Master Thesis

Behavioural Economics

The contest of motivational theories in explaining performance: Expectancy vs. Goal setting

What do you expect?

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1. Introduction

Abstract

This thesis tested the theoretical constructs of two motivational theories, expectancy and goal setting, and their accuracy to predict performance. An experiment, with 130 participants, was used to control behaviour and to create a moderate and a hard goal context. These contexts were specially to control for a difference with respect to goal difficulty, since according to goal setting theory performance will increase when given a hard goal compared to an easier goal, but according to expectancy theory performance will be determined by an interaction of expectancy, instrumentality, and valence into a force value. The results show that expectancy, instrumentality, and valence have added value, but force has little. Because of the latter, the accuracy of the expectancy theory is low. The results show in addition that the goal-performance relation is influence by persistence as positive mediator and by task strategy and commitment as positive moderators. Goals themselves have a significant influence on performance and are accurate in predicting performance, although only when controlling for the mediators and moderators. Finally, some limitations of this thesis and suggestions for future research are discussed.

Key words

Expectancy theory; expectancy; instrumentality; valence; force; goal setting theory; ability; commitment; feedback; situational resources; task strategy; intensity; and persistence.

"What do you expect?" is a very common question. This shows how expectations play a major role in everyday life. Clearly, they govern gambling and sports betting, but looking beyond the obvious its scope begins to emerge. Not only elections, career choice, job application, holiday destination, but also social interactions between employer and employee, friends, and family, all involve expectations or expectancies.

Expectations and expectancies are closely linked. Both are derived from "*expectationem*" which can be translated from Latin with "an awaiting", as in beliefs concerning the future[1]. However, there is a slight difference. While from an economic perspective expectations are "*anticipations*

[1] https://www.vocabulary.com/dictionary/expectation, Retrieved February 24th 2016

of future events that influence present economic behaviour"[2], expectancy points to the subjective probabilistic assessment of future events that affect decisions in the present (Vroom, 1995, p. 20).

This accurately describes one of the core concepts in expectancy theory, popularised by Vroom (1964). His theory states that the motivational force (hereafter: force) of a person to perform a particular act is determined by an interaction of expectancy, instrumentality and valence. This can be expressed very basically[3] as: *Force = Expectancy (Instrumentality × Valence)* or in short: *F = E (I × V).* Also called VIE-theory or -model, after the concepts within.

To elaborate these concepts, suppose, for example, an employee whose force to work hard depends on (a) his expectancy that high effort will lead to good performance, (b) his instrumentality that good performance is related to high rewards, and (c) a high positive valence of these rewards (Lawler & Suttle, 1973; Schwab, Olian-Gottlieb & Heneman, 1979). Hereby is expectancy a subjective probability, instrumentality a perceived correlation, and valence a subjective valuation (Mitchell, 1974, pp. 1053-1054).

In this respect, the concept of force is very similar to the input for the choice maximisation in (subjective) expected utility theory. In both cases the option or act with the highest utility or force is chosen (Edwards, 1954; Vroom, 1995, pp. 17-22).

Over the years expectancy theory has been extensively empirically tested (e.g. Schwab *et al.*, 1979; Van Eerde & Thierry, 1996). Even nowadays, after 50 years, expectancy theory is used in various field of research (e.g. Ernst, 2014[4]; Lee, Ko & Chou, 2015[5]; Purvis, Zagenczyk & McCray, 2015[6]). Moreover, it is compared to and/or tested against other theories, especially with respect to goal setting theory (e.g. Locke & Latham, 2002; Mento, Cartledge & Locke, 1980; Tubbs, Boehne & Dahl, 1993).

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[2] Expectations. (n.d.) *Collins Dictionary of Economics, 4th ed.*. (2005). Retrieved February 24th 2016 from http://financial-dictionary.thefreedictionary.com/expectations

[3] Further elaboration of this expression will be conducted in section *2.1.2 Expectancy theory model*.

[4] Ernst, D. (2014). Expectancy theory outcomes and student evaluations of teaching. *Educational Research and Evaluation*, *20*(7-8), 536-556.

[5] Lee, Y. H., Ko, C. H., & Chou, C. (2015). Re-visiting Internet addiction among Taiwanese students: a cross-sectional comparison of students' expectations, online gaming, and online social interaction. *Journal of abnormal child psychology*, *43*(3), 589-599.

[6] Purvis, R. L., Zagenczyk, T. J., & McCray, G. E. (2015). What's in it for me? Using expectancy theory and climate to explain stakeholder participation, its direction and intensity. *International Journal of Project Management*, *33*(1), 3-14

It is not strange that expectancy theory and goal setting theory are compared and tested. They have been the two most prominent motivational theories (Locke, Motowidlo & Bobko, 1986). Both theories explain motivational behaviour, but in their own specific ways.

Expectancy theory is a descriptive theory about the internal process of decision making and how the VIE-concepts are used therein. More specific it concerns the subjective thoughts and/or feelings of an individual that result in a decision (Vroom, 1995).

Goal setting theory of Locke and Latham (1990, 2013) demonstrates that goals can influence the behaviour of individuals given different circumstances. It states that hard, specific goals lead to higher performance compared to vague, easy, or do-your-best goals. It claims a positive, linear relationship between goal difficulty and task performance when an individual has no conflicting goals and has the required ability and commitment (Locke & Latham, 2006, p. 265).

These theories describe the motivational process in different ways, with some different concepts and with some different predictions. At least once their predictions apparently contradict:

> *Goal-setting theory appears to contradict Vroom's (1964) valence–instrumentality–expectancy theory (...) Other factors being equal, expectancy is said to be linearly and positively related to performance. However, because difficult goals are harder to attain than easy goals, expectancy of goal success would presumably be negatively related to performance* (Locke & Latham, 2002, p. 706).

First of all, Locke and Latham (2002) did not correctly quote Vroom (1964) in this statement. Other factors being equal, Vroom (1964, 1995) does not claim that expectancy is linearly and positively related to performance, but to force. So, force is said to be linearly and positively related to performance in expectancy theory, while expectancy is negatively related to performance in goal setting theory. Hence, these theories contradict if expectancy is positively related to force.

Although research considering the relation between force and performance have repeatedly found it to be positive[7], this relation depends on the specific values of expectancy, instrumentality and valence (Vroom, 1964, 1995).

According to Klein (1991), research on these concepts within expectancy and goal setting theory has been far from unambiguous in its conclusions. Obviously, contradicting relations cannot be present at the same time. However, various papers show that negative, positive, and

[7] E.g. Dachler & Mobley, 1973; Hackman & Porter, 1968; Matsui, *et al.*, 1981; Mitchell & Albright, 1972

non-significant relations have been found between performance and both expectancy and a valence × instrumentality measure (for references see: Klein, 1991, pp. 232-238). Klein (1991) tried to explain these contradicting relations by the different operationalisations used in various papers. However, he was not able to explain all relations so this ambiguity prevailed.

Locke and Latham (2002, p. 706) report an explanation that could harmonise expectancy and goal setting theory views. When goal level (difficulty) is constant there is a causal relation between higher expectancies and higher performance (i.e. expectancy theory view). But when difficulty varies a negative relation is found (i.e. goal setting theory view).

Another explanation can be found in the difference between the large role for ability and commitment in goal setting theory compared to expectancy theory. While the first has received some attention in expectancy theory research (e.g. Galbraith & Cummings, 1967; Heneman & Schwab, 1972), both have been virtually requisite in goal setting theory (Mento *et al.*, 1980, p. 421).

Even if all these explanations are applicable, which is not evident, there is no clear answer whether expectancy theory is has lower predictive power than goal setting or the opposite. Especially, since many goal setting oriented papers also find support for expectancy theory constructs (e.g. Dachler & Mobley, 1973; Locke, *et al.*, 1986; Matsui, *et al.*, 1981; Mento *et al.*, 1980).

Hence, this thesis will use over 50 years of research on expectancy and goal setting theory to theoretically verify and test the explanations mentioned above, to test the theoretical predictions of the theories, and to dissolve the ambiguity with respect to expectancy, instrumentality, valence, and force.

An experiment with a specific assigned moderate and hard goal context is sufficient to empirically test most of the basic underlying constructs of the theory. In this context, expectancy and goal setting constructs will be tested in their accuracy to predict performance, by use of correlation and regression analyses. Therefore, the research questions that will be answered are:

> *RQ1: Do the motivational theories, expectancy and goal setting, have correct theoretical constructs?*
>
> *RQ2: Which motivational theory, expectancy or goal setting, is more accurate in predicting performance in a moderate and hard goal context?*

Answering this question is interesting because doing research according to the theoretical constructs of expectancy theory can be cumbersome (Connolly, 1976) in comparison to goal setting theory, but it may be worth the effort. If, albeit in specific contexts, expectancy theory is proven to be significantly better in predicting behaviour, motivational researchers should redirect attention back to expectancy theory.

The results show that expectancy, instrumentality, and valence have added value, but force has little. Because of the latter, the accuracy of the expectancy theory is low. In addition the results show that the goal-performance relation is influence by persistence as positive mediator and by task strategy and commitment as positive moderators. Goals themselves have a significant influence on performance and are accurate in predicting performance, although only when controlling for the mediators and moderators.

Doing expectancy theory research in the proper fashion appears to be difficult, since there are many remarks about previous research (Eerde & Thierry, 1996. p. 581). Expectancy theory entails more constrains as to what questions to ask and how to do the research than goal setting. In addition, goal setting constructs can be investigated from an expectancy theory perspective, while this is impossible *vice versa*. Therefore, the research is performed from an expectancy theory perspective.

The remainder of this thesis is structured as follows. Chapter 2 discusses the literature with respect to the expectancy and goal setting theories. Thereafter the hypotheses are formulated. In chapter 3 the experimental design is presented. Chapter 4 describes the results from the analyses and gives answers to the hypotheses. In chapter 5 a conclusion in draw and the results are discussion. In addition, it discusses possible limitations and gives directions for future research.

2. Literature review

This chapter introduces the theories to answer the research questions and to form hypotheses. In the following sections the expectancy theory and goal setting theory are introduced and discussed respectively, where after the hypotheses that will be tested are formulated based on these theories. Within the theories the origin of the theory, the theoretical model and the related concepts will be explained.

2.1 Expectancy theory

2.1.1 Expectancy theory origin

Expectancy theory (1964) has been the dominant motivational theory in organisational psychology during the 1960's and 1970's (Klein, 1991). Yet, it has been seldom discussed in economic literature (Sloof & Van Praag, 2008). It has become popular since Vroom's (1964) book *Work and Motivation*. However, both others (e.g. Hackman & Porter, 1968; Mitchell, 1974) and Vroom (1995, pp. 15-31) himself point to former psychologists for earlier formulations of parts of this theory. By providing the similarities and differences a deeper understanding is gained about the use of expectancy theory and the origin of the theoretical concepts expectancy, instrumentality, valence, and force.

Psychologists Lewin (1935, 1938) and Tolman (1932, 1955) were among the first to emphasize the need for theories to understand behaviour as the result of a cognitive process within an individual (Vroom, 1995, p. 15). This contrasted with the doctrine of behaviourism, which was the dominant doctrine in psychology at that time (Locke & Latham, 2015), which claimed that cognition or consciousness is useless in scientific theory (Watson, 1925, 2013).[8]

According to Lewin (1935), behaviour can be explained from both a historical and an ahistorical point of view. In a historical point of view, behaviour is explained by events of the past, while behaviour in an ahistorical point of view is only explained by the present setting (Vroom, 1995, p. 15). In addition, Lewin (1938) described and measured valence and a concept closely related to motivational force.

Tolman (1932, 1955) saw learning as changes in beliefs or expectations that affect behaviour, instead of changes in the strength of habits (Vroom, 1995, p. 15). His ideas described in his

[8] However, Tolman himself states to be a behaviourist (Tolman, 1925, p. 37), albeit in a subtype called purposive behaviour (see: Tolman, E. C. (1932). *Purposive behavior in animals and men*. New York: Century.)

1955 paper are referred to as "*Tolman's expectancy theory*" (Atkinson & Reitman, 1956, p. 361).

The basic principle in Tolman's (1955) and Vroom's (1964, 1995) expectancy theory is the same: organisms have beliefs and/or expectations, which can change and thereby can influence behaviour. There are also differences. Tolman mostly worked with animals, so his theory is based on and specified to animals, while Vroom describes his theory regarding humans. Also, Tolman is interested in performance, but not in work-related performance as is Vroom. Moreover, Vroom gives a much broader theoretical and mathematical foundation of his theory, compared to Tolman.

A lot of psychologists gave different names to concepts that were used in a similar fashion, so it looked like different concepts. Results from studies with 'different' concepts were not always applied or mentioned in other studies. Vroom (1964, 1995) however included and merged a lot of concepts. His theory has therefore a broad theoretical foundation. For example, Vroom used the concept of valence, but he referred to and used the insights of the concepts attitude, expected utility, incentive, and valence (for references see Vroom, 1995, p. 17). The same applies to expectancies and subjective probabilities. And to motivational force, aroused motivation, behaviour potential, performance vector, and subjective expected utility (for references see Vroom, 1995, pp. 20, 21). Of these concepts, (subjective) expected utility and subjective probability are likely the most familiar to economists, hence the similarities and differences will be discussed.

Utility (i.e. subjective valuation) can be different from the objective valuation. This can be explained by Daniel Bernoulli, who first introduced the term 'expected utility' in 1738 to replace 'expected value'. He described a situation wherein according to the theoretical and mathematical prediction of expected value theory someone should be willing to pay an infinite amount of money to participate in a gamble, although it contradicted any common-sense. This situation is referred to as the *St. Petersburg paradox* and it describes a coin-flip gamble wherein someone can win a monetary value of 2^i in turn i wherein for the first time a 'head' is tossed. Expected value theory predicts an infinite value by summing up all the infinite possible outcomes multiplied by their probability. In expected utility theory this problem is resolved by diminishing returns of money (Gigerenzer & Selten, 2001).

Edwards (1954) gives an overview of (subjective) expected utility with respect to both riskless and risky choices. Individuals in a riskless context are assumed to maximise utility and individuals in a risky context are assumed to maximise expected utility. The expected utility is

the summation of the utility of all possible outcomes weighted by their probability. Individuals choose the alternative with most positive or least negative (expected) outcome by maximising (expected) utility.

Although expected utility includes some form of subjectivity, the probabilities are considered to be objective. Edwards (1954) however, argues that subjective probabilities and subjective expected utility may be more appropriate to predict decisions. Research shows that individuals tend to overestimate low probabilities and underestimate high probabilities (Edwards, 1954, pp. 393, 396-400). What is confirmed by Kahneman and Tversky (1979). This and other differences between the objective and subjective probability can be corrected by subjective probabilities (Edwards, 1954, pp. 396-400).

A major difference between (subjective) expected utility and expectancy theory are the following assumptions that must be satisfied in subjective expected utility, but are not explicit assumptions in the expectancy theory. Probabilities should sum up to one. Transitivity entails that if $a \geq b$ and $b \geq c$, then a must be larger or at least equal to c. Independence is when the preference of $a \geq b$ remains when multiplying a and b with the same subjective chance (i.e. irrelevance of identical outcomes). Comparability exists when a trade-off is possible between outcomes (Camerer & Weber, 1992; Edwards, 1954; Michell, 1974). In expectancy theory single expectancies are between 0 and 1, but combined expectancies can deviate from this assumption. Transitivity, independence and comparability are implicitly assumed in expectancy theory (House, *et al*. 1974; Vroom, 1964, 1994), although violations do occur (Mitchell, 1974).

Another difference is that within subjective expected utility there are two concepts, whereas expectancy theory separates three concepts. The first only uses subjective probabilities and subjective valuation of possible outcomes, while expectancy theory also includes instrumentality. This gives additional information about what drives behaviour.

However, Vroom (1964, 1995) uses, among many others, Edwards (1954) insights to support and construct the concepts expectancy (i.e. subjective probability) and valence (i.e. subjective valuation). So, Vroom uses the insights of Edwards (1954), Lewin (1935, 1938), Tolman (1932, 1955), and many others to support and construct his theory. In all cases, he combines different theoretical views and he broadens the theoretical foundation of the concepts to be used in his expectancy theory.

2.1.2 Expectancy theory model

To use his expectancy theory, Vroom (1964) developed a mathematical model. The model calculates the force to perform a particular act for an individual, whereby the act with the highest force will be chosen. This force is determined by an interaction between expectancy, instrumentality and valence and results in behaviour.

The formula of the expectancy theory is composed of two formulas as expressed by Vroom (1995, pp. 20, 22) and Mitchell (1974, p. 1054). The first expression is as follows (Equation 1):

$$F_i = \sum_{j=1}^{n} (E_{ij} V_j)$$

Whereby:
- F_i = the force of an individual to perform act i;
- E_{ij} = the expectancy that act i will be followed by outcome j;
- V_j = the valence of outcome j; and
- n = the number of outcomes.

Equation 1 gives the summation of the multiplicative relation between the valence of outcome j (V_j) and the expectancy that doing act i will result in outcome j (E_{ij}) for all outcomes (n). This will result in a specific personal force to perform act i (F_i). Equation 1 shows the interaction of the concepts expectancy and first level valence. These will be explained in the following section *2.1.3 Expectancy theory concepts*.

In the second expression, the valence of the first level outcome, V_j, is further explained as follows (Equation 2):

$$V_j = \int \sum_{k=1}^{m} (I_{jk} V_k)$$

Whereby:
- V_j = the valence of outcome j;
- I_{jk} = the instrumentality between j and k;
- V_k = the valence of second level outcome k; and
- m = the number of outcomes.

Equation 2 gives the summation of the multiplicative relation between the valence of a second level outcome k (V_k) and the instrumentality (I_{jk}) between the first level (j) and second level outcome (k) for all second level outcomes (m). This results in the valence of the first level outcome j (V_j). Equation 2 shows the interaction of the concepts instrumentality and second level valence. Instrumentality describes the perceived correlation between the first and second level outcomes. These concepts will be explained in the following section *2.1.3 Expectancy theory concepts*.

2.1.3 Expectancy theory concepts

In the expectancy theory model, an interaction of the theoretical concepts expectancy, instrumentality and valence, results in the force.

Expectancy

Expectancy is a subjective probability. Individual expectancies range between 0-1. But when an individual overestimates the objective chance of events/alternative, can the total expectancy be in either higher or lower, due to the sum of these expectancies.

More specifically, expectancy points to the individual subjective probabilistic assessment of future events that affects decisions in the present. Expectancy is determined positively by the individual's ability, negatively by the presence of constraints (House, 1971, p. 323), positively by perceived control over performance (House, *et al.*, 1974, p. 499), and negatively by perceived difficulty (Vroom, 1964, 1995, pp.17-31). It can be based on objective (external) information, but it is the internal process within a specific individual that results in his/her expectancy (Vroom, 1995, p. 20).

Expectancy involves risk, because not all external factors can be controlled by an individual (Vroom, 1995, p. 20). Probabilities can be significant under- or overweighed from their objective probability in decisions under risk (Edwards, 1954, pp. 396-397; Kahneman & Tversky, 1979). Hence, if people evaluate the probability of realising uncertain future outcomes of alternatives differently from person to person (Edwards, 1954, p. 403), this can result in various decisions. Even if the objective probability is the same.

In Equation 1 this concept of expectancy is applied to measure the strength of the subjective probability that doing act i will result in outcome j, on a continuous scale from 0 to 1, for all possible outcomes of act i.

Instrumentality - first and second level outcomes

Instrumentality usually describes the individually perceived correlation between performance and rewards (Mitchell, 1974, p. 1054). As a correlation based measure, instrumentality ranges from -1 to 1 (Vroom, 1995, p. 21).

It is an outcome-outcome relation. Instrumentality describes the relation between first level outcomes and second level outcomes[9]. First level outcomes (e.g. joining a group, getting your

[9] Vroom described it as "first outcomes" and "second outcomes", whereby the second was a consequent of the first. Although he did not use "level", the reasoning is the same.

driver's licence, a person's performance, reaching a particular goal) are the direct effect of someone's behaviour (Lawler & Suttle, 1973, p. 483). While second level outcomes are consequents of attaining the first level outcome (Vroom, 1964, 1995). Such as, reaching a particular goal can result in promotion, pay raise, feeling of satisfaction, and/or feeling of accomplishment (e.g. Mitchell, 1974).

In Equation 2 this concept of instrumentality is applied to measure the strength of the perceived correlation between outcome j and outcome k, on a continuous scale from -1 to 1, for all possible outcomes of act j. With maximum (minimum) value 1 (-1), meaning that outcome k is present (not present) when outcome j is, and outcome k is not present (present) when outcome j is not. Values in-between 0 and 1 (-1 and 0) give a relation that outcome k is more likely or stronger present (not present) for higher (lower) values.

Valence - first and second level outcomes

Valence describes the anticipated subjective valuation of future outcomes at a given moment. This subjective valuation can differ considerably from the actual value of the future outcome (Mitchell, 1974, p. 1053; Vroom, 1995, p. 18).

The valence of an outcome (i.e. first level) is determined by the valence of the second level outcomes, that are the effect of attaining the first level outcome (Lawler & Suttle, 1973, pp. 482-483).

Galbraith and Cummings (1967) made a distinction between intrinsic and extrinsic sources of valence. Extrinsic sources refer to valence that has an external source of motivation to perform a behaviour (i.e. pay, pride, respect). While intrinsic sources refer to valence that is self-administered (i.e. aversion of particular work, enjoying to perform). House (1971) extended the intrinsic source of valence to be either determined by the behaviour itself or determined by the extent of goal attainment. An extrinsic source of valence usually has a lower instrumentality since it depends on an external party to observe and/or judge. Intrinsic valence is self-administered and therefore only depends on doing a task or the extent of goal attainment (House, 1971, p. 322-323).

In Equation 1 this concept of valence is applied to measure the subjective valuation of all possible first level outcomes of act i. In Equation 2 this concept measures the subjective valuation of all possible second level outcomes of act j. Positive (negative) levels of valence mean that these outcomes have a positive (negative) subjective value.

Force

The motivational force describes the appeal to an individual of a particular act, whereby the act with the highest force is chosen. It conceptualises the value upon which our choices, consciously or unconsciously, are based (Vroom, 1964, 1995).

It is determined by an interaction of theoretical concepts expectancy, instrumentality and valence based on an individual's characteristics, as is shown in Equations 1 and 2.

2.2 Goal setting theory

2.2.1 Goal setting theory origin

Goal setting theory (1990, 2013) is designed by Locke and Latham. In 1990 the theory was first formally published and it was updated in 2013. It has been extensively researched with over 1000 papers, whereof 600 from past 1990 (Locke & Latham, 2015).

Early goal setting theory research dates back to the 1960's, when behaviourism was dominant in psychology. The prominent behaviourist Watson (1925) claims that cognition or consciousness is useless in scientific theory. Behaviourists study observable behaviour. In doing so, they disregard cognitive reasoning, since they assume that behaviour is the result of the external environmental context. So, we are controlled by the stimulus-response that we grow up with, hence are controlled by our environment and do not a free will (Locke & Latham, 2015; Watson, 1925, 2013). However, goal setting theory demonstrates not only our environment, but also our own cognitive reasoning affects (goal) choice and performance. Personal goals influence the behaviour of individuals. Hence this became the focus of their research (Locke & Latham, 2002)[10].

This thought that behaviour is affected by a cognitive process was not new. Mace (1935) described it as the 'will to work'. Whereby the efficiency of employees is mostly determined by the direction, intensity and duration of the will to work. Mace (1935) compared specific assigned goals, improving previous performance goals, and do-your-best goals. He found that specific assigned goals yield the highest performance. However, participants needed a reasonable expectation that the specific assigned goal was within reach, for specific goals to outperform do-your-best goals (Latham & Locke, 2007, p. 290).

[10] Although it is possible that this response to goals is controlled by our environment.

Even before Mace (1935), Bryan and Harter (1897, p. 50) gave proof that employees could greatly increase their performance by striving to obtain a specific hard goal. Locke and Latham used, among others, their insights as a starting point to research goal setting.

2.2.2 Goal setting theory model

Locke and Latham (2015) describe a theoretical goal setting theory model. It states that: more difficult, specific goals lead to higher performance compared to vague, easy, do-your-best goals, or no goals. It claims a positive, linear relationship between goal difficulty and task performance (Locke & Latham, 2006, p. 265). This relation will hold insofar five moderators are present. These are, if individuals: have the required ability to perform the task; have commitment until the goal is attained; receive feedback with respect to their advancement in goal completion; have the necessary resources to perform the task; and develop task strategy. Whereby the satisfaction of the task is determined by the degree of goal attainment (Locke & Latham, 2015, pp. 114-115).

In addition, the relation that specific, hard goals lead to high performance is explained by four mediators. These are: task strategy, direction, intensity, and persistence. The former is cognitive, the last three are motivational (Locke & Latham, 2015, pp. 114-115)

Moderator variables affect and mediator variables explain a relation between two other variables. Moderators are variables that can increase of decrease the strength and/or direction of a relation. Mediators are variables that explain a relation between two other variables. That is, two variables influence each other through the mediator (Baron & Kenny, 1986). In case of goal setting theory, the positive, linear relationship between goal difficulty and task performance is explained through the mediators and exists when the moderators are sufficiently present.

2.2.3 Goal setting theory concepts

According to goal setting theory the goal-performance relation has five moderators and 4 mediators. Task strategy can be both. The five moderators ability, commitment, feedback, situational resources, and task strategy, and the four mediators, task strategy, direction, intensity, and persistence, are explained below.

Goal

A goal is the object or aim of an action. The goal content and goal intensity can be distinguished. The former refers to the content of the result that is intended. Goal content can be determined by external sources (e.g. boss, friends) and internally (e.g. own view or feelings). Goal intensity

refers to the effort exerted, degree of goal commitment, and level of importance of the goal. Goal setting theory usually uses higher and lower goals to refer to harder and easier goals (Locke & Latham, 1990, 2013).

Ability

Ability describes knowledge and skill. This knowledge and skill can be used to pursue a goal. Individuals need specific abilities to be able to perform a given task (Locke & Latham, 2015).

Ability or perceived ability affects goal choice and performance (Locke & Latham, 1990). Individuals with greater ability have higher self-set goals (Locke, Motowidlo & Bobko, 1986). When Individuals lack either ability or motivation for a goal, performance will be negatively influenced. Therefore, ability is a goal setting moderator (Locke & Latham, 2006).

Commitment

Commitment to a goal is present when an individual continues trying or is resolute to attain a goal. This applies both to assigned and self-set goals. When an individual is no longer reaching for a goal, it is not a goal anymore (Locke & Latham, 1990, pp. 124-125). Goal commitment is positively influence by the importance of the outcomes of the goal, and by the perceived probability of goal attainment (Locke & Latham, 2002, p. 707).

A strong positive relation is found between high goals and performance, when goal commitment is considered (Locke & Latham, 2015). Ability and commitment are positively correlated (Locke & Latham, 2002, p. 712).

Feedback

Feedback is goal or task related information on performance. It can increase, decrease, or have no effect on performance, depending on the specific setting and individual (Locke & Latham, 1990, pp. 17-18).

Feedback is a moderator for the high goal-performance relation. That is, goals affect performance more when feedback is present. So feedback can influence goals. But goals can also influence feedback. They can be a mediator for the feedback-performance relation. That is, feedback is translated by goals into performance[11] (Locke & Latham, 1990, pp. 173-174; 2015).

[11] The analyses will test the relation of goal on performance, described in the last part of this statement.

Situational resources

Situational resources describe the range of available needs that are required to reach a particular goal. Needs, in this case, can be related to information, material and familiarity with a situation or environment. Lack or partial lack of these resources leads to situational constraints. Constraints limit the possibility to actively engage in pursuing a goal, hence lowering performance (Locke & Latham, 1990).

Task strategy

Task strategy is the result of a cognitive process in the form of a conscious plan, to reach goals or to make it easier to reach goals. It is both mediator and moderator to the high goal-performance relation (Locke & Latham, 2015).

Task strategy can be considered as pre-existing. Since readily available task strategies can be applied to increase performance, whereas the absence thereof relatively decreases performance. Then this moderates the high goal-performance relation. However, when strategies are considered to be acquired during a task, they will mediate the goal-performance relation. Because high goals stimulate to think of and/or apply task strategy to attain the high goal, and therefore increase performance[12] (Locke & Latham, 2013).

Direction

Performance is influenced by goals through its directional effect. This effect is twofold. Firstly, goals consciously direct the attention of effort to relevant activities for goal attainment and away from distracters of goal attainment (Locke & Latham, 1990, 2013). However, if only part of the task is monitored or assessed, effort and attention will be mainly directed towards this part of the task (Locke & Latham, 2013, p. 6). Secondly, goals also, unconsciously, activate pre-existing abilities or task strategies that seem necessary for the task (Locke & Latham, 1990, 2013).

Intensity

Performance is influenced by goals through the intensity of effort. If individuals want to attain a high goal this requires more effort, compared to low goals. Therefore, the more difficult the goal, the higher the intensity of effort (Locke & Latham, 1990, 2013)

[12] In the present research will consider task strategy only as moderator. This is explained in chapter 4 in more detail.

Persistence

Performance is influence by goals through the persistence of effort. That is, the time spent on a task. More specifically, the time an individual continues to exert effort during the attainment of the task or while trying to attain it, in contrast to giving up (Locke & Latham, 1990).

2.3 Hypotheses development

This thesis has the aim to answer the following research questions. *RQ1: Do the motivational theories, expectancy and goal setting, have correct theoretical constructs? RQ2: Which motivational theory, expectancy or goal setting, is more accurate in predicting performance in a moderate and hard goal context?* To answer research question RQ1 and RQ2, the main theoretical constructs and predictions of the theories are tested with respect to moderate and hard goal contexts.

2.3.1 Expectancy theory hypotheses

The first concept within expectancy theory is expectancy. In the experiment of this thesis, expectancy will be manipulated to have a moderate and a hard goal context. For expectancy to be of importance to the decision process in comparison of the moderate and hard goals, the expectancy should be lower in the hard goal context, compared to the moderate goal context.

For the concept of expectancy to have scientific value, two conditions should hold. (1) It must be significantly different from the objective probabilities (Vroom, 1964, 1995), otherwise it is easier to use objective probabilities. The difference between the expectancy and the objective probability can either increase the predictive ability of the expectancy concept or decrease the predictive ability of the expectancy concept. This can be explained. Predictive ability can increase, since according to expectancy theory individuals evaluate a possible outcome based on expectancy (i.e. a subjective probability) instead of objective probability, hence their behaviour is the result of expectancy. However predictive ability can also decrease, because when expectancy is different from the objective probability, the outcome that is aimed for can be (substantially) different from their actual outcome. (2) Expectancy should vary between individuals, for the correction on the individual level (Vroom, 1964, 1995) to have added value. These statements result in the following hypotheses:

H1a: Expectancy is lower in the hard goal context, compared to the moderate goal context.

H1b: Expectancy varies between individuals in a moderate and hard goal context.

H1c: Expectancy differs from the objective probabilities in a moderate and hard goal context.

Expectancy theory states that expectancy is determined by ability, constraints, perceived control and perceived difficulty. Ability and perceived control are supposed to be positively (House, 1971; House, *et al.*, 1974) and perceived difficulty is supposed to be negatively (Vroom, 1964, 1995) related to expectancy. Constraints will be accounted for in the experimental design. Hence the following hypotheses:

H2a: Perceived ability has a positive effect on expectancy in a moderate and hard goal context.

H2b: Perceived control has a positive effect on expectancy in a moderate and hard goal context.

H2c: Perceived difficulty has a negative effect on expectancy in a moderate and hard goal context.

Further, expectancy theory claims a correlation between first and second level outcomes, described by the concept of instrumentality (Lawler & Suttle, 1973, p. 483). For this concept to have scientific relevance, this correlation must exist and have meaning. This is hypothesised as:

H3: First level outcomes and second level outcomes are meaningfully correlated in a moderate and hard goal context.

Expectancy theory describes the valence as an anticipated subjective valuation. Valence usually has both intrinsic and extrinsic sources, that must be treated differently (House, 1971). This will be accounted for in the experimental design.

However, the anticipated subjective valuation can differ from the actual value (Mitchell, 1974, p. 1053; Vroom, 1995, p. 18). The valence of outcomes to individuals should vary between individuals to have value as a concept. This leads to the following hypothesis:

H4: Valence varies between individuals in a moderate and hard goal context.

2.3.2 Goal setting theory hypotheses

Goal setting theory claims that the goal-performance relation is effected through four mediators (Locke & Latham, 2015). Gaining task strategy in a one-time task, will be very limited (Locke & Latham, 1990, 2015). The level of direction needs to be accounted for in the experimental design. The levels of intensity and persistence are hypothesised to be positively affected by higher goals, compared to lower goals *ceteris paribus*, and hence will positively affect performance (Locke & Latham, 2015). This results in the following hypotheses:

H5a: Intensity is a positive mediator in the goal-performance relation in a moderate and hard goal context.

H5b: Persistence is a positive mediator in the goal-performance relation in a moderate and hard goal context.

In addition, goal setting theory claims a linear relation between higher goals and higher performance (Locke & Latham, 2006, 2013). This relation depends on the levels and/or use of ability, commitment, feedback, lack of situational constrains, and task strategy (Locke & Latham, 2015). Of these variables, the possibility of feedback is less present in a one-time task (Locke & Latham, 1990); lack of situational constrains needs to be accounted for in the experimental design.

All these variables are positive moderators of the goal-performance relation (Locke & Latham, 2013). Therefore, applying goal setting theory to a moderate and hard goal context, results in the following hypotheses:

H6a: Task strategy is a positive moderator of the goal-performance relation in a moderate and hard goal context.

H6b: Perceived ability is a positive moderator of the goal-performance relation in a moderate and hard goal context.

H6c: Perceived commitment is a positive moderator of the goal-performance relation in a moderate and hard goal context.

2.3.3 Expectancy theory vs. Goal setting theory hypotheses

According to expectancy theory, effort depends on the values of expectancy, instrumentality, and valence. (Vroom, 1964, 1995). A simulation hereof with random numbers is shown in Table 1. Three different individuals are assumed, with effort levels being a ≥ b ≥ c, with various values of expectancy and instrumentality multiplied by valence.

Table 1 - Simulation of the interaction of concepts in expectancy theory

Effort	E	(I×V)	= F
1a	25%	6.00	1.500
1b	50%	2.25	1.125
1c	75%	0.80	0.600
2a	25%	5.00	1.250
2b	50%	2.75	1.375
2c	75%	1.60	1.200
3a	25%	4.50	1.125
3b	50%	3.00	1.500
3c	75%	2.20	1.650

Table 1. VIE-interaction for three hypothetical individuals. With E (25%, 50%, 75%), V×I (0-7) and performance (individual 1, 2 and 3 with effort being a ≥ b ≥ c). Whereby the highest force is marked in red.

Depending on the interaction of the concepts in expectancy theory, the force value differs and hence the assumed effort. If the force to exert high effort for a specific individual is higher, compared to low effort, this individual is assumed

to exert high effort. However, if the force to exert low effort is higher compared to high effort, this individual is assumed to exert low effort. Therefore, expectancy theory has no single prediction concerning the relation between force and effort. The same applies to performance. Hence, the following hypothesis:

H7a: Performance is accurately predicted by expectancy theory in moderate and hard goal contexts and will depend on the interaction of expectancy, instrumentality, and valence in both moderate and hard goal contexts.

Expectancy is one of the concepts in expectancy theory that can influence and explain performance. Expectancy is partially determined by perceived difficulty (Vroom, 1964, 1995). As shown in Table 1, effort or performance can be different while the expectancy is the same.

On the contrary, goal setting theory predicts a linear relationship between goal difficulty and task performance, when controlling for moderators and mediators (Locke & Latham, 2006, 2015). So, *ceteris paribus* for decreasing levels of expectancy, increasing level of performance are expected according to goal setting theory. Since expectancy must be lower in the hard goal context this results in the following hypothesis:

H7b: Performance is accurately predicted by goal setting theory in moderate and hard goal contexts and will be higher in the hard goal context, compared to the moderate goal context, when considering the moderators and mediators.

3. Research design

This chapter discusses the experiment used to test the hypotheses. The methodology is explained in detail in the following sections with respect to the task, questionnaire, participants, procedure, and analysis that are used.

3.1 Experiment

To answer the research questions and to test the hypotheses an experiment is conducted. This experiment has a moderate difficult context and a had goal context. The choice for an experiment is based on recommendations from the literature. For example, Eerde & Thierry (1996) recommend the use of experiments to learn more about the validity of the expectancy theory constructs. And to overcome measurement problems that have occurred in previous research (Eerde & Thierry, 1996. p. 581). Others as well underline the use of experiments in expectancy theory (e.g. Sloof & van Praag, 2008).

Also in goal setting research, both lab and field experiments are conducted, such as by the founders of goal setting theory. While Locke mainly did experiments to verify the internal validity, Latham tried to verify the external validity (Locke & Latham, 2015, pp. 107-108). In fact, the greater part of the theory is based on experiments (Locke & Latham, 2002, 2015).

To differentiate from previous research, this experiment uses a task that is new to both expectancy theory and goal setting theory. In addition, there was no deception in this experiment. In goal setting theory, sometimes deception is used (e.g. Mento, *et al.*, 1980). However, in experimental economics there should be no deception (Friedman & Sunder, 1994). Friedman and Sunder (1994, p. 56) emphasize that even if deception is only applied when it is impossible for participants to find out, there needs to be a "*strong justification for polluting the well from which your colleagues draw their own sustenance*" (Friedman & Sunder, 1994, p. 56). So, oppose all forms of deception.

3.2 Task

3.2.1 Task description

Appendix A, Panel A to Panel G present the experiment. The task description (see Appendix A, Panel B) starts with: "*Imagine that you work for a company*". Since the goal of the experiment is to extract information from this experiment and apply it to a work situation.

Participants "*are asked to do a task* (*solve a Sudoku)*". This task will be referred to as 'exercise', to overcome possible misunderstanding.

In addition, it states that: "*This company wants you to work as fast as you can. Therefore, they use one of their other employees as a benchmark. You will be paired with a* ***fictive*** *co-employee*" and: "*Your payment depends on (1) whether you complete the task faster than* [this fictive co-employee] *and (2) chance*." Therefore, participants can: lose (hereafter: Lose) from their benchmark; beat the benchmark, but not get a bonus (hereafter: Win^{-}); or beat the benchmark and get a bonus (hereafter: Win^{+}). The choice for this type of payment structure is threefold. Firstly, due to limited resources not all participants could receive a compensation. Secondly, the payment is depended on performance, this stimulates them to do their best (Camerer & Hogarth, 1999). Thirdly, as in a real work situation, not all effort is observed and rewarded. External events occur, beyond the control of an employee that influence the 'chance' of payment.

The reasoning for this way of expressing, and in particular for the choice of a Sudoku, are fivefold. For most participants it is (somewhat) familiar, challenging, interesting, imposed, and time consuming. Familiar, because a lot of people know or even play Sudoku. Challenging, since it requires cognitive skill and needs to be done under time pressure. Interesting, for people usually like to play Sudoku. Imposed, because participants have to do it, while they did neither choose nor knew that they had to do in advance. Time consuming, because it takes time to solve a Sudoku.

This has clear parallels to tasks in work situations. Familiar, because people normally work for longer periods doing the same type of work. (Somewhat) challenging, since work at almost every level has its own demands (i.e. deadlines, load of work, quality standards). Interesting, because people usually like their job or job characteristics to a certain extent. Imposed, because usually a task is imposed to you by a boss in a work situation. Time consuming, since time spent at work cannot be used for leisure.

3.2.2 Exercise

In the experiment the same Sudoku is used for all participants (see Appendix A, Panel F). It is the one-star Sudoku of 8 May 2016, retrieved from the archive of the website *www.sudokuoftheday.co.uk*. One-star means a Sudoku of the easiest level. The Sudoku of 8 May was judged to be one of the easier Sudoku's with one star.

The choice for an easier Sudoku was twofold. First, with respect to test the theories, the exercise should not measure skill or ability, but effort and performance as dependant variable. With higher level Sudoku's, the possibility to solve a Sudoku is more related to skill and/or ability than to effort. Since solving higher level Sudoku's, is more a related to the amount of task strategies that are, in advance, known to the participant, than to their level of effort or performance. Performance needs, at least partially, to be determined by effort (Mitchell, 1971, p. 1071). Second, it is motivated by the time constraints of an experiment. The experiment asked about 30 minutes of the participants' time. This is quite long for an experiment, in particular for experiments with only a chance of receiving a monetary reward. Of this 30 minutes, instructions and questionnaire took 13-17 minutes and the subjects received approximately 13 minutes to do the exercise, so to solve the Sudoku. Doing a more difficult Sudoku would result in a longer duration of the experiment, while adding no advantage.

3.2.3 Manipulation

In the experiment, there is a manipulation. This manipulation is operationalised by two different tasks. The goal was to have two benchmarks that are moderate and hard, respectively.

The task description (see Appendix A, Panel B) states either: "*You will be paired with a **fictive** co-employee, named **Frank***" or: "*You will be paired with a **fictive** co-employee, named **Simon***." Whereby **F**rank stand for **F**aster and **S**imon for **S**lower.

Some used 10% and 50% attainability to account for, respectively, hard and medium goal attainment (e.g. Locke, 1966) or expectancies (e.g. Mento, *et al.*, 1980). Locke (1968) used a hard goal that was attained by 19% of the participants (Matsui, *et al.*, 1981). To have more comparison in the experiment between the participants that solve the Sudoku in the groups of Frank and Simon, the aim is for the hard task around 25% and for the moderate task 50-60% attainability. In addition, the benchmark is rounded off to a whole minute.

The choice for the particular benchmarks is the result of seasoning and two independent sources. In the first place, the website *www.sudokuoftheday.co.uk* shows average statistics of solving the Sudoku's on their website. At September 9th 2016 the average statistics of 34 individuals who solved an easy Sudoku (i.e. similar to the exercise) was 9 minutes and 58 second, with a minimum of 4:41 and a maximum of 24:08. These Sudoku Statistics are also shown in the experiment: "*Since you need to solve a Sudoku in this experiment, an idea of the time that is needed to solve a similar Sudoku can be useful. Therefore, the statistics of 34 individuals who have solved a similar Sudoku are presented to your left. The average time to solve a similar Sudoku was 9 minutes and 58 seconds.*" With the source mentioned below.

This included individuals that very frequently solved Sudoku's on this website. If there would be relatively less experienced individuals in the experiment, they maybe would need more time. Therefore, in the second place, a group of 10 individuals were asked to solve the exercise while their time was monitored. Whereof 3 solved it within 8 minutes, 5[13] within 12 and 5 took longer than 12 minutes. This largely overlapped with the aimed attainment.

Hence, in 'the task against Frank' (hereafter: Frank), participants "*have 12 minutes to complete the task. However, Frank completed the task in **8 minutes***." While in case of 'the task against Simon' (hereafter: Simon), it states that: **"***Simon completed the task in **12 minutes***." So, participants either have a benchmark of 8 minutes (i.e. Frank) or 12 minutes (i.e. Simon) to complete the same exercise (i.e. Sudoku).

3.3 Questionnaire

The participants were asked to fill out a questionnaire on paper. This questionnaire checked the manipulation and to measure task strategy, ability, expectancy, instrumentality, valence, commitment, goal attainment, and task related feelings. The questionnaire has two parts, a pre- and a post-experimental questionnaire (see respectively Appendix A, Panel C and Panel G). Question can have various answer categories, mostly in the form of Likert items. 5-point and 7-point Likert items explain slightly more of the data compared to other scales (Dawes, 2008), whereof 7-point Likert items is selected. All but seven questions are asked on this scale.

3.3.1 Pre-experimental questionnaire

The pre-experimental questionnaire is included in Appendix A, Panel C. Question 1 asks about the last time that a participant had solved a Sudoku. It is a measure of task strategy, in that it states how 'fresh' pre-existing task strategies are in their cognitive memory. In addition, *the last time* potentially gives information about the frequency of solving Sudoku's. Doing it more frequently, increases the chance that it is more recent. And therefore, more task strategies could exist. In the analyses the results from this question are reversed, in order that higher values are related to higher levels of task strategy and ability (see Appendix B).

Questions 1-3 are the operationalisation of ability. Which refer to task strategy, perceived own ability, and perceived ability relative to the average HBO/University student. The perceived control over their performance is asked in question 4 by control over performance and in question 5 by control over time. Since intensions need the possibility to be translated in effort

[13] Including the individuals that solved the Sudoku within 8 minutes.

and/or performance (Mitchell, 1971, p. 1070; Locke & Latham, p. 115). Perceived difficulty is retrieved from question 7 by asking how easy it is to beat the benchmark. Asking it in this manner results in higher levels of Q7 corresponding to lower levels of difficulty.

Question 6 gives the expectancy to beat the benchmark. Questions 1-5 and 7 together account for the input for the concept of expectancy. That is, the expectancy theory states that ability, control, and difficulty together determine expectancy. Questions 8, 10, 11 and 13 are various control questions for the expectancy variable.

These control questions give additional information and control for certain relations beyond the expectancy theories prediction. Question 8 describes the influence of luck to beat the benchmark. Question 10 reports whether the participants have to exert high effort to beat the benchmark. Question 11 is close to being the opposite of expectancy, in that it asked whether the participants think to Lose from the benchmark, instead of the expectancy to beat the benchmark. Question 13 asked whether the participants would try less hard when they expect to Lose. These questions are also control questions regarding the relation between performance and the first level outcomes Lose and Win^-. And questions 9 and 12 control for the relation between Win^- and Win^+, so whether they get the bonus.

Questions 14-22 assess the decreasing, neutral, or increasing influence on various feelings of achieving a Win^+ situation. Together with question 12 they form the instrumentality measure for Win^+. Questions 23-31 assess the influence of Win^- on various feelings and form the Win^- instrumentality measure. The same applies to questions 32-40 in case of Lose.

Questions 9 and 12 inform about the monetary aspect (i.e. money: bonus of €5,-). The other questions are asked with respect to pride, luck, pleasure, satisfaction, confidence, fairness, humiliation, loss of time, and stress. Money and the previous feelings are the 10 second level outcomes used in the experiment, which are selected based on a suggestion of Hackman and Porter (1968) to make a list of potential outcomes and choose the items that are important to most participants. However in the experiment the creation of the list and the selection of the items is done by the experimenter instead of the participants. Since the experimenter has experience with Sudoku's a good reflection of the related feelings can be obtained and in addition it saves time.

Instrumentality seems difficult to apply in research (Connelly, 1976, p. 40ff.). It describes the correlation between the 3 first and 10 second level outcomes. A correlation can be positive, negative, or non-existing, hence the decreasing, neutral, or increasing scaling of the answers.

The valence measure, questions 41-50, uses the same 10 second level outcomes. Schwab *et al.* (1979) state that the explained variance is highest when valence is only positively scaled, and when using desirability instead of importance. The experiment partially deviates, as questions will be asked on a scale from strongly undesirable (-3) to strongly undesirable (+3). Mitchell and Albright (1972) suggest to include some negative outcomes (i.e. first and second level), since it is a measure of perceived anticipated value that can also be negative.

Question 51 is an obvious question, since everyone logically prefers to beat their benchmark and get a bonus (Win^{+}). However, it relates to question 52 to make it more evident that there might be a difference between what outcome they prefer and what is realistic. In addition, it relates to question 53, in which a realistic time assessment of solving the Sudoku is asked in blocks of minutes. The participants are asked in question 54-56 to indicate "*which percentage comes closest to what you think the chance is to* ***Win***$^{+}$*, to* ***Win***$^{-}$ *and to* ***Lose***." To get the individual expectancies of the 3 first level outcomes with a range from 5% to 95% chance in steps of 15% chance. The choice option does not include an option that sums up to 100%. Therefore, it is indicated "*which percentage comes closest."* In questions 51-56, participants will be asked to reflect the assigned goal (i.e. beating Frank or Simon) on their realistic assessments. Since there is also a post-experimental questionnaire, this gives the option to relate pre-exercise thoughts to post-exercise thoughts and feelings.

3.3.2 Post-experimental questionnaire

The post experimental questionnaire is presented is Appendix A, Panel G. After the exercise, participants were asked whether they solved the Sudoku (question 57), beat Frank/Simon (question 58), achieved their realistic goal (question 59), and achieved their realistic goal time (question 60). These questions were asked with respect to task/goal attainment and were checked afterwards.

Questions 61-66 are control questions, which respectively inform about the participants view about difficulty, performance, expectations, effort, and goal commitment.

The true perceived value of the task (i.e. in contrast to the anticipated valuation) is asked in questions 67-76. Whereby questions 67 and 68 account for the loss of time and the expected money, respectively, and questions 69-76 account for the other second level outcomes.

3.3.3 Order Effect

In questionnaires (Schuman, Presser & Ludwig, 1981), within-subject research (e.g. Harrison, Johnson, McInnes & Rutström, 2005), and other research, order effects should be controlled

for. Order effects are present when behaviour/answers in a particular situation is/are effected by previous behaviour/answers (Harrison, *et al.*, 2005), although this effect is less present with higher educated individuals (Babbie, 2010, p. 265). To overcome order effects in a questionnaire the order of questions can be varied by multiple versions, so effects can be mitigated or even eliminated (Babbie, 2010, p. 266).

In the experiment, the order of the questions is changed to get four versions in which the same questions are used. The pre-experimental questionnaire has 6 sections and the post-experimental questionnaire has 2 implicitly separated sections (see Appendix A, Panel C & Panel G). Version 1 uses the order of the questions as described above. In version 2, per section the order of the questions is reversed. Version 3 uses the same order as version 1, but the sections are reversed, with exception of section 1. In version 4, the order of the questions is reversed and the sections are reversed, again with exception of section 1. In total, there are four versions of Part 1 and four versions of Part 2 with benchmark Frank, and four versions of Part 1 and four versions of Part 2 with benchmark Simon.

3.4 Participants

Table 2 - Descriptive statistics age

	N	**Min.**	**Max.**	**Mean**	**SD**
Age	130	16	27	19.45	1.996

Participants for the experiment were recruited from multiple universities and universities of applied sciences (i.e. HBO). In total 136 participants took part in the experiment, in 9 sessions with 5-32 participants per session. Six had to be removed from the sample, leaving 130 participants. Five of these participants prematurely quit the experiment: two had to leave earlier than expected, for one the English was too difficult and for two the reward was too low. The sixth removed participant did not complete large parts of the questionnaire.

At the end of Part 1 participants had to fill out some personal information, with respect to their gender, age, study level, and study direction.

The age of the participants is distributed between 16 and 27 years with a mean of 19.45 years, as shown in Table 2. Of the 130 participants 78 (60%) were female and 52 were male (40%). Table 3 presents this distribution in gender.

Table 3 - Descriptive statistics gender

Gender	***N***	**Percent**
Female	78	60%
Male	52	40%
Total	130	100%

Table 4 shows that 96 (73.9%) of the participants are university students and 34 (26.2%) are HBO level students. Table 5 shows that 50 participants (38.5%) study economics, 40 (30.8%) study psychology, and 40 (30.8%) study something else (Other).

Participants were randomly assigned to either the Frank or Simon version, with respectively 68 and 62 participants, as presented in Table 6. Hence, they got one of the four versions of both Part 1 and Part 2, as described above.

Frank's four versions of Part 1 were respectively given to 19, 18, 15, and 16 participants. The four versions of Part 2 were respectively given to 17, 15, 16, and 20 participants.

Simon's four versions of Part 1 were respectively given to 19, 15, 14, and 14 participants. The four versions of Part 2 were respectively given to 14, 16, 14, and 18 participants.

Table 4 - Descriptive statistics study level

Study level	***N***	**Percent**
University	96	73.9%
HBO	34	26.2%
Total	130	100%

Table 5 - Descriptive statistics study direction

Study direction	***N***	**Percent**
Economics	50	38.5%
Psychology	40	30.8%
Other	40	30.8%
Total	130	100%

Table 6 - Descriptive statistics study direction

Benchmark	***N***	**Percent**
Frank	68	52.3%
Simon	62	47.7%
Total	130	100%

3.5 Procedure

3.5.1 Invitation

Participants were addressed at the end of a lecture or when they had time off, and asked to participate in an experiment. They were informed that they helped with a master thesis, that it would approximately take 25-30 minutes, and that there was a chance to win €5,- (i.e. the bonus). Participants were never informed about the chance to attain a bonus. At this point they were also not yet informed about the number of bonuses that were available. When individuals wanted to participate, they were guided to a silent room to conduct the experiment.

3.5.2 Introduction

After handing out the first part of the experiment, the introduction of the experiment (see appendix A) was read out loud. This introduction contained successively a personal introduction, a statement concerning confidentiality, an explanation about the structure of the experiment, a comprehensive instruction of how to solve a Sudoku, and a practice Sudoku. The latter was to recall Sudoku task strategies, and to give all participants a small trial that could be

used as feedback on their ability. Hereafter they were informed regarding the task description and Sudoku statistics.

3.5.3 Part 1

Hereafter the participants could continue with Part 1 of the experiment. This part started with the task description. Participants either had Frank or had Simon as benchmark, with their respective time constraints of 8 or 12 minutes. In addition, the Sudoku statistics, a summary of the information, and the Sudoku practice solution were presented. After having read this information, the participants could start with the pre-experimental questionnaire. When participants finished Part 1, they had to remain silent until the papers were collected.

3.5.4 Part 2

After all papers were collected, Part 2 of the experiment was handed out. Participants read the instructions and were asked to take a smartphone and to open the stopwatch application. They started the time when turning the paper to start with the exercise. If they solved the Sudoku within 12 minutes they could stop the time and continue with the post-experimental questionnaire. A little over 12 minutes, the participants who were not finished, were asked to stop and to continue with the post-experimental questionnaire. Part 2 was collected when all participants had finished. And after a few weeks the bonuses were distributed to the corresponding participants.

3.6 Analysis

The analyses in this research are performed in Stata. Various statistical tests are used. An extensive discussion of these tests is beyond the scope of this thesis. For further information the reader is for example referred to Moore, McCabe, Duckworth, and Alwan (2008).

A two-sample t-test is used to test for differences in the means of two variables. This is a parametric test which is used with variables that are (approximately) normally distributed and have at least an interval scaling. To test for differences in the distribution of two variables that are not normally distributed and have at least an ordinal scaling, a Wilcoxon rank-sum test is used. This is a non-parametric test. When the two variables are categorical, a Pearson's chi-squared test is used to test for differences in the distribution. If the lowest frequency is lower than 5 a Fisher-exact test is used instead of the Pearson's chi-squared test. In analyses of non-parametric explanatory variables with matched-pairs and at least an ordinal scaling a Wilcoxon matched-pairs signed-ranks test or sign rank test is used (Moore, *et al.*, 2008).

Regression analyses can be performed in various ways. A factorial analysis of covariance or ANCOVA is used with two or more categorical or continuous variables explaining a dependent variable that is (approximately) normally distributed and has at least an interval scaling. In the same situation with a dependent variable that is at least ordinal, an ordered logit regression model is used. In case of a categorical dependent variable, a factorial logistic regression is used (Moore, *et al.*, 2008).

Results from the analyses are considered to be significant with *p*-values smaller than or equal to 0.05 and to be marginally significant when *p*-value are larger than 0.05 but smaller than or equal to 0.10.

Various variables are used in the analyses. Appendix B lists the variables, explains their names, and in some cases explains the related concept and/or meaning of the associated values.

4. Results

This chapter discusses the results from the analyses to test the hypotheses. First the personal information of the groups with different benchmarks is compared to test for differences between the groups. Thereafter are hypotheses tested and discussed. Hypotheses 1-4 an 7a concern the expectancy theory and hypotheses 5-6 and 7b concern the goal setting theory.

4.1 Analyses of personal information

The experiment has two groups, one with Frank and the other with Simon as benchmark. These groups should have similar characteristics, to make it more likely that differences in results between the groups are because of a variation in treatment. Therefore, age, gender, study level, and study direction should be similar[14].

The age of the participants has a ratio scale but is not normally distributed in this sample. A Wilcoxon rank-sum test found no significant difference (z = -0.663; p = 0.507) in its distribution. A Pearson's chi-squared test is used to test for differences in the distribution between the categories of categorical variables[15]. There are no significant differences with respect to gender (chi2(1) = 0.005; p = 0.943), study level (chi2(1) = 0.098; p = 0.754), and study direction (chi2(2) = 1.747; p = 0.418) between the two groups.

Based on the characteristics described above, there is no reason to assume that the two groups are different.

4.2 Hypotheses tests

4.2.1 Hypothesis 1

The first concept within expectancy theory is expectancy. This concept is measured in multiple ways in this experiment. Question 6 asks for it directly (i.e. whether a participant expects to beat the benchmark on a scale of -3, fully disagree, to +3, fully agree). Questions 54-56 respectively ask for it in relation to Win^+, Win^- and Lose on a scale of 5% to 95%. These questions are combined to form another expectancy measure: Q5456. This variable is the sum of the expectancy to Win^+ (Q54) and Win^- (Q55), dividing by the sum of the expectancy to Win^+ (Q54), Win^- (Q55), and Lose (Q56). It gives the expectancy to beat the benchmark (i.e. to Win^+ or Win^-) relative to the sum of the total expectancies. It is similar to Q6 in that higher

[14] The output of these tests are not included in this thesis.
[15] The smallest frequency is larger than 5

values correspond to higher expectancies to beat the benchmark. But in Q5456, expectancy is given in a percentage from 0 to 1, instead of a value from -3, fully disagree, to +3, fully agree. Hence, more like Vroom's original formulation (Vroom, 1964, 1995).

According to the expectancy theory, expectancy is determined by ability, control, and difficulty. These concepts are measured in questions 1-5 and 7. They are used as explanatory variables for the expectancy concept.

Hypothesis 1a

Hypothesis 1a states: *Expectancy is lower in the hard goal context, compared to the moderate goal context*. A comparison between the expectancy of the Frank and Simon groups can be used to test this hypothesis.

A Wilcoxon rank-sum test found a marginal significant difference ($z = -1.879$; $p = 0.060$) in the distribution of expectancy in question 6 between Frank and Simon. With the expectancy of the participants with benchmark Frank being lower than the expectancy with benchmark Simon.

A Wilcoxon rank-sum test found that also with expectancy in questions Q54-56 the expectancy of the participants with benchmark Frank was marginally significantly lower ($z = -1.714$; $p = 0.087$), compared to the expectancy with benchmark Simon.

It is not peculiar that Q6 and Q5456 find a similar result, since these variables have a highly significant strong positive pairwise correlation of 0.635 ($p < 0.000$). Both show that the manipulation of the expectancy to beat Frank or Simon in the experiment was at least partially successful and supports hypothesis 1a. Therefore hypothesis 1a is accepted.

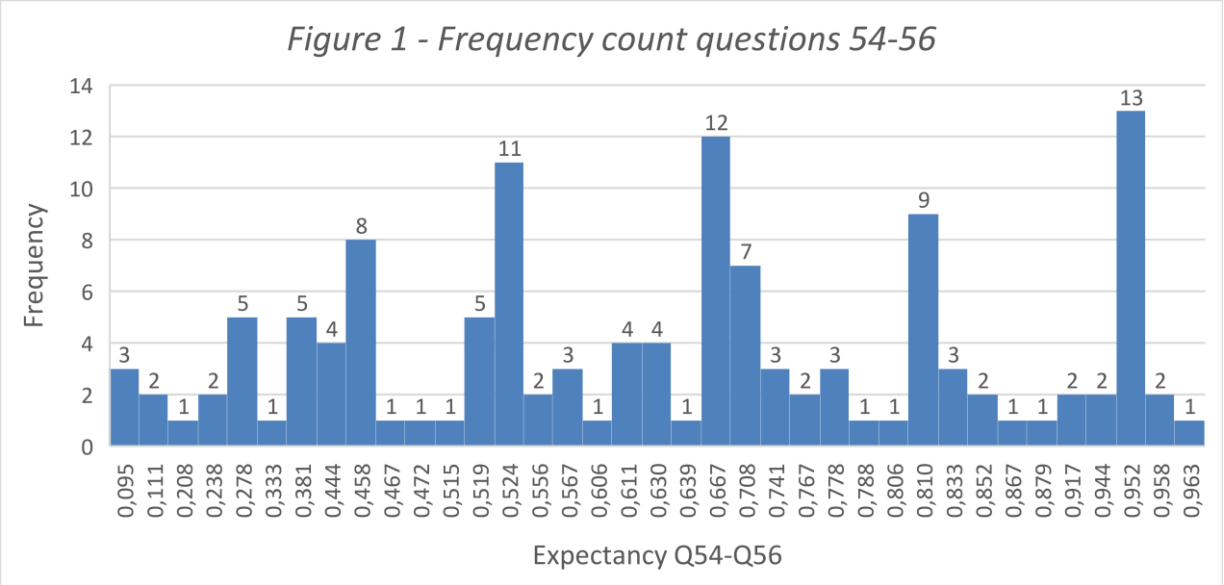
Hypothesis 1b

Hypothesis 1b states: *Expectancy varies between individuals in a moderate and hard goal context*. A comparison of the expectancy levels between participants will reveal whether expectancy differs from person to person in a moderate and hard goal context.

If individual's expectancy does not vary from person to person, the majority will choose a specific expectancy level, or the answers will be clustered around a particular expectancy. Questions 54-56 give the opportunity to state a person's expectancy more exactly on a scale from 5% to 95%, compared to Q6. Therefore, the variable Q5456 is used. A histogram of the results of Q5456 is shown in Figure 1. In total this measure has 37 different expectancies with

a highest frequency of 13 observations, what is 10% of the 130 observations[16]. The observed expectancy to beat the benchmark is distributed with a wide range from the lowest expectancy (i.e. 9.5%) to the highest (i.e. 96.3%).

This seems to support that expectancy varies substantially between participants. Therefore hypothesis 1b is accepted.



Hypothesis 1c

Hypothesis 1c states: *Expectancy differs from the objective probabilities in a moderate and hard goal context*. A comparison between individual's expectancy and the objective probability shows whether this concepts has added value. The objective probability to beat the benchmark can be derived from question 58.

Table 7 - Count and percentage to beat or lose from benchmark Frank/Simon

Defeat benchmark	**Frank**	**Simon**	**Total**
Beat	17 (25%)	27 (43.6%)	44 (33.9%)
Lose	51 (75%)	35 (56.5%)	86 (66.2%)
Total	68 (100%)	62 (100%)	130 (100%)

Table 7 presents that the objective chance to beat Frank was 25% (17 out of 68 participants with Frank as benchmark). The objective chance to beat Simon was 43.6% (27 out of 62 participants with Simon as benchmark). The objective probability to beat Simon (Frank) is significantly (Pearson chi2 (1) = 4.983; p = 0.026) higher (lower) that the objective probability

[16] With respect to Q6, where the participants could choose from seven options, there is also no majority with a clear preference for a specific answer. The highest frequency was 34 (26,2%) of the 130 observations.

to beat Frank (Simon). So, the manipulation of the objective probability to beat Frank or Simon in the experiment was successful.

Now the objective probabilities are known it is possible to check whether the expectancy of the participants is different from their objective probability to beat either Frank or Simon. To do this the observations from Q5456 are separated with respect to their benchmark, to construct the variables Q5456F, for participants with benchmark Frank, and Q5456S, for participants with benchmark Simon (see Appendix B).

A Wilcoxon signed-ranks test finds highly significant differences between Q5456F and its objective probability ($z = 7.018$; $p < 0.000$) and Q5456S and its objective probability ($z = 5.594$; $p < 0.000$)[17]. Both tests find that on average the participants with either Frank or Simon as benchmark report significantly higher expectancies than their objective probability. This supports hypothesis 1c and hence hypothesis 1c is accepted.

Table 9 - Ordered Logit regression model of expectancy (Q6) with control questions

ologit Q6 Q1r Q2 Q3 Q4 Q5 Q7 Q8 Q10 Q11 Q13 — **Number of obs = 127**; **LR Chi2 (10) = 135.31**; **Prob > chi^2 = 0.000**; **Log lik. = -155.388**; **Pseudo R^2 = 0.303**

Expectancy	Coef.	SE	z	P>|z|
Task strategy	0.190	0.136	1.40	0.163
Own ability	0.136	0.173	0.79	0.431
Relative ability	0.104	0.183	0.57	0.570
Control over performance	-0.049	0.153	-0.32	0.746
Control over time	0.538	0.191	2.82	0.005
Difficulty	0.785	0.177	4.44	0.000
Luck to beat	0.009	0.128	0.07	0.947
Effort to beat	-0.141	0.160	-0.88	0.377
Expectancy losing	-0.767	0.147	-5.22	0.000
Effort when losing	-0.226	0.096	-2.35	0.019

4.2.2 Hypothesis 2

According to the expectancy theory, expectancy is determined by ability (questions 1-3), control (questions 4-5), and difficulty (question 7). These concepts are used as explanatory variables for the expectancy (Q6) to test hypotheses 2a, 2b, and 2c, which are describes below. The tests that are conducted are ordered logit regression models.

The Stata output in Appendix C, Panel A shows expectancy (Q6) explained by ability (i.e. task strategy, own ability, and relative ability), control (i.e. control over performance and control over time), and difficulty. The overall model is significant ($p < 0.000$). In this regression model with

[17] A test with a similar approach to Q6, that is not included in this thesis, results in a nearly identical support ($z = 6.629$; $p = 0.000$ and $z = 3.873$; $p = 0.000$, respectively) for hypothesis 1c.

an overall Pseudo R-squared of 0.222, task strategy ($p = 0.019$), control over time ($p < 0.000$), and difficulty ($p < 0.000$) are significantly explanatory to expectancy (Q6), when questions 1-5 and 7 are used.

In Tables 8, 9 and 10 control questions are used in addition to the variables described earlier with respect to ability, control, and difficulty. Questions 8, 10, 11, and 13 are control questions which give additional information and control for certain relations beyond the expectancy theories prediction. Respectively they give information about the perceived influence of luck to beat the benchmark (i.e. luck to beat), the influence of high effort to beat the benchmark (i.e. effort to beat), the expectancy to lose (i.e. expectancy losing), and the effort when they expect to Lose (i.e. effort when losing).

Table 8 shows the ordered logit regression model of expectancy (Q6) with control questions. The overall model is significant ($p < 0.000$), with an overall Pseudo R-squared of 0.303. In this regression model control over time ($p = 0.005$), difficulty ($p < 0.000$), expectancy losing ($p < 0.000$), and effort when losing ($p = 0.019$) are significantly explanatory to expectancy.

Table 11 - Ordered Logit regression model of Frank expectancy (Q6) with control questions

ologit Q6F Q1r Q2 Q3 Q4 Q5 Q7 Q8 Q10 Q11 Q13 — **Number of obs = 67**; **LR Chi2 (10) = 70.56**; **Prob > chi^2 = 0.000**; **Log lik. = -74.424**; **Pseudo R^2 = 0.322**

Expectancy	Coef.	SE	z	P>|z|
Task strategy	-0.047	0.208	-0.22	0.822
Own ability	-0.207	0.288	-0.72	0.472
Relative ability	0.436	0.271	1.61	0.107
Control over performance	-0.022	0.225	-0.10	0.922
Control over time	0.426	0.263	1.62	0.105
Difficulty	0.895	0.274	3.27	0.001
Luck to beat	0.049	0.203	0.24	0.809
Effort to beat	-0.466	0.238	-1.95	0.051
Expectancy losing	-0.875	0.225	-3.88	0.000
Effort when losing	-0.238	0.130	-1.83	0.068

In the previous analysis of Q6, no distinction is made between the expectancy of participants with either Frank or Simon as benchmark. Table 9 shows the explanatory variables and control questions of the expectancy of the participants with benchmark Frank (Q6F). In this regression model, difficulty ($p = 0.001$) and expectancy losing ($p < 0.000$) are significant, and effort to beat ($p = 0.051$) and effort when losing ($p = 0.068$) are marginally significantly explanatory to Frank expectancy (Q6F). The overall model is significant ($p < 0.000$), with an overall Pseudo R-squared of 0.322.

Table 10 shows the explanatory variables and control questions of the expectancy of the participants with benchmark Simon (Q6S). In this regression model difficulty ($p = 0.009$), and expectancy losing ($p < 0.000$) are significant explanatory variables of Simon expectancy (Q6S). The overall model is significant ($p < 0.000$), with an overall Pseudo R-squared of 0.351.

Hypothesis 2a

Hypothesis 2a states: *Perceived ability has a positive effect on expectancy in a moderate and hard goal context*. Perceived ability relates to task strategy, own ability and relative ability. These concepts are hypothesised to have a positive effect on expectancy.

In Appendix C, Panel A with the regression of expectancy (Q6) without the control variables, at least one of the ability measures was significant, namely task strategy ($p = 0.019$). However when the control variables were added to the regression model as shown in Table 8, Q1r became insignificant ($p = 0.163$), and Q2 ($p = 0.431$) and Q3 ($p = 0.570$) remained insignificant. Also in Tables 9 and 10 the ability variables are insignificant.

Table 13 - Ordered Logit regression model of Simon expectancy (Q6S) with control questions

ologit Q6S Q1r Q2 Q3 Q4 Q5 Q7 Q8 Q10 Q11 Q13 — **Number of obs = 60**; **LR Chi2 (10) = 74.44**; **Prob > chi^2 = 0.000**; **Log lik. = -155.388**; **Pseudo R^2 = 0.351**

Expectancy	Coef.	SE	z	P>|z|
Task strategy	0.398	0.277	1.44	0.150
Own ability	0.297	0.256	1.16	0.245
Relative ability	-0.152	0.272	-0.56	0.578
Control over performance	0.086	0.238	0.36	0.719
Control over time	0.852	0.324	2.63	0.009
Difficulty	0.407	0.302	1.35	0.178
Luck to beat	0.272	0.202	1.35	0.178
Effort to beat	0.014	0.258	0.05	0.958
Expectancy losing	-1.062	0.275	-3.86	0.000
Effort when losing	-0.134	0.166	-0.81	0.419

Although the direction of the variables sometimes matches the hypothesised positive direction, interpreting the direction is not very meaningful since the variables are insignificant. Hypothesis 2a cannot be supported by this data and hence is rejected. That ability is not significant can be caused by a correlation of own ability and perceived ability with both perceived control (0.274, p = 0.002 and 0.490, p < 0.000, respectively) and perceived difficulty (0.320, p < 0.000 and 0.520, p < 0.000, respectively). This can have resulted in most of the explained variation of ability taken into account in perceived control and perceived difficulty.

Hypothesis 2b

Hypothesis 2b states: *Perceived control has a positive effect on expectancy in a moderate and hard goal context*. Perceived control relates to control over performance and control over time. These concepts are hypothesised to have a positive effect on expectancy. These concepts are linked since time is related to performance.

The results presented in Table 8 show that control over performance is insignificant ($p = 0.746$), while control over time is significant ($p = 0.005$) and in the hypothesised positive direction. This is similar to Table 10 from the participants with benchmark Simon ($p = 0.719$ and $p = 0.009$, respectively). In Table 9 from the participants with benchmark Frank both control over performance and control over time are insignificant ($p = 0.922$ and $p = 0.105$, respectively). It seems that control over time is more explanatory than control over performance. This can be due to time being more tangible compared to the more abstract concept of performance. Although these are linked because finishing the Sudoku in less time could improve your performance (i.e. from losing to beating the benchmark).

A possible explanation between the different results from Tables 9 and 10, is the importance of control in a specific context. When a target is moderately difficult, control might be more important to make the difference between attainment and failure, compared to when a target is hard. Expressed differently, a moderately difficult target can be attained by more individuals when they try harder, compared to a hard target that is only attainable by a few individuals. This might explain the difference in importance of the perceived control in a moderate and hard goal context.

So, Table 8 supports the positive effect of perceived control on expectancy in hypothesis 2b with respect to control over time. Tables 9 and 10 show that control over time is significant in a moderate goal context, but insignificant in a hard goal context. These tables may have shed additional light on the context wherein perceived control is more explanatory to the concept expectancy. Hence Hypothesis 2b is accepted.

Hypothesis 2c

Hypothesis 2c states: *Perceived difficulty has a negative effect on expectancy in a moderate and hard goal context*. Perceived difficulty is asked by how easy it is to beat the benchmark. So positive higher values relate to lower difficulty.

Difficulty is significant in both Tables 8 and 9, with a *p*-value smaller than 0.000 and a *p*-value of 0.001, respectively. In Table 10 difficulty is insignificant with a *p*-value of 0.178. In Tables

8, 9 and 10 the sign is positive, indicating a negative relation between difficulty and expectancy. Although, perceived difficulty seems less explanatory (i.e. is insignificant) in a moderate goal context (see Table 10), compared to a hard goal context (see Table 9).

A negative effect of perceived difficulty on expectancy as described in Hypothesis 2c is supported by Table 8. Tables 9 and 10 give additional information on the context wherein perceived difficulty is more explanatory to the concept expectancy. Therefore is Hypothesis 2c accepted.

4.2.3 Hypothesis 3

Hypothesis 3 states: *First level outcomes and second level outcomes are meaningfully correlated in a moderate and hard goal context*. This hypothesis cannot be tested directly, since there is no single value for the first level (hereafter: FL) outcomes. That is, questions 14-22 describe the second level (hereafter: SL) outcomes related to the FL outcome Win^{+}, as do questions 23-31 to the FL outcome Win^{-}, and questions 32-40 to the FL outcome Lose.

However, it is possible to check whether the SL outcomes of the FL outcomes are on average[18] significantly different from each other. Because these questions are correlation type questions, insignificant differences would indicate that first and second level outcomes are not meaningfully correlated, opposing hypothesis 3.

This analysis is done per corresponding question by a Wilcoxon matched-pairs signed-ranks test (sign rank test), since the data is not normally distributed and the answers are paired by same participant. The results from the SL outcomes of Win^{+} by the SL outcomes of Win^{-} can

Table 15 - Signed-rank test of SL outcomes of: Win^{+} by Win^{-}

Win^{+} by Win^{-}	**z**	**P>|z|**
Pride	7.036	0.000
Luck	8.341	0.000
Pleasure	9.274	0.000
Satisfaction	9.277	0.000
Confidence	7.299	0.000
Fairness	4.236	0.000
Humiliation	-6.112	0.000
Loss of time	-6.609	0.000
Stress	-6.267	0.000

Table 17 - Signed-rank test of SL outcomes of: Win^{+} by Lose

Win^{+} by Lose	**z**	**P>|z|**
Pride	9.744	0.000
Luck	8.871	0.000
Pleasure	9.838	0.000
Satisfaction	9.901	0.000
Confidence	9.722	0.000
Fairness	3.143	0.002
Humiliation	-7.707	0.000
Loss of time	-7.001	0.000
Stress	-8.565	0.000

[18] Correlation is likely to be different from person to person, but on average particular directions in the correlation might be present.

be found in Table 11[19]; Win^+ by Lose can be found in Table 12; and Win^- by Lose can be found in Table 13.

In Table 11, with respect to Win^+ and Win^-, all relations are highly significant (highest $p < 0.000$). This also applies to the relations between Win^+ and Lose (highest $p = 0.002$) in Table 12. From the results presented in Table 13 seven relations between Win^- and Lose are significant, with a highest *p*-value of 0.016. The two insignificant question-pairs are Q24/Q33 ($p = 0.942$) and Q28/Q37 ($p = 0.285$). So, out of the 27 relations 25 are significant.

Table 19 - Signed-rank test of SL outcomes of: Win^- by Lose

Win^- by Lose	**z**	**P>|z|**
Pride	9.169	0.000
Luck	-0.072	0.942
Pleasure	7.997	0.000
Satisfaction	8.309	0.000
Confidence	8.867	0.000
Fairness	-1.070	0.285
Humiliation	-4.916	0.000
Loss of time	-2.403	0.016
Stress	-6.401	0.000

The nine items in questions 14-22, 23-31, and 32-40 relate respectively to pride, luck, pleasure, satisfaction, confidence, fairness, humiliation, loss of time, and stress. From these question the first six are positive feelings and the last three are negative feelings. Negative values of a variable relate to a decrease in a feeling, while positive values relate to an increase in a feeling. Money is considered in a different manner because it is known in advance it has no correlation (i.e. a correlation of 0) for Win^- and Lose, and a positive correlation[20] for Win^+. For only in case of Win^+ a bonus can be attained.

As shown in Tables 11-13, when the relation is significant, the signs of the z-score are also positive for the first six question-pairs and negative for the last three questions-pairs. This indicates that Win^+ results in significant more positive feelings compared to Win^-, and Win^- overall[21] results in significant more positive feelings compared to Lose.

When Win^+, Win^-, and Lose (i.e. first level outcomes) result in significantly different second level outcomes in a moderate and hard goal context, it is very plausible that first and second level outcomes are meaningfully correlated. The results cannot reject hypothesis 3. On the contrary, they are very likely supporting Hypothesis 3. Hence Hypothesis 3 is accepted.

[19] These tables contain the following information. In the first column the SL outcomes are presented of the FL outcome written in row one. These are compared to the SL outcomes in column two of the FL outcome written in column two row one. Column three contains the z-score of the signed-rank test. With a positive (negative) z-score indicating that the outcome in column one is higher (lower), compared to the outcome in column two. Whether this difference is significant is shown in column four.

[20] This is asked in question 12.

[21] Table 13 indicates more positive feelings by Win^- compared to Lose, because positive feelings are increased by seven significant question-pairs and are not significantly influenced by the remaining two question-pairs.

4.2.4 Hypothesis 4

Hypothesis 4 states: *Valence varies between individuals in a moderate and hard goal context*. A comparison between the valence of participants will reveal whether valence is different from person to person.

Questions 41-50 asked about the concept of valence. More specifically, about the valence of the SL outcomes that can be attained by FL outcomes. These SL outcomes are money, pride, luck, pleasure, satisfaction, confidence, fairness, humiliation, loss of time, and stress, respectively.

The results to these concepts are presented in Table 14, whereby the highest frequency per question is in bold. Values indicate that a SL outcome is perceived to be undesirable by negative values and desirable by positive values. It is expected that the first seven are perceived desirable, while the last three are perceived undesirable.

Table 21 - Frequency count of SL outcomes of valence

Valence	**-3**	**-2**	**-1**	**0**	**+1**	**+2**	**+3**	Total
Money	2	1	1	14	40	29	**43**	130
Pride	1	4	1	26	**39**	30	28	129
Luck	1	2	6	30	**42**	28	20	129
Pleasure	0	2	2	7	30	43	**46**	130
Satisfaction	0	1	2	9	18	**54**	47	130
Confidence	0	2	1	5	33	42	**47**	130
Fairness	2	1	2	29	27	27	**42**	130
Humiliation	**63**	27	7	21	7	5	0	130
Loss of time	**43**	34	23	17	7	4	1	129
Stress	**67**	25	8	18	8	4	0	130

A Wilcoxon signed-ranks test, testing whether responses are significantly different from 0, supports that participants have a significant preference for positive values with respect to money, pride, luck, pleasure, satisfaction, confidence, fairness (smallest z = 7.940, highest $p < 0.000$). It also supports that participants have a significant preference for negative values with respect to humiliation, loss of time, and stress (highest z = -8.354, highest $p < 0.000$).

However, as shown in Table 14 there is still considerable variation in the choices of participants. Only once more than half of the participants chose one particular answer. The highest frequency varies between 39 (30.2%) and 67 (51.5%) of the total observations. This suggests that participants' valence indeed varies in a moderate and hard goal context, accepting hypothesis 4.

4.2.5 Hypotheses 5 & 6

Goal setting theory claims that the relation between goals and performance is mediated positively by intensity and persistence[22], and moderated positively by task strategy, ability, and

[22] Intensity is asked in question 65 and persistence in question 66.

commitment[23] (Locke & Latham, 2006, 2013). The goal is to beat the benchmark. Performance can be viewed as the actual time wherein a participant solved the Sudoku, and/or as being faster than either Frank (i.e. 8 minutes) or Simon (i.e. 12 minutes). These mediators and moderators influence the goal-performance relation.

The mediators explain the goal-performance relation. They are caused by goals and explain the performance (Baron & Kenny, 1986). Whether a mediator exists can be tested by the explanatory power of the mediators on performance. In contrast, the moderators affect the strength and/or direction of the goal-performance relation (Baron & Kenny, 1986). When a moderator exists, higher levels of a moderator result *ceteris paribus* in a higher goal-performance relation. Whether a moderator exists can be tested by the existence of an interacting effect between the goal and the moderators. So the mediators are tested by their explanatory power of the goal-performance relation and the moderators are tested by their interaction effect on the goal-performance relation.

Table 15 presents the summary of the *p*-values of the variables in the factorial analyses of covariance[24], known as ANCOVA. Interaction is denoted with a hashtag (#). The models are respectively included in Appendix C, Panel B to E. Performance is the dependent variable, although this variable is measured differently in the models, as noted in Table 15. Target attainment has a value of 1 if the Sudoku is solved within a specific time and 0 otherwise, while actual time gives the actual time if the Sudoku is solved within a specific time and a missing value otherwise. In both cases the specific times are either 8 or 12 minutes. This performance is explained by the mediators and moderators and by the benchmark. In addition the number of observations, the significance of the overall model and the adjusted R-squared are shown per model. The results that are significant are in bold, whereas results that are marginally significant are underlined.

Table 15 shows that all the models in the summary are significant. The models have adjusted R-squares that vary between 0.166 and 0.415, so adjusted for the number of variables[25] the models explain between 16.6% and 41.5% of the variation. In addition it shows that the number of (marginally) significant variables within the models of 8 minutes is higher, compared to the models of 12 minutes. This indicates an increased explanatory power of particular variables

[23] Task strategy is asked in question 1, ability in question 1-3, and commitment in questions 65 and 66.
[24] Since Q57A is binary a factorial logistic regression model (logistic) can be used to test the hypothesised relations. However, when the interaction terms were included in the model Stata was not able to conduct the test. Therefore the analyses is conducted by a factorial ANCOVA.
[25] More accurate: adjusted for the number of degrees of freedom within the analysis.

when only Sudoku's that are solved faster are considered. Taking only the first 8 minutes is also more explanatory because within this time participants with both benchmarks are trying to solve the Sudoku in time, while the participants with benchmark Frank might already have given up after 8 minutes. Therefore the 8 minutes models are more informative.

Table 23 – Summary of p-values of factorial ANCOVAs for mediators and moderators of the goal-performance relation in goal setting theory

Dep. Variable	**Target attainment 8 minutes[1]**	**Target attainment 12 minutes[2]**	**Actual time 8 minutes[13]**	**Actual time 12 minutes[4]**
N	130	130	31	61
Adjusted R^2	0.245	0.337	0.415	0.166
Model	**0.000**	**0.000**	**0.019**	**0.040**
Benchmark	0.295	0.408	<u>0.054</u>	0.535
Task strategy	**0.013**	0.563	**0.004**	**0.018**
Own ability	**0.015**	**0.001**	0.530	0.179
Relative ability	0.723	0.359	<u>0.094</u>	0.971
Intensity	0.420	0.511	**0.011**	0.749
Persistence	**0.004**	**0.000**	0.107	0.910
Task strategy# Benchmark	0.905	0.123	**0.031**	0.863
Own ability# Benchmark	0.878	0.753	0.694	0.161
Relative ability# Benchmark	0.848	0.589	0.216	0.273
Intensity# Benchmark	**0.015**	0.119	0.607	0.543
Persistence# Benchmark	0.108	0.500	0.652	0.783

Remark: Variables that are in **bold** have *p*-value: $p \leq 0.05$;
variables that are <u>underlined</u> have *p*-value: $0.05 < p \leq 0.10$.

[1] Value is 1 if Sudoku is solved within 8 minutes and 0 otherwise.

[2] Value is 1 if Sudoku is solved within 12 minutes and 0 otherwise.

[3] Value is the actual time when the Sudoku is solved within 8 minutes and a missing value otherwise.

[4] Value is the actual time when the Sudoku is solved within 12 minutes and a missing value otherwise.

Intensity and persistence are interpreted in the following section *Hypothesis 5a & 5b*. Task strategy, ability, and the interaction effects are interpreted in section *Hypotheses 6a, 6b & 6c*. Benchmark is interpreted in section *Hypotheses 7b*.

Hypotheses 5a & 5b

Hypothesis 5a states: *Intensity is a positive mediator in the goal-performance relation in a moderate and hard goal context.* Hypothesis 5b states: *Persistence is a positive mediator in the goal-performance relation in a moderate and hard goal context*. When intensity and persistence are caused by goals then they are mediators when they have a significant explanatory power on performance.

Intensity is significant in the model of actual time within 8 minutes. Persistence is significant in both models of target attainment. This difference can be partially explained by the relative explanatory effect when the actual time is considered, compared to target attainment. As noted below Table 15, target attainment has values of zeros and ones, while actual time gives the actual time or a missing value.

The observations of participants that took more than either 8 or 12 minutes and gave up/had to give up (i.e. persistence) are omitted in actual time but included in target attainment with a value of zero. Persistence is not explanatory to performance in the model of actual time within 8 minutes, since no participants gave up within the first 8 minutes[26]. But because after 12 minutes[27] some participants gave up/had to give up this increased the explanatory power of persistence the models of target attainment.

With respect to intensity, most of the participants worked very intensely[28], including those that took more than either 8 or 12 minutes, thereby reducing the explanatory effect of intensity in the models of target attainment. When considering the actual time in the first 8 minutes, intensity is significant, although not in the hypothesised direction[29]. Higher levels of intensity had a negative effect on the time wherein a participant solved the Sudoku. This can be explained by the lower perceived intensity of participants that solved the Sudoku very quickly compared to higher levels of perceived intensity for participants that took longer and had a feeling of more intense trying.

[26] Tabulating the results for persistence within the first 8 minutes showed no positive observations.
[27] Tabulating the results for persistence after 12 minutes showed 23 positive observations.
[28] Tabulating the results for intensity showed that 80% of the observations are positive.
[29] Further analysis shows a negative effect of intensity on performance.

Hence only persistence had the hypothesised positive explanatory effect on the goal-performance relation. The analysis supports persistence as mediator variable, in comparing participants that attained a target to those who did not attain this target. Therefore hypothesis 5a is rejected and hypothesis 5b is accepted.

Hypotheses 6a, 6b & 6c

Hypothesis 6a states: *Task strategy is a positive moderator of the goal-performance relation in a moderate and hard goal context*. Hypothesis 6b states: *Perceived ability is a positive moderator of the goal-performance relation in a moderate and hard goal context.* Hypothesis 6c states: *Perceived commitment is a positive moderator of the goal-performance relation in a moderate and hard goal context*. These hypotheses refer respectively to task strategy, ability, and commitment. Ability is measured by task strategy, own ability, and relative ability. Commitment is measured by intensity and persistence. These variables are interacted individually by the variable benchmark. When these variables are moderators they interact with the goal-performance relation.

As shown in Table 15, task strategy, own ability, and relative ability are used to explain performance. Since they are pre-existing and not determined by goals they cannot be mediators for the goal-performance relation, but they can be moderators. Regarding their direct effect some statements can be derived after analysis of the direction. As mentioned before, part of the difference between the 8 and 12 minutes models might be explained by an increased explanatory power; that is, higher levels of ability can explain why Sudoku's are solved faster.

Task strategy is positive significant to performance with target attainment, but negative significant with actual time. It seems that task strategy is informative in comparing participants that solved the Sudoku within 8 minutes to participants that took longer, but not in comparing the group of very quick participants regarding their actual time. Own ability is significantly positive to performance in the models of target attainment. Relative ability is marginally significantly positive to performance in the model of actual time within 8 minutes. This difference between own ability and relative ability can be because own ability cannot exactly predict the actual time, however relative ability can partially predict a faster time.

Table 15 shows that the interactions have two significant results. The interaction of task strategy is significant with respect to the actual time within 8 minutes. That is, performance is higher with benchmark Simon for higher levels of task strategy compared to benchmark Frank. The interaction of intensity is once significant with respect to target attainment within 8 minutes.

That is, performance is higher with benchmark Frank for higher levels of intensity compared to benchmark Simon. The interactions of own ability, relative ability, and persistence have no significant results.

With respect to Hypotheses 6a and 6b, task strategy, perceived own ability, and perceived relative ability are all explanatory variables as measures of ability, though depending on how performance is measured. However, the analyses of the interactions of each of these variables show only significant interactions for task strategy. It is possible that most of the explanatory effect of these variables is in the direct effect of the explanatory variables, instead of in the interaction effect. The results cannot reject but find only some support that a different benchmark would have a different effect on performance for participants with higher levels of task strategy. Therefore hypothesis 6a is plausible. Since task strategy is part of hypothesis 6a and perceived own ability and perceived relative ability have no significant interactions, the result reject ability as moderator and therefore hypothesis 6b.

With respect to Hypothesis 6c the model of target attainment within 8 minutes marginally supports intensity as moderator, but not persistence. A different benchmark might have a different effect on performance for participants with higher levels of commitment. This suggest that, although the support is weak, it is possible that commitment is a moderator to the goal-performance relation. Hence hypothesis 6c is plausible.

4.2.6 Hypothesis 7

Hypothesis 7a

Hypotheses 7a states: *Performance is accurately predicted in moderate and hard goal contexts and will depend on the interaction of expectancy, instrumentality, and valence in both moderate and hard goal contexts*. To test this hypothesis the force value is calculated by these concepts per first level outcome. These force values are then compared to actual outcomes to test the accuracy and hypothesised interaction.

Table 25 - Frequency and percentage of the expectancy theory predictions

Prediction	***N***	**Percent**
Lose	9	7.1%
Win^{-}	27	21.4%
Win^{+}	90	71.4%
Total	126	100%

The force is calculated by expectancy, instrumentality and valence by $F = E\ (I \times V)$ according to the integrated version of Equation 1 and 2 presented in Chapter 2 (see section *2.1.2 Expectancy theory model*). Which variables are used to calculated the force is shown in Appendix D. Force is a value per individual. In addition it is related to a specific act, in this

case (to strive for) one of the outcomes Win^+, Win^-, and Lose. A comparison between the force values of these first level outcomes will determine which outcome has the highest force for a particular participant. The outcome with the highest force has the highest appeal.

Table 16 shows the results of the prediction of the expectancy theory. *N* is the number of participants with the highest force value for that particular first level outcome. Most (71.4%) of the participants had a highest force for Win^+ and are motivated to strive for attaining the bonus. Less (21.4%) participants have the highest force for Win^-, they want to beat the benchmark but are less stimulated by the bonus. An explanation is that they think that a bonus is (very) unlikely. However, they perceived the second level outcomes of Win^- higher than the second level outcomes of losing, although additional effort is required. For only some (7.1%) losing has the highest force. A highest force for losing can be present when beating the benchmark is very unlikely, hence making the associated benefits (i.e. positive valenced outcomes) also very unlikely. This can reduce the positive outcomes to a lower force than the negative valenced outcomes of losing. Hence making Lose the best alternative.

Table 17 gives the number of correct predictions of the expectancy theory with respect to whether a participant beat the benchmark or lost from the benchmark. In only 33.3% of the observations the theory gives the right prediction. With respect to Lose 44.4% of the predictions are correct, however these are only 4 observations. Especially with respect to Win^+ and Win^- (i.e. beat category in Table 17) a lot of predictions are wrong in percentage (67.5%) and in absolute numbers (79 predictions).

Table 27 - Frequency of the right and wrong expectancy theory predictions

Prediction	Right	Wrong	Total
Lose	4 (44.4%)	5 (55.6%)	9 (100%)
Beat	38 (32.5%)	79 (67.5%)	117 (100%)
Total	42 (33.3%)	84 (66.7%)	126 (100%)

This large number of incorrect predictions can partially be explained by Table 18. It shows a significant difference (chi2(1) = 5.155; $p = 0.023$) in the accuracy of predictions with respect to the different benchmarks. Especially in case of Frank, the model has many (i.e. 50) wrong predictions. Only 24.2% of the

Table 29 - Frequency of the of the right and wrong expectancy theory predictions by benchmark

Benchmark	Right	Wrong	Total
Frank	16 (24.2%)	50 (75.8%)	66 (100%)
Simon	26 (40%)	34 (60%)	60 (100%)
Total	42 (33.3%)	84 (66.7%)	126 (100%)

observations could be explained by the expectancy theory predictions. In case of Simon 40% of the observations could be explained.

To evaluated these predictions in terms of accuracy they should be compared to a standard. In case of the expectancy theory the force value would predict the outcome. Since there are only three possible outcomes, the random chance to predict a correct prediction is 33.3%. This is equal to the correct prediction rate of the expectancy theory, as shown in Table 17. So the expectancy theory does not have more prediction power compared to random chance. Therefore there is reason to believe that the combination of the concepts in a force value to determine the outcome is not accurately enough.

A partial explanation for this low accuracy can be found in the results of hypotheses 1a and 1c. Combining these results already showed that the expectancy for the participants with Frank as Benchmark was lower compared to the expectancy for the participants with Simon as Benchmark[30]. This overconfidence can partially explain the difference in predictive power of the expectancy with respect to a moderate and hard goal context. In addition, this large difference between the expectancy and the objective probability led to an overestimation of the benefits of beating the benchmark, thereby inflating the prediction of beating the benchmark relative to losing from it. The expectancy theory predicted only 9 participants to Lose, while in fact 86 participants lost form their respective benchmark.

Hence the results show minimal support for both parts of Hypothesis 7a. Although the predictive power of the expectancy theory is higher with benchmark Simon compared to Frank, the accuracy is weak. Performance seems only partially depending on the interaction of the expectancy theory concepts expectancy, instrumentality and valence as stated by the expectancy theory. Therefore hypotheses 7a is rejected.

Hypothesis 7b

Hypothesis 7b states: *Performance is accurately predicted by goal setting theory in moderate and hard goal contexts and will be higher in the hard goal context, compared to the moderate goal context, when considering the moderators and mediators*. The accuracy of the goal setting theory in predicting performance can be derived from the explanatory power of the models. Performance in relation to moderate and hard goal contexts is tested.

[30] For both Q6 and Q5456 the test statistics were larger for Frank compared to Simon, respectively z = 7.018 vs. z = 5.594 and z = 6.629 vs. z = 3.873.

The accuracy of the goal setting theory in predicting performance is shown in the variation of the adjusted R-squared of the models in Table 15. The model with the highest explained adjusted variation is 41.5% in the model of actual time within 8 minutes. This model has an unadjusted R-squared of 63%, so 63% of the variation. This figure is similar or higher than models explaining performance in previous research, for example Huber (1985) found an unadjusted R-squared of 63% and Mento, Locke and Klein (1992) found an unadjusted R-squared of 32%.

The analysis of performance in relation to moderate and hard goal contexts is shown in Table 15. When controlling for various interaction effects and direct effects, the dummy variable Benchmark gives the direct effect of a different benchmark. Benchmark has a marginally significant result, in the model of actual time within 8 minutes. The interactions pointed out that performance is higher with benchmark Simon for higher levels of task strategy compared to benchmark Frank. And performance is higher with benchmark Frank for higher levels of intensity compared to benchmark Simon. Further analysis suggests that *ceteris paribus* Benchmark Simon will marginally significantly lower performance compared to benchmark Frank. In other words, participants with benchmark Frank perform marginally significantly better compared to participants with benchmark Simon.

The results show some support for both parts of Hypothesis 7b. The explanatory power of the models using the goal setting theory constructs is similar or higher than the explained variation in previous research. In addition, the results show that the hard goal context (i.e. having a higher benchmark) will marginally significantly increase performance *ceteris paribus*. This is in accordance with the theoretical predictions of the goal setting theory after controlling for other relations specified by the theory. Hence Hypothesis 7b is accepted.

5. Conclusion

This chapter summarises the present research, discusses the conclusion that answers the research questions and the contribution of the present research. In addition the limitations of the present research and directions for future research are discussed.

5.1 Conclusion and Discussion

This thesis began with the common question "What do you expect?" This general question led to the motivational theory of expectancy theory, wherein expectations play a major role. Together with instrumentality and valence, they are the three concepts that determine the force of a person to perform a particular act. According to expectancy theory, the force value of particular outcomes can explain which performance level an individual chooses. But results are not conclusive as to how accurate expectancy theory is in explaining performance. However, expectancy theory is not the only motivational theory to explain performance. Goal setting theory assumes that goals themselves influence performance when accounted for multiple mediators and moderators. This theory, that is strongly supported by previous research, sometimes appears to contradict expectancy theory. Particular with respect to expectancy in the form of goal difficulty the theories have different predictions. Since goal difficulty is different in a moderate goal context compared to a hard goal context, this is an ideal context to test the theories. Therefore this thesis tested the following research questions:

> *RQ1: Do the motivational theories, expectancy and goal setting, have correct theoretical constructs?*
>
> *RQ2: Which motivational theory, expectancy or goal setting, is more accurate in predicting performance in a moderate and hard goal context?*

An experiment with 130 participants divided over a specific (assigned) moderate (62 participants) and hard goal context (68 participants) was used to empirically test most for the underlying constructs of the theories and their predictive accuracy. The choice to conduct the research by an experiment was suggested in the literature and inspired by the need to control behaviour to be able to test the determinants of this behaviour (e.g. Van Eerde & Thierry, 1996).

In this experiment real incentives are use, since the bonus is depending on performance. Research finds significant differences between incentivised and non-incentivised studies whereby real incentives result in more realistic (i.e. has lower error) and higher performance where increases effort increases performance, however there are also tasks wherein this effect

is not present, for example when participants have sufficient intrinsic motivation as psychologists usually claim or the task is to hard, and incentives can also hurt performance (Camerer & Hogarth, 1999). Although Read (2005) does not find significant difference between real and hypothesised incentives he concludes by saying that the incentivised dominates the non-incentivised if the incentivised can be easily conducted and the money is available. This experiment uses real incentive because money is hypothesised as a motivator that increases effort. In addition, the design was easily incentivised, it better simulates a real work related setting and a behavioural economic experiment uses real incentives.

The hypotheses that were derived from the theories were the guidelines to analyse the research questions. In total there were seven hypotheses, some with multiple parts. Hypotheses 1-4 and 7a related to expectancy theory. Hypotheses 5-6 and 7b related to the goal setting theory.

Hypothesis 1 shows that the manipulation of the moderate and hard task context was successful. With respect to expectancy theory, it also proved that the concept of expectancy has added value. The results support part of hypothesis 2 that expectancy is determined by perceived control and perceived difficulty, but ability does not significantly determined expectancy. Possibly due to correlation most of the explained variation of ability is taken into account in perceived control and perceived difficulty. Hypothesis 3 is supported. The results confirm that the first level outcomes and second level outcomes are meaningfully correlated. Valence, as hypothesised in hypothesis 4, varies among individuals. Despite most of the previous theoretical constructs of the concepts expectancy, instrumentality and valence are confirmed, the theoretical construct of force could not be confirmed. This lowered the accuracy of the expectancy theory and hence led to the rejection of hypothesis 7a. That force was not informative enough can be explained by a lack of predictive power in the combination of the concepts, partially because the expectancy of goal attainment was overestimated by the participants, especially in case of benchmark Frank. This indicates that the theory as presented by Vroom (1964, 1995) is likely not valid. Another possibility is that the task used in the experiment is not appropriate to measure and predict performance, although this seems unlikely given the results of the predictions of goal setting theory.

With respect to goal setting theory, the results of hypothesis 5 support that persistence is a positive mediator in the goal-performance relation in a moderate and hard goal context. Results find some support for intensity as a positive mediator, making this relation plausible. Hypothesis 6 has mixed support. Task strategy, perceived own ability, and perceived relative ability all have some direct explanatory effect. However from these ability measures, only task

strategy has some significant interaction in explaining performance. Therefore this relation is deemed plausible. This difference can be due to most of the variation already explained by the direct effects. Hypothesis 6 is further supported by a significant positive interaction of commitment to the goal-performance relation in a moderate and hard goal context. Hypothesis 7b is supported by the results, indicating that goal setting theory is satisfactory accurate in predicting performance in moderate and hard goal contexts. In addition, it indicates that the goal setting theory prediction that performance is higher in the hard goal context compared to the moderate goal context is supported. When controlling for the moderators and mediators, it is supported that goals influence the goal-performance relation themselves.

Hence the research questions with respect to both motivational theories can be answered. This research showed that regarding RQ1 the concepts expectancy, instrumentality, and valence, have significant value, but the interaction resulting in a force value that can predict behaviour is not supported. Also with respect to goal setting theory most of the hypothesised relations were either plausible or supported. Persistence is a mediator to the goal-performance relation. Furthermore, this relation can be influenced by task strategy and is influenced by commitment, as positive moderators. Finally, the theoretical construct that goals themselves have a significant influence on performance is also supported. Regarding RQ2 with respect to expectancy theory, the research shows that expectancy theory has little predict power. On the contrary, goal setting theory is supported in its accuracy to predict performance while controlling for the moderators and mediators. So in comparison with expectancy theory is goal setting theory the most accurate motivational theory.

5.2 Contribution

The results are in line with previous findings that question the validity of the expectancy theory. For example House *et al*. (1974) found that support for the validity is mixed. Connelly (1976) and Van Eerde and Thierry (1996), among others, state that some research is performed in a different manner than the original formulation. The current research went back to Vroom's original formulation and took into account many suggestions from previous research, but the results were similar. This research likewise finds evidence for the concepts expectancy, instrumentality, and valence within the expectancy theory but the concept of force seems of very little value (e.g. House *et al*., 1974; Van Eerde & Thierry, 1996).

This research that is very close to the original formulation adds to the understanding of researchers that even the original formulation is likely not valid. This research indicates that the

main problem with expectancy theory is in the concept of force, while the other concepts have added value. Employers can use the expectancy of target attainment, the instrumentality between performance and rewards, and the valence of these rewards to create a deeper understanding of human behaviour in work related settings. Especially expectancy can be overestimated, whereby overconfident employees can engage in more risk taking or overinvesting that could have harmful consequences (e.g. Ben-David, Graham & Harvey, 2013; Malmendier & Tate, 2005). Making expectancies more realistic could mitigate this problem. This research further confirms that research has drifted away from expectancy theory in a search for more valid and accurate motivational theories, such as goal setting theory.

The present research adds to the growing body of evidence that supports goal setting theory. Taking into account the moderators and mediators, performance is indeed positively influenced by a higher goal as claimed by for example Locke and Latham (2013, 2015). However some remarks can be made. It is possible that this higher performance is due to higher risk taking for the participants with a higher goal, thereby increasing the chance of success but also of failure (Locke & Latham, 2013, p. 299). Since in case of the actual time only the participants with success are taken into account, this could inflate the effect of the higher goal itself. The present research also raises the question whether applying goal setting theory to work related settings does increase performance. Taken into account the moderators and mediators does not say much about the actual performance. A comparison between the performance measured in actual time shows no significant difference between the groups with either benchmark Frank or Simon[31]. The present research shows that not taking into account the moderators and mediators gives no increase in performance. When applying goal setting theory to a work related setting, Ordóñez, Schweitzer, Galinsky and Bazerman (2009) list several potential side effects. Including that goal setting theory can increase unethical behaviour, increase risk taking, create a narrow focus, and reduce intrinsic motivation. They also give several directions on how to mitigate these potential problems. Taking these directions into account in the application of goal setting theory could result in an increased performance.

5.3 Limitations and Future Research

This research has some limitations which suggest future research. As mentioned before it can be that the task used in the experiment is not appropriate to measure and predict performance.

[31] A Wilcoxon rank-sum test found no significant difference with respect to actual time within 8 minutes ($z = -0.099$; $p = 0.921$) and within 12 minutes ($z = -0.601$; $p = 0.548$) with respect to benchmark.

Since the predictions of the expectancy theory with respect to force were not accurate. Although this seems unlikely given the results of the predictions of goal setting theory.

In addition, students are used to test for the differences of the motivational theories expectancy and goal setting. It can be possible that other groups of participants have different behaviour that would result in different conclusions. An experiment was performed to control the environment to eliminate other effects than the aimed manipulation of the expectancy. However, it could have been that different groups would respond differently to the same treatment in the experiment.

Future research can control more extensively for the limitations mentioned above. It is possible that although controlling for differences between the groups, the groups were not the same after all. This might explain differences between the groups that were not related to the examined relations. Different age groups can be used to generalise the findings of this research.

The concept of force could be investigated in greater detail. Especially with respect to the weighting of the concepts expectancy, instrumentality, and valence. This might increase the accuracy of the expectancy theory.

In addition, this research can be applied to other tasks to check for potential differences in their conclusions. The current research used most of the questions from the questionnaire to answer the research question, although future research could use the results from the questionnaire in a variety of ways and to test multiple other relations.

The results show that some results are only significant in specific situation, with respect to either dependent variable or interaction variable. A closer examination is needed to further distinguish between relations in the specific situations.

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Appendix A: *Experiment*

Panel A: *Introduction - Decision making experiment*

BEEP: ☐ Last 4 digits of your phone number: ☐

Introduction – Decision making experiment

Introduction

Thank you for participating in this experiment. I, John de Jong, am a master student with a specialisation in Behavioural Economics at the Erasmus University Rotterdam (EUR). This experiment is part of my master thesis. In total it will take approximately 30 minutes of your time and you will have a chance to win €5,-.

I ask you to carefully read the instructions, give your answers truthfully and ask questions if something is unclear.

Personal information you might provide in this experiment will never be given to others. Your answers are confidential and will never be traced back to you. However, your results from the first and the second part of this experiment need to be linked and potential payment needs to be given to the correct participant. Therefore, **please fill out the last 4 digits of your phone number** in the top right corner.

Experiment

In part 1 of this experiment you will first receive information about the task you are going to do and average statistics regarding the time to solve a Sudoku. Before you will begin with part 2 you are asked to answer a series of questions. Just select what you think/feel. There are no right or wrong answers.

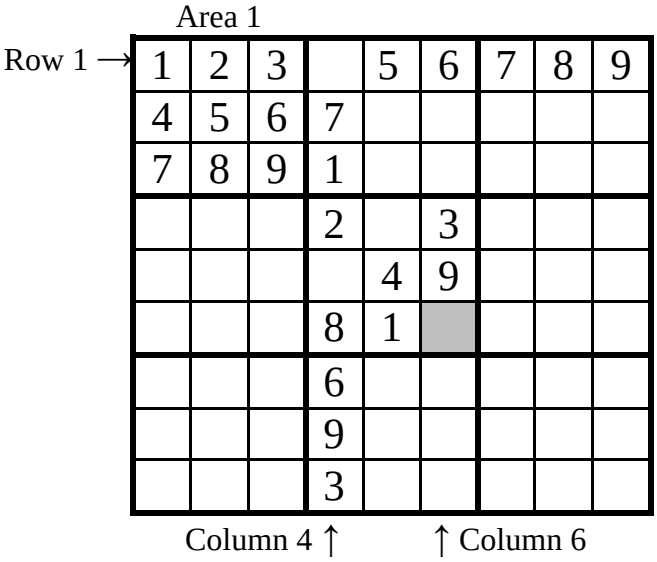
In part 2 of this experiment you are asked to perform the task. After this task you are asked to answer a few final questions. Here again, just select what you think/feel. There are no right or wrong answers. After the experiment potential payment will be given to you.

Below a short explanation of how to solve a Sudoku is presented. Because in this experiment you will have to solve a Sudoku puzzle. Please read these instructions.

Instruction Sudoku

On the right side you can see *Sudoku Example*. To successfully complete a Sudoku there is just one rule. In **every area, row and column** there needs to be 1, 2, 3, 4, 5, 6, 7, 8 and 9. There is **only one correct way**.

Sudoku example



In the example you can see that area 1 is filled out. In row 1 only one number is missing. After checking the numbers, this needs to be a 4. (You can fill in this 4.) Then, column 4 can be completed as well, since now there is only one number missing. (You can fill in the 5.)

In area 5 (the middle area) yet two numbers are missing. These are 6 and 7. However, in column 6 there is already a 6. So, the 6 cannot be in the grey cell, but the 7 can. (You can fill in the 7.) Then the 6 needs to be in the remaining empty cell in area 5. (You can fill in the 6.)

Sudoku practice

9	7		4	5		8	2	
5	3		8		6		1	4
8	4		3	7		9	5	

To the right in *Sudoku practice*, you can practice in just 3 rows in a bit more difficult setup.

(Please fill out this practice. To check your answers, you can see the *Sudoku practice solution* on the next page.)

Panel B: *Part 1 - Decision making experiment - Task description*

Task description

Imagine that you work for a company. You are asked to do a task (solve a Sudoku). This company wants you to work as fast as you can. Therefore, they use one of their other employees as a benchmark. You will be paired with a **fictive** co-employee, named **[Simon or Frank]**.

You have 12 minutes to complete the task. However, **[Simon or Frank]** completed the task in **8 minutes.** Your payment depends on (1) whether you complete the task faster than **[Simon or Frank]** and (2) chance (this is explained below).

To stimulate you to work hard, the company gives in total at random 10 bonuses of €5,- to the employees who beat [Simon or Frank]. So, if you beat [Simon or Frank], you will have a chance to win €5,-. For example:

If 20 employees beat [Simon or Frank], you will have a chance of:
10 bonuses / 20 employees = 1/2 = 50%
If 60 employees beat [Simon or Frank], you will have a chance of:
10 bonuses / 60 employees = 1/6 ≈ 17%

In total, there are three possible outcomes, which will be called/referred to as follows:

1. You can lose from [Simon or Frank] **Lose**
2. You can beat [Simon or Frank], but not get a bonus **Win^{-}**
3. You can beat [Simon or Frank] and get a bonus **Win^{+}**

Sudoku statistics

Since you need to solve a Sudoku in this experiment, an idea of the time that is needed to solve a similar Sudoku can be useful. Therefore, the statistics of 34 individuals who have solved a similar Sudoku are presented to your left. The average time to solve a similar Sudoku was 9 minutes and 58 seconds.

(Source: www.sudokuoftheday.co.uk September 9th 2016)

Sudoku time statistics

Difficulty	Similar
Total individuals	34
Min. time	4:41
Max. time	24:08
Average time	9:58

Summary:

- Available time: 12 minutes
- Benchmark: [Simon or Frank] **8 minutes**
- Bonuses: 10 bonuses of €5,- each
- To win a bonus: Beat [Simon or Frank] & random chance
- Possible outcomes: **Lose, Win^{-} and Win^{+}**

Please, continue with the Pre-experimental questionnaire on the next pages.

Sudoku practice solution

9	7	6	4	5	1	8	2	3
5	3	2	8	9	6	7	1	4
8	4	1	3	7	2	9	5	6

Panel C: *Part 1 - Decision making experiment - Pre-experimental questionnaire*

Pre-experimental questionnaire

Section 1 (of 6)

Please fill out the most correct answer		**0 – 24 hours**	**24 – 48 hours**	**3 – 7 days**	**8 – 31 days**	**32 - 365 days**	**>1 year**	**Never**
I solved a Sudoku in the last	---1---	❑	❑	❑	❑	❑	❑	❑

Section 2 (of 6)

In section 2, please respond to the statements. The numbers have the following meaning:

–3=Fully disagree, –2=Mostly disagree, –1=Somewhat disagree, 0=Neither agree nor disagree, +1=Somewhat agree, +2=Mostly agree and +3=Fully agree.

(The dotted line is only to help you to fill out your answers in the correct place.)

Please respond to the following statements		**Fully disagree**	**–3**	**–2**	**–1**	**0**	**+1**	**+2**	**+3**	**Fully agree**
I am very able in doing Sudoku's	---2---		❑	❑	❑	❑	❑	❑	❑	
I am better in solving Sudoku's than the average HBO/University student	---3---		❑	❑	❑	❑	❑	❑	❑	
I can influence my performance	---4---		❑	❑	❑	❑	❑	❑	❑	
If I try hard I can solve my Sudoku in less time	---5---		❑	❑	❑	❑	❑	❑	❑	
I expect to beat [Simon or Frank]	---6---		❑	❑	❑	❑	❑	❑	❑	
It is easy to beat [Simon or Frank]	---7---		❑	❑	❑	❑	❑	❑	❑	
I need luck to beat [Simon or Frank]	---8---		❑	❑	❑	❑	❑	❑	❑	
I need luck to get **Win**$^{+}$	---9---		❑	❑	❑	❑	❑	❑	❑	
I have to work very fast to beat [Simon or Frank]	--10--		❑	❑	❑	❑	❑	❑	❑	
I think I will end up **Losing**	--11--		❑	❑	❑	❑	❑	❑	❑	
When I beat [Simon or Frank], I have a reasonable chance to get **Win**$^{+}$	--12--		❑	❑	❑	❑	❑	❑	❑	
When I expect to **Lose,** I will try less hard	--13--		❑	❑	❑	❑	❑	❑	❑	

Section 3 (of 6)

In section 3, you can see a sentence with different words beneath it. Please fill in the words and respond. There is a difference in the meaning of the numbers:

–3=Strongly decrease, –2=Moderately decrease, –1=Weakly decrease, 0=Neither increase nor decrease, +1=Weakly increase, +2=Moderately increase and +3=Strongly increase.

Two examples are:
- When I **Win^{+},** my feeling of '*happiness*' will '*moderately increase*' = '*+2*'
- When I **Win^{+},** my feeling of '*anger*' will '*strongly decrease*' = '*–3*'

Please respond When I **Win^{+}**, my feeling of ……. will		**Strongly decrease**	**–3**	**–2**	**–1**	**0**	**+1**	**+2**	**+3**	**Strongly increase**
Pride	--14--		❑	❑	❑	❑	❑	❑	❑	
Luck	--15--		❑	❑	❑	❑	❑	❑	❑	
Pleasure	--16--		❑	❑	❑	❑	❑	❑	❑	
Satisfaction	--17--		❑	❑	❑	❑	❑	❑	❑	
Confidence	--18--		❑	❑	❑	❑	❑	❑	❑	
Fairness	--19--		❑	❑	❑	❑	❑	❑	❑	
Humiliation	--20--		❑	❑	❑	❑	❑	❑	❑	
Loss of time	--21--		❑	❑	❑	❑	❑	❑	❑	
Stress	--22--		❑	❑	❑	❑	❑	❑	❑	

Please respond When I **Win^{-}**, my feeling of ……. will		**Strongly decrease**	**–3**	**–2**	**–1**	**0**	**+1**	**+2**	**+3**	**Strongly increase**
Pride	--23--		❑	❑	❑	❑	❑	❑	❑	
Luck	--24--		❑	❑	❑	❑	❑	❑	❑	
Pleasure	--25--		❑	❑	❑	❑	❑	❑	❑	
Satisfaction	--26--		❑	❑	❑	❑	❑	❑	❑	
Confidence	--27--		❑	❑	❑	❑	❑	❑	❑	
Fairness	--28--		❑	❑	❑	❑	❑	❑	❑	
Humiliation	--29--		❑	❑	❑	❑	❑	❑	❑	
Loss of time	--30--		❑	❑	❑	❑	❑	❑	❑	
Stress	--31--		❑	❑	❑	❑	❑	❑	❑	

Please respond When I **Lose**, my feeling of ……. will		**Strongly decrease**	**–3**	**–2**	**–1**	**0**	**+1**	**+2**	**+3**	**Strongly increase**
	Pride	--32--	❑	❑	❑	❑	❑	❑	❑	
	Luck	--33--	❑	❑	❑	❑	❑	❑	❑	
	Pleasure	--34--	❑	❑	❑	❑	❑	❑	❑	
	Satisfaction	--35--	❑	❑	❑	❑	❑	❑	❑	
	Confidence	--36--	❑	❑	❑	❑	❑	❑	❑	
	Fairness	--37--	❑	❑	❑	❑	❑	❑	❑	
	Humiliation	--38--	❑	❑	❑	❑	❑	❑	❑	
	Loss of time	--39--	❑	❑	❑	❑	❑	❑	❑	
	Stress	--40--	❑	❑	❑	❑	❑	❑	❑	

Section 4 (of 6)

In section 4, please indicate what you think/feel. Here again the numbers have a different meaning: –3=Strongly undesirable, –2=Mostly undesirable, –1=Somewhat undesirable, 0=Neither desirable nor undesirable, +1=Somewhat desirable, +2=Mostly desirable and +3=Strongly desirable.

Please respond How **desirable/undesirable** are the following items/feelings:		**Strongly decrease**	**–3**	**–2**	**–1**	**0**	**+1**	**+2**	**+3**	**Strongly increase**
	Money (€5,-)	--41--	❑	❑	❑	❑	❑	❑	❑	
	Pride	--42--	❑	❑	❑	❑	❑	❑	❑	
	Luck	--43--	❑	❑	❑	❑	❑	❑	❑	
	Pleasure	--44--	❑	❑	❑	❑	❑	❑	❑	
	Satisfaction	--45--	❑	❑	❑	❑	❑	❑	❑	
	Confidence	--46--	❑	❑	❑	❑	❑	❑	❑	
	Fairness	--47--	❑	❑	❑	❑	❑	❑	❑	
	Humiliation	--48--	❑	❑	❑	❑	❑	❑	❑	
	Loss of time	--49--	❑	❑	❑	❑	❑	❑	❑	
	Stress	--50--	❑	❑	❑	❑	❑	❑	❑	

Section 5 (of 6)

In section 5, please fill out what you think/feel. The meaning of the options is presented in **bold**.

From the three possible outcomes:		**Lose**	**Win$^-$**	**Win$^+$**
My preferred outcome is	--51--	❑	❑	❑
My realistic outcome is	--52--	❑	❑	❑

From the following time periods:		**1-3 min.**	**4-6 min.**	**7-9 min.**	**10-12 min.**	**13+ min.**
My realistic goal time is	--53--	❑	❑	❑	❑	❑

Section 6 (of 6)

In section 6, please indicate which percentage comes closest to what <u>you think</u> the chance is to **Win$^+$**, to **Win$^-$** and to **Lose**.

From the following percentages		**5%**	**20%**	**35%**	**50%**	**65%**	**80%**	**95%**
The chance that I **Win$^+$** and receive **€5,-** is	--54--	❑	❑	❑	❑	❑	❑	❑
The chance that I **Win$^-$** and receive **€0,-** is	--55--	❑	❑	❑	❑	❑	❑	❑
The chance that I **Lose** and receive **€0,-** is	--56--	❑	❑	❑	❑	❑	❑	❑

Panel D: *Part 1 - Decision making experiment - Personal information*

Personal information

Please fill out/select your personal information. Again, your answers are confidential and will never be traced back to you.

Gender:	Male ❑	Female ❑
Age:		
City:		
Field of study: (please select one)	Economic ❑ Education ❑ Engineering ❑ Health ❑ Languages ❑ Law ❑	Arts ❑ Environmental ❑ IT ❑ Media ❑ Other ❑
Level:	HBO ❑	University ❑

You have reached the end of part 1.
Please remain silent, until the experimenter collects your papers.

Panel E: *Part 2 - Decision making experiment - Introduction*

BEEP: [ ] Last 4 digits of your phone number: [ ]

Part 2 – Decision making experiment

Please wait, do not turn this paper until the experimenter instructs you to do so!

Please take your (smart)phone and open your stopwatch application (do not use timer). After you have read these instructions, click on 'start' when you turn this paper. After you have finished you can stop your time. Please leave your phone on the table so your time can be checked.

Again, the most important parts of information are presented.
I ask you to carefully read the instructions, give your answers truthfully and ask questions if something is unclear.
Please fill out the last 4 digits of your phone number in the top right corner. To make it possible to link the part 1 and part 2 and to give potential payment to the correct participant.
In part 2 of this experiment you are asked to perform the task. After you have finished you are asked to answer a few final questions. Here again, just select what you think/feel. There are no right or wrong answers. After the experiment, potential payment will be given to you.

Summary:

- Available time: 12 minutes
- Benchmark: [Simon or Frank] 8 minutes
- Bonuses: 10 bonuses of €5,- each
- To win a bonus: Beat [Simon or Frank] & random chance
- Possible outcomes: **Lose, Win$^-$ and Win$^+$**

Whereby these possible outcomes stand for:

1. You can lose from [Simon or Frank] **Lose**
2. You can beat [Simon or Frank], but not get a bonus **Win$^-$**
3. You can beat [Simon or Frank] and get a bonus **Win$^+$**

Please wait, until the experimenter instructs you to turn this paper!
Start your stopwatch when you turn your paper.

Panel F: *Part 2 - Decision making experiment - Exercise*

	3						2	7
6		9	7				1	8
		4	3		1			
	4							6
8	9					5	4	
5		1			8			
9	1			4				3
4	7			1			8	9
2			5	9	7			

If you have finished you can stop your time. Leave your phone on the table so your time can be checked. Please remain silent and continue with the post-experimental questionnaire.

Panel G: *Part 2 - Decision making experiment - Post-experimental questionnaire*

Post-experimental questionnaire

Please fill out the following questions

I solved the Sudoku	--57--	❑ No	❑ Yes, in …… : ……. (min. : sec.)	
I have beaten [Simon or Frank]	--58--	❑ No	❑ Yes	
I achieved my realistic goal	--59--	❑ No	❑ Yes	❑ Maybe
I achieved my realistic goal time	--60--	❑ No	❑ Yes	

In the statements below, again –3=Fully disagree, –2=Mostly disagree, –1=Somewhat disagree, 0=Neither agree nor disagree, +1=Somewhat agree, +2=Mostly agree and +3=Fully agree.

Please respond		**Fully disagree**	**–3**	**–2**	**–1**	**0**	**+1**	**+2**	**+3**	**Fully agree**
It was easy to beat [Simon or Frank]	--61--		❑	❑	❑	❑	❑	❑	❑	
I performed very bad	--62--		❑	❑	❑	❑	❑	❑	❑	
The task was more difficult than I expected	--63--		❑	❑	❑	❑	❑	❑	❑	
I performed better than the average participant	--64--		❑	❑	❑	❑	❑	❑	❑	
I tried very hard to beat [Simon or Frank]	--65--		❑	❑	❑	❑	❑	❑	❑	
I gave up	--66--		❑	❑	❑	❑	❑	❑	❑	
This experiment cost too much of my time	--67--		❑	❑	❑	❑	❑	❑	❑	
I expect to **Win**$^{+}$ (get one of the bonuses)	--68--		❑	❑	❑	❑	❑	❑	❑	

Please respond Doing the Sudoku made me feel:		**Fully disagree**	**–3**	**–2**	**–1**	**0**	**+1**	**+2**	**+3**	**Fully agree**
Pride	--69--		❑	❑	❑	❑	❑	❑	❑	
Luck	--70--		❑	❑	❑	❑	❑	❑	❑	
Pleasure	--71--		❑	❑	❑	❑	❑	❑	❑	
Satisfaction	--72--		❑	❑	❑	❑	❑	❑	❑	
Confidence	--73--		❑	❑	❑	❑	❑	❑	❑	
Fairness	--74--		❑	❑	❑	❑	❑	❑	❑	
Humiliation	--75--		❑	❑	❑	❑	❑	❑	❑	
Stress	--76--		❑	❑	❑	❑	❑	❑	❑	

You have reached the end of part 2 and with it the end of this experiment. Please remain silent, until the experimenter collects your papers. Thank you for your participation!

Appendix B: *Explanation of used variables*

Below a list of the variables that are used in the analyses is included. It explains the name of the variable and where needed the related concept or meaning of the associated values.

Q1, Q2, … Qx		with x = 1/76, with the corresponding items from the questionnaire
Q1	=	changed in Q1o = Q1 original, and Q1r = Q1 reversed
Q6F	=	the expectancy of Q6 per participant with benchmark Frank
Q6S	=	the expectancy of Q6 per participant with benchmark Simon
Q5456	=	(Q54 + Q55) / (Q54 + Q55 + Q56) This expectancy variable is constructed by questions 54-56. It gives the expectancy per participant to beat the benchmark relative to the sum of their total expectancy.
Q5456F	=	the expectancy of Q5456 per participant with benchmark Frank to beat Frank relative to the sum of their expectancies.
Q5456S	=	the expectancy of Q5456 per participant with benchmark Simon to beat Simon relative to the sum of their expectancies.
Q57	=	split in Q57A, and Q57B
Q57A	=	whether the participants solved the Sudoku, with 0 = No, 1 = Yes
Q57A8m	=	whether the participants solved the Sudoku within 8 minutes, with 0 = No, 1 = Yes
Q57A12m	=	whether the participants solved the Sudoku within 12 minutes, with 0 = No, 1 = Yes
Q57B	=	the time to solve Sudoku (iff solved, otherwise missing value)
Q57B8m	=	the time to solve Sudoku within 8 minutes (otherwise missing value)
Q57B12m	=	the time to solve Sudoku within 12 minutes (otherwise missing value)
Q58	=	0 = No 1 = Yes
Q59	=	0 = No 1 = Yes 2 = Maybe
Q60	=	0 = No 1 = Yes
Benchmark	=	the benchmark of the participant, with 0 = Frank, 1 = Simon
Gender	=	the gender of the participant, with 0 = Female, 1 = Male

Study	=	the study direction of the participant, with 1 = Economics, 2 = Psychology, 3 = Other
Level	=	the study level of the participant, with 0 = University, 1 = HBO

Appendix C: *Output of regression analyses*

Panel A: *Ordered Logit regression model of expectancy (Q6)*

ologit Q6 Q1r Q2 Q3 Q4 Q5 Q7 **Number of obs = 127**

LR Chi2 (10) = 98.94

Prob > chi^2 = 0.000

Log lik. = -173.573 **Pseudo R^2 = 0.222**

Expectancy	**Coef.**	**SE**	**z**	**P>|z|**
Task strategy	0.310	0.132	2.35	0.019
Own ability	0.200	0.160	1.25	0.210
Relative ability	0.238	0.169	1.40	0.160
Control over performance	-0.021	0.139	-0.15	0.879
Control over time	0.614	0.173	3.55	0.000
Difficulty	0.872	0.164	5.31	0.000

Panel B: *Factorial regression model of performance (Q57A8m) and interactions with goals (Benchmark)*

Number of obs = 130 R-squared = 0.309

Root MSE = 0.372 Adjusted R-squared = 0.245

Source	Partial SS	df	MS	F	Prob>F
Model	7.294	11	0.663	4.80	0.000
Benchmark	0.153	1	0.153	1.11	0.295
Task strategy	0.880	1	0.880	6.36	0.013
Own ability	0.845	1	0.845	6.11	0.015
Relative ability	0.017	1	0.017	0.13	0.723
Intensity	0.091	1	0.091	0.66	0.420
Persistence	1.168	1	1.168	8.45	0.004
Task strategy# Benchmark	0.002	1	0.002	0.01	0.905
Own ability# Benchmark	0.003	1	0.003	0.02	0.878
Relative ability# Benchmark	0.005	1	0.005	0.04	0.848
Intensity# Benchmark	0.840	1	0.840	6.08	0.015
Persistence# Benchmark	0.362	1	0.362	2.62	0.108
Residual	16.314	118	0.138		
Total	23.608	129	0.183		

Panel C: *Factorial regression model of performance (Q57A12m) and interactions with goals (Benchmark)*

Number of obs = 130 R-squared = 0.393

Root MSE = 0.408 Adjusted R-squared = 0.337

Source	Partial SS	df	MS	F	Prob>F
Model	12.727	11	1.157	6.95	0.000
Benchmark	0.115	1	0.115	0.69	0.408
Task strategy	0.056	1	0.056	0.34	0.563
Own ability	1.820	1	1.820	10.93	0.001
Relative ability	0.141	1	0.141	0.85	0.359
Intensity	0.072	1	0.072	0.43	0.511
Persistence	5.631	1	5.631	33.81	0.000
Task strategy# Benchmark	0.402	1	0.402	2.42	0.123
Own ability# Benchmark	0.017	1	0.017	0.10	0.753
Relative ability# Benchmark	0.049	1	0.049	0.29	0.589
Intensity# Benchmark	0.410	1	0.410	2.46	0.119
Persistence# Benchmark	0.076	1	0.076	0.46	0.500
Residual	19.650	118	0.167		
Total	32.377	129	0.251		

Panel D: *Factorial regression model of performance (Q57B8m) and interactions with goals (Benchmark)*

Number of obs = 31 R-squared = 0.630

Root MSE = 1.112 Adjusted R-squared = 0.415

Source	Partial SS	df	MS	F	Prob>F
Model	39.953	11	3.632	2.94	0.019
Benchmark	5.194	1	5.194	4.20	0.054
Task strategy	13.056	1	13.056	10.56	0.004
Own ability	0.505	1	0.505	0.41	0.530
Relative ability	3.838	1	3.838	3.10	0.094
Intensity	9.884	1	9.884	8.00	0.011
Persistence	3.549	1	3.549	2.87	0.106
Task strategy# Benchmark	6.689	1	6.689	5.41	0.031
Own ability# Benchmark	0.197	1	0.197	0.16	0.694
Relative ability# Benchmark	2.026	1	2.026	1.64	0.216
Intensity# Benchmark	0.337	1	0.337	0.27	0.607
Persistence# Benchmark	0.260	1	0.260	0.21	0.652
Residual	23.487	19	1.236		
Total	63.440	30	2.115		

Panel E: *Factorial regression model of performance (Q57B12m) and interactions with goals (Benchmark)*

	Number of obs = 61			R-squared = 0.319	
	Root MSE = 2.094			Adjusted R-squared = 0.166	
Source	**Partial SS**	**df**	**MS**	**F**	**Prob>F**
Model	100.453	11	9.132	2.08	0.040
Benchmark	1.711	1	1.711	0.39	0.535
Task strategy	26.534	1	26.534	6.05	0.018
Own ability	8.153	1	8.153	1.86	0.179
Relative ability	0.006	1	0.006	0.00	0.971
Intensity	0.456	1	0.456	0.10	0.749
Persistence	0.057	1	0.057	0.01	0.910
Task strategy# Benchmark	0.132	1	0.132	0.03	0.863
Own ability# Benchmark	8.865	1	8.865	2.02	0.161
Relative ability# Benchmark	5.384	1	5.384	1.23	0.273
Intensity# Benchmark	1.649	1	1.649	0.38	0.543
Persistence# Benchmark	0.335	1	0.335	0.08	0.783
Residual	214.861	49	4.385		
Total	315.314	60	5.255		

Appendix D: *Calculation of force*

The force will be calculated individually for the outcomes Win+, Win–, and Lose in respectively Expressions 3, 4 and 5. In these expressions the variables are presented. They are clarified below each expression.

Expression 3:

$$F_{Win+} = (Q6 * (Q12 * (Q41 + Q14 * Q42 + Q15 * Q43 + Q16 * Q44 + Q17 * Q45 + Q18 * Q46 + Q19 * Q47 + Q20 * Q48 + Q21 * Q49 + Q22 * Q50)))$$

In Expression 3 the following items appear. Q6 the expectancy value of beating the benchmark. Q12 describes the correlation between beating the benchmark and attaining a bonus, that is the difference between Win^+ and Win^-. Q14 till Q22 are the instrumentality of the second level outcomes of Win^+. Q41 till Q50 are the valence of these second level outcomes.

Expression 4:

$$F_{Win-} = (Q6 * (0 * Q41 + Q23 * Q42 + Q24 * Q43 + Q25 * Q44 + Q26 * Q45 + Q27 * Q46 + Q28 * Q47 + Q29 * Q48 + Q30 * Q49 + Q31 * Q50))$$

In Expression 4 the following items appear. Again, Q6 is the expectancy value of beating the benchmark. Q23 till Q31 are the instrumentality of the second level outcomes of Win^-. Q41 till Q50 are the valence of these second level outcomes.

Expression 5:

$$F_{Lose} = ((1 - Q6) * (0 * Q41 + Q32 * Q42 + Q33 * Q43 + Q34 * Q44 + Q35 * Q45 + Q36 * Q46 + Q37 * Q47 + Q38 * Q48 + Q39 * Q49 + Q40 * Q50)))$$

In Expression 5 the following items appear. As explained above, Q6 is the expectancy value of beating the benchmark, so the subjective chance of losing is one minus this chance. Q32 till Q40 are the instrumentality of the second level outcomes of Lose. Q41 till Q50 are the valence of these second level outcomes.