Thinking Success, Behaving Successfully:

The Relation between Hypothetical Thinking Strategies, Effort towards Goal Attainment and Grit

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Preface

I wanted to write about a topic that had wide relevance across different areas of psychology. I was introduced to the concept of 'Grit' by Tove I. Dahl, who knew of my interest in achievement and effort in the field of educational psychology. I was, furthermore, introduced to counterfactual thinking by my supervisor Frode Svartdal. Through reviewing the literature, I identified the current gap and extended my scope to include Mental Contrasting Implementation Intentions and positive fantasy which seemed intricately linked with the research on grit. It has been challenging to work through the jungle of related literature from three strands of psychology (health, organizational and educational) but also very exciting. I want to thank Tove for her kindness and interest. She has been completely devoted to the wellbeing of the master student and the program. Frode, for his eager engagement in method and experimental design and rapid email response, Georg Elvebakk for his unwavering dedication to students and statistics and to Sarah Martiny who magically appear at the institute the last month of my thesis with sound knowledge of my theory and overwhelming willingness to help. Finally, I want to extend gratitude to my two small children, Aksel & Mathea, who have had to give up play sessions and quality time for my education and to my fiancée Thomas for his support and dedication especially in the last months.

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Abstract (Norwegian)

Denne masteroppgaven undersøkte forholdet mellom hypotetiske tankestrategier og personens standhaftighet og iver for langsiktige mål, grit (Duckworth, Peterson, Matthews, & Kelly, 2007). For å kunne undersøke grit i et norsk utvalg ble grit skalaen oversatt ved bruk av parallell blindteknikk og administrert til 143 deltagere rekruttert fra UiT via nettet (Studie 1). To studier ble så gjennomført for å undersøke forholdet mellom grit og hypotetiske tankestrategier. Studie 2 (N=117) brukte scenario-beskrivelser av tenkte negative utfall og fant støtte for at grit var assosiert med visse hypotetiske tankestrategier, men at assosiasjonen ikke var lik over alle scenarioene. Studie 3 (N=432) undersøkte faktisk adferd på en anagramoppgave hvor sannsynlighet for å oppnå suksess var manipulert (lav/høy sannsynlighet og kontroll) og estimert ytelse og reell ytelse ble målt før og etter utførelse. Resultatene indikerte at grit predikerte estimert ytelse før oppgavene men ikke reel ytelse på oppgavene. De samme strategiene som var relatert til grit i de fleste scenario i studie 2 var også relatert til grit i studie 3. Implikasjoner og begrensninger ved studiene er diskutert og videre forskning foreslått.

Keywords: grit, hypotetiske tanke strategier, meta-kognitive strategier, suksess, læring, ytelse, interesse, Mental Contrasting Implementation Intention, kontrafaktisk, positive fantasi.

Abstract

This thesis examined the relation between hypothetical thinking strategies and grit defined as the "perseverance and passion for long-term goals" (Duckworth, Peterson, Matthews, & Kelly, 2007, p. 1087). The scale measuring grit was translated using parallel blind technique, in order to examine grit in a Norwegian population, and administered to 143 participants at UiT recruited online (study 1). Two further studies were conducted to test the relation between grit and hypothetical thinking strategies. Study 2 (N=117) used scenario descriptions of imagined negative outcome and found support for grit being associated with hypothetical thinking strategies, and different strategies were preferred by the high and low grit sample, but the association did not persist across scenarios. Study 3 (N=432) examined actual behavior on an anagram task where likelihood at success was manipulated (low likelihood/high likelihood and control) and estimated and real effort was measured before and after negative feedback. The results indicated that grit predicted perceived effort levels before task but not real effort levels. The same strategies associated with grit in study 2, was also related to grit in study 3. Implications and limitations of the findings were discussed and further research suggested.

Keywords: grit, hypothetical thinking strategies, metacognitive strategies, success, performance, learning, effort, interest, Mental Contrasting Implementation Intention, counterfactuals, positive fantasy.

"If we are truly to be a nation of college-goers, we must not only raise the bar on what students learn but we must also leverage an understanding of non-cognitive factors to teach adolescents how to become effective learners"

The university of Chicago consortium on Chicago School Research

In "The Energies of Men", in 1907, William James addressed the human ability to sustain effort on tasks after reaching the point of exhaustion that many "*habitually fails to use*"(James, 1907). He talked of people's tendency to energize below their full potential and behave below their optimum ability. He boiled the problem down to two fundamental questions. First, the need to define what these powers were; what allowed one to sustain effort on task even after supposed depletion? Secondly, he suggested that in order to be able to define these powers, a methodical inventory of the paths of access or keys to sustaining this energy towards our goals should be created which took into account individual differences (James, 1907).

Although very little research has been conducted on this topic, in the last few years there has been an increased focus on the importance of being in possession of non-cognitive traits such as perseverance and self-control in order to achieve successful outcome in areas such as education (Duckworth, Kirby, Gollwitzer, & Oettingen, in press), organizations (Oettingen, Wittchen, & Gollwitzer, 2013) and positive health (Moffitt et al., 2011; Seligman, 2011; Singh & Jha, 2008). "Grit" - the tendency to pursue long-term challenging goals with perseverance and passion - is one such non-cognitive trait that has greatly increased in popularity within educational research and practice due to its superior predictive power of success (Duckworth, Kirby, Gollwitzer, & Oettingen, 2013; Duckworth, Peterson, Matthews, & Kelly, 2007). Grit is especially interesting because it defines the ability to sustain effort and interest on task despite adversity. Examining how gritty people might think after negative feedback, might provide us with knowledge of what tools they are in possession of which confers an advantage upon them that less gritty people do not have. Knowing this might be beneficial for developing intervention strategies for those that do not manage to work towards their goal after negative feedback, when reaching the goal is of paramount importance.

Why is this research important?

Although this thesis will most likely provide more questions than answers, due to its novel nature, it was a step in the right direction towards understanding some of the underlying

factors in explaining how high grit participants are able to sustain efforts on task after negative outcome. Understanding which strategies are the most efficient when it comes to sticking to and reaching a goal after negative outcome, and what features of the strategy (or gritty person) confers the advantage has implications for educational, sport, health and organizational psychology as well as for real life. Furthermore, the findings in this study might in the long term contribute to developing more efficient tools for educational, occupational and health psychology. Such tools might assist the less gritty stay on task regardless of the nature of the goal; when staying on task is an imperative whether it is connected with learning to read, getting an A on an important exam, being successful on project or/and loosing or putting on weight after initially having experienced failure.

This research is novel in the field of cognitive psychology in that it examines preference for strategy without manipulation, and then based on that result examine if tasks that are considered more or less difficult (low likelihood of success and high likelihood of success respectively) affect the type of strategy chosen and the effort put towards task after negative outcome.

What is Grit?

Duckworth et al. (2007) developed the construct of grit to capture an essential part of the variance in successful outcome of academics and professionals not explained by concepts such as "IQ" and "Conscientiousness". Grit is made up of two subscales measuring "consistency of interest" and "perseverance of effort"(Duckworth et al., 2007) and predicts teacher effectiveness (Robertson-Kraft & Duckworth, in press) retention at the US Military Academy, West Point (Duckworth & Quinn, 2009), retention at work, in school and in marriage (Eskreis-Winkler, Shulman, Beal, & Duckworth, 2014), success for African American males in predominantly white institutions (Strayhorn, 2013) and academic performance at elite universities (Duckworth et al., 2007). It is also associated with lifetime educational attainment (Duckworth et al., 2007) as well as rank in the National Spelling Bee (American spelling competition for children) (Duckworth et al., 2007, 2011). In other words, it predicts achievement in challenging domains, and does so over and beyond measures of talent.

Grit was found to be positively related to self-control (r=.63, p<.001) and increase over the lifespan as older individuals tend to be more gritty (Duckworth et al., 2007). In a longitudinal study of eighth-grade students, self-discipline measured in the fall accounted for

more than twice as much variance as Intelligence (IQ) in final grades, high school selection, school attendance, hours spent doing homework, hours spent watching television (inversely), and the time of day students began their homework (Duckworth, Grant, Loew, Oettingen, & Gollwitzer, 2011). Therefore, we know that grit relates to self-control, but we know very little about what cognitive mechanisms allow gritty participants sustained effort on task and success.

What we do not know about Grit and Success

Little, if any, research have examined how gritty people persevere through adversity. Although we know how to measure grittiness, we are still far from understanding all aspects of grittiness that might confers an advantage on reaching a goal despite adversity. So far most studies has looked at correlations or odds ratios (difference between those with low and high grade) between grit and successful outcome in terms of better grades, better performance or retention in a program, job or relationship. Few studies have examined what cognitive facets allow gritty people to sustain effortful engagement on a task after negative outcome.

One study examined the possible non-cognitive learning mechanisms by exploring the use of different learning strategies in relation to successful outcome on the National Spelling Bee. Duckworth, Kirby, Tsukayama, Berstein, and Ericsson (2010) found in their longitudinal study on children attending the National Spelling Bee, that highly gritty children dedicated themselves assiduously to deliberate practice- an activity which entailed working where challenges exceeded skill levels, and involved working hard at less enjoyable tasks. It became the most preferred strategy as they became more experienced in the competition, showing a learning effect or preference effect across trials. The researchers concluded the gritty children's ability to stay with an effortful and less enjoyable task predicted their success. The question remains: why they were able to do so. The conclusion from Duckworth and colleagues was based on a fundamental assumption that deliberative practice is a more effective but less intrinsically rewarding activity; however, they admitted that high grit participants might be able to detect the advantage the strategy gave them with regard to superior outcome over consecutive trials. An alternative interpretation in line with this would be that gritty children chose this strategy as they become more experienced for its ability to boost effort towards an intrinsic learning goal by making the obstacles to success apparent; however, this has yet to be examined.

Whereas grit is highly associated with retention and success it is not associated with talent. In four separate samples grit was orthogonal to or slightly inversely related to intelligence (Duckworth et al., 2007). Participants who score high on grit score on average lower on IQ scores than those who score low on grit. Duckworth hypothesize that talented children have fewer opportunities to develop a resilient approach to setbacks and failures compared with highly gritty children due to their less frequent encounter with negative outcome (Duckworth & Eskreis-Winkler, 2013). However, this postulation has not yet been verified.

If we take this line of reasoning further, it might not just be that talented people have less experience but that high grit participants are not afraid to take on challenges that are more difficult than their skill level dictates giving them more experience in both the task itself but also in how to overcome negative feedback. Locke and Latham (2002) argued that futures that are more challenging to achieve brings out more effort than less challenging goals. The fact that highly gritty participants chose deliberate practice (Duckworth et al., 2010), a highly challenging strategy requiring more effort, might indicate that high grit participants might choose more difficult task, when given an option. Alternatively, they might choose a strategy, which makes an originally easy task seem more difficult hence increase effort on tasks which might require less effort when only examining the likelihood of success estimates (by identifying obstacles to reaching the goal). To support the argument that highly gritty individuals might thrive on engaging in difficult tasks, Gitter (2008) found, in a free choice paradigm, that highly gritty participants tended to choose the more difficult option with no apparent reward, even when less difficult options were available. If this is the case one would expect to see large differences between those higher and lower in grit on tasks that were considered to be more difficult. The lessons learned from this failure might lead to new and better strategies and ways to identify obstacles to reaching a goal.

Grit was found to correlate with self-efficacy in academic pursuit (Rojas, Reser, Toland, & Usher, 2012). The difference between self-efficacy and grit are blurry but perhaps the only difference lay in persistence across time. People with low self-efficacy are more likely to lessen their effort and give up on a task as well as respond to negative feedback with decreased effort. Whereas those with high self-efficacy try harder to master a task, set challenging goals and maintain strong commitment to them, try to respond to negative feedback with increased levels of effort, which foster increased intrinsic interest and deep engrossment in activity. They heighten or sustain their effort when faced with failure and

quickly recover (Bandura, 1994). More importantly, they attribute failure to insufficient effort, skill and/or knowledge all of which are acquirable (Bandura, 1994). Mastery experience builds self-efficacy, but it also necessitate experience of overcoming obstacles through the perseverance of effort, hence grit is perhaps a necessary precursor for sustained self-efficacy, the ability to keep on persevering.

Although grit itself might not be teachable (there are several arguments in popular press that it can be taught but no empirical evidence support this hypothesis so far), some of the factors which build or sustain grit might be. Research into education indicates that there are five non-cognitive elements that play together in predicting academic achievement: attendance, mindset (optimism, locus of control, growth), perseverance, learning strategies and social skills (Farrington et al., 2012). Perseverance was a trait already conserved in grit. The other obvious avenue to explore was learning strategies or more correctly cognitive thinking strategies in relation to real or potential negative outcome since some research had been conducted on this previously. This thesis therefore examined the relationship between perseverance (in the form of grit) and cognitive thinking strategies (study 2) and how they impact on effort (study 3).

Hypothetical Thinking Strategies and their Potential Relationship with Grit

The literature utilize different concepts to mean similar things with regard to hypothetical thinking strategies. These concepts are "metacognitive strategies", "mental simulations", "self-regulating strategies" and "hypothetical thinking strategies". "Metacognitive strategy" have been defined as being aware of what you know and do not know (S. Taylor, 1999). Although this is a useful concept, it is too narrow to address the type of thinking discussed in this thesis since a well-established strategy might not reach meta-awareness. "Mental simulations" is defined as the imitative mental representation of some event or series of events that seem real (S. E. Taylor, Pham, Rivkin, & Armor, 1998). It is the cognitive construction of hypothetical scenarios including rehearsing, fantasizing and reconstructing past and future events by mixing in hypothetical elements. Mental simulations are thought to enhance the link between thought and action (Pham & Taylor, 1999). Although all hypothetical thinking makes use of mental simulations, some of the strategies such as mental contrasting implementation intention (MCII)- a strategy for identifying obstacles to goal and planning how to overcome them- goes beyond just mentally simulation to planning. Others

do not require as much elaboration as one would in mental simulation. Furthermore, all the strategies included in this thesis are "self-regulating" but this concept speaks more of the behavioural outcome of the cognitive process than the cognitive process itself i.e. the outcome of applying the strategies might be self-control but the strategy is the cognitive process that precede self-control. Evans (2007) used the concept of "hypothetical thinking" as a catch phrase for the human ability to reason, make hypothesis and make decisions based upon mental simulations about future options. Since this concept covers the entire range of strategies, it was chosen as an umbrella term for all strategies examined in this thesis.

Engaging in hypothetical thinking strategies such as upward counterfactual thinking (UCFT)- mentally undoing the current outcome and imagining alternative outcomes or realities "if only" a different choice had been made or action taken-(Roese & Olson, 1995a) and Mental Contrasting Implementation Intentions (MCII)- mental contrasting a desired future with relevant obstacles of reality and forming implementation intentions (if–then plans) specifying when and where to overcome those obstacles (Adriaanse et al., 2010), can lead to improved performance (Duckworth et al., in press; Duckworth et al., 2013; Markman, Gavanski, Sherman, & McMullen, 1993; Markman, Lindberg, Kray, & Galinsky, 2007). It does so by increasing effort on task where the likelihood of success is high ((Markman, McMullen, & Elizaga, 2008; Oettingen, 2012; Oettingen et al., 2009). It was hypothesized in this thesis, due to the nature of grit i.e. persistence of effort despite adversity, that high grit participants would be more likely to engage in strategies which conferred an advantage concerning maintenance of effort or increase in effort on task after negative feedback.

"Effort" is conceptually distinct from "motivation" (to be moved to do something) (Ryan & Deci, 2000) and "interest" (content specific motivational characteristic composed of intrinsic feeling related or value related valences) (Schiefele, 1991) in that motivation and interest both deals with direction, intensity and persistence of effort whereas effort is the pure energy or force exerted (Naylor, Pritchard, & Ilgen, 1980). Traditionally, effort has been viewed as mediating between motivation and performance i.e. effort is the force that translate motivation into performance (Naylor et al., 1980) and this is also how it is interpreted in this thesis. Effort can further be divided into subjectively estimated or "phenomenological effort" and "real effort". Estimated "phenomenological effort" is defined as the felt output of cost/benefit computations for time spent on the current task versus alternatives (Kurzban, Duckworth, Kable, & Myers, In press) i.e. how much energy is it going to cost me to engage

in this activity versus an alternate activity, hereafter called "estimated effort". "Real effort" is operationalized as time spent on task (Seligman, 2011).

Furthermore, research indicated that strategies that conferred the advantage of sustained self-discipline matters more than intelligence when it comes to successful outcome (Duckworth et al., 2011; Duckworth & Seligman, 2005, 2006). In Duckworth et al. (2011) research on 66 high school students preparing to take high stake exams in the fall, the students were assigned either to a 30 minute MCII writing exercise (intervention condition), or to a placebo writing exercise (control condition). The students in the intervention condition completed 60% more practice questions than the control group. The effect of self-discipline on final grades held even when controlling for first-marking-period grades, achievement-test scores, and measured IQ. The explanation presented by Duckworth et al. (2011), which allowed for this advantage, was that the application of self-control strategies such as MCII. Although this research was never connected with grit, it is reasonable to hypothesize, that strategies that confers an advantage with regard to self-discipline should be positively associated with grit scores (Duckworth et al., 2011) . In order to more fully understand how each strategy relate to effort and self-control they will be discussed below in order of assumed importance in relation to grit.

Mental Contrasting Implementation Intentions (MCII) and grit. Mental Contrasting Implementation Intentions (MCII) entails mental contrasting a desired future with relevant obstacles of reality and forming implementation intentions (if–then plans) specifying when and where to overcome those obstacles (Adriaanse et al., 2010; Duckworth et al., 2013; Oettingen & Gollwitzer, 2010). Mental contrasting (MC) is a time and cost effective self-regulatory strategy for pursuing goals provided the likelihood of success on the goal pursuit is judged to be sufficiently high (i.e. belief in likelihood of reaching the goal or the goal being realistic) (Oettingen, 2012). It allowed people to exert greater effort, feel greatly energized and become successful in their goal pursuit in contrast with those who engaged in positive fantasy (PF) (only reflecting on the future "I will get that A") (Oettingen, Pak, & Schnetter, 2001). Locke and Latham (2002) argued that commitment to a desired goal is linked with an energizing function. This theory was further confirmed by research which indicated that energisation mediated between engaging in MC and subsequent goal striving (Oettingen & Gollwitzer, 2010; Oettingen et al., 2009), measured both in subjective terms in the shape of self-report as well as more objective in the form of blood pressure; a reliable indicator of effort mobilization(Oettingen et al., 2009). So, in other words, when the

likelihood of successful outcome is considered high, engaging in mental contrasting will lead to increased effort levels and hence also increased goal commitment. However, being committed to a goal does not imply that one will be able to reach the goal.

P. M. Gollwitzer (1990) argued that failing to plan for potential obstacles to reaching the goal could impact upon the likelihood of reaching the goal. One way to combat this was combine the theory of mental contrasting (MC) with implementation intentions (II) a self-regulatory strategy where if…then plans were formed to overcome obstacles. E.g. "if I feel the need to watch television tonight rather than study when sitting in the living room, then I have move to another room so I can sit down with my homework". II was found to be the cognitive mechanism responsible for the effects of MC on successful outcome by ensuring that a plan for implementing change and dealing with obstacles was readily available (Oettingen & Stephens, 2009). When added together they form MCII a strategy for both identifying desired goal and obstacles to that goal, and making a plan for identifying and overcoming the obstacles to reaching that goal. Some research has examined how MCII has led to better academic results than control conditions (Duckworth et al., 2011; Duckworth et al., in press; Duckworth et al., 2013; A. Gollwitzer, Oettingen, Kirby, & Duckworth, 2011). Similar studies have looked at how MCII affect effort on task by making clear the obstacles to reaching the goal and increasing goal commitment (A. Gollwitzer et al., 2011; Oettingen, 2012; Oettingen et al., 2009; Oettingen et al., 2013). All of the above-mentioned research have operationalized MCII as an intervention plan or intervention tool.

Most research on MCII has looked upon it as a non-cognitive intervention plan (learning strategy) where goal is identified (excelling in mathematics), expectation of reaching the goal is identified (which will either fuel or reduce effort), aspects associated with excelling are identified (e.g. feeling proud) as well as obstacles (e.g. party and other interests). Finally an if-then plan is implemented which stipulated how to overcome the identified obstacles and reach the desired goal. In summary, whereas MC, part of MCII, facilitates effort provided the likelihood of success is sufficient, II ensure that there is a plan in place for dealing with obstacles to ensure successful obtainment of desired goal.

MCII have been shown to facilitate the effort of high school students (Duckworth et al., 2011) elementary and middle school students (A. Gollwitzer et al., 2011) towards long term goals even when benefits are not immediately apparent, but this strategy has not to date been linked with grit. On one hand, the research from Duckworth et al. (2011) on MCII and success did not examine why MCII might result in completing more practice questions. One

reason following from the above argument is that MCII serves to increase effort towards a task by making the obstacles to achieve the goal clearer and then spontaneously create a plan for how to overcome the obstacles. MCII seem to confer advantages when benefits are not apparent given likelihood of success is high. Hence, MCII increase effort provided perceived likelihood of successful outcome is high, and confers an advantage when benefits are not apparent. On the other hand, gritty individuals seem to engage in more difficult tasks than less gritty individuals, requiring more effort with no apparent benefit of doing so (Gitter, 2008). These two sets of information considered together makes it likely that MCII might be the preferred strategy among those with high grit when faced with negative outcome on a task especially if the level of task difficulty was high.

Although MCII, thus far, was never directly linked with grit, grit was linked with deliberate practice: a strategy that on many levels resemble MCII. In Duckworth et al. (2010) grittiness was related to success through the ability to work hard at less enjoyable tasks where challenges exceed skill levels. Both deliberate practice and MCII aids in identifying obstacles to reaching the goal based on feedback (Duckworth et al., 2010; Oettingen et al., 2013). Deliberative practice also involves planning designed to improve a skill and furthermore the strategy provides informative feedback on progress and performance (Duckworth et al. 2011). Deliberative practice thereby resembles MCII since based on negative feedback (e.g. getting the words wrong) alternative and better strategies can be implemented to improve future outcome (e.g. memorizing spelling from the dictionary). Both require quite a bit of cognitive resources but the general increase in effort might set this off in relation to a cost-benefit analysis. It was therefore hypothesized that the lessons learned from failure might lead to the choice of a strategy which makes the task seem more difficult (by making obstacles to reaching the goal clearer) if the task has a high likelihood of success thereby increasing the effort levels on task. Furthermore, it should lead to better outcome on a difficult task by identifying obstacles to reaching the task and work hard at implementing the plan for improvement.

What makes MCII even more interesting in relation to gritty participants and their assumed sustained effort levels towards goal despite adversity, is recent findings that engaging in MCII in one task transfers to engaging in an unrelated task (Sevincer, Busatta, & Oettingen, 2014). By engaging in MCII effort levels would increase on other unrelated tasks which could go some distance to account for the superior sustained effort levels over time that signify gritty individuals. This could support an argument for context general strategy

application however the counterargument is that some strategies, such as MCII, depend on likelihood of success estimates which is not context general, therefore once engaged in MCII the effort level should increase provided likelihood of success was considered high, however, not all scenarios might engage MCII. Furthermore, interest is also a factor in grit as described above and not all goals might be equally interesting. However, before any conclusions can be drawn the advantages of other strategies such as counterfactual thinking and positive fantasy must also be examined.

Counterfactual thinking and grit. Counterfactual thinking is defined as a mental model where the factual outcome and the alternate desired outcome are held in mind at the same time taking the form of "if…then" statements (Byrne, 2002; Kahneman & Miller, 1986) e.g. "If only I had studies harder, then I would have gotten an A on my exam". Counterfactual thinking is thinking about what "might have been" when encountering negative outcome (Roese & Olson, 1995a, 1995b).

There are three major categories of counterfactual inference: action versus inaction, self versus others, and upward versus downward (Barbey, Krueger, & Grafman, 2009). This thesis will concentrate on self-focused action oriented upward counterfactuals which are most highly associated with improved performance and increase in effort (Tyser, McCrea, & Knüpfer, 2012) e.g. "If I had only done…., then I would have reached my goal" (self-improvement, action, upward) versus "If she had not…, then her outcome would have been worse than today" (other, inaction, downward). The strategy's advantage in relation to successful outcome is in identifying factors that hinder past performance thereby affecting future goal directed behaviour.

Upward counterfactual thinking (UCFT). There are great similarities between MCII and UCFT. Both serve to identify obstacles to reaching a goal (Oettingen, 2012; Tyser et al., 2012), facilitate the formation of future intentions (Oettingen, 2012; Smallman & Roese, 2009), are problem solving strategies and hold both the future and the present in mind at the same time. Furthermore, both leads to improved effort and performance, if the future or alternate future serves as the basis for comparison (Markman et al., 2008; Oettingen, 2012), however the latter is a more robust finding in the MCII literature than in the UCFT literature. Oettingen (2012) argued that counterfactuals do not necessarily entail prediction of successful outcome. However Petrocelli, Seta, and Seta (2012) argue that the influence of counterfactuals on outcome are determined by the extent to which the likelihood of the "if-statement" (the degree to which one judge the antecedent condition to be likely) and the

"then-statement" (the degree to which one judge the conditional outcome to be likely given the antecedent condition) are considered high. Hence, there was no reason to assume any difference between the two with regard to likelihood evaluations. Although there are many similarities, there are also two important differences, which makes MCII the more functional choice with regard to successful outcome. These two differences are emotions after negative feedback and the inclusion of a plan of action.

Upward counterfactual thought (UCFT) is said to have a preparative function by facilitating the formation of future intentions (Smallman & Roese, 2009), however it is also related, unlike grit, to short term (in all cases) or long term (when there is no option to improve) negative affect (Epstude & Roese, 2008; Roese, 1994) and more so when it is related to the self than to evaluation of others (Sanna & Turley, 1996). Negative affect from UCFT can be interpreted as evidence that there is a discrepancy between goal and current performance, resulting in increased task effort (Bandura & Locke, 2003; Carver & Scheier, 1999; Markman et al., 2008). Results from Singh and Jha (2008) study indicated that the concepts of grit, positive affect, happiness and life satisfaction are significantly positively correlated, where joy, confidence, alertness and interest is defined as a positive affect and fear, sadness, anger, guilt, contempt and disgust as negative affect (Snyder & Lopez, 2002). Grit seems to be more highly associated with positive emotions than with negative emotions hence if emotions play a role in choice of strategy, then someone who is highly gritty should be more likely to engage in MCII than UCFT.

An implicit assumption when discussing the concept of grit is that effortful engagement in work has no immediate intrinsic reward and that what signifies gritty individuals is that they have an ability to endure boring tasks and delayed rewards (Duckworth et al. 2011: 2013). An alternate assumption in line with the argument above might be that applying effort is not about endurance but in itself produce positive emotion. Cherrington (1980)'s proposed model on work motivation, which suggest that effortful engagement in work has positive affective consequences, is in line with this argument. Hence, effortful engagement on tasks might have a positive emotional connotation rather than a negative one in highly gritty individuals. Further research indicated that high grit individuals were more likely than low grit individuals to seek happiness through engagement, where the positive association between grit and engagement was driven primarily by the grit facet of effort (Von Culin, Tsukayama, & Duckworth, in press). In other words, an orientation toward exerting effort on tasks and finding a way to engage with it may promote

grit by encouraging sustained effort. Furthermore, For successful wish fulfilment people need to acknowledge negative feedback without letting it harm their positive beliefs in their own abilities and their future options and what the future hold (Oettingen & Kappes, 2009). MC allow people to extract meaningful information from negative feedback without it damaging their positive self-image or positive feeling about their goal, II allow them to bring it to action.

The second difference is the inclusion of a plan for implementation. Roese (1997) argued, in his two-stage model, that UCFT prepare for the future by suggesting specific course of action i.e. thinking 'If I had just studied harder, then I would have received a better grade' will eventually lead to 'therefore I will study harder next time'. However, making the counterfactual into an intention to implement entails an additional step (i.e. more cognitive resources) already built into MCII in the shape of II. Furthermore, II are more specific than the proposed plan by Roese: detailing time and space. Therefore, the prediction was that if given the choice between the two strategies, highly gritty individuals are more likely to choose MCII than UCFT.

Although some research has connected UCFT with improved performance (Epstude & Roese, 2008; Markman et al., 1993) other research conclude that UCFT is not adaptive (Sirois, Monforton, & Simpson, 2010). Recent research indicated that personal intention such as self-improvement versus self-protection might determine how UCFT affect outcome. The sentence "if only I had studied harder, then..." Could also reflect a shift of blame for failure rather than a wish to identify corrective actions (Tyser et al., 2012). In situations where there is no possibility of alternate outcome (no likelihood of later success) or UCFT might leads to regret if there are no options to improve (Gilovich & Medvec, 1995; Sirois et al., 2010). However, participants in the above mentioned studies were not allowed to choose alternate strategies. Type of strategy affect the level of effort put forward in a task (Oettingen, 2012); problem solving strategies increase effort towards goal and general goal commitment whereas emotional coping strategies reduce effort towards goal or lead to a change of goal. Whereas MCII and UCFT are both problem solving strategies in a situation where a problem cannot be solved the most functional choice of strategy would be an emotional coping strategy. If allowed to choose freely one might expect that participants in the above mentioned studies might have chosen downward contra-factual thinking (DCFT) strategies instead of UCFT thinking which serves the purpose of self-protection instead of futile self-enhancement (Markman et al., 1993).

Downward counterfactual thinking (DCFT). "Downward counterfactual thinking" (DCFT) is an emotional coping strategy where reality (negative outcome) is seen as better than a possible alternative outcome highlighting how the alternative outcome could easily have been worse (Markman & McMullen, 2003; McMullen, Markman, & Gavanski, 1995; Roese & Olson, 1995a) e.g. "If I had not studied the night before, then I would have done even worse on my exam". DCFT was not related to improved outcome or increased effort on task (Epstude & Roese, 2008) It was therefore hypothesized that DCFT would not be positively correlated with grit scores. It is included in this thesis in order to provide a choice of emotional coping strategy. Another emotional coping strategy that should lead to reduced effort on task is positive fantasy (Oettingen, 2012) which only entail elaborating on the desired future rather than evaluating the alternate outcome.

Positive fantasy (PF) and grit. There are two different forms of positive thinking covered in the literature on fantasy realization theory: expectancy statements and positive fantasy (PF) or indulgence (Oettingen, 2012). Whereas expectancy statements lead to better outcome on tasks than control conditions PF leads to less effort and hence worse outcome than control (Oettingen & Wadden, 1991). Unlike common popular beliefs "positive fantasy" (PF)- a creative emotional coping strategy - in the form of an elaborated "*I will do better on my exam next time*" or "*I will reach my goal*", does not necessarily lead to better performance (Oettingen, 2012). Research on PF indicate that it is associated with reduced effort (Oettingen, 2012; S. E. Taylor et al., 1998) and fails to activate goal directed action (Oettingen, 2012; Oettingen & Mayer, 2002; S. E. Taylor et al., 1998). Oettingen (2012) concluded, counter to popular self-help literature, that positive thinking can be detrimental to effort and success if it come in the form of fantasies, defined as free thoughts and images about desired future rather than beliefs or expectations (Bandura & Locke, 2003). He further argues, however, that fantasy has a functional aspect in that it can be used to self-regulate futile goal pursuit by reducing the effort devoted to a goal. The hypothesis is therefore that PF should not be associated with high grit since grit is the trait that above others predicts sustained effort and success.

In summary, despite robust evidence indicating that both MCII and UCFT can confer, an advantage on people with regard to reaching their goal and increasing effort on task we still do not know if those who are successful at reaching their goals would choose to use either of these strategies if given a choice between them and other strategies. The question

remains: what makes high grit individuals more able to commit to deliberate practice? What enable them to sustain effort towards goal despite negative feedback? The present study extends existing lines of research by addressing this gap in the literature by bringing the different strategies together in one study and examining them in relation to grit.

Aim

This master thesis was the first to bringing together the different strands of hypothetical thinking strategies and the non-cognitive trait called grit (perseverance of effort and interest). In order to study grit the aim of study one was to make a good translation of the American Grit Scale into Norwegian using parallel blind technique and to examine if there were any large differences between the demographic variable in the Norwegian sample and the sample used by Duckworth in her studies (study 1). Study two aimed to examine the relationship between grit and five different hypothetical thinking strategies to find if there were any significant correlations and if interest affected the choice of strategy. Furthermore it aimed to examine if the choice of strategy in relation to grit was context specific rather than general i.e. strategies will vary between scenarios rather than be the same across scenarios (study 2). '

Furthermore, following from the findings in study two, study three aimed to test if likelihood of success (high, low or control condition) affected choice of strategy between high and low grit participants. In addition it aimed to examine if there was a difference in choice of strategy before negative feedback compared to after and if estimated and real effort levels on an anagram task was affected by either likelihood of success, grit, hypothetical thinking strategies or all three (study 3).

Research Questions and Assumptions

Grounded in the above aims this thesis set out to investigate the following research questions:

Study 1:

1. Did the translated scale into Norwegian have similar mean and relationship with education and age as the American samples?

Study 2:

1. Is choice of strategy in relation to grit context specific or context general?
2. Which strategy is most positively/negatively associated with grit scores (continuous variable)?

3. Is there a significant difference between high and low grit participants (dichotomous variable) with regard to choice of strategy?

Study 3:

4. Does choice of strategy and/or grit scores predict perceived and real effort on task?

5. Does likelihood of success affect choice of strategy? Is this effect modified by entering grit into the model?

6. Is there a difference between choice of strategy before and after negative feedback?

7. Does grit scores and/or choice of strategy predict outcome on task?

A fundamental assumption of study 2 was that individuals who scored high on the non-cognitive trait of grit would be more likely to succeed in reaching their goal compared to those with low scores due to the grit scales predictive power of success. Study 3 tested this assumption in relation to the anagram task.

Present Research

The literature review indicated that choice of strategy should be context specific i.e. change across scenarios since likelihood estimates and interest should differentially predict goal engagement. Furthermore, the literature review lead to the prediction that grit should be positively associated with MCII and negatively associated with UCFT and ALT. It also led to the prediction that there should be no significant relationship with DCFT and PF after negative outcome provided interest in success was sufficiently large. The reason why UCFT was considered a less likely choice of strategy than MCII, was that it would require additional cognitive resources to implement changes in behaviour and its association with negative emotions. In addition, the literature indicated that highly gritty participants tend to engage in effortful action towards goal. Therefore, it was considered unlikely that they would engage in PF since research indicated that engaging in PF led to reduced effort. Likewise, it was considered unlikely that participants with high grit scores would choose DCFT since according to the literature it is an emotional coping strategy, which does not lead to improved performance. Finally, results from previous research indicated that highly gritty participants engaged in tasks that were difficult or above skill level and receiving negative feedback did not lead to reduced effort levels. Hence, likelihood of success manipulations should not affect the effort levels of high grit participants to the same extent, as it would low grit participants.

In order to examine the difference between high and low grit participants the grit scale (Duckworth et al., 2007) was translated into Norwegian using parallel blind technique (Behling & Law, 2000). The scale was then administered to 23 bilingual students who sat the test in counterbalanced order to look at the validity of the translation and then further administered to a sample of 215 participants to examine if the demographic variables in Norwegian sample was similar to those in the US sample (Duckworth et al., 2007) (study 1). The second study examined the association between hypothetical thinking strategies and grit using the translated grit scale, in a sample of 117 participants (study 2). The third, an experiment, examined how manipulating likelihood of successful outcome (high /low /control) affected the relationship between choice of strategy, grit and perceived and real effort levels in a sample of 428 participants (study 3).

Study 1

Translation of 12-item Grit scale from English to Norwegian

The grit scale is a 12- (Grit-O) or 8-items (Grit-S) self-report instrument developed to measure grit (Duckworth et al., 2007; Duckworth & Quinn, 2009).The 12 item self-report Grit Scale (Grit-O) was designed to meet four criteria: psychometric soundness, face validity in a variety of domains, low likelihood of ceiling effects in high-achieving populations, and construct validity (Duckworth et al., 2007). Data from 1545 participants, 25 years and older (73% women and 27% men), were collected. The Grit-O Scale was developed using Promax rotation on 50% of the data, chosen at random, from a pool of 17 items. An exploratory factor analysis, only retaining items with loading of at least 0.40, identified a two-factor solution. Confirmatory factor analysis with the remaining 773 observations supported the two factor solution (comparative fit index =.83). The grit scale thus has two somewhat correlated (r=0.45) subscales "consistency of interest" and "consistency of perseverance and effort" (Duckworth et al., 2007). The scale has an internal consistency of α=.85 for the overall scale. Duckworth et al. (2007) found that neither factor was more predictive of outcome.

In 2009 Duckworth and Quinn developed a short Grit Scale (Grit-S) since the goodness of fit indexes indicated that the Grit-O did not fit the data as well as the Grit-S (Duckworth & Quinn, 2009). The correlation between Grit-S and Grit-O was .96 (p<.001) and conscientiousness was more highly correlated with Grit-S than Grit-O (r=.77 vs. r= .73) (Duckworth & Quinn, 2009). The 8-item test was found to be stable over time with high test-retest stability, however the 8 item Grit-scale was not tested against the conscientiousness

facet of achievement striving e.g. "I am something of a workaholic" and "I strive for excellence in everything I do"(Costa Jr & McCrae, 1992). Duckworth and Quinn (2009) argue that the difference between the two is the emphasis on long-term goals. Due to these differences the Grit-O scale was translated into Norwegian using the parallel blind technique (see Behling & Law, 2000) which will allow either scales to be applied later if considered necessary.

Parallel Blind Technique (PBT) was chosen over translation/back-translation due to the former having higher practicality (less time consuming and costly) and security. According to Brisling (1970) some of the key issues with the translation/back-translation are that the translators might apply the same set of conventions for handling material that is in fact not equivalent. Furthermore, some back-translators might be able to make sense of the statement in the target version even if it depicts the original ideas poorly and as a result come up with a less good versions misleadingly close to the original source (cited in Behling & Law, 2000, p. 21). Although parallel blind technique (PBT) was considered lower in source language transparency and informativeness than back-translation it is still rated as medium in both (Behling & Law, 2000). It was decided that PBT would result in a translation higher in semantic equivalence (choice of terms and sentence structure that ensures meaning is preserved in translation), conceptual equivalence (the extent that a concept exist in the target language independent of the wording used to operationalize it) and normative equivalence (way in which the cultures differ in how and what ideas are expressed and openness) since it allowed the two bilingual translators the option to openly discuss the translation. The Grit Scale was considered to contain no sensitive information or breaches of cultural norms.

A criticism of the parallel blind technique is that it lack a second aspect of source language transparency, however, this is only an issue if the researcher is not fluent in both languages, and translators were recruited with this information in mind. A possible second line of criticism is that agreement between the translators does not document linguistic and cultural equivalence. However, the knowledge of both languages and cultures (both as fully bilinguals with extended experience of living in both countries) should ensure this better than translation-back translation where only linguistic knowledge is required and where the focus is more on each written word than the semantic content of the items.

The aim of this study was to translate the 12-item Grit scale (Grit-O) into Norwegian and ensuring a useful and valid translation by applying parallel forms. The further purpose of this study was to examine if the construct of grit had the same relationships in the Norwegian

population to age and education as in the American, and if it would be possible to find sufficient number of high grit participants in order to conduct later studies. Finally, the translated grit scale would be utilized in two subsequent studies.

Method

      Participants. The translated version was first piloted on 23 reasonably bilingual participants (21 women, 2 men) sourced from the Psychology department at UiT- Arctic Univeristy of Norway. The sample was chosen based on one criterion: that they rated both their Norwegian and English as eight or better on a scale from 1-10 where one was "no English" and 10 was "equal to mother tongue". The translated version was then administered electronically to 215 opportunity sampled Norwegian speaking participants (23.9% male and 75.1% female) sourced through opportunity sampling at UiT-Arctic University of Norway and snowball sampling through Facebook and LinkedIn. Of the participants who logged onto the website, 72 data sets were deleted due to no, missing or severely incomplete information giving a dropout rate of 33.48%. Of the 143 participants who completed the data set, 88.3% had Norwegian as their mother tongue, 1.7% English and 10% reported other languages as their mother tongue although the assumption was that all participants understood sufficiently Norwegian to complete the study. The level of education in the sample was quite high with 34% having high school or trade school, 45.4% reported having a college or bachelor degrees, 19.2% a master degree and 0.5% a PhD. All participants were asked to read the informed consent before proceeding and were debriefed after the study. No compensation was provided for taking part in the study.

      Measure and translation. The two translators were lay female bilinguals aged between 35 and 45 with extended experience of American and Norwegian culture and language. The first translator, the researcher, was a Norwegian citizen who grew up bilingual and lived in the US for a total of three years as well as attended American schools internationally. The second translator, an Asian American female doctor, grew up in America and was currently a Norwegian resident (for over 10 years), speaking Norwegian on a regular basis. The second translator was recruited based on knowledge of target languages, cultures, and familiarity with the construct of "Grit" and was informed of the use to which the instrument would be put. The method was rigorously adhered to during translation and thorough discussions were applied to ensure that technical, semantic and content equivalence was ascertained. All items were considered relevant to Norwegian participants; hence no

further cross-cultural measures were taken (see Flaherty et al., 1988). Both translators produced their own version of the scale. Versions were then compared in a meeting. Equivalent items were retained, items with minor word differences were discussed at quickly agreed upon and items with larger discrepancies or conceptual differences were disused at length both with regard to equivalent meaning and cultural significance. The method chosen for testing the reliability of the translated Grit-O scale was parallel forms. It is a version of Brislin's (1973) ultimate test where the absence of statistically significant differences are considered to be indicative of the draft language version representing the source language version adequately (cited in Behling & Law, 2000, p. 22). According to Behling & Law (2000) by administering two different measures of the same construct (target language and original) the correlation should equal 1. A high positive correlation at levels of 0.80 and above was considered to show sufficient reliability. Cultural and linguistic equivalence were thoroughly discussed with both language and cultural aspects in mind.

Procedure. The bilingual participants were asked prior to their participation to estimate their proficiency in English and participants with self-evaluated proficiency over eight were included in the study. The participants received both version of the scale (English and Norwegian) in a paper and pen task in counterbalanced order to control for practice- and fatigue effect. The order of the questions was also reversed to lessen the likelihood of remembering the answers from the preceding grit scale. Participants were questioned on the wording of the translation, equivalence of meaning to original version and flow of language after completing the scales, and two further minor amendments to the translated version was made based on this feedback (See appendix A for Grit-O final version in Norwegian and Appendix B for Grit-S final version in Norwegian). '

Another group of participants were thereafter sourced online through Facebook, LinkedIn and through email to all students at the health faculty at UiT- Arctic University of Norway inviting them to the Qualtrics website (software for questionnaires). Those who accepted the invitation logged onto the website where they read the informed consent and agree to partake by clicking on a box called "partake in study". They were then asked demographic questions, (gender, age, educational background and mother tongue), before taking the 12-item grit scale. The data was analyzed using bivariate correlations and multivariate regression in SPSS.

Results

Results of translation. Of the 12 questions, two questions were equivalently translated, a further eight questions had only minor wording differences which were easily resolved. Two questions had greater discrepancies which required a more lengthy discussion. These items were "*I am diligent*" translated into "*jeg er flittig*" and "*Setbacks do not discourage* me" translated into initially "*motgang tar ikke motet fra meg*". After the pilot study the first translated item was retained and the second was altered to *"tilbakegang tar ikke motet fra meg"*. Agreements were made on all 12 questions after one meeting lasting two hours; only two minor linguistic amendments were made after the feedback from the parallel forms administration. The correlation between the bilingually administered grit scales were significant *(r (76) = .89, p<0.001)*.

Results of administration. The data was analysed using bivariate correlations and regression. The Grit scores of 142 participants were skewed as to be expected *(M=3.45, SD= 0.59)* and was centred in order to reach normal distribution. Grit was significant correlations with higher education *(r (141) = .54, p<0.001)* and age *(r(141) = .56, p<0.001)*. However when all factors were entered into a regression model only level of education predicted grit scores *(β=0.28, p<0.001)*. The correlation between the Norwegian versions of the Grit-0 and grit-S scales in all gathered data was .96 *(r (141) = .96, p<.001)*.

Discussion

The correlation between the bilingually administered grit scales were significant *(r (141) = .89, p<0.001)* indicating that the answers given in either language were pretty much the same. The mean grit scores were similar to those found in Duckworth et al's studies, and grit was also significantly positively related to age and level of education as was the case in previous research. The sample had a reasonably large proportion of missing data which could have affected the outcome, however, the participants were sourced in much the same way as research conducted by Duckworth et al. hence it should not have affected the validity and reliability of the outcome in comparison to the American sample. Duckworth & Quinn (2009) further, found that the correlation between Grit-S and Grit-O was .96 *(p<.001)* which was the same correlation as found in this study indicating that the same relationship remained between the translated 8-grit scale and 12-grit scale in Norwegian as in English.

One potential issue with the translation was conceptual equivalence of the word "diligence". Although "flittig" was chosen to be the word highest in conceptual equivalence both translators agreed that it the two terms were not completely conceptually equivalent, however, no better word was found in Norwegian, so the word was retained in the analysis.

There was a rigorous adherence to the procedure of translation as described in Behling and Law (2000) and the results indicated that the translation was a good reflection of the original scale. A large group of reasonably bilingual participants *(N=23)* piloted the scale and gave qualitative feedback on the translation according to the criteria set by Behring & Law (2000) and amendments were made ensuring that the translation was of a high standard. It might to useful for future studies to run a "replication analysis" (Osborn & Fitzpatrick, 2012) where factor structures could be systematically compared over items between the two versions (Norwegian and English) to ensure further replication and cross validation.

Study 2

The Association between Hypothetical Thinking Strategies and Grit Sores

Introduction

This study was designed to examine the relationship between grit and hypothetical thinking strategies, and whether the choice of strategy was context general (chose same strategy in all scenarios) or context specific (different strategies for different scenarios). It was hypothesized that high grit participants would choose the strategy, which conferred the largest advantage with regard to improving outcome after negative feedback.

Interest deals with direction, intensity and persistence of effort (Naylor et al., 1980), it was therefore reasonable to assume that it would affect choice of strategy. It was predicted, that level of interest in succeeding on task after negative feedback would affect the choice of strategy. As a result, the expectation was that different strategies would be chosen for different scenarios (context specific) rather than the same strategy for all scenarios (context general) provided interest levels were not equally high. It was therefore hypothesized that the within-participant choice of strategy would vary across the different scenarios. If the opposite result was found it might have indicated that highly gritty participants have a specific mindset rather than an ability to choose the right strategy for the right context after negative feedback

Although interest might affect if same or different strategies are chosen in a task so might the choice of MCII. A recent study concluded that engaging in MCII in one task

transferred to engaging in MCII on an unrelated task (Sevincer, Busatta, & Oettingen, 2014). This could be seen as lending support to the prediction that once highly gritty participants chose to engage in MCII they would be more likely to choose the same strategy across scenarios and thereby sustain effort across scenarios. However the counterargument, which is more robustly supported in literature, is that all strategies depend on likelihood of success estimates which is not context general (Oettingen, 2012; Petrocelli et al., 2012). Hence, there seem to be more support for context specific choice of strategy than context general. If this is the case it was expected that there would be a difference between choice of strategy for those with high compared with low grit scores within each scenario.

Although both MCII and UCFT is associated with improved outcome in the literature, MCII was considered to be more positively associated with grit than UCFT. This was because of three fundamental differences between the two strategies: the role and format of the implementation plans where the UCFT plan required more steps and resources(Roese, 1997), the functional benefit of the strategy on self-discipline where research on MCII robustly tie it to increased self-discipline (Duckworth et al., 2011; Oettingen, 2012) and the emotional implications of engaging with the strategy- where MCII is associated with more positive emotions than UCFT (Epstude & Roese, 2008; Oettingen & Kappes, 2009; Roese, 1994; Sanna & Turley, 1996; Singh & Jha, 2008). Therefore, the prediction was that grit would be more positively associated with grit than any other strategy, and that more high grit participants would choose MCII than low grit participants. Finally, since this experiment only allowed the option to choose one strategy for each scenario, the hypothesis was that choosing UCFT would be negatively associated with grit scores since they have similar function but different in usefulness for those with high grit with regard to cost benefit analysis of choosing a strategy. UCFT cost more in terms of cognitive resources and emotions than MCII and has less benefit with regard to staying on task.

Downward counter-factual thinking strategies (DCFT) and positive fantasy (PF) was also included in this study as to provide options of coping strategies. In the literature they are often presented as the counterstrategies to UCFT and MCII respectively (Oettingen, 2012; Roese & Olson, 1995b). Although both were included, neither was expected to be significantly associated with grit since neither strategy confers an advantage concerning reaching a goal after adversity nor sustained effort.

Finally, the option to choose an alternate goal was included. Some participants might choose to change goal or indicate that they are not interested in continued work towards a goal. If this was not taken into account in a forced choice paradigm, it might end up confounding the data. The alternate goal option took the form of "I will not reach my goal" or "I will choose an alternate goal". It was predicted that grit would be negatively associated with changing goal provided the level of interest in success was sufficient.

A more naturalistic study (where strategies are chosen) rather than an experiment (where strategies are manipulated) was chosen in order to find out what type of strategy highly gritty individuals would chose using a forced choice paradigm (with five different choices of strategy). Although this type of study has less if any predictive power, it will provide an indication of what strategies should be incorporated into an experiment, and if one or more strategies are more frequently chosen than others after negative outcome. It was decided that hypothetical scenarios would be the best stimuli. A scenario is a description of an event that allow participants to further mentally elaborate on that event. When people imagine hypothetical events and are subsequently asked to rate the likelihood of those events, they are more likely to believe the event will occur after mental simulations of scenarios (vividly imagining a scenario) than after other cognitive activities focusing on the same hypothetical events e.g. persuasive communication (Anderson, 1983; for review see Koehler, 1991). By mentally simulating an event participants become more engaged in that event (Gregory, Cialdini, & Carpenter, 1982, study 4) which should ensure higher goal commitment. Mental simulations make events seem true by generally adhering to reality by presenting possible events rather than impossible (Kahneman & Miller, 1986). As Kahneman and Miller (1986) observed, even fantasy simulation of becoming wealthy starts with winning the lottery or an inheritance and not with encountering a money tree. Furthermore, the act of simulation demand that the participant temporarily suspend doubts about the occurrence, hence will proceed as if it were true. The choice of scenario should further ensure that participants engage in elaborative processing rather than reflective (Anderson, 1983).

Although it might have been useful to measure estimated likelihood of success it was decided against in this study since Dweck and Gillard (1975) argued that it was differentially affected by gender. In a sample of 5th grade students Dweck and Gillard (1975) found that requesting initial statements of success heightened boys persistence but lowered girls persistence on task. Since the main goal was to examine the association between choice of strategy and grit the likelihood measures were not included.

The aim of this study was to examine three research questions (a) was choice of strategy in relation to grit context specific or context general?, (b) Which strategy would be most positively/negatively associated with grit scores?, and (c) was there a significant difference between high and low grit participants with regard to choice of strategy?

In this study the following hypothesis were tested:

H1: Choice of strategy differs across scenarios in both the high and low grit sample.

H2: MCII is positively associated with grit scores.

H3: UCFT is negatively associated with grit scores.

H4: PF is not associated with grit scores.

H5: ALT is negatively associated with grit scores.

H6: DCFT is not associated with grit scores.

Method

Participants. An opportunity/snowball sample of 117 participants (24 male / 93 female) were sourced from The Psychology department at UiT-Arctic University of Norway, Facebook and "Olympia toppen" (a National association for top athletes). The latter group (consisting of 14 participants) was sourced to ensure the presence of the grittiest and most accomplished individuals in society in the sample. The athlete sub sample did not significantly differ from the other participants on any scores (age, education, gender or interest across scenarios) except a slightly higher average grit score *(M=3.58, SD=0.92)*. There was a 68% completion rate (78 participants) from those who logged onto the website and proceeded beyond the informed consent. The sample was almost evenly distributed between 26 or older (66 participants) and 25 or younger (52 participants). The largest part of the sample had college/ bachelor degree (48%) or high school/trade school (29%) followed by master and doctorate (12%) and middle school (3%). The amount of the sample with higher education was above the national average (26%) of those have bachelor degree or equivalent and master or higher education (6,5%) (Statistisk Sentralbyrå, 2012).

Design and Measures. The study was a within-subject naturalistic study where all participants encountered the same four scenarios in the same order. Scenarios were not counterbalanced due to limitations in the Qualtrics, which could produce scenario effects; this is taken into account in the analysis. The study examined correlations between grit scores

(where 1= extremely low grit and 5= extremely high grit) measured using the grit scale and hypothetical thinking strategies dummy coded into 1= strategy, 0 = all other strategies. Interest was measured before each scenario on a scale from 1-9. In the regression analysis, grit became the dependent variable and interest and dummy coded hypothetical thinking strategies independent variables.

Age. Age was originally measured on an ordinal scale from 19 or less to 26 with 1 year increments with a final category of 27 and above. This design was chosen since the initial assumption was that the sample would be from the undergraduate and graduate psychology program at the university. However, it was decided later that a wider sample was desired to increase generalizability. After data collection it became clear that data was not normally distributed and the age variable was recoded into a categorical variable (1=<25 and 2=>25) in line with Duckworth et al. (2007).

Interest. "Interest" was operationalized as a specific interest in successful outcome on a task. It was measured on a 10-point response scale ranging from 1= least interested to 10=most interested. The scale was presented visually in terms of a gauge as well as sliding scale. The sentence read: «Anslå hvor interessert du ville være i å lykkes i denne eller lignende situasjoner på en skala fra 1 til 10 (1=minst, 10=mest) Hvor viktig ville det være for deg?»[1] The question of interest was measured after reading the scenario but before choice of strategy.

Grit. The personality trait of grit was assessed with a twelve-item self-report questionnaire with established construct and predicted validity (Duckworth & Quinn, 2009) translated into Norwegian using parallel blind technique (PBT) and tested for translation validity using parallel forms (see study 1). Participants endorsed items indicating consistency of interest (e.g. "Jeg har vært besatt av en ide eller et project over en periode men så mistet interessen")[2] and effort ("jeg er arbeidsom"[3]) over time using a five point Likert-type scale ranging from 5= very much like me to 1= not at all like me.

Hypothetical thinking strategies. Since all other strategies examined in this thesis came in shorter format, MCII learning strategy was slightly modified to be more in line with the format of the other strategies, so that it's format would not serve as a confound. The

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[1] Estimate how interested you would be to succeed in this or similar situations on a scale from 1 til 10 (1= least interested and 10= most interested)

[2] I have been obsessed with a certain ide or project for a short time but later lost interest

[3] I am diligent

slightly modified version was in line with "if I want an A on my next exam (and not the B that I got on this exam), then I must not get distracted from my studies, and focus on understand all the chapters, one a day, as well as answer essay questions every day until the next exam". The Five different hypothetical thinking strategies consisted of MCII e.g. «Hvis vil ha god nok karakter, og ikke få for dårlig karakter igjen, så må jeg ... og …»[4], UCFT e.g. «Hvis jeg ..., så ville jeg ha oppnå målet mitt»[5], DCFT e.g. «Hvis jeg …, så ville det gått enda dårligere på eksamen»[6], PF e.g. «Jeg klarer å oppnå målet mitt»[7] and Alternative goal (ALT): «Jeg vil vurdere andre jobber/utdannelser»[8]. The participants were told, «vurder nå valgene nedenfor i forhold til hvilket som mest typisk represent den tanke du ville tenke i denne situasjonen. Fyll inn (…) med egne tanker og handlinger»[9], and could only choose one out of the five strategies for each subsequent scenario.

Materials. The stimulus in this study was four different scenarios depicting situation in which the participants were asked to imagine facing an important task where the cost of failure would be considered large (given sufficient interest in succeeding). The stimulus was created for this study since no previous study was found that used this person centred type of scenarios with negative outcome and an open ending. The end of each scenario, after negative feedback, was open ended to allow participant to elaborate on their own strategies, which on the following page should be matched with one of the five preselected strategies. The specific scenarios were chosen to represent four different areas of life where success would be important but where failure (negative outcome) would also be likely, after piloting a larger selection of scenarios and three different versions of each scenario (both cost and benefit of negative outcome provided, option to improve provided and open ending). The four scenarios themes chosen were exam (failing an important exam), interview (coming in second at an all-important interview for a job), sport (failing to meet the qualification criteria for an important sports event), and project (not getting the funding for an important project at work). The text for the exam scenario was as follows "Forestill deg at du for noen uker siden endelig ble med den siste viktige eksamen, og i dag får du resultatene dine. Du følte at du gjorde det ganske bra og forventer å få - etter din vurdering - en god karakter. Spent og litt

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[4] If I want a good enough grade and not fail again, then I have to ... and ….
[5] If I..., then I would have accomplished my goal.
[6] If I..., then it would have been even worse at the exam.
[7] I will accomplish my goal.
[8] I would evaluate other jobs or educations.
[9] Evaluate the options below in relation to which would most typically represent the type of thought you would think in this situation. Fill in (...) with your own thoughts and actions.

nervøst åpner du sakte studweb-siden eller brevet. Da oppdager du at karakteren er dårligere enn det du forventet og trenger for å oppnå målet ditt om å få en bestemt jobb eller få innpass i videre utdanning. Da du legger ned brevet eller lukker studweb-siden tenker du ...»[10] (for translations of the scenarios see appendix E, for the full study as it appeared in Qualitrics see appendix F). Although it was not expected that all participants would be equally interested in obtaining success in all areas it was expected that at least one area would be interesting to all participants.

      Procedure. All participants were recruited through email or Facebook. The email gave a brief outline of the study, and link brought the participants to the informed consent Qualitrics website where they had to read the informed consent and instructions (brief) before proceeding. The participants were then introduced to four different scenarios, each with a negative outcome. Participants were asked to reflect on their thoughts in this or similar scenarios for a few minutes before progressing. Then they were asked to rate their interest in successful outcome on this or similar situations on a scale from 1-10. Thereafter they choose which base sentence was most typical of their own thought. The 12-item grit scale was administered after the presentation of all four scenarios. The grit scale was also administered to all participants at the end of the study due to the same limitations. At the end of the study the participants were debriefed (see Appendix D). The results were downloaded from the website and analysed using SPSS. The analysis was both confirmatory, with regard to testing the hypothesis that choice of strategy was part of a general mind-set versus situation specific, and exploratory, with regard to examining findings that were not immediately interpretable. The data was analysed using point bi-serial correlations with grit as a continuous variable and strategies dummy coded into 1= elected strategy 0= all other strategies. Each individual scenario was further analysed using stepwise hierarchical multiple regression with grit as dependent variable and interest in the first block and dummy coded hypothetical thinking strategies as independent variable in the second block. Stepwise method was chosen since no single previous theory can lead to a clear prediction on which to test the hypothesis (just a compilation of different theories) and causality was not of specific interest since the data was mainly correlational (Field, 2009). Finally, a 2*3 cross tabulations with grit divided along

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[10] "Imagine that you, a few weeks ago finally finished an important exam, and today you are getting your results. You feel that did pretty good, and expect to get- after your own evaluation- a good grade. Exited and slightly nervous you open your webpage or letter. You then discover that the grade is lower than you expected and need in order to accomplish your goal to get a specific job or reach further education. When you put down the letter or close down the browser you think...."

the 60th percentile (3.67) against each scenario was applied, to explore differences in frequency of participants with higher and lower grit for each strategy.

Results

Grit scores. The grit scores were calculated from a sample of 78 participants and had a mean of 3.48 and a standard deviation of 0.613 ($M=3.48$, $SD=0.61$). The distributional shape of grit was examined to determine to what extent the assumption of normality was met. Skewness (-.21, $SE=.272$), kurtosis (-.57, $SE=.54$) and Shapiro-Wilk test of normality (S-$W=$ .98, $df=78$, $p=.133$) indicated a somewhat right skewed flat and light tailed distribution but was deemed to be sufficiently normally distributed. Visual examinations indicate that one frequency was much more represented than others, however this was remedied by centring the grit scores. There were no extreme cases or outliers. No other assumptions were violated. Although there is skepsis to dichotmizing continous data (MacCallum, Zhang, Preacher, & Rucker, 2002) in this study it was done in an exploratory fashion in order to further understand the differences among those with high and lower grit in relation to choice of strategy. Initially the data was split along the median (3.583) where the scores of 3.58 was included in the high grit sample however that resulted in more high grit participants than low grit participants which seemed inorganic. Therefore a 60th percentale split was chosen in which those with 3.58 in grit scores became part of the low grit sample. Cross tabulations as part of the exploratory study was therefore run using the 60th percentile split (3.67) i.e. top 40 % of the sample polulation where low grit mean was 3.04 ($N= 43$, $SD=0.43$) and high grit mean was 4.01 ($N=35$, $SD=0.31$).

Demografic variables and grit. There were no significant correlations between the demographic variables age, gender, or level of education and the dependent variable grit

Other included and excluded variables in relation to grit. Grit was significantly correlated with interest ($p<0.05$) in all scenarios (except the interview scenario) and with interest>7 across scenarios ($r (76) = .24$, $p=0.04$). Therefore, interest was included in the model when examining both overall results and individual scenarios. The frequency of distribution for each strategy was examined to ensure sufficient power to include the strategy in the analysis. Due to the low number of responses (between 1-5 for each scenario) DCFT was removed from the analysis. The analysis excluded the interview scenario since preliminary analysis indicated there were no significant difference between groups or significant association between grit and any of the hypothetical thinking strategies.

Did choice of Strategy Differ across Scenarios? In order to test the hypothesis that choice of strategy was context dependent point bi-serial correlations and simple regression was applied. Results from point bi-serial correlations, with grit as continous variable, and dummy coded strategies (0= all other strategies, 1= specific strategy), indicated that although MCII was positively associated with grit scores in the sports and project scenario, it was negatively associated with grit in the exam scenario (see table 1). In the stepwise hierarchical regression analysis (see table 2) the same pattern persisted, however, in this model, when controlling for interest, only MCII predicted higher grit scores: negatively in the exam scenario and marginally positively and positively in the sport and project scenario. From the cross tabulations it was made clear that the high negative correlations between MCII and grit was not caused by high grit participants not choosing MCII but by more low grit participants choosing it in the exam scenario than in any other scenario (see figure 1 below). To further support the finding that choice of strategy was context specific, a simple regression was run on those who choose three or more of the same strategy across scenarios (dummy coded as 1) versus those who chose 2 or less of the same strategy (dummy coded as 0) to see if it predicted grit scores. The result indicated that there was no relationship between grit scores and choosing three or more of the same strategy (coded as a dummy variable) across scenarios *(β=-.027, t (76) = -.17, p=0.86).*Results cautiously indicate that choice of strategy was scenario specific rather than scenario general, hence hypothesis 1 was retained.
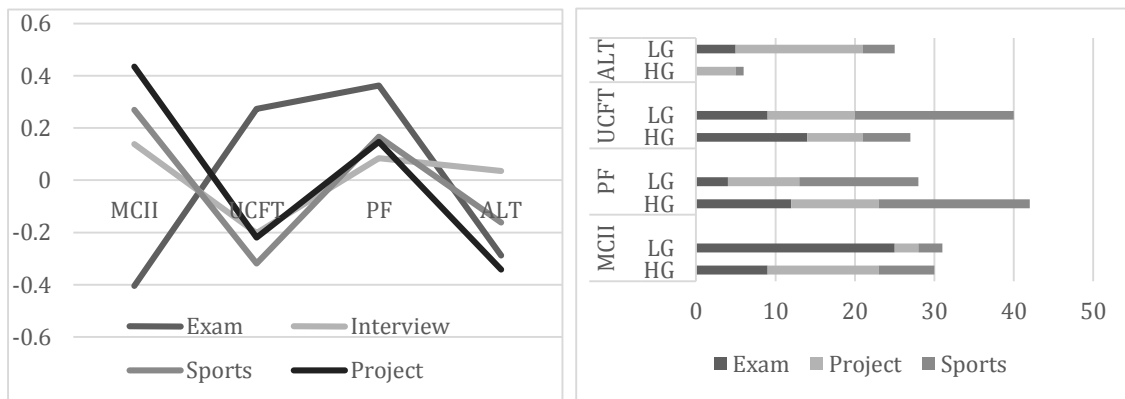

Figure 1. Across scenario point bi-serial correlations (pearson correlation coefficients) with dummy coded strategies (left) and cross tabulations across scenarios of High (HG) and low grit (LG) participant and choice of strategy measured in frequency (N) (right)

Table 1

Point Bi-serial Correlations Between Grit and Choice of Strategy in all 4 Scenarios

| | Type of strategy by scenario | | | | | | | |
| | MCII | | UCFT | | PF | | ALT | |
Scenario	r	p	r	p	r	p	r	p
Exam	-.404***	.001	.273*	.015	.362***	.001	-.288*	.011
Interview	.138	.228	-.202	.063	.084	.465	.035	.760
Sports	.270**	.014	-.319**	.004	.166	.146	-.162	.157
Project	.435***	.001	-.219*	.057	.147	.204	-.342**	.003

* p<0.05 (2 tailed) ** p<0.01 (2 tailed) *** p<0.001 (2 tailed)

Relationship between grit and hypothetical thinking strategies in individual scenarios.

Falling short at an important exam. The results from point bi-serial correlations indicated that grit was positively associated with UCFT and PF and negatively associated with MCII in the exam scenario counter to predictions in hypothesis 2, 3 and 4 (see Table 1). Only ALT was in line with predictions: negatively associated with grit scores (hypothesis 5). Analysing the data where interest>7 only strengthened these relationships (but reduced power due to the limited number of participants).

In a stepwise hierarchical regression model with centred grit as dependent variable and interest as independent variables in the first block and dummy coded strategies in the second block, only MCII and ALT significantly predicted grit scores when interest was included in the model. When going from not choosing ALT to choosing ALT, grit decreased with 0.866. Interest became less of a predictor of grit as strategies were entered into the model. The final model with MCII, ALT and interest explained 33% of variance in grit scores $(R^2_{adj} = .33.2)$. The other strategies failed to reach significance hence was not included in the model. The only hypothesis supported in the exam scenario was hypothesis 5: ALT was negatively associated with grit scores both when interest was in the model and when it was not.

Table 2

Stepwise Hierarchical Multiple Regression Anaysis with Grit (scale from 1-5) as Dependent Variable and Interest (scale 1-10) and Hypothetical Thinking Strategy (dummy variables) as Independent Variables.

Scenario			β	SE(B)	B	T	Sig. (p)	CI 95%
Exam	Model 1	Interest	.080	.038	.240	2.129	0.037*	[.005, .155]
	Model 2	Interest	.093	.034	.278	2.734	0.008**	[.026, .160]
		MCII	-.547	.126	-.442	-4.347	0.001***	[-.798, -.302]
	Model 3	Interest	.049	.035	.145	1.403	.165	[-.020, .117]
		MCII	-.636	.121	-.514	-5.245	.001***	[-.875, -.398]
		ALT	-.866	.246	-.349	-3.278	.002**	[-1.388, -.345]
Sports	Model 1	Interest	.063	.025	.274	2.470	0.016*	[.012, .133]
	Model 2	Interest	.050	.025	.217	1.982	.051	[.000, .100]
		UCFT	-.356	.142	-.275	-2.503	.015*	[-.639,-.073]
		MCII	.207			1.868	.066	
Project	Model 1	MCII	.782	.154	.535	5.080	.001***	[.475,1.089]
		PF	.446	.148	.317	3.009	.004**	[.151, .742]

* p<0.05 (2 tailed) ** p<0.01 (2 tailed) *** p<0.001 (2 tailed)

Since this scenario ran counter to prediction, further exploratory cross tabulations were administered. The results from an exploratory cross tabulation indicated that there were clear differences between the number of high and low grit participants who choose a given strategy both when analysing the subsample where interest > 7 $(X^2(2, N=52)=13.50,$ $p<0.001)$ and when analysing the whole sample $(X^2(2, N=78)=12.51, p=0.02)$. This result also indicate that it was not that MCII was not associated with high grit scores rather that more people with low grit scores chose the MCII strategy in the exam scenario and fewer chose UCFT compared with the other strategies and the other scenarios (see Figure 2)
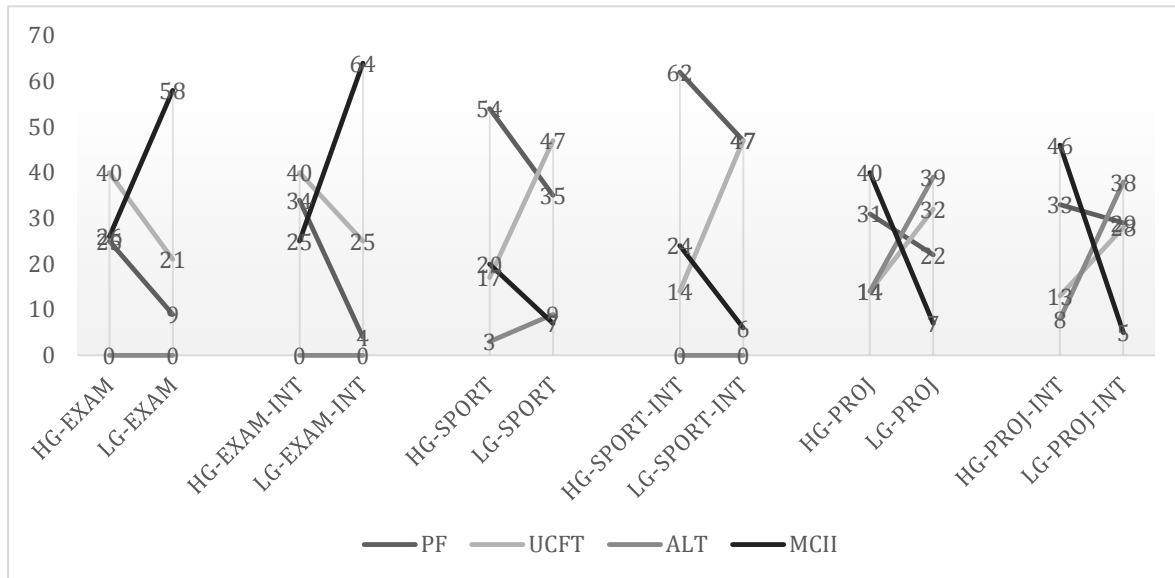
Figure 2. Percentage (%) of high (HG) and low grit (LG) participants who chose a specific strategy in each scenario (EXAM, SPORT, PROJECT) and in a selected sample which only include participants with interest>7 (-INT).

Cross tabulations indicated that no high grit participants chose ALT as their preferred strategy, (see Figure 1), which could explain the large difference in grit scores between those who chose and did not chose ALT in the hierarchical regression analysis.

Just missing the mark on a qualifying sports competition. The result from a point bi-serial correlation indicated that grit was significantly positively associated with choosing MCII in the sports scenario in line with predictions and significantly negatively associated with UCFT also in line with predictions (see table 1). When only examining the cases with indicated interest>7 (high interest in success) the association with MCII became more positively correlated *(r (76) = .42, p=.011)*, the association with PF increase and became significant *(r (76) = .41, p<.001)* and the association with UCFT became more negative *(r (76) = - .42, p=.01)*.

When applying stepwise hierarchical regression model with centred grit as dependent variable and interest as independent variables in the first block and dummy coded strategies in the second block, only interest and UCFT was retained in the model as predictors of grit. The results indicated that for each unit interest increased, grit scores increased with 0.05 units. Furthermore, going from choosing any other strategy to choosing UCFT the grit score decreased with 0.36 points (see table 2). MCII was not a significant predictor of grit.

However, this might be down to low number of participants in this study so should be interpreted with care so as not to commit a type II error. The proportion of variance in grit in the sport scenario explained by this model was only 12.4% (R^2_{adj}=.124). The result let us retain H3: that UCFT will be negatively associated with grit scores.

A 2 x 3 cross-tabulation indicated that there were significant differences between those high and low in grit with regard to choice of strategy *(X^2(2, N=75)9.16, p=0.012).* When only those with interest >7 was analysed the results failed to reach significance mainly because of two of the cells having lower frequency than the recommended five (see figure 2). The cross tabulation also show that the most frequently chosen strategy in the sports scenario was PF (54% across sample, 64% among those with interest > 7). It is also worth noting that the frequency of low grit participants who chose MCII was reduced from 58% in the exam scenario to 9% in the sports scenario (figures for those with high interest levels were similar) (see figure 2).

Not getting an important project proposal accepted. The results from point bi-serial correlations indicated that grit was positively associated with MCII and negatively associated with ALT in line with predictions. Grit was also marginally negatively associated with UCFT but results failed to reach significance in line with predictions. When only examining the cases with interest> 7 the association with UCFT became more negative and reached significance *(r= -.32, p=0.03).*

In a stepwise hierarchical regression model with centred grit as dependent variable, interest as independent variables in the first block and dummy coded strategies in the second block, MCII and PF was retained in the model as predictor of grit. The results indicated that going from not choosing MCII and PF to choosing them grit scores increased with 0.78 and 0.45 respectively. In line with predictions MCII was positively associated with grit scores (H2), contrary to predictions choice of PF was also again associated with higher grit scores (H4). Interest was not a significant predictor of grit when choice of strategy was added. The model explained 27.2% of variance in grit scores *(R^2_{adj}=0.272).*

An exploratory 2 x 3 cross-tabulation indicated that there were significant differences between those high and low in grit with regard to choice of strategy *(X^2(3, N=76)=16.26, p<0.001).* In cases where interest >7 several of the cells had lower frequency than the recommended five hence no further analysis was conducted (see figure 3). In the project scenario a large proportion of HG participants chose MCII (40%) whereas only a small

proportion of LG participants chose MCII (6%). Furthermore, although PF was positively associated with grit scores in the hierarchical regression, the cross tabulation indicated that a much lower frequency of HG participants chose PF (14%) than LG participants (39%). The findings from the project scenario lent support to the prediction that MCII was positively associated with grit scores but went counter to the prediction that PF should not be associated with grit scores although there are some reservations on a clear rejection of the hypothesis when the cross tabulation results are taken into account.

Discussion

The results indicated that the association between higher grit scores and choice of strategy was not context general but rather context specific, offering support to the prediction that something within the situation such as likelihood of success or experience might contribute to high grit participants choosing different strategies for different situations (Hypothesis 1). Furthermore, although there were no specific preferences for any strategy among those with high grit across scenarios, there seemed to be definite trends discussed below. There was also some support for the other hypotheses regarding the relationship between type of strategy and grit (hypothesis 2-5) in the sport and project scenario but the results from the exam scenario ran counter to predictions for all strategies except ALT. The possible interpretation for this discrepancy was discussed below. In addition, the prediction that PF would not be associated with grit scores were rejected in the project scenario, however, in this scenario interest was not a significant predictor of grit, which might account for the association between grit and PF. Limitations of the study are discussed at the end and future studies suggested.

There were no significant point bi-serial correlations between the demographic variables age (dummy coded), gender, or level of education (ranked) and the dependent variable grit. Unlike Duckworth et al. (2007) and study 1, education and age was not found to be positively correlated with grit. This discrepancy might be explained by the way age (in one-age steps with one group of 27 and older) and education was measured in this study. An alternate explanation might be that the presence of the top athletes in the sample might have affected the data with regard to the relationship between age, education and grit although no such effect was directly detected. Top athletes might reach higher grit scores at a younger age with lower education affecting this correlation.

Results from point bi-serial correlations and hierarchical analysis indicated that choice of strategy was context specific rather than context general independent of level on interest

towards tasks. Point bi-serial correlations indicated a significant association between interest>7 across scenarios and grit but in a simple regression with grit as dependent variable and choosing three or more of the same strategy across scenarios (coded as a dummy variable) as independent variable did not predict grit scores. In other words it seemed that other factors than interest contributed to a differential choice of stratgy across scenarios. One likely factor might have been experience and further studies should therefore include a measure of experience.

It seemed that for each scenario there was an increase in positive association between grit and MCII, and an increase in negative association with UCFT in line with predictions. The increase in association and predictive power between MCII and grit scores over trials lends support to Duckworth et al. (2010) findings that preference for deliberate practice (strategy that shares many similar features with MCII) grew with experience i.e. there was a learning effect or preference effect across trials. Encountering four similarly sounding scenarios, although with different contexts might create conditions for a similar learning effect as found by Duckworth et al. Furthermore, research by Sevincer et al. (2014) indicated that engaging in MCII on one task transferred to engaging in MCII on another unrelated task. In the current study it was only found that the high grit scores population choosing MCII experienced a learning or preferential effect across tasks. The findings might indicate that in addition to experience playing a role, either control of emotions and/or the usefulness of MCII in relation to implementing a plan, hence the likelihood of success estimates after failure (P. M. Gollwitzer, 1990), might play a role in choice of strategy across trials. Although there seem to be a trend, some care must be taken in interpreting the results. First, the order or scenarios were not counterbalanced hence it is difficult to know if it was a result of the type and order or scenario or a real effect. Secondly, there was increasing likelihood with age that people would have encountered the type of scenario in the order they were presented: exam, interview and project pitch. Few young people might have pitched a project proposal whereas many if not all should have sat an important exam at some point judging from the demographical data. Future follow up studies should counterbalance the order to ensure that the learning effect persist with different scenarios or same scenarios in different order. It might also be worthwhile in future studies to follow up the theory that the emotional connotation of the strategies might affect choice in high and low grit participants by measuring emotions before and after negative feedback and/or choice of strategy

The lack of option to improve on the scenario stimuli might have led to emotional connotations of strategies playing a role in choice of strategy. Theory indicated that grit was positively associated with positive emotions (Snyder & Lopez, 2002). Whereas UCFT is associated with at least short term negative emotions (Epstude & Roese, 2008; Roese, 1994), MCII allow people to both extract meaningful information from negative feedback without it damaging their positive self-image or positive feeling about their goal, and help them make a plan to change current outcome (Oettingen & Kappes, 2009). In scenarios presented in this study, there is no real option to improve (it is all in the imagination), hence negative emotions such as those experienced when engaging in UCFT would not be useful which could explain the reduction across scenarios in the choice of UCFT in relation to grit. However, this would not explain why UCFT was the preferred strategy in the exam scenario.

There is a strong link between regret, UCFT and irreversible outcome (Epstude & Roese, 2008; Gilovich & Medvec, 1995) which might explain the different outcome in the exam scenario. Having experienced previous negative outcome in a similar setting with no option to improve vividly imagining negative outcome on a similar scenario might have lead to the negative emotion of regret and choice of UCFT rather than MCII. UCFT was positively associated with grit in the exam scenario (counter to predictions) i.e. the most frequently chosen strategy (40%) among the gritty. However, when UCFT was included in a model that contained interest in successful outcome, UCFT was no longer significantly related to grit. UCFT is found to be associated with regret when there is no option to improve and although grit is associated with primarily positive emotions, it is not illogical, given the large proportion of participants over the age of 25, that some of them might regret not getting that grade on an important exam although given circumstances in their life they might not consider it likely or interesting to go back and sit an exam again. If this is the case then one should not see a positive correlation between grit and UCFT in a real analytical task with real options to improve.

In general, the choice of strategy in relation to grit on the exam scenario differed from the choice of strategy in the other scenarios. This might be understood in terms of differences in level of experience with this scenario versus other scenarios and/or in terms of likelihood of success estimates. The effect of the negative association between grit and MCII in the exam scenario (counter to predictions) was mainly produced because more low grit participants chose it as their preferred strategy for this scenario, compared with other scenarios. There were almost as many high grit participants choosing MCII in this scenario as

in other scenarios (25% versus, 20% and 40%), but a significant higher proportion of low grit participants who chose MCII in the exam scenario versus the other scenarios (58% versus 9% and 7%). Previous research results have indicated that MCII does not always confer the advantage of increased effort. When likelihood of success is considered low then MCII will lead to reduced effort (Oettingen, 2012; Oettingen & Stephens, 2009). For low grit participants, getting the perfect grade on an exam might be considered less likely. This understanding might be reached by applying MCII which makes the obstacles to the goal clear (mainly because there is also experience to build on), and if there are many obstacles which seem insurmountable then the likelihood estimate would be lower. Choosing MCII would then lead to a lowering of effort on task. To explore this further, the follow up experiment will examine whether choice of MCII differentially effect effort levels on task between high and low grit participants based on likelihood of success estimates.

An additional complimentary explanation, which might have augmented the effect, was that certain cultural factors inherent in the scenario itself created the difference. Whereas failing an interview, not making it in an important sports competition or not getting an important project proposal can potentially have grave consequences and hence great costs, in Norwegian Universities, exams can be taken trice (provided one invests the time) and there is no indication in the results whether the grade was achieved the first or the last attempt. This type of setting might not support a high effort input since the process produces low end-reward for those that do give the effort on the first attempt. In order to follow this line of reasoning future research should conduct a cross-cultural study where the cultural element of the exam scenario could be put to the test.

MCII was the strategy that overall was most positively associated with grit scores lending support to hypothesis 2. MCII was considered to be a more useful strategy in relation to increased effort and improved outcome than UCFT. This was mainly based on the argument that it had an inbuilt plan for implementing change of behaviour, thereby also increasing the likelihood of success after failure (P. M. Gollwitzer, 1990). Although this study found an association between MCII and grit no conclusions can be drawn about why there is a link and why the strength and direction of the link differ between the exam and the sport and project scenario. If this was the case, one would expect to see highly gritty participants be more likely to choose MCII than UCFT after negative outcome than before negative outcome. This could be examined in a future experiment where likelihood of success was manipulated, and real effort (i.e. time spent on task) was measured. In this study

it was assumed that highly gritty participants were also likely to score high on likelihood of success, given the predictive power of grit on success. However, this might not be a valid assumption, and future studies should put this to the test.

One observation that went counter to prediction was that positive fantasy (PF) was moderately to significantly positively associated with grit. Positive fantasy was postulated not to be associated with grit since it is an emotional coping strategies associated with a decrease in effort(for review see Oettingen, 2012). According to the point bi-serial correlation results, PF was most positively associated with grit on the exam scenario but was no longer a significant predictor when interest was entered into the model during regression analysis. Looking at the cross tabulations it was a more frequently chosen strategy among those with high grit across all scenarios. However, it was only significantly associated with grit in the hierarchical regression in the project scenario where interest was not a significant predictor of grit scores. This indicate that then interest is high the likelihood for a high grit participant to choose PF is low, but when interest is low PF might be the preferred strategy.

There seem to be two other possible ways to interpret this result. First, the fact that scenarios cannot be physically changed, by changing behaviour will mean that PF might be a useful strategy since it serves to reduce effort on task and in this case, real effort is neither needed nor useful. If this is the case then positive fantasy should not be associated with grit on a real task with options to improve. Some participants might have had a real option for improvement in mind (being able to re-sit a failed exam in the spring) and hence might have chosen other strategies. The fact that fewer of the participants would have had experience with project pitching, hence would have had no real option to improve, might account for the choice of PF in this scenario over other strategies(i.e. a default strategy when experience is low). Hence, in further studies both interest and experience should be taken into account when examining positive fantasy in relation to grit.

Secondly, the way that positive fantasy is presented in this thesis: as a cognitive strategy rather than daydreaming, and participants are only asked to elaborate on their own without objective measures to ensure they elaborated, might have allowed PF to be interpreted as an expectancy judgment rather than as an indulging positive fantasy. If this was the case then PF might not serve to reduce effort (Oettingen, 2012). Engaging in expectancy judgements says something about the likelihood of anticipated event occurring (Bandura & Locke, 2003). If this this was the case it should not be associated with grit if likelihood of successful outcome was considered low, however, if PF was understood as indulging in

fantasies about positive outcome, as was intended, it would not be affected by likelihood manipulations.

There are some potential limitations to this study with regard to sample, online testing, choice of stimuli, experience, likelihood of success and the fact that it was a correlational study, affecting the conclusions drawn and the generalizability of the results.

The sample could potentially represent two samples in one due to the addition of the Olympic athletes. Furthermore, the manner in which age was gathered was not optimal in relation to seeing its effect on grit. Finally, the sample was too small to be looking at choice of individual strategies when interest was taken into account. When only examining the data from participants who highly interested in succeeding on the task (interest>7) many of the cells in the cross tabulations were too small to be taken into account. A more random sample (wider population base) and perhaps even a more specific sample, i.e. only looking at top athletes, would increase the validity and reliability of the results and its generalizability.

There should further more have been an indication of experience: to what extent had one experienced the scenario before, since experience might have affected the outcome. Also, DCFT should not be included in similar studies in the future; including it the research might have cause unnecessary noise. Finally, neither the order of the scenarios nor the presentation of grit was counterbalanced due to the limitations of the Qualtrics software program. Although this might not have impacted the results, such an effect cannot be ruled out.

Finally, the choice of scenario as stimuli could in itself also have affected the outcome. During the pilot testing it was obvious that small changes in scenario produced big changes in outcome, which makes it both less reliable as a stimulus, and the research less valid due to the limitation of what conclusions we can draw from this study. At least it needs another form of research e.g. experimentation with manipulation in order to support the findings. Big differences between scenario's can also point to the fact that we behave differently in different situations, however, it could also be as argued above that that small changes in the scenarios can have a ripple effect on the results as found during pilot testing. These scenarios had open ends after negative outcome and did not specify if the option to improve was present or not. Therefore, individual difference in likelihood of success estimates (experience with achievement of alternate outcome) could have influenced the results. Future studies should therefore take the form of an experiment, have a real task and

include measures or manipulations of likelihood of success and measure previous experience on the task.

In summary, the results indicated that the association between higher grit scores and choice of strategy was not context general but rather context specific. Nevertheless, although no single strategy was preferred by all with higher grit scorers in all scenarios, there seemed to be definite trends where the association between grit and MCII increased and became more positive across scenarios and decreased and became more negative with regard to UCFT across scenarios. There was also some support for the other hypotheses regarding type of strategy, e.g. that MCII was positively associated with grit, and UCFT and ALT negatively associated with grit in the sport and project scenario but the results from the exam scenario ran counter to predictions. Furthermore, the prediction that PF would not be associated with grit scores was rejected in the project scenario, however, interest was here not a significant predictor of grit when strategies were entered into the model which might account for the association between grit and PF, alternate interpretations were also discussed. Although there were many limitations in this study it still provides interesting results that ought to be examined further in future research. Some of these limitations were addressed in the follow up experiment (study 3) where likelihood levels were manipulated (high likelihood, low likelihood and control), and experience, interest (independent variables) and real and perceived effort (dependent variables) before and after task was measured in addition to grit and hypothetical thinking strategies.

Study 3

The Role of Hypothetical Thinking Strategies on Effort in High and Low Grit Participants

Introduction

Study two was found to have several limitations such as a possible split sample, online testing, choice of scenario versus real task, not measuring experience or likelihood of success and the fact that it was a correlational study rather than an experiment. The use of scenarios in study two did not offer real opportunities for improvement, which might have affected the outcome. This was changed in study three by choosing an anagram task, loosely based on the research by Markman et al. (2008), where the anagram tasks were presented twice and choice of hypothetical thinking strategies were examined both before and after negative feedback

providing real opportunity for change of outcome after negative feedback. Some of the other most pressing limitations of study two were also addressed in study three, an experiment, where likelihood of success was manipulated, experience, interest, grit and hypothetical thinking strategies measured to see to what extent they affect estimated and real effort on an anagram task. Due to time restraint, it was not considered viable to do a laboratory task so this study was also conducted online.

Because this experiment examined choice of strategy before and after negative feedback, a new type of strategy, intimately related to UCFT, was introduced. Whereas UCFT is concerned with alternate outcome after ask, Pre-factual thoughts (PFT) are concerned with alternate thoughts before a task or event. PFT are mental simulations of alternatives to their expected realities of the future e.g. *"If Jo would tell Rachel how he really feels, she might go out with him"* (Sanna, 1996). It is a mean to predict the future by modifying factual events '*if Jo would tell Rachel…*' and considering the likelihood of future consequences '*she might go out with him*'(Barbey et al., 2009). Upward PFT tend to take the form of implied or explicit if-then statements which representing mental simulations of alternatives to expected future outcome that are better (Petrocelli et al., 2012). There are two major distinctions between UCFT and PFT. The first is that whereas UCFT is related to negative outcome, PFT happens before an event has taken place and therefore is not necessarily associated with negative emotions. The other is that where UCFT most often is related to reality upward PFT can have an antecedent that has low likelihood and yet serve as an upward PFT (Petrocelli et al., 2012).

It was predicted in this study that there would be a difference in the effort levels (estimated and real before and after) dependent on likelihood of success manipulations. Because different strategies should differentially predict effort levels based on likelihood of success estimates, the choice of strategy could potentially account for this difference.. According to theory, MCII differentially affects effort levels dependent on likelihood of successful outcome estimates (Oettingen, 2012). If a task was perceived as difficult (i.e. likelihood of successful outcome was low) it should lead to less effort on task, if a task was considered to be easy (i.e. likelihood of successful outcome was high) MCII should lead to more effort on task. PF should always lead to less effort on task and is not dependent on likelihood estimates, so there should be no difference in mean estimated effort levels between those who chose PF across conditions. PFT and UCFT are both dependent upon the likelihood estimates of either the antecedent (i.e. to what extent is the if… likely in "If I want

to get into top 40%, then….) in UCFT or the consequent (then….) in both UCFT and PFT. Therefore, it is likely that UCFT might be differentially affected by likelihood estimates. From the previous study it is unlikely that UCFT will be significantly related to grit scores or effort on task when other types of strategies are available.

Furthermore, it is likely that difference between low and high grit scores might predict significantly different mean effort scores. Grittiness is the ability to sustain effort on task despite adversity (such as facing up to more difficult tasks) (Duckworth et al., 2007) and the literature review indicated that gritty individuals tended to choose or thrive on tasks that were considered above their skill level (Duckworth et al., 2010; Gitter, 2008). It was therefore hypothesized, that there would be a difference between the high and low grit participants with regard to effort on task in the three conditions.

P. M. Gollwitzer (1990) argued that a goal might not reach fruition without and implementation plan for change of behaviour, which also increasing the likelihood of success after failure. Engaging in the MC part of MCII should lead to increased goal commitment. By increasing effort and identifying obstacles to reaching the goal, the likelihood of success estimates should also increase making a difficult task seem more surmountable (which would be necessary on a task where the risk of not reaching the goal would be considered relatively high). No other strategy but MCII would confer this advantage. Furthermore, for successful wish fulfilment people need to acknowledge negative feedback without letting it harm their positive beliefs in their own abilities and their future options and what the future hold i.e. their self-efficacy (Oettingen & Kappes, 2009). MC allow people to extract meaningful information from negative feedback without it damaging their positive self-image or positive feeling about their goal, II allow them to bring it to action. Supported by theory by Locke and Latham (2002) that more challenging goals brings out more effort, and the assumption from grit literature that highly gritty individuals are better at sustaining effort on task despite adversity than less gritty individuals (Duckworth et al., 2007; Duckworth & Quinn, 2009) it was expect that the odds of choosing MCII over other strategies would be larger in high grit sample than in the low grit sample. Furthermore, it should be the preferred strategy in the low likelihood condition among the high gritty participants since it was the only strategy to confer this advantage.

In addition, it was predicted that ALT should be negatively associated with all four effort measures based on the findings of study 2, and that more low grit participants should choose ALT than high grit participants after negative feedback.

It was argued in study 2 that PF should be maladaptive in a situation when the aim was to achieve a goal. The evidence from study 2 indicated that positive fantasy was positively correlated with grit scores, and there might be two possible explanations for this that need to be examined in study 3. If it was chosen because it was considered to be adaptive with regard to reduce effort levels when faced with a hypothetical scenario with no "real" alternative outcome, then it should not be chosen in a study with real tasks and real option to improve by the highly gritty. If however, due to the way the strategy was formulated it was perceived as an expectancy statement rather than a fantasy, then it should be more highly associated with grit before negative feedback than after, and more so in the high likelihood condition than in the low and control condition. It should the also be associated with increased effort (Oettingen & Wadden, 1991)

Finally, this study will examine if likelihood estimates, grit and/or hypothetical thinking strategies significantly predict outcome on task. Although grit should be a predictor of successful outcome and therefore should produce better results, the mechanism by which they learn might not have short term effects (high scores on task) but rather long term effects (mastery of skill).

The aim of this study was to conduct an experiment which improved upon some of the limitations of study two and which would furthered the understanding of the relationship between grit and hypothetical thinking strategies in relation to experience, effort, likelihood of success and successful outcome. The research questions were:

1. Does choice of strategy and/or grit scores predict perceived and real effort on task?

2. Does likelihood of success affect choice of strategy? Is this effect modified when entering grit into the model?

3. Is there a difference between choice of strategy before and after negative feedback among high and low grit participants?

4. Does likelihood estimates, grit scores and/or choice of strategy predict outcome on task?

The hypotheses for the study are as follows:

H1: There will be a mean difference in effort scores (phenomenological and real, before and after feedback) between the likelihood conditions.

H2: Grit and hypothetical thinking strategies together produce a mean difference in effort scores (all four DV's) across the three conditions.

H3: There will be no significant difference in odds between choosing PF and not choosing it between the high and low grit sample.

H4: The odds of choosing ALT will be larger for the low likelihood condition than the high likelihood condition (i.e. below 1)

H5: The odds of choosing MCII will be higher for the high grit population than the low grit sample and higher after negative feedback than before.

H6: There will be a difference in mean rank scores across condition/grit with choice of strategy.

Method

Participants. Four hundred and twenty-eight students (94 males and 323 females) recruited via email from the health faculty at UiT, Arctic University of Norway participated in exchange for taking part in a draw of a gift certificate to the campus bookstore. The majority of the sample was 25 or under (54%) with an age range from 19-55. The control condition had 14% drop out rate, high likelihood had 16 % dropout rate, and the low likelihood had 23% dropout rate. A total of 346 participants completed the study making the total drop-out rate 19.15%. There were less high grit participants than low grit participants in the sample, however, the ratio of high to low grit participants were similar across all three likelihood conditions. The design contained mild deceit in that participants were told that they were not among top 40% after the practice anagram task. However, all participants were debriefed at the end and contact information was provided if they required more information.

Design and measures. A three condition between participant design manipulating likelihood of success (high likelihood, low likelihood and control) and measuring grit, interest, experience, age, gender and education level (as independent variables) was administered. Estimated effort (on a scale from 1-9) and real effort (in seconds) was measured before and after negative feedback (dependent variables). There were three major differences between the current study and that by Markman et al. (2008). Firstly, this study had a time limit whereas the students in Markman et al. were given unlimited time. This was included to ensure some form of control over the experiment when taken online. Secondly, more strategies were included in this study and finally only one correct answer to the

anagram task was required to ease interpretation, whereas Markman et al had several answers for each anagram. In addition, likelihood levels were manipulated (high likelihood, low likelihood and control) by telling the participants that the task had been rated by others as difficult or easy, and experience and interest (independent variables) was measured in addition to grit and hypothetical thinking strategies (independent variables).

The participants were randomly assigned by the computer software Qualtrics to one of the tree different conditions; high likelihood, low likelihood and control. Likelihood was manipulated by giving the participants the information that others rated the anagram task as either easy or difficult.The high likelihood condition contained the information that the anagrams were evaluated by others as having a relatively low level of difficult: with the intent to increasing the likelihood estimates of achieving the goal. The low likelihood condition informed the participants that the task was evaluated by others as having a relatively high level of difficulty: with the intent to lower the likelihood estimates of reaching the goal. The control condition had no such information. In all conditions, the task administered was the same (see Appendix G for original printouts of study 3). Anagrams were counterbalanced half way through the task (i.e. the first 75 participants had set 1 first across conditions, the last 60-75 participants had set 2 first).

Age. Age was measured in five-year increments from 20-55. There were two further groups <19 and >55.

Education. Education was measured both in terms of number of years of education in three-year increments and as accomplished degree.

Experience. Experience was measured on a 9-point response scale ranging from 1 (no experience) to 9 (expert) The scale was presented visually in terms of a sliding scale.

Interest. "Interest" was operationalized as a specific interest in successful outcome on this given task. It was measured on a 9-point response scale ranging from 1(not at all) to 9 (most interested) The scale was both presented visually in terms of Lego blocks as well as a sliding scale.

Grit. The personality trait of grit was assessed with an eight-item self-report questionnaire with established construct and predicted validity (Duckworth & Quinn, 2009) translated into Norwegian (see study 1). The Grit-S scale was preferred over the Grit-O scale since no differences were found with regard to results in the previous study since it has less items that required response. Grit (range from 1-5) was further divided between low and high

grit along the 60th percentile (3.55) in line with study 2 to examine the difference between the high and low grit population.

Hypothetical thinking strategies. The study utilized four different hypothetical thinking strategies MCII, UCFT, PF and ALT operationalized slightly differently than study 2 to fit the task. (a) MCII before task: «For å <u>lykkes </u>med oppgaven <u>må jeg</u> ...og ...; for ikke å <u>mislykkes</u> med oppgaven, <u>så må jeg</u>...og.....»[11] (b) MCII after negative feedback: «Hvis jeg vil komme blant de 40% beste og ikke blant de 60% dårligte må jeg….og….»[12], (c) Upward-directed self-focused pre-factual thought (PFT) before task: «hvis jeg vil lykkes med oppgaven så må jeg bare…»[13] (d) UCFT was used after negative feedback: « hvis jeg bare hadde…, så kunne jeg ha nådd målet mitt»[14] (e) PF: «Jeg klarer å oppnå målet mitt»[15] (f) and ALT: «Jeg kommer ikke til å oppnå målet mitt»[16]. Only one out of the four options could be selected at any given time.

Estimated effort. Estimated effort was operationalized as energy and time spent on reaching the goal. It was measured on a 9-point response scale ranging from 1 (no effort at all) to 9 (max effort) The scale was presented visually in terms of Lego blocks and a sliding scale.

Real effort. Real effort was operationalized as time spent on task. Since there was a finite time limit on the task the lack click made (last entry into any field) was counted as time spent on task. Smart phone entries did not have a click count and in these cases (N=17) real effort was estimated as time of submittal of page.

Procedure*.* Participants were recruited through email sent to approximately 500 students in the health faculty at UiT, inviting them to partake in an Educational Psychology study on "hypothetical learning strategies and goal accomplishment". Participants were asked to ensure they could sit down in a quiet place, before taking part in the study, where they could work undisturbed for 10-15 minutes. They were further instructed that entries that were over 20 minutes would be removed from the dataset to ensure that all participants sat the study in one go. They were also informed that if they wanted to partake in the study the link to the Qualtrics website would take them to the informed consent site. All further instructions

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[11] To succeed on the task I have to…and…, to not fail on the task I have to….and….
[12] If I want to become top 40% and not bottom 60% then I have to ….and…..
[13] If I want to succeed at my goal, then I would have to….
[14] If I just had…, then I could have reached my goal
[15] I will accomplish my goal.
[16] I will not accomplish my goal.

were built into the study. The following instructions appeared on the first screen following informed consent (freely translated into English):

> In this study, you will be solving six anagrams. An anagram is a word where the letters are moved around. You have to unscramble a series of letters so that they form a word in Norwegian e.g. "P R E M" can become "P E R M". The task is to solve as many anagrams as you can in 45 seconds. Your goal is to become one of top 40% respondents in the last 24 hours. The number of correct answers plus the time that you spend on the task forms the foundation for calculating your results with regard to reaching the goal. If you can find a strategy to solve the anagrams, e.g. that all words are from the same category or start with a specific letter, then you increase your likelihood of succeeding. However, do not forget that you have to answer as many questions as you can before the time runs out, so even thought it might present you with an advantage, it could also cost with regard to time. Before you start the real task, a similar practice task will be administered. You will receive feedback concerning your performance on the practice task: if it was among top 40% of respondents. Focus on the information provided above and set a goal in relation to this. Use a minute to think about your goal: how will you accomplish it? Think about your strategy for reaching your goal. How will you think in order to solve the task? Write down on a piece of paper what your strategy and goal is. When you are ready proceed to the next page".

After reading these instructions the participants were asked to choose which of the four presented strategies best fit their strategy (counterbalanced for order of appearance). The following pages asked for demographic information, estimate of experience on anagram tasks, estimated effort and estimated interest before the first set of anagrams. All anagrams were presented on the same page with a timer counting down at the bottom of the page. After time ran out information was given to all participants that they were close but did not reach their goal of being in top 40%. The participants were thereafter asked to choose which strategy they would now choose given the feedback from the practice task (same or different) and perceived effort levels were estimated again before sitting the last six anagrams. Finally, the grit scale was administered before the participants were debriefed. The data was downloaded from the website and analyzed using MANOVA and ANOVA, as well as point bi-serial correlation and logistic regression, when appropriate, to test the hypotheses.

Results

The results indicated that all dependent variables were normally distributed, there were no extreme outliers, and no other assumptions were violated. The results further indicated that there were no significant differences between the conditions with regard to gender, age, interest, level of experience and grit.

Effort and interest. Neither experience nor interest was significantly correlated with grit scores on the anagram task when likelihood manipulations were taken into account. However, in a MANOVA, with effort (all four), rank (before and after) and number of correct answers (before and after) as dependent variable, and grit, dummy coded hypothetical thinking strategies, interest, experience and conditions as predictor variables there was an interaction effect between interest, experience and conditions ($F_{(37,188)}$=1.61, p=0.02) which significantly predicted number of correct answers and rank (outcome) on the practice task but was no longer significant after negative feedback. It did not significantly predict effort levels (neither estimated nor real). Experience was significantly correlated with interest (r (344) =.17, p=0.003) positively correlated with number of correct answers (r(344)=.21, p<0.001) and negatively correlated with rank results (r(344)=-.20, p<0.001) which indicate that it was negatively correlated with time spent on task although not significantly (real effort) (r(344)=-.10, p=0.072).

How condition and grit separately and together predicted effort. A MANOVA examined if conditions predicted effort scores and results indicated, counter to predictions, that it did not ($F_{(4,762)}$=1.81, p=1.83). The average mean grit score was 3.31 (lower than previous studies) (SD=0.61) and was normally distributed. Mean grit scores were marginally higher in the low likelihood condition (M=3.35, SD=0.57) than the high likelihood (M=3.31, SD=0.64) and control (M=3.31, SD=0.56), but the difference was not significant. There were no significant gender difference with regard to grit scores, although men in this sample had on average lower grit scores than women ($F_{(1,359)}$=0.13, p=0.722). In order to test the hypothesis that difference between high and low grit sample predicted difference in mean effort scores a MANOVA with grit divided along the 60th percentile (M=3.55) as independent variable, and the four effort measures as dependent (estimated and real) was conducted. The results indicated that there was a significant effect of grit on estimated effort before task ($F_{(1,365)}$=10.54, p<0.001) and estimated effort after task ($F_{(1,365)}$=6,32, p<0.02). It was the same trend for real effort on task one and two but the difference was not significant. However, the

estimated effort after task effect disappeared when the likelihood manipulation was taken into account.

When grit and condition were categorically coded to form six conditions (2*3) (grit*likelihood) as predictor of the four different effort measures (dependent variables), results indicated there was a significant effect of condition and grit on estimated effort before task ($F_{(5,361)}$=3.05, $p<0.01$) but not after. There were no other significant differences, however, there was a trend of higher grit participants estimating and investing more real effort than low grit participants across conditions.
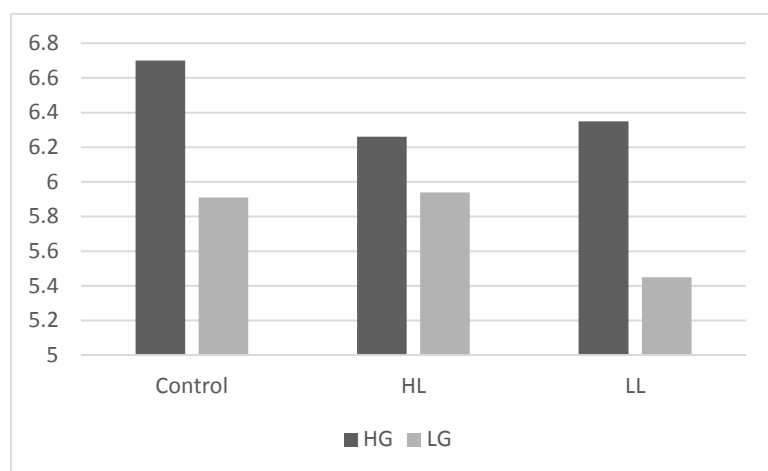

Figure 3. Difference between perceived effort before feedback among participants with high grit (HG) and low grit (LG) across the three conditions: control, high likelihood (HL) and low likelihood (LL).

A post hoc analysis indicated a significant mean differences of 0.789 in estimated effort, between the low and high grit control group (*SE*=0.63, *p*=0.03, *CI* [0.08, 1.50]). Mean difference between the high grit control (C/HG) and low grit low likelihood (LL/LG) group was 1.25 (*SE*=0.63, *p*=0.03, *CI:* [0.08,1.50]). There was a significant difference in mean estimated effort of 0.77 between C/HG and high likelihood low grit group (HL/LG) (*SE*=0.36, *p*=0.036, *CI* [0.05, 1.48]. Furthermore, low likelihood high grit (LL/HG) mean was .91 higher than LL/LG mean (*SE*=0.34, *p*=0.009, *CI* [0.23, 1.58]) and finally high likelihood high grit (HL/HG) and LL/LG had a mean difference of 0.81 (*SE*=0.35, *p*=0.02,*CI* [0.13,1.49]) (see figure 3). In summary, the largest difference between conditions were between high grit control condition and low grit low likelihood condition with a difference of 1,25 points followed by the within condition difference between high and low grit in the low

likelihood condition with a difference of 0.91 points. In general, high grit participants had higher estimated effort than the low grit conditions.

Grit plus hypothetical thinking strategy split by conditions. A split by condition MANOVA was run with perceived effort before and after task as dependent variables and grit, dummy coded strategy before task (strategy 1) and dummy coded strategy after task (strategy 2) as independent variables to examine if grit and hypothetical thinking strategies differentially predicted differences in perceived effort before and after task in the three likelihood conditions. Gender was not included in the model since it was not a significant predictor of estimated effort and did not interact with variables included in the model. The results indicated that grit but not choice of strategy was a marginally significant predictor of estimated effort before negative feedback ($F_{(24, 226)} = 1.52$, $p=0.07$) but not after ($F_{(24, 226)} = 1.09$, $p=0.368$) as found above. In the multivariate test the results indicated there was an interaction effect between grit, strategy 1 and strategy 2 in predicting estimated effort before task in the control condition ($F_{(6, 64)}=2.44$, $p=0.023$). The results indicate that in the control condition grit scores, choice of strategy before task and after task together contribute to predict estimated effort before task better than either alone. No other interaction effect were found.

The relationship between grit and hypothetical thinking strategies. *Gender Effect and Positive Fantasy*. During preliminary correlational screening gender was found to have an unpredicted effect on choosing PF over other strategies, since no previous references to such an effect have been found in the literature. Logistic regression using the backward likelihood ratio method with PF as dependent variable and gender as predictor variable indicated that men were 1.81 times more likely to choose PF before task than women and 2.31 times more likely to choose PF after negative feedback compared with women (X^2 (2, $N=268)=20.15$, $p<0.001$, *-2LL*=399). This effect was independent of grit scores. To address hypothesis five, a backward LR logistic regression was applied with PF as dependent variable and dichotomous grit as independent variable. Choice of PF was more positively related to grit in women (*M*=3.45, *SD*=0.06), than in men (*M*=3.21, *SD*=0.08). However, there was no significant difference in the likelihood (OR) of high and low grit sample choosing PF before (X^2 (1, $N=288$)= 0.03, $p=0.86$, OR=1.43) or after negative feedback (X^2 (1, $N=288$)= 1.93, $p=0.16$, OR=1.36), regardless of gender, hence hypothesis five was retained.

Table 3

Odds Ratio (OR) of Gender and Choice of Positive Fantasy Before Task (PF1) and After Task (PF2).

| | B(SE) | 95% Cl for Odds Ratio | | |
		Lower Cl	Odds Ratio	Upper Cl
PF1	0.60 (0.26)	1.09	1.81	3.03
PF2	0.84 (0.28)	1.34	2.31	3.98
Constant	-1.76 (0.19)			

Grit and MCII. The hypothesis that the high grit sample would be more likely than the low grit sample to choose MCII after negative feedback than before was tested using logistic regression where dummy coded MCII was dependent variable and grit independent variable. The results indicated that grit significantly predicted choosing MCII after negative feedback i.e. the odds was 1.77 times higher for the sample with high grit choosing MCII over the low grit sample after feedback (X^2 (1, $N=367$)= 7.51, $p=0.006$) but not before (X^2 (1, $N=367$)= 0.03, $p=0.86$, OR=1.043) . A point bi-serial correlation was conducted to follow up on the findings in study 2 (and hypothesis 4). The results indicated that MCII 2, after negative feedback, was the only strategy that was significantly positively associated with grit scores (r (67) =.22, $p=0.016$) in the low likelihood condition (when task was considered to be difficult). In total, 41.9% of high grit participants in the low likelihood condition chose MCII after negative feedback. However, choosing MCII did not predict more effort or better outcome than not choosing it.

Grit and ALT. Logistic regression was also applied to examine if grit negatively predicted engaging in ALT1 and ALT 2 (0= all other strategies, 1=ALT) also in line with hypothesis 4. The results indicated that the odds of choosing ALT before task and after negative feedback for high grit sample compared with the low grit sample was 0.179 times higher (i.e. lower likelihood) before task (X^2 (1, $N=367$)= 7.86, $p=0.005$, OR=0.179) and 0.432 times higher after negative feedback (X^2 (1, $N=367$)= 11.59, $p=0.001$, OR=0.432) i.e. it was more likely that the low grit sample chose ALT than the high grit sample. A point bi-serial correlation to follow up the findings of study 2 indicated that ALT 1 and 2 overall was marginally significantly (r (25) = -.17, $p=0.06$) and significantly (r (119) = -.22, $p=0.012$) negatively correlated with grit scores in line with predictions in study 2 and study 3. The before task ALT only had an $N = 25$ and results, therefore need to be interpreted with care.

No other strategies were significantly associated with grit but the trends were similar to those predicted in study 2.

Hypothetical thinking strategy as predictor of mean rank results across grit/likelihood conditions. A MANOVA with number of correct answers and rank on task 1 and task 2 as dependent variables, and grit and hypothetical thinking strategies before and after task as independent variables indicated that only MCII after negative feedback significantly predicted outcome ($F_{(4, 285)}= 2.77$, $p=0.028$). There was also an interaction effect between grit and MCII before task, ($F_{(68, 1162)} = 1.463$ $p=0.01$), and an interaction effect between choosing MCII before task and MCII after negative feedback ($F_{(4, 285)} = 3.963$, $p=0.004$). There was a marginally significant effect of grit on rank after negative feedback ($F_{(24, 78)} = 1.525$, $p=0.058$) but not on before or on number of correct answers which indicate that effort might mediate this effect, (reduced effort lower rank). Mean rank increased (1 is highest 390 is lowest) when choosing MCII compared with other strategies in all conditions except high and low likelihood conditions for high grit participants, but the result was not significant. The biggest difference was found in the control condition where estimates of likelihood was not manipulated and the difference between not choosing MCII and choosing MCII in relation to rank on practice task was significant ($F_{(1, 355)}=4.87$, $p=0.02$) and on the second task was marginally significant ($F_{(1, 355)}=3.557$, $p=0.06$).
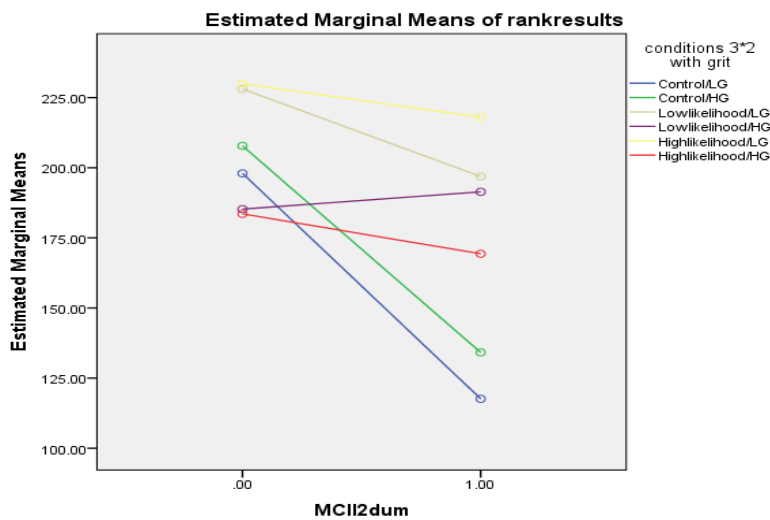

Figure 4. Estimated marginal means of rank result (1 highest rank and 390 is lowest) of conditions divided into high grit sample (HG) and low grit sample (LG) in relation to choosing MCII after negative feedback (1.00) versus other strategies (.00).

Discussion

A study was conducted to examine the relationship between likelihood of success, grit, hypothetical thinking strategies and estimated and real effort levels. There was no mean difference in effort scores between the likelihood conditions counter to predictions however, when grit was included in the model, then grit (HG and LG) and condition (control, high likelihood and low likelihood) together predicted significant mean difference in estimated effort before task, although not estimated effort after task or real effort before or after task. A planned comparison analysis indicated that high grit participants in the control group had the highest mean perceived effort score before task and low grit participants in the low likelihood condition had the lowest estimated mean grit scores. It also indicated that on average high grit participants estimated their effort scores to be higher across the conditions compared with low grit participants. It also indicate than when gritty participants did not have any other measure of likelihood than their own (control condition) they predicted their effort to be higher then when provided with an estimate in the form of manipulation. There was no significant interaction between grit, hypothetical thinking strategy and conditions, and grit and hypothetical thinking strategies together did not predict effort except for in the control condition where the interaction between grit and hypothetical thinking strategy before and after negative feedback predicted estimated effort scores before task.

Furthermore, in line with predictions choosing MCII was more likely in the high grit sample than in the low grit sample, and more so after negative feedback than before. In addition, results indicated in line with predictions, that MCII was a more preferred strategy among the more gritty participants in the low likelihood condition (task perceived as difficult) than in the other conditions. However, choosing MCII did not predict increase in effort rather an increase in rank regardless of condition. Choosing ALT was more likely in the low grit sample than in the high grit sample both before and after feedback, and the association between grit and alt was negative as it was in study 2 but only significantly so before task. Finally, counter to predictions the interaction between grit and each individual hypothetical thinking strategies did not significantly predict outcome on task.

It was hypothesized that there would be a mean difference in effort between the three conditions based on the assumption that different likelihood estimates should produce different effort levels on task. According to theory, choice of strategy should differentially affect effort levels dependent on likelihood of successful outcome estimates (Oettingen,

2012; Petrocelli et al., 2012; Sanna & Turley, 1996), however, there was no difference found between conditions unless each condition was further divided into high and low grit. When divided a significant difference was found with respect to estimated effort before task. The post hoc analysis indicated that high grit participants in the control group had the higest mean perceived effort score before task and low grit participants in the low likelihood condition had the lowest estimated mean grit scores. It also indicated that on average high grit participants estimated their effort scores to be higher across the conditions compared with low grit participants. There was no significant difference between the condition (with or without grit) with regard to real effort on task 1 nor on task 2.

Grit alone significantly predicted estimated effort indicating that it was a better predictor of perceived effort than likelihood manipulations, perhaps because manipulations might play on existing likelihood estimates (that which the person has independent of manipulation). This is supported by evidence that indicated that when gritty participants did not have any other measure of likelihood than their own they predicted their effort to be higher (control condition) than when provided with an estimate in the form of manipulation. Grit should predict sustained effort on task (Duckworth et al., 2007; Duckworth & Quinn, 2009) however, the discrepancy between theory and this experiment might be explained by weakeness in how effort was operationalized and the short timeframe that effort was measured (45 seconds). Although grit did not signficantly predict real effort the trend was the same as for perceived effort i.e. that high grit sample spent more time on task than low grit sample.

Grit but not hypothetical thinking strategy predicted estimated effort before task. Only in the control condition did grit, choice of strategy before task and choice of strategy after negative feedback interact to predict the mean estimated effort scores, which means that grit and choice of effort before and after task better explain estimated effort levels before task than either alone. This result might indicate that when only subjective likelihood of success estimates are taken into account the estimated effort was both associated with grit scores which should be stable, and with choice of strategy both before and after feedback i.e. the willingness to invest effort in the first place might guide the choice of strategy. This argument is supported by literature in the sense that highly gritty participants seem to not only be willing to work with great effort on tasks (Duckworth et al., 2010) but seem to seek happiness or thrive on effortful engagement (Von Culin et al., in press) which might affect choice of strategy. In the high likelihood condition, strategy predicted estimated effort scores

i.e. when task was considered to be easy the choice of strategy before task was a better indicator of estimated effort than grit or choice of strategy after task. However, results need to be interpreted with care since gender predicted choice of PF and ALT had few data points (N=25). In the low likelihood condition, neither strategy nor grit was significant predictors of perceived effort before and after task. In order to more fully understand this rather complex relationship each strategy was then examined on their own as dummy coded strategies.

Positive fantasy was hypothesized to not be associated with grit since it was closely tied to decrease in effort (for review see Oettingen, 2012). Because PF did not predict better outcome or more effort it was assumed that it was interpreted as indulging in fantasy as intended rather than as expectancy statements. The latter should according to Oettingen and Wadden (1991) and Oettingen (2012) lead to better outcome on task however choice of PF was not related to better outcome on task. An unexpected gender effect was found in relation to PF since no such effect has been noted in previous literature reviewed for this thesis. Men were found to be 2.3 times more likely to choose PF after negative feedback compared with women. Men also had lower mean grit scores compared with women but the difference did not reach significance. However, grit did not predict engaging in PF either as a whole sample or split by gender.

In line with predictions, the results indicated that it was more likely that high grit participants chose MCII than low grit participants, and even more so after negative feedback than before. Based on theory by Locke and Latham (2002), that more challenging goals brings out more effort, and the assumption from grit literature that highly gritty individuals are better at sustaining effort on task despite adversity than less gritty individuals (Duckworth et al., 2007; Duckworth & Quinn, 2009), significant differences was expected between the high and low in grit sample on tasks considered more difficult (i.e. low likelihood condition). Although no difference was found with regard to time spent on task (although the high grit sample spent more time on task than the low grit sample) the high grit sample was found to be significantly more likely than the low grit sample to select MCII as their preferred strategy after negative feedback in general. Results from this study also indicated that MCII was most highly preferred among the high grit sample in the low likelihood condition: a situation where task demands were considered higher than skills. This can be understood in terms of Gollwitzer (1990) argument that engaging in the MC lead to increased goal commitment by identifying obstacles to reaching the goal, which would be useful when receiving negative feedback. According to theory, by identifying obstacles and implementing a plan for

overcoming them the subjective likelihood of success estimates should increase compared to when not engaging in MCII, hence effort towards task should increase, which would be useful on a task where the risk of not reaching the goal would be considered relatively high. Furthermore, MC allow people to extract meaningful information from negative feedback without it damaging their positive self-image or positive feeling about their goal (self-efficacy) (Oettingen & Kappes, 2009), II allow them to bring it to action. Hence evidence from this study indicate that one of the advantages that the highly gritty might have over the less gritty is their ability to choose the most useful strategy for overcoming obstacles after negative feedback. Although no significant increase in real effort was found in this study that might be down to the way effort was operationalized and to limitations in the software program discussed below.

In line with predictions ALT was also more likely to be chosen by low grit sample than high grit sample and more so after negative feedback than before. This lends support to the theory that grit is associated with staying on task despite adversity working strenuously towards goal (Duckworth et al., 2007; Duckworth & Quinn, 2009) rather than changing the goal when faced with negative outcome.

Contrary to the prediction, grit and hypothetical thinking strategies did not predict outcome on task. There was a marginally significant effect of grit on rank after negative feedback when choosing MCII but not on before or on number of correct answers, which indicate that effort might mediate this effect, (reduced effort lower rank). This difference in rank result in relation to choosing MCII might indicate that MCII affect better outcome in low grit participants but not high grit participants, at least in the short run, mainly because HG participants spent longer time on task after engaging in MCII. This might be connected with gritty participants having process goals rather than outcome goals, i.e. they seek mastery rather than results. It might be useful in further studies to examine the relationship between grit and hypothetical thinking strategies in relation to Dweck (2000) incremental theory and mastery patterns of learning and problem solving.

Participants did better when there was no information of the difficulty of the task (control condition) compared to when there were information. Furthermore, manipulating likelihood measures might have had the same effect as self-reporting them found in Dweck and Gillard (1975), whose results indicated that self-measures on expectancy of successful outcome resulted in positive outcome for boys but negative outcome for girls. The biggest difference between engaging and not engaging in MCII was in the control condition where

rank results were improved considerably when engaging in MCII for the low and high grit group (from mean rank result of approx.. 200 to mean rank result of 120 and 130 respectively).

Limitations of this study were the operationalization of real effort, operationalization of likelihood of success measures, use of internet for data collection and lack of manipulation check. Each will be discussed in turn below.

 Real effort did not differ between the high and low grit group as suggested by literature. One likely explanation might be that the short time frame for completing the task (45 seconds) and problems in the software could have accounted for the lack of effect. On several occasions, the clock on the software did not stop at 45 seconds as predetermined but at 48 seconds or 52 seconds, which might have affected the results. Furthermore, people who took the test while on their phone only had their first click registered not their last. Although it accounted for only a few entries, it might have influenced the result. Finally, giving such a tight time limit might not have separated those that were willing to keep on working to find the solution (as would be expected for those with high grit), from those that were more likely to give up. Future studies should take this limitation into account and measure effort in more objective terms in the form of blod pressure (BP) (Oettingen et al., 2009) and/or a task where there is no time constraint in a laboratory (Markman et al., 2008).

Furthermore, the way that likelihood of success was manipulated could have masked real likelihood of success estimates effects on choice of strategy or effort. Future studies should not manipulate it but find a way to measure it where it is not affected by gender bias (Dweck & Gillard, 1975).

The lack of a manipulation check could also have affected the outcome. There was no check to ensure that participants actually perceived the conditions as offering high or low likelihood of success. Future research should take this into account or use pre-checked measures for likelihood manipulations.

Finally, sourcing participants through the internet does not allow for very good control over the conditions or results. It is also more likely that participants did not understand as much of the instructions when reading it on screen as when given it on paper. Educational research on 72 10th graders found that those who read on computer screens understood less of the text compared with those who read it on a piece of paper and this was independent on the content of the article (prose or factual text) (Mangen, Walgermo, &

Brønnick, 2013). Further research into this field might consider doing a laboratory task rather than an internet based task to increase control and ensure that participants read and understand all the instructions.

General Discussion

The goal of this thesis was to examine the association between grit and hypothetical thinking strategies, to see if choice of strategies were context specific or general, and to see if the different choices of hypothetical thinking strategies would differentially regulate effort in high and low grit participants controlling for level of interest, experience and likelihood of success. Two studies on adults, one correlational and one experimental indicated that both high and low grit participants chose strategy based on the context of the scenario. Grittier individuals were more likely than less gritty individuals to choose MCII on the anagram task and in all scenarios except from the exam scenario, in line with predictions, but no strategy was chosen by all which indicate that choice of strategy is only part of the story of how gritty people can sustain effort on tasks despite adversity.

Grit and Demographical Variables

Although grit in the literature was found to increase over the lifespan (Duckworth et al., 2007) this was only found to be the case in study one and three where age and education were positively associated with grit. The reason for not finding this difference in study two might either be down to the presence of a sub sample within the sample (the top atheletes) or down to how age was measured on study 2 where 27 years were the upper cutoff for age.

Grit, Interest and Experience

Interest was not related to grit in study 3 like it was in study 2. In study 2 interest positively and significantly related to grit in each scenario and across scenarios. However, when strategies were entered into the model the effect of interest was reduced indicating that choice of strategy affected interest levels on task. In study 3 interest was no longer associated with grit. Although according to theory, interest should relate to grit, the type of interest that relate to grit is more long term i.e. consistency of interest over time (Duckworth et al., 2007) which is more likely to pick up on in life event scenarios compared with anagram tasks.

Experience did not affect choice of strategy and was not significantly related to grit scores counter to expectations. Experience was nevertheless positively correlated with interest in study 3, and positively correlated with number of correct answers and it predicted number of correct answers on the first anagram task before negative feedback. There was also

an interaction effect between interest, experience and condition with regard to outcome in other words, the three together better predicted rank than either alone. Hence, it might be that it is not how much experience a high grit person has that is relevant but how they gain experience in areas where they lack experience i.e. how they achieve mastery.

Grit and Hypothetical Thinking Strategies

It was hypothesized in the thesis that highly gritty participants would engage in strategies, which conferred and advantage concerning the maintenance of effort or the increase in effort on task after negative feedback. The two suggested strategies were UCFT and MCII, where MCII was preferred over UCFT due to its ability to sustain self-efficacy after negative feedback (positive emotions) and its built plan with intention to implement (Oettingen & Gollwitzer, 2010).

The results from study 2 and 3 indicated that MCII in general was most positively associated with grit (study 2) and that high grit participant were more likely than low grit participants to engage in MCII versus other strategies (study 3). The only exception was in the exam scenario in study 2 where more low grit participants chose MCII than high grit participants. The reason for this discrepancy can most likely be found either in a cultural variable where there are little cost associated with failing an exam in Norway or down to experience. Future studies might explore which of these two is the most likely explanation.

Results from study 3 further indicated that MCII was the preferred strategy in a situation where task demands were higher than skills. Some parallels can be drawn to study two. Out of all the scenarios student would have had the most experience and most skill in the exam scenario. It is likely that low grit participants who chose MCII more frequently here than in any other scenario would have found the exam scenario less surmountable than high grit participants since grit is associated with performance at elite universities and lifetime educational attainment (Duckworth et al., 2007). Given the extended experience of sitting exams, since most participants had completed some form of degree, and the general experience that demands for success on exams might on many occasions have surpass skill levels, the choice of MCII makes sense since it serves to increase effort (Oettingen, 2012) and maintain self-discipline on task (Duckworth et al., 2011) even when benefits are not immediately apparent (Duckworth et al., 2011; A. Gollwitzer et al., 2011). Further, due to the circumstances in Norway where exams can be redone without consequences, it would be

worthwhile for the less gritty to invest more effort since the likelihood of succeeding in the end is reasonable and the cost of investing low (resitting exams are culturally acceptable).

The challenging nature of the scenario or task, and the tendency to choose (Gitter, 2008), or stay with an effortful and less enjoyable task where demands exceed skill levels (Duckworth et al., 2010) might account for why MCII was the preferred strategy among the high grit sample in the project scenario (Study 2), and in the low likelihood condition (study 3). More challenging goals should bring out more effort and increase goal commitment (Locke & Latham, 2002), and highly gritty individuals search for happiness through engagement is driven by effort (Von Culin et al., in press), therefore choosing MCII would be a useful way to ensure that effort was administered to task provided the subjective likelihood of successful outcome estimates were sufficiently high (Oettingen, 2012). Since there is a significant positive association between grit and self-efficacy (Rojas et al., 2012) it is reasonable to assume that highly gritty participants might have higher baseline estimates of successful outcome which might facilitate the choice of MCII to increase effort, however further studies are needed to confirm this logical deduction.

Finally, the assumption by Duckworth et al. (2010) that high grit participants might be able to detect the advantage deliberate practice gave them, a strategy with many similar traits to MCII, seems less likely given the results from the previous two studies. Here MCII was chosen after one round of feedback and one anagram task, far too little time to detect advantages in a strategy. Furthermore, the scenario in study 2 provided no feedback as to choice of strategy yet MCII became the preferred strategy gradually over four trials. It is therefore more likely that some intrinsic value in the strategy, such as boosting effort and goal commitment and making obstacles to reach goal apparent, makes it the better choice. Future studies should measure both assumed skill level, estimated effort and experience on scenarios to see if the interpretation above is valid and reliable.

UCFT was found to be negatively associated with grit (study 2) in all but the exam scenario, and was negatively but not significantly associated with grit on the anagram task (study 3) in line with predictions. Although UCFT has in previous studies been associated with improved outcome (Tyser et al., 2012) when the choice of MCII was available it seems that this was considered to be more like how the highly gritty thought than UCFT. In addition, the fact that UCFT was associated with negative emotions (Epstude & Roese, 2008; Roese, 1994) and MCII and grit with more positive emotions might have made this strategy a less likely choice than MCII by those with high grit.

The result from study 3 indicates in line with predictions in study 2 that positive fantasy (PF) was not significantly associated with grit. The positive association between grit and PF in the project scenario was then most likely due to engaging in scenarios as discussed in study 2, rather than understanding the PF as an expectancy statement. Although, it cannot be completely ruled out that some participants understood it that way, so future studies should take this into consideration. An unexpected gender effect was found in relation to PF in study 3. Where men were 2.3 times more likely to choose PF after negative feedback compared with women. No such effect was found in study 2. The gender effect on PF might either be absent in study two due to the relatively small male sample, or might be a function of manipulating likelihood of success measures. Dweck and Gillard (1975) argued that making estimates of success affected men positively but women negatively. This might have impacted upon choice of strategy, however further studies must be conducted in this area before any assumptions can be drawn.

Finally, ALT was negatively associated with grit in study 2 and results from study 3 indicated that it was significantly more likely that low grit participants chose ALT than high grit participants both before and after negative feedback in line with predictions. Grit was associated with staying on task or working strenuously towards goal despite adversity and setbacks (Duckworth et al., 2007) and the unwillingness to change goals found in study two and three support this.

Although choice of strategy did not seem to be context general, i.e. that high grit participants chose a given strategy at every scenario, it did not seem to be completely context dependent either, since MCII was most highly associated with grit in most settings both using scenario stimuli and real task. Further studies should examine in more detail perhaps using qualitative methods, the reason behind choosing MCII and to what extent the thought process of the highly gritty resemble the choice of MCII.

Grit, Hypothetical Thinking Strategies and Effort

Contrary to predictions no relationship was found between hypothetical thinking strategies and real effort, operationalized as time on task until last click on the website, across the conditions, however, overall grit but not choice of strategy was a marginally significant predictor of estimated effort before negative feedback but not after (study 3). The results further showed that in the control condition grit scores, choice of strategy before task and after task together contribute to predict estimated effort before task better than either alone.

This result might indicate that when only subjective likelihood of success estimates are taken into account the estimated effort was both associated with grit scores which should be stable, and with choice of strategy both before and after feedback i.e. the willingness to invest effort in the first place might guide the choice of strategy. This argument is supported by literature in the sense that highly gritty participants seem to not only be willing to work with great effort on tasks (Duckworth et al., 2010) but seem to seek happiness or thrive on effortful engagement (Von Culin et al., in press). Further studies are needed to follow up if this interpretation of the results are warranted, by examining baseline emotions before and after negative feedback in a high and low grit sample and see how they relate to effortful engagement on task. The lack of association between grit and hypothetical thinking strategies and real effort is most likely down to the way real effort was measured in this study and the software used to measure it. Further studies should make sure more reliable ways of measuring effort are used and perhaps give participants longer or unlimited time on task, something, that due to time restraints was not possible in this thesis.

Grit, Hypothetical Thinking Strategies and Improved Outcome

Although it was hypothesized in study three that grit and hypothetical thinking strategies would lead to improved outcome, this was not found to be the case. Previous studies indicate that grit MCII and UCFT are all associated with improved outcome on goal or task ((Duckworth et al., 2011; Duckworth et al., in press; Duckworth et al., 2013; Duckworth et al., 2007; A. Gollwitzer et al., 2011; Markman et al., 2008; Smallman & Roese, 2009; Strayhorn, 2013; Tyser et al., 2012) however, most of these studies were conducted over much longer time than 15 minutes. It is unlikely given what signifies grit: consistency of interest and perseverance of effort, that they would have outcome goals. In order to sustain interest and effort on task the process must have more significance which is perhaps why in study three effort seem to be more highly related to grit than number of correct answers.

Contribution

 Whereas previous scholars have shown that grit predicts happiness and life satisfaction (Singh and Jha 2008), retention at West Point (Duckworth and Quinn 2009) and self-efficacy for elementary- and middle school students (Rojas et al. 2012), this study provides compelling evidence that grit also predict type of hypothetical thinking strategy the gritty are most and least likely to engage in. This represents an important extension of research into the three different but conjoined areas of psychology of hypothetical thinking strategies, grit and

successful outcome. Furthermore, that some of the same correlations between grit, age and education are found in Norway might indicate that the findings from this Norwegian sample might be generalized beyond the countries borders. Although this is very much a new area of research, many questions remain unanswered, and more have cropped up during the study. Still, knowing something about the relationship between grit and hypothetical thinking strategies have brought us one step closer to uncovering why some people manage to expend effort after adversity while other might not, and a bit closer to answering James question posed 107 years ago.

Limitations

There are many limitations across the two studies most of which are discussed within the context of either study. Furthermore, most of the limitations of study two was addressed in study three however in both studies there were three large limitations, which might have affected upon the conclusions and the reliability and validity of the results. The choice of internet task rather than pen and pencil task in a laboratory might also have affected the result and led to less control over confounding variables. Further, choosing to operationalize MCII and PF as cognitive strategies in order to present them in the same format at UCFT might have changed the effect of these strategies, which might affect the possible conclusions drawn from this study. Finally, baseline emotions and emotional reactions after negative feedback might explain some of the relationship between grit and hypothetical thinking strategies, not measuring it might affect the interpretation of the result.

Recommended Further Research

In summary, in order to fully understand the relationship between hypothetical thinking strategies and grit future research should run the same studies in a laboratory setting to ensure that all instructions are sufficiently followed. It should also examine choice of strategy and grit in relation to effort (perceived and real) in a longitudinal study where effort levels are objectively measured over time. Furthermore, learning strategies such as MCII and PF as operationalized by Adriaanse et al. (2010), which require more elaboration, should be examined against MCII and PF as operationalized in these studies (as cognitive strategies) to see if they confer the same or different results. In addition, emotions should be measured at baseline and after negative feedback to examine what role emotions play in the choice of strategy and if there is a difference with regard to emotions between the low and high grit

sample. Finally, baseline measures of likelihood of success should be taken as well as after negative feedback in a way that does not cause a gender effect to see to what extent this affect choice of strategy and outcome after choosing strategy with regard to effort and performance in a high and low grit population.

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Appendix A
Transelated Grit-0 scale and Grit-S scale.

12-spørsmåls Grit Skala (Grit-O)

Veiledning for utfylling: Vennligst svar på de følgende 12 spørsmål. Det er ikke noen riktige eller gale svar, så svar hva du synes passer best.

1. Jeg har overvunnet motgang for å klare en viktig utfordring

   ☐ Veldig typisk meg
   ☐ Ganske typisk meg
   ☐ Litt typisk meg
   ☐ Ikke typisk meg
   ☐ Ikke meg i det hele tatt

2. Noen ganger distraherer nye ideer og prosjekter meg fra tidligere prosjekter. *

   ☐ Veldig typisk meg
   ☐ Ganske typisk meg
   ☐ Litt typisk meg
   ☐ Ikke typisk meg
   ☐ Ikke meg i det hele tatt

3. Mine interesser endrer seg fra år til år*

   ☐ Veldig typisk meg
   ☐ Ganske typisk meg
   ☐ Litt typisk meg
   ☐ Ikke typisk meg
   ☐ Ikke meg i det hele tatt

4. Jeg mister ikke motet ved tilbakeslag/motgang

   ☐ Veldig typisk meg
   ☐ Ganske typisk meg
   ☐ Litt typisk meg
   ☐ Ikke typisk meg
   ☐ Ikke meg i det hele tatt

5. Jeg har vært besatt av en bestemt ide eller prosjekt i en kort periode, men har senere mistet interessen. *

- ☐ Veldig typisk meg
- ☐ Ganske typisk meg
- ☐ Litt typisk meg
- ☐ Ikke typisk meg
- ☐ Ikke meg i det hele tatt

6. Jeg er arbeidsom.

- ☐ Veldig typisk meg
- ☐ Ganske typisk meg
- ☐ Litt typisk meg
- ☐ Ikke typisk meg
- ☐ Ikke meg i det hele tatt

7. Jeg setter meg ofte et mål, men bestemmer meg så for et annet isteden. *

- ☐ Veldig typisk meg
- ☐ Ganske typisk meg
- ☐ Litt typisk meg
- ☐ Ikke typisk meg
- ☐ Ikke meg i det hele tatt

8. Jeg har vansker med å beholde fokus på prosjekter som tar mer enn et par måneder å fullføre. *

- ☐ Veldig typisk meg
- ☐ Ganske typisk meg
- ☐ Litt typisk meg
- ☐ Ikke typisk meg
- ☐ Ikke meg i det hele tatt

9. Jeg fullfører alt jeg påbegynner.

- ☐ Veldig typisk meg
- ☐ Ganske typisk meg
- ☐ Litt typisk meg
- ☐ Ikke typisk meg
- ☐ Ikke meg i det hele tatt

10. Jeg har oppnådd et mål som krevde flere års arbeid

- ☐ Veldig typisk meg
- ☐ Ganske typisk meg
- ☐ Litt typisk meg

☐ Ikke typisk meg
☐ Ikke meg i det hele tatt

11. Jeg blir med jevne mellomrom (noen måneder) interessert i nye gjøremål *

☐ Veldig typisk meg
☐ Ganske typisk meg
☐ Litt typisk meg
☐ Ikke typisk meg
☐ Ikke meg i det hele tatt

12. Jeg er flittig.

☐ Veldig typisk meg
☐ Ganske typisk meg
☐ Litt typisk meg
☐ Ikke typisk meg
☐ Ikke meg i det hele tatt

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* Disse spørsmålene utgjør subskalaen "consistency of interest". De andre utgjør subskalaen "perserverance of effort" (Duckworth et al. 2007; Duckworth & Quinn, 2009)

Skåring:

1. For spørsmål 2, 3,5 ,7, 8 og 11 gis følgende poengsum:

1 = Veldig typisk meg
2 = Ganske typisk meg
3 = Litt typisk meg
4 = Ikke typisk meg
5 = Ikke meg i det hele tatt

2. For spørsmål 1, 4, 6, 9, 10 og 12 gis følgende poengsum:

5 = Veldig typisk meg
4 = Ganske typisk meg
3 = Litt typisk meg
2 = Ikke typisk meg
1 = Ikke meg i det hele tatt

Legg sammen alle poengene og del på 12. Den maksimale skår på denne skalaen er 5 (ekstremt gritty) og den laveste skår er 1 (overhode ikke gritty).

Appendix B

8-spørsmåls Grit Skala (Grit-S)

Veiledning for utfylling: Vennligst svar på de følgende 8 spørsmål. Det er ikke noen riktige eller gale svar, så svar hva du synes passer best.

1)   Noen ganger distraherer nye ideer og prosjekter meg fra tidligere prosjekter. *

     ☐   Veldig typisk meg
     ☐   Ganske typisk meg
     ☐   Litt typisk meg
     ☐   Ikke typisk meg
     ☐   Ikke meg i det hele tatt

2)   Jeg mister ikke motet ved tilbakeslag/motgang

     ☐   Veldig typisk meg
     ☐   Ganske typisk meg
     ☐   Litt typisk meg
     ☐   Ikke typisk meg
     ☐   Ikke meg i det hele tatt

3)   Jeg har vært besatt av en bestemt ide eller prosjekt i en kort periode, men har senere mistet interessen. *

     ☐   Veldig typisk meg
     ☐   Ganske typisk meg
     ☐   Litt typisk meg
     ☐   Ikke typisk meg
     ☐   Ikke meg i det hele tatt

4)   Jeg er arbeidsom.

     ☐   Veldig typisk meg
     ☐   Ganske typisk meg
     ☐   Litt typisk meg
     ☐   Ikke typisk meg
     ☐   Ikke meg i det hele tatt

5)   Jeg setter meg ofte et mål, men bestemmer meg så for et annet isteden. *

     ☐   Veldig typisk meg
     ☐   Ganske typisk meg
     ☐   Litt typisk meg

□   Ikke typisk meg

□   Ikke meg i det hele tatt

6)   Jeg har vansker med å beholde fokus på prosjekter som tar mer enn et par måneder å fullføre. *

□   Veldig typisk meg

□   Ganske typisk meg

□   Litt typisk meg

□   Ikke typisk meg

□   Ikke meg i det hele tatt

7)   Jeg fullfører alt jeg påbegynner.

□   Veldig typisk meg

□   Ganske typisk meg

□   Litt typisk meg

□   Ikke typisk meg

□   Ikke meg i det hele tatt

8)   Jeg er flittig.

□   Veldig typisk meg

□   Ganske typisk meg

□   Litt typisk meg

□   Ikke typisk meg

□   Ikke meg i det hele tatt

---

* Disse spørsmålene utgjør subskalaen "consistency of interest". De andre utgjør subskalaen "perserverance of effort" (Duckworth et al. 2007; Duckworth & Quinn, 2009)

Skåring:

For spørsmål 1, 3, 5 og 6 gis følgende poengsum:

1 = Veldig typisk meg
2 = Ganske typisk meg
3 = Litt typisk meg
4 = Ikke typisk meg
5 = Ikke meg i det hele tatt

For spørsmål 2, 4, 7 og 8 gis følgende poengsum:

5 = Veldig typisk meg
4 = Ganske typisk meg
3 = Litt typisk meg
2 = Ikke typisk meg
1 = Ikke meg i det hele tatt

Legg sammen alle poengene og del på 8. Den maksimale skår på denne skalaen er 5 (ekstremt gritty) og den laveste skår er 1 (overhode ikke gritty).

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Appendix C
Consent Forms Study 2 and 3

Universitetet I Tromsø
Institutt for Psykologi

Informert Samtykke studie 2

Mål:
Målet med dette studiet er å kikke på de typer tanker som en person produserer når de opplever et senario. Dette studiet er en del av en master oppgave i psykologi ved Universitetet i Tromsø, under veiledning av professor Frode Svartdal.

Prosedyre:
Hvis du aksepterer å delta i dette studiet vil vi spørre deg om følgende:

1. Spørsmål om alder, kjønn, utdannelse og modersmål.
2. Å forestille deg at du opplever noen beskrevede senarioer, for deretter å velge en setningen som best representerer hvilken tanker du ville ha etterfølgende.
3. Utfylle et spørreskjema

Total tid for eksperimentet er ca 15 minutter.

Fordeler/Risiko for deltagere:
Deltagere vil bidra til den kunnskap vi har i psykologi omkring hvordan vi resonerer og lærer. Det vil være lite eller ingen ubehag assosiert med å lese senarioene eller svare på spørsmål.

Frivillig deltagelse/ fortrolighets erklæring:
Din deltagelse i dette studiet er fullstendig frivillig og du kan trekke deg når som helst under eksperimentet, og/eller unngå å svare på spørsmål du finner ubehagelig. Ditt navn vil aldri bli forbundet med dine resultater eller svar på spørsmålene; istedenfor så anvendes et nummer for å identifisere dine resultater. Information som gjør det mulig å identifisere deg eller andre deltagere vil aldri bli inkludert i noen rapport. Du er garantert full konfidensialitet. Data er kun tilgengelig for de som arbeider på prosjektet.

Kontakt informasjon:
Hvis du har noen spørsmål I forbindelse med studiet så kan du kontakte Vibeke Sending på vse004@post.uit.no eller veileder Frode Svartdal på…. Spørsmål eller bekymringer omkring godkjennelse fra instituttet skal rettes til…

Samtykke Erklæring:
Jeg har lest den overstående informasjonen og velger å delta i dette studiet. (tick box)

Notis: Du må være over 18 år for å delta i dette studiet.

Takk for din deltagelse!

UiT - Norges Arktiske Universitet
Institutt for Psykologi (IPS)

Informert Samtykke studie 3

Mål:

Målet med denne undersøkelsen er å kartlegge de prosesser som påvirker måloppnåelse på en spesifikk oppgave: å løse anagrammer (ord hvor bokstavene er hulter til bulter). Studiet er en del av en master oppgave i psykologi ved Universitetet i Tromsø, under veiledning av professor Frode Svartdal.

Prosedyre:

Hvis du aksepterer å delta i dette studiet vil vi spørre deg om følgende:

1. Spørsmål om alder, kjønn og utdannelse
2. Vurdere noen kriterier i forhold til måloppnåelse
3. Svare på anagram oppgaver med tilbakemelding på hvordan du gjorde det i forhold til andre deltagere
4. Svare på et spørreskjema.

Undersøkelsen tar ca. 15 minutter å gjennomføre.

Fordeler/risiko for deltagere:

Deltagere vil bidra til den kunnskap vi har i psykologi omkring hvordan vi resonnerer og lærer. Du vil på et tidspunkt motta en beskjed som gir informasjon om din besvarelse er blant topp 40% av alle besvarelser de siste 24 timer.

Frivillig deltagelse/ fortrolighets erklæring:

Deltagelse i studiet er fullstendig frivillig og du kan trekke deg når som helst, og/eller unngå å svare på spørsmål du finner ubehagelig. Ditt navn vil aldri bli forbundet med dine resultater eller svar på spørsmålene; istedenfor så anvendes et nummer for å identifisere dine resultater som kun du kjenner til. Informasjon som gjør det mulig å identifisere deg eller andre deltagere vil aldri bli inkludert i noen rapport. Du er garantert full konfidensialitet. Data er kun tilgjengelig for de som arbeider på prosjektet.

Kontakt informasjon:

Hvis du har noen spørsmål I forbindelse med studiet så kan du kontakte Vibeke Sending på vse004@post.uit.no eller veileder Frode Svartdal påfrodes@psyk.uit.no

Samtykke Erklæring:

Jeg har lest den overstående informasjonen. Ved å gå videre i studie gir jeg mitt samtykke til å delta.

Notis: Du må være over 18 år for å delta i dette studiet.

Appendix D
Debrief Study 2

DEBRIEFING

Denne studien kartlegger hvordan forskjellig typer hypotetiske tanker er forbundet med en persons nivå av "grit" (standhaftighet og iver for langfristige mål [til tross for motgang]). Tidligere studier har funnet at oppadgående kontrafaktisk tenking (UCFT) (f.eks." Hvis jeg hadde forberedt meg ved bruk av eksamen spørsmål, da ville jeg gjort det bedre på eksamen") og mental kontrast implementerings intensjon (MCII) (f.eks. «hvis jeg forbereder meg ved bruk av eksamen spørsmål, da vil jeg gjøre det bra på neste eksamen») er begge relater til forbedret prestasjon. Høye grit skårer er relatert til suksess så det er rimelig å anta at mennesker med høy grit score vil også benytte seg av disse strategiene. Dette er hva denne studien har som mål å undersøke.

Hvordan testes det?
Alle deltagere har svart på de samme spørsmålene. Denne studien undersøkes hvilken setnings typer som har sammenheng med høy og lav grit skårer.

Hypotese og hovedspørsmål:
En hypotesen er at høye grit skårer er mere relater til MCII og UCFT og mindre relater til positive fantasi (f.eks. jeg gjør det bedre neste gang) og nedadgående kontrafaktisk tenkning (f.eks. hvis jeg hadde vært ute ennå lengere kvelden før eksamen, hadde jeg gjort det enda verre). Den andre hypotesen er at lave grit skårer er mere relatert til positiv fantasi og nedadgående kontrafaktisk tanker.

Hvorfor er dette studiet viktig?
Høy grit skår er relatert til suksessfullt utfall mere enn IQ og talent. Å forstå hvilke typer hypotetisk tankesett eller strategi individer med høy grit skårer benytter seg av når de møter negativt utfall, kan være det første skrittet i å forstå hvorfor suksessfulle mennesker er suksessfulle.

Hvis du har spørsmål omkring din deltagelse i denne studien så kan du kontakte undertegnede.

Takk igjen for din deltagelse!

Appendix E
Translation of Scenarios to English

Interview scenario
Imagine that you just applied for the perfect job and were called in for an interview. Most things went well with the interview but there were a few things you could have expressed different. Today you are getting the phone call telling you if you got it or not. The call comes and the manager tells you that you came in second for the position. She wishes you good luck with your future job search. You hang up the phone and you think...

JOBBINTERVJU

Forestill deg at du hadde søkt drømmejobben og ble kalt inn til intervju. Det meste gikk bra med intervjuet, selv om det var et par ting du kunne gjort annerledes. I dag venter du telefon fra vedkommende som skal fortelle deg om du har fått drømmejobben eller ikke. Samtalen kommer, og den ansvarlige forteller deg at du kom på andreplass. Hun ønsker deg lykke til videre med jobbsøking. Da du legger på røret og setter deg ned tenker du ...

Sports Scenario
Imagine that you are an aspiring athlete who are to compete in a competition. Winning the current competition is important in order for you to accomplish your goal of qualifying for a national competition of great importance to you. You have mentally and physically prepared for the race and expect to do your best, but for some reason you did not do as well as the competition hence your results were insufficient to qualify. When you sit down after the race, you think ...

SPORT

Forestill deg at du er en sportsutøver som skal delta i en konkurranse. Å vinne denne konkurransen er en forutsetning for å kunne delta i en nasjonal konkurranse som har stor betydning for deg. Du har mentalt og fysisk forberedt deg på konkurransen og forventer å gjøre ditt beste. Av en eller annen grunn presterte du dårligere enn konkurrentene og dermed oppnådde du ikke målet ditt om kvalifisering. Da du setter deg ned etter konkurransen tenker du ...

Project Scenario
Imagine that you are in charge of a very important project at work/university dependent upon external financing. The pitching of the project to an investor is due today, and based on your presentation it will be decided if the project should receive further financing or not. After your presentation you were informed that you did not get the financing without further feedback. When you sit down in your office after the rejection, you think....

PROSJEKT

Forestill deg at du er ansatt til å lede et stort nystartet prosjekt som er avhengig av ekstern finansiering for videre drift. I dag skal du presentere prosjektet for en investor, og ut fra din presentasjon vil det bli tatt en beslutning om prosjektet skal få finansiering eller ikke. Etter presentasjonen får du beskjed om at du ikke fikk finansieringen, uten ytterligere tilbakemelding. Når du setter deg ned på kontoret etter samtalen så tenker du ...

Appendix F
Study 2 Stimuli from Qualtrics

Qualtrics Survey Software   Page 1 of 5

Default Question Block

Først litt om deg selv.

Kjønn

Kvinne

Mann

Alder

19 eller yngre	20	21	22	23	24	25	26	27 eller eldre

Morsmål

Norsk	Engelsk	Annet

Høyeste utdannelse

Ungdomskole	Gymnas	Yrkesutdannet	Høyskole	Universitet, Bachelor	Universitet, Master	Universitet, Drgrad

Vennligst lev deg inn i den følgende historie så godt du kan:

EKSAMEN

Forestill deg at du for noen uker siden endelig ble ferdig med den siste viktige eksamen, og i dag får du resultatene dine. Du følte at du gjorde det ganske bra og forventer å få - etter din vurdering - en god karakter. Spent og litt nervøst åpner du sakte studweb-siden eller brevet. Da oppdager du at karakteren er dårligere enn det du forventet og trenger for å oppnå målet ditt om å få en bestemt jobb eller få innpass i videre utdanning. Da du legger ned brevet eller lukker studweb-siden tenker du...

Bruk noen minutter for å tenke igjennom situasjonen. Så gå videre til neste side.

Anslå hvor interessert du ville være i å lykkes i denne eller lignende situasjoner på en skala fra 1 til 10 (1=ikke overhode, 10=maks interessert). Hvor viktig ville det være for deg?

Vurder nå valgene nedenfor i forhold til hvilket som MEST TYPISK den typen tanke du ville tenke i denne situasjonen. Fyll inn (...) med egen tanker/handlinger.

	Mest typisk
Jeg vil vurdere andre jobber/utdannelser.	
Jeg klarer å oppnå målet mitt.	
Hvis jeg ... ,så ville det gått enda dårligere på eksamen.	
Hvis jeg bare...,så ville jeg fått bedre karakter.	
Hvis jeg vil oppnå målet mitt og ikke få for dårlig karakter igjen...,så må jeg.....og.........	

Vennligst lev deg inn i den følgende historie så godt du kan:

JOBBINTERVJU

Forestill deg at du har søkt drømmejobben og ble kalt inn til intervju. Det meste gikk bra med intervjuet, selv om det var et par ting du kunne gjort annerledes. I dag venter du telefon fra vedkommende som skal fortelle deg om du har fått drømmejobbe eller ikke. Samtalen kommer, og den ansvarlige forteller deg at du kom på andreplass. Hun ønsker deg lykke til videre med jobbsøking. Da du legger på røret og setter deg ned, tenker du...

Bruk noen minutter for å tenke igjennom situasjonen. Så gå videre til neste side.

Anslå hvor interessert du ville være i å lykkes i denne eller lignende situasjoner på en skala fra 1 til 10 (1=minst, 10=mest) Hvor viktig ville det være for deg?

Vurder nå valgene nedenfor i forhold til hvilket som MEST TYPISK den type tanke du ville tenke i denne situasjonen. Fyll inn (...) med egen tanker/handlinger.

	Mest typisk
Hvis jeg skal få jobben og ikke bli nummer to igjen ..., så må jeg......og.......	
Hvis jeg bare ...., så ville jeg fått jobben.	
Hvis jeg ..., så ville jeg ikke engang kommet inn på andre plass.	
Jeg klarer å oppnå målet mitt.	
Jeg vil vurdere andre typer jobber.	

Vennligst lev deg inn i den følgende historie så godt du kan:

SPORT

Forestill deg at du er en sportsutøver som skal delta i en konkurranse. Å vinne denne konkurransen er en forutsetning for å kunne delta i en nasjonal konkurranse som har stor betydning for deg. Du har mentalt og fysisk forberedt deg på konkurransen og forventer å gjøre ditt beste. Av en eller annen grunn presterte du dårligere enn konkurrentene og dermed oppnådde du ikke målet ditt om kvalifisering. Da du setter deg ned etter konkurransen tenker du...

Bruk noen minutter for å tenke igjennom situasjonen. Så gå videre til neste side.

Anslå hvor interessert du ville være i å lykkes i denne eller lignende situasjoner på en skala fra 1 til 10 (1=minst, 10=mest) Hvor viktig ville det være for deg?

Vurder nå valgene nedenfor i forhold til hvilket som MEST TYPISK den type tanke du ville tenke i denne situasjonen. Fyll inn (...) med egen tanker/handlinger.

	Mest typisk
Hvis jeg ... ,så ville jeg gjort det dårligere i konkurransen.	
Jeg når målet mitt neste gang.	
Jeg vil vurdere andre konkuranser/mål.	
Hvis jeg vil vinne konkurransen, og ikke bli nummer to neste gang, så må jeg...og......	
Hvis jeg bare ..., så ville jeg vunnet konkurransen.	

Vennligst lev deg inn i den følgende historie så godt du kan:

FINANSIERING

Forestill deg at du er ansatt til å lede et stort nystartet prosjekt som er avhengig av ekstern finansiering for videre drift. I dag skal du presentere prosjektet for en investor, og ut fra din presentasjon vil det bli tatt en beslutning om prosjektet skal få finansiering eller ikke. Etter presentasjonen får du beskjed om at du ikke fikk finansieringen, uten ytterligere tilbakemelding. Når du setter deg ned på kontoret etter samtalen så tenker du...

Bruk noen minutter for å tenke igjennom situasjonen. Så gå videre til neste side.

Anslå hvor interessert du ville være i å lykkes i denne eller lignende situasjoner på en skala fra 1 til 10 (1=minst, 10=mest) Hvor viktig ville det være for deg?

Vurder nå valgene nedenfor i forhold til hvilket som MEST TYPISK den type tanke du ville tenke i denne situasjonen. Fyll inn (...) med egen tanker/handlinger.

	Mest typisk
Jeg får finansiert projektet.	
Jeg vil vurdere å gi presentasjonen/projektet til noen andre.	
Hvis jeg skal få finansiering og ikke miste projektet, så må jeg.....og...	
Hvis jeg bare ... , så ville jeg ha fått finansieringen.	
Hvis jeg ... ,så ville det gått ennå dårligere.	

Vennligst svar på de følgende 12 spørsmålene. Det er ikke noen riktige eller gale svar, så bare vær ærlig og svar hva du synes passer best.

Jeg har overvunnet motgang for å klare en viktig utfordring

Veldig typisk meg	Ganske typisk meg	Litt typisk meg	Ikke typisk meg	Ikke meg i det hele tatt

Noen ganger distraherer nye ideer og projekter meg fra tidligere projekter

» Veldig typisk meg	» Ganske typisk meg	» Litt typisk meg	» Ikke typisk meg	» Ikke meg i det hele tatt

Mine interesser endrer seg fra år til år

» Veldig typisk meg	» Ganske typisk meg	» Litt typisk meg	» Ikke typisk meg	» Ikke meg i det hele tatt

Motgang tar ikke motet fra meg.

» Veldig typisk meg	» Ganske typisk meg	» Litt typisk meg	» Ikke typisk meg	» Ikke meg i det hele tatt

Jeg har vært besatt med en bestemt idé eller prosjekt i en kort periode, men har så mistet interessen.

» Veldig typisk meg   » Ganske typisk meg   » Litt typisk meg   » Ikke typisk meg   » Ikke meg i det hele tatt

Jeg er arbeidsom.

» Veldig typisk meg   » Ganske typisk meg   » Litt typisk meg   » Ikke typisk meg   » Ikke meg i det hele tatt

Jeg setter meg ofte et mål, men bestemmer meg så for et annet i stedet.

» Veldig typisk meg   » Ganske typisk meg   » Litt typisk meg   » Ikke typisk meg   » Ikke meg i det hele tatt

Jeg har vansker med å holde fokus på projekter som tar mer enn et par måneder å fullføre.

» Veldig typisk meg   » Ganske typisk meg   » Litt typisk meg   » Ikke typisk meg   » Ikke meg i det hele tatt

Jeg fulfører alt jeg påbegynner

» Veldig typisk meg   » Ganske typisk meg   » Litt typisk meg   » Ikke typisk meg   » Ikke meg i det hele tatt

Jeg har oppnådd et mål som krevde flere års arbeid.

» Veldig typisk meg   » Ganske typisk meg   » Litt typisk meg   » Ikke typisk meg   » Ikke meg i det hele tatt

Jeg blir med jevne mellomrom (noen måneder) interessert i nye gjøremål.

» Veldig typisk meg   » Ganske typisk meg   » Litt typisk meg   » Ikke typisk meg   » Ikke meg i det hele tatt

Jeg er flittig.

» Veldig typisk meg   » Ganske typisk meg   » Litt typisk meg   » Ikke typisk meg   » Ikke meg i det hele tatt

Block 1

Appendix G
Study 3 Stimuli from Qualtrics

Default Question Block

BESKRIVELSE AV OPPGAVEN

I dette eksperimentet vil du bli bedt om å løse 10 anagrammer riktig og raskt.

Et anagram består av et ord hvor bokstavene er hulter til bulter. Du skal ordne bokstavene i riktig rekkefølge slik at de blir til et ord på norsk *F.eks. kan "P R E M" bli til "PERM"*.

Oppgaven går ut på å løse så mange anagrammer som du kan på 45 sekunder. Ditt mål er å kommer blant de beste 40% av respondentene som har svart innenfor de siste 24 timer.Antallet riktige løsninger pluss den tid du bruker på oppgaven danner grunnlaget for å beregne resultatet på din måloppnåelse. Finner du en løsningsstrategi, f.eks. at alle ord er en type ord eller begynner på en bestemt bokstav, så øke du din sannsynlighet for å lykkes, men husk; du skal svare på så mange som du kan før tiden er ute, så selv om det kan gi deg en fordel er det en risiko for at det også vil koste deg mht. tid.

Før du starter med den reelle oppgaven får du en mulighet til å øve deg på en helt lignende situasjon. Du får også tilbakemelding på om du er blant topp 40% av alle respondenter som har svart på øvingsoppgavene det siste døgnet.

FOKUSER på det som er beskrevet ovenfor og sett deg et mål i forhold til dette . Bruk et minutt for å tenke på målet og hvordan du vil oppnå det. Tenk også igjennom din strategi for å oppnå målet. Hvordan vil du tenke for å løse oppgaven?

Skriv ned på et stykke papir hva målet/strategien din er.

Når du er KLAR gå videre til neste side.

HYPOTETISKE TANKESTRATEGIER
Hypotetiske tankestrategier er strategier som hjelper oss med å nå målet vi har satt oss. Disse strategiene kan ta forskjellige former f.eks.

"jeg kommer til å finne den beste strategien og klare målet mitt" eller

"Jeg kommer ikke til å klare målet mitt" eller

" *Hvis jeg vil nå målet mitt og ikke komme blant de 60% dårligste besvarelsene, må jeg....*".

Jeg vi spørre deg om å vurdere hvilken av de fire hypotetiske tankestrategiene nedenfor som best representerer det du skrev ned på forrige side.

Fyll inn med egne ord der hvor det står ...

Ta den tid du trenger.

○ Jeg kommer til å mislykkes med oppgaven.

○ For å lykkes med oppgaven må jeg ....og ....; for ikke å mislykkes med oppgaven, så må jeg...og......

○ Hvis jeg vil lykkes med oppgaven, så må jeg bare...

○ Jeg kommer til å lykkes med oppgaven.

Først litt om deg selv.

Kjønn

○ Kvinne

○ Mann

Alder

19 eller yngre	20-24	25-29	30-34	35-39	40-44	45-50	50-55	55 eller eldre
○	○	○	○	○	○	○	○	○

Hvor mange års utdannelse har du etter ungdomskole?

mindre enn 2	3-5	6-8	9-11	12+
○	○	○	○	○

Hva er den høyeste grad du har oppnådd?

Ungdomskole	Videregående eller yrkesskole	Høyskole eller Bachelorgrad	Mastergrad	Doktorgrad
○	○	○	○	○

På en skala fra 1-9 (1= "ingen erfaring overhode" og 9= "ekspert") hvor mye erfaring har du i å løse anagrammer?

	1	3	5	7	9
hvor mye erfaring har du i å løse anagram oppgaver eller lignende oppgaver					

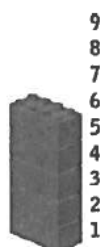**Hvor mye anstrengelse (effort) vil du yte for å løse oppgaven og nå målet?**

Anstrengelse skal her forstås som energi og tid tilbrakt for å nå målet.

Vurder på en skala fra 1-9 (hvor 1 = "ingen anstrengelse overhode" og 9 = "maks anstrengelse").

9
8
7
6
5
4
3
2
1

Hvor interessert er du i å lykkes på denne oppgaven?

Vurder på en skala fra 1-9 (hvor 1 = "*ikke overhode*" og 9 = "*maks interessert*").

9
8
7
6
5
4
3
2
1

PÅ NESTE SIDE KOMMER DET TRE ØVELSESOPPGAVER.

Et anagram består av et ord hvor bokstavene er hulter til bulter. Du skal ordne bokstavene i riktig rekkefølge så det blir til et norsk ord. Når du har løsningen skriver du det i feltet nedenunder oppgaven.

HUSK at ditt mål er Å LØSE SÅ MANGE ANAGRAMMER SOM MULIG innenfor 45 sekunder de slik at din besvarelse er blant de 40 % beste innenfor de siste 24 timer. Forhold deg til øvelsesoppgaven som om det var den riktige oppgaven for å gi deg en god indikasjon på hvordan du vil gjøre det.

NÅR DU KLIKKER DEG VIDERE SÅ STARTER ØVELSESOPPGAVENE. HVIS DU IKKE KAN FINNE SVARET KAN DU HOPPE OVER OPPGAVEN, MEN DET VIL PÅVIRKE DIN MÅLOPPNÅELSE.

1) D E H L O

2) S E K T O

3) M E S I L

4) T G E Å R

5) E S I V N

6) H T L A E

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Click Count: *0 clicks.*

0 0

Vent litt mens maskinen regner ut ditt svar i forhold til de andre...

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Du er dessverre ikke blant topp 40% av respondentene de siste 24 timer, selv om du var tett på.

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NÅ SKAL DU SNART IGANG MED OPPGAVEN

Før du starter vil jeg vite mer om hvordan du NÅ tenker, etter feedbacken på øvelsesoppgaven.

Jeg vi spørre deg om å vurdere hvilken av de fire hypotetiske tankestrategiene nedenfor som best representere hvordan du tenke NÅ i forhold til å løse oppgaven og nå målet.

Fyll inn med egne ord der hvor det står ...

Ta den tid du trenger.

○ Hvis jeg vil komme blandt de 40% beste, og ikke blant de 60% dårligste, må jeg...

○ Jeg kommer ikke til å nå målet satt i denne oppgaven.

○ Hvis bare jeg hadde...,så ville jeg ha nådd målet mitt.

○ Jeg kommer til å oppnå målet satt i denne oppgaven.

Hvor mye anstrengelse må du yte NÅ for å løse oppgaven(e) og nå målet? Har det økt eller blitt redusert fra siste øvelsesoppgave? Anstrengelse skal her forstås som energi og tid tilbrakt for å nå målet.

1) Skriv først ned hva du vurderte din anstrengelse til å være før oppgaven (på en skala fra 1-9 hvor 1= ingen anstrengelse overhode og 9= max anstrengelse)

2) Skriv så ned hva du vurderer forskjellen i anstrengelse kommer til å være mellom den forrige og den neste oppgave (den kan ha økt eller redusert eller forblitt det samme). Skriv minus tegn foran tallet hvis det er blitt redusert. Skriv 0 hvis det er ingen forskjell. Tallene lagt til sammen kan ikke bli større enn 9 og mindre enn 1.

3) Husk: den totale estimerte anstrengelse kan ikke sammenlagt overstige 9 = max anstrengelse.

1	0
2	0
Total	0

NÅR DU TRYKKER DEG VIDERE STARTER OPPGAVEN MED DE 10 ANAGRAMMENE.

---

1) H T L A E

---

2) P S E I S

3) H K E S U

4) E S A V K

5) S T E U P

6) N V N E A

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Click Count: *0 clicks.*

~~0 0 0 0 0 1~~

Vennligst svar på de følgende 8 spørsmålene. Det er ikke noen riktige eller gale svar, så svar hva du synes passer best

Noen ganger distraherer nye ideer og projekter meg fra tidligere projekter

Veldig typisk meg	Ganske typisk meg	Litt typisk meg	ikke typisk meg	ikke meg i det hele tatt
◎	◎	◎	◎	◎

Jeg mister ikke motet ved tilbakeslag/motgang
» Veldig typisk meg	» Ganske typisk meg	» Litt typisk meg	» ikke typisk meg	» ikke meg i det hele tatt
○	○	○	○	○

Jeg har vært besatt med en bestemt idé eller prosjekt i en kort periode, men har så mistet interessen.
» Veldig typisk meg	» Ganske typisk meg	» Litt typisk meg	» ikke typisk meg	» ikke meg i det hele tatt
○	○	○	○	○

Jeg er arbeidsom.
» Veldig typisk meg	» Ganske typisk meg	» Litt typisk meg	» ikke typisk meg	» ikke meg i det hele tatt
○	○	○	○	○

Jeg setter meg ofte et mål, men bestemmer meg så for et annet i stedet.
» Veldig typisk meg	» Ganske typisk meg	» Litt typisk meg	» ikke typisk meg	» ikke meg i det hele tatt
○	○	○	○	○

Jeg har vansker med å holde fokus på projekter som tar mer enn et par måneder å fullføre.
» Veldig typisk meg	» Ganske typisk meg	» Litt typisk meg	» ikke typisk meg	» ikke meg i det hele tatt
○	○	○	○	○

Jeg fulfører alt jeg påbegynner
» Veldig typisk meg	» Ganske typisk meg	» Litt typisk meg	» ikke typisk meg	» ikke meg i det hele tatt
○	○	○	○	○

Jeg er flittig.
» Veldig typisk meg	» Ganske typisk meg	» Litt typisk meg	» ikke typisk meg	» ikke meg i det hele tatt
○	○	○	○	○

Du er nå ferdig med denne undersøkelsen.

DEBRIEF.

Målet med undersøkelsen var å finne ut om vanskelighetsgrad på oppgaven (lett oppgave eller vanskelig) påvirker hvilken hypotetisk tanke strategi deltagere velger og om det igjen påvirker grad av anstrengelse mot måloppnåelse. Ved å forstå mer om hvordan mennesker med høyt "Grit" (evnen til å arbeide mot målet til tross for motgang) tenker og hvilket rolle strategiene spiller i forhold til måloppnåelse, er håpet at man som resultat av forskningen kan utvikle redskaper som hjelper de som ikke er så gode til å håndtere motgang til å kunne håndtere det bedre.

Eksperimentet inneholdt en liten grad av missinformasjon for å kunne undersøke hvordan deltagere med tenker når de møter motgang. Informasjonen om at du ikke ble blant topp 40% var fiktiv da din data aldri ble målt opp mot andres data; alle fikk den samme beskjed. Formålet med å gi denne informasjonen var at studiet undersøker hvordan vi tenker og handler i forhold til måloppnåelse når vi møter motgang. Grit skalaen (helt til sist i eksperimentet) måler evnen til å arbeide mot målet til tross for motgang og vi ønsker å forstå denne prosessen bedre.

Har du ytterligere spørsmål kan du kontakte veileder Professor Frode Svartdal (frodes@psyk.uit.no) eller master student Vibeke Sending (vse004@post.uit.no)

<u>Takk for at du deltok i denne undersøkelsen.</u>

Hvis du vil være med på trekkingen av gavekort til Akademisk Kvarter på 1000 kroner skriv inn en firesifrede kode i feltet nedenunder. Du må skrive ned koden eller huske den. Koden skal ikke sendes til meg. Send KUN din email adresse til vbsending@gmail.com. Når undersøkelsen er ferdig vil en vinner bli trukket ut og email sendt til vedkommende. Du må da oppgi koden slik at jeg kan se at du har vært med på undersøkelsen. Kodene blir klippet ut av undersøkelsen når den blir lastet ned og oppbevart i en annen fil slik at din data ikke kan bli satt sammen med din email adresse hvis du skulle være så heldig å vinne.