest av?\*

- Mest blå baller
- Mest rød baller

**HL2**

#### Spørsmål del 4

Nedenfor finner du noen påstander som passer mer eller mindre godt for ulike mennesker. Kryss av i den ruten som passer best for deg slik du vanligvis er. Ikke tenk for mye på hver oppgave, men sett et kryss i ruten du umiddelbart synes stemmer best. Sett ett kryss per linje.

(1 = Passer ikke; 7 = Passer helt)\*

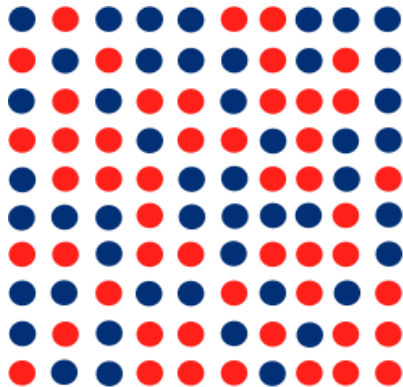
	1	2	3	4	5	6	7
Legger planer og følger dem opp	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bekymrer seg mye	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Liker å spekulere, leke med ideer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kan være sky og hemmet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



HL2

**Oppgave 5**

Under ser du et brett med blå og rød baller. Angi hvilken farge det er mest av.



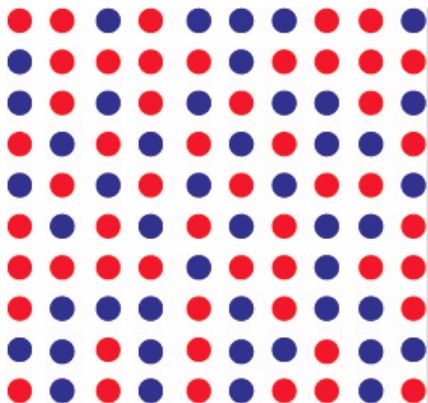
Hvilken farge er det mest av?\*

- Mest blå baller  
 Mest rød baller



HL2

Under ser du et brett med blå og rød baller. Angi hvilken farge det er mest av.



Hvilken farge er det mest av?\*

- Mest blå baller  
 Mest rød baller



**HL2**

### Spørsmål del 5

Nedenfor finner du noen påstander som passer mer eller mindre godt for ulike mennesker. Kryss av i den ruten som passer best for deg slik du vanligvis er. Ikke tenk for mye på hver oppgave, men sett et kryss i ruten du umiddelbart synes stemmer best. Sett ett kryss per linje.

(1 = Passer ikke; 7 = Passer helt)\*

	1	2	3	4	5	6	7
Er hensynsfull og vennlig overfor de fleste mennesker	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kan være uforsiktig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Blir lett nervøs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Har få kunstneriske interesser	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



**HL2**

### Flott, du er nå ferdig med del 2!

Helt til slutt vil du få noen korte spørsmål.

**Demografiske spørsmål**

Kjønn\*

- Kvinne  
 Mann

Alder\*

- 18-21  
 22-25  
 26-29  
 30+

Hva studerer/studerte du?\*

- Humaniora  
 Teologi  
 Jus  
 Teknikk  
 Naturvitenskap  
 Samfunnsvitenskap  
 Medisin og odontologi  
 Pleie og omsorg  
 Kunst  
 Annet  
 Har ikke studert

Er/var du fornøyd med studiet?\*

- Ja  
 Nei  
 Har ikke studert

Dersom du ikke fullførte studiet, føler/følte du deg bekymret over å ikke ha fullført?\*

- Ja  
 Nei  
 Har fullført/fullførte studiet

**Siste spørsmål**

Hvilket konsept valgte du som riktig for del 1?\*

- Størrelse på bokstav  
 Blå ring  
 Farge  
 Ingen/Vet ikke

- Kombinasjon
- Type bokstav

**HL2****Tusen takk for at du deltok i undersøkelsen!**

Dersom du har noen spørsmål eller er interessert i å vite noe mer om undersøkelsen kan du kontakte meg på mail.

---

Kontaktopplysninger:

Navn: Celine Rognskaug

Mail: [celiner@stud.ntnu.no](mailto:celiner@stud.ntnu.no)