# Controlling decisions

## Causes, risks, signals and controls of decision traps

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# Contents

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# Management summary

The amount of money lost because of poor decision making is huge. The problem is that poor decision making is not very visible. This makes it hard to get the problem on the corporate agenda. This is why the central problem of this dissertation is to find a way to detect poor decision making.

The problem of poor decision making is very broad. Politics, sociological factors, group processes and incentive structures are just examples of the factors influencing decisions. In this study the problem has been limited to the factors which influence our decision making unawarely. These factors are called decision traps.

There are a lot of decision traps. Well over 200 have been given a name. There are several taxonomies which aim to structure them into a framework, heuristics being the best known. The problem with these taxonomies is that they do not explain the cause of the traps. The theories which can provide the causes, like evolution, provide no cues on how to address the problem in a business environment. For this reason a taxonomy has been created which combines previous research into a framework which has four primary causes of decision traps. These causes provide cues on how to address the resulting decision traps.

The four primary causes are memory distortion, problem simplification, learning by experience and regret aversion. In the empirical part of this study the decision traps have been discussed with experts in decision making: business consultants, strategic advisors and others who have witnessed decision making in several organizations. They provide the reality-check and the result is a list of decision traps which indeed occur in reality. Each trap is accompanied by the risk factors and the signals which point to the trap manifestating itself.

Finally the controllers question is off course what can be done to prevent or correct decision traps. Literature as well as empirical

research does give some suggestions which have been summarized in the final chapter of this dissertation.

The result of this study is a checklist, a set of controls and a lot of work. The checklist comes in a format well known to controllers and auditors. The controls are new instruments as well as expansions or alterations in existing instruments. Finally, the work comes in the form of three hypotheses.

## Checklist

First, a checklist is presented which may be used to find out how vulnerable an organization is for decision traps. The checklist presents risks and signals which may be used by the controller to raise awareness of decision traps in general and the ones the organization is most vulnerable to in particular.

| **Trap cause** | **Decision trap** | **Risk** |
|---|---|---|
| Memory distortion | Recency Effect | Information on some aspects of the decision is available later |
| | Isolation effect | Decision is taken in response to critical event |
| Problem simplification | Ignoring small probabilities | Budgeting<br>Formatting of small probabilities as percentages instead of expected number of cases |

| Trap cause | Decision trap | Risk |
|---|---|---|
| | De-escalating commitment | Budgeting, especially budgeting costs but not results<br>High visibility of costs |
| | Focusing | Low experience of decision maker |
| Experience based learning | Base rate neglect | Not comparing results with peer group |
| | Clustering illusion | Strong opinions, emotions or ideas |
| | Optimism bias | Absence of second-opinion-counterpart with sufficient knowledge |
| Regret aversion | Procrastination | Blame culture and low trust environment<br>Low or invisible costs of not deciding<br>Accountability, a.o. SMART-targets<br>Absence of clear goals<br>Male decision makers |
| | Frame blindness | Low education of decision maker<br>Action-promoting-culture |

| Trap cause | Decision trap | Risk |
|---|---|---|
| | Escalating commitment | Blame culture<br>Group decision making<br>Large organizations<br>Lack of knowledge at the budget-approving level<br>Technology-driven product development<br>High profits<br>Few new employees |
| | Confirmation bias | Group decision making |
| | Omission bias | Decision affects people<br>Decision maker has strong moral opinions |
| | Congruence bias | Information on some aspects of the decision is available earlier |

| Trap cause | Decision trap | Signal |
|---|---|---|
| Problem simplification | Ignoring small probabilities | Not analyzing small probability / high impact scenario's |
| | De-escalating commitment | Less hiring of consultants at the end of the budget period<br>Low customer- or employee satisfaction |
| Experience based learning | Optimism bias | Ambiguity in statements, agreements or promises<br>Low or declining customer satisfaction |
| Regret aversion | Overconfidence | Group culture<br>No or very few external advisors<br>Low customer satisfaction |
| | Frame blindness | Recurring problems |
| | Escalating commitment | Increasing budgets<br>Low customer/employee satisfaction |
| | Confirmation bias | Missing alternatives and downsides |

## Controls

As soon as awareness has arrived, the call for controls will follow. This research shows that there are four groups of controls available: allowing failure, creating awareness, generating feedback and promoting exploration. Allowing failure is about handling budgeting and accountability. These instruments are designed to guide decision making but they seem to be used to blame people for bad results. Or at least: that is what people think they are used for (which does not alter the effect). The budgeting and accountability-controls need expansion. The focus has to shift from costs to results. Furthermore they need to incorporate the rewarding of trying. If not, they hamper innovation and progress.

Promoting exploration seems to address the same point, but it is also about identifying risks. The key point is to be aware of the frame that is used and to think “out of the box”, i.e. to use other frames. Creating awareness and generating feedback are methods to improve decision making by educating decision makers, either through information on the process of decision making or through information on the results of their decisions (taking into account the difference between poor decisions and poor results).

## Hypotheses

An important conclusion of this study is that it is merely a first attempt at getting decision making in control. The checklist presented is helpful and certainly better than nothing, but I have no doubt that it is incomplete and easily improved.

This improvement may be found by further researching the hypotheses which have been put forward in this study.

The first hypothesis is that decision traps can be explained by the simple fact that we learn by forming hypotheses on the basis of our own experience. This experience is biased by our recollection and our wish to find a cause and be in control. Once we have formed a

hypothesis we seek to confirm it, instead of falsifying it. And then, once we have accepted our hypothesis, regret aversion locks us into it when evidence to the contrary emerges.

The second hypothesis is that the checklist on the previous page holds and does indeed show the risks and signals of decision traps. The third and last hypothesis is that management controls may be found in allowing failure, creating awareness, generating feedback and promoting exploration.

# 1. Introduction

This study has started years before I realized it. In my bookcase there were books on this subject which I had long forgotten about. During my studies General Economics I more than once told people that economics was not about money but about making choices. And in my professional history I have witnessed a lot of decision making which often made me think about what motivated people. Personal objectives, company politics and negotiation preparation do explain a lot, but sometimes I was left wondering.

It was only when I started looking for a subject for the dissertation for the Master of Finance and Control study in Maastricht, that I stumbled over the subject again. A column in the Financial Times[1] mentioned some decision traps and why they were occurring. For me this was the start of an exploration into the psychology of choice and the start of an attempt to use this knowledge in the controllers' function, which in my opinion is much broader than the financial figures people usually associate with it.

But off course, a dissertation for a Finance and Control study has to start with some figures. After all, that is what businesses expect from controllers: saving costs. Luckily enough, there is ample opportunity to save costs when it comes to decision making. Like AT&T showed with avoiding just one decision trap, increasing bottom line results with 137 million dollars each year[2].

In a recent survey amongst 300 corporate decision makers three out of four said that poor decisions had had significantly to alarmingly degrading effects on the performance of their company[3]. Decision making clearly is an area with room for improvement.

The question is why, with all research on decision making and all instruments and trainings available, this room for improvement still

1 Dobson and Donkin, *When alarm bells ring*, in: Financial Times 6-4-2006
2 Schoemaker and Gunther (2005), p. 2
3 BPM Forum, p. 13

exists. One answer might be the relative invisibility of poor decision making. It is difficult to notice room for improvement if the decision making process is not monitored. But even if monitored, how should the decision making process be judged?

Two different strategies may be chosen. The first one is to describe the optimal decision making process. All deviations from this process must then leave room for improvement. The second one is to describe all problems which may arise in the decision making process. Any problem observed is then an opportunity to improve decision making.

Both strategies have their drawbacks. A single optimal decision strategy is, given the wide range of decisions from everyday simple questions to once in a lifetime major choices, hardly feasible. A complete list of all problems which may be encountered while making decisions is likewise unreachable. There will always be another reason why a decision was made poorly.

However, the first strategy implies that the problem of bad decision making is recognized in the first place. Given the answers of the 300 decision makers mentioned earlier this is at least questionable. If broadly recognized then why is poor decision making so common that it degrades performance significantly in over three quarters of all companies?

For this reason the focus of this dissertation is to find ways to detect and reveal poor decision making. If the business controller has the instruments to show the existence of poor decision making, the first step in the improvement of decision making may be set.

The first question is: what is poor decision making? A decision may be considered poor because the results turn out to be disappointing. Another reason why a decision may be considered poor, is because it can not be explained to other parties involved. Many decisions require legitimating and the inability to provide a legitimation is generally considered proof of a poor decision.

For the purpose of this dissertation poor decision making will be defined as the unstructured business decision making process in

which steps are unawarely either ignored, postponed or completed on the basis of lacking or biased information or motives.

The first limitation in the definition is the limitation to unstructured business decisions. Although many of the decision traps described in this dissertation apply to personal decisions as well, the focus is on business decisions since those are within the scope of the controllers function.

The business environment implies that one or more organizations and several persons are involved or at least observe and judge the decisions being made. This interaction influences the decisions being made and is thus part of the subject of this dissertation. However, this interaction is rarely unaware so the majority of these influences will not be covered.

Unstructured decisions are decisions in which the factors to be taken into account and the information needed have yet to be discovered. The taking of routine decisions by following procedures may be considered the implementation of a set of taken unstructured decisions.

The second limitation in this definition is the limitation to the process. In this definition a good decision making process may lead to a poor decision in the sense that the decision turns out to deliver disappointing results or may be hard or impossible to legitimate to stakeholders[4]. A disappointing result or a conflicting point of view on the ethics of a decision are not considered signals of poor decision making.

The third limitation is unawareness. There are countless situations in which the decision making process is influenced by personal motives like budgets, bonuses, personal power or other incentives. To the decision maker these factors are valid factors in the comparison of

[4] E.g. in a fraud-example: a decision maker may calculate the risk of being discovered and take the risk. This decision is obviously hard to legitimate, but the decision making process is not poor: the possibility and consequences of discovery were observed and taken into account.

alternatives and are taken into account (although probably not admitted so). This kind of agency-problems is not discussed here.

The fourth limitation is lacking or biased information or motives. The decision making process is considered poor if information or motives which influence the decision, are missing or not representing reality. This is the most important limitation since it restricts the scope of this dissertation to the decision making problems known as decision traps, biases, fallacies or illusions.

Decision traps are thus defined as biases which unawarely influence unstructured decisions. Since decision traps are unawarely influencing decisions, creating awareness may be a large step towards avoiding them. To do so the business controller needs instruments which asses the risk of decision traps occurring and signal their actual occurrence. This is the purpose of this dissertation.

# 2. Decision making

## 2.1 How decisions should be made

How decisions should be made is the subject of normative theory. These theories describe the process which has to be followed to make the best choice.

This type of decision theory started around 1750 with the question of how to gamble. Bernouilli answered this question with the expected value model[5]. This model bases the decision on the comparison of the products of probability and payoff. The best gamble is the one with the highest probability-payoff-product. A variation on this model is the Markowitz-model in which the expected value is corrected for the standard-deviation of the probabilities. In this model an individual outcome is valued higher if the probability of that outcome is more certain.

The expected value model was soon adapted to the expected utility model, which used the utility of the payoff instead of the payoff itself. The rationale is that the utility may not be equal to the payoff. The disutility of losing a sum of money might be higher than the utility of winning an equal amount of money, which explains why people buy insurance, given that the expected value of any insurance contract is negative. The disutility of the low probability severe loss is considered larger than the disutility of the certain loss of small premium-payments.

Bayesian models are the next step. In these models the probabilities are subjective rather than objective. It is not the actual probability that the decision maker uses, but the perceived or estimated probability. Gigerenzer showed that the use of subjective probabilities is valid when relative frequencies are used, but not

[5] Beach and Connolly (2005), p. 51

when unique events are considered[6]. In the case of unique events the probability estimates do not conform to the mathematics of probability, e.g. because the sum of the chance of something happening and the chance of something not happening is far less than 1.

Another adaptation of the normative models is the concept of bounded rationality, introduced by Simon[7]. Since it is impossible to incorporate all possible "states of the world" and all possible effects of a decision into a decision making process, the factors taken into account when making a decision are limited to a decision space which has boundaries. This means that when we decide whether or not to release a butterfly we do not take into account the possibility that a flap of its wings may eventually lead to a hurricane.

The concept of bounded rationality is an adaptation which brings the process of decision making into the picture. This process-part of decision making theory is generally believed to start when Dewey stated that problem-solving follows five steps[8]:

1. a felt difficulty;
2. definition of the problem;
3. suggestion of possible solution(s);
4. development by reasoning of the bearings of the suggestion(s);
5. further observation and experiment leading to its acceptance or rejection.

As an alternative or elaboration of Dewey's steps different frameworks have been proposed by different authors, basically varying the number of steps. Of these frameworks, Simon's phases intelligence, design and choice, is one of the best known. In his three phases Simon combines Dewey's first two steps into the intelligence phase and the third, fourth step and part of the fifth step into the design phase. The acceptance or rejection of a solution is in Simon's model the choice-activity.

6 Beach and Connolly (2005), p. 73
7 Beach and Connolly (2005, p. 10
8 Dewey (1910), p.72

All of these frameworks are sequential. They consider the decision steps to be logically following each other.

In reality the decision making process rarely follows the steps sequentially, and equally rarely results in a decision based on expected (subjective) utility. This brings us to the next paragraph which concerns the actual decision making process. This is the realm of descriptive theories.

## 2.2 How decisions are made

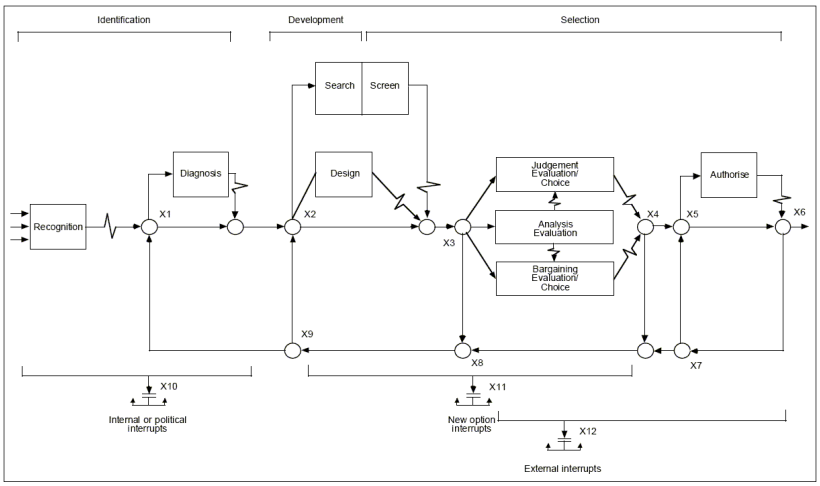
In 1972 Witte concludes, based on empirical research, that the steps actually taken in decision making processes are not sequential but rather parallel. His conclusion is that “human beings cannot gather information without in some way simultaneously developing alternatives. They cannot avoid evaluating alternatives immediately, and in doing this they are forced to a decision”[9].

In 1976 Mintzberg, Raisinghani and Theoret present a non-sequential model. This model consists of Simon’s three phases which are subdivided into routines. Cycling between routines or phases is an essential part of the model. The model is shown in figure 2.1.

The model of Mintzberg, Raisinghani and Theoret concerns the process for a single decision. Since the subject of this dissertation is the decision making process in organizations, involving multiple simultaneous and sequential decisions, an additional routine is necessary: the evaluation routine. This routine concerns the evaluation of the decision-making process, which enables an organization to learn from previous decisions.

[9] Witte (1972), p.180

**Figure 2.1 The general model of the strategic decision process**




Source: Mintzberg, Raisinghani and Theoret (1976), p.266

### 2.2.1. Decision Recognition Routine

The decision recognition routine is the first step in any decision making process. It is the discovery of a problem or better the emergence of an opportunity to decide.

This routine may take seconds or ages. How long it actually takes depends on two factors:

1. the level of accumulated stimuli
2. the level of the action threshold

The level of accumulated stimuli is dependent on, amongst others, the authority of the origin, the recentness of the stimuli and the associated uncertainty. Mintzberg et al. hypothesize that the level of accumulated stimuli will diminish over time, while reinforcement of stimuli by other stimuli will increase the level of accumulated stimuli. Research on memory effects, like the recency effect and the spacing effect, supports this hypothesis[10].

[10] See p. 43

One important stimulus is the match. This happens when a solution meets its problem or vice versa. The recognition routine may remain dormant when a problem with no apparent solution is seen, or when an idea is suggested which does not solve any current problems. As soon as a possible solution or a problem which the idea does solve emerges, there is a strong stimulus to start the decision making process.

Whether the decision making process is actually started depends on the level of the action threshold. As soon as the level of accumulated stimuli exceeds the level of the action threshold, the decision making process is started.

Question is: what determines the level of the action threshold? Radomsky[11] found the following factors to be determinants of the threshold level:

- manager's workload
- number of active decision processes
- type of active decision processes

Klein[12] points to experience as another factor in the setting of the threshold level: a case description of an experienced nurse and a trainee shows the importance of pattern recognition in the accumulated stimuli. Although both nurses had seen the same stimuli, the experienced nurse noticed a familiar pattern and identified the situation as a problem, whereas the inexperienced nurse did not.

Klein found in his case studies that "problem detection stemmed from the realization that the actual situation was ominously different from the one that the person initially believed. A considerable amount of expertise is needed in order to make sense of the data received ....". In this model it is not a slowly narrowing gap between accumulated stimuli and threshold level like both Radomsky and

[11] The thesis or Radomsky (*The Problem of Choosing a Problem*, MIT, 1967) is unpublished, the determinants shown here are mentioned in Mintzberg et al (1976), p. 254

[12] Klein et al. (2005)

Cowan[13] suggest, but rather a sudden pattern recognition in the accumulated stimuli. This sudden recognition is only possible if someone is prepared and able to reframe of the situation.

Another factor Klein adds is attention. If attention is focused on certain tasks signals that are not related to this task may be completely missed.

### 2.2.2. Diagnosis Routine

The purpose of this routine is to clarify and define the issues. Mintzberg et al. state that finding information and sources is the core activity, but goal clarification is equally important. It may be argued that goal clarification is the core activity, which calls for some information finding.

According to Drucker the attention to goal clarification is an important difference between Japanese and American decision makers. In Japanese decision making much emphasis is placed on attaining consensus about the need for a decision and the subject of the decision, whereas in American decision making attention is focused on the answer to the question. “The Japanese process is focused on understanding the problem. The desired end result is certain action and behaviour on the part of people. This almost guarantees that all the alternatives will be considered. It rivets management attention to essentials.”[14]

### 2.2.3. Search Routine

The search routine focuses on finding existing solutions to the defined problem. Four types of search behaviour are distinguished:

| | |
|---|---|
| passive search | Waiting for information to present itself. Passive search requires a mind to be open to information. This might be the result of a recognized problem |

[13] Cowan (1986)
[14] Drucker (1971), p. 112

| | |
|---|---|
| | waiting for a solution to present itself or an idea waiting for a problem to solve. |
| memory search | The scanning of the organization's memory, whether in paper, digital or human form. |
| trap search | Letting others known that a solution to a problem is sought. |
| active search | The direct search for alternatives. There are several search techniques such as breadth-first, hill climbing, backward chaining, operator subgoaling and progressive deepening[15]. |

Mintzberg at al. find a hierarchy in search types likely: "There is considerable support for the contention that search is a hierarchical, stepwise process. In general, one would expect the decision maker to begin with memory and passive search, and some convenient forms of trap search as well."[16]

### 2.2.4. Screen Routine

The screening routine is essentially about disposing infeasible solutions that were found in the search routine. Although modelled as a separate routine Mintzberg, Raisinghani and Theoret observe that in practice the screening routine is often incorporated in the search routine.

### 2.2.5. Design Routine

In Mintzberg's model the design routine is invoked if the search routine does not deliver sufficient solutions. The design routine may be used to adapt solutions found in the search step or may be used to create entirely new solutions.

There is a difference in the number of alternatives considered. Decision makers may be divided in two groups: those using a

[15] Cooper (2002), p. 128
[16] Mintzberg et al. (1976), p. 255

maximizing strategy and those using a satisficing strategy. The maximizing strategy consists of evaluating all available alternatives, estimating the probability a better alternative will present itself, and then choose either the best available alternative or wait for the better alternative to materialize. The satisficing strategy consists of a set of minimum requirements. The alternatives are evaluated one-by-one and discarded if one or more of the requirements are not met. If no alternatives meet all requirements, the decision maker waits until an alternative that does meet all requirements is found. Alternatively the decision maker may lower the threshold and choose an alternative that was rejected earlier. Note that satisficing may result in a suboptimal decision since the first alternative that meets the minimum requirements is chosen, even if a better alternative is "around the corner".

If the design-routine is used to adapt solutions found in the search routine, organizations typically develop more than one solution, while entirely new solutions are typically built using a progressive deepening process. In this process a number of possible solutions for an intermediate goal are compared, one is chosen and the same process is followed for the next intermediate goal.

Mintzberg et al. suppose that: "Apparently, because design of custom-made solutions is expensive and time-consuming, organisations are unwilling to spend the resources on more than one alternative. In contrast, the cost of generating extra alternatives during the search routine is small and when relatively little design is involved, as in modified solutions, organisations are prepared to fully develop a second solution to compare it with the first." [17]

The design routine necessarily uses creativity to generate possible new solutions. An understanding of creativity is thus needed to understand the design routine. There are several models which may explain creativity:[18]

[17] Mintzberg et al (1976), p. 256
[18] VandenBosch et al (2001), p. 111

- o Illumination (Wallas 1926)
- o Intuition (Glaser 1995)
- o Darwinian selection (Campbel 1960)
- o Bisociation, the combination of elements from unrelated domains (Koestler 1964)
- o Combination of individual, social and contextual characteristics (Woodman, Sawyer and Griffin 1993)
- o Cognitive and affective mechanisms (Vos and Means 1989)

VandenBosch et al. use a different approach in their article on the generation of ideas. They identify different approaches to the idea generation process which are based on the thinking styles of well known philosophers: Locke, Leibniz, Kant, Hegel and Singer[19].

In short the different styles may be described as follows:

| | |
|---|---|
| Locke | Lockeans are consensus-seeking decision-makers. New information is incorporated in the decision process if there is agreement on the correctness and relevance of the information. |
| Leibniz | These are experience-based decision-makers. Similar situations are used for guidance and familiar resources are used for information and advice. |
| Kant | Kanteans primary focus is on understanding the problem. To gain understanding a wide network of information sources is used. |
| Hegel | Hegelians seek the same understanding, but through internal debate. They use values, ethics, beliefs and emotions to assist the logic. |
| Singer | Singerians are continuously re-assessing the problem. They employ all systems of inquiry. |

VandenBosch et al. find most decision makers to be of the Leibnizian type: 26 out of 49 senior decision makers are Leibnizians. Among the other 23 were 6 Lockeans, 11 Kanteans, 2 Hegelians and 4 Singerians. The style of the decision making may be relevant to decision traps. It might e.g. be expected that a Leibnizian is more

[19] VandenBosch et al (2001), p. 114-115

vulnerable to frame blindness (see p. 58), while Kanteans might be more susceptible to the information bias (see p. 58).

### 2.2.6. Evaluation-Choice Routine

Evaluation and choice are usually seen as separate phases. In practice this does not seem to be the case: ”In the typical situation, evaluation and choice are inextricably intertwined”[20].

Mintzberg, Raisinghani and Theoret therefore combine the evaluation process and the choice process in one routine.

Within this routine they distinguish three different modes of evaluation-choice:

| | |
|---|---|
| Judgement | The choice is made individually, using an implicit decision model. |
| Bargaining | The choice is made by a group of decision-makers, each of them having their own goals. Each group member uses judgement to make his or her own decision. |
| Analysis | The evaluation is done by “technocrats”. The choices are made by the decision-makers, either by judgement or by bargaining. |

It follows that, although there are three different modes of evaluation-choice, in the end the choice is made using judgement. There are several theories about the process of judgement, expected utility, regret theory and prospect theory being the best known ones.

In expected utility the choice is based on the comparison of the sums of probability- and timevalue-weighted utilities of the outcomes of the considered alternatives. Although utility is not easily quantifiable, the process is in essence a strictly mathematical one. Given the probabilities of outcomes and the utility of outcomes, calculation is all that is needed to reach a choice.

[20] Mintzberg et al (1976), p. 258

Regret theory is an expansion of expected utility. In calculating the utility of outcomes, the anticipated regret of rejecting a better option is accounted for as alternative costs, the costs of not choosing the (next-)best option.

Prospect theory was presented by Kahneman and Tversky as an alternative to the expected utility theory, which they argue is not an adequate descriptive model of decision making. In prospect theory decisions are made in two phases, the editing phase and the evaluation phase[21]. In the editing phase alternatives are simplified and reformulated to ease later choice. E.g. a choice between an 80% chance of a gain of 300 and a 20% chance of a gain of 200 is simplified to a choice between an 80% chance of a gain of 100 and nothing. In the evaluation phase the choice between the simplified alternatives is made. Instead of using probabilities, deviations from the reference point are used to weigh the different outcomes.

Kahneman and Tversky show that the reflection effect[22] (see p. 54) can be explained by prospect theory. While doing so they conclude that “In many situations, however, the decision maker does not have the opportunity to discover that his preferences could violate decision rules that he wishes to obey. In these circumstances the anomalies implied by prospect theory are expected to occur”.

### 2.2.7. Heuristics

Tversky and Kahneman described the decision making process as a largely intuitive process which is guided by heuristics approach or “rules of thumb”. They identified three heuristics: representativeness, availability and anchoring[23]. Finucane later added the affect-heuristic[24].

[21] Kahneman and Tversky (1979), p. 274-275

[22] Risk aversion for positive prospects and risk seeking for negative prospects in the situation where the utility of both alternatives is the same. See Kahneman and Tversky (1979), p. 273

[23] Tversky and Kahneman (1974), p. 1124

[24] Finucane et al. (2000), p. 3

The representativeness heuristic is based on judgment by similarity, the basic idea being that if it walks like a duck and talks like a duck, it probably is a duck. This heuristic explains a.o. base rate neglect (see p. 48) and the clustering illusion (see p. 49).

The availability heuristic is based on ease of recall of similar events. Easily recalled events are judged to be more likely than other events, which causes the probability of e.g. flight disasters to be overestimated. This heuristic generates a list of biases like the recency effect (see p. 43) and the isolation effect (see p. 43).

The anchoring heuristic is based on the assumption that people make a random first assumption and adjust this assumption when more information is given. Adjustment continues until the value is in line with the new information. This adjustment process generally leaves the final estimate at the boundaries of the confidence interval which results in an estimate that is not the best estimate according to the information available, but is tilted towards the initial, random, assumption. This heuristic explains a.o. the disconjunction effect (see p. 72).

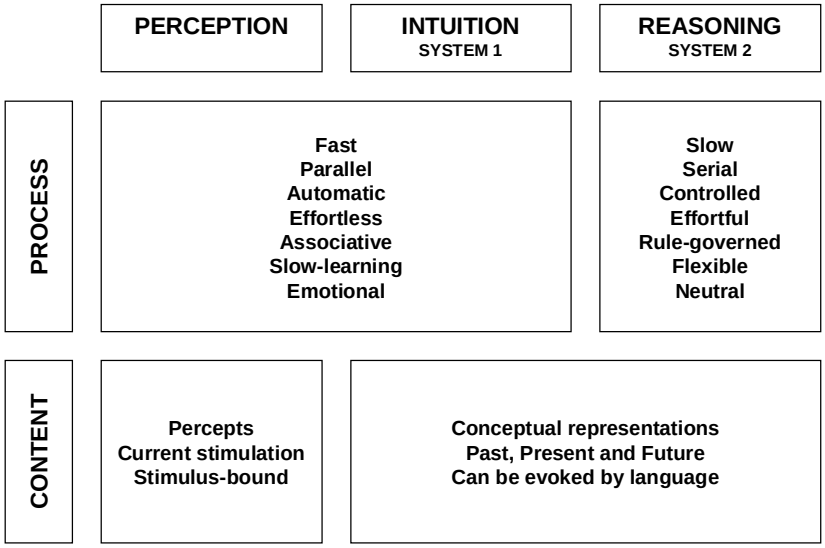
The affect heuristic is based on the first impression. Even when the intention is to decide strictly by reason, the first impression attaches affecttive information to the options which influences the subsequent decision. If e.g. a new car has to be chosen and the colour of the showroom car A is more to one's liking than the colour of showroom car B, car A is preferred over car B, even if they can both be delivered in the preferred colour.

In his Nobel Prize speech Kahneman presents a model of three cognitive systems to show the position of heuristics in decision making.

In this model decisions can be made either by intuition or by reasoning[25]. Intuitive decision making is an automated effortless process which is guided by heuristics.

[25] Reasoning may also be used to legitimate an intuitively made decision.

**Figure 2.2 Three cognitive systems**




Source: Kahneman (2003), p. 1451

Although many strategic decisions are probably made intuitively, one expects at least some reasoning to be involved. For this reason the heuristics approach seems less suited to strategic decision making. It may be a suitable approach for the first step in decision making though: the recognition routine is based on the initial intuitive decision whether a development is a problem or not. Heuristics probably play an important role in this decision.

The use of heuristics may lead, as Tversky and Kahneman have shown, to several decision traps. Heuristics are very efficient ways to take most of day to day decisions. However, they are shortcuts in the decision making process and thus there is a risk that a factor in the problem is overlooked. This may result in a decision that would have been otherwise, had the complete decision making process been followed.

### 2.2.8. Authorization Routine

Authorization of decisions is necessary if the decision maker does not have the authority to commit the organization to the decision. This is not an uncommon situation[26].

The authorization process is described by Mintzberg, Raisinghani and Theoret as a “binary process”: the proposed decision is either approved or rejected.

Since the authorization routine introduces a new decision maker this routine is a miniature decision making process in itself, and a stressful one given the limited amount of information and time available to the decision maker.

In organizational decision making authorization includes the synchronization of different decision-making-processes in the organization. While several decision processes may reach satisfactory decisions on the decision-makers level, the combined set of decisions may be unsatisfactory because the decisions counteract each other.

### 2.2.9. Evaluation Routine

Simon’s decision making model is one of the best known decision making models. It is usually quoted as consisting of the three phases intelligence, design and choice. Simon’s model actually consists of four phases, the fourth being the review-activity in which the decision maker evaluates past choices.[27]

Simon’s evaluation routine is added to the model by Mintzberg et al. to adapt the model from a single decision model to an organizational decision model. The evaluation routine consists of two parts: keeping track of outcomes of decisions and evaluation of decision processes.

[26] Mintzberg et. al. (1976) found about half of the decisions to be subject to authorization, see p. 259

[27] Simon (1977), pp. 40-41

## 2.3 Factors influencing the decision making process

The process of decision making is influenced by several factors, amongst which the level of uncertainty associated with the information used and the experience of the decision maker. These are factors that increase or decrease the likelihood of decision traps occurring.

### 2.3.1. Uncertainty

The level of uncertainty is generally divided in four different types: certainty, risk, ambiguity and ignorance.

In 1921 Frank Knight introduced the difference between risk, uncertainty and ignorance in his book Risk, Uncertainty and Profit: "The essence of the situation is action according to opinion, of greater or less foundation and value, neither entire ignorance nor complete and perfect information, but partial knowledge. If we are to understand the workings of the economic system we must examine the meaning and significance of uncertainty".[28]

This illustrates that there is no clear distinction between the four levels of uncertainty, it is more of a sliding scale with certainty on the one hand and complete ignorance on the other, having risk and uncertainty as in-between-types. The term uncertainty has proven to be confusing: it may be perceived as risk which is, in decision theory, not the same. Hence the term ambiguity is frequently used for decision making under uncertainty.

The four different levels are defined as:

Certainty — Each action is known to lead invariably to a specific outcome. An example of decision making under certainty is the decision whether or not to take your umbrella with you when it is raining.

[28] Knight (1921), VII.5

| | |
|---|---|
| Risk | Measurable uncertainty[29]. The different outcomes are known and the probability-distributions of these outcomes are known. According to Knight there is nothing uncertain about risk: “The fact is that while a single situation involving a known risk may be regarded as uncertain, this uncertainty is easily converted into effective certainty; for in a considerable number of such cases the results become predictable in accordance with the laws of chance, and the error in such prediction approaches zero as the number of cases is increased.”. An example of decision making under risk is the decision whether or not to take your umbrella with you when you know from the local weather report that there is a 20% rain-chance. |
| Ambiguity[30] | Immeasurable uncertainty. The different outcomes are known but (some of) the probability distributions are not known. An example of decision making under ambiguity is the decision whether or not to take your umbrella with you when you live in a dungeon and have no information at all on the actual or forecasted weather. |
| Ignorance | No or at least not all outcomes are known nor are the probability distributions[31]. An example of decision making under ignorance is the decision whether or not to take your umbrella with you when you lived in a desert up to now and have heard some stories about other weather states than clear blue skies in the place you are now. |

[29] Knight (1921), I.26

[30] First mentioned by Ellsberg (1961), p. 657

[31] This is a combination of total ignorance, described by Hurwicz (1951, p. 2) as “No element of [the set of possible states of nature] is more plausible than any other” and partial ignorance, described by Luce and Raiffa (1957, p.299) as ”some vague partial information concerning the true state”. Although the definitions mention known completeness of the set of possible states, the examples given include not known states: “He doesn’t have the faintest idea what to expect” (Luce and Raiffa (1957, p. 278)

In the case of certainty or risk, the decision may be logically derived. In the case of ambiguity or ignorance this is not possible. Luce and Raiffa[32] list several criterions mentioned in literature which may be used to decide in the case of ambiguity or ignorance:

- maximin. This method consists of determining the worst outcome each alternative may produce for a given set of "states of nature" and then choose the alternative which has the highest of these minimum-payoffs.
- maximax. This criterion is based on the best outcomes each alternative may produce. The alternative with the highest of maximum-payoffs is chosen.
- minimax risk. This method is based on a risk- (or regret-) table which is calculated by subtracting the outcome from each alternative from the best alternative for the given state of nature. Then for each alternative the highest level of risk (or regret) is determined and the alternative which has the lowest maximum regret is chosen.
- the Hurwicz-criterion. This is a weighted combination of maximin and maximax with the weight (α) determined by the level of optimism. The alternative with the highest α · maximin + (1- α) maximax is chosen.
- the principle of insufficient reason. This is a weighted combination of the outcomes of all alternatives with the weight determined by the likelihood of the scenarios. The title of the criterion refers to the absence of a rational reason to attach any other weight to the outcome of any scenario than the likelihood of its occurrence.

Amitai Etzioni uses an approach that focuses on the decision making process and describes two ways to copy with uncertainty or ignorance: "muddling through" and "go for it".[33] The muddling through strategy, a.k.a. incrementalism, is directed at taking small steps to "steer away from trouble" without a larger goal to steer at. This is a conservative strategy. The "go for it"-strategy is the bolder one, the

[32] Luce and Raiffa (1957) p. 278-286
[33] Etzioni (1989), p. 123

"just do it"-approach. This strategy does have a goal, but is also more likely to fail. Etzioni describes both ways as methods of despair and suggests an adaptation of incrementalism, called mixed scanning. This method consists of the selection of a goal, combined with incremental steps which are directed towards the selected goal.

The distinction between the levels of uncertainty - from certainty to total ignorance - is relevant to the probability of the occurrence of decision traps. In an article on decision making under ignorance Hogarth and Kunreuther conclude: "It is perhaps ironic that, under ignorance, when people should probably think harder when making decisions, they do not. In fact, they may be swayed by the availability of simple arguments that serve to resolve the conflicts of choice." [34] and: "Our results suggest that one-sided arguments or justificatory processes may be more likely to occur in situations of ignorance as opposed to risk. Under risk, explicit tradeoffs are salient. Under ignorance, decision makers are free to recruit arguments to support their intuitions and to ignore conflicting arguments." [35]

The conclusion is that the decision traps themselves may not differ, but the likelihood of the occurrence of decision traps seems to increase as uncertainty increases.

### 2.3.2. Experience and intuition

The role of intuition in decision making is an important one. As Damasio discovered[36], the part of the brain that handles emotional responses[37] is vital in the decision making process. Damage to this part of the brain results in an extreme maximizing strategy. This strategy calls for all alternatives to be explored. The missing emotional part of the brain does not limit the number of alternatives

[34] Hogarth and Kunreuther (1995), p. 32
[35] Hogarth and Kunreuther, (1995) p. 33
[36] Morse (2006) p. 44
[37] Or as Morse (2006) describes it: the dog-part of our brain, referring to three layers in the brain: the primitive brain which is shared by all animals including fish and reptiles, the limbic system, which is shared by mammals, and the cortex which is unique to primates.

being explored which leads to indecision. Apparently it takes emotion to draw the line between alternatives worth investigating and alternatives not worth that investment.

Bechara designed an experiment which shows the role of the subconscious in detecting patterns[38]. The subconscious reactions of the body demonstrate an awareness of a disfavourable pattern long before the conscious mind does.

It is this pattern recognition ability which is called the X-factor by Hayashi[39]. But in his article he does not attribute intuition to some ill-understood factor. Instead he quotes Simon: “Intuition and judgment are simply analyses frozen into habit”. And it seems the best intuition is the one that detects patterns across problem fields, called cross-indexing by Hayashi. This is essentially the mechanism suggested originally by Simon: “We observe that the subject compares the theorem to be proved with some theorems he knows - he looks for similarities and differences. These suggest subproblems whose solution may contribute to the solution of the main problem.”[40]

But in the end, it all stands or falls with the validity of the analysis frozen into habit. And the people making the best intuition-based decisions are very aware of this limitation. Hayashi mentions a high awareness of decision making traps in this group: they are monitoring their decision making process all the time, are willing to alter decisions and are able to make the distinction between intuition based on valid assumptions and intuitions based on invalid assumptions. Basically this is the framing question: is the way I feel or think about this problem fitting for this problem or is it induced by experience not quite applicable to this problem? The best combination thus seems to be experience and doubt, both in abundant quantities.

The idea can be visualized in Markova’s comfort-, stretch- and stress-zones model. In the comfortzone everything is familiar and

38 Morse (2006), p. 45
39 Hayashi (2001), p. 61
40 Simon (1977), p. 65

decisions are based on routine. In this zone the risk of overconfidence and framing is real because the routine obscures the sides of problems that do not fit the frame. Furthermore the history of comfortable decisions creates overconfidence. The stretch zone requires more effort. In this zone the problem needs to be studied because the decision maker can not rely entirely on routine. But his or hers experience ensures that the elements of the decision that are challenging are indeed recognized. It is exactly this what makes it a stretch zone decision. If the decision is too far away from experience, the panic zone is reached. Risks and opportunities will be overlooked and a poor decision is almost inevitable.

# 3. Decision traps

## 3.1 Traps, biases, errors, illusions and fallacies

Poor decision making has been defined as the unstructured business decision making process in which steps are unawarely either ignored, postponed or completed on the basis of lacking or biased information or motives. The different ways in which this kind of poor decision making may occur are also known as decision traps, biases, errors, illusions or fallacies.

The best known publications on decision traps are the book "Decision Traps" by Russo and Schoemaker[41] and the article "The Hidden Traps in Decision Making" by Hammond, Keeney and Raiffa[42]. They list the most important traps.

Russo and Schoemaker describe the following ten traps:

1. Plunging in. This is the skipping of the diagnosis routine, which may result in solving the wrong problem.
2. Frame blindness. A frame is a simplification of reality which helps the decision maker to understand reality. Most decision makers are not aware of the frame they use. This creates a problem if the frame used is outdated or simply wrong. Another problem this creates is that the decision maker assumes the complete picture is known. However, each frame focuses on different aspects of a problem, more or less hiding other factors.
3. Lack of frame control. Failure to apply different frames or letting other people's frames influence the decision too much.
4. Overconfidence. Failure to search information because the decision maker regards his or her assumptions and opinions as beyond doubt.
5. Shortsighted shortcuts. Assuming easily available information is the best or at least sufficient information.

[41] Russo and Schoemaker (1989), p. xvi-xvii
[42] Hammond et al (2006), p. 2

6. Shooting from the hip. Failure to systematically analyze information and priorities but instead making decisions using intuition. This lets non-relevant factors like the weather[43] influence the decision and causes relevant information to be overlooked.
7. Group failure. Assuming that the participation of a large number of intelligent people will automatically result in a wise decision.
8. Fooling yourself about feedback. Failure to assess feedback objectively or misinterpret evidence, for example to protect the belief in one's own personal characteristics as predictive of desirable results.
9. Not keeping track. Failure to systematically register and evaluate the results of past decisions. This prevents learning from previous decisions.
10. Failure to audit your decision process. Not evaluating one's own decision process leaves the decision maker vulnerable to decision traps.

Hammond, Keeney and Raiffa sum up nine traps:

1. Anchoring. Using the first (or most recent) information available as a point of reference for further elaboration of the problem. This reduces the number of considered alternatives by screening the alternatives which are relatively distant from the anchor.
2. Status quo. Change is generally perceived as troublesome. It requires effort and therefore maintaining the current situation has a cost advantage. Problem is that even when change requires relatively little effort, people still display a strong tendency to prefer the status quo.
3. Sunk cost. Letting past investments in time, commitment or money influence the decision on future investments.
4. Confirming evidence. Seeking supportive information to confirm a choice already made.

[43] Simonsohn (2007) demonstrated that the chances of admittance to a university increased by 11,9% if the application was read on a cloudy day, p. 150.

5. Framing gains versus losses. Decision makers tend to be drawn towards gains, even if the gain is only in the wording of the problem, not in the actual probabilities.
6. Framing with different reference points. People tend to evaluate gains and losses as a percentage of the reference point. Wording the problem in a way that increases the reference point results in a reduction of risk aversion.
7. Overconfidence. Underestimating the variance of factors influencing the decision. This leads to underestimating failure probabilities.
8. Prudence. Adjusting estimates to “be on the safe side”. This distorts the information used in the decision making process.
9. Recallability. Extreme events tend to be remembered better. This results in an overestimation of the probability of an extreme event. Also known as the availability trap.

The traps found by Russo and Schoemaker partly overlap with the traps found by Hammond, Keeney and Raiffa. Some traps seem to be another way of grouping the traps. The two framing traps reported by Hammond, Keeney and Raiffa fit in Russo’s and Schoemakers frame blindness trap and anchoring, the confirming evidence trap and the recallability trap fit in shortsighted shortcuts. One trap is named the same, overconfidence, but seems to refer to a different trap, not questioning presumptions vs. underestimating variance.

The combination of the two major publications on decision traps does by no means give the complete picture. Over a hundred different biases, fallacies, errors etc. can be found in literature[44].

The different traps are not limited to certain routines in the decision making process, although some are more likely in some steps than others. Certain routines in the decision making process like the diagnosis routine and the evaluation/choice-routine may however be particularly well suited to check for the occurrence of decision traps.

[44] An overview of a large number of these decision traps may be found on wikipedia in the article “List of cognitive biases”

## 3.2 An evolutionary explanation of biases

The existence of decision traps is widely observed. One might expect that the occurrence of decision traps would diminish over time by itself. After all, there is a disadvantage in taking a decision which leaves room for better results. One explanation is that decision traps do not leave room for better results: they lead to the best results in the sense that they are evolutionary optimal. Haselton et al. propose three mechanisms by which the evolution of humans has resulted in biases[45].

The first is heuristics. The use of a rule of thumb saves on effort spent on thinking and increases quickness of reaction. As long as the cost of the incidental error is less than the gain of the increased reaction and saved effort, the use of heuristics is an evolutionary advantage.

The second is error management bias. In a decision there are two possible errors: the error of doing something when you shouldn't and the error of not doing something when you should. It is likely that the results of both errors will be different. The consequences of the first error may be far greater than the consequences of the second error. Error management bias is the result of this difference in consequences. It is the bias towards the decision type that results in the less costly error. Because of this bias the error rate in the decision making process is increased but the total costs of decision errors are decreased[46].

The third is artifact. Haselton et al. use this term for the use of "natural" decision making strategies in "unnatural" circumstances. An example is the use of probabilities instead of frequencies. In real life we observe frequencies, not probabilities. If we toss coins we count heads and tails: 3 to 2. We do not recalculate the probability of heads with each toss. The use of frequencies is thus easier for

[45] Haselton et al (2005), p. 726
[46] This is also the conclusion of Foster and Kokko (2008), p. 1

humans than the use of probabilities and this results in calculation errors when we use probabilities instead of frequencies[47].

It is important to make a distinction between personal decision making and business decision making. The biases evolved in a personal decision making context. While in this context the bias proved to be the best way to reduce the costs of erroneous decisions, this may not be the case in the business context. E.g. the fear of unknown circumstances can very well be explained by the lower costs of avoiding situations where predators may lurk. The loss of possible food found is well worth avoiding the small risk of being food oneself. The resulting bias applied to business may however result in the avoidance of unknown markets, even though the cost of error is much smaller in this situation than in the evolutionary situation that created the bias.

In short, error management biases may be evolutionary optimal, in a business situation they are probably not.

## 3.3 A taxonomy of decision traps

The vast number of traps, biases, errors, illusions and fallacies calls for some structuring. The structure of heuristics seems to cover only part of the traps. The problem simplification created by heuristics can explain a lot of traps but seems less successful in explaining e.g. an important trap like overconfidence.

Heuristics is the best known taxonomy of decision traps, but there are more. Arnott[48] lists three taxonomies (and some partial ones) and adds his own:

1. Heuristics by Tversky and Kahneman. This taxonomy is based on the rules of thumb people appear to be using when making decisions.

[47] Haselton and Buss (2003), p. 27
[48] Arnott (1998), pp. 23-32

2. The information systems perspective by Remus and Kotteman. This taxonomy is based on the division between data presentation and data processing.
3. The human judgement model by Hogarth. This taxonomy is based on the stages of decision making: information gathering, information processing, deciding and evaluating.
4. Perceived similarity by Arnott. He distinguishes memory, statistical, confidence, adjustment, presentation and situation biases as “naturally emerging groupings”.

These taxonomies do classify decision traps but not by causal relationships. For the purpose of this dissertation a taxonomy by cause is more useful since causes may be addressed with remedies.

By combining research done on the different traps and their causes a taxonomy of decision traps can be made which add causal relations. This taxonomy is constructed on the basis of possible causes mentioned in articles on the different biases. Some articles mention other biases as sources of the studied bias, others mention more general human traits as causes.

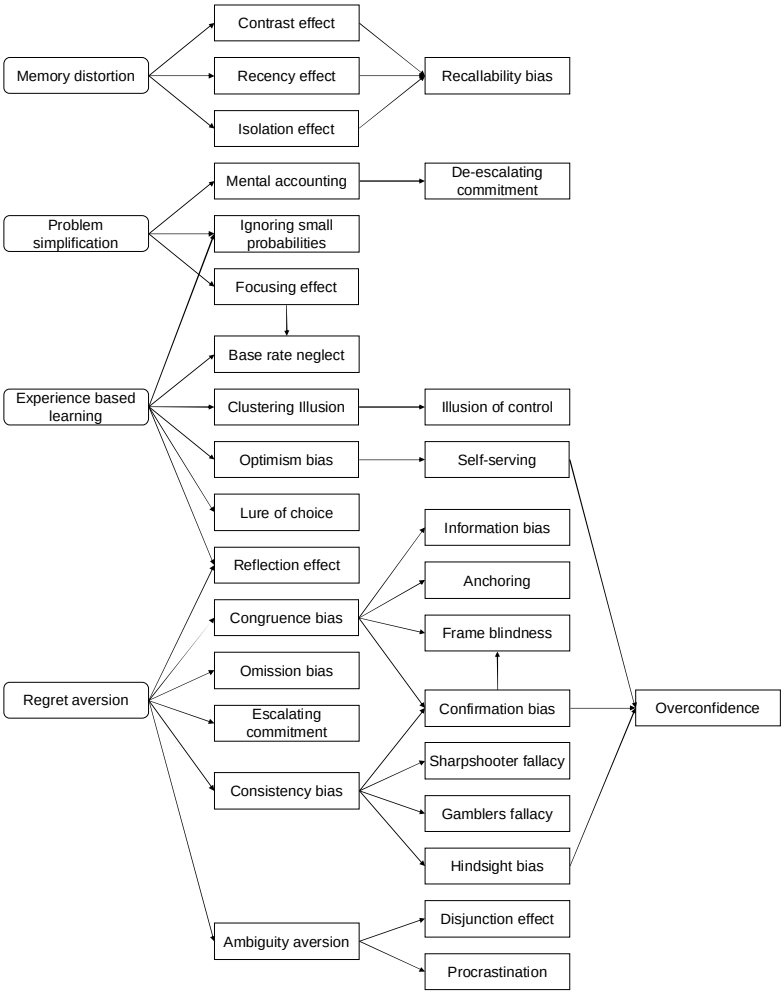
The combination of these hypotheses results in a taxonomy which has four main causes, several main biases and a lot of secondary biases. Problem simplification and memory effects, two basic effects in Tversky´s and Kahnemans heuristics-study, seem to be important causes of a lot of traps. Regret aversion explains another large part of the decision traps as well as the way people learn and reason. The primary biases these four main causes result in are well known biases. However, the best known biases - overconfidence, framing and anchoring - seem to be second- or third-order-biases.

The taxonomy might be useful in business controlling since some traps are more easily detected than others. If an easily detectable trap is observed, traps with the same cause might be expected to occur as well. Control measures should take these traps into account as well.

In the following paragraphs the taxonomy in figure 3.1 will be used to explain the traps mentioned as well as their relation to other traps or

main causes of traps. The list of traps discussed is by no means complete but is intended to contain the traps most commonly observed.

**Figure 3.1 Taxonomy of decision traps**



The relations in the taxonomy are based upon the possible causes mentioned in articles. They have not been tested in experiments, let alone observed in reality. A way to test the taxonomy experimentally is described in paragraph 3.8.

## 3.4 Memory distortion

Human memory is not like computer memory in the sense that it records data as they are registered and then leaves them unaltered. The strength of the imprint of an experience in memory is dependent on the emotion involved with the experience. The higher the emotion involved with the experience, the stronger the memory will be. This is why stressful events “seem like yesterday”. But with time, memory intensity decreases which is why “time heals all wounds”.

These effects have bias-names like recency effect, contrast effect and isolation effect. The result of these biases is that the weighing of information in memory is not equal. Recent, repeated and intense experiences have more influence on the decision, which may not be appropriate.

The recallability bias is the result of the memory effects. In heuristics the availability heuristic contains most, if not all, of the memory biases. Both the recallability bias and the availability heuristic imply that we use the information that is most easily available to us, in general the information that “springs to mind”.

The most important memory effects are listed below.

| | |
|---|---|
| Contrast effect | The enhancement or diminishment of a weight or other measurement when compared with recently observed contrasting objects. |
| Recency effect | Recent events are better recalled than earlier events[49]. |

[49] Gigerenzer offers an explanation for the recency effect in an example on base rate neglect (1991, p. 107). His explanation is that recent events are more informative about future events since it is possible that the environment has

Isolation effect — An item that is attracting attention is remembered better than other items[50]. There seems to be a counter-recency-effect. Worthen et al. observe that "the frequency of unusual events may become increasingly overestimated as time elapses between the actual occurrences and the subsequent judgment."[51] The peak-end rule found by Fredrickson and Kahneman may be a form of the isolation effect. This rule is shown in an experiment with series of loud noises: "the series of discomfort ratings 2-5-8-4 (indicating four 5-min episodes ending with an episode with a discomfort rating of 4) was reliably judged as less aversive than the series 2-5-8, although the only difference between the two episodes is that the latter includes 5 min fewer of discomfort." [52]

There are a lot more of these memory effects, but the general idea is that we can't trust our memory. At best our memory of events is a small part of the complete picture, and a part which has been photoshopped extensively.

## 3.5 Problem simplification

In order to understand problems they need to be simplified. To grasp a problem in all its detail and complexity would require far too much time and effort, even for the simplest of decisions.

changed. A change in environment renders the historic probabilities useless. The older the historic information is, the higher the probability of changed environments and therefore the lower the value of the information.

50 This effect also includes the perception of time slowing down during a frightening event. Stetson et al. (2007) conclude that: "time-slowing is a function of recollection, not perception: a richer encoding of memory may cause a salient event to appear, retrospectively, as though it lasted longer."

51 Worthen et al (2002), p. 223

52 Fredrickson and Kahneman (1993), p. 46

In short there are three basic ways to simplify a problem:

1. Leave out the details
2. Reduce the scope of the decision
3. Start with a solution and adjust it until it works

These are steps on a sliding scale: the first solution is simply a reduction of information which needs to be processed. A further reduction of information may be achieved by reducing the scope of the decision. Limiting the number of factors included in the decision significantly reduces the information needed. The highest level of information reduction is to start with total ignorance and seek only that information that is needed to get to a workable solution.

### 3.5.1. Mental accounting

Reducing the scope of the decision is achieved by mental accounting. An example of mental accounting is the labelling of sources: “This money was given to me as a birthday present so I can not use it to buy groceries”.

Thaler presented mental accounting as a way of self-regulation: “The whole mental accounting apparatus being presented here can be thought of as part of an individual’s solution to these (self-control) problems”[53]. Brendl et al explained the occurrence of mental accounting as way to simplify decision making by limiting the decision space to a particular goal. Currently active goals determine which mental accounts are formed. Further decision making is then limited to the gains and losses which are within the account associated with the goal. “Mental accounts may make a comparison of gains and losses across different needs or goals unnecessary because they first select which gains and losses are to be considered and simply ignore the rest.”[54]

Heath also mentions budgeting as a way to simplify problems “The idea of budgeting is also consistent with classic work on satisficing

[53] Thaler (1985), p. 208
[54] Brendl et al. (1998), p. 9

(Simon, 1947; March & Simon, 1958) which argued that when decision makers face difficult decisions, they simplify the decision problem by setting targets and constraints and then searching for a solution that satisfies those self-imposed constraints"[55]

### 3.5.2. De-escalating commitment

Mental accounting may lead to de-escalating commitment where a minor investment needed to get the project completed is postponed or not done because otherwise the budget would be exceeded.

Heath shows experiments in which sunk costs lead to escalating costs if there is no (mental) budget or if expenses are difficult to track. However if there is a (mental) budget and expenses are traceable, then escalating costs is less likely and sunk costs more often lead to irrational de-escalating[56]. The wish to stay within the budget then leads to underinvestment when compared to future earnings.

### 3.5.3. Ignoring small probabilities

Leaving out details may present us with problems. Sometimes the details turn out to be exactly what goes wrong. Ignoring small probabilities is one such example. Not wearing your seatbelt on a short trip is an example: what's the chance of an accident happening on such a short trip?

The tendency to ignore risks with small probabilities was found by Slovic et al. They suggest that thresholds are a source of this bias: "people may refuse to worry about losses whose probability is below some threshold. … There are only so many things in life one can worry about." [57] Wolfe and Horowitz showed the same effect in an experiment with luggage-screening. Participants who were told the frequency of dangerous objects appearing was 50% had a much

[55] Heath (1995), p. 41
[56] Heath (1995), p. 53
[57] Slovic et al (1977), p. 254

higher accuracy in detecting these objects than the participants who were told the appearance-frequency was 1%. People simply gave up looking for the objects since the probability of finding one was low.[58]

Research by Barron and Erev points to experienced based learning (see p. 48) as a source of ignoring small probabilities: “Experience was found to lead to a reversed common ratio/certainty effect, more risk seeking in the gain than in the loss domain, and to an underweighting of small probabilities”[59].

### 3.5.4. Focusing effect

The focusing effect is a simplification of the decision by focusing on one aspect of the situation. In an experiment Neisser showed that people with a specific task failed to see obvious events whereas people without this task did see the event (a woman with an opened umbrella strolling through a basketball game).[60] Similar experiments with similar results were done later by Mack & Rock[61] and by Simons & Chabris[62].

Another form of focusing is focusing on one or a few alternatives. This reduces the problem of choosing by reducing the number of alternatives that have to be considered. Del Missier et al. find strong support for this form of the focusing effect and describe several theories which may explain it, amongst which the mental model theory and the satisficing and relevance hypotheses. The satisficing as well as the mental model theory limit the effort of decision making by limiting the number of options considered.[63]

58 Mentioned in Bazerman and Chugh (2006), p. 91
59 Barron and Erev (2003), p. 215
60 Mentioned in Bazerman and Chugh (2006), p. 90
61 Mack and Rock (1998)
62 Simons and Chabris (1999)
63 Del Misser et al. (2007)

## 3.6 Experience based learning

Carl Rogers founded humanistic psychology in the early sixties. One of his theories is the experiential theory of learning which basically states that only by personal experience people gain insight. In his book “On becoming a person” he describes the function of experience in learning: "Experience is, for me, the highest authority. The touchstone of validity is my own experience. No other person's ideas, and none of my own ideas, are as authoritative as my experience."[64]

### 3.6.1. Base rate neglect

The first bias which may be attributed to experience based learning is base rate neglect. Base rate neglect is the failure to incorporate probabilities which are relevant to the decision at hand. Consider a medical test for a genetic defect which has a 99% probability of a correct test result. If the defect is known to be found in 1% of people tested, then what is the chance that a positive test is correct? If 10.000 people are tested, 9.900 are negative. Of these 9.900 1% is incorrectly tested as positive. That is 99 people. The remaining 100 are positive and 99 of them are correctly tested positive. Of the 198 people who tested positive 99 actually have the genetic defect: a 50% chance, not a 99% chance.

Kruschke provides a theory for base rate neglect with supporting empirical evidence: “The more frequent categories are learned earlier, in terms of their typical features, and the rare categories are subsequently learned predominantly in terms of their distinctive features.” [65]

So we first learn the general rule, remembering the general characteristics. Then we learn about the exceptions and remember them by the way they differ from the general rule. This results in our neglecting the general rule when confronted with evidence of an

[64] Rogers (1961), p. 23
[65] Kruschke (1996), p. 24

exception, which is also known as base-rate neglect. If e.g. most of the students are wearing black clothes and the most common grade given is a C with some students getting an B, what grade will a student wearing white clothes have? Chances are we think it will be a B since this student is clearly an exception to the general rule: black clothes and a C.

Gluck and Bower cite similar learning mechanisms research by Medin and Edelson "who demonstrated an extreme form of learned neglect of base rate. They presented Symptom Pair AB with Disease 1 three times as often as Symptom Pair AC with Disease 2. As expected, this led to a majority of Disease 1 choices when subjects were tested with the ambiguous A cue. More important, a conflict test on the novel pattern BC yielded a surprising majority of Disease 2 choices, thus reversing the direction of the 3-to-1 base rate. As Medin and Edelson noted, the LMS learning rule accounts for this stronger association of Cue C to Disease 2 than of Cue B to Disease 1. Because the 3:1 base rate causes A to become predominantly associated with Disease 1, it increases the predictability of Disease 2 to AC. In such circumstances, the LMS rule implies that Cue B will be relatively more blocked than Cue C in acquiring their respective associations, so that Cue C will dominate B in the BC conflict test."[66]

Bar Hilllel draws a similar conclusion: "The dominating information may be causally linked to the judged outcome, in the absence of such a link on behalf of the dominated information. This enhances relevance because it is an indirect way of making general information relate more specifically to individual cases."[67]

### 3.6.2. Clustering illusion

The clustering illusion is the tendency to see patterns where actually none exist. It is also known as illusory correlation or apophenia. Michael Shermer suggests that the clustering illusion is a by-product

[66] Gluck and Bower (1988), p. 242
[67] Bar Hillel (1980), p. 228

of the human brain's capability for pattern recognition[68]. This view is supported by Tversky and Kahneman: “people expect that a sequence of events … will represent the essential characteristics of that process even when the sequence is short”[69]. Gilovich also points to pattern recognition and adds learning to the explanation: “many of the mechanisms that distort our judgment stem from basic cognitive processes that are usually quite helpful in actually perceiving and understanding the world”[70]. Zikmund-Fisher has found the clustering illusion in research on premature quitting of infertility treatment. A relative short series of failing attempts were increasingly viewed as proof of future failure[71]. The source of the problem is according to Zikmund-Fisher found in “causal attribution processes, associative learning, and/or discounting of ambiguous information”.

It appears plausible that experience based learning results in the clustering illusion: most things we see do have a cause. As a toddler we discover that something rattles because we shake it and food appears because we cry. From a state of events happening randomly we quickly discover that events are not randomly happening but do have causes and are predictable: we detect the patterns. Since almost everything happening has a pattern it is not surprising we expect a pattern in everything we see.

Combined with the congruence bias and the confirmation bias (see pg. 57), it becomes almost unavoidable to see a pattern in any sequence, including the random ones.

Gilovich et al. demonstrate the existence of the clustering illusion convincingly, not only finding a tendency to see a positive serial

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68 *Turn Me On, Dead Man*, in: Scientific American, April 25, 2005

69 Tversky and Kahneman (1974), p. 1125

70 T. Gilovich, (1991), p. 10

71 Zikmund-Fisher (2004), p. 365. The effect was attributed to de-escalation but in my opinion the explanation given points to clustering illusion: “Repeated negative feedback appears to induce individuals to see each successive failure as more and more diagnostic. As a result, even a short series of failed attempts evokes beliefs that future attempts will also fail. These emergent expectations of failure... induce people to forgo profitable marginal investments.” However, as Zikmund-Fisher shows in the article, de-escalation may very well be the result of a conclusion which is premature because of clustering illusion.

correlation in a random sequence, but also a tendency to see a sequence with a negative serial correlation as a random sequence[72].

### 3.6.3. Illusion of control

One step further is the illusion of control. This is the tendency of people to believe they can control or at least influence outcomes that they demonstrably have no influence over.

Langer and Roth explain it as follows: “People approach situations with strategies. If they are successful, there is no information in the situation telling them that their strategy was incorrect, and there is every motivation to see a relationship between their response and the outcome - that is, to see control. It appears that the motivation to see events as controllable is so strong that the introduction of just one cue, a fairly consistent sequence of wins (with runs of no more than four in a row), is enough to induce an illusion of control over the task of coin flipping even in sophisticated subjects.”[73]

The detection of a pattern apparently also works very well for a series of actions and results, not just for external observations.

### 3.6.4. Optimism and self-serving bias

The optimism bias is the tendency for people to overestimate the likelihood of good things happening rather than bad things. It is also known as positive outcome bias or valence effect. The self-serving bias is the tendency to evaluate ambiguous information in a way beneficial to one’s own interest.[74]

There is not much evidence on the causes of the self-serving bias. Kaplan even concludes that the self-serving bias does not exist and states that it is simply strategic behaviour.[75]

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72 Gilovich et al (1985), p. 311

73 Langer and Roth (1975), p. 955

74 There is also a similar named attributional bias which refers to the tendency to claim more responsibility for successes than failures.

75 Kaplan and Ruffle (2004), p. 237

Pahl and Eiser link learning by experience to first the optimism bias and then self-serving: “To the extent that activities yielding satisfactory outcomes will be positively reinforced and repeated, whereas activities leading to pain or distress will thereafter be avoided, positive experiences will tend to predominate over negative ones, even in a potentially dangerous world. This general positivity bias may explain positivity biases for the self as they arise in comparative ratings.”[76]

It may be that the optimism bias is a more general cause of self-serving and self-attribution than Pahl and Eiser suggest. If people are optimistic about their own abilities and the opportunities presented to them, then ambiguous information will be evaluated with an optimistic view, meaning that the information is viewed more supportive of people’s belief than it actually is. Self-serving and self-attribution is then the logical result of optimism[77].

Taylor and Brown also explain the optimism bias as a result of learning by experience: “… research evidence indicates that self-enhancement, exaggerated beliefs in control, and unrealistic optimism can be associated with higher motivation, greater persistence, more effective performance, and ultimately, greater success. A chief value of these illusions may be that they can create self-fulfilling prophecies. They may help people try harder in situations with objectively poor probabilities of success; although some failure is inevitable, ultimately these illusions will pay off more often than will lack of persistence.”[78]

[76] Pahl and Eiser (2005), p. 307

[77] Gilovich (1991) mentions the confirmation bias as a bias that may strengthen this effect: ”For nearly all complex issues, the evidence is fraught with ambiguity and open to alternative interpretation. One way that our desires or preferences serve to resolve these ambiguities in our favour is by keeping our investigative engines running until we uncover information that permits a conclusion that we find comforting.” (p. 83)

[78] Taylor and Brown (1988), p. 199

### 3.6.5. Lure of choice

Another trap for which learning might be responsible is the lure of choice. When considering different courses of action people tend to prefer actions which leave further choices to be made, even when these further choices do not improve or even worsen the outcome[79]. This effect was demonstrated by Bown et al.[80] A possible explanation of this effect may be that we have learned that it is better to keep our options open for as long as possible. There is always a possibility that new information or new alternatives will emerge. The same effect might explain other delaying-traps (see p. 73 Procrastination).

Ariely observes a similar effect in a pricing strategy experiment[81]. When students were given the choice between a 59$-online-subscription and a 125$-print-and online-subscription about 1/3 chose the 125$-print-and-online-subscription. When a lure option was added in the form of a 125$-print-only-subscription over 3/4 chose the 125$-print-and-online-subscription. According to Ariely this is the result of decision making by comparing alternatives; the two 125$-options are easily comparable, so the first decision made is which 125$-option is best. Having decided which 125$-option is best, this option has the benefit of being “the best”, resulting in it getting chosen in the final decision more often.

The reason of this behaviour might also be that people are choosing choice first. The choice to spend 125$ leaves two options open instead of one. Expanding Ariely’s experiment with a fourth option, a 59$-option, might be useful to determine whether the lure of choice is indeed a factor in this behaviour[82].

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79 Bown, Read and Summers did experiments with 3 options A, B and L, where option L was inferior to option B (same properties but more expensive). When people chose between (A or L) and B the final choice was significantly more often option L than when the initial choice was between (B or L) and A (p. 300).

80 Bown et al. (2003)

81 Ariely (2008), p. 4

82 Another explanation of this behaviour might be the effect of FREE! In the third chapter of *Predictably irrational* Ariely discusses the effect of adding a free item to an offer on people’s buying behaviour. In the described experiment the online subscription is in fact added for free, which might explain the shift in preference.

Finally Ariely shows with the disappearing doors experiment that people do accept lower payoffs in order to keep options open, even if they are not planning on using these options.[83]

### 3.6.6. Reflection effect

The reflection effect is the preference people show for risk-seeking when choosing between negative alternatives and risk-aversion[84] when choosing between positive alternatives.[85] This effect is also known as the pseudo-certainty effect.

Most people, when choosing between a 50% chance of a loss of 1000 and a sure loss of 500, choose the 50% chance-option. The same people however, when choosing between a 50% chance of a gain of 1000 and a sure gain of 500, choose the 100% surety-option. The expected utilities of both options are the same in both experiments, so a shift in risk preference would not be expected.

This observation that people are risk averse for gains and risk seeking for losses is an important basis for a.o. prospect theory. Kahneman and Tversky use a concave weighing function combined with a utility function which is concave for losses and convex for gains to explain the reflection effect[86].

March has shown that learning by experience results in risk aversion for gains and risk seeking for losses. The basic assumption that a positive outcome will teach the observer to repeat the action is enough to produce this risk-taking behaviour. He has tested different versions of experiential learning models and concludes:

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83 Ariel (2008), p. 144

84 Not everybody has the same level of risk aversion. Filbeck, Hatfield and Horvath found that the MBTI-type Thinking and to a lesser extent MBTI-types Judging and Sensing showed less risk aversion than their counterparts Feeling, Perceiving and Intuition and the in-between-groups (2005, p. 177). Stress promotes risk aversion. In stressful situations people tend to accentuate evidence supporting negative decision results. (Wright, 1974, p. 560)

85 Kahneman and Tversky (1979), p. 268

86 Kahneman and Tversky (1979), p. 283 resp. p. 279. Note that Kahneman and Tversky observe that, due to the simplification of prospects, highly unlikely events may also be ignored. (p. 283)

"Experimental learning that conforms to standard learning models is shown to lead learners to favour less risky alternatives when possible outcomes are positive. This learning disadvantage for risky alternatives is likely to be quite substantial and persistent, particularly among relatively fast learners. Learning to choose among alternatives whose outcomes lie in the negative domain, on the other hand, leads to favouring more risky alternatives in the short run but tends to become risk neutral in the long run. Thus, the fact that human beings exhibit greater risk aversion for gains than for losses in a wide variety of situations may reflect accumulated learning rather than inexplicable human traits or utility functions." [87]

Regret aversion is part of the model March uses. The key assumption that a positive outcome will lead to repetition of the action assumes regret aversion: the decision maker does not take the risk that another action may produce lesser outcomes.

Zeelenberg et al. show another way in which regret-aversion may explain the reflection effect. They first show that people are regret-averse rather then loss-averse[88] and then use Kahneman and Tversky's assumption that losses are weighed more heavily than gains to explain the reflection effect: "We know that losses are weighed more heavily than gains (Kahneman & Tversky, 1979), and that regret stems from a comparison between what is and what might have been. According to this line of reasoning, regret over not gaining $100 is likely to be less severe than regret over losing $100. If the regret associated with losing is more intense, we expect the anticipation of regret to have more influence on decision making in the domain of losses as compared to gains." [89] Minimizing regret thus explains why people choose as they do in the above mentioned problem.

Bell has shown that the hypothesis by Zeelenberg et al. holds in a model. He expanded the expected utility model to include regret, measured as the difference between the chosen alternative and the

[87] March (1996), p. 309
[88] Zeelenberg et al. (1996), p.156
[89] Zeelenberg et al. (1996), p.156

next-best alternative. This expanded model explains the reflection effect.[90]

## 3.7 Regret aversion

The basic normative model of choice under uncertainty is the expected utility model. This model states that someone who has to choose will evaluate all options and choose the option with the highest expected value. In real life, this model does not explain all decisions. The expected utility model has been expanded to include regret, being the decision makers' desire to avoid situations where, with hindsight, they will appear to have made the wrong decision. In 1982 Bell suggested regret may be measured as the difference between the alternative chosen and the next best alternative[91]. With an expected utility model, adapted to include regret, he showed that several paradoxes like coexistence of gambling and insurance, the reflection effect and probabilistic insurance, can be explained.

Sagi and Friedland showed that it is not just the next-best alternative that counts. Regret is higher when there are more, and more diverse, alternatives available at the time of choice[92].

A factor influencing regret is the expectation whether unchosen alternatives will be resolved. If the outcomes of unchosen alternatives will be known, anticipated regret will be higher. Ritov showed that in a lottery-experiment people more often chose the high-risk-high-reward option when all alternatives would be resolved then in the situation where unchosen alternatives would not be resolved. This shift in preference is explained by the higher regret from not choosing the highest reward option if the value of this option is resolved[93].

90 Bell (1982), pp. 972-973
91 Bell (1982), p. 965
92 Sagi and Friedland (2007), p. 515
93 Ritov (1996), pp. 235-236

The same was shown by Ritov and Baron[94] as well as by Zeelenberg and Pieters[95]

### 3.7.1. Congruence bias

Congruence bias is the result of people relying on positive testing. Neglecting negative testing may result in the acceptance of a hypothesis which is not valid. A well known example is finding the rule behind the following pattern: 2-4-6. Usually people assume the rule will be “an increase with 2” and will try a number of sequences which all have in common that the increase in the number is 2. When several of these sequences are confirmed to be according to the rule, people are convinced the rule is “any increase with 2”. In reality the rule is “any increase” but people fail to notice this since they only test increases with 2.[96]

Schoemaker and Gunther notice that “an executive’s reputation and rewards are typically based on the height of his or her successes, not on the depth of learning from failures” as an explanation of why decision makers tend to perform positive tests only.[97] A similar motivation is shown in an experiment by Schwartz. In one experiment people were given the task to find a rule for generating a correct pattern. Part of the test group was given a reward each time they typed in a correct pattern. The other part of the group did not get a reward. The people getting the reward tended to stick to the first correct pattern they found and consequently declare this pattern to be the general rule. Thus, reward leads to positive testing, for the sake of the reward. Or as Schwartz concludes: “In short, when responses have significant consequences, the push is toward producing desirable outcomes, and not toward producing true generalizations.” [98] This points to regret aversion as a cause of the congruence bias.

94 Ritov and Baron (1995), p. 119
95 Zeelenberg and Pieters (2004), p. 155
96 Schwartz (1982), p. 54-55
97 Schoemaker and Gunther (2006), p. 110
98 Schwartz (1982), p. 56

### 3.7.2. Information bias

The information bias is the tendency to seek information even when it cannot affect action. It is also known as analysis paralysis. By continuously asking for more information the decision keeps getting postponed.

Baron et al. point to the congruence bias as the source of information bias. They conclude that unnecessary information is gathered to test "whether an answer to a question is consistent with a favoured hypothesis"[99]

### 3.7.3. Anchoring

Anchoring was first described by Tversky in an experiment with the question what the percentage of African states in the United Nations is. People who were first asked whether the percentage was over or under 20 gave a significantly lower estimate then people who were first asked whether the percentage was over or under 65. The mechanism is best described by Epley and Gilovich who "obtained evidence that people adjust insufficiently from an initial anchor value because they stop adjusting once their adjustments fall within an implicit range of plausible values. People's estimates therefore tend to lie near the anchor side of this implicit range, but, on average, the true value is likely to lie closer to the middle of the range." [100]

Mussweiler et al. argued that anchoring is not the result of insufficient adjustment but the result of selective accessibility[101]. Their theory is that anchoring is the result of people using the anchor value as a hypothesis. Since people tend to try to confirm their hypotheses they will selectively use the evidence in support of the initial anchor. This leads to an estimate which is biased towards the anchor.

[99] Baron et al (1988), p. 108
[100] Epley and Gilovich (2006), p. 316
[101] Mussweiler (2000), p. 1143

Epley and Gilovich later argued that there are different sources for the anchoring bias. They found self-generated anchors to lead to insufficient anchor adjustment and other anchors to lead to selective accessibility.[102]

The main source of anchoring thus seems to be the tendency to seek confirming evidence for our hypotheses; the congruence bias.

### 3.7.4. Frame blindness

A frame is a simplification of reality which helps the decision maker to understand reality. It is a hypothesis about the nature of the problem which needs deciding. The frames we use are equally vulnerable to the traps on hypothesis-testing as other hypotheses are. We accept the frame we chose until evidence shows up that the frame is not applicable to the current problem. The problem is that both the congruence bias and the confirmation bias tend to discount disconfirming evidence. This leads to the use of a frame which has not been adequately tested for validity, even when disconfirming evidence is starting to emerge.[103] Another problem with the use of frames is that the decision maker assumes the complete picture is known. However, each frame focuses on different aspects of a

[102] Epley and Gilovich (2001), p. 395

[103] An urban legend describes frame blindness very well. The legend is a fictitious transcript of a US Navy radio conversation recording.

Americans: "Please divert your course 15 degrees to the North to avoid a collision."

Canadians: "Recommend you divert your course 15 degrees to the South to avoid a collision."

Americans: "This is the captain of a US Navy ship. I say again, divert your course."

Canadians: "No, I say again, you divert your course."

Americans: "This is the aircraft carrier USS Abraham Lincoln, the second largest ship in the united states' atlantic fleet. We are accompanied by three destroyers, three cruisers and numerous support vessels. I demand that you change your course 15 degrees North. That's one-five degrees North, or counter measures will be undertaken to ensure the safety of this ship."

Canadians: "This is a lighthouse. Your call."

problem, more or less hiding other factors[104]. "It is the illusion of completeness rather than the existence of frames per se, that is the real culprit. No frame is complete; each one highlights and hides different aspects of the situation at hand."[105]

It is thus not the frame in itself that is the problem, it is our blindness to the other frames which may be of equal or better use[106] and, if we do see other frames, our loyalty to our initial frame. This loyalty was shown by Le Boeuf. He showed that the preference for the initial frame is strong. If confronted with a different frame we tend to avoid inconsistencies between the frames but we keep using our initial frame for as long as possible: " what high NC respondents are successful at avoiding is inconsistency—not framing per se. Their responses to a second occurrence of a decision problem are likely to be in line with their responses to the first. But the responses of both high- and low-NC participants to the first occurrence of a choice problem are heavily, and equally, influenced by the provided frame." [107]

In group decision making the use of different frames by joint decision makers may result in conflict[108]. Failure to recognize the existence of different frames may block a decision.

[104] Framing can be shown in people's brain-patterns. De Martino et al. (2006) show that people who are less sensitive to framing show different neural activity while making a decision, compared to those more susceptible to framing. Which is cause and which is effect remains unclear.

[105] Schoemaker and Russo in: Hoch, Kunreuther and Gunther (2001), p. 140

[106] Special cases of frame blindness are the déformation professionnelle and the Ludic fallacy. Déformation professionnelle is the tendency to observe reality according to the conventions of one's own profession, neglecting other points of view. The Ludic fallacy is also known as the "uncertainty of the nerd" and refers to the déformation professionnelle of the statistician: deciding by studying probabilities, ignoring one´s own influence on the outcome.

[107] Le Boeuf and Shafir (2003), p. 87

[108] This trap is not mentioned often. It is as far as I know only mentioned by Schoemaker and Russo in Hoch, Kunreuther and Gunther (2001), p. 141

### 3.7.5. Confirmation bias

The confirmation bias is the tendency to search, filter or interpret information in a way that confirms the preferred decision. The confirmation bias is also known as the selection bias or the illusion of validity[109]. The bias is one of the basic ideas of Gestalt psychology in which any problem is dealt with by selecting a preferred interpretation of reality and then modifying the acquired information to fit this interpretation[110].

The confirmation bias was shown in an experiment by Darley and Gross. Test groups were shown a video of a girl in either a high socioeconomic environment or a low socioeconomic environment. Then they were shown a video of this girl doing 25 achievement-tests. This video was the same for both groups. When asked about the performance level of the girl, the group which had been shown the high socioeconomic environment rated her performance significantly higher than the other group. The congruence bias is suggested as the cause of confirmation bias: “This pattern of results suggests that when the diagnostic validity of a perceiver's expectations is suspect, expectancies function as hypotheses, and the task of evaluating an individual for whom one has an expectancy is a hypothesis-testing process. … As is apparent from our data, the hypothesis-testing strategy that perceivers use has a bias toward confirmation of the hypothesis being tested.” [111]

Einhorn and Hogarth add that in reality a test to demonstrate the incorrectness of the hypothesis may be difficult to perform. “However, when actions are based on judgment, learning based on disconfirming evidence becomes more difficult to achieve. For example, consider how one might erroneously learn the rule ‘my judgment is highly predictive’ and focus on the hypothetical case of a manager learning about his predictive ability concerning the potential

[109] A similar bias is called observer expectancy. This bias occurs when a researcher is expecting a result and unconsciously manipulates experiments or misinterpretes the data in order to find it.
[110] Glöckner and Betsch, p.216
[111] Darley and Gross (1983), p. 28

of job candidates. The crucial factor here is that actions (e.g., accept or do not accept) are contingent on judgment. Therefore, at a subsequent date, the manager can only examine accepted candidates to see how many are successful. If there are many successes (which, as will be shown below, is likely), these instances all confirm the rule. Indeed, the important point here is that it would be difficult to disconfirm the rule, even though it might be erroneous."[112] The likelihood of many successes is explained by a.o. base rate neglect.[113]

Another cause of confirmation bias may be that non-confirming evidence may be perceived as biased. The intention of sources is not always known and thus not always trusted. In case of disconfirming evidence this distrust makes ignoring the information easy to defend.[114]

### 3.7.6. Overconfidence

The confirmation bias seems to be the main cause of a well known bias: overconfidence. Overconfidence is the phenomenon that people, as Kahneman states it very clearly, "assign much higher probability to the truth of their opinions than is warranted".[115]

Overconfidence shows itself in a number of ways but the common denominator is the decision-makers belief that there is no question whether or not his or hers opinion is the right one: it's not an opinion, it's a fact.[116] There are some well known quotes to illustrate this[117]:

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112 Einhorn and Hogarth (1978), p. 414

113 Einhorn and Hogarth (1978), p. 410

114 Peters, Covello and McCallum (1997) name the perception of knowledge, expertise, openness,honesty, concern and care as the principal drivers of trust and credibility.

115 Forbes.com, *Nobel Laureate Debunks Economic Theory*, 11-6-2002

116 A similar named bias is the overconfidence bias. It refers to the underestimation of the size of the confidence interval. This effect is a strong effect which is even found in the estimation of physical constants (Henrion and Fischhoff, 1986). Kahneman and Tversky explain this as follows: "Because confidence increases with consistency, confidence will generally be high when the input variables are highly correlated. However, given input variables of stated validity, the multiple correlation with the criterion is inversely related to the correlations among the

"A Japanese attack on Pearl Harbor is a strategic impossibility"
Major George Fielding Eliot [118], 1938

"They couldn't hit an elephant at this distance"
General J. Sedgwick, last words [119], 1864

Kahneman mentions the illusion of validity (similar to confirmation bias) as the source of overconfidence and so do Rabin and Schrag. They show with a mathematical model that the introduction of confirmation bias results in overconfidence: "Our simple model by and large confirms an intuition common in the psychology literature: confirmatory bias leads to overconfidence, in the sense that people on average believe more strongly than they should in their favoured hypotheses."[120] Koriat, Lichtenstein and Fischhoff find the same: "The first bias involves favouring positive rather than negative evidence (i.e., reasons for over reasons against).... The second bias in confidence assessment is a tendency to disregard evidence inconsistent with (contradictory to) the chosen answer."[121]

Pronin et al.[122] discuss a different approach: "naïve realism". This approach takes overconfidence as the cause and explains a.o. the confirmation bias as a result of overconfidence. Since overconfidence itself is not explained by naïve realism, while on the other hand the conviction that "I see the world as it is", would not

inputs. Thus, a paradoxical situation arises where high intercorrelations among inputs increase confidence and decrease validity." (Kahneman and Tversky, 1973, p. 249)

117 A popular representation of overconfidence is that over half the drivers rate themselves as better than average drivers. As Benoit and Dubra show in JP. Benoit and J Dubra, *Overconfidence?*, 2008, http://mpra.ub.uni-muenchen.de/765/ this is actually not a good example of overconfidence since it assumes that the deviation from the mean is equal in both worse and better then average drivers. Benoit and Dubra show in a calculation that this is not the case: the downward deviation is higher than the upward deviation.

118 G. Eliot, *The Impossible War with Japan*, In: The American Mercury, September 1938

119 In fact this was the second-last sentence of the general. An account of the battle of Spotsylvania Court House in "Battles and Leaders of the Civil War", lists a response to the words of a soldier (who did take cover) as his actual last words.

120 Rabin and Schrag (1999), p. 38

121 Koriat, Lichtenstein and Fischhoff (1980), p. 116 & p. 117

122 Pronin et al. (2004)

need a search for confirmation, confirmation bias as the source of overconfidence seems more logical than the other way around. Apart from that, the framework of naïve realism presents a convincing image of the way overconfidence may cause other biases, like the bias blind spot, the hostile media effect and other effects. The framework of naïve realism is presented in Appendix I (p. 136), since most of the biases in the framework are of too much detail to discuss here.

Other causes for overconfidence have also been reported. Kahneman et al. have mentioned hindsight bias: "hindsight tends to promote overconfidence, by fostering the illusion that the world is a more predictable place than it is".[123] Billet and Qian quote several sources for self-serving as the source of overconfidence and show evidence in the context of acquisition processes[124].

It is likely that there are several causes, rooted in learning by experience, regret aversion as well as bidirectional reasoning, for overconfidence.

### 3.7.7. Omission bias

The omission bias is the tendency to judge actions with harmful effects as reproachable while judging inactions with equally harmful results as less or not reproachable. Hammond, Keeney and Raiffa observe that "In business, the sins of commission (doing something) tend to be punished more severely than sins of omission (doing nothing), the status quo holds a particularly strong attraction."[125]

Thaler suggests that anticipated regret may explain "choosing not to choose" since avoidance of choice is a way to avoid the negative consequences of choice[126]. Ritov and Baron agree and state that

[123] Kahneman et al. (1998), p. 5
[124] Billet and Qian (2005), p. 1 resp. p.24
[125] Hammond, Keeney and Raiffa (2006), p. 4
[126] Thaler (1980), p. 51

"the bias toward omission is greater when potential regret is present"[127].

Feldman et al. offer a list of explanations for actions being more regrettable than inactions:

- Actions are more likely to lead one to think counterfactually about the things that could have been had one not acted. Therefore actions are more likely to be compared to (possibly) better alternatives.[128]
- It is easier to hypothetically "undo" actions when thinking about the events that lead to the outcome, than it is to imagine actions that could have been taken.[129]
- Actions may provide faster feedback than inactions.[130] Faster feedback may result in a higher perceived correlation between actions and outcomes than between inactions and outcomes. This makes the decision maker more responsible for an unfavourable outcome resulting from actions. Feldman et al. mention the faster feedback as a reason for the real-life-observation that on the short term actions are regretted more while on the long term inactions are regretted more. This might also be explained by the omission bias itself: if actions are evaded more than inactions, there will be more inactions to regret than there will be actions.

In the short term, regrets over actions are higher than regrets over inactions. On the long term this is exactly the opposite; inactions are regretted more than actions. One of the reasons for the long term reversal is, according to Gilovich and Medlec, the possibility to undo the effects of actions[131]. In some decisions it is not possible to undo the effects of inaction, as in the wedding proposal example: it is possible to undo the action of marriage by divorce, but it may not be possible to undo the inaction; the potential partner may be unavailable.

[127] Ritov and Baron (1995), p. 119
[128] Feldman et al. (1999), p. 234
[129] Feldman et al. (1999), p. 235
[130] Feldman et al. (1999), p. 254
[131] Gilovich and Medvec (1995), p. 385

The status quo bias is an often mentioned bias which actually turns out to be the omission bias. The status quo bias is the tendency to prefer the status quo above other situations, even if these are superior to the status quo. It is also known as the endowment effect. Ritov and Baron[132] found that the status quo bias disappeared when maintaining the status quo required action. It seems that the status quo bias as described in literature is in fact the omission bias (although Ritov and Baron keep their options open in the discussion on their findings). The quote from Hammond, Keeney and Raiffa illustrates the point: if commissions are indeed more severely punished than omissions a status quo bias is a logical result from the omission bias, not a bias in itself.

Gilovich and Medvec mention evolutionary advantage as an explanation of the status quo bias. “Maintaining the status quo is probably safer than trying something new. Following the status quo has kept one alive at least until that point.”[133] This explanation cannot explain the disappearance of the status quo bias when maintaining status quo requires action, as found by Ritov and Baron. However, one might argue that maintaining the status quo requiring action is a rare event, so rare that it would not be incorporated in a trait which has been formed by evolution.

### 3.7.8. Escalating commitment

Escalating commitment refers to the situation where previous decisions influence the current decision, e.g. when an additional investment is made because earlier substantial investments have been made, not because the additional investment is expected to be profitable but to avoid the recognition of past investments being “bad” decisions. The effect is also known as the sunk costs bias, dead loss effect and entrapment.

Wong and Kwong did some experiments to test whether escalating commitment might by caused by regret aversion and conclude that

[132] Ritov and Baron (1992), pp. 59-60.
[133] Gilovich and Medvec(1995), p. 393

this is the case: “people choose the option that reduces the possibility of future regret under escalation situations”[134]. Huber and Seiser offer support for this result: “Several studies have found that the continuous commitment to a failing course of action (sunk cost effect) is stronger when decision makers know they have to justify their choice. Elaborate reviews and discussions of these results can be found in Brockner (1992) also in Gärling et al (1997) Lerner and Tetlock (1999) and in Tetlock (1992).”[135]

The name sunk-cost-effect seems to capture the essence of this trap. Soman showed that time-investments are not subject to this effect. The effect even disappears when sunk costs are translated into labour hours.[136] This might be because “wasted” labour hours are less regretted than out of pocket costs. The relevance of costs is also shown by Gino who showed that advice is being followed more often when it is paid for, even in experiments where the costs of the advice are known to the decision maker to be random[137].

### 3.7.9. Consistency bias

The consistency bias is the wish to be consistent with previous decisions. Holyoak and Simon demonstrated that the wish to maintain a coherence of beliefs results in bidirectional reasoning. They conclude that decision makers aim to reach a set of arguments and decisions which are coherent with each other. Decision makers use a constraint satisficing strategy to obtain a set of arguments and conclusions which are consistent with each other and with arguments and conclusions used by the same decision maker in previous decisions[138]: “The proposal we tested is that decisions that are based on complex but ambiguous information follow a function of maximal coherence among the underlying inferences and that the process of achieving coherence is based on constraint satisfaction,

134 Wong and Kwong (2007), p. 551
135 Huber and Seiser (2001), p. 70
136 Soman (2001), p. 182
137 Gino (2006), p.3
138 Holyoak and Simon (1999), p. 21

which depends on bidirectional links." "These findings support the hypothesis that the emergence of a coherent position guides the process of decision making."[139]

The consistency bias, and especially the bidirectional reasoning that is the result of it, gives rise to several biases. Precision bias is one of them. This is the belief that greater precision implies greater accuracy implying that a precise statement must also be true. A similar bias is reported by Luan, Sorkin and Itzkowitz[140]. They found that people tend to assume that consistency amongst different sources increases the validity of the information. This may be true if the sources are not correlated, but if they are, consistency does not increase validity since there is no extra information added. Similar results were found by Kahneman and Tverksy[141].

The outcome bias is another result. This is the tendency to judge a decision by its result instead of the quality of the decision making process at the time the decision was taken. It is "the overapplication of a general rule that bad outcome is a sign of bad decision making."[142]

Another remarkable effect, the conjunction fallacy, may also be caused by consistency bias. The conjunction fallacy, also known as the subadditivity effect, is the tendency to assume that specific conditions are more probable than general conditions. If e.g. people are told most Scandinavians have blond hair and blue eyes, the likelihood that a single Scandinavian has blond hair and blue eyes is generally estimated higher than the likelihood of the same person having blond hair (and any eye colour). Ahn and Bailenson point to bidirectional reasoning as a cause of this fallacy: people construct a theory and then assess the likelihood of the observation fitting the

139 Holyoak and Simon (1999), p. 4 resp. 23
140 Luan, Sorkin and Itzkowitz (2004), p. 112
141 Kahneman and Tversky (1973), p. 249: " Because confidence increases with consistency, confidence will generally be high when the input variables are highly correlated."
142 Baron and Hershey (1988), p. 578

theory. If the observation fits the theory, the theory, in its entirety, is assumed the most probable explanation[143].

Overreaction; assuming the problem is solved because a decision has been made, and the planning fallacy; increasing confidence in a positive outcome because of the existence of a plan, are other results of the confusing of cause and result due to bidirectional theory-construction.

In group decision making the bandwagon fallacy is a result of the consistency bias. The bandwagon fallacy shows itself in people believing things because many others believe so: if something is true, many people will believe it. Therefore, if many people believe it, it must be true. This fallacy may result in exercising self-censorship when reporting results that differ considerably from "accepted wisdom".

### 3.7.10. Sharpshooter fallacy

The bidirectional component of consistency bias may also be responsible for a very common fallacy, the Texas sharpshooter fallacy. The fallacy is called this way because it is usually explained with an example in which a Texan fires some rounds at the barn door, then draws a target around the hits and claims to be a sharpshooter. It may seem unlikely but a lot of mathematical models used in business decisions are made this way. People gather every bit of data they can find, estimate a model and then proudly present a model which fits the data with a high level of correlation. Using the same data to create (or adapt) a hypothesis and then test it, is in fact committing the sharpshooter fallacy. The Texas sharpshooter fallacy is common practice in data mining, where relationships are randomly tested and “discovered”. If data mining is to be performed statistically correct, the data set has to be split in a hypothesis data set and a verification data set[144]. Data dredging, fishing or snooping are terms

[143] Ahn and Bailenson (1996)

[144] A hypothesis on the causal relation in the found correlation would also be apropiate.

used for data mining activities which fail to do so and thus commit the Texas sharpshooter fallacy.

### 3.7.11. Gamblers fallacy

The gamblers fallacy is another way of consistency bias fooling us. The gamblers fallacy is the assumption that future events will cancel out deviations from the predicted mean observed in past events. It is also known as the Monte Carlo fallacy since it is frequently observed in casino's: if the roulette wheel spins a series of black results, people tend to think it must then produce a series of red results in order to remain random[145]. This way of thinking is bidirectional: a random event will generate 50/50-results. Therefore if the past results are not 50/50 the future results will have to balance out the past results[146].

### 3.7.12. Hindsight bias

The hindsight bias is "a general tendency to view actual outcomes as having been more foreseeable than was actually the case." [147] Pieters et al. describe it as "a pervasive consistency bias in memory for prior decision making, such that not only are remembered predictions more consistent with experienced outcomes than actual predictions, but also that remembered intentions are more consistent with behaviour than actual intentions."[148] Philips notes that we do not only have distorted memory for the decisions we made, but also for the information we used. If this information is re-used, it will influence

[145] fallacyfiles.org quotes Huff and Geis (1959): " On August 18, 1913, at the casino in Monte Carlo, black came up a record twenty-six times in succession [in roulette]. … [There] was a near-panicky rush to bet on red, beginning about the time black had come up a phenomenal fifteen times."

[146] In fact the opposite would be advisable: if the wheel is indeed random the future results will be random. If the wheel is not, then the past results indicate a deviation from random to black, which would mean the chance of black turning up is higher. As long as the possibility of the wheel not being random is not absolutely zero, the weighed result of the two scenarios will be a higher chance of black results.

[147] Holyoak and Simon (1999), p. 23

[148] Pieters et al. (2006), p. 34

future decisions[149]. The hindsight bias has been shown in experiments by a.o. Mather et al.[150] and Fischhoff[151].

The hindsight bias is an important cause of overconfidence. It not only gives us the impression that we are better decision makers than we actually are, it also distorts the information we use in coming decisions.

### 3.7.13. Ambiguity aversion

People tend to avoid ambiguity. This is demonstrated in a classic experiment by Ellsberg where people can win a prize if they correctly predict whether the ball they draw from one of two urns is red or black. People show a preference for the urn with a known 50/50 proportion over the urn with the unknown proportion.[152] Van Dijk and Zeelenberg even found that ambiguous information is discounted to a level which makes it comparable to having no information at all.[153]

Kramer and Stone[154] propose a model which, on the condition that ex post ambiguity is at least partly (expected to be) resolved, shows that regret aversion will result in ambiguity aversion. Ritov and Baron[155] deliver empirical support for the theory: “Ambiguity (salient missing information) is considered relevant only in the case of commissions. Consistent with the view that one feels more responsible for results of commission that for results of omission, subjects seem to think of the effect of missing information on the consequences of their action (vaccinating), not the consequences of their inaction (not vaccinating). Ambiguity concerning the

149 Philips (2002), pp. 782-783
150 Mather et al. (2000)
151 Fischhoff (1975)
152 Ellsberg (1961) is an often quoted source on this experiment. However, Ellsberg himself presents the results as follows: “Judging form a large number of responses, under absolutely nonexperimental conditions, ... if you are in the majority you will report that you prefer to bet on $Red_{II}$ rather than $Red_{I}$”. Ambiguity aversion has later been shown in various experimental settings (See Camerer and Weber (1992))
153 Van Dijk and Zeelenberg (2003), p. 350
154 Kramer and Stone (2006)
155 Ritov and Baron (1990)

consequences of action increases the reluctance to act, but there is no corresponding effect of the omission option. A possible explanation of this result is that ambiguity increases the feeling of responsibility for a bad outcome that a decision maker causes." Curley et al find similar results[156]. That responsibility is an important factor in regret aversion is shown by Trautmann et al. who found that ambiguity aversion disappears if the risk of negative evaluation by others is eliminated[157]. Self-evaluation alone is not sufficient to generate ambiguity aversion.

Thus, there is considerable support for regret aversion being the cause of ambiguity aversion.

Ambiguity aversion leads to some remarkable effects. One is the zero risk bias. This is a preference for reducing a small risk to zero over a greater reduction in a larger risk. This bias has also been linked to external stakeholders[158]. Individuals having no particular stake in the outcome, like environmental activist groups, tend to be more vulnerable to the zero-risk bias. The bias is found to be reduced by economic or statistical training and amplified by professional training related to protected values like law-training[159].

Ambiguity aversion is cleverly used in marketing: price partitioning influences customer's choices by attractively pricing the parts of the product that are evaluated easily. The ambiguity aversion will result in an underweighting of the higher priced but less easily evaluated parts[160].

### 3.7.14. Disjunction effect

One of the ways to avoid ambiguity is to delay the decision until the ambiguity is resolved. This waiting for more information before taking

156 Curley et al. (1986), p. 230
157 Trautmann et al (2007), p. 19
158 Noll & Krier, mentioned by Baron et al (1993), p. 184
159 Baron et al (1993), p. 190
160 Bartini and Wathieu (2006)

a decision, even though this information will not change the final decision, is known as the disjunction effect.

Bastardi and Shafir have shown that the disjunction effect not only delays decision making but influences the decision taken as well. The fact that the information has been waited for gives it greater weight in the final decision.[161]

Shafir adds the consistency bias as a possible cause of the disjunction effect: “People wait for information when they shouldn’t, and once they wait, they infer from waiting that the information matters”.[162]

It may be questioned whether the disjunction effect is a real decision trap in the sense that it is really a non-conscious factor influencing the decision. Most decision traps keep appearing even after the person has been told about the trap and how to avoid it. Tversky and Shafir show that, once subjects realize the uncertainty does not affect the decision, they no longer wait with the decision[163]. The disjunction effect seems to be avoidable.

### 3.7.15. Procrastination

Ambiguity may also result in procrastination. This is the delaying of decision making without rational reasons for delay.

An explanation of procrastination based on the decision making styles maximizing and satisficing is given by Parker et al. Decision makers may be divided in two groups: those using a maximizing strategy and those using a satisficing strategy. The maximizing strategy which consists of evaluating all available alternatives, estimating the probability a better alternative will present itself, and then choose either the best available alternative or wait for the better alternative to materialize. The satisficing strategy consists of a set of minimum requirements. The alternatives are evaluated one-by-one

161 Bastardi and Shafir (1998)
162 E. Shafir is quoted in S. Vedantham, *When the Brain Stalls at Disjunction Junction*, Washington Post, Jan 1st 2007
163 Tversky and Shafir (1992)

and discarded if one or more of the requirements are not met. If no alternatives meet all requirements, the decision maker waits until an alternative that does meet all requirements is found. Alternatively the decision maker may lower the threshold and choose an alternative that was rejected earlier. Parker et al. found in experiments that "Self-reported maximizers report greater decision avoidance, plausibly the result of taking the time to examine each option in detail. When that examination fails to yield clearly superior options, the result may be inaction or actions driven by events outside of individuals' control"[164].

The examination of each option in detail may be the result of ambiguity aversion.

Another cause of procrastination is regret aversion. Watson mentions embarrassment as a cause: "Whether or not they are to blame, people often look upon problems as personal failings which are embarrassing. To protect their feelings of self-esteem they filter the information they receive that suggests a problem exists"[165]. Tetlock and Lerner[166] mention that accountability, although in general leading to better decisions, may lead to indecisiveness: "Decision-makers can become paralyzed in self-doubt, so anxious to avoid criticism that they take obsessive precautions against worst-case-scenarios and are easily distracted in environments with unfavourable signal to noise ratio's". It is likely that accountability will increase potential regret since the consequences are more severe.

However, procrastination may also be rational behaviour. As long as there is no need to decide, there is an option-value in delaying the decision. This option-value consists of the possibility that a better alternative will present itself. It has been shown in option theory that it is economically irrational to use an option before the expiry-date[167]. In decision-making this would mean that it is economically irrational to take a decision before it is absolutely necessary to do so.

[164] Parker et al. (2007), p. 348
[165] Watson (1976), p. 88
[166] Tetlock and Lerner (1999)
[167] Damodaran (2006), p. 637

Tykocinski did some experiments on procrastination using the course registering experiment[168]. Students were given the choice to register for a course in 2 scenarios: the course is taught by a less popular professor and the course is taught by either a popular or a less popular professor. In the last scenario there is an option to wait until it is clear which professor will teach the course. Half of the students chose to wait and were then told the less popular professor would teach the course. Nearly half of these students then registered. These students had no rational reason to wait since they would register anyway.

However, there was no loss associated with waiting, so one might equally state that it is irrational not to wait for further information. In real life it is always possible that new information emerges so in general it would be rational to wait. In this experiment this possibility was absent, but the experience of the students should still result in a preference to wait. The results of the experiments are therefore in my opinion not a proof of an irrational tendency to delay a decision. The most interesting question in the experiment is why half of the students did not wait for further information in the first place.

## 3.8 Testing the taxonomy

It is beyond the scope of this dissertation to test the relations between the decision traps described in the taxonomy. However it clearly is necessary to test the taxonomy.

This might be done by combining experiments on various biases in one experiment. If the taxonomy is correct the covariance between experiment-outcomes within one causal group should be higher than the covariance between experiments in different causal groups.

Bruine de Bruin et al. developed the A-DMC-test in which 7 different decision making components are tested, amongst which resistance to framing, overconfidence and resistance to sunk costs (escalating

[168] Tykocinski (2003)

commitment)[169]. They found a significant 0.23 correlation between framing and overconfidence but no correlation between escalating commitment and either framing or overconfidence.[170] The correlation between framing and overconfidence fits with the taxonomy; both are the result of the confirmation bias. Escalating commitment is the result of regret aversion and the absence of correlation between escalating commitment and both framing and overconfidence would therefore also fit with the taxonomy. However the confirmation bias is the result of the congruence bias, which is the result of regret aversion. Some correlation between escalating commitment and both framing and overconfidence would thus be expected. It may be that the number of steps between escalating commitment and framing and overconfidence is too high but the absence of any correlation may also point to a problem in the taxonomy. Further testing is definitely needed.

One way to test the taxonomy is to adapt the A-DMC to test for more decision traps. However, many experiments on decision traps are comparisons between two groups of participants. In these experiments one group of participants is presented with another description of the problem than the other group. The difference in the mean answer of the groups is then the measure for the decision trap. An example is the anchoring experiment described by Tversky and Kahneman[171]. In these experiments the values of 8x7x6x5x4x3x2x1 and 1x2x3x4x5x6x7x8 have to be estimated. The anchor consists of the outcome of the first part of the sequence, e.g. 8x7x6 in the first case and 1x2x3x4 in the second case. Since the anchor is lower in the second case the result-estimations are expected to be lower in the second case. Tversky and Kahneman found a median estimate of 512 in the group of participants presented with the ascending sequence. In the group of participants who were presented with the descending sequence the median answer was 2250. This difference is a clear indication of anchoring. However, when an individual would

[169] The A-DMC-test is available at http://sds.hss.cmu.edu/risk/ADMC.htm and http://journal.sjdm.org/vol2.6.htm
[170] Bruine de Bruin et al (2007), p. 945
[171] Tversky and Kahneman (1974), p.1128

be asked both variants of the same question, the problem would be recognized and the same answer would probably be given, even if someone felt the answer should be higher or lower[172].

In the A-DMC-test the recognition-problem is avoided by asking (a lot) of other questions between the two variants. This lowers the recognition-risk but cannot eliminate it.

A way to keep the group comparisons while being able to test for correlation between biases would be better. An experiment with random-drawn questions might be useful.

In such an experiment the questions which do not have to be different between groups are the same for all questionnaires. The questions which do have to be different between groups (like 8x7x6x5x4x3x2x1 vs. 1x2x3x4x5x6x7x8 to test anchoring) can be drawn randomly. In this way an online survey may be generated without the need to develop several different questionnaires. The random process of the different questions assures that all possible combinations of questions will be asked (given enough questionnaires).

The analysis of the results is accomplished by first drawing random small groups from the data. For these groups the mean answers to the different decision-trap-questions are calculated. For the questions which have different wordings the mean is calculated as the difference between the mean answer on the first question and the mean answer on the second question, for all other questions the arithmetic mean is used. The result is a single observation with mean scores for each trap. Repeating this process results in a dataset of such observations which may then be tested for association with e.g. Chi square or Spearman's Rho.

[172] This test would thus be a good test for the consistency bias if frame blindness could be shown with another test.

## 3.9 Conclusion

Different publications which mentioned possible causes of certain decision traps have been combined to form a taxonomy of decision traps. This results in four main sources of decision traps. The main sources of decision traps seem to be a few very human traits: memory distortion, regret aversion, learning by experience and problem simplification.

It must be noted that the causes mentioned in the publications are almost all in the form of hypotheses. Further research on these causes is clearly necessary. I described an experiment which might be used in such research but it is beyond the scope of this dissertation to validate the entire taxonomy described.

For the remainder of this dissertation I therefore assume that the causes which are named in the publications on decision traps are indeed the actual causes. The causes seem logical to me and are apparently not in contradiction with the behaviour observed in experiments by the authors of the publications.

With this reservation the conclusion is that most decision traps seem to be explained by the simple fact that we learn by forming hypotheses on the basis of our own experience. This experience is biased by our recollection and our wish to find a cause and be in control. Once we have formed a hypothesis we seek to confirm it, instead of falsifying it. And then, once we have accepted our hypothesis, regret aversion locks us into it when evidence to the contrary emerges.

# 4. Research approach

The purpose of this dissertation is to find risks and signals for decision traps. To determine these risks and signals semi-structured interviews were held with people who have been working in numerous different organizations, on an organizational level where decision making could be observed first hand. These people, from here on called the experts, were selected because it is my assumption that they are capable of comparing different decision making processes and are therefore more likely to observe and notice differences in decision making. These differences may point to risks and signals for decision traps.

The most important advantage of using semi-structured interviews is that this method leaves room for exploration in depth and detail. This makes it a good method to generate hypotheses. The major disadvantage is that the results are hard to interprete, which introduces personal bias. Due to the small amount of interviews the results are not representative and thus hard to generalize.

To reduce personal bias and increase representativeness, the interviews were divided in two phases. The first phase consisted of interviews with the interviewed people. In these interviews three decision traps have been presented. For each decision trap the following questions were asked:

- How often have you seen this decision trap occur?
- How do you recognize the occurrence of this decision trap?
- In which situations does this trap occur? Situation descriptors are e.g. the size, sector, age and level of growth of the company, profit or not for profit, the age, gender and hierarchical level of the decision maker etc.
- Do companies have mechanisms in place which prevent this decision trap from influencing the decision being made? If so, what are those mechanisms?

In the second phase of the research an email-survey has been sent to same experts. In this email-survey they were presented with up to 6 other decision traps, as well as the risks and signals which others

(including literature and my own thoughts) had identified. For each trap they were asked to indicate how often this trap occurs in reality. They were then asked to rate the risks and signals that others had suggested on a 7-point-scale indicating the level of agreement. Finally they were asked if they knew of any other risks or signals.

Not all decision traps were equally well recognized in the interviews. The decision traps which were not recognized in the first interview have been discussed in at least one other interview. If multiple interviews did not deliver risks or signals and literature did not suggest risks and signals either, the decision traps were not included in the emailsurveys. These decision traps will not appear in the checklist, because no risks and signals have been put forward in literature or interviews. This does not mean they do not exist. It just means they are not observed in business. This may also occur because there are effective controls in place, because the description in the interview-invitation was too vague or because people find it difficult to distinguish rational arguments from irrational thoughts if they point in the same direction.

Although the second opinion in the email-survey-round does mitigate the disadvantages of semi-structured interviews to some extent, this research is by no means proof of the risks and signals presented in the checklist.

I do believe that, given the purpose of this research: a checklist for possible decision traps, this lack of proof is acceptable. The aim of the checklist is to raise awareness and the occurrence of a signal or risk does not necessarily mean that the associated decision trap is indeed occurring. After all, this would not be the case if the risks and signals had been proven either.

# 5. Risks and signals

In the previous chapters the literature on decision traps has been presented and structured. There is little doubt that at least several of these decision traps do occur in experimental situations. However, the question remains whether they do occur in reality. This is dependent on three factors. First there is the principal likelihood of the trap occurring, probably equal to the findings in experimental situations. Then there are environmental factors that influence this likelihood. And finally there is the management control that reduces the likelihood.

The actual occurrence of decision traps can be described as:

*Decision trap occurrence = experimental likelihood × risk factors × management control*

The literature on decision traps has shown the experimental likelihood. Those that are not shown in experiments have simply not been included in this dissertation. The risk factors will be described in this chapter, possible controls in the next chapter.

The other side of the equation can also be evaluated. This is simply the detection of a trap occurring. The signals which may indicate that a trap is occurring are also described in this chapter.

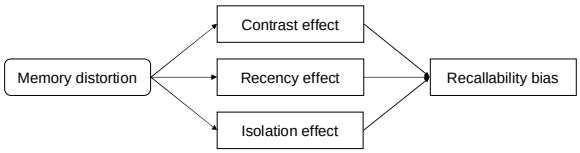
The theories deliver some risks and signals. To extend the range of risks and signals a series of interviews has been held in which senior managers and business consultants were asked whether they recognize decision traps and if so how they do that. The results are discussed in this chapter.

## 5.1 Memory distortion

Memory distortion traps are numerous. In this dissertation only the most well known ones are named because the use of human memory as the main source of information is always problematic, no

matter which bias. Human memory is simply too biased to be relied upon.

**Figure 5.1 Memory distortion traps**




### 5.1.1. Risks and signals in literature

Since the memory effects seem to be “hardwired” an obvious risk as well as a signal is the lack of information from verifiable sources. Whenever a decision is based upon “general knowledge”, “known truths” or “clear reasons”, it is likely that the information used is biased. The same goes for assumptions which are not tested. Even when the information used is obtained from verifiable sources like statistics, the ERP-system or accounting information, memory effects may influence the decision. The recency effect, contrast effect and isolation effect can result in the overweighing of recent, contrasting or remarkable information.

The recency effect causes the last information obtained to get a disproportional weight in the decision. A risk factor is therefore whether there is information that has to be waited for (e.g. the financial calculations). Chances are this information disproportionally influences the decision[173].

### 5.1.2. Results expert-interviews

The memory distortion traps were recognized by the experts, but no specific signals or risks were mentioned. These traps seem to be

[173] Tykocinski and Ruffle (2003), p. 152

difficult to recognize. When examples are given they are usually recognized, but even the experienced decision makers seem to be unaware of these traps.

### 5.1.3. Checklist for memory distortion

The memory distortion traps are, given the amount of research results and the level of recognition, probably very common. But people are not aware of them and the commonness makes it difficult to identify specific risk factors or signals.

There are two risks which are relevant in the business context. These are the waiting for information and the response to critical events.

| **Decision trap** | **Risk** |
|---|---|
| Recency Effect | Information on some aspects of the decision is available later |
| Isolation effect | Decision is taken in response to critical event |

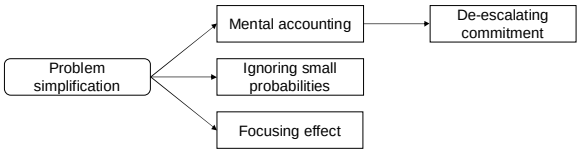
## 5.2 Problem simplification

There are four decision traps which are probably caused primarily by problem simplification:

- Ignoring small possibilities, even if the impact of the event is huge (e.g. earthquake insurance).
- Mental accounting which simplifies decision making by limiting the budget, either in money, time or effort. This reduces the number of possible solutions to be considered.
- De-escalating commitment as a result of mental accounting: once the budget is depleted the project is stalled.

- Focusing effect. By decreasing the number of factors considered relevant in the decision to one or a few, finding a solution is much easier.

**Figure 5.2 Problem simplification traps**




### 5.2.1. Risks and signals in literature

There are numerous publications on the effect of the format of numerical information, especially the use of frequencies vs. the use of probabilities. A risk factor for ignoring small probabilities seems to be the use of probabilities instead of frequencies. People are more used to making decisions based on observed frequencies than based upon the mathematical representation in the form of probabilities. When confronted with probabilities chances are the events with a low probability will be discarded as unlikely. “Absolute frequencies are consistently recognized as the format of choice for increasing or exaggerating the importance of statistical information using fairly low magnitudes (20% in Experiment 3 and 0.006% in Experiment 4), whereas single-event probabilities are consistently recognized as the format of choice for decreasing or minimizing the importance of statistical information”[174]

Accountability seems to be another risk factor. De-escalating commitment is more likely when expenses are traced or at least traceable. If there is a (mental) budget and expenses are traceable, then sunk costs more often lead to de-escalating commitment

[174] Brase (2002), p. 395, Newell, Mitchell and Hayes (2008), p. 317 support this conclusion.

because the violation of the budget, either self-imposed or external, becomes more easily visible[175].

Finally lack of experience is a risk-factor for problem simplification. The use of the diagnosis routine seems to be age- and experience-related. Dörner and Schaub[176] find that the average time experienced executives spend on goal elaboration is about twice the time student's use. This is not because the students understand the problem better: "Accordingly later on the executives exhibit in the average a neatly planned and well organized behaviour, whereas the students tend to muddle through". Chi et al found[177] that this difference may be caused by experienced decision makers responding to the underlying problem whereas less experienced decision makers are responding to the symptoms. Less experience in decision making thus leads to the risk that the problem simplification strategy focusing will result in solving the wrong problem.

### 5.2.2. Risks and signals suggested in expert-interviews

Budgeting was mentioned as a risk for ignoring small possibilities, since the costs of a project may increase significantly if small-probability-events are taken into consideration. Safety measures or timely replacement of critical equipment are examples of small probabilities which might be ignored to stay within budget.

Budgeting was also mentioned as a risk-factor for de-escalating commitment, especially when bonuses are linked to budgets or costs are strictly budgeted but results are not. In these cases the incentive to stay within the budget is strong whereas a reduction in the (quality of the) output will probably go unnoticed. Altering the goals near the end of the budget period may be signal for this.

The focus effect was related to negative experiences from past decisions. The perceived error in judgment is then overcompensated

[175] Heath (1995), p. 53
[176] Dörner and Schaub, (1994) p. 437
[177] Chi et al. (1981), p. 5

in future decisions. Focusing was also related to personal development plans and performance interviews. These systems tend to focus the attention on the less developed skills.

### 5.2.3. Possible other risks and signals

Not mentioned in the interviews but in my opinion an obvious signal of ignoring small probabilities is that small probability / high impact – scenarios have not been analyzed.

A signal of de-escalating commitment may be low customer- or employee satisfaction. Reduction of (the quality of) the output of the project will keep the project within budget but the customers or employees who will receive the project results will be less pleased. Low customer or employee satisfaction may thus be a signal of de-escalating commitment.

### 5.2.4. Support for risks and signals

De-escalating commitment was judged to be very likely. All of the risks and signals mentioned in literature and interviews were recognized in the review round. The risk rated as the absolutely highest risk was budgeting costs but not results. High visibility of costs is also judged to be a risk factor. The strongest signal is, according to the experts, hiring fewer consultants at the end of the budget period.

Experts differed in their opinions on how often ignoring small probabilities occurs in reality. Two experts thought it is likely this trap occurs, another completely disagrees. However, support for the risks and signals was unanimous.

Focusing was not very likely according to the interviewed experts. Decision makers without experience were judged to be more prone to focussing. Less experience decision makers are generally supervised by more experienced colleagues, so the trap is normally avoided. For small companies or start-ups the risk may remain.

Experienced decision makers did focus more on one aspect of a decision if that aspect was the cause of a negative experience. However, this was not to the extent that it dominated the decision.

### 5.2.5. Checklist for problem simplification

If there is a common signal or risk for the problem simplification decision traps, it is budgeting. Strict budgeting and high visibility of budget overrun are clear risk-factors, especially if the budget is one-sided, i.e. if results are not budgeted. This makes it easy to reduce the quality of results in order to meet the budget.

| **Decision trap** | **Risk** |
|---|---|
| Ignoring small probabilities | Budgeting<br>Formatting of small probabilities as percentages instead of expected number of cases |
| De-escalating commitment | Budgeting, especially budgeting costs but not results<br>High visibility of costs |
| Focusing | Low experience of decision maker |

| **Decision trap** | **Signal** |
|---|---|
| Ignoring small probabilities | Not analyzing small probability / high impact scenario's |

| Decision trap | Signal |
|---|---|
| De-escalating commitment | Less hiring of consultants near the end of the budget period<br>Low customer- or employee satisfaction<br>Altering goals near the end of the budget period |

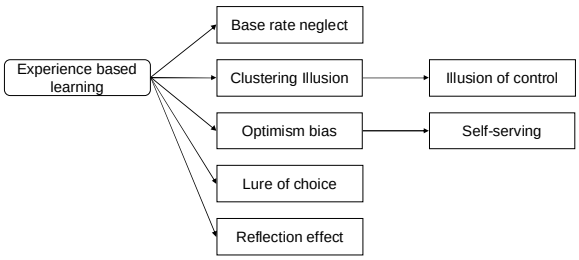
## 5.3 Experience based learning

There are seven decision traps which are probably caused primarily by experience based learning:

- base rate neglect, the failure to incorporate relevant probabilities into the judgment
- clustering illusion, the human tendency to detect patterns, even in random data
- illusion of control, the developing of habits to influence future events, even if these are clearly not influenceable
- optimism bias, the tendency to think that bad things won't happen to us
- self serving, the evaluation of information in a way which supports our own view of ourselves
- lure of choice, keeping options open, even if they are worse than the option lost.
- reflection effect, taking risks in the face of failure

The main mechanism of experience based learning is that we learn by doing. If we do things wrong, we do it differently the next time. If we do things right we do them the same next time. Because we usually do not do things differently the second time if we were successful the first time we create patterns of observations which are biased towards our own handling of problems and towards taking less risks when we have get positive results.

**Figure 5.3 Experience based learning traps**




### 5.3.1. Risks and signals in literature

As mentioned before[178] the format used to represent numerical data influences the weight these data get in the decision. Small probabilities are perceived as less significant when expressed as percentages (0,005% of the people each year) instead of absolute frequencies (500 people each year). In general the absolute frequency format is the easiest format for people to understand[179]. However as Brase points out using absolute frequencies has risks as well: “information providers may be particularly well served (or particularly ill served) by the use of absolute frequency information.”[180] The choice of format may thus be self serving. If the format used is different from the format regularly used, self serving may be occurring.

178 See p. 84

179 See also Gigerenzer (1991), p. 95, where Gigerenzer states that overconfidence and conjunction fallacy disappear when frequencies are use to describe the problem. The article is a critique of heuristics and biases, but in Kahnemans reply (*Autobiography*, 2003) the effect of the use of frequencies is supported. Kahneman subscribes the effect to the involvement of “system-II”-thinking induced by the presenting of frequencies.

180 Brase (2002), p. 397

### 5.3.2. Risks and signals suggested in expert-interviews

Denial of the real problem was mentioned in the interview round as a cause of optimism bias. Regret-avoidance results in (unaware) denial of the problem, which in turn results in the assumption that the symptom is the problem. The symptom is then expected to be easily solved. In reality either the problem proves to be less easily solved, or the symptom is solved and returns a few months or years later. As a serious risk-factor for regret-avoidance the family-company was mentioned. In these companies admittance of poor decisions has social consequences, increasing regret and thus regret-avoidance.

Another suggested risk factor for optimism bias was the absence of a counterpart with whom the decision can or should be discussed. Generally the superior has the counterpart-function, but in larger businesses colleagues may perform as counterparts as well. It is essential that the counterpart has sufficient knowledge to detect whether decision are based on too optimistic expectations.

A signal of optimism bias can be low or declining customer-satisfaction because expectations can not be fulfilled. Another signal may be large reservations “unforeseen” in costs-estimations or budgets. These may indicate that the lesson learned from previous projects is that budgets are always overdepleted. This is a way to compensate for optimism, but the optimism is apparently an accepted reality.

Another signal of optimism bias and self serving may be ambiguity. The more ambiguous a statement is, the more self serving it is judged to be. The example given was a collection agency: the more specific a debtor is about the date and amount of payment, the more likely the actual payment is.

Clustering illusion was recognized in the expert interviews. Strong opinions, ideas and emotions were judged to be risk factors for clustering illusion, because the will to see (confirmatory) trends is strong.

Finally the reflection effect was not recognized in the interviews. Risk aversion was judged to be higher in threatening situations. If e.g. a

person's job is at stake, people do not take more risks to show capability or display skill. The natural tendency is to "hide" and avoid errors.

### 5.3.3. Possible other risks and signals

A possible risk factor for the clustering illusion is the first-mover-ambition. Wanting to be the first mover means one has to detect trend changes the first. The need to detect the trend change first results in seeing trend changes faster than the data warrant (which may not be a bad thing. If acting on the trend change does not have serious risks, acting on ambiguous trends may be profitable).

Not comparing own results with peer group results may be a risk for base rate neglect. When results are attributed to own actions only, all external influences (like market growth) are neglected.

### 5.3.4. Support for risks and signals

Optimism bias and self serving were recognized by the experts, but the signals and risks were not. The only signal judged to be an indicator of optimism bias was ambiguity in statements, agreements or promises.

Strong opinions, ideas and emotions were judged to be risks for the clustering illusion. Organizations which have a first mover ambition are probably organizations of people with such strong opinions.

Not comparing performance with the peer group was judged a risk for base rate neglect in the review round.

Finally, the lure of choice was not recognized by the experts. People do like to have a choice, but they do not appear to sacrifice a good opportunity for the sake of choice.

### 5.3.5. Checklist for experience based learning

The checklist for experience based learning is short. In the literature as well as in interviews several risk factors and signals were

mentioned, but few were confirmed in the review round. Since the review round was a limited one, some of the theoretically convincing risk and signals have been included in the checklist. The justification is the “better safe than sorry”-argument. Absence of a counterpart and low or declining customer satisfaction have been included in the checklist for this reason.

| **Decision trap** | **Risk** |
|---|---|
| Base rate neglect | Not comparing results with peer group |
| Clustering illusion | Strong opinions, emotions or ideas |
| Optimism bias | Absence of second-opinion-counterpart with sufficient knowledge |

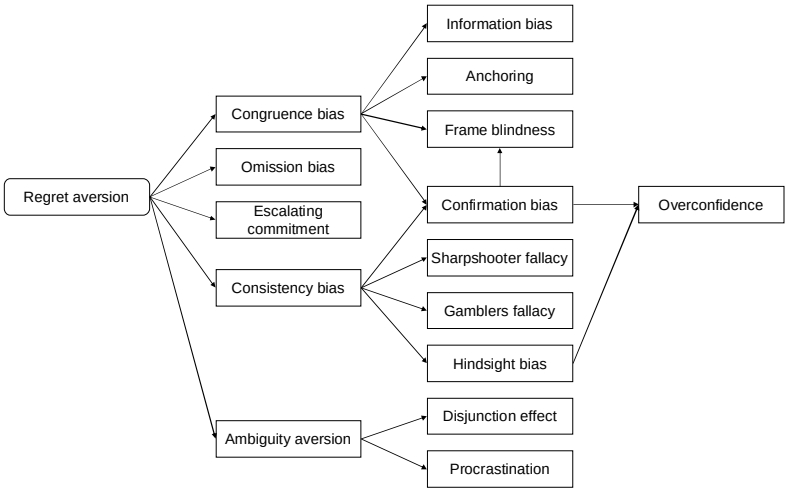
| **Decision trap** | **Signal** |
|---|---|
| Optimism bias | Ambiguity in statements, agreements or promises<br>Low or declining customer satisfaction |

## 5.4 Regret aversion

Regret aversion is the casual group with the best known decision traps. Anchoring, framing, overconfidence, escalating commitment: these are the traps people recognize best and they are all a result of regret aversion.

The traps which are the result of regret aversion are shown in figure 5.4.

**Figure 5.4 Regret aversion traps**




### 5.4.1. Risks and signals in literature

The risk factor most often mentioned in literature is accountability, especially when the consequences of failure are high like in a blame culture.

The effect of accountability shows even before a decision is made. Tetlock and Lerner[181] conclude that: “Decision-makers can become paralyzed in self-doubt, so anxious to avoid criticism that they take obsessive precautions against worst-case-scenarios and are easily distracted in environments with unfavourable signal to noise ratios”. This is especially the case if criticism is certain: “People are especially likely to resort to one of the trilogy of decision-evasion tactics -- buckpassing, procrastination and obfuscation -- when they feel accountable to two audiences who not only hold conflicting

[181] Tetlock and Lerner (1999), p. 572

views about what should be done but also hold each other in contempt."[182]

Escalating commitment is another effect of accountability: "A failure-fearing culture leads employees to perpetuate their mistakes"[183]. Of course accountability does not mean that a failure-fearing culture exists, but accountability does increase visibility. And in general the assumption is that high visibility of failure results in worse consequences for the decision maker, especially in blame cultures. This is why escalating commitment is an increased risk when decisions are taken by groups: "Group decision making amplified trends apparent at the individual level in terms of frequency with which escalation occurred and its severity."[184] The way in which groups discuss the problem is relevant: "Groups who make decisions after each individual has staked an initial position tend to continue failing projects, whereas groups who consider project information only as a group tend to abandon the same projects, more than individual decision-makers would."[185] This might be because staking initial positions increases the chance of someone "losing" the discussion. This is because terminating the commitment is a clear decision whereas continuation is not. The perceived loss of those who favour termination is therefore much less, if any, than the loss of those who favour continuation. This makes continuation the preferred decision when perceived loss is minimized.

The same effect occurs for the congruence bias. This bias is more likely if people have voiced their hypotheses or conclusions prematurely. This goes for individuals as well as groups. Atzioni advises executives that they "are best off when they refuse to commit to an initial diagnosis and so refuse to risk dignity and stature on what is inevitably an uncertain course."[186] In group discussions the same advice may be followed: "Well-defined groups with special interests - duelling divisions in search of budget increases, for

[182] Tetlock and Lerner (1999), p. 575
[183] Hammond, Keeney and Raiffa (2006), p. 123
[184] Whyte (1993), p. 430
[185] Moon, Conlon, Humphrey, Quigley, Devers and Nowakowski (2003), p. 67
[186] Etzioni (1989), p. 125

example - advocate for particular positions. Participants are passionate about their preferred solutions and therefore stand firm in the face of disagreement. That level of passion makes it nearly impossible to remain objective, limiting people's ability to pay attention to opposing arguments."[187]

Finally accountability and blame influence the evaluation of past decisions (and hence the level of learning from past mistakes). Collins points to the effect of blame on the evaluation of decisions: "When you conduct autopsies [of wrong decisions] without blame, you go a long way toward creating a climate where the truth is heard".[188]

The literature is quite clear on the effect of accountability and especially blame: it is responsible for a lot of adverse reactions in decision making.

One would expect the effect of accountability and blame to increase if the decision maker has more to lose: income, status, maybe even marriage. This is indeed the case. People who have a partner score higher on regret aversion, as do people with higher incomes. Also omission bias was found to be less when the decision maker has a low income, but higher if the decision maker has a partner. On the other hand: procrastination is lower when the decision maker has a partner and/or children[189].

Experience and education do pay off: Van Rooij and Teppa found that higher educated people score lower on regret aversion and that procrastination is lower when the decision maker is medium or higher aged[190]. Bruine de Bruin, Parker and Fischhoff found that lower age and lower education are risk factors for frame blindness. They also found that lower education is a risk factor for overconfidence[191]. Again, experience and education apparently help to control the traps resulting from regret avoidance. Off course, this

187 Garvin and Roberto (2001), p. 110
188 Collins (2001), p.78
189 Van Rooij and Teppa (2008), p. 31
190 Van Rooij and Teppa (2008), p. 31
191 Bruine de Bruin, Parker and Fischhoff (2007), p. 946

is not 100% valid. Bruine de Bruin, Parker and Fischhoff also found that higher age is a risk factor for escalating commitment[192].

The general picture emerging from literature is that accountability, blame and what's at stake aggravate the regret avoidance traps, whereas experience and education reduce them.

There are some other risk factors which are less generic. Omission bias seems to be aggravated by protected values. "Most people have some values that they think of as absolute, not to be traded off for anything. ... protected values will show stronger omission bias than will other values."[193] Overconfidence seems to be higher the more spontaneous the decision has been[194] and males tend to score higher on procrastination[195]. Finally large groups of decision makers may be more vulnerable to confirmation bias. The results of Driskell and Salas imply that in small groups centralization of decision making will result in a consultative decision making style since the decision maker needs the information input from all group members[196]. The risk of large groups then is that of all available information sources only those are selected that confirm the leader's opinion. A possible risk factor for confirmation bias is thus decision group size.

And then there is one decision trap which has a huge risk-factor. This is overconfidence. It is always to be expected. Only if explicit probabilistic predictions are made and precise feedback on the outcomes is provided overconfidence may be absent[197].

The signals which have been mentioned in literature are less abundant. The absence of alternatives and downsides in decision documents is mentioned more than once. "Receiving recommendations without contradictory data is a red flag indicating

192 Bruine de Bruin, Parker and Fischhoff (2007), p. 946
193 Ritov and Baron (1999), p. 80
194 Sniezek et al. (1990), p. 264
195 Van Rooij and Teppa (2008), p. 31
196 Driskell and Salas (1991), p. 477
197 Kahneman, Higgins and Riepe (1998), p.3

that your team members are falling prey to bounded awareness"[198]. "Business cases are often presented as a proposal with the aim of convincing the decision makers. Information on alternatives and downsides is therefore likely to be missing or underweighted".[199] Confirmation bias and framing are to be expected in these cases. Not testing the assumptions is another signal in this category[200].

Absence of measurable results may be a signal of regret avoidance: "One implication of our results is that, if people know about the effects of outcome knowledge, they may try to avoid such knowledge, especially if the effects of regret over a bad outcome are greater than the effect of rejoicing over a good one. Thus, investors who make more risky investments may try to make it more difficult for themselves to follow the ups and downs of their investments day by day (e.g. by making them through pension funds)"[201]

Some signals are hard to see: "Poor results, surprises (violations of expectations), inconsistencies and difficulties communicating with others are indications of a weak frame"[202] Poor results is too general to be used as a signal for frame blindness. Inconsistencies and difficult communication are difficult to detect to the relative outsider, but violations of expectations are more likely to be noticeable. These will result in adjustments in either budgets or results.

And finally, to make it just a little bit more confusing, confidence itself may be a signal of overconfidence. Sniezek et al. conclude: "These differences in amount of processing produced the unsettling result that those who were the most confident were also the least accurate."[203] Should we only take a decision if we are NOT confident we are doing the right thing?[204]

198 Bazerman and Chugh (2006), p. 93
199 Spetzer (2007), p. 462
200 Garvin and Roberto (2001), p. 116
201 Ritov and Baron (1995), p. 127
202 Hoch, Kunreuther and Gunther (2001), p. 147
203 Sniezek et al. (1990), p. 279
204 The experts on experience seem to agree. See p. 33. Off course there are two sources of low confidence: lack of knowledge and abundance of knowlegde. In between sits overconfidence.

### 5.4.2. Risks and signals suggested in expert-interviews

Overconfidence was seen as almost natural in the business environment. To start a business or to succeed in climbing the corporate ladder one has to be absolute confident of oneself. The ones that eventually reach the top have built a history of successes which reinforces this confidence even more. The result is that people who do not share this confidence are kept out of the top of the company. They are judged as not fitting in with the company's culture. The resulting lack of opposing opinions further reinforces the thought that the judgments of the companies leader are without flaw. Signals mentioned are a strong group culture, few or no external advisors, lack of opposing opinions and low customer satisfaction.

One of the biases which contributes to overconfidence is the confirmation bias. In the interviews experience was mentioned as a factor. Experienced people tend to show less confirmation bias. They appear to have learned to avoid this trap.

Frame blindness is another trap that occurs frequently. In the interviews the Anglo American culture is mentioned as a risk factor for frame blindness. The focus on solving problems quickly does not leave much room for contemplation on the possible source of the problem. Solving symptoms is the result which in turn results in recurring problems. If there are enough senior (in the sense of length of service) employees recurring problems may be detected. Lack of senior employees is therefore a risk factor for the occurrence of frame blindness. A lack of junior employees was also mentioned as a risk factor because new employees are usually more aware of the frames that are being used.

Large companies were reported as having a higher risk of frame blindness. The reason is that they are more likely to have developed a way to take decisions which is in fact a frame. Smaller companies do not have this experience and are thus more explorative in their process of finding a solution.

Large, bureaucratic organizations also have a higher risk of escalating commitment, probably because these organizations are

more prone to internal politics. To the decision maker the loss of reputation due to a terminated project is much higher than the costs of extra. This high-cost-effect is also an issue in family companies and Asian cultures. In these cultures the personal consequences of "failure" are severe.

Another risk factor is lack of knowledge at the budget-approving level. This increases the chance of approval in two ways: first because the amount of resources wasted is ambiguous, second because withholding approval attracts attention and might disclose the lack of knowledge. This risk is probably higher in technology-driven organizations. Technology drivenness also increases the risk of escalating commitment because these organizations tend to use a push-marketing-strategy rather than a pull-marketing-strategy. This reduces the feedback on project results from customers.

The wealth of an organization was also mentioned as a risk factor. If profit margins or budgets are high, the costs of escalating commitment are not threatening to the organization. Finally, organizations with relatively few new employees have a higher risk of escalating commitment. This is because there are fewer people to observe the project with enough distance to see the widening gap between expectations and realizations.

A signal for escalating commitment, besides the obvious increasing budgets, is low customer or employee satisfaction. This is due to the postponement of results or the lack of quality when results are finally delivered.

Procrastination is another decision trap which is occurring very often. The decision to terminate an unsuccessful project was given as an example of procrastination. This decision is almost always not taken, because the project initiator fears this has a negative impact on his or hers performance record. A signal of this happening is projects which are completed but do not result in implementations. If there is no implementation, the result of the project is usually the conclusion that the project is not feasible. It is rarely the case that this infeasibility shows on the last day of the project. Much more likely is the wish to "hide the defeat" by not drawing any attention to the

project. Taking the decision to stop the project would draw attention and is therefore avoided.

Risk factors for procrastination are blame culture, low trust, hard targets and small projects. A blame culture is increasing the negative effects of “failure” while low trust in the other parties involved in the decision is increasing the (perceived) likelihood of “failure”. If hard targets are used taking the decision to terminate a project will probably affect the measured performance, whereas useless completion of a project or lowering quality to reach the target-numbers will not. On the other hand the absence of clear goals was also mentioned as a risk factor. This is because a lack of clear goals creates uncertainty about the way in which initiatives will be received. Finally, small projects are a risk factor because the gain from termination is small compared to the risk of blame.

Omission bias was also judged to occur frequently, especially if decisions concerned people. The feeling of responsibility if an active decision is made is much stronger if the decision influences people instead of budgets or products.

### 5.4.3. Possible other risks and signals

When information for different aspects of the decision is not provided at the same time the decision may be biased towards confirming the initial hypothesis which will be based on the first information available. Receiving information on different aspects with large time-intervals may thus be a risk for congruence bias. Another risk may be the lack of testing of assumptions. If assumptions are not tested, it is likely they will be biased towards confirmation of the preferred outcome.

Large time-intervals may also result in the disjunction effect. If decisions are postponed until information from a certain source (e.g. finance report, marketing report) is available, this information may very well get disproportionate weight in the final decision.

### 5.4.4. Support for risks and signals

Procrastination was judged to be the most likely decision trap to occur. Of the tested risk factors for procrastination relatively few were supported by the reviewing experts. Risk factors which had been mentioned in literature were e.g. not recognized by the experts. The risk factors that were recognized were however scaled as high risk factors, which may explain the lower scores for the other risk factors (due to the contrast effect, see p. 43). The risk factors which were unanimously scored as highly relevant were blame culture and low or invisible costs of not deciding. Accountability, SMART-targets, a low trust environment, the absence of clear goals and male decision makers were also judged to be risk factors.

Blame culture is also a risk factor for escalating commitment, as well as large organizations, lack of knowledge at the budget-approving level and few new employees. Group decision making was confirmed to be a risk factor for escalating commitment as well as for confirmation bias. Missing alternatives and downsides in the decision document were judged to be a signal for confirmation bias.

Frame blindness was also judged as a bias which occurs frequently. Low education of the decision maker is the highest risk factor, recurring problems the best signal. A business culture based on action (getting things done) is another risk factor because this culture does not promote the exploring of problems.

Omission bias seems to be a typical people-related decision trap. This bias was judged to be especially likely if the decision concerned people or strong moral opinions were involved.

Finally, if information on some aspects of the decision is available earlier, congruence bias was judged to be more likely.

### 5.4.5. Checklist for regret aversion

The checklist for regret aversion is the longest one. This is off course no surprise since most of the traps in the taxonomy are related to this cause.

| **Decision trap** | **Risk** |
|---|---|
| Procrastination | Blame culture and low trust environment<br>Low or invisible costs of not deciding<br>Accountability, a.o. SMART-targets<br>Absence of clear goals<br>Male decision makers |
| Frame blindness | Low education of decision maker<br>Action-promoting-culture |
| Escalating commitment | Blame culture<br>Group decision making<br>Large organizations<br>Lack of knowledge at the budget-approving level<br>Technology-driven product development<br>High profits<br>Few new employees |
| Confirmation bias | Group decision making |
| Omission bias | Decision affects people<br>Decision maker has strong moral opinions |

| Decision trap | Risk |
|---|---|
| Congruence bias | Information on some aspects of the decision is available earlier |

| Decision trap | Signal |
|---|---|
| Overconfidence | Group culture<br>No or very few external advisors<br>Low customer satisfaction |
| Frame blindness | Recurring problems |
| Escalating commitment | Increasing budgets<br>Low customer/employee satisfaction |
| Confirmation bias | Missing alternatives and downsides |

## 5.5 Decision traps, a checklist

In the previous paragraphs, a checklist has been constructed for each of the four groups of decision traps. In this paragraph the complete checklist is presented.

The general idea of the checklist is that if a certain decision trap scores high on risks and signals, it is not only likely that this decision trap occurs, it is also more likely that other decision traps in the same causal groups are occurring. This is a hypothesis which needs further testing, but as long as this is not the case: it won't hurt to be at guard against these other traps.

### 5.5.1. Risks-checklist

The risks mentioned in the last column may appear more than once since some risks are more related to the complete causal group than to individual traps. Other risks may influence different causal groups, usually in opposite ways.

| Trap cause | Decision trap | Risk |
|---|---|---|
| Memory distortion | Recency Effect | Information on some aspects of the decision is available later |
| | Isolation effect | Decision is taken in response to critical event |
| Problem simplification | Ignoring small probabilities | Budgeting<br>Formatting of small probabilities as percentages instead of expected number of cases |
| | De-escalating commitment | Budgeting, especially budgeting costs but not results<br>High visibility of costs |
| | Focusing | Low experience of decision maker |
| Experience based learning | Base rate neglect | Not comparing results with peer group |

| Trap cause | Decision trap | Risk |
|---|---|---|
| | Clustering illusion | Strong opinions, emotions or ideas |
| | Optimism bias | Absence of second-opinion-counterpart with sufficient knowledge |
| Regret aversion | Procrastination | Blame culture and low trust environment<br>Low or invisible costs of not deciding<br>Accountability, a.o. SMART-targets<br>Absence of clear goals<br>Male decision makers |
| | Frame blindness | Low education of decision maker<br>Action-promoting-culture |
| | Escalating commitment | Blame culture<br>Group decision making<br>Large organizations<br>Lack of knowledge at the budget-approving level |

| Trap cause | Decision trap | Risk |
|---|---|---|
| | | Technology-driven product development<br>High profits<br>Few new employees |
| Regret aversion | Confirmation bias | Group decision making |
| | Omission bias | Decision affects people<br>Decision maker has strong moral opinions |
| | Congruence bias | Information on some aspects of the decision is available earlier |

### 5.5.2. Signals-checklist

The signals-checklist is a lot shorter than the risks-checklist. However, if observed, the signals may provide a strong argument for action, especially if the risk factors are present.

| Trap cause | Decision trap | Signal |
|---|---|---|
| Problem simplification | Ignoring small probabilities | Not analyzing small probability / high impact scenario's |

| Trap cause | Decision trap | Signal |
|---|---|---|
| | De-escalating commitment | Less hiring of consultants at the end of the budget period<br>Low customer- or employee satisfaction |
| Experience based learning | Optimism bias | Ambiguity in statements, agreements or promises<br>Low or declining customer satisfaction |
| Regret aversion | Overconfidence | Group culture<br>No or very few external advisors<br>Low customer satisfaction |
| | Frame blindness | Recurring problems |
| | Escalating commitment | Increasing budgets<br>Low customer/employee satisfaction |
| | Confirmation bias | Missing alternatives and downsides |

## 5.6 Conclusion

In the interviews and the following emailsurveys a shortlist of risks and signals for decision traps has been constructed. The starting point has been the taxonomy of decision traps which was presented in chapter three. The suggestions for risks and signals made by the authors of the various articles were collected and then enlarged in a round of interviews with people who have observed decision making in different organizations. To increase the validity of the risks and signals they have been rated in an emailsurvey by other experts.

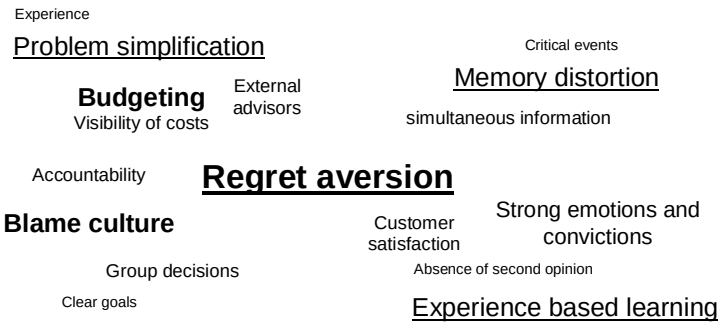
The general picture emerging from the research is that the resulting checklist is short. The items on the checklist are furthermore very diverse. This indicates that there are more risks and signals to be discovered.

The results do seem to support the taxonomy. There are risks and signals which have been mentioned for more than one decision trap. These risks and signals are found in the same causal group, although budgeting is found in problem simplification as well as regret aversion. Some risk and signals are found to work in opposite directions in which case they are pointing to different causal groups. The simultaneity of information is an example. If information on different aspects of the decision is not presented simultaneously, the information which is presented first causes the congruence bias: it sets the hypothesis. The information which is presented later will get a disproportionate weight due to the recency effect.

A way to summarize the checklist is the tag cloud. This is a cloud of words which are printed bolder and larger if they are more related to the subject at hand, in this case decision traps. The word tag refers to the links between internet pages: the more links between pages on one subject and pages on the other subject the stronger the relation between the two is perceived to be. In the typical internet application the location of the words relative to each other has no meaning. In the tag cloud presented here, the location is relevant: if words are close they are related to each other.

The tag cloud shows regret aversion as strongest related to decision traps. Budgeting and blame culture are also strongly associated with decision traps. Budgeting is influencing both regret aversion and problem simplification.

**Figure 5.5 Decision trap tag cloud**




It is noteworthy that there are some risks in the checklist which are part of the control function. In other words: the way organizations are controlled seems to create opportunities for decision traps. Budgeting is the most obvious culprit, but simultaneity of information (in e.g. balanced score cards) and visibility of costs are important as well. These will be discussed in the next chapter, which is about how to control decision traps.

# 6. Management Control

## 6.1 General management control theory

In this chapter two well known management control theories, by Simons and by Merchant, will be briefly summarized and then related to the main causes of decision traps.

The relation of management control system and decision traps is twofold. On the one hand the management control system can be used to control decision traps. On the other hand management control systems themselves can be a risk factor in the occurrence of decision traps.

How controls can be a risk factor will be discussed in the first two paragraphs.

The control systems that can be used to control decision traps will be discussed in paragraph 6.2 where some specific control measures are described.

### 6.1.1. Simons' levers of control

The best known management control theory is probably the levers of control by Robert Simons. In this theory the control system consists of four subsystems:

- Diagnostic control system. The diagnostic control system is basically the comparison of results with plans. They focus on defining plans or budgets, then measuring results and finally comparing the two.
- Boundary system. These are the "rules". The boundary system describes the limits within which the organization, and thus its members, can operate.
- Beliefs system. This is the system that focuses on things like mission, goal, meaning and purpose. The aim is to provide a

framework which is to be used to evaluate the creative process in the organization.

- Interactive control system. The interactive control system is aimed at the support of creativity. The diagnostic and boundary system can be very strict, thereby hampering innovation. The interactive system is used to give innovation and creativity a chance.

The four subsystems are complementary. They are "working together to control both the implementation of intended strategies and the formation of emergent strategies"[205]. Simons clusters the four subsystems into two categories. The beliefs and interactive control systems are used to motivate people to be creative in reaching the companies goals. Simons calls these the positive systems. The diagnostic control and the boundary systems are the "negative" systems used to keep this creativity within the limits of goals and budgets.

### 6.1.2. Are the levers of control linked to causes of traps?

The question which control systems are vulnerable to which decision traps seems to be a question of positive and negative systems.

The memory traps and the learning by experience traps are probably related to the positive control systems, whereas the problem simplification and regret traps are probably more related to the negative control systems.

The memory traps are most likely to incur in a situation where the focus is not on correct and complete information but rather on creativity, speed and agility. In these situations people are more likely to use first impressions and recollections from memory instead of statistics and accounting information.

The decision traps which have learning by experience as their main source are basically the result of people creating theories and then

[205] Simons (2000), p. 304

seeking to confirm them. This results in overoptimism, clustering illusion etc. The main vulnerability in this process is the confirmation-part. The devaluation of disconfirming evidence and the search for confirming evidence is more likely to occur in a control system which emphasizes new ideas and experiments, like the belief and interactive systems do.

Problem simplification traps are more likely to occur in situations where the diagnostic system is the principal system. These traps occur in situations where boundaries are well defined. Mental budgeting e.g. is reinforced by a diagnostic control system which adds performance evaluation to the mental budget. The time pressure of a diagnostic budget may also result in skipping the problem exploration phase.

The regret traps are more likely to occur in situations where wrong decisions (or good decisions with “wrong” outcomes) are actively monitored and punished. The diagnostic system is clearly a risk factor for regret traps, but a well developed boundary system is also more likely to keep people well within the boundaries since the potential regret of an out-of-boundaries-decision is higher.

### 6.1.3. Are the solutions linked to certain levers of control?

It might be that the solution for each trap may be found in the opposite corners of the levers of control-diagram. The memory traps are more likely to occur in the positive control systems. A solution might be found in the boundary system (“business cases are built on statistics”) and the diagnostic system which will provide feedback on solutions.

Problem simplification traps are most likely to occur in negative control systems. Strengthening the interactive control system to enhance creativity may be very helpful because it promotes looking at problems in different ways. Enhancing the belief system may also help because it focuses the decision maker on the purpose of the organization and therefore broadens the scope, which reduces focussing effects.

Learning by experience traps are best avoided by providing feedback on decisions for which the diagnostic control system is well equipped. And finally the regret traps are probably best avoided by interactive systems which allow experimenting and learning.

### 6.1.4. Merchant's controls

Merchant's people-, action- and results-controls scheme is another well known structuring of management control systems. The people controls are divided by Merchant in personnel controls and culture controls. There are thus 4 controls:

- Personnel controls. These are aimed at motivation, knowledge and targets of the people working in the organization. Controls are a.o. education and function design.
- Culture controls. The aim of this control is to create a company culture with shared beliefs. Controls are a.o. codes of conduct, group-reward-systems and the "tone at the top".
- Results controls. The results controls are aimed at reaching the results that were planned. The controls consist of plans, targets and result measurement.
- Action controls. The action controls are aimed at the control of activities. They limit behaviour to the activities which are assigned and/or prohibit certain activities.

The controls Merchant describes seem to be variants of the Levers of control Simons describes. The culture controls are comparable to the belief system, just as the results control is comparable to the diagnostic system. The boundary system seems to be a part of the action control.

The biggest difference between Simons and Merchant controls is the difference between the personnel control and the interactive system. Though both are related to people skills the focus of the control is quite different. In Simons' system the interactive control system is explicitly designed to allow bottom up strategy formation, whereas in Merchants system the personnel control is a way to align people's capabilities with the strategy that was chosen.

Another difference might be that in Merchants system the reward is explicitly added to ensure that the strategy is indeed realized. This is however not contradictory to Simons' system and it is highly likely that rewards are a "natural part" of Simons' system.

### 6.1.5. Simons or Merchant?

The controls which are mentioned in the literature on decision traps are more easily structured in Merchants system than in Simons' system. The most important reason is the importance of awareness. As stated by Hammond, Keeney and Raiffa the first, and probably most important, step in dealing with decision traps is the knowledge that they do exist[206]. This awareness is hard to place in the levers of control system but falls naturally into Merchants personnel control. Feedback on decision results is a function of the results control and encouraging problem exploration is an action control.

## 6.2 Decision trap controls

In his research on decision making Mintzberg concluded that decision making controls "tend to be implicit and informal, taking place in the mind of the decision maker, and to leave little trace of themselves."[207]

To the controller this must be an explanation as well as a challenge. The explanation is that without control there is no feedback on decisions and therefore no guidance. Failure to reach the goals is then almost inevitable. Which explains why decision traps cost so much money[208]. The challenge is to offer those controls.

In the research for this dissertation some controls did surface. They may be grouped in four categories: allowing failure, creating awareness, generating feedback and promoting exploration. These

[206] Hammond, Keeney and Raiffa (2006), p. 2
[207] Mintzberg et al. (1976) , p. 261
[208] See p. 12

are not controls which can be summarized in a graph or annual figure. But they are definitely controls which are within the reach of the controller and which will strengthen the position of the controller as a business partner.

### 6.2.1. Allowing failure

There is one control which may need loosening. That is accountability. Ignoring small probabilities, de-escalating commitment, escalating commitment, procrastination, in fact probably all regret avoidance traps are aggravated by accountability.

Accountability in itself is probably not the problem. Blame culture and fear of failure are the real culprits. A good example is a project celebration which was recalled in an interview. The project was a feasibility study and the study was prematurely ended as soon as it became obvious that the project would not be feasible. This saved part of the budget for the feasibility study, which was celebrated. Needless to say, most spectators did not understand this. The culture in our companies is that results matter and that failure is not an option. This may sound motivational, but the reality seems to be that this culture results in exactly the opposite.

If the controller is to help avoid decision traps, the first priority is probably to put accountability into perspective. The direct coupling of measurable performance and reward results in people hiding their ideas and lessons learned. In short: accountability will not get the job done: it will keep undone jobs hidden. Expanding accountability towards rewarding new ideas, risk taking and learning from mistakes may be a big step towards reducing the costs of decision traps.

A first step towards expanding accountability is defining clear goals. Clear generic goals guide the decisions in an organization much better than subgoals which tend to become separated from the generic goal[209]. The first reason is the frame they provide. Using the same frame throughout the company avoids miscommunications.

[209] Geelen and van de Coevering, p. 17

The second reason is that a generic goal is usually related to the output. Budgets are usually related to input which makes them vulnerable to output-manipulation. A clear goal makes it easier to reconsider the budget because in the end it is not the budget that matters but whether or not the goal is reached. Off course the controller has to make sure that targets are indeed output-related, not input-related. Furthermore, the controller needs to check the validity of the frame the company uses.

Another step is changing the culture towards one that rewards trying. Examples are companies like 3M and Google which expect their employees to devote part of their time to trying new things. This results in new products but more important is the message it contains: you can try anything you want, we don't expect success. This creates an atmosphere in which not failing means you are not trying hard enough. And that is quite different from the usual failure-taboo.

### 6.2.2. Creating awareness

As Russo and Schoemaker as well as Hammond et al. have already said: creating awareness is a major step towards controlling decision traps[210].

There are several ways to create awareness. The first step usually is providing information. If people know what decision traps are they might recognize one if it occurs.

Company guidelines on decision making may also help. For example, companies could use the 6-hats- or Dialog Decision Process-techniques as standard decision making tools[211]. Another - highly visible - one is constructing a list of assumptions: "Top executives may not be aware of all the assumptions a company makes, so they should ask colleagues throughout the organization to help construct such a list."[212]

[210] Russo and Schoemaker (1992), p. 12-13
[211] See p. 121
[212] Schoemaker and Gunther (2006), p. 7

Finally, reporting successes helps creating awareness. Celebrating "failure" helps in two ways: it assures people that it is indeed safe to show "failure" and it again focuses attention on the subject of decision traps.

### 6.2.3. Generating feedback

Many, if not all, decision traps may be tackled by adequate feedback on the results of decisions. A good decision outcome does not proof that the decision process was good, but a series of bad decision outcomes provide an incentive to check if the decision making process needs improvement.[213]. This is however a tad late. Earlier feedback might considerably reduce the damage. As shown in this paragraph it is possible to get earlier feedback.

*Feedback on decisions*

Most feedback will be directed towards the decision makers themselves. If they are willing to evaluate their decisions open-mindedly this feedback may help improve decisions. However there are traps like the hindsight bias and the confirmation bias which influence the evaluation process itself, hampering the learning effect. For this reason it is important that decision makers document their decisions. This may prevent hindsight and confirmation, thus enabling learning by experience.

A more systematic way of providing feedback on decisions is the task of the management control department. Providing feedback on user satisfaction and customer satisfaction is a great way to create direct links between action and effect, avoiding the static of intermediate goals, CPI's etc. The same goes for providing feedback on results. Showing the progress of projects not only in terms of budget, but also in terms of timeliness and quality of intermediate results will help to monitor decisions.

[213] E.g. "Systematic feedback works, even though it only treats the symptoms of overconfidence", Russo and Schoemaker (1992), p. 11-13

Zooming in on the decision making process itself can begin with checking assumptions. Assumptions can be checked by comparing the distribution of outcomes on the assumed parameters with the assumptions. The difference should be evenly distributed between the positive and the negative domain and the tails should be diminishing quickly. If not, traps like overconfidence, optimism bias or the memory traps might be systematically influencing decisions in the organization. Off course the management information system should collect information on the assumptions and data used for making decisions. This collection process itself might even help to avoid the memory traps, because it gives an incentive to collect data from external sources.

Finally, feedback on decisions may be provided by consultants who are hired to solve recurring problems. They are able to confront the decision maker with the result of the last decision and may try to discover the underlying problem. Off course this is not always in the interest of the consultant. It might disqualify a solution the consultant helped establishing or reduce the expected revenue for the consultant's firm. The controller does have a role in this. If the same consultants are regularly hired to solve the same (or almost the same) problem, it might be advisable to change consultants and find the underlying problem.

*Feedback on information*

Another way of feedback is feedback on the information which is used. Collins mentions Churchill as an example of someone double-checking every bit of information, not only to see if the information is correct, but also to check whether contrasting information has been left out: "Churchill ... created an entirely separate department outside the normal chain of command, called the Statistical Office, with the principal function of feeding him, continuously updated and completely unfiltered, the brutal facts of reality."[214] These brutal facts are very important according to Collins: "One of the dominant themes from our research is that breakthrough results come about by a

[214] Collins (2001), p. 73, reference to W. Churchill, *The Grand Alliance*, 1950, p.371

series of good decisions ..... The good to great companies displayed two distinctive forms of disciplined thought. The first ... is that they infused the entire process with the brutal facts of reality. The second ... is that they developed a simple yet deeply insightful, frame of reference for all decisions"[215]

Confronting the brutal facts is worded almost the same by Schoemaker and Russo in their advice on managing frames: "Become brutally realistic. Collect disconfirming evidence. Ask other people … No matter how disturbing it is, use this feedback to improve your frames".[216]

Feedback on information is possible before the decision is made. This makes feedback on information a very powerful tool in controlling decision traps.

One way to "confront the brutal facts" is to externalize the information gathering, sorting and general decision preparation. In the interviews this was mentioned as an instrument used by large organizations to rationalize decision making for large investments. In the ideal form the factors and weights which should be used to decide are agreed upon before the decision preparation begins. This assures that the decision outcome is not influenced by personal preferences (since it is not possible to steer the decision by reweighing and dropping factors).

Another way of confronting the brutal facts is confronting uncertainty. "Overconfidence was reduced substantially by simple skipping best guesses and moving directly to ranges."[217] Showing uncertainty in the figures will result in more careful decision making.

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[215] Collins (2001), p. 69-70. Aligning operational decisions to strategic goals is one of the key elements of integral performance management, described in Geelen and van de Coevering (2005). In this performance management system the link between strategic goals and operational processes is made explicit. The strategic goals are used througout the organization, they are not decomposed into subgoals.

[216] Hoch, Kunreuther and Gunther, p. 154

[217] Russo and Schoemaker (1992), p. 11

*Feedback on ideas*

Decisions are not made on information alone. They result from ideas about problems that need to be solved or opportunities that emerge. As mentioned in paragraph 2.2.1 on the decision recognition routine, the decision maker is not addressing every single decision opportunity that arises for several reasons. Some of these reasons are valid, like other problems which are more important or more urgent. Other reasons are less valid, like lack of knowledge of the problem or conflicting interests.

To avoid the less valid reasons, General Electric has developed a system in which decision makers have to address the problems. "General Electric used 'work out': groups of employees meet to discuss opportunities for improvement and make concrete proposals. Upper managers are not allowed to participate in the discussion, but must make on the spot decisions about the proposals – in front of the whole group – he or she can not run, hide, evade or procrastinate"[218]. Off course this system needs an environment in which it is safe to address problems management would rather not be aware of.

### 6.2.4. Promoting exploration

Exploring the problem is an important way to reduce decision traps. Especially when the focus of the organization is on solving problems, meeting deadlines etc. the risk of solving symptoms is substantial.

The idea of counterargumentation is important in exploring the problem[219]. Counterargumentation is a way to force exploration all sides of the problem. Dialectic inquiry and the devil's advocate are ways to provide counterarguments. The problem is that these methods rely on outsiders to provide the counterarguments. This might result in ignoring the counterarguments. A way to force

[218] Collins and Porras (2005), p. 188
[219] Russo and Schoemaker (1992), p. 12-13

decision makers to think of their own counterarguments is probably better.

One such method is the rank order: “Groups instructed to rank order the alternatives, compared to groups instructed to choose the best alternative, were more likely to fully consider all of the alternatives, exchange information about unpopular alternatives, and make the best decision.” [220] Robbins has developed a method called nominal group technique which adds brainstorming to the ranking. The method consists of four rounds. In the first round people write down their own ideas without interaction with others. In the second round these ideas are presented to the others, without discussion. In the third round the ideas are discussed and in the fourth round each group member ranks the ideas individually. By following this procedure independent thinking is not hampered, but in the end the decision is taken by the group.[221]

Another simple method is the time reversal, suggested by Collins[222]. This method is especially useable in omission bias situations. It simply consists of the question: if I had to take action to preserve the status quo, would I do that? If the answer is no, taking action to alter the status quo might be advisable.

The rank order and time reversal are simple and fast ways to improve exploration, but it is limited to the decision phase. A method which is usable in the entire decision making process is the Six Thinking Hats of De Bono.

De Bono uses hats to get people to assume a specific role. There are six hats, each characterized by a different colour:

- White. The wearer of the white hat focuses on facts.
- Red. This is the feelings- and emotions-hat.
- Black. This is the critic, focusing on points where the decision may be wrong.

[220] Hollingshead (1996), p. 181
[221] Robbins (1992), p. 140
[222] Collins (2001), p. 58

- Yellow. The optimist who describes which benefits and rewards the decision will bring.
- Green. The creator of new ideas who sees possibilities.
- Blue. The organizer who makes sure things happen.

In each decision phase the hats can be used to create counterargumentation, even if there are no other persons present. This makes this method a very effective tool in counteracting decision traps.

Another method is the Dialog Decision Process.[223] This method splits the decision making process in four steps. The steps are:

- Framing, the diagnosis routine
- Alternatives, the search and design routines
- Analysis, the screen and choice routines
- Connection, creating a solution that incorporates the best aspects of the alternatives considered

Each step is finished with a report to the decision makers on the results of the step. This reporting in stages ensures that problem elaboration gets enough attention and that tunnel vision is avoided.

A relatively easy and fast way to promote exploration is to make sure new people enter the organization. As new employees, free-lancers, consultants or interim managers. As long as they are free to voice their questions on the problems facing the organization, answering their questions will result in problem exploration.

## 6.3 Conclusion

The conclusion of this chapter is that the controller has methods to control decision traps. However, it is necessary to take the step beyond budgeting to being the partner in business. As long as the controller sticks to the figures, the main function of the controller: providing the check and balance in business, can not be fulfilled

[223] Spetzer (2007) contains a description of the GM-decision making process.

because the area where this check and balance is needed most is the soft, human side of business.

Allowing failure, creating awareness, generating feedback and promoting exploration are useful controls and they are within reach of the controller. But the main challenge remains to get the problem on the corporate agenda in the first place. The checklist may help to achieve this, but as Mintzberg already noticed: providing a solution may also be very helpful in getting the problem recognized[224].

[224] See the trigger “match” on p. 20

# 7. Conclusion

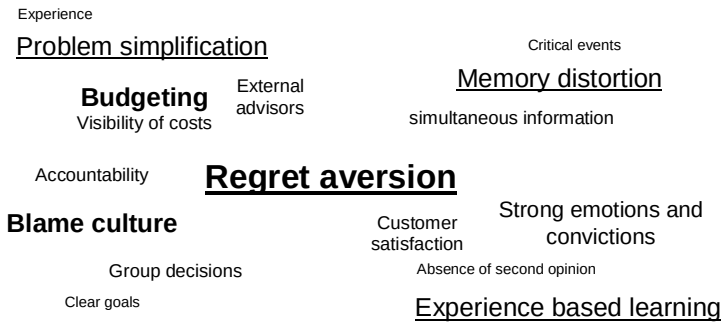
This research has started with the construction of a taxonomy of decision traps. In this taxonomy decision traps can be explained by the simple fact that we learn by forming hypotheses on the basis of our own experience. This experience is biased by our recollection and our wish to find a cause and be in control. Once we have formed a hypothesis we seek to confirm it, instead of falsifying it. And then, once we have accepted our hypothesis, regret aversion locks us into it when evidence to the contrary emerges. The four main causes of decision traps are thus memory distortion, problem simplification, experience based learning and regret aversion.

The four causes are not human defects or organizational faults. On the personal level they may very well have helped people to survive since prehistoric times. However, organizations are not people. They are far less vulnerable and can therefore take far greater risks. And in the event a risk proves fatal, they have the ability to re-emerge, whether with only a new name or in the form of people moving on to other companies, taking experience and ideas with them.

Problems arise when decision makers use their personal decision system to make organizational decisions. This results in decision traps because risks that are worth taking are not taken and decisions that may hurt the decision maker personally are not taken either, beneficial to the organization or not.

The main hypothesis of this dissertation was to find a way to detect these decision traps. The conclusion of the empirical research is that it is indeed possible to detect decision traps. Several risks and signals have been found. They are presented here in a “tag cloud”, the complete checklist may be found in appendix II.

**Figure 7.1 Decision trap tag cloud**




The tag cloud shows regret aversion as strongest related to decision traps. Budgeting and blame culture are also strongly associated with decision traps. Budgeting is influencing both regret aversion and problem simplification. The way information is supplied affects decision making but corporate governance issues like second opinions and clear goals are also important.

With the checklist the controller has an instrument to show possible weaknesses in the decision making process. This will enable the controller to go beyond internal control and financial reporting into the field of “soft skills”. This will no doubt be difficult since it focuses on the heart of management itself: decision making. But there are substantial profits to be made and costs to be avoided with controlling decisions.

If decision traps are detected, the question is how to counteract them. In other words: how to get decision making in control. This research shows that there are four groups of controls available: allowing failure, creating awareness, generating feedback and promoting exploration. Allowing failure is about handling budgeting and accountability. These instruments are designed to guide decision making but they seem to be used to blame people for bad

results. Or at least: that is what people think they are used for (which does not alter the effect). The budgeting and accountability-controls need expansion. The focus has to shift from costs to results. Furthermore they need to incorporate the rewarding of trying. If not, they hamper innovation and progress.

Promoting exploration seems to address the same point, but it is also about identifying risks. The key point is to be aware of the frame that is used and to think “out of the box”, i.e. to use other frames. Creating awareness and generating feedback are methods to improve decision making by educating decision makers, either through information on the process of decision making or through information on the results of their decisions (taking into account the difference between poor decisions and poor results).

This dissertation has started with the observation that the research on decision traps has resulted in a vast number of decision traps, but not in a framework which explains them. Evolution theory does provide an explanation of why they exist, but offers no cues to control mechanisms. Therefore an attempt to provide a taxonomy which does offer cues to controlling decisions has been made. The main conclusion about the taxonomy is that it is a theory which has to be tested.

Another “missing link” is the step from experimental observation to real life occurrence. Being able to show a decision trap in laboratory conditions does not mean it also occurs in real life. The empirical results indicate that some decision traps are indeed very common whereas others are probably not occurring in reality, at least not in business decisions.

With the question whether decision traps do occur in real life, the question arises which risks and signals are associated with the different decision traps. This question has been answered with a checklist of risks and signals. The hypothesis is that this checklist holds and does indeed show the risks and signals of decision traps. It is the question whether, given the vast number of decision traps, a complete checklist will ever be possible.

The next step is controlling decision making. Allowing failure, creating awareness, generating feedback and promoting exploration have been presented as management controls. They need further testing, in experimental situations as well as in everyday business.

Summarizing the conclusions results in two main conclusions:

1. Using the checklist will enable the controller to show possible weaknesses in decision making and introducing the management controls proposed here can help control these weaknesses. If the controller is to be a business partner, controlling decision making is a major step towards that partnership.
2. The taxonomy, the checklist and the controls are ways to use the insights from behavioural economics to control the decision making process, enabling organizations to increase bottom line results and improve continuity. But they are first steps and definitely need further exploration.

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# Appendix I Naive realism

Naive realism was first mentioned by Ross and Ward[225] and refers to "the (false) sense that one sees the world as it is and not as it is filtered through one's expectations, needs, or motives, or constructed by one's sensory and cognitive apparatus"[226].

Pronin, Gilovich and Ross present naive realism as a framework for several biases[227]. For this dissertation the framework presented by Pronin, Gilovich and Ross has been translated to achieve a better fit with the decision traps found in literature.

They present three related convictions that have several biases as result as is shown in Figure 7.1. Not all of these biases are directly related to organizational decision-making, but most of them are.

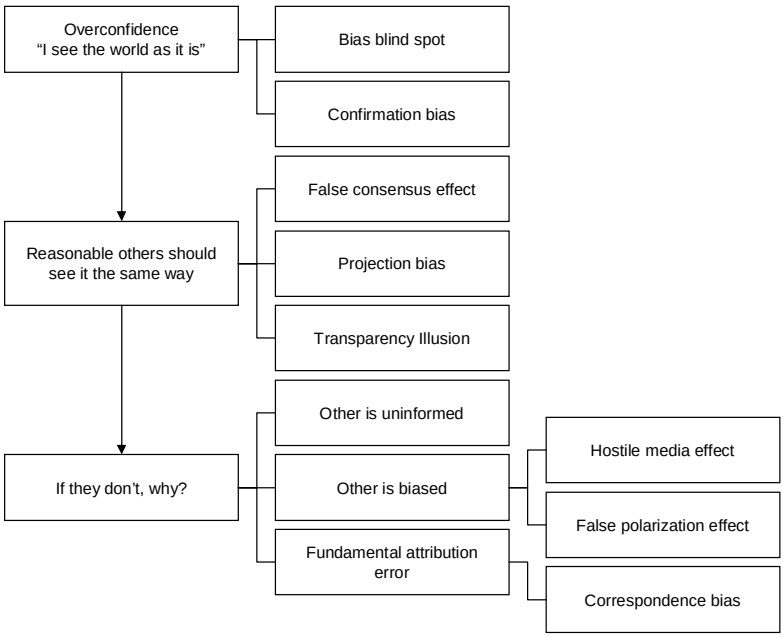
The biases in naive realism are:

| | |
|---|---|
| Overconfidence | The tendency to overestimate one's own abilities. Related is the Lake Wobegon effect, the tendency to believe that one is above average. |
| Bias blind spot | The failure to observe one's own cognitive biases. Framing is one form of bias, but obviously there are more biases. |
| Confirmation bias | The tendency to search, filter or interpret information which confirm the preferred decision. Also known as selection bias. |
| False consensus effect | The tendency for people to overestimate the degree to which others agree with them. |

[225] Ross and Ward, p. 110.
[226] Pronin, Gilovich and Ross, p. 794.
[227] Pronin, Gilovich and Ross, p. 795.

| | |
|---|---|
| Projection bias | The tendency to unconsciously assume that others share the same or similar thoughts, values and beliefs. |
| Illusion of transparency | Overestimating the extent to which one knows the thoughts, values and beliefs of other people and vice versa (see projection bias). |
| Hostile media effect | The tendency by highly involved people to perceive hostile bias in news coverage that appears evenhanded and objective to a neutral audience. |
| False polarization effect | Underestimation of the similarities in thoughts, values and beliefs between one's own group and out-groups. |
| Fundamental attribution | The tendency to explain behaviour of others from their personality traits instead of the situational factors. Also known as actor-observer-bias. |
| Correspondence bias | The assumption that someone who behaves differently is responding to the same decision problem. |

**Figure 7.1 The translated framework of naive realism**



# Appendix II Checklist decision traps

| Trap cause | Decision trap | Risk |
|---|---|---|
| Memory distortion | Recency Effect | Information on some aspects of the decision is available later |
| | Isolation effect | Decision is taken in response to critical event |
| Problem simplification | Ignoring small probabilities | Budgeting<br>Formatting of small probabilities as percentages instead of expected number of cases |
| | De-escalating commitment | Budgeting, especially budgeting costs but not results<br>High visibility of costs |
| | Focusing | Low experience of decision maker |
| Experience based learning | Base rate neglect | Not comparing results with peer group |
| | Clustering illusion | Strong opinions, emotions or ideas |
| | Optimism bias | Absence of second-opinion-counterpart |

| Trap cause | Decision trap | Risk |
|---|---|---|
| | | with sufficient knowledge |
| Regret aversion | Procrastination | Blame culture and low trust environment<br>Low or invisible costs of not deciding<br>Accountability, a.o. SMART-targets<br>Absence of clear goals<br>Male decision makers |
| | Frame blindness | Low education of decision maker<br>Action-promoting-culture |
| | Escalating commitment | Blame culture<br>Group decision making<br>Large organizations<br>Lack of knowledge at the budget-approving level<br>Technology-driven product development<br>High profits<br>Few new employees |

| Trap cause | Decision trap | Risk |
|---|---|---|
| | Confirmation bias | Group decision making |
| | Omission bias | Decision affects people<br>Decision maker has strong moral opinions |
| | Congruence bias | Information on some aspects of the decision is available earlier |

| Trap cause | Decision trap | Signal |
|---|---|---|
| Problem simplification | Ignoring small probabilities | Not analyzing small probability / high impact scenario's |
| | De-escalating commitment | Less hiring of consultants at the end of the budget period<br>Low customer- or employee satisfaction |
| Experience based learning | Optimism bias | Ambiguity in statements, agreements or promises<br>Low or declining |

| **Trap cause** | **Decision trap** | **Signal** |
|---|---|---|
| | | customer satisfaction |
| Regret aversion | Overconfidence | Group culture<br>No or very few external advisors<br>Low customer satisfaction |
| | Frame blindness | Recurring problems |
| | Escalating commitment | Increasing budgets<br>Low customer/employee satisfaction |
| | Confirmation bias | Missing alternatives and downsides |

# Appendix III Interviewed experts

In alphabetical order:

| | | |
|---|---|---|
| Els Aarts | Sr Manager | Deloitte Consulting |
| Nanke van Asten | Manager Permanent Recruitment | Michael Page |
| Marloes van de Braak | Sr Manager | Deloitte Consulting |
| Hans Bruring | Owner | Credit Group |
| Gerard Coppus | Partner | Deloitte Accountancy |
| Henk van Dam | Manager Testing Services | Collis |
| Peter Geelen | Owner | CPM Partners |
| Pascal Lamy | Sr Manager Audit | Deloitte Accountancy |
| Robert Scherder | Principal Consultant | Atos Consulting |
| Armand Schins | Manager Data Optimization | Albert Heijn |
| Marcel Stukker | Owner | M2S Consultancy |
| Paul Tilanus | Project manager | TNO-ICT |
| Aart Wierenga | Sr Consultant | Atran CIS |
| Leo Wildeman | Executive Partner | Atos Consulting |