Detecting noise in decision making processes of a biotechnology startup

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Abstract

Title: Detecting noise in decision making processes of a biotechnology startup

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This dissertation is about noise, which is a flaw in human judgment. When it comes to judgment errors, bias and heuristics are well-established fields of study. Noise, or decision scatter, is a relatively new area of research and hence deserves attention. The following paper will highlight whether and why noise exists in a young organization using a German biotechnology startup as an example. The study topics were investigated using exploratory research and in-depth interviews with every employee of the organization. As the results demonstrate, there are different kinds of noise in a startup. Although there is limited knowledge of the issue, the startup is very interested in incorporating it into the current development of decision-making frameworks. This thesis is, thus, a first step into a scarcely explored subject and suggests companies should increase their awareness of the topic to reduce noise and better serve their consumers.

Sumário

Título: Detecção do ruído nos processos de tomada de decisão de um arranque biotecnológico
Autora: Valerie Schweitzer
Palavras-chave: Optimal Decision Making, Erros de Julgamento, Ruído, Viés

Esta dissertação é sobre ruído, que é uma falha no julgamento humano. Quando se trata de erros de julgamento, o campo de estudo de enviesamentos e heurísticas é bem estabelecido. O ruído, ou dispersão de decisões, é uma área de investigação relativamente nova e, por isso, merece atenção. O documento seguinte irá destacar se e porquê o ruído existe numa organização jovem e se o assunto é abordado com consciência, utilizando como exemplo uma *start-up* de biotecnologia alemã. Os tópicos do estudo foram investigados utilizando uma investigação exploratória e entrevistas aprofundadas com cada funcionário da organização. Como os resultados demonstram, existem diferentes tipos de ruído na empresa *start-up*. Embora haja um conhecimento limitado da questão, a *start-up* está muito interessada em incorporá-lo no actual desenvolvimento de abordagens à de tomada de decisão. Ao diminuir o ruído, é possível tomar decisões mais precisas e assim optimizadas.

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I	Interviewee
RQ	Research Question
TA	Thematic Analysis

1. Introduction

1.1. Background and Problem Statement

In real life, the concept of a fully rational human being, which is useful in numerous economic theories, does not apply. In most cases, the paradigm of a completely rational human being, *homo economicus*, is an outdated model when it comes to analyzing and comprehending economic behavior. (Leiser & Azar, 2008) Over the last decades, the study of optimal decision making has been a hot topic in behavioral economics. One of the primary questions is how to make judgments more efficient by making them objective. (Carey et al., 2020) But is it feasible for two people in the same organization to make the same decisions on a regular basis, resulting in the same output and, as a result, the same outcomes? It is critical in organizations like corporations, where hundreds of people work together, that employees make consistent, objective decisions.

However, a huge proportion of human assessments is influenced by outside factors and hence varies from the ideal state. This indicates that two distinct persons could arrive at two different ultimate conclusions based on the same decision-making process. This disparity in final judgments in decision-making processes among individuals can cause significant harm in economic institutions such as businesses, as well as in other sectors such as health care and justice. It is difficult to maintain equality and optimal justice in this environment. (Kahneman et al., 2021b)

Human biases are one explanation for the variance of the results of human decisions. There are a lot of biases, and thanks to extensive research, they can be studied and explained rather clearly. Human psychology is always at the root of these biases. (Marshall et al., 2006) Biases, on the other hand, will not be the subject of this thesis investigation. The goal of this research is to get to the bottom of the second explanation for variance in human decisions, namely noise. Noise is loosely defined as the distorted mingling of information flows whenever human judgments are made (Hilbert, 2012). As external elements that have a substantial impact on decisions but are unrelated to the human psyche, noise is a relatively new research object to the study of optimal decision making (Kahneman et al., 2021).

1.2. Research Objectives

In this paper, noise will be defined with a startup as an example and a demonstration of how much noise exists in the real world will be provided. The objective of this work is to investigate the decision-making process of a Munich-based biotechnology startup, which specializes in nutritional supplements, to see if and how noise affects employees' decisions.

The hypothesis is that 1) noise exists in businesses and 2) these businesses, particularly startups and small businesses, are unaware of the impact of noise on each employee's decision-making process.

The following specific research questions will be used to analyze the problem statement:

RQ1: Is there any noise in the startup's decision-making processes?

RQ2: Does the decision-making structure of a startup perceived to foster noise?

RQ3: Is the corporation aware of the impact of noise on each employee's decision-making process?

RQ4: What factors are perceived as having an influence on noise?

RQ5: What factors are perceived to reduce noise?

RQ6: Is noise reduction perceived to improve the decision-making process?

1.3. Outline

The difference between the two judgment errors of bias and noise in decision making is discussed at the outset. The term noise, in the context of decision making, is then described in detail for a better comprehension of the dissertation that follows. The problem of noise is then described, as well as the influence it can have on any type of organization. To investigate this issue in the everyday world, a Munich-based startup, used as a model for small businesses, will operate and serve as the study object. Expert interviews with employees will be undertaken to determine whether noise occurs in decision-making processes and, if so, to what degree it can become an issue with consequences. Finally, suggestions are presented for how to successfully reduce noise and hence minimize judgment errors.

2. Decision Making Process

A better understanding of decision-making processes requires a clear explanation of what decision-making is in the first place. From a theoretical viewpoint, it is nothing more than a selection between a set of alternatives (Power, 2002). However, the decision-making process must be viewed in a broader context. The knowledge of the context in which a certain option occurs leads to a major categorization of decisions. In this regard, there are three primary sorts of decisions. (Takemura, 2014)

First, decisions made in conditions of certainty occur when the outcome of a specific option is explicitly determined by the choice of that alternative. This is an ideal position in corporate operations, although it only occurs in a few instances. It might refer to the acquisition of machinery and gadgets with documented performance and explicitly specified operating parameters, for example. (Wach & Chomiak-Orsa, 2021a)

Second, decisions made in conditions of risk are obtained when a decision maker is unclear about the repercussions of a decision but is aware of the potential of alternate outcomes, which leads to a dilemma, that might arise. A common example of such decisions is gambling, for example, roulette, which occurs when the risk taker understands all of the factors for the decision being made (bet stake, the odds, and its amount). In the business sector, there are virtually no situations with a clearly defined likelihood of occurrence, which means that this type of decision is difficult to come by in this dissertation's context of interest. (Wach & Chomiak-Orsa, 2021a)

Third and foremost decisions made under uncertainty. The most prevalent circumstances are those in which the likelihood of repercussions is unclear. These choices are grouped into two categories (Takemura, 2014). The first category comprises judgments taken in ambiguous situations, in which all of the decision's consequences are understood but the likelihood of their occurring is unknown. The second category includes judgments taken in the face of ignorance, when the decision maker is unaware of all of the repercussions. (Wach & Chomiak-Orsa, 2021b)

This thesis will primarily focus on the third group of decisions, the decisions made under uncertainty, since it is the largest group and hence encompasses most decision-making situations in the business context.

3. Error of judgment

Our brain employs two types of thinking. On the one hand, there is heuristic information processing. It is intuitive and occurs automatically. The analytic, conscious processing, on the other hand, is based on rules and is explicit. (Hicks & Kluemper, 2011) When it comes to making problem-solving decisions, intuition often comes out on top. We rely even more heavily on heuristic processing when making decisions in uncertain circumstances. (F. J. Costello & Watts, 2016) Heuristics for making decisions are frequently influenced by previous evaluations and preferences since they are quickly constructed from memories fragments. As a result, a decision-making process in the face of uncertainty is often marked by a series of unconscious errors. (Elstein, 1999)

Cognitive bias describes the tendency to collect and analyze information by filtering it through one's own views and experiences (Elstein, 1999). They are flaws in judgment induced by memory, social attribution, and statistical mistakes (Norman, 2009). Cognitive biases occur for a variety of causes. Nonetheless, they are typically the consequence of a set of heuristic processes, in problem-solving procedures, that assist the brain in processing information efficiently. Although heuristics are useful in problem solving, they are known to cause systemic mistakes in judgment when faced with complexity and ambiguity. (Croskerry, 2003)

3.1.Noise

Some judgments are flawed and systematically incorrect. Other judgments are noisy; strewn around in a haphazard pattern, even though they should agree. Judgment errors are made up of two types of errors: systematic deviations and random errors. Biases are systematic biases. The term "noise" refers to the random spread and undesirable fluctuation. (Kahneman et al., 2021b)

To identify judgment errors, it is typical to employ a genuine fixed value (Erev et al., 1994). In many circumstances, however, determining this value is challenging because an ideal decision outcome is often rather difficult to predict. Decision outcomes are frequently ambiguous, especially at startups, because many judgments are made for the first time and there are few empirical values to rely back on. (di Gregorio et al., 2020) While noise cannot be recognized and quantified without previous knowledge of the aim of a certain decision, it may be detected and quantified without prior knowledge of the true value, that is, of the optimum decision. Thus, to measure noise, it is not important for the truth to be identifiable or understood (Kahneman et al., 2021b). For example, if many physicians arrive at different diagnoses for the same patient,

it is not necessary to know what the patient is genuinely suffering from to recognize that the diagnoses are contradictory and that the conclusions reached are inconsistent. (Mc Gurk, 2017) It is conceivable to analyze the jumble of reactions without having a clear grasp of what is going on in the world. So it is not required to know who is accurate to estimate the amount by which different perspectives on the same topic differ from one another. When measuring noise, we just need to take dispersion into account. (Eren & Mocan, 2018) Generally speaking, whenever decisions are made, there is noise, and often more than expected (Kahneman et al., 2021).

To clarify the difference between bias and noise, the following Figure1 should serve as an illustration. The visual comparison of judgment errors with targets in a shooting arcade was produced by Daniel Kahneman et al. (2021). The outcome of a decision is represented by the target. The various decision options are dispersed throughout the target. The ideal choice value, or the best decision, reflects the target's center, or the so-called bullseye. Five individual bullet crosses represent different decisions, regardless of whether they were made numerous times by one person or by a group of individuals on the same issue. Figure 1's panel stands for the best, or most correct, decision. Every decision made here is nearly the same. A noisy judgment is depicted in Panel B. The scatter is dispersed widely throughout the target, indicating that various decisions were made in all directions. Panel C.'s target depicts a biased decision, or one that is likely influenced by the same psychological tendencies. All decisions in the same direction diverge from the best value in this situation. This consistency of a bias may support a prediction of the decision's outcome. Finally, Panel D. depicts what happens when a judgment is influenced by both bias and noise.

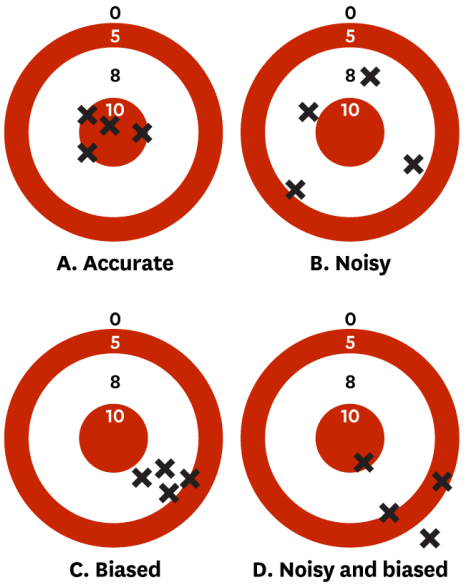

Figure 1: Bias versus noise (Kahneman, D., Rosenfield, A.M., Gandhi, L., Blaser, T., 2016)

3.2. Different kinds of noise

Kahneman (2021) defined noise as having three distinct types, which are level noise, pattern noise, and occasion noise. The differences between these three types of noise are described in detail below.

3.2.1 Level noise

The phrase *level noise* is used to characterize errors in judgment that occur as a result of individual variances in a person's general attitude, here called level (Kahneman et al., 2021b). It is worth repeating that everything that deviates from the average value is described as judgment error (Johnson et al., 2013).

Essentially, basic human behavior directions always diverge in details from one another. For example, there are supervisors that are more goal-oriented in their evaluations of their employees' performance and thus harder, and those who include the individual approach in the performance review and thus are softer. This means that character changes frequently cause scattering in level errors. (Minson et al., 2011) For example, a study of judges and their sentencing judgments in the United States (Clancy et al., 1973)discovered that the punishments judges chose to impose were frequently based on basic opinions. Judges who believed that the primary purpose of punishment was simply to keep the defendant out of circulation, for example, generally chose a different sentence than judges who believed that punishment may help the criminal resocialize or prevent crime in general (Yang et al., 2014). Judges who cared more about resocialization gave shorter jail sentences and more suspended sentences than those who worried more about deterrence, according to the study.

It can be determined that level noise, or judgment errors connected to individual traits, is a problem. This can comprise a person's past experiences (formative events), as well as basic character traits and moral attitudes. This also implies that there is a dispersion of level errors in every judgment task (Lagerfeld, 2013).

3.2.2 Pattern noise

Level noise, as defined in the previous paragraph, is the dispersion of the mean value of individual assessments. Pattern noise, on the other hand, describes a person's decision-making divergence from himself. This means that, depending on the circumstances, someone may make

a different decision in one situation than in another. (de Baets & Harvey, 2020) Pattern noise can be seen in the judge study when judges make various decisions in different scenarios that need the same judgment and so deviate from themselves individually (F. Costello & Watts, 2014).

If a judge is normally stricter than the average yet tolerant toward white-collar criminals, this suggests person-related pattern noise (Murrah, 1974). The term "person-related" refers to the judge or the person making the decision, not to the person or circumstance being judged. As a result, these are very personal responses to a certain situation. (F. J. Costello & Watts, 2016)These reactions can be linked back to the individual decision-maker ideology or mental associations, for example. A judge's sentence of a defendant who has visual similarities to his daughter, for example, is more forgiving than if the defendant has visual similarities to someone he despises, even without the judge realizing it. (Charles & Yeung, 2019)

The assumption is that pattern noise is not just a random phenomenon (Kahneman et al., 2021b). If a judge were to hear the same case again, pattern noise would be expected to repeat itself. Furthermore, pattern noise is ubiquitous: Whether it is in the courtroom, a doctor's decision to admit someone to the hospital, or a company's hiring process. Various judges construct different rankings of the cases to be assessed all across the world.(Eva & Reiter, 2004)

When judges render differently harsh judgments, level noise emerges. When they have different points of view, pattern noise emerges, indicating whether a criminal is given a harsher or softer verdict (Kahneman et al., 2021).

3.2.3 Occasion noise

Occasion noise is the issue that a judge considers to be more or less severe in a particular scenario (occasion), based on whether it is before or after lunchtime, whether it is sunny or pouring outside, or whether the decider recently had an argument with a close friend (Kahneman et al., 2021b). These are only a handful of the numerous variables that can affect a decision in a given situation. (Kahneman et al., 2021a) Occasion noise refers to the specific moment when an expert makes a decision. It describes the variability of a large number of options from which just one was chosen by the individual decision-maker. Frequently, the true number of different decision-making options is unknown to the judge.(Grimstad & Jørgensen, 2007) Occasion noise often remains hidden (Ashton, 2000).Because this type of erroneous judgment is based on a specific situation with all its variables, occasion noise is difficult to

quantify. And because it is impossible to recreate an exact situation, it is difficult to measure even for research purposes. (Kahneman et al., 2021b)

At first sight, the concept of occasion noise is plausible, and it makes sense that for example when one is in a good mood, one makes more forgiving, patient, and lenient decisions than when one is in a poor mood. The challenge here is in quantifying occasion noise. (Loomes, 2015)On the one hand, it is difficult to determine whether occasion noise influenced a particular decision. On the other hand, it's difficult to pinpoint precisely which factor causes occasion noise, whether it's the weather, hunger, or something else.(Gureckis & Love, 2009)

When determining occasion noise, it is recommended to ask the same question again, at distinct times. The greater time between two rounds of questions, the better, as this reduces the likelihood that the respondent would recall the prior answer and hence duplicate it exactly. (Scheffers & Coles, 2000)According to research, this strategy is particularly effective when used in conjunction with an intuitive decision-making process (Shiller, 2002). It becomes more challenging when a person's decision grows more considered and comprehensive. For instance, if a teacher assigns a particular grade to a student's essay and one then confronts him with the same essay months later and allows him to rate it again, he would most probably recall and retain his judgment. When confronted with the same dilemma a second time, people tend to repeat the same responses. They do so for a variety of reasons, including consistency and the fact that the selection process has already been finished, minimizing their work to make a decision again. (Kahneman et al., 2021b) Thus, in these instances of a well-considered decision that likely entailed some time investment in the decision-making process, demonstrating whether the initial decision, and thus the subsequent second decision, was influenced by occasion noise is more challenging.

It can be summarized as follows: the term occasion noise refers to insignificant influencing elements that yet affect decision makers. These characteristics may vary over time but are notoriously difficult to recreate. As a result, estimating occasion noise is in general challenging. The more easily cases may be remembered and so reproduced, the more challenging it is to quantify opportunity noise. (Funder, 1987)

3.3. Noise in corporations

Noisy environments are inescapable when it comes to decision-making, as has recently been demonstrated in the preceding sections. However, excessive noise is often unwelcome and can

result in considerable economic expenses in the workplace. Overall, it can be stated that consistency in decision-making is desirable in a firm (Åstebro & Elhedhli, 2006). Individual judgments are never 100 percent consistent with one another, and this should already be obvious to everyone. However, in a corporation with a defined vision, it is critical that the different judges make decisions that are consistent with the overall vision. (McMillan, 2013) As many experts within a firm are empowered to make decisions that can be game-changing for the organization, it is critical to minimize all potential sources of mistakes for incorrect decisions and thus to optimize decisions. (Gigerenzer, 2013)Managers and team leaders want their staff to make sound judgments consistently. While the effect of diverse perspectives and personalities is frequently sought in the business context to make an informed decision, noise is not.

When considering firms in terms of their competitive environment, it is critical to remember that system noise (which includes both level and pattern noise) is a problem that arises within systems, that is, within corporations, not markets. Diversification and differentiation are desirable in specific markets. This is because selection is impossible in a market without diversity. In a competitive context, it is not only necessary but also expected to conduct several assessments, utilizing a diversity of views and methodologies.(Branson, 2002) When different companies compete with one another, the utilization of a common strategy to offer unique solutions to the same consumer problem will be rejected. A business needs to differentiate itself from the outside market while acting consistently and reliably inwardly. Therefore, it is critical to identify decision errors within an organization in the first phase to keep them low in the second. This guarantees that judgments are made accurately.(Newell et al., 2004)

The next section discusses an approach, called noise audit, for identifying and addressing noise in an organization.

3.4. Noise audit

As discussed in the previous section, it is critical for business leaders to understand where probable mistakes of judgment can emerge. Kahneman and collaborators (2021) propose running a so-called noise audit to discover noise. A noise audit, as proposed by these authors, assists companies in becoming aware of noise and determining its source. The purpose of a noise audit is to ascertain the accuracy of all employees' professional judgments. A noise audit

needs considerable effort to assure a high degree of detail and proper execution, as well as the accompanying reliability of the results.

Different parties are required to conduct such an audit in a business. First, an external or internal consultant, who serves as the project's leader, arranges data collection and evaluates it. Then, a project team of impeccable professional reputation, comprised of subject-matter experts capable of developing and then evaluating pertinent subject-matter cases. Additionally, someone from the company's top management should be involved from the outset, as a noise audit makes sense only if it results in organizational reforms. Furthermore, an audit involves so-called assessors. The top management designates one or more company areas for auditing. Assessors should be a diverse collection of professionals who make comparable decisions on the company's behalf. They are, in a sense, the audit's subject of inquiry. Finally, a project manager with the highest potential standing inside the organization can assist in overcoming administrative roadblocks.

The noise audit is conducted in four stages. To begin, project team members must develop appropriate case material, that means, the cases that will be used in the audit. This is a challenging undertaking, as they must create realistic simulations of judgments that occur in the same way that they do in real life. Assessors must complete a choice simulation on the one hand and a questionnaire on the other. The questionnaire requests information on the important elements influencing the decision and an average assessment of the remainder of the assessment. The second stage is to convene a meeting with top management. After compiling the case information, the audit should be given to upper management to dispel any potential objections. However, it is critical to have guarantees from high management that all results, regardless of how severe, would be accepted. During this discussion, top management's expectations for results can also be questioned. The third step is then the study's execution. This is the point at which project managers become involved and share accountability. For the time being, it is critical to avoid the term and description of noise when performing the study. The study participants should enter the case study with as much objectivity as possible and should not be affected by any prior knowledge of the research's outcome. To ascertain respondents' awareness of choice noise, this might be addressed at the conclusion of the survey and explained to them. Additionally, it is critical that respondents are ensured anonymity, which means that no response can be traced back to a specific individual, allowing them to speak freely. The audit concludes with an analysis and conclusion. The consultant collaborates closely with the project team to accomplish this. The data must be evaluated with extreme caution. The evaluation of

the data and its subsequent absorption into the organization to improve decision hygiene and maybe reconstruct processes can take many months. This finishes the first step of the noise audit. To maintain a company's decision-making hygiene, it is prudent to conduct such an audit every few years.

4. Research Problem

The challenge with identifying noise is that you cannot get it out by asking direct questions because noise is a phenomenon that is largely undiscovered and, more importantly, occurs unintentionally, making it difficult to detect. As mentioned in the previous section it would take a lot of time as well as a big team of psychologists, business researchers, and professional experts to complete such an audit, which would be conducted in a standardized manner. As conducting a comprehensive noise audit would be beyond the scope of this paper, an exploratory approach was chosen. This approach could serve as the preliminary stage of a comprehensive noise audit and is intended to determine whether noise can be detected as well as whether there is any awareness of and further interest in this topic. However, in this technique, special attention was made to ensure that as many parameters of a proper noise audit as feasible may be examined during the approach's execution. First and foremost, a suitable organization, a corporation, was identified that was the appropriate size to conduct an in-depth interview with each employee and so include everybody in the study. Consequently, a startup with nine permanent staff was selected for this project. Additionally, the substance of the interviews was discussed in advance with one of the startup's CEOs, and a project important to the company was chosen in which all of the company's workers participated. The specific procedure is discussed in greater detail in the following section.

5. Research Methodology

5.1. Research Approach and Setting

The purpose of this research is to determine whether it is possible to create a strategy to detect noise in an organization with flat decision hierarchies. Furthermore, the purpose of this work is to determine whether or if there is already a general awareness of and knowledge about noise. Because the issue of noise is still relatively unknown, according to Kahneman and collaborators

(2021), and there is still a paucity of empirical data on it, an exploratory study design approach was used in this investigation.

To obtain precise information, as well as an overview and a first practical approach to the problem, a qualitative technique with an exploratory research approach was chosen (Tarallo et al., 2019). One of the primary aspects of qualitative research is the identification and study of distinct perspectives (Flick 2009), which justifies its usage for this thesis issue, noise. In general, qualitative research places a greater emphasis on words and particular cases than on quantitative data when it comes to data collection and interpretation (Bryman 2021).

5.2. Data Collection

Using secondary data, which refers to information that has already been collected in the past, the primary data gathering procedure is more effectively designed. As a starting point, the book *Noise: A flaw in human judgment* by Daniel Kahneman and colleagues (2021) was used as a guide, furthermore journals, websites, papers, and other resources were used to get a better understanding of the current state of research on the topic of noise.

5.2.1 Sample

A series of in-depth interviews were conducted on March 9 and 10 to gather qualitative data, which proved to be a useful strategy. A German startup is the subject of the study. This startup is a young biotechnology firm that focuses on digestive health nutritional supplements. Its goal is to harness the power of bacteria to remedy imbalances in the human microbiome, resulting in a beneficial impact on the overall body. However, for this thesis, what the small company achieves in terms of product is less significant than being an example of a young organization with flat decision-making hierarchies, in contrast to a long-established firm with established structures. Every permanent employee of the organization was interviewed, for a total of nine people. It was decided to employ this strategy because in-depth interviews are most appropriate in instances where open-ended questions are asked to produce the biggest potential flow of information from a small number of participants (Guion et al., 2011). This open discovery method allows the interviewer to delve deep into the interviewee's thoughts, feelings, and opinions (Guion et al., 2011). To maintain anonymity, the order of interviewees was chosen at random in the following sections. As a result, three distinct methods of naming interview participants are employed in the following: once from 1-9, once from A-I, and finally from Z-

R, with the identities always assigned in random order. The result should provide enough background information to understand where noise can be detected. The interviews were conducted using online video calls and lasted around 30 minutes. Table 1 provides an overview of all the interviews, that were conducted.

Type of Data	Position in the Startup	Date of the Interview	Interview Length
Interview A	Founder & CEO	09.03.2022	36:32
Interview B	Founder & CEO	09.03.2022	32:26
Interview C	Creative Director	09.03.2022	34:52
Interview D	Digital Marketing Manager	09.03.2022	28:37
Interview E	Social Media Manager	09.03.2022	30:17
Interview F	Head of Performance Marketing	10.03.2022	26:05
Interview G	People & Culture Manager	10.03.2022	31:19
Interview H	CMO	10.03.2022	25:44
Interview I	Operations & HR	10.03.2022	31:56

Table 1: Overview of the interviews

5.2.2 Interview

The issue of the interview is that direct questions cannot reveal noise. As noise occurs subconsciously and frequently goes unobserved by those participating in a decision-making process (Tversky & Kahneman, 1974), it is impossible to uncover noise by asking direct questions about processes. The work's purpose is not so much to demonstrate how much noise can exist in a young, dynamic organization, as it is to bring attention to the topic in the first place by identifying noisy approaches. So, the in-depth interview is more of a two-tiered interview. There is the content level of the responses, which are uninteresting on their own. There is also a second level of responses, the level of the kind of the responses required to bring attention to noise. Only when comparing the varied responses to each other does this level make sense. More on this can be found in Chapter 6, which contains the examination of the responses.

Since all the employees speak German as their mother tongue, the interview was conducted in that language, which allows for a more natural and spontaneous flow of communication. This was designed to ensure that no important information was missed because of a language barrier. In general, questions were posed with a lot of open-endedness to allow for a more in-depth exchange of views.

The interview's concrete structure is outlined below. Prior to the content-related questions, general information about the master's thesis topic and the interview's purpose is provided. The interviewer makes sure that the topic of noise isn't brought up at this point, so that the interviewees can begin the conversation as unbiased as possible. Permission is granted for a voice recording, and employees are assured that the data would not be analyzed on a person-by-person basis, but rather on a company-level basis. As a result, the identity of which employee says what is treated confidentially. The interview is divided into four parts.

In the first section of the interview, three estimation questions are posed, all of which deal with the topic of nutritional supplement usage in Germany, the startup's core business. The set of questions aimed at getting an estimate of the number of Germans who currently consume dietary supplements, the amount of current annual turnover in Germany generated by dietary supplements, and the proportion of probiotics in the total dietary supplement consumption were posed to those who took part in the interviews. After the third part, the exact same questions were asked again. To test for various types of noise, it is necessary to compare not just responses supplied by different individuals, namely interpersonally, but also two responses to the same question given by the same individual, that is intrapersonally. As a result, the three questions were repeated in the same manner but in a different order to determine whether the responses varied. They were placed following the third section to allow for the longest possible time interval between identical questions. The fourth section defined noise, consequently, the questions had to be asked prior to this section to ensure that the responses were not impacted.

The second section elicited information regarding the decision-making structures within the startup to gain a sense of whether or not established structures prevail. The second stage will include this understanding into the data analysis to determine the extent to which the startup's structures may act as a breeding ground for the emergence of noise.

The interview's third section is the longest. For this, together with the CEO of the company an overarching issue was determined in advance, which is related to a current project of the company, namely brand development. This project is significant for including all employees and providing them with equal decision-making authority, which makes it an excellent

candidate for noise discovery. For this brand topic, open-ended questions were posed with the goal of eliciting the individual's personal judgment of the brand's significance. In addition, questions were addressed about concrete brand development ideas and opinions in respect to the organization. To finish the third part, the interviewee is asked to evaluate certain issues based on his or her opinions and feelings, as well as to estimate how the interviewee believes the average rating from the entire team is regarding the exact same issues.
In the fourth and concluding part, the concept of noise is explained to the participants, followed by an open discussion about whether or not the interviewee is familiar with the topic and whether or not he or she considers it to be significant for the company.

5.3. Data Analysis

After the completion of the interviews, the voice recordings were transcribed. Following that, the transcriptions were carefully read through again and compared to one another. The most important information gleaned from the respondents' statements was noted down. After that, the notes were separated into the different subjects, sorted, and then clustered according to their importance.

The data analysis consisted of two parts. In the first part, for the purpose of analyzing the collected data, thematic analysis was selected. Thematic analysis (TA) is the process of identifying and defining both implicit and explicit ideas, referred to as themes, within the data set (Guest et al., 2014). TA allows the researcher to get on and make sense of common or related ideas and experiences by focusing on meaning across a data collection (Braun & Clarke, 2012). Accordingly, this method can be used to identify the characteristics that are shared by all interviewees, as well as a strategy for making sense of those characteristics(Javadi & Zarea, 2016). Because of its theoretical independence, thematic analysis is a highly adaptable approach that can be tailored to meet the objectives of a wide range of research, resulting in a rich and detailed, yet complex, account of the data collected (Braun & Clarke, 2012). Additionally, thematic analysis is effective for summarizing significant elements of a huge dataset since it compels the researcher to take a well-structured approach to handle data, which aids in the production of a clear and organized final report (Nowell et al., 2017).

In the second step, the evaluation questions were analyzed as well as the open answer questions were coded into categories. Because the purpose of the noise survey is to examine individual responses for their primary difference, that is, to determine whether the responses of different employees differ from one another, an index for each question was calculated (Kahneman et

al., 2016). For the estimation questions to determine whether and how much the individual responses deviate from each other a mean value, as well as a so-called noise index, was computed. For example, the mean and standard deviation from the mean was determined for the first estimation question, which asked how many Germans now consume nutritional supplements. Additionally, the smallest and largest responses were provided. Both to determine the degree to which individual responses differed from one another and to determine if there was a wide range of responses or not. Additionally, the noise index was calculated, which determined the average percentage value of the divergence between a person's two responses, to determine whether there was a significant deviation, in other words, noise.

To make the answers similar to one another in the event of open questions, the answers to the open questions were aggregated into categories to allow them to be comparable. For example, in the question about the values that the startup's brand should embody, categories of all mentioned values were created and the number of responses in each category was noted to determine whether respondents agreed or whether there were numerous categories with few corresponding responses.

The numerical comparison of the evaluation questions was done with a calculated mean. For instance, respondents were asked to rate the importance of a brand to the success of a business on a 10-point scale. The mean of all nine responses was calculated to gain a sense of how essential the question was evaluated in general. Additionally, the maximum, minimum, and standard deviation were computed to determine the disparities between the responses.

6. Results

The outcomes of the interviews are reported and examined in this chapter. Themes were chosen to structure the material by carefully checking the input provided by the participants. The detection of occasion noise is addressed first in Section 6.1, which covers RQ1. In Section 6.2, the real decision structure in a startup is examined, which addresses RQ2 & RQ5, followed by 6.3, which discusses the detection of system noise, which is also relevant for RQ2. Finally, in Section 6.4, the perception of noise is studied, with RQ3 and RQ4 being addressed.

Initial Categories	Evolved Chapters	Research Question addressed
Part1: Estimation Question	6.1. Detecting Occasion Noise	RQ1
Part 2: Decision-Making Structure in Startups	6.2. Actual Decision Structure in a Startup	RQ2 & RQ5
Part 3: The Brand	6.3. Detecting System Noise	RQ1
Part 4: Noise Awareness	6.4. Noise Awareness	RQ3 & RQ4

Table 2: Overview grouping of codes

The results reported in the next section are entirely based on the observations and findings made by the participants during the interviews. As a result, the assertions in the following sections are not applicable in all situations. To maintain the anonymity of the interview participant, only generic references are made.

6.1. Noise in estimation questions

Aiming to detect occasion noise, the first part of the interview is structured as follows: Three estimation questions are presented below, each about the issue of dietary supplement consumption in Germany, which is a topic with which all employees should be at least somewhat familiar. During the interview, the three questions were asked twice: first at the beginning of the intervention and second, in reversed order, between the third and fourth part of the interview. When two answers to the same question are distinct, the answers reveal dispersion, which suggests that there is noise. The question spacing between questions aimed to create as much temporal distance as possible between them. The first round of questions was also asked before disclosing what noise is. This was done to ensure that the interviewees were as unaffected as possible by the interview's actual purpose.

None of the responders correctly answered the estimation questions, but for the initial goal of measuring occasion noise, it is not necessary to compare answers with the truth. Although the question's intended purpose was to discover occasion noise, data analysis revealed both occasion noise and pattern noise. As a result, the data analysis of the answers to the three questions is reviewed in two sections in the following, once for pattern noise detection and once for occasion noise detection. In the occasion noise section 6.1.2, the difference between the two answers given by each respondent to the three questions will be compared, rather than the correct answer. In this case, the focus is also not on how employees' responses differ from the

answers of other employees, which will be covered in the pattern noise section 6.1.1. Instead, for occasion noise, only intrapersonal differences in responses are considered, which means the focus is on the differences between the two responses made by each responder. The true value is simply presented for the sake of completeness and as a guiding principle in the following analyses. Between each of the two rounds of questions, there was around a 25-minute distance. While 25 minutes is not a long period, it was sufficient to demonstrate that the replies of the same person differed at the two points in the time under consideration.

For all three questions, the evaluation was carried out with the same method. First, in section 6.1.1, which deals with pattern noise, the standard deviation and general mean of the responses were calculated. The computed mean, that is the mean of the difference between the two answers, as well as the minimum and maximum stated value, demonstrate how diverse the responses of the individual employees were. The volatility of the two question rounds is measured by the standard deviation. The first and second round standard deviations were compared to discover if the first round or the second round showed more volatility and therefore suggests more noise. Following that, section 6.1.2 deals with occasion noise and, for each case, determines the noise index. To understand how that was done more information is provided in the evaluation of the individual questions.

6.1.1 Pattern noise in estimation questions

Firstly, it is significant to mention, that in this section is being talked about pattern noise, not occasion noise, because it deals with the variation in the responses of the different people, not the noise between answers of the same person. The first question of the set of three questions aimed at getting an estimate of the number of Germans who currently consume dietary supplements. The true value, and thus the proper response to the question, is 70%. %. To investigate pattern noise, it is necessary to look into the variation between respondents. In the first round of answers, the minimum value mentioned was 6%, the maximum value was 40%, the mean 23.89%, and the standard deviation was 12.56. In the second round, the mentioned minimum was 4%, the maximum was 40%, and the mean is 27.44%. The standard deviation is 14.52 in this case. Based on the standard deviation, it can be observed that the responses were closer together in the first round than they were in the second round. Furthermore, the deviation, or difference in replies, is larger in the second round, implying greater noise. Likewise, the

range between the minimum and maximum response values, 34% for the first round and 36% for the second, is also noteworthy for the detection of noise in this case.

The second estimation question asked for the current annual turnover in Germany generated by dietary supplements. In this case, the right answer is 2.08 billion euros, evaluated in the year 2020. In the first answer round, the measured minimum was 400 million euros, which means 0.4 billion. The maximum here was 5 billion euros, the mean value was 2.72 billion euros, and the standard deviation was 1.58. Regarding the second round, the minimum was also 0.4 billion, but the maximum was 7 billion. The mean value in this round was 3.63 billion euros and the standard deviation was 2.43 billion. The standard deviations of 1.58 in the first round and 2.43 billion euros in the second round of questions indicate that pattern noise is also present in this question and that there was a larger range of responses, 4,6 in the first round and 6,6 in the second, indicating that there was more pattern noise in the second round of answers.

The last question which was posed to the interviewees asked about the proportion of probiotics in the total dietary supplement consumption. The correct answer is 7%. In the first round of questions, the maximum value given was 33%, the minimum value was 5% and the mean value was 12.78%. The calculated standard deviation is 8.86. In the second round of questions, the maximum value was 33%, the minimum value was 5%, the mean was 12,78%, and the standard deviation was 8,86%. As was the case with the first two questions, the standard deviation, demonstrates that there is an imbalance in the individual responses, and as a result, pattern noise, which appears larger in the second round of answers.

6.1.2 Occasion noise in estimation questions

As previously stated, the pattern noise analysis suggested that occasion noise, the sort of noise originally targeted by the inquiry, was also identified in the estimation questions. Therefore, an occasion noise index was created for each individual question to be more precise and compare not just the average of the answers but also the individual responses. For each participant, an occasion noise index was created to answer the question, "How much do the two judgments of one employee differ?" (Kahneman et al., 2016, p. 40) . The occasion noise index was calculated using the average deviation, which was expressed as a percentage value.(Kahneman, Rosenfield, et al., 2016) For example, the first interviewee predicted a 6% answer value in the first round and a 4% answer value in the second. The average of these two assessments is 5%, and the deviation between them is 2%. That means the noise index for this pair of answers is

40%, because the deviation (2%) was 40% of the average (5%) of the two estimates. For each pair of answers, the same procedure was conducted, and an overall average noise index was determined. The maximum value of noise index was 72% and the minimum value was 0%, meaning no difference between two answers. The mean noise index in this case was 25.22%. The range from 0% to 72% illustrates that the individual answer variations were quite high. According to Kahneman (2021), a noise index of 25.22 is considered relatively high, indicating that there is a significant quantity of occasion noise present.

Regarding the second question, there was also a difference between the two rounds, because in the second round the standard deviation was larger, which indicates a higher dispersion of the answers and which means that occasion noise may be detected. To be more precise, a noise index was calculated here as well. Again, the difference, in billion euros, was taken, and then the average percentage was calculated. For example, an employee's initial response to the identical question was 3 billion euros, whereas his second response was 7 billion euros. The gap between the two replies is 4 billion euros, and the average of his estimates is 5 billion euros. As a result, the noise index for this pair of responses is 80%. The smallest noise index was also zero, indicating that there was no difference between the two responses, while the greatest noise index was 80%. For this question, the average noise index is 26.19%. This is a high value because the answers differ on average by a fourth of the average of the two estimates. It can be observed that the level of occasion noise must be considerable in this case.

Finally, regarding the third question, a noise index was, once again, calculated to determine whether or not there is any occasion noise. The noise index was again calculated as a percentage of two individuals' answers deviation. The maximum noise index was 66.67% and the minimum was 0%. The overall average noise index for this question was 25.19%. One can see that there is some range of occasion noise from 0% up to 66.67%, which is still impressive given the small gap between rounds (25 minutes). The fact that the team knew an estimated answer to the question about the number of probiotic products in total supplements may have contributed to this result. Alternatively, it may be said that all respondents had a reasonable expectation that the answer would be in the single-digit percentage range. Nevertheless, the respondents were unsure of the exact answer and most of them provided different answers in the two rounds, which in some cases led up to a noise index of 66.67%, which is according to Kahneman (2021) a high value.

As a result, these three estimation problems by themselves can already indicate a noise approach, namely occasion noise, that varied between items (25.19% to 26.11%).

6.2. Decision Structure in a Startup

> "In startups, a lot happens without great structures and agreements. Decisions are made in companies like Siemens based on certain criteria that must be met, and there are defined hierarchies and frameworks for decision-making power. In a young organization like ours, you don't have somebody above you to ask or who has already taken such a decision, you have to work a lot from your gut. If someone asks me [to take a particular decision] I don't have any empirical data from our organization from which to draw conclusions. I go with my instincts and hope it was the right decision. Only time allows for the formation of experiences and repetitions, from which one can then advance." (I*Y*)

In the second block, an open question was posed about the decision-making structure in the startup. This question did not seek to provide a well-founded accurate answer because it is unlikely that such a question can be answered in a well-founded manner off the cuff, nor does it seek to provide information on decision-making mechanisms. Instead, the purpose of this inquiry is to create a picture of subjective and spontaneous judgments of the subject matter. Additionally, the question is designed posed to provide an idea of how freely or structured decisions are truly made at this startup. This question is meant to address RQ2, namely if the decision-making structure of a startup can conceivably foster noise. The purpose of this section is to illustrate how decisions are made in a startup, to make possible deductions about the emergence of noise in a subsequent stage.

The responses revealed that there are only a few decision-making frameworks in place at the start-up in question. Interviewees mentioned that decisions are made based on the current situation and without regard to any parameters because most structures (e.g., human resources, public relations, marketing, finance, and many others) have not yet been properly developed, and because there is no single golden solution that has been proven over a long period, but rather a great deal is still to be tried out freely according to the trial and error principle, so routine decision-making processes are rare in the business environment. "Because we are making numerous decisions for the first time, we have not yet defined something like specific decision-making structures." (I*Z*)

In terms of decision-making power, important decisions were reported to be frequently not decided by a single individual alone, but rather by a group of employees who are well-versed in the subject matter in which they are being considered. Particularly vociferous are C-level employees who assert that every employee, regardless of profession or length of service with the company, is given equal weighting in terms of opinion and decision-making. "That is, we make every effort to listen to each employee equally and to offer everyone decision-making

ability" (I*R*). A weekly meeting was said to be held, in which the entire staff gathers to discuss current themes and impending decisions, and then the opinions of all employees who would like to contribute are solicited. The interviewees considered that this allows the company to make informed decisions on crucial decisions and courses of action. "Even if you don't make decisions on your own, it's vital to us to have an open culture in which we sit down together frequently and make significant decisions collectively" (I*W*).

Notably, those who have been with the team for a longer period and who tend to hold management positions with greater responsibility report that all decisions are made on a flat hierarchical structure, in other words, that each employee is given a high degree of autonomy and relevance in decision-making. In contrast, individuals who are newer to the team report a lower level of decision transparency as well as less autonomy and responsibility than they would have anticipated before beginning employment with the organization. Thus, in certain circumstances, they are unsure of how and who determines the final judgments that have been communicated to them, nor do they understand why some decisions have been made the way that they have been. "I am new to the company, and it is still tough for me to comprehend why and how certain decisions are made" (I*T*).

Following the consideration of the findings, it will be examined if and to what degree these decision-making systems may serve as a breeding ground for noise in the following section.

6.3. Detecting System Noise

The third section of the interview, which is also the most extensive in terms of questions, is devoted to the finding of system noise, which includes both level and pattern noise. The level noise is difficult to determine, which is why the majority of questions were centered on it. As previously stated, a current project of the startup was employed for this purpose to serve as a topic-related thought model. The respondents were asked to respond to questions about branding, which is a process that they, as a firm, are just getting started with right now. Specifically, this process was chosen because the company intends to incorporate every present employee in this decision-making process and believes that every voice should be heard on an equal basis. In this section, opinions and personal judgments were solicited to gain a better understanding of how individual employees felt about the topic and how they would make a decision, as well as whether everyone agreed on the topic or whether there are interpersonal differences in opinion.

6.3.1 Level Noise

As a brief reminder, level noise is a term used to describe errors in judgment that occur as a result of individual variations in a person's general attitude, called level (Kahneman et al., 2021b). To set the tone for the discussion, the first question in this section asked whether respondents believe that brand is an important concern for businesses in general, and if yes, why. The brand is a very significant concern, especially nowadays, according to all responders. All respondents agreed that a good brand and accompanying brand building are critical for differentiating in the market and creating identity, particularly for startups. Because the startup is a direct-to-customer business, it's crucial to create a consistent brand that customers will recognize.

When it comes to the issue of what constitutes a good brand, there was broad agreement on criteria like recognition value (mentioned by seven interviewees), trust (six interviewees) transparency (nine interviewees), consistency (five interviewees), and emotionality (seven interviewees). On these two topics, there was a lot of consensus and unanimity, because there was just a little variation or dispersion in the responses. To compare the responses to these two questions, respondents were asked to pick a brand that was performing well in their opinion these days. Across the board, strong brands such as *Lindt, Patagonia, Apple, Nike, Hey Estrid, Spanx*, and *Tesla* were identified. All of these brands have considerable brand recognition in their respective categories, indicating that they seem to do well on the previously indicated criteria of recognition, trust, consistency, and emotionality, confirming the preceding statements. There was no conflict to be found here, neither among individuals nor in themselves individually, Because the respondents mostly named the same values, and the brands they named matched the values they identified as relevant.

The following three questions were all about the startup. It was now less about a personal assessment, but much more technically and on the specific topic of the enterprise's brand development. The goal was to discover how individual employees made decisions about the organization and what their perspectives are, which should not differ significantly from one another in an optimal method. The topic was about three to five brand values that each employee would assign to the company and establish as basic ideals that the company should always adhere to, both internally and externally. The attitudes were broadly similar here as well, with a strong emphasis on transparency (mentioned by nine interviewees), scientific validity (nine interviewees), sustainability (nine interviewees), and quality (seven interviewees). Furthermore, education was frequently mentioned as a value (six respondents). Customer

orientation, team spirit, modernity, uniqueness, and equality were the only values stated by individuals just once. These values were partly mentioned by the other interviewees as important but not ranked as a top priority for the startup. There are also a lot of consensuses here regarding the firm's core principles and what everyone believes is crucial for the startup to stand for.

Following that, a specific evaluation question was given to be a little more precise and to make the replies more comparable, as well as to draw attention to any disparities that might exist. To do this, the interview participants were briefly informed that the added value of a brand is influenced by three variables. The added value of a brand for the consumer, as well as its advantage to the organization, is comprised of three components: information efficiency, risk reduction, and optimum benefit. (Perrey & Meyer, 2010) It was further explained what each of the three factors meant in detail. Customers should be able to inform themselves more easily if brands want to improve information efficiency for them. Risk reduction refers to the process through which brands reduce the likelihood that a client will make a poor decision. Finally, brands have the ability to develop a perfect benefit for their customers. They can aid in the realization or expression of one's self (Perrey & Meyer, 2010). The respondents were asked to rate these three parameters in order of relevance to the startup with respect to the other two parameters. The question then becomes, what is most vital for the brand of the startup to perform, what is less important, and how do they determine their priorities? Different responses emerged as a result of this, which are depicted in Figure 2. The individual responses of the nine interviewees are depicted in this Figure. Each of the respondents scored the parameters differently, and there is little broad consensus on the parameters.

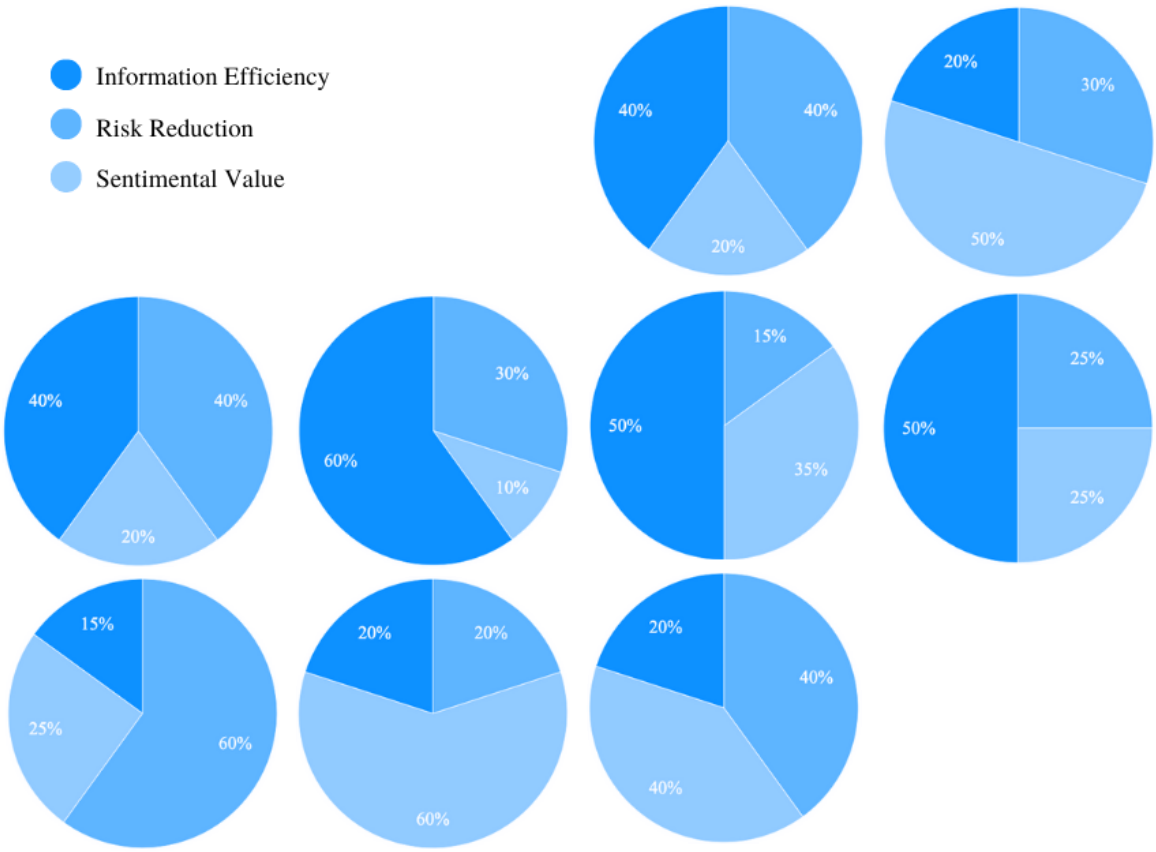

Figure 2: Added value of a brand as perceived by the nine interviewees

It is clear from this Figure 2 that there is no agreement on the relative importance of the various functions. When it comes to decisions about the brand, this can have an impact on them and result in various scattering, without it being recognized exactly why the decisions turn out differently. If the original scenario, in other words, the opinion regarding the relevance of the fundamental functions of a brand, varies across the individual employees, it is quite likely that different decisions will be made as a result of this difference in perspective.

A value proposition was then requested from the interviews, after which they were asked what the startup could give as a guarantee to their prospective clients. They were provided with an example of *SIXT* to follow for them to understand what was expected of them. *SIXT* is a car rental and car-sharing company based in Germany. It is one of the most well-known German brands, with a well-articulated value proposition, thus it serves as an illustrative example here. The answers to this question were remarkably similar in terms of their emphasis. Despite not knowing what the other respondents were saying, the respondents almost all agreed that four fundamental aspects of their value proposition were important. These were: conducting the most amount of research feasible (mentioned by seven interviewees), assuring the best possible

(nine interviewees) and most heavily dosed items (nine interviewees), and placing a strong emphasis on very high-top quality as a result of the research (nine interviewees). Customers' education (seven interviewees), as well as the company's desire to provide an added health benefit (five interviewees), were both recognized as important factors. As a result, there was little to no change in the content of the answers to the question.

6.3.2 Pattern Noise

The third part's last questions were rating questions. On a 10-point scale, respondents were asked to rank four topics, importance of brand, brand values, brand name, and brand logo, according to their perceived significance. These questions were also about evaluating the respondents' subjective evaluations and comparing them with the team (i.e., pattern noise). The importance of a brand was first discussed with respondents. The entire team assessed a brand as very important for a firm, with the maximum value assigned being a 10 and the lowest value assigned being a seven. For an easy overview, the outcomes of the questions are visualized in Figures 3, 4, 5, and 6.

The following question asked about the importance of brand values, and as you can see from Figure 2, the responses were more varied. The greatest value was ten once more, while the lowest was only five. Nonetheless, it is fair to say that the bulk of the team places a high value on brand values, as evidenced by the mean value of 7,89.

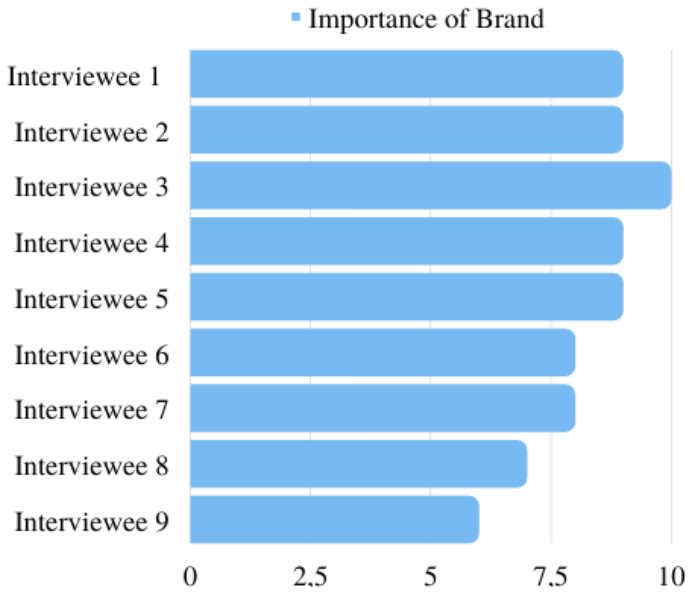

Figure 3: Importance of a brand

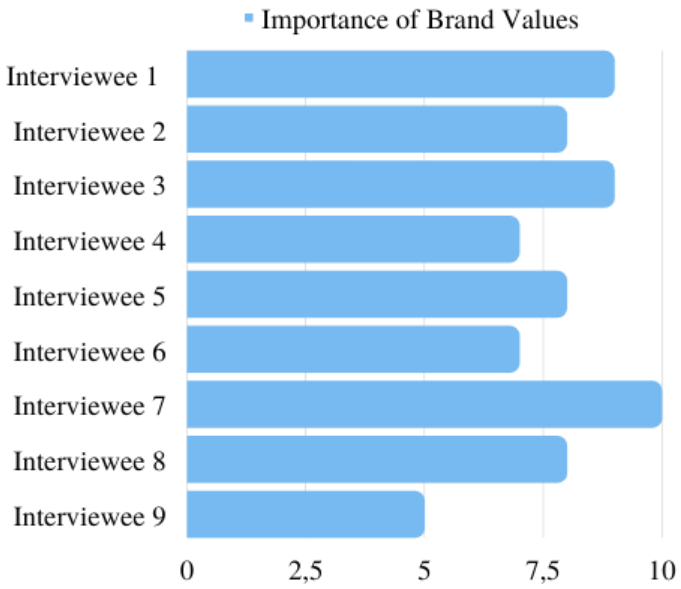

Figure 4: Importance of brand values

The next two questions delve into further depth. They inquire as to the significance of the brand name and the brand logo. Already with these two questions, one can see that there is a large increase in the variety of responses (see Figures 5 and 6). The question about the importance of a brand logo revealed a mean of 6.78 points, with a minimum of 3 points and a maximum of 10 points. The standard deviation was 2.28. The mean variance for the question of the relevance of a brand name was 5.78 points, with a minimum of 2 points and a maximum of 10 points. The standard deviation was 2.99 in this case. While one part of the team believes that a brand's logo and name are vitally important to the success of the company, another portion of the team believes the opposite and believes that they are even somewhat unimportant. Pattern Noise is characterized by the different individual weighting of different items. When it comes to making a judgment about a brand logo, for example, this variation in responses can be important information. While those on the team will undoubtedly consider this decision to be extremely important because the impact on their lives is significant in their eyes, the others will likely consider this decision to be rather unimportant and may, as a result, be less concerned with the decision and make it more succinctly, which can result in decisions being made less optimally.

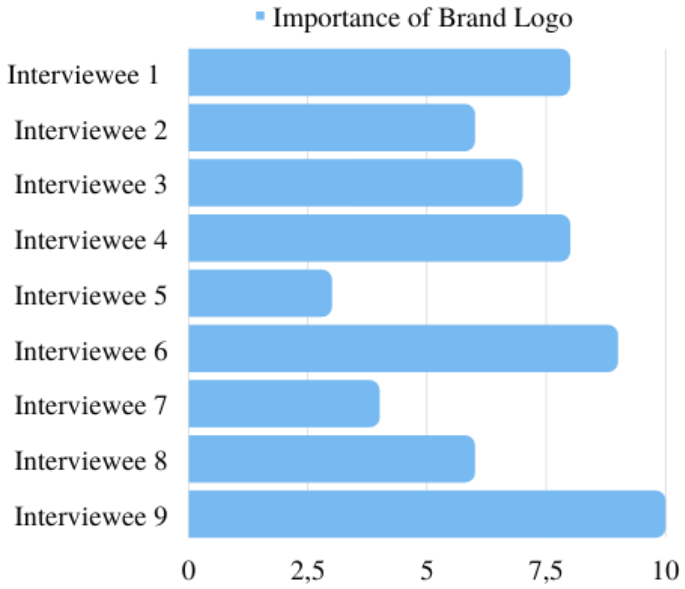

Figure 5: Importance of brand logo

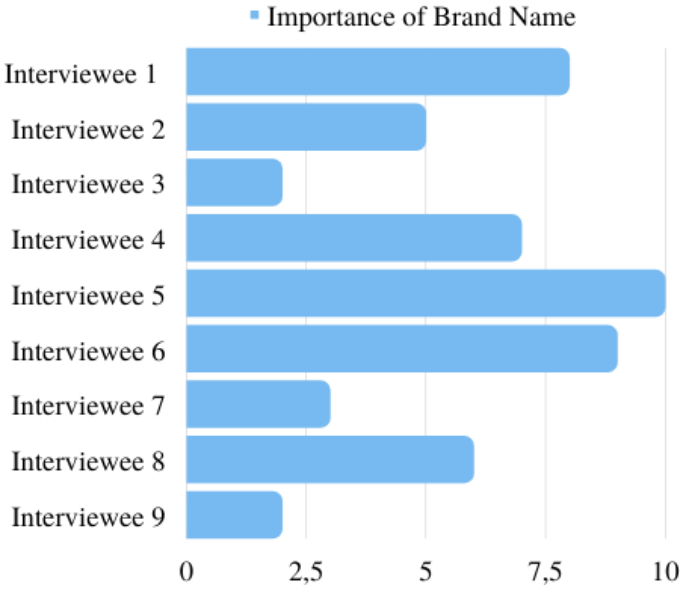

Figure 6: Importance of brand name

Finally, but not least, the interview participants were asked what they believed the average of the rest of the team said about two of the evaluation questions. The goal of this exercise is to determine whether or not the employees are capable of evaluating the rest of the team. And, if someone has a different point of view on a particular issue, whether or not they are aware that others may hold a different point of view. In this situation, noise would be discovered, but there would be a conscious awareness of the fact that it was there. The respondents were asked to rate how essential they believe the brand is to the firm's success and how significant they believe brand values are to the organization's success (see Figures 7 and 8). The mean variance for the respondents' perceptions of the relevance of the brand among the rest of the team was

7.78. The minimum and maximum values were 7 and 10 points, respectively. In this case, the standard deviation was 0.97. Finally, when it came to the team's evaluated relevance of brand values, the mean was 7.76, with a minimum of 6 points and a maximum of 10. In this case, the standard deviation was 1.22. As the respondents almost invariably named the same value that they themselves named is particularly interesting in this instance. When you compare the two mean values for the first and second questions, you'll notice that they're 8.33 and 7.78 points for the first question and 7.89 and 7.67 points for the second. These numbers are fairly close to one another, indicating that the answers are on average very comparable. The stated reason for this is that they believe the other members of the team believe the same as they do.

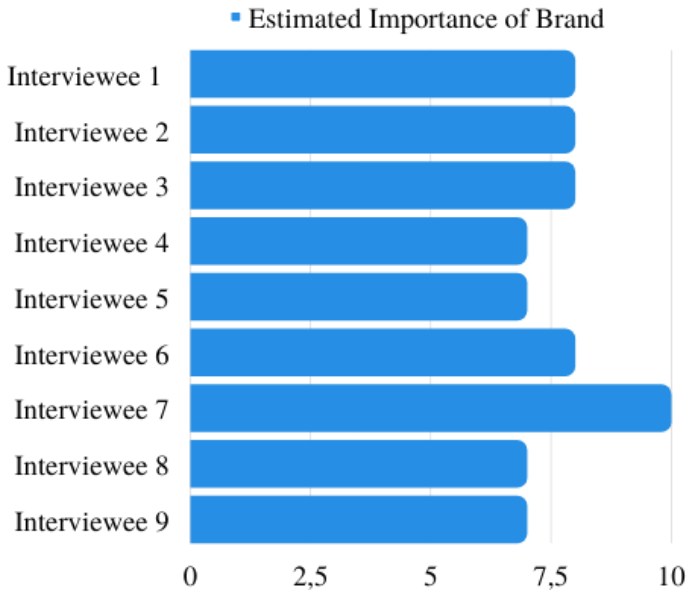

Figure 7: Estimated average of the importance of brand

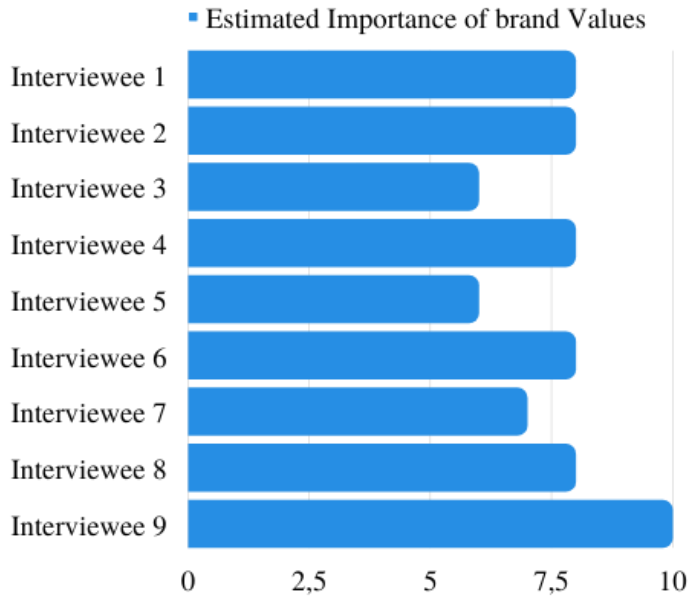

Figure 8: Estimated average of the importance of brand values

The noise index, which is the average value of the answers given to the question of how essential the rest of the team believes the brand is to the overall success of the company, was 7.78, according to the results of the survey. According to the question of how important the other employees regard the brand values to be on average, the noise index for this issue is 7.67. Thus, comparing what the interviewees considered to be important and what they think others consider important, we can observe that the noise index of 8.34 for the self is slightly lower than the index of 7.78 for the others, indicating that the employees believe that the rest of the team views their company's brand to be somewhat less important than their own. And 7.89 for the self, which is extremely close to 7.67 for the others, means the individual team members believe that the remainder of the team will make the same decision as they did.

6.4. Noise Awareness

> "We have a lot of diverse characters in our company, all with various histories and, at times, slightly different values. So, I'm not astonished if different decisions are made about the same item, or that diverse perspective and points of view exist on a subject. To avoid inconsistency, we always aim to engage in open discourse in our organization." (I*V*)

Finally, the participants were informed about the concept of noise. They were given a definition and an in-depth explanation of the issue with illustrations. This was done at the very end of the interview to ensure that the answers were not swayed by the fact that they knew what the interview was about. Almost all of the interviewees, 90%, had never heard of noise in relation to decision-making, and the topic has no meaning to them. The interviewees were also asked if they thought the topic was important in general, and if so, to what extent they thought it played a role in their organization. They found it difficult to assess the topic's overall importance, although they all considered it fascinating and deserving of study. When it comes to the importance of noise to their small business, everyone agrees: "I think noise plays a role wherever decisions are made, whether in a professional or private environment" (I*T*).

Everyone thinks the matter is important and implies that noise is a problem, especially for tiny and fledgling businesses like theirs. Likewise, the arguments in support of their view were all the same. The interviewees all agree that decision-making is often uncoordinated and chaotic as a result of open structures, some of which have yet to be formed. It is also not always obvious who has what decision-making power. The executives, in particular, voiced concern that judgments are often taken on the spur of the moment, and that if one looked closer, there would likely be a great deal of volatility. Finally, the majority of respondents stated that even being

aware of noise and being sensitive to the issue can already lead to rudimentary consistency and, as a result, better decision-making.

> "Since decisions in our organization are frequently situational, I believe noise plays a significant role. Even if the circumstances vary little, a different decision may be made. That makes sense to me and is extremely close to reality for us. However, I had not given this any thought before. Having this little explanation of Noise in mind could help us all be a little more differentiated in our judgments, I believe." (I*Y*)

7. Discussion

While choice errors caused by biases and heuristics in optimal decision processes have been the subject of significant investigation for decades, Kahneman and collaborators (2021) have demonstrated that such decision errors are caused by more than just biases and heuristics. They believe that so-called noise, or the dispersion of decisions, is a significant issue when it comes to decision-making. Given the topic is relatively new in research, this study should contribute to determining whether there are signals of noise in small organizations and to what degree it plays a role in the first few steps of practice. As an example of a young, small organization, the research object was a startup. The purpose of this paper is to determine whether there is noise in a startup's decision-making process, if there is interest in the subject, and which elements contribute to noise. The first traces of noise were found through semi-structured interviews.

7.1. Main findings and recommendations

Although performing a noise audit is recommended for detecting noise in the literature, the first indicators of noise were uncovered in this work through a suitably designed semi-structured interview. To begin, occasion noise, that is situational noise, was detected. This suggests that the same individual made two distinct judgments about the same subject at two distinct times in time. Additionally, pattern noise, namely, noise patterns induced by personality and personal judgments, was unmasked. It was revealed here that different respondents from the team placed a varied value on different items, maybe as a result of their character, and hence gave diverse responses to evaluation questions throughout the interview. As a result, distinct judgments were made inside the team. Additionally, level noise was shown, indicating that different employees of the startup value various issues differently, which could be a result of distinct personal ideals or worldviews.

Thus, the approach discovered all three types of noise. This could be because the interview questions lacked decision criteria. On the contrary, at the start of each interview, it was

requested that judgments be formed as intuitively as feasible, to simulate as closely as possible a startup's decision-making process. As a result, the interviewees had no access to statistics or other empirical data. They all responded to the questions based on their personal assessment which is why they made inconsequential choices. This small company's lack of decision-making criteria, as well as the lack of attention to these tasks, is most likely the reason that a substantial amount of noise exists.

To ascertain the extent to which a startup can serve as a breeding ground for noise, all respondents were asked about the company's decision-making structures. It became evident at this point that there are no set structures or empirical knowledge from the past on which decisions can be based. Additionally, numerous employees stated that there is a regular lack of clarity regarding how and by whom choices would be made. These two conditions can foster the growth of noise. In contrast, it was emphasized that the most significant choices are made with the input of all employees and that everyone has the right to share their opinions. Due to the startup's size, this democratic decision-making process continues to work. This is significant because this democratic process may result in a reduction in noise, namely pattern and level noise, in real-world decisions. This is because the numerous personalities, with their varying values, are heard and so it is more likely that a final judgment is reached that represents the mean value of all individual people.

Finally, respondents were asked if they were familiar with the concept of noise and if they believed noise was a problem in their workplace. Most of the team was unfamiliar with the concept of noise. However, it was noticeable that the entire crew expressed a strong interest in the subject and agreed that it was important. This could be because the team is aware of their startup's relatively open and loose decision-making frameworks and is interested in standardizing and optimizing decision-making. This high level of attention may be related to the fact that they are a startup, and their daily operations include developing the best possible structures that are both trendsetting and offer enough room for growth and adaptation to the market.

In summary, it can be said that noise does exist in this startup. Additionally, all sorts of noise have been investigated, including occasion noise, pattern noise, and level noise. Existing structures can act as both noise accelerators and noise inhibitors. However, this study did not fully elucidate the specific noise causes. This brings us to the dissertation's limitations and further research.

7.2. Limitations and future research

There are obvious limitations, particularly given the paucity of literature and empirical data on noise and the present work's exploratory approach. Three constraints have been recognized as primary limitations. To begin, it is necessary to clarify that the research was conducted within a single startup. As a result, no data can be generalized, and no implications are reached for other organizational kinds, such as larger organizations. Additionally, no solid conclusions about the sources of noise can be reached. The precise variables underlying disparities in judgments in the case of level noise have not been identified or examined. Additionally, it is unclear which character traits or particular value catalogs contributed to which decisions in terms of pattern and level noise. To ascertain this, a detailed noise audit would need to be conducted by appropriately qualified personnel who also possess psychological expertise. As previously stated, such a noise audit would have exceeded the scope of this work. Finally, it should be noted that one limitation is that no general assertions concerning the formation of noise and associated dominant structures can be made.

These constraints provide a foundation for future research. One area of inquiry would be to undertake proper noise audits in a range of diverse types of organizations, of varying sizes and with different agile or established decision-making processes. It would be interesting to study how the procedures differ in terms of decision-making and whether this has an effect on the amount of noise. Additionally, it is still intriguing to investigate the precise nature of several fundamental noise factors. For instance, how is it that the same person can answer the same question differently at various moments in time? And what are the individual reasons for this, and whether the individual reasons of various people coincide and allow for the formation of concrete clusters? Following that, it will be feasible to determine whether noise can be minimized based on empirically researched elements. Finally, it would be interesting to investigate whether reducing noise actually results in an optimization of accurate decisions making processes.

In summary, this thesis contributes to the academic literature by determining whether and how noise develops in a small firm such as a startup. Further research will be able to assess more precisely whether noise is a significant issue in decision-making by demonstrating that it can be recognized across multiple organizations and that it can be decreased, hence optimizing decisions.

8. Sources

Ashton, R. H. (2000). A review and analysis of research on the test-retest reliability of professional judgment. *Journal of Behavioral Decision Making*, *13*(3), 277–294. https://doi.org/10.1002/1099-0771(200007/09)13:3<277::AID-BDM350>3.0.CO;2-B

Åstebro, T., & Elhedhli, S. (2006). The effectiveness of simple decision heuristics: Forecasting commercial success for early-stage ventures. *Management Science*, *52*(3), 395–409. https://doi.org/10.1287/mnsc.1050.0468

Branson, D. M. (2002). The Rule That Isn`t a Rule - The Business Judgment Rule. *Valparaiso University Law Review*, 631–654. https://heinonline.org/HOL/License

Braun, V., & Clarke, V. (2012). Thematic analysis. In *APA handbook of research methods in psychology, Vol 2: Research designs: Quantitative, qualitative, neuropsychological, and biological.* (pp. 57–71). American Psychological Association. https://doi.org/10.1037/13620-004

Carey, S., Leahy, B., Redshaw, J., & Suddendorf, T. (2020). Could It Be So? The Cognitive Science of Possibility. In *Trends in Cognitive Sciences* (Vol. 24, Issue 1, pp. 3–4). Elsevier Ltd. https://doi.org/10.1016/j.tics.2019.11.007

Charles, L., & Yeung, N. (2019). Dynamic sources of evidence supporting confidence judgments and error detection. *Journal of Experimental Psychology: Human Perception and Performance*, *45*(1), 39–52. https://doi.org/10.1037/xhp0000583

Clancy, K., Bartolomeo, J., Richardson, D., & Wellford, C. (1973). Sentence DecisionMaking: The Logic of Sentence Decisions and the Extent and Sources of Sentence Disparity. *The Journal of Criminal Law and Criminology*, *72*(2), 524–554.

Costello, F. J., & Watts, P. (2016). *A test of two models of probability judgment: quantum versus noisy probability*.

Costello, F., & Watts, P. (2014). Surprisingly rational: Probability theory plus noise explains biases in judgment. *Psychological Review*, *121*(3), 463–480. https://doi.org/10.1037/a0037010

Croskerry, P. (2003). The Importance of Cognitive Errors in Diagnosis and Strategies to Minimize Them. *Academic Medicine*, *78*(8), 775–780. http://journals.lww.com/academicmedicine

de Baets, S., & Harvey, N. (2020). Using judgment to select and adjust forecasts from statistical models. *European Journal of Operational Research*, *284*(3), 882–895. https://doi.org/10.1016/j.ejor.2020.01.028

di Gregorio, F., Maier, M. E., & Steinhauser, M. (2020). Are errors detected before they occur? Early error sensations revealed by metacognitive judgments on the timing of error awareness. *Consciousness and Cognition*, *77*. https://doi.org/10.1016/j.concog.2019.102857

Elstein, A. S. (1999). Heuristics and Biases: Selected Errors in Clinical Reasoning. *Academic Medicine*, *74*(7).

Eren, O., & Mocan, N. (2018). Emotional Judges and Unlucky Juveniles. *American Economic Journal: Applied Economics*, *10*(3), 171–205. https://doi.org/10.1257/app.20160390

Erev, I., Wallsten, T. S., & Budescu, D. v. (1994). Simultaneous over- and underconfidence: The role of error in judgment processes. *Psychological Review*, *101*(3), 519–527. https://doi.org/10.1037/0033-295X.101.3.519

Eva, K. W., & Reiter, H. I. (2004). Where Judgement Fails: Pitfalls in the Selection Process for Medical Personnel. *Advances in Health Sciences Education*, *9*(2), 161–174. https://doi.org/10.1023/B:AHSE.0000027479.14637.6c

Funder, D. C. (1987). Errors and mistakes: Evaluating the accuracy of social judgment. *Psychological Bulletin*, *101*(1), 75–90.

Gigerenzer, G. (2013). *Risiko. Wie man die richtigen Entscheidungen trifft*. C. Bertelsmann Verlag.

Gigerenzer, G., & Gaissmaier, W. (2011). Heuristic decision making. *Annual Review of Psychology*, *62*, 451–482. https://doi.org/10.1146/annurev-psych-120709-145346

Grimstad, S., & Jørgensen, M. (2007). Inconsistency of expert judgment-based estimates of software development effort. *Journal of Systems and Software*, *80*(11), 1770–1777. https://doi.org/10.1016/j.jss.2007.03.001

Guest, G., MacQueen, K., & Namey, E. (2014). Applied Thematic Analysis. In *Applied Thematic Analysis*. SAGE Publications, Inc. https://doi.org/10.4135/9781483384436

Guion, L. A., Diehl, D. C., & Mcdonald, D. (2011). *Conducting an In-depth Interview*. www.aidsmark.org/ipc_en/pdf/manual/14_Research-

Gureckis, T. M., & Love, B. C. (2009). Learning in noise: Dynamic decision-making in a variable environment. *Journal of Mathematical Psychology*, *53*(3), 180–193. https://doi.org/10.1016/j.jmp.2009.02.004

Hicks, E. P., & Kluemper, G. T. (2011). Heuristic reasoning and cognitive biases: Are they hindrances to judgments and decision making in orthodontics? *American Journal of Orthodontics and Dentofacial Orthopedics*, *139*(3), 297–304. https://doi.org/10.1016/j.ajodo.2010.05.018

Hilbert, M. (2012). Supplemental Material for Toward a Synthesis of Cognitive Biases: How Noisy Information Processing Can Bias Human Decision Making. *Psychological Bulletin*. https://doi.org/10.1037/a0025940.supp

Javadi, M., & Zarea, K. (2016). Understanding Thematic Analysis and its Pitfall. *Journal of Client Care*, *1*(1). https://doi.org/10.15412/j.jcc.02010107

Johnson, D. D. P., Blumstein, D. T., Fowler, J. H., & Haselton, M. G. (2013). The evolution of error: Error management, cognitive constraints, and adaptive decision-making biases. In *Trends in Ecology and Evolution* (Vol. 28, Issue 8, pp. 474–481). https://doi.org/10.1016/j.tree.2013.05.014

Kahneman, D., Rosenfield, A. M., Gandhi, L., & Blaser, T. (2016). Noise - How to Overcome the High, Hidden Cost of Inconsistent Decision Making. *Harward Business Review*, *October*, 36–43.

Kahneman, D., Rosenfield Andrew M., Gandhi Linnea, & Blaser, T. (2016). Noise: How to Overcome the High, Hidden Cost of Inconsistent Decision Making. *Harvard Business Review*, 36–43.

Kahneman, D., Sibony, O., & Sunstein, C. R. (2021a). *Book Review: Noise: A Flaw in Human Judgment by*. https://blogs.lse.ac.uk/usappblog/

Kahneman, D., Sibony, O., & Sunstein, C. R. (2021b). *Noise : a flaw in human judgment*.

Lagerfeld, S. (2013). The Signal and the Noise: Why so many Predictions Fail - But some don`t. *The Wilson Quaterly*.

Leiser, D., & Azar, O. H. (2008). Behavioral economics and decision making: Applying insights from psychology to understand how people make economic decisions. In *Journal of Economic Psychology* (Vol. 29, Issue 5, pp. 613–618). https://doi.org/10.1016/j.joep.2008.08.001

Loomes, G. (2015). *Variability, Noise, and Error in Decision Making Under Risk* (G. Keren & G. Wu, Eds.).

Marshall, J. A. R., Dornhaus, A., Franks, N. R., & Kovacs, T. (2006). Noise, cost and speed-accuracy trade-offs: Decision-making in a decentralized system. *Journal of the Royal Society Interface*, *3*(7), 243–254. https://doi.org/10.1098/rsif.2005.0075

Mc Gurk, V. (2017). Snowball in a Blizzard - The tricky problem of uncertainty in medicine. *Nursing Standard*, *32*(12).

McMillan, L. (2013). *The Business Judgment Rule as an Immunity Doctrine*.

Minson, J. A., Liberman, V., & Ross, L. (2011). Two to Tango. *Personality and Social Psychology Bulletin*, *37*(10), 1325–1338. https://doi.org/10.1177/0146167211410436

Murrah, A. P. (1974). Book Reviews : Criminal Sentences: Law without Order, Marvin E. Frankel. Pp. x, 124. New York, Hill and Wang, 1973. $5.95. *Crime & Delinquency*, *20*(2), 186–186. https://doi.org/10.1177/001112877402000211

Newell, B. R., Rakow, T., Weston, N. J., & Shanks, D. R. (2004). Search strategies in decision making: The success of "success." *Journal of Behavioral Decision Making*, *17*(2), 117–137. https://doi.org/10.1002/bdm.465

Norman, G. (2009). Dual processing and diagnostic errors. In *Advances in Health Sciences Education* (Vol. 14, Issue 1 SUPPL, pp. 37–49). https://doi.org/10.1007/s10459-009-9179-x

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic Analysis: Striving to Meet the Trustworthiness Criteria. *International Journal of Qualitative Methods*, *16*(1). https://doi.org/10.1177/1609406917733847

Perrey, J. 1967-, & Meyer, T. (2010). *Mega-Macht Marke Erfolg messen, machen, managen*. Redline Verlag, FinanzBuch Verlag GmbH.

Power, D. J. (2002). *Decision Support Systems: Concepts and Resources for Decision Support Systems: Concepts and Resources for Managers Managers*. https://scholarworks.uni.edu/facbook/67

Scheffers, M. K., & Coles, M. G. H. (2000). Performance monitoring in a confusing world: Error-related brain activity, judgments of response accuracy, and types of errors. *Journal of Experimental Psychology: Human Perception and Performance*, *26*(1), 141–151. https://doi.org/10.1037/0096-1523.26.1.141

Shiller, R. J. (2002). Bubbles, Human Judgment, and Expert Opinion. *Financial Analysts Journal*, *58*(3), 18–26. https://doi.org/10.2469/faj.v58.n3.2535

Takemura, K. (2014). *Behavioral Decision Theory Psychological and Mathematical Descriptions of Human Choice Behavior*. Springer.

Tarallo, E., Akabane, G. K., Shimabukuro, C. I., Mello, J., & Amancio, D. (2019). Machine learning in predicting demand for fast-moving consumer goods: An exploratory research. *IFAC-PapersOnLine*, *52*(13), 737–742. https://doi.org/10.1016/j.ifacol.2019.11.203

Tversky, A., & Kahneman, D. (1974). *Judgment under Uncertainty: Heuristics a nd Biases Biases in judgments reveal some heuristics of thinking under uncertainty*.

Wach, M., & Chomiak-Orsa, I. (2021a). The application of predictive analysis in decision-making processes on the example of mining company's investment projects. *Procedia Computer Science* , *192*, 5058–5066. https://doi.org/10.1016/j.procs.2021.09.284

Wach, M., & Chomiak-Orsa, I. (2021b). The application of predictive analysis in decision-making processes on the example of mining company's investment projects. *Procedia Computer Science*, *192*, 5058–5066. https://doi.org/10.1016/j.procs.2021.09.284

Yang, C. S., Blackwell, K., Cauble, E., Chamberlain, G., Chetty, R., Chilton, A., Clopton, Z., Dobbie, W., Frank Easterbrook, J., Harry Edwards, J. T., Epstein, L., Fischman, J., Ford, S., Nancy Gertner, J., Goldin, C., Heeren, G., Hofer, P., Hubbard, W. H., Hutchinson, D., … William, J. G. (2014). *Have Interjudge Sentencing Disparities Increased In An Advisory Guidelines Regime?*

9. Appendix

Appendix A: Interview Guide English Version

Hello (name),

Welcome and thank you so much for participating in the interview for my thesis.

First of all, I will provide you with some information, so you know what to expect in the next 30 minutes.

- In general, it is discussed how individual decisions are made in an organization. Your startup serves as a model for a young, dynamic organization with a flat hierarchy.
- It's a special interview because your answers aren't directly related to my work, but rather secondary and in comparison, to the responses of others. More about the thesis topic will be revealed during the interview.
- It is important to understand that there is no such thing as right or wrong. Please respond as honestly as possible and include your personal assessment and opinion. It will mostly be about one topic, namely brand development. This is a project with which you are already familiar, which will soon immerse you in the company and in which all employees are equally involved. That is why this topic was chosen for this interview.
- To give you a better idea of where we are, I'll let you know that the interview is divided into four parts.
- The responses will not be evaluated on a person-to-person basis, which means that whatever you say will be evaluated anonymously. It will not be attributed to you individually.
- If you need time to think, please take it, and if you have any questions, don't hesitate to ask!
- Finally, I would like to request that you refrain from discussing the interview with your coworkers until I have conducted the interview with all of you.

Is it okay with you if I make a voice recording of the interview so that I can better evaluate it later?

Part 1: Estimation Questions

a. How many Germans currently using dietary supplements?

b. How much revenue do you estimate from dietary supplements in Germany by 2020?

In 2015, there were 1,731 billion dollars.

c. How much of the total revenue generated by food supplements is provided by probiotic products?

Part 2: Decision-Making Structure in Startups

a. How do you make decisions in your startup? Have you developed any rigid structures for this purpose?

b. Are you capable of making autonomous decisions? Or are your decisions vetoed by someone else in your corporation?

c. How would you describe an average decision-making process in your startup?

Part 3: The Brand

a. Do you believe that a brand is critical for a business? If so, why, or more precisely, why not?

b. What defines a (good) brand?

c. Which brand do you consider to be strong/good? And why? Please provide an example of a brand that, in your opinion, is currently performing well.

d. Each established brand has three to five core values that they represent and live by on the outside as well as the inside. Values that define the brand and differentiate it from the competition. What are the fundamental values upon which your brand is built? How would you describe the personality of your startup?

e. A brand fulfills three fundamental functions.

1) Information efficiency, which means that brands should make information retrieval easier.

2) Risk reduction, in other words, a brand minimizes the risk of making an incorrect decision.

3) Personal Value, which means brands can serve an ideal purpose such as self-realization, self-presentation, or identification.

How would you weigh these three functions proportionally? Why?

f. Which functional and emotional benefits does your startup offer consumers in comparison to the competition? Why would a consumer believe that your brand is the best option for him? What might your value proposition sound like?

As assistance, here is an illustrative value proposition, so that you may see how such a concept might sound:

If I choose Sixt over another car rental company, I get a lot of car for a little money, because only Sixt offers the most attractive vehicles at the best prices.

g. How significant do you believe a brand is to the overall success of a business?

1 2 3 4 5 6 7 8 9 10

h. How critical do you believe it is for a brand to have strong brand values?

1 2 3 4 5 6 7 8 9 10

i. How significant is the brand name in this case? Why?

1 2 3 4 5 6 7 8 9 10

j. How critical is a brand logo? What is significant about it?

1 2 3 4 5 6 7 8 9 10

k. How important do you think is the brand for the overall success of the business to the rest of the team?

1 2 3 4 5 6 7 8 9 10

l. How is the rest of the team the brand's (lived) values rating for the success of the business?

1 2 3 4 5 6 7 8 9 10

Estimation Question Second Round:

a. How much of the total revenue generated by food supplements are provided by probiotic products?

b. How many Germans currently using dietary supplements?

c. Are you capable of making autonomous decisions? Or are your decisions vetoed by someone else in your corporation?

Part 4: Noise

Last but not least, I have two closing questions. Here, I'll explain briefly what my Master's thesis is about. I'm working on a paper about noise in decision-making.

Noise describes the situation in which different people make different decisions about the same issue. Not to be confused with bias, which are just preconceived notions or unconscious personal prejudices. Noise has something to do with taste, and personality, but also with profane things like the weather or the time difference from the last meal. Bias and noise both influence our daily decisions and can lead to errors in judgment.

a. Was the term "noise" in relation to decision-making familiar to you?

b. Do you believe that noise plays a role in your startup? Why or why not?

These were the final questions of the interview.

Thank you for taking the time to participate and share your thoughts! If you are interested in the research findings, I will gladly make my dissertation available to you as soon as it is completed, and I will present my findings to you.

Appendix B: Interview Guide German Version

Hallo (Name),

Willkommen und vielen Dank, dass du dich bereit erklärst bei dem Interview mitzumachen.

Damit du weißt, was dich die nächsten 30 Minuten erwarten wird, habe ich hier ein paar Informationen für dich.

- Im Groben geht es darum, wie individuell Entscheidungen in einer Organisation getroffen werden. Euer Startup steht hier beispielhaft für eine junge dynamische Organisation mit flachen Hierarchien.
- Es handelt sich hierbei um ein besonders Interview, da eure Antworten inhaltlich nicht primär relevant sind für meine Masterarbeit, sondern eher sekundär und im Vergleich mit den Antworten der anderen. Mehr zum Thema der Thesis werdet ihr im Laufe des Interviews erfahren.
- Wichtig ist, dass es kein richtig und kein falsch gibt. Antwortet bitte möglichst aus dem Bauch heraus, nennt mir eure persönliche Einschätzung und Meinung. Es wird hauptsächlich um ein Thema gehen, nämlich Markenbildung. Das ist ein Projekt, mit dem ihr bereits vertraut gemacht wurde, das in Kürze bei euch im Unternehmen ansteht und bei dem alle Mitarbeiter gleichermaßen involviert sind. Deshalb wurde es für dieses Interview ausgewählt.
- Das Interview ist in vier Teile unterteilt.
- Die Antworten werden nicht personenbezogen ausgewertet, das heißt was genau ihr sagt, wird anonym ausgewertet. Es wird nicht auf euch im Einzelnen zurückzuführen sein.
- Wenn du Zeit zum Überlegen brauchst, nimm sie dir gerne und wenn du Fragen hast, stelle sie bitte jederzeit!
- Ich bitte dich abschließend, nach dem Interview nicht mit deinen Kollegen darüber zu sprechen, bis ich mit allen Mitarbeitern das Interview geführt habe.

Ist es in Ordnung für dich, wenn ich eine Sprachaufzeichnung von dem Interview mache, damit ich es anschließend besser auswerten kann?

Teil 1: Schätzfragen

a. Wie viel Prozent der Deutschen nehmen aktuell Nahrungsergänzungsmittel zu sich?
b. Wie hoch schätzt du den Umsatz mit Nahrungsergänzungsmitteln in Deutschland 2020?

Hilfe: 2015 waren es 1,731 Milliarden

c. Wie viel Prozent des Gesamtumsatzes von Nahrungsergänzungsmitteln machen probiotische Produkte aus?

Teil 2: Entscheidungsstrukturen im Startup

a. Wie trefft ihr in eurem Startup Entscheidungen? Habt ihr irgendwelche festen Strukturen hierfür?
b. Triffst du autonome Entscheidungen? Oder werden deine Entscheidungen durch eine andere Instanz abgesegnet?
c. Wie würdest du einen durchschnittlichen Entscheidungsprozess in eurem Startup beschreiben

Teil 3: Die Marke

a. Denkst du eine Marke ist wichtig für ein Unternehmen? Warum, beziehungsweise warum nicht?
b. Was macht eine (gute) Marke aus?
c. Welche Marke findest du stark/gut? Und warum, nenne bitte ein Beispiel einer Marke, die deiner Meinung nach zur Zeit gut performed.
d. Jede etablierte Marke hat drei bis fünf Kernwerte, die sie nach außen so wie aber auch nach innen vertreten und leben. Werte für die, die Marke steht und die sie von der Konkurrenz abgrenzt. Welches sind die fundamentalen Werte, für die eure Marke steht? Wie ist die Persönlichkeit eures Startups?
e. Eine Marke erfüllt drei Grundfunktionen. 1.Informationseffizienz, das heißt Marken sollen die Informationsaufnahme erleichtern. 2.Risikoreduktion, das heißt eine Marke reduziert das Risiko, eine falsche Entscheidung zu treffen. 3. Ideeller Nutzen, das heißt, Maken können einen ideellen Nutzen, wie Selbstverwirklichung, Selbstdarstellung oder Identifikation stiften.

   Wie würdest du diese drei Funktionen prozentual zueinander gewichten? Warum?
f. Welche funktionalen und emotionalen Nutzenvorteile bietet eur Startup den Konsumenten im Vergleich zum Wettbewerb? Warum wird ein Konsument glauben, dass eure Marke die beste für ihn ist? Wie könnte euer Wertversprechen lauten?

   Als Hilfestellung hier ein beispielhaftes Wertversprechen, damit du siehst, wie sowas lauten kann:

   Wenn ich Sixt, statt einer andere Autovermietung wähle, dann erhalte ich viel Auto für

wenig Geld, weil nur Sixt die attraktivsten Autos zum günstigsten Preis bietet.

g. Wie wichtig schätzt du eine Marke für den allgemeinen Unternehmenserfolg ein?
   1 2 3 4 5 6 7 8 9 10
h. Wie wichtig denkst du sind dabei gelebte Markenwerte für die Marke?
   1 2 3 4 5 6 7 8 9 10
i. Wie wichtig ist dabei der Markenname? Warum?
   1 2 3 4 5 6 7 8 9 10
j. Wie wichtig ist ein Markenlogo? Was daran ist wichtig?
   1 2 3 4 5 6 7 8 9 10
k. Wie wichtig schätzt der Rest des Teams durchschnittlich die Marke für den Unternehmenserfolg ein?
   1 2 3 4 5 6 7 8 9 10
l. Wie wichtig schätzen deiner Meinung nach das Team (gelebte) Markenwerte für das Unternehmen ein?
   1 2 3 4 5 6 7 8 9 10

Schätzfragen zweite Runde

a. Wie viel des Gesamtumsatzes von Nahrungsergänzungsmitteln machen probiotische Produkte aus?
b. Wie viel Prozent der Deutschen nehmen aktuell Nahrungsergänzungsmittel zu sich?
c. Wie hoch schätzt du den Apothekenumsatz mit Nahrungsergänzungsmitteln in Deutschland?

Teil 4: Noise

Zuletzt habe ich noch zwei Abschlussfragen. Hierfür erkläre ich kurz, worüber meine Masterarbeit handelt. Ich schreibe meine Arbeit über das Thema Noise in Decision Making.

Noise beschreibt den Umstand, dass verschiedene Leute verschiedene Entscheidungen bei einem eigentlich gleichen Thema machen. Nicht zu verwechseln mit Bias, das sind einfach gesagt Vorurteile oder unbewusste persönliche Prägungen. Noise hat etwas mit Geschmack, Persönlichkeit aber auch profanen Dingen wie dem Wetter oder der zeitliche Abstand zum letzten Mahl zu tun. Sowohl Bias als auch Noise beeinflussen unsere täglichen Entscheidungen und können zu Entscheidungsfehlern führen.

a. War dir der Begriff Noise bezüglich Entscheidungsfindung bekannt?

b. Denkst du, dass Noise in eurem Startup eine Rolle spielt? Inwiefern, oder warum nicht?

Das waren die letzten Fragen des Interviews.
Vielen Dank für deine Teilnahme und deine Meinung! Wenn du an den Forschungsergebnissen interessiert bist, stelle ich euch meine Dissertation gerne zur Verfügung sobald sie fertiggestellt ist und präsentiere euch meine Ergebnisse.

Appendix C: Overview of Main Findings

Part 1: Estimation Questions	
Number of Germans who currently consume dietary supplements	• 6% • 25% • 37% • 40% • 20% • 10% • 35% • 12% • 30%
Amount of current annual turnover in Germany generated by dietary supplements	• 3 Billion • 3 Billion • 4 Billion • 4 Billion • 3 Billion • 600 Million • 1,5 Billion • 400 Million • 5 Billion
Proportion of probiotics in the total dietary supplement consumption in Germany	• 8% • 9% • 7% • 8% • 5% • 15% • 33% • 10% • 20%
Part 2: Decision Structure in a Startup	
Decision Structure	"Our decision-making system is very flat, in my opinion. That is, we make every effort to listen to each employee equally and to offer everyone decision-making ability. In a startup, it's critical that decisions are made fast and that everyone has some level of accountability." (I*R)* "Because we haven't yet developed any structures, and because we've only been around for a short time, each employee has a pretty high degree of decision-making freedom. We still have a small number of permanent employees, so everyone bears a great deal of responsibility. According to this, we also choose our staff; trust and independence are important in our organization."(I*S*) "We strive to provide each individual with a high level of autonomy and responsibility. We want everyone to be able to make

	their own decisions within a specific framework. And, even if you don't make decisions on your own, it's vital to us to have an open culture in which we sit down together frequently and make significant decisions collectively. However, this is also a huge challenge for us because decision-making transparency is still lacking. It is quite tough to involve all staff equally. We obviously have a lot more to learn in this area. Also, in terms of openness, making it clear who made which judgments and why. I believe that reality still deviates from the ideal in certain ways."(I*W*) "I am new to the company, and it is still tough for me to comprehend why and how certain decisions are made. In my opinion, communication here is still problematic at times. Although all employees are given the impression that they are taken seriously, it has happened a few times that I thought we were still in a decision-making process, only to have a sudden choice delivered a little later."(I*T*) "To be honest, I don't always understand how some decisions are made. It is frequently proposed that we all make a choice collectively, yet some individual decisions or viewpoints are sometimes overlooked. This is entirely reasonable to me because we are a corporation with specific aims for which higher-level employees must simply make certain judgments. Decisions in a startup must frequently be made quickly. These judgments, however, are sometimes poorly communicated, if expressed at all. There isn't always enough transparency to make decisions understandable to all employees."(I*U*) "In startups a lot happens without great structures and agreements. Decisions are made in companies like Siemens based on certain criteria that must be met, and there are defined hierarchies and frameworks for decision-making power. In a young organization like ours you don't have somebody above you to ask or who has already taken such a decision, you have to work a lot from your gut. If someone asks me if the website button should be red or orange, I don't have any empirical data from our organization from which to draw conclusions. I go with my instincts and hope it was the right decision. Only time allows for the formation of experiences and repetitions, from which one can then advance."(I*Y*) "Because our decision-making structures do not yet exist, it is difficult to say anything definite or explicit about them. Depending on the situation, our decision-making processes are frequently very different. Because we are making numerous decisions for the first time, we have not yet defined something like specific decision-making structures." (I*Z*)
Part 3: Detecting Noise	

Importance of a brand	Extremely important (all Respondents) “Extremely important because of differentiation, brand is product, and the product is the brand.”(I*Z*) “A functional brand is critical since it aids in market differentiation and customer identification.”(I*W*) “Brand is important, especially in our company due to less defeasibility and a soft usecase.”(I*Y*) "In general, I believe that a brand is quite significant. However, in our instance, it is critical to establish a brand. We are not a pharmacy product, such as a prescription drug, where the name comes second to the quality of the product. We are more in the lifestyle sector with our product and don't have such a difficult usecase, therefore a good brand is just as crucial to us as a good product."(I*T*) “A brand is extremely important, especially in today's world. There are so many products on the market that the buyer might easily become overwhelmed by the appropriate pick. It is no longer the case that each product has only a few variations. That is why it is more crucial than ever to differentiate yourself not only through unique product attributes, but also through creating a brand that buyers remember and associate with. In the end, it is the huge brands, not the big items, that function well.”(I*V*)
Brand Criteria	transparency (9 Respondents) recognition value (7 Respondents) emotionality, creating a Love brand (7 Respondents) trust (6 Respondents) consistency (5 Respondents) authenticity (3 Respondents) advancement (1 Respondent) strong boundaries, differentiation (1 Respondent)
Brand example	Patagonia Lindt Spanx Goop Apple Nike Ortovox Hey Estrid Tesla
Values and personality	transparency (9 Respondents) scientific validity (9 Respondents) sustainability (9 Respondents) quality (7 Respondents)

	education (6 Respondents) customer orientation (1 Respondent) team spirit (1 Respondent) modernity (1 Respondent) uniqueness (1 Respondent) equality (1 Respondent)
Value of a Brand	Information Efficiency 40% Risk Reduction 40% Sentimental Value 20% Information Efficiency 20% Risk Reduction 30% Sentimental Value 50% Information Efficiency 40% Risk Reduction 40% Sentimental Value 20% Information Efficiency 60% Risk Reduction 30% Sentimental Value 10% Information Efficiency 50% Risk Reduction 15% Sentimental Value 35% Information Efficiency 50% Risk Reduction 25% Sentimental Value 25% Information Efficiency 15% Risk Reduction 60% Sentimental Value 25% Information Efficiency 20% Risk Reduction 20% Sentimental Value 60% Information Efficiency 20% Risk Reduction 40% Sentimental Value 40%
Value Proposition	Research (7 Respondents) best quality (9 Respondents) high dose product (9 Respondents) customer education (7 Respondents) health benefit (5 Respondents) “we provide the customer with the greatest research effort, clear and straightforward and health advantages” (I*Y*) “We place a high value on well-being and believe that the microbiome may help you solve your problems.”(I*V*) “We offer high quality, based on the latest scientific results, sustainably produced, and last but not least education around the topic of digestion, body awareness and microbiome.” (I*S*) “We offer a high level of scientificity and thus quality. We also value individuality and personal consultation.”(I*X*) “We provide customers with the latest scientific knowledge in the field of microbiome research and make it available to customers by developing high-quality products and providing customers with the knowledge they need for a healthy life.”(I*W*)

	“Well-being in everyday life, Sustainable, Scientific, Added health value.”(I*U*)
Brand Importance Ranking	• 9 • 9 • 10 • 9 • 9 • 8 • 8 • 7 • 6
Importance of Brand Values Ranking	• 9 • 8 • 9 • 7 • 8 • 7 • 10 • 8 • 5
Importance of Brand Logo Ranking	• 8 • 6 • 7 • 8 • 3 • 9 • 4 • 6 • 10
Importance of Brand Name Ranking	• 8 • 5 • 2 • 7 • 10 • 9 • 3 • 6 • 2
Estimated Importance of Brand	• 8 • 8 • 8 • 7 • 7 • 8 • 10 • 7

	• 7
Estimated Importance of Brand Values	• 8 • 8 • 6 • 8 • 6 • 8 • 7 • 8 • 10
Repetition Part 1: Estimation Questions	
Proportion of probiotics in the total dietary supplement consumption in Germany	• 5% • 10% • 7% • 4% • 7% • 15% • 25% • 10% • 13%
Number of Germans who currently consume dietary supplements	• 4% • 25% • 40% • 45% • 20% • 15% • 45% • 18% • 35%
Amount of current annual turnover in Germany generated by dietary supplements	• 3 Billion • 7 Billion • 5 Billion • 6 Billion • 2,5 Billion • 800 Million • 2 Billion • 400 Million • 6 Billion
Part 4: Noise Awareness	
Knowledge	• 4x “No” • 4x “No not yet but it is very interesting and i would like to learn more about it” • 1x “Yes”

Relevance	“I think in certain decisions, you can not prevent noise, even in our Startup.” “I think noise plays a role wherever decisions are made, whether in a professional or private environment.” (I*T*) “We have a lot of different personalities who approach or understand similar situations differently due to their respective experiences with a different mindset. This also leads to a discussion when decisions are made, which in my view can often be very productive because a topic is examined and evaluated from different points of view.“ “In any case! I think especially with Start Ups it plays a role! Why? Because a lot happens here without large structures and agreements. In a company like Siemens, for example, decisions are made according to precise criteria that have to be met, and there are clear hierarchies and structures for decision-making power at the end. In young companies, you work a lot from your gut, because you don't have anyone above you to ask or who has already made such a decision. If someone asks me whether the button on the website should be red or orange, I have no empirical values from our company from which I can derive anything. I decide from my gut and just hope that it was the right one. Only with time experiences and repetitions are formed, according to which one can then proceed. This can have advantages and disadvantages. Impulsive thinking of course also requires a very high degree of creativity and thinking outside of the box and so new and innovative products and brands are created again and again. But this can of course also lead to a very high and constant stress level for the employees in the long run and ultimately of course also to wrong decisions.” “We have a lot of diverse characters in the firm, all with various histories and, at times, slightly different values. So I'm not astonished if different decisions are made about the same item, or that diverse perspectives and points of view exist on a subject. To avoid inconsistency, we always aim to engage in open discourse in our organization.” (I*V*) “Since decisions in our organization are frequently situational, I believe noise plays a significant role. Even if the circumstances vary little, a different decision may be made. That makes sense to me and is extremely close to reality for us. However, I had not given this any thought before. Having this little explanation of Noise in mind could help us all be a little more differentiated in our judgements, I believe.”(I*Y*) “As far as I can tell, this is not something that can be avoided, and it thus plays a role in our company.”(I*X*)

Appendix D: Calculation of Numerical Data

Dietary Sublements Consumption 1

Mean in %	Values in %	QSum
23,89	6,00	320,01
	25,00	1,23
	37,00	171,90
	40,00	259,57
	20,00	15,12
	10,00	192,90
	35,00	123,46
Value Count	12,00	141,35
9	30,00	37,35

Sum QSum	1.262,89
QSum / (ValueCount - 1)	157,86
SD	**12,56**

Dietary Sublements Consumption 2

Mean in %	Values in %	QSum
27,44	4,00	549,64
	25,00	5,98
	40,00	157,64
	45,00	308,20
	20,00	55,42
	15,00	154,86
	45,00	308,20
Value Count	18,00	89,20
9	35,00	57,09

Sum QSum	1.686,22
QSum / (ValueCount - 1)	210,78
SD	**14,52**

Annual Turnover 1

Mean in € (bn)	Values in € (bn)	QSum
2,72	3,00	0,08
	3,00	0,08
	4,00	1,63
	4,00	1,63
	3,00	0,08
	0,60	4,50
	1,50	1,49
Value Count	0,40	5,39
9	5,00	5,19

Sum QSum	20,08
QSum / (ValueCount - 1)	2,51
SD	**1,58**

Annual Turnover 2

Mean in € (bn)	Values in € (bn)	QSum
3,63	3,00	0,40
	7,00	11,33
	5,00	1,87
	6,00	5,60
	2,50	1,28
	0,80	8,03
	2,00	2,67
Value Count	0,40	10,45
9	6,00	5,60

Sum QSum	47,24
QSum / (ValueCount - 1)	5,91
SD	**2,43**

Proportion of Probiotics 1

Mean in %	Value in %	QSum
12,78	8,00	22,83
	9,00	14,27
	7,00	33,38
	8,00	22,83
	5,00	60,49
	15,00	4,94
	33,00	408,94
Value Count	10,00	7,72
9	20,00	52,16

Sum QSum	627,56
QSum / (ValueCount - 1)	78,44
SD	**8,86**

Proportion of Probiotics 2

Mean in %	Values in %	QSum
10,67	5,00	32,11
	10,00	0,44
	7,00	13,44
	4,00	44,44
	7,00	13,44
	15,00	18,78
	25,00	205,44
Value Count	10,00	0,44
9	13,00	5,44

Sum QSum	334,00
QSum / (ValueCount - 1)	41,75
SD	**6,46**

Brand Importance

Mean	Values	QSum
8,33	9,00	0,44
	9,00	0,44
	10,00	2,78
	9,00	0,44
	9,00	0,44
	8,00	0,11
	8,00	0,11
Value Count	7,00	1,78
9	6,00	5,44

Sum QSum	12,00
QSum / (ValueCount - 1)	1,50
SD	**1,22**

Importance of Brand Values

Mean	Values	QSum
7,89	9,00	1,23
	8,00	0,01
	9,00	1,23
	7,00	0,79
	8,00	0,01
	7,00	0,79
	10,00	4,46
Value Count	8,00	0,01
9	5,00	8,35

Sum QSum	16,89
QSum / (ValueCount - 1)	2,11
SD	**1,45**

Importance of Brand Logo

Mean	Values	QSum
6,78	8,00	1,49
	6,00	0,60
	7,00	0,05
	8,00	1,49
	3,00	14,27
	9,00	4,94
	4,00	7,72
Value Count	6,00	0,60
9	10,00	10,38

Sum QSum	41,56
QSum / (ValueCount - 1)	5,19
SD	**2,28**

Importance of Brand Name

Mean	Values	QSum
5,78	8,00	4,94
	5,00	0,60
	2,00	14,27
	7,00	1,49
	10,00	17,83
	9,00	10,38
	3,00	7,72
Value Count	6,00	0,05
9	2,00	14,27

Sum QSum	71,56
QSum / (ValueCount - 1)	8,94
SD	**2,99**

Estimated Importance of Brand

Mean	Values	QSum
7,78	8,00	0,05
	8,00	0,05
	8,00	0,05
	7,00	0,60
	7,00	0,60
	8,00	0,05
	10,00	4,94
Value Count	7,00	0,60
9	7,00	0,60

Sum QSum	7,56
QSum / (ValueCount - 1)	0,94
SD	**0,97**

Estimated Importance of Brand Values

Mean	Values	QSum
7,67	8,00	0,11
	8,00	0,11
	6,00	2,78
	8,00	0,11
	6,00	2,78
	8,00	0,11
	7,00	0,44
Value Count	8,00	0,11
9	10,00	5,44

Sum QSum	12,00
QSum / (ValueCount - 1)	1,50
SD	**1,22**

Information Efficiency

Mean in %	Values in %	QSum
35,00	40,00	25,00
	20,00	225,00
	40,00	25,00
	60,00	625,00
	50,00	225,00
	50,00	225,00
	15,00	400,00
Value Count	20,00	225,00
9	20,00	225,00

Sum QSum	2.200,00
QSum / (ValueCount - 1)	275,00
SD	**16,58**

Risk Reduction

Mean in %	Values in %	QSum
33,33	40,00	44,44
	30,00	11,11
	40,00	44,44
	30,00	11,11
	15,00	336,11
	25,00	69,44
	60,00	711,11
Value Count	20,00	177,78
9	40,00	44,44

Sum QSum	1.450,00
QSum / (ValueCount - 1)	181,25
SD	**13,46**

Sentimental Value

Mean in %	Values in %	QSum
31,67	20,00	136,11
	50,00	336,11
	20,00	136,11
	10,00	469,44
	35,00	11,11
	25,00	44,44
	25,00	44,44
Value Count	60,00	802,78
9	40,00	69,44

Sum QSum	2.050,00
QSum / (ValueCount - 1)	256,25
SD	**16,01**