

Methodology Article

Addressing Emotional Dysregulation in Experimental Design

Alain Finet , Julie Laznicka* 

Health Institute, Financial Management Department, University of Mons, Mons, Belgium

Abstract

This article describes the set-up of an experimental protocol to take into account the effects of emotional adaptation following stock market decision-making. Basically, the qualitative models used to analyze the behavior of small investors in experimental finance consider three areas of analysis (a socio-demographic analysis, a socio-cultural analysis and an analysis of the psychological reality of individuals). These different areas would then influence the emotions felt, which would stimulate the development of behavioral and cognitive biases. Finally, the latter would ultimately be responsible for influencing decision-making processes. Firstly, our protocol is based on this traditional view of the different factors influencing individual investors' decision-making. Secondly, we suggest a retrospective approach as we believe that the confrontation between expectations and the results generated by decision-making have a feedback effect on the emotional patterns developed by individual investors, and on their psychological reality. Indeed, the increasing number of different emotions tends to "plunge" them into an "emotional bath" in which they can no longer regulate their emotions. This could result in abandonment versus euphoria. According to some authors, "emotional dysregulation" is the result of excessive emotional involvement. Since the stock market is an uncertain environment, where decisions must be made quickly and risks are high, emotional regulation strategies become difficult to apply. Finally, this experimental protocol, supported by qualitative methodological techniques implemented sequentially, makes it possible to analyze emotions as the experiment progresses. We believe this approach offers real added value on two levels. Firstly, even though behavioral finance questions the foundations of traditional finance (and the assumption of rationality), it most often uses quantitative measurement tools. For this purpose, the literature clearly highlights the under-representation of qualitative methodologies in this field. Secondly, the few studies supported by qualitative approaches aim at identifying cause-and-effect links between elements which, in some cases, are difficult to measure and cannot be approached in a linear process. This protocol provides a precise understanding of how emotional patterns and their changes over time might affect the decision-making processes of individual investors.

Keywords

Experimental Finance, Qualitative Research, Individual Investors, Emotional Dysregulation, Experimental Design, Decision Making Process, Emotions

*Corresponding author: julie.laznicka@umons.ac.be (Julie Laznicka)

Received: 24 January 2025; **Accepted:** 8 February 2025; **Published:** 20 February 2025



Copyright: © The Author(s), 2025. Published by Science Publishing Group. This is an **Open Access** article, distributed under the terms of the Creative Commons Attribution 4.0 License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

1. Introduction

Behavioural finance argues that the decision-making process of individual investors is largely influenced by numerous factors such as their socio-demographic characteristics [1, 2], the elements associated with different investment options [3], the development of cognitive and behavioural biases [4-6, 2] and their emotional feelings [7-10]. While behavioural finance insists on the need to consider the qualitative subtleties of individuals, the fact remains, however, that most of the studies aimed at understanding financial decision-making in greater detail are, generally speaking, very much rooted in quantitative methodological perspectives [11-13]. However, there are two major limitations to the use of quantitative methodology. On the one hand, it tends to be limited to highlighting links between cause and effect, without necessarily controlling the psychological subtlety of individuals (working with large samples and using econometric models do not facilitate its inclusion), which is a major advance in behavioural finance. On the other hand, quantitative research is limited to analysing a linear view of the factors likely to influence the decision-making of individual investors. Although it will be analysed later in this study, the retroactive aspect of decision-making on individual characteristics is not considered in this type of approach. In any case, quantitative analyses attempt to demonstrate correlations between variables that are seen as not very variable, which does not correspond to the reality of how stock markets work.

To overcome these limitations, the development of a qualitatively oriented experimental protocol seems to make sense. Firstly, laboratory experiments would provide a more precise understanding of financial decision-making [14]. Secondly, the methods of measurement generally used in qualitative studies would offer the opportunity to approach the emotional influences on the decision-making of individual investors in a precise manner, without being limited to the analysis of a smooth pattern, as in the case of the quantitative approach. Finally, by working with different qualitative methodological tools, the research would objectify the conclusions obtained by highlighting their possible convergent aspect. However, even if the qualitative approach is intended to move away from the quantitative approach, the fact remains, as we will show later, that some experimental protocols are often part of a straightforward vision, highlighting the links of cause and effect between different variables affecting decision-making. Although the measuring instruments are not the same, the

epistemological orientation remains unchanged.

Moreover, the presentation of these designs is often very short, which raises the question of their replication [15]. Reading various articles in this specific field tends to show that the added value primarily sought concerns the results obtained rather than the experimental design that enabled them to emerge. In our opinion, the size requirements for articles imposed by journals may partly explain this situation. In our opinion, the constraints imposed by journals on the size of articles may partly explain this situation. In any case, in our opinion, there is a cruel lack of scientific debate on the construction of experimental designs.

In the first part of this article, we look at the existing literature on the factors influencing the decision-making process of individual investors from a qualitative perspective. The second point examines the interest for qualitative research and, more specifically, for the construction of experimental designs, of adopting a retroactive conception of the emotional influence on financial decision-making. The following section develops an experimental protocol based on qualitative methodological instruments used sequentially, designed to provide an approach to the phenomena of emotional regulation versus dysregulation. It should be pointed out that it was our accumulation of experience in setting up experimental protocols that led us to propose a new one with a high level of completeness [16-19]. The central added value of our analysis is therefore the recognition that decision-making processes are largely influenced not only by emotions as such but also by possible progressive emotional dysregulation. The article ends with a conclusion and several avenues of research, in particular the emotional influence on decision-making and the dynamics leading to the creation of speculative bubbles on the stock markets.

2. Factors Influencing Decision-Making: The Linear Vision

Stock markets are generally highly uncertain, since the results of investments can often follow a very random path that is beyond the rational control of market participants. In addition, the valuation of each asset is conditioned by the influence of several factors that can lead to irrational investment decisions. These different factors of influence will be largely interlinked and will follow the following pattern, which we have modified from [20]:

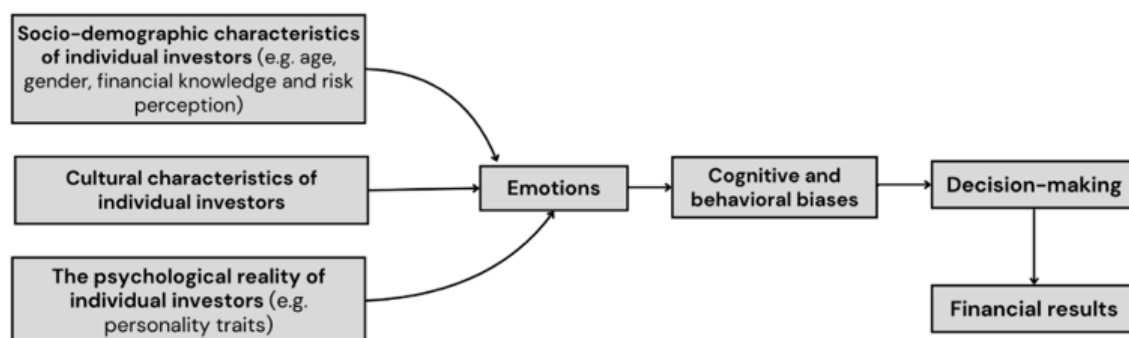


Figure 1. Linear Vision of Factors Influencing Decision-Making.

The first elements influencing decision-making relate to the inherent characteristics of the individual investor. The initial factors influencing decision-making relate to the specific characteristics of the individual investor. Among these characteristics are the socio-demographic elements of the participants, including age, gender and financial knowledge, which have a considerable influence on decision-making [21-24, 1]. In addition, these characteristics also include risk appetite versus risk aversion, which varies according to investor preferences; it is thought to play a decisive role in investment choices and the degree of portfolio diversification [25-28]. The literature shows that cultural factors also seem to influence investment decisions because of the persistence of values and beliefs linked to the investor's cultural environment [29-32]. Lastly, the personality traits of individual investors influence both the intention to participate in stock markets [33] and the investment decisions taken [34-36].

In the field of experimental finance, these three areas of analysis (socio-demographic elements, cultural factors and the psychological reality of individuals) are therefore considered to be the qualitative elements most often used to analyse the behaviour of retail investors, even if they are not necessarily presented exhaustively in the papers. More downstream, these different areas are thought to exert an influence on emotions when it comes to evaluating the investment option. Emotional responses, while adaptive in certain situations, may be inappropriate in the context of financial markets, where advanced cognitive functions such as logical reasoning and planning are essential. Indeed, emotions play a crucial role in financial decision-making by influencing how individual investors assess risky situations and make decisions [37-40].

Emotions then encourage the development of behavioural and cognitive biases. Each individual investor is likely to develop one or other cognitive or behavioural bias to the extent that he or she often relies on cognitive shortcuts rather than exhaustive information gathering before making a decision [41, 42]. A large number of studies have documented the influence of cognitive and behavioural biases on the decision-making process. [43-46].

It should be pointed out that the influence of these different variables of interest is, in most cases, analysed separately; the

authors argue, for example, that personality traits exert a direct influence on decision-making processes, without passing through the emotional prism and developed biases.

2.1. Measuring Instruments

For each component analysed, qualitative measurement tools can be used. Firstly, regarding the specific characteristics of individual investors, socio-demographic data can be collected using closed questions on age, gender, prior knowledge of stock markets and risk perception. This questionnaire may also include several questions concerning the cultural identity of the players [29]. Different questionnaires can be used to analyse personality traits. According to some authors, they are measured in terms of the five major personality factors: neuroticism, extraversion, openness, agreeableness and conscientiousness [47]. Other authors use the Temperament and Character Inventory, which assesses four temperament traits (novelty seeking, danger avoidance, reward dependence and persistence) and three-character traits (self-determination, cooperation and transcendence) [48].

Secondly, there are several measurement tools for analysing emotions. These include self-report measures such as the Discrete Emotions Questionnaire [49], the Brief Mood Inventory Scale [50] and the Pleasure-Arousal-Dominance [51]. However, self-assessment questionnaires tend to inhibit individual investors from freely expressing their emotions, given that they are limited to assessing emotional states on a Likert scale. A lexical-discursive analysis of emotions can therefore also be carried out to give investors greater discursive freedom when describing their emotions in relation to their experience. This analysis could, for example, include different scenarios that individual investors must recall and then write down five words that best describe the emotion experienced at the time.

Thirdly, cognitive and behavioural biases can be approached in two different ways. The first involves analysing the trading journals in which individual investors record every move made. We found very few studies that used investment histories and strategies to identify potential biases. The only studies referred to diaries, which can be considered as written collections of impressions [52, 53]. This finding

seems to us particularly surprising since, in our view, the manifestations of bias can be understood from the point of view of the general orientation of placements. The second approach to assessing bias is based on the use of a questionnaire consisting of several items corresponding to a pre-defined bias. These items are assessed by the individual investor on a Likert scale.

Finally, semi-structured interviews and a focus group (or several depending on the number of participants) can be organised to complete the data collected through questionnaires [54]. Semi-structured interviews are based on direct interaction between the organiser and the interviewee. This tool is based on a pre-established list of questions but allows great flexibility. The organiser can adjust the order of the questions, look in more detail at certain points or rephrase the questions depending on the answers given. To this end, it is necessary to draw up an interview guide, which will serve as a sort of guideline for the interviews. This method of data collection gives priority to the quality of responses by providing a detailed analysis of respondents' individual perceptions [55]. Focus groups have the advantage of generating more in-depth data than semi-structured interviews, as they provide an overview of group dynamics [56]. This produces relatively diverse responses and provides an opportunity to observe how respondents' opinions diverge or converge on the same subject. In addition, group discussion makes it possible for spontaneous ideas to emerge, thanks to the interaction between participants, which an isolated individual might not have thought of [57].

It should be noted that this experimental design and the methodological approach adopted most often involve the use of student populations. According to many authors, students (and more specifically those following a university programme in management) adopt behaviours that are relatively similar to those of professional traders [58, 59]. In addition, several studies show that using students to analyse the effect of emotional fields on decision-making makes scientific sense [60, 61]. In practical terms, participants are provided with a fictional portfolio of a specified financial amount, from which they can execute as many trades as they want. In terms of organising the experiment, questions may also arise about transaction costs, the type of order envisaged, the possible reward offered, the usefulness of people being paid, and so on.

2.2. Linear Vision: Its Implications and Limits

On the one hand, the linear analysis proposed by [20] has the advantage of offering an assessment based on a continuum of more or less strongly connected elements. In this sense, the representation proposed shows that it is not single factors that influence decision-making processes, but rather their interplay. On the other hand, by addressing each area of interest with specific measurement tools, this makes it possible to guarantee high levels of objectivity in the conclusions drawn. To a

certain extent, the advantage of this approach is that it reveals average (i.e. smooth) emotional patterns, generally developed biases and specific behaviours. In this article, we do not question the relevance of using this kind of measurement (and the associated methodological tools), but we do argue that they should be used with caution and completed by other evaluation tools, as explained below.

The use of linear analysis has one very important limitation. In fact, the different variables of interest are measured at very specific moments during the experiment (before and after the experiment) without taking into account the emotional transition and the emotional path followed by the participants during the experiment. It is therefore a mainly generalist analysis, without taking into account possible emotional modifications and the appearance of differentiated biases as decisions are made and the financial results they produce. These results are therefore based on an emotionally unmodifiable analysis scheme. From an epistemological point of view, this method of proceeding is fundamentally part of a deductive logic inspired by quantitative research, whereas work based on an experimental design such as the one proposed gives an inductive and qualitative orientation. So, the next section of the article therefore aims to reformulate the experimental protocol in its linear version, considering possible flexibility versus emotional rigidity, with a particular focus on the “emotional path”.

3. The Emotional Influence on Decision-Making: The Need for a Retroactive View

Based on the evidence presented above, we question the retrospective effects of the decisions taken, for two main reasons. The first comes from the experience we have accumulated in building experimental designs between 2019 and 2024 (see bibliographic references), and the second comes from the theoretical field of emotional flexibility:

- Firstly, the various experiments we have conducted in recent years have resulted in very strong feelings of abandonment (in the case of a negative stock market configuration) or, conversely, euphoria (in the case of a positive stock market configuration) within the audiences. In the first case, we had the feeling that the students were paralysed: at a certain point in the experiment, no more orders were placed, they were sticking to a certain composition of their portfolio and the students were letting the losses accumulate. In the second case, a feeling of excitement set in and the students increased the number of transactions. In both cases, the feeling of paralysis or excitement tended to spread to the entire audience. Depending on the general direction of the markets and the financial performance of the fictional portfolios, participants developed very specific behaviours. In the case of a negative market trend, the feeling of abandonment could be explained by a bearish configuration that did not encourage the multi-

plication of orders and, concomitantly, by the major regrets engendered by decisions leading to greater or lesser financial losses [62, 63, 35]. We put forward the hypothesis that it would be the addition of disillusiones which could lead to phenomena of abandonment (individuals would no longer have sufficient energy to cope with their emotions [64] based on psychological realities which are either modified (if they were based on elements leading to optimism and self-confidence) or reinforced (if they were based on elements leading to pessimism and lack of self-confidence). All these elements connected with the paralysis of participants are also part of the various developments of the disposition bias, namely that individuals want to avoid other unpleasant sensations associated with regret and that loss aversion is created (in a way, "they are waiting for better days"). This last observation seems to us all the more relevant given that paralysis is not preceded by massive sales when the market reverses. On the other hand, in the event of a positive market trend, we have observed the use of increasingly offensive investment strategies and a multiplication of stock market movements over shorter and shorter time horizons. In this case, biases associated with over-confidence and over-optimism develop. In this case, it would be the addition of expectations met that could result in the development of feelings of euphoria, based on psychological realities leading to optimism, reinforced by the decisions taken, or more pessimistic psychological realities altered by meeting their financial expectations. In both cases, the feelings developed seem to be relatively persistent and long-lasting. From this perspective, it might be interesting to identify the emotional inflection points (for example, the levels or the number of financial losses that would lead to feelings of abandonment, and the levels or number of gains that would lead to euphoria, and so on). In the case of both abandonment and euphoria, the attitudes developed may be far from the initial psychological reality of the individual. This reality is constructed/deconstructed as a function of the correlation between the decision-making processes and the results initially expected. We can also use the term emotional regulation/dysregulation. This topic will be discussed in more detail in the second part of this section.

As a result of the repeated decision-making process, the psychological reality of the participants should therefore change over time as orders are placed. We suggest that emotional dysregulation is developing (or at the very least that emotional equilibria can only be temporary and transitory), encouraged by the specific features of the stock market environment. There would therefore be an emotional path which would influence decision-making; the initial psychological and emotional maps would only very superficially explain the choices made. This emotional path would be the result of the various emotional shocks induced by the satisfaction versus dissatisfaction of the participants following the decisions taken: the result of the decision taken will produce more or less strong and more or less permanent feedback on the emotional patterns.

They would therefore be in continuous evolution as a function of their constant alteration over time. In order to be exhaustive, it is possible that people's expectations will also evolve over time, and so the first comparisons between expectations and the results obtained will tend to reconfigure the following ones.

In addition, there is the question of intellectual fatigue (or even failure) and the abandonment of any rational schema in favour of animal-like behaviour, itself a result of increasingly strong emotions. In the case of a bull market, this intellectual fatigue and the concomitant emotional weight can lead participants to simply follow the momentum of the markets and adopt a herd-like behaviour. This less-than-rational attitude may have the advantage, for the individual, of relieving emotional pressure and recovering a certain psychological serenity. In the case of a bear market, this would result in positions being left unchanged (without being cut) and an increasingly intense individual withdrawal.

In our view, the point is no longer to identify and focus on the central and dominant emotions, but to analyse how these interact or mix with each other so that, at the end of the process, we can firstly obtain a coherent overall view and, secondly, identify any possible structural changes in an individual's personality traits. Indeed, we believe that recurring changes in emotional patterns cause changes in individuals' personality traits.

In any case, this can lead to the development of irrational behaviours which are not explained by behavioural or cognitive biases, but which have an emotional meaning for themselves.

Secondly, at the theoretical level, the retrospective analysis of emotions focuses on understanding the processes of emotional regulation as they allow people to modify their emotions according to the goals they are trying to achieve [65]. Literature broadly accepts the principle that people try to increase the intensity of their positive emotions and decrease the intensity of their negative emotions [66, 67]. We therefore assume that investors will regularly redefine their goals and expectations to adapt to emotions felt after a decision has been made.

Following this logic, the flexible theory and the fixed theory of emotions can be used respectively to define emotional flexibility versus emotional rigidity [68, 69]. The former theory refers to people's ability to adjust their emotional feelings, while the latter suggests the opposite.

The literature also discusses the concept of emotional regulation, which refers to several strategies including cognitive reappraisal, expressive suppression and mindfulness, each of which aims to act on emotions to bring them into line with a specific objective. The first strategy (cognitive reappraisal) is a method of regulating emotions which aims to redefine how a situation is interpreted in order to modify its emotional impact [70]. This process can attenuate or intensify positive or negative emotions, depending on individual needs. Cognitive reappraisal is particularly beneficial when a stressful situation

is beyond the person's control [71]. The second strategy (expressive suppression) focuses more on the emotional response and involves removing the physical manifestations of emotions [72].

By contrast with cognitive reappraisal, expressive suppression is often considered to be ineffective as it only focuses on the visible signals of emotions without intervening in their origins, which can lead to a deterioration in emotional well-being [73]. The final strategy (mindfulness) encourages people to accept their emotions without trying to change or control them. This helps to reduce automatic emotional reactions through awareness of one's emotions in order to encourage decentration [74]. Many authors have pointed out that the effectiveness of these strategies depends on the characteristics of the people using them and the context in which they are applied. As stock markets are environments with a high level of uncertainty, where decisions are taken quickly and in large numbers (and the associated risks are obviously also high), emotional regulation strategies are difficult to

apply. The multiplication of different emotional feelings over very short periods of time would tend to immerse people in an 'emotional bath' in which they would no longer be able to regulate their emotions [75]. The authors [74] mention the notion of 'emotional dysregulation', which implies an excessive use of emotions.

As a result of these two elements of analysis - the first empirical and the second theoretical - we believe it is necessary to review the experimental design based on linear inspiration to the extent that, although it claims to be a qualitative analysis tool (only the measurement tools are), it is unfortunately not qualitative in its construction process. We therefore propose a sequential approach which, in essence, consists of regularly coming back to the participants in the experiment in order to assess the changes in the expectations being sought, to understand the factors behind these changes and to analyse the changes in the emotional patterns (and even the personality traits of the individuals) and the investment strategies chosen. The experimental protocol is as follows:

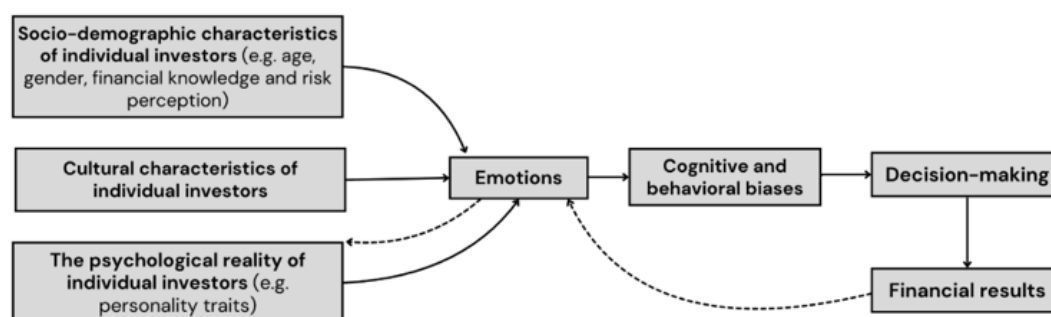


Figure 2. Retroactive View of the Emotional Influence on Decision-Making.

4. Designing the Experimental Protocol: The Need for a Sequential Evaluation

By using measurement instruments derived from linear vision, it is possible to approach some emotional feelings and some biases developed and apparently fixed over the whole duration of the experience. The aim of using sequential analyses is to take into account the retrospective effects that can modify the emotional patterns and biases developed over time.

This process provides a scientifically robust architecture for understanding traders' decision-making processes, based on what traders are (their initial socio-demographic, socio-cultural and psychological reality), what traders do (the decision-making processes that are more or less strongly influenced by their emotional contours and the biases they develop) and what traders become (the more or less significant changes in their psychological reality and personality traits as a result of the eventual fulfilment of their expectations). From that point on, the next cycle could be described as

follows: a new psychological reality for the individual (positively or negatively affected by whether or not their expectations were met in the previous stage), new emotional influences and biases and, finally, a new type of decision-making (and new expectation encounters versus the developing sense of disillusionment).

From this sequential perspective, one way of proceeding is to take into account the theoretical phases of stock markets [76], which are likely to generate largely different market behaviours, with potentially distinct emotional responses during each phase. These phases are as follows for European markets:

- 1) The opening (9 a.m.- 11 a.m.): European investors integrate news from the US markets and, to a lesser extent, Asian markets during this period. In addition, news (such as corporate earnings announcements) may have been made after the European markets had closed. Overnight movements in commodity and currency prices can also affect investor behaviour in early trading;
- 2) The dead zone (11:30 a.m. - 2:30 p.m.): investors during this period digest the numerous news they received during the opening phase and then prepare for the

opening of the US markets. The dead zone can be compared to a waiting area in which investors will attempt to act by creating new opportunities for themselves [77];

- 3) The close (2:30 p.m. - 5:30 p.m.): investors will be highly influenced during this period by the configuration of the US markets, itself dependent on US corporate and macroeconomic news. European markets will generally be trading at their highest volume during this period [78, 79].

After each period, a return to investors, using the same scale for measuring emotions as in the linear view, should make it possible, firstly, to accurately perceive the evolution in emotional influences (if any) over short periods [80] and, secondly, to approach the development of potentially differentiated biases. Adjustments to investment strategies could also be identified, as the emotional influence of gains and losses (the disposition effect) could lead to an updating of strategies to bring them into line with investors' risk tolerance and objectives [43].

In addition to the emotional questionnaire, particular attention should also be paid to investors' expectations to the extent that these can be modified over time and cause emotional changes in terms of satisfaction versus dissatisfaction with expectations. To this end, part of the literature refers to the concept of learning, which is based on the adjustment of expectations according to the results of previous experiences, in order to adjust and improve future decisions [81, 80]. However, all these studies are based either on the analysis of a set of secondary data or on the development of an equation model. In order to follow the same methodological line, we plan to distribute a questionnaire specifically oriented towards the qualitative analysis of expectations in order to gather information on the retrospective effect of emotions.

This questionnaire will be administered sequentially (adapted from [82] as it constitutes a central element of the added value of this research, we include it in the appendix to the article) after each phase of the European markets and will aim to examine in greater depth the way in which the expect-

tations of individual investors were met or not during the different phases of the experiment.

The data will also be compared with the main market trends over the different sub-periods and with the data coming from the trading journals. For the analysis of the latter, particular attention will be paid to cash management (considered as a proxy for risk-taking propensity versus risk aversion), and how investments are concentrated or diversified (at this level again it will be possible to identify the individual's risk profile and the development of more or less conservative or higher risk profile investment strategies), on the participants' behaviour in relation to the informational signals sent to them on the stock market websites (as the experiment progresses, the organisers will also gather all the public information provided to the markets) as well as the trend in the benchmark index for each sub-zone of time taken into consideration (which may provide a useful method of approaching the presence of any herd effects). Among other things, this approach would make it possible to identify any links between the emotions and the biases at specific moments in the experiment on decision-making processes. As these different data will be collected three times a day, it will be possible to assess how investment orientations evolve over time as a function of emotional adjustments.

Based on the results of our three-dimensional analysis (emotional questionnaire, expectations questionnaire, trading journal reading and comparison with informational data), the idea will be to identify any breaks in the emotional and psychological guidelines and to assess their possible strength.

In addition, the aim is to identify the key moments and the reasons for their development, which could explain the changes in the emotional and psychological patterns initially identified. This part of the research will therefore focus on the possible adjustment of the emotional and psychological fields resulting from the feedback (questionnaires) and observations (trading journals). This approach should make it possible to understand the possible development of abandonment (related to the disposition effect and the theory of regret) or euphoria (related to overconfidence and over-optimism).

Table 1. *Synthesis of visions and tools for analysing the decision-making processes of individual investors.*

Analysis of individual investor decision-making	What ?	When ?	How ?
Linear vision	Influence of sociodemographic, cultural and psychological characteristics on the decision-making of individual investors	At the beginning of the experimentation	1) Questionnaire on age, gender, cultural factors and risk perception 2) Questionnaire on personality traits
	The role of emotions in decision-making	At the end of the experimentation	1) Questionnaire on emotions 2) Lexico-discursive analysis 3) Semi-structured interviews 4) Focus group(s)
	Development of cognitive and behav-	At the end of the ex-	1) Reading the trading journals

Analysis of individual investor decision-making	What ?	When ?	How ?
Sequential vision	ioral biases	perimentation	2) Bias questionnaires (items to be assessed on a Likert scale) 3) Semi-structured interviews 4) Focus group(s)
	Emotional state	After each phase of the European markets	Questionnaire on emotions
	Expectations of individual investors	After each phase of the European markets	Questionnaire on expectations (Appendix 1)
	Analysis of orders placed	After each phase of the European markets	Reading the trading journals
Retrospective vision	Retroactive effects of past decisions on future strategies	Continuous data collection	Analysis of trading journals based on previous results
	Changes in expectations and adjusting investment strategies	Continuous data collection	Questionnaire on expectations and analysis of trading journals
	Influence of financial results on emotional state	Continuous data collection	Reading of trading journals and questionnaires on expectations and emotions
	Changes in personality traits	Continuous data collection	Comparison of initial and final psychological traits

5. Discussion

In this section, we propose a number of complementary avenues of research arising from the experimental protocol described in the previous section.

The protocol we are proposing has the advantage of being consistent with an evolving reality of emotions that has rarely been mentioned in previous methodological studies. Further studies could look at a number of aspects. Firstly, on the key moments and elements that determine the strength of emotional patterns. Secondly, as emotional changes increase, questions could also be asked about changes in people's psychological profiles. Thirdly, neurophysiological measurement instruments (EEG, heart rate, skin conductance, etc.) could be used to strengthen the results obtained qualitatively. Fourthly, we argue that as time goes on and more decisions are made, the empirical verification of emotional effects (i.e. biases) tends to disappear. At the end of the process, therefore, it would not necessarily be useful to try to understand decision-making behaviour through biases, but only to focus on the evolution of the psychological and emotional reality of individuals. Fifthly, although studies demonstrate the importance of taking emotional fields into account in order to understand decision-making processes at an individual level, the fact remains that little has been done in the qualitative field to analyse the dynamics of emotional propagation and diffusion between individuals. This level of study seems

particularly important because the feelings of abandonment or euphoria that we have identified in our small-scale controlled environments could provide an innovative approach to understanding how speculative bubbles are formed or why they explode on the stock markets.

6. Concluding Remarks

Considering the different types of evaluation of decision-making processes on stock markets, we have noted a chronic under-representation of qualitative methodological orientations. Looking at experimental finance, we argue that the experimental designs generally used have numerous shortcomings, mainly explained by the linear vision envisaged by the analyses. We demonstrate that, in decision-making environments with high uncertainty and a large number of decisions, emotional realities adjust or deregulate as a function of satisfaction versus dissatisfaction with previous outcomes. The main contribution of this article is to provide an innovative experimental protocol based on the different sections analysed in the linear approach, but which also takes into account the retrospective effects of decision making on the emotional patterns and personality traits. To investigate these retrospective effects, we show that it is necessary to split the investment time horizon into different sub-zones and to focus on analysing the behaviours and emotions developed in each of them. To our knowledge, although this approach has been discussed in literature, spe-

cific tools and explicit methodological recommendations have never really been issued for analysing emotional shifts as orders are being placed. Nor has this approach to analysis ever been implemented at an empirical or operational level (at least in the field of trading). We believe that the protocol proposed could be replicated in other decision-making environments with a greater or lesser degree of uncertainty.

Abbreviations

EEG Electroencephalogram

Author Contributions

Alain Finet: Project administration, Conceptualization, Investigation, Supervision, Writing – original draft, Writing – review & editing

Julie Laznicka: Investigation, Resources, Writing – original draft, Writing – review & editing

Funding

This work is supported by the Walloon-Brussels Federation (Belgium) through a Concerted Research Action.

Data Availability Statement

No data was used.

Conflicts of Interest

The authors declare no conflicts of interest.

Appendix

This questionnaire is about your opinion and expectations regarding the financial markets during the experiment.

- 1) In your opinion, if the price of a stock increased significantly during the previous phase of the experimentation, its price in the next phase will:
 - a) Continue to rise
 - b) Begin to fall
 - c) Remain unchanged
 - d) Impossible to say
- 2) In your opinion, if the price of a stock decreased significantly during the previous phase of the experiment, its price in the next phase will:
 - a) Continue to fall
 - b) Begin to rise
 - c) Remain unchanged
 - d) Impossible to say
- 3) When a new type of investment becomes popular around you, would you consider investing in it as well?

- a) Strongly agree
- b) Agree
- c) Slightly disagree
- d) Strongly disagree
- 4) During this phase of the experiment, your financial situation has:
 - a) Worsened
 - b) Improved
 - c) Stayed the same
- 5) Do you think your financial situation will improve or deteriorate during the next phase of the experiment?
 - a) Deteriorate
 - b) Stay the same
 - c) Improve
- 6) Compared to the previous phase, would you say your emotional well-being is better or worse than before?
 - a) Better
 - b) Similar
 - c) Worse
- 7) Have you adjusted your investment strategies based on whether your expectations were met?
 - a) Yes, how?
 - b) No, why?

References

- [1] Quang, L. T., Linh, N. D., Van Nguyen, D., & Khoa, D. D. (2023). Behavioral factors influencing individual investors' decision making in Vietnam market. *Journal of Eastern European and Central Asian Research (JEECAR)*, 10(2), 264-280. <https://doi.org/10.15549/jeeCAR.v10i2.1032>
- [2] Madaan, G., & Singh, S. (2020). A systematic review of investment influences of individual investors. *TEST: Engineering & Management*, 83, 15324-15341.
- [3] Wang, Mei & Keller, Carmen & Siegrist, Michael. (2011). The Less You Know, the More You Are Afraid of—A Survey on Risk Perceptions of Investment Products. *Journal of Behavioral Finance*. 12. 9-19. <https://doi.org/10.1080/15427560.2011.548760>
- [4] Mouna, A., & Anis, J. (2015). A study on small investors' sentiment, financial literacy and stock returns: evidence for emerging market. *International Journal of Accounting and Economics Studies*, 3(1), 10-19. <https://doi.org/10.14419/ijaes.v3i1.4098>
- [5] Konteos, G., Konstantinidis, A., & Spinthiropoulos, K. (2018). Representativeness and Investment Decision Making. *Journal of Business and Management*, 20(2), 5-10. <https://doi.org/10.9790/487X-2002050510>
- [6] Chenini, H., & Jarboui, A. (2024). The specific factors of heterogeneity characterizing investors' beliefs. *Journal of Economics, Finance and Administrative Science*, 29(57), 77-97. <https://doi.org/10.1108/JEFAS-09-2021-0195>
- [7] Boyle, G., Hagan, A., O'Connor, R. S., & Whitwell, N. (2004). Emotion, fear and superstition in the New Zealand stockmarket. *New Zealand Economic Papers*, 38(1), 65-85. <https://doi.org/10.1080/00779950409544394>

- [8] Lovric, M., Kaymak, U. & Spronk, J. (2008). A Conceptual Model of Investor Behavior. ERIM Report Series Reference, ERS-2008-030-F&A, Available at SSRN: <https://ssrn.com/abstract=1144293>
- [9] Gabbi, G., & Zanotti, G. (2019). Sex & the City. Are financial decisions driven by emotions? *Journal of Behavioral and Experimental finance*, 21, 50-57. <https://doi.org/10.1016/j.jbef.2018.10.005>
- [10] Duxbury, D., G ärling, T., Gamble, A., & Klass, V. (2020). How emotions influence behavior in financial markets: a conceptual analysis and emotion-based account of buy-sell preferences. *The European Journal of Finance*, 26(14), 1417-1438. <https://doi.org/10.1080/1351847X.2020.1742758>
- [11] Bubić, A., & Erceg, N. (2018). The role of decision making styles in explaining happiness. *Journal of Happiness Studies*, 19, 213-229. <https://doi.org/10.1007/s10902-016-9816-z>
- [12] Iram, T., Bilal, A. R., & Dost, K. (2020). Behavioral Factors Affecting the Investment Decision of an Individual: A Systematic Review. *Journal of Xidian University*, 14(8), 774-804. <https://doi.org/10.37896/jxu14.8/081>
- [13] Kumalasari A., Karremans J., Dijksterhuis A., (2022). Do people choose happiness? Anticipated happiness affects both intuitive and deliberative decision-making, *Current Psychology*, 41, 6500–6510. <https://doi.org/10.1007/s12144-020-01144-x>
- [14] Floyd, E., & List, J. A. (2016). Using field experiments in accounting and finance. *Journal of Accounting Research*, 54(2), 437-475. <https://doi.org/10.1111/1475-679X.12113>
- [15] Serra, D. (2017). Behavioral Economics. *Economica*.
- [16] Finet, A., Kristoforidis, K., & Viseur, R. (2021). The emergence of behavioral biases in trading situations: an exploratory study. *Recherches en Sciences de Gestion*, (5), 147-182. <https://doi.org/10.3917/resg.146.0147>
- [17] Finet, A., Viseur, R., & Kristoforidis, K. (2022). Decision-making tools in trading situations: an exploratory study. *Revue du Financier*, 44(248).
- [18] Finet, A., Viseur, R., & Kristoforidis, K. (2022). The role of gender in trading activities: An exploratory study. *La Revue des Sciences de Gestion*, (1), 43-51. <https://doi.org/10.3917/rsg.313.0047>
- [19] Finet, A., Laznicka, J., & Palumbo, H. (2024). From which planet do they come from? Biases in trading strategies: Does the gender matter? *International Journal of Business and Management*. 12(12). <https://doi.org/10.24940/theijbm/2024/v12/i12/BM2412-002>
- [20] Lerner, J. S., Li, Y., Valdesolo, P., & Kassam, K. S. (2015). Emotion and decision making. *Annual review of psychology*, 66(1), 799-823. <https://doi.org/10.1146/annurev-psych-010213-115043>
- [21] Aren, S., & Aydemir, S. D. (2015). The factors influencing given investment choices of individuals. *Procedia-Social and Behavioral Sciences*, 210, 126-135. <https://doi.org/10.1016/j.sbspro.2015.11.351>
- [22] Kıymaz, H., Öztürk, B., & Akkemik, K. A. (2016). Behavioral biases of finance professionals: Turkish evidence. *Journal of Behavioral and Experimental Finance*, 12, 101-111. <https://doi.org/10.1016/j.jbef.2016.10.001>
- [23] Cueva, C., Iturbe-Ormaetxe, I., Ponti, G., & Tomás, J. (2019). Boys will still be boys: Gender differences in trading activity are not due to differences in (over) confidence. *Journal of Economic Behavior & Organization*, 160, 100-120. <https://doi.org/10.1016/j.jebo.2019.02.027>
- [24] Faradynawati, I. A. A. (2023). Understanding individual investors' preferences and knowledge of sustainable investments (Doctoral dissertation, Kungliga Tekniska högskolan).
- [25] Sulaiman, E. K. (2012). An empirical analysis of financial risk tolerance and demographic features of individual investors. *Procedia Economics and Finance*, 2, 109-115. [https://doi.org/10.1016/S2212-5671\(12\)00070-6](https://doi.org/10.1016/S2212-5671(12)00070-6)
- [26] Bikas, E., Jurevičienė, D., Dubinskas, P., & Novickytė, L. (2013). Behavioural finance: The emergence and development trends. *Procedia-social and behavioral sciences*, 82, 870-876. <https://doi.org/10.1016/j.sbspro.2013.06.363>
- [27] Marinelli, N., Mazzoli, C., & Palmucci, F. (2017). How does gender really affect investment behavior? *Economics Letters*, 151, 58-61. <https://doi.org/10.1016/j.econlet.2016.12.006>
- [28] Sakthivelu, S., & Karthikeyan, K. (2024). Investors Decision making Behaviour in Insurance Investment Preference. *Com-Fin Research*, 12(4), 34-38. <https://doi.org/10.34293/commerce.v12i4.8151>
- [29] De Bondt, W., Zurstrassen, P., & Arzeni, A. (2001). A psychological portrait of the individual investor in Europe. *Revue d'Économie Financière*, 131-143. <https://doi.org/10.3406/ecofi.2001.4954>
- [30] Ricciardi, V. (2008). The Psychology Of Risk: The Behavioral Finance Perspective. *Handbook Of Finance: Volume 2: Investment Management And Financial Management*, Frank J. Fabozzi, Ed. Available at SSRN 1155822, 85-111.
- [31] Nelson, J. A. (2015). Are women really more risk - averse than men? A re-analysis of the literature using expanded methods. *Journal of economic surveys*, 29(3), 566-585. <https://doi.org/10.1111/joes.12069>
- [32] Lemaster, P., & Strough, J. (2014). Beyond Mars and Venus: Understanding gender differences in financial risk tolerance. *Journal of Economic Psychology*, 42, 148-160. <https://doi.org/10.1016/j.joep.2013.11.001>
- [33] Conlin, A., Kyröläinen, P., Kaakinen, M., Järvelin, M. R., Perttunen, J., & Svento, R. (2015). Personality traits and stock market participation. *Journal of Empirical Finance*, 33, 34-50. <https://doi.org/10.1016/j.jempfin.2015.06.001>
- [34] Grassi, G., Pallanti, S., Righi, L., Figuee, M., Mantione, M., Denys, D., Piccagliani, D. & Rossi, A., Stratta, P. (2015). Think twice: Impulsivity and decision making in obsessive-compulsive disorder. *Journal of Behavioral Addictions*. 4. 263-272. <https://doi.org/10.1556/2006.4.2015.039>

- [35] Raheja, S., & Dhiman, B. (2017). Influence of personality traits and behavioral biases on investment decision of investors. *Asian Journal of Management*, 8(3), 819-826. <https://doi.org/10.5958/2321-5763.2017.00129.9>
- [36] Sachdeva, M. and Lehal, R. (2023). The influence of personality traits on investment decision-making: a moderated mediation approach. *International Journal of Bank Marketing*, 41(4), 810-834. <https://doi.org/10.1108/IJBM-07-2022-0313>
- [37] Lo, A. W., Repin, D. V., & Steenbarger, B. N. (2005). Fear and greed in financial markets: A clinical study of day-traders. *American Economic Review*, 95(2), 352-359. <https://doi.org/10.1257/000282805774670095>
- [38] Herman, A. M., Critchley, H. D., & Duka, T. (2018). The role of emotions and physiological arousal in modulating impulsive behaviour. *Biological psychology*, 133, 30-43. <https://doi.org/10.1016/j.biopsycho.2018.01.014>
- [39] Gambetti, E., & Giusberti, F. (2012). The effect of anger and anxiety traits on investment decisions. *Journal of Economic Psychology*, 33(6), 1059-1069. <https://doi.org/10.1016/j.joep.2012.07.001>
- [40] Matsumoto, D., & Wilson, M. (2023). Effects of multiple discrete emotions on risk-taking propensity. *Current Psychology*, 42(18), 15763-15772. <https://doi.org/10.1007/s12144-022-02868-8>
- [41] Chhapra, I. U., Kashif, M., Rehan, R., & Bai, A. (2018). An empirical investigation of investor's behavioral biases on financial decision making. *Asian Journal of Empirical Research*, 8(3), 99-109.
- [42] Al-Tarawneh, H. A. (2012). The main factors beyond decision making. *Journal of Management Research*, 4(1), 1-23. <http://dx.doi.org/10.5296/jmr.v4i1.1184>
- [43] Padmavathy, M. (2024). Behavioral Finance and Stock Market Anomalies: Exploring Psychological Factors Influencing Investment Decisions. *Shanlax International Journal of Management*, 11(S1), 191-97. <https://doi.org/10.34293/management.v11iS1-Jan.7164>
- [44] Shukla, A., Dadhich, M., & Dipesh Vaya, A. G. (2024). Impact of Behavioral Biases on Investors' Stock Trading Decisions: A Comprehensive Quantitative Analysis. *Indian Journal of Science and Technology*, 17(8), 670-678. <https://doi.org/10.17485/IJST/v17i8.2845>
- [45] Utari, D., Wendy, W., Azazi, A., Giriati, G., & Irdhayanti, E. (2024). The influence of psychological factors on investment decision making. *Journal of Management Science (JMAS)*, 7(1), 299-309. <https://doi.org/10.35335/jmas.v7i1.379>
- [46] Xia, Y., & Madni, G. R. (2024). Unleashing the behavioral factors affecting the decision making of Chinese investors in stock markets. *PloS One*, 19(2), e0298797. <https://doi.org/10.1371/journal.pone.0298797>
- [47] Costa Jr, P. T., & McCrae, R. R. (2000). *Neo Personality Inventory*. American Psychological Association.
- [48] Cloninger, C. R., Bayon, C., & Svrakic, D. M. (1998). Measurement of temperament and character in mood disorders: a model of fundamental states as personality types. *Journal of Affective Disorders*, 51(1), 21-32. [https://doi.org/10.1016/S0165-0327\(98\)00153-0](https://doi.org/10.1016/S0165-0327(98)00153-0)
- [49] Harmon-Jones, C., Bastian, B., & Harmon-Jones, E. (2016). The discrete emotions questionnaire: A new tool for measuring state self-reported emotions. *PloS One*, 11(8). <https://doi.org/10.1371/journal.pone.0159915>
- [50] Mayer, J. D., & Gaschke, Y. N. (1988). The experience and meta-experience of mood. *Journal of Personality and Social Psychology*, 55, 102-111. <https://doi.org/10.1037/0022-3514.55.1.102>
- [51] Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology*. Cambridge, MA: MIT Press.
- [52] Waddington, K. (2012). Using qualitative diary research to understand emotion at work. *A Day in the Life of a Happy Worker*, 132-149, Psychology Press.
- [53] Scott, S. (2022). 'I enjoy having someone to rant to, I feel like someone is listening to me': Exploring emotion in the use of qualitative, longitudinal diary-based methods. *International Journal of Qualitative Methods*, 21. <https://doi.org/10.1177/16094069221074444>
- [54] Touré E. H. (2010). Epistemological reflection on the use of focus groups: Scientific foundations and problems of scientific validity. *Recherches Qualitatives*, 29(1), 5-27. <https://doi.org/10.7202/1085130ar>
- [55] Pin, C. (2023). The Semi-Structured Interview. *LIEPP Methods Brief from LIEPP*.
- [56] Rabiee, F. (2004). Focus-group interview and data analysis. *Proceedings of the nutrition society*, 63(4), 655-660. <https://doi.org/10.1079/PNS2004399>
- [57] Akyıldız, S. T., & Ahmed, K. H. (2021). An overview of qualitative research and focus group discussion. *International Journal of Academic Research in Education*, 7(1), 1-15. <https://doi.org/10.17985/ijare.866762>
- [58] Porter, D. P., & Smith, V. L. (2003). Stock market bubbles in the laboratory. *The Journal of Behavioral Finance*, 4(1), 7-20. https://doi.org/10.1207/S15427579JPFM0401_03
- [59] Fréchette, G. R. (2011). Laboratory experiments: Professionals versus students. Available at SSRN 1939219. <http://dx.doi.org/10.2139/ssrn.1939219>
- [60] Rossignol, M., Anselme, C., Vermeulen, N., Philippot, P., & Campanella, S. (2007). Categorical perception of anger and disgust facial expression is affected by non-clinical social anxiety: an ERP study. *Brain research*, 1132, 166-176. <https://doi.org/10.1016/j.brainres.2006.11.036>
- [61] She, S., Eimontaite, I., Zhang, D., & Sun, Y. (2017). Fear, anger, and risk preference reversals: An experimental study on a Chinese sample. *Frontiers in Psychology*, 8, 1371. <https://doi.org/10.3389/fpsyg.2017.01371>
- [62] Bell, D. E. (1982). Regret in decision making under uncertainty. *Operations research*, 30(5), 961-981. <https://doi.org/10.1287/opre.30.5.961>

- [63] Ratner, R. K., & Herbst, K. C. (2005). When good decisions have bad outcomes: The impact of affect on switching behavior. *Organizational Behavior and Human Decision Processes*, 96(1), 23-37. <https://doi.org/10.1016/j.obhdp.2004.09.003>
- [64] Domeignoz, C., & Morin, E. (2016). Emotions Have their Reasons: We Should Listen to Them. *Entreprendre & Innover*, (2), 7-15. <https://doi.org/10.3917/entin.029.0007>
- [65] Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of general psychology*, 2(3), 271-299. <https://doi.org/10.1037/1089-2680.2.3.271>
- [66] Larsen, R. J. (2000). Toward a science of mood regulation. *Psychological inquiry*, 11(3), 129-141. https://doi.org/10.1207/S15327965PLI1103_01
- [67] Quoidbach, J., Berry, E. V., Hansenne, M., & Mikolajczak, M. (2010). Positive emotion regulation and well-being: Comparing the impact of eight savoring and dampening strategies. *Personality and individual differences*, 49(5), 368-373. <https://doi.org/10.1016/j.paid.2010.03.048>
- [68] Tamir, M., John, O. P., Srivastava, S., & Gross, J. J. (2007). Implicit theories of emotion: affective and social outcomes across a major life transition. *Journal of personality and social psychology*, 92(4), 731.
- [69] De Castella, K., Platow, M. J., Tamir, M., & Gross, J. J. (2018). Beliefs about emotion: Implications for avoidance-based emotion regulation and psychological health. *Cognition and Emotion*, 32(4), 773-795. <https://doi.org/10.1080/02699931.2017.1353485>
- [70] Gross, J. J. (2014). Emotion regulation: Conceptual and empirical foundations. *Handbook of emotion regulation*, 2, 3-20.
- [71] Troy, A. S., Shallcross, A. J., & Mauss, I. B. (2013). A person-by-situation approach to emotion regulation: Cognitive reappraisal can either help or hurt, depending on the context. *Psychological Science*, 24, 2505-2514. <http://dx.doi.org/10.1177/0956797613496434>
- [72] Gross, J. J., & Levenson, R. W. (1993). Emotional suppression: Physiology, self-report, and expressive behavior. *Journal of Personality and Social Psychology*, 64, 970-986. <http://dx.doi.org/10.1037/0022-3514.64.6.970>
- [73] Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, 85, 348-362. <http://dx.doi.org/10.1037/0022-3514.85.2.348>
- [74] Chambers, R., Gullone, E., & Allen, N. B. (2009). Mindful emotion regulation: An integrative review. *Clinical psychology review*, 29(6), 560-572. <https://doi.org/10.1016/j.cpr.2009.06.005>
- [75] Sheppes, G., & Meiran, N. (2007). Better late than never? On the dynamics of online regulation of sadness using distraction and cognitive reappraisal. *Personality and Social Psychology Bulletin*, 33(11), 1518-1532. <https://doi.org/10.1177/0146167207305537>
- [76] Seban, O. (2007). *Day Trading and Swing Trading Techniques and Strategies: 2nd revised and expanded edition*. Maxima Laurent du Mesnil Éditeur.
- [77] Kabbaj, T. (2011). *Famous Traders Psychology*. Editions Eyrolles.
- [78] Cushing, D., & Madhavan, A. (2000). Stock returns and trading at the close. *Journal of Financial Markets*, 3(1), 45-67. [https://doi.org/10.1016/S1386-4181\(99\)00012-9](https://doi.org/10.1016/S1386-4181(99)00012-9)
- [79] Bacidore, J., Polidore, B., Xu, W., & Yang, C. (2013). Trading around the close. *The Journal of Trading*, 8(1), 48-57.
- [80] Asutay, E., & Västfjäll, D. (2024). Affective integration in experience, judgment, and decision-making. *Communications Psychology*, 2(1), 126. <https://doi.org/10.1038/s44271-024-00178-2>
- [81] Wu, G., Zhang, J., & Gonzalez, R. (2004). Decision under risk. *Blackwell handbook of judgment and decision making*, 399-423.
- [82] Lee, B., Rosenthal, L., Veld, C., & Veld-Merkoulova, Y. (2015). Stock market expectations and risk aversion of individual investors. *International Review of Financial Analysis*, 40, 122-131. <https://doi.org/10.1016/j.irfa.2015.05.011>

Research Field

Alain Finet: Corporate Governance, Market Efficiency, Event Studies, Behavioral Finance, Qualitative Research Methodology, Emotions, Cognitive Bias

Julie Laznicka: Qualitative Research Methodology, Emotions, Cognitive Bias