Educational Implications of Biases in Financial Decision Making

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Abstract Decision making competence is a central objective of economic education in general and financial education in particular. Children and young people should be enabled to make the most rational decisions possible, in economic life situations (Retzmann et al. 2010; CEE 2013). This particularly relates to financial decision making situations, because these are often characterized by a high level of complexity, and the consequences of wrong decisions have direct material effects. The field of behavioural economics deals with the systematic research of irrational decisions within the economic sciences. Over the past few years, however, the emergence of behavioural economics and behavioural finance has supplemented the rational choice paradigm with psychological aspects, and also, in part, called it into question. The chapter, as outlined here, shall highlight whether and to what extent new theoretical approaches of behavioural finance are changing the conceptual understanding and the subject area of financial literacy. Initially, rational decision making competence will be described in more detail as an objective of financial education, the relationship of rational choice and behavioural economics will be clarified and the basic findings on behavioural finance for decision making will be presented. On the basis of this, relevant anomalies, biases and heuristics for the example of financial investing will be revealed, and implications for the education process will be sketched out. The typical three phases in the process of decision making serve as systematization here: Information perception, information

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processing and evaluation and decision making. The exemplary analysis shows that knowledge about typical anomalies, biases and heuristics on an individual level can have an effect on the quality of financial decisions.

Keywords Behavioural economics · Behavioural finance · Homo economicus · Rational choice · Biases and heuristics · Economic education · Financial literacy

3.1 Rational Decision Making as a Central Goal of Financial Education

In economically oriented life situations, decisions and, hence, the abandonment of non-realized alternatives are unavoidable. The omnipresent scarcity of time, resources, goods and services, etc., forces decisions to be made that favour one alternative and not others. Decisions can be described as a conscious choice between alternatives. Decision making is a key competence which is named as an educational goal in almost every definitive concept of economic education. In papers on educational standards for economic education, the centrality of decision making in economic contexts is justified with the phenomenon of scarcity. In their draft for *Educational Standards for Economic Education at All Types of General-education Schools* in Germany, Retzmann et al. (2010, 9 f.) argue as follows: "[…] scarcity is the constitutive criterion for economic situations. […]. From a formal point of view, scarcity occurs whenever individuals, due to limited availability of resources, do not have sufficient resources at their unrestrained disposal in order to attain all desired goods—in other words: when they have to make selection decisions that create opportunity costs". The Content Standard No. 1 of the American Council for Economic Education is headed with the word "scarcity" (CEE 2010, 2), too. They argue that "productive resources are limited. Therefore, people cannot have all the goods and services they want; as a result, they must choose some things and give up others". Students should be able to "identify what they gain and what they give up when they make choices" (ibid.). As a logical follow-on, the Content Standard No. 2 is also headed with "decision making". Students should be put in the position to compare "the additional costs of alternatives with the additional benefits" (ibid, 5).

Financial education is a sub area of economic education as far as we understand, and the significance of the competence in decision making, as described here in general terms, for economic education applies for financial education in particular. Financially oriented situations encountered by young people and adults are characterized by a high degree of scarcity, whereby permanent decisions are taken, and also concern the individual's own finances in varying degrees depending on the decision. This refers, for instance, to decisions when it comes to dealing with one's own money, individually insuring against life risks or building up wealth, e.g. for retirement. But even consequences of incorrect decisions condition new types of situations in which decisions have to be made, e.g. dealing with debt.

The relevance of decision making in the field of financial education is, for example, highlighted in a definition of the OECD INFE. Financial literacy as the central goal of financial education is described as "a combination of awareness, knowledge, skill, attitude and behaviour necessary to make sound financial decisions and ultimately achieve individual financial wellbeing" (OECD INFE 2011, 3). In the PISA framework 2012 the term "financial literacy" is described as the ability "to make effective decisions across a range of financial contexts […]" (OECD 2013, 144). The American *National Standards for Financial Literacy* also makes clear the fundamental significance of financial decisions, outlining in the context of its introduction that "economics is about making decisions" (CEE 2013, 8). If nothing else, school textbooks on financial literacy also devote entire chapters to the topic of financial decision making (e.g. Madura et al. 2014).

Economic and financial education can prepare students for decision making situations. In doing so, rationality is the central characteristic of making informed economic decisions. Rationality in this context means the ability to select the best out of the available alternatives, from an individual point of view (see in detail Kirchgässner 2008). The theory-based focus on rationality does not always apply in concrete life situations, as the situational complexity of a decision based on uncertainty or incomplete information makes a fully rational decision impossible. As decisions in economic contexts, e.g. cash investment situations, are often made based on irrational motives, it makes economic and financial education based on rational decisions all the more important. Obviously, it is also vital to show students the limits of rational action. Learning processes in economics cannot be about training rational choice behaviour to the point that students are able to identify each alternative in every decision making situation, linked with the lowest opportunity costs. This is neither possible nor sensible given the requirements for information asymmetries on the markets, and the transaction costs that need to be considered in the search for information.

Besides the rational choice theory, behavioural economics has developed and established itself as a research branch of economic sciences today, describing a range of situations in which cognitive biases lead to irrational decisions. Whilst assumptions of the rational choice theory are part of the standard repertoire of economic and financial education, the educational relevance of behavioural economics has, to date, hardly been developed systematically. Both approaches—rational choice and behavioural economics—as well as their relationship will be elaborated in the following section.

3.2 Rational Choice and Behavioural Economics

Landsburg (1995, 5) summed up the essence of economics in a nutshell with the statement: "Most of economics can be summarized in four words: 'People respond to incentives.' The rest is commentary". Landsburg continued by saying that this sounds quite harmless, and most people would probably agree with this statement,

but what distinguishes economics is its systematic application of this core statement to every problem that requires analysis. Economic analyses not only assume that the individual reacts to stimuli; but that s/he does so in a particular and predictable manner, namely as a rational and self-interested actor. Accordingly, Content Standard No. 4 of CEE (2013, 10) expresses the following: "People usually respond predictably to positive and negative incentives".

Individuals described as rational are those who are able to choose the alternative with the least renouncing benefits out of various courses of action, i.e. where the alternative costs are minimal. A decision maker can be regarded as self-interested if s/he also actually chooses the alternative mostly recognized as an advantage. Improving one's own situation is the assumed goal. Not confined to maximizing material utility, this improvement also includes intangible improvements such as heightened social prestige, increased reputation, pursuit of affection, etc. The Nobel Prize winner for Economics, Becker (1976), wrote one of the most popular works by applying the economic approach to out-of-economic problems.

On the one hand, the rational choice theory is a kind of academic export hit for economics, because approaches from other academic disciplines today work with this theory, e.g. public choice theory or the economic analysis of law. On the other hand, ever since the existence of the rational choice theory, the approach has been criticized from different academic quarters. This criticism currently comes from the area of experimental economics. Numerous laboratory experiments have proved that individuals in economic-oriented situations do not always behave in the manner predicted by the standardized model of the homo economicus. When testing human behaviour in economically oriented situations, so-called bilateral negotiations (e.g. ultimatum game or dictator game) are used (e.g. Fehr/Schmidt 1999; Camerer 2003; Ottone 2006). Real individuals, as can be inferred from such experiments, do not, by any means, always act out of self-interest and rationally, but may pursue a preference for fairness even if this behaviour costs them.

The results of experimental economics have contributed to the development of the new research branch of behavioural economics, researching behaviour anomalies in economic contexts. Approaches in the field of behavioural economics assume that human behaviour occasionally directly contradicts the assumptions of rational choice theory. However, the rational choice theory—and this is particularly relevant—is disputed. Despite its factual refutation in many experiments, the homo economicus model can play an important heuristic role in economic science, and also in economic learning processes. In this context, the high degree of falsification (Popper) is one of the merits of the rational choice theory. A clear distinction needs to be made between the empirical observation of irrational behaviour and the consequences resulting from promoting financial decision making on the one hand, and heuristic analytical power of homo economicus models on the other.

Within behavioural economics, the sub area of behavioural finance has emerged, researching new theories explaining financial decision making. Up to now, only a small body of literature exists on the consequences of current behavioural finance research for financial education. The first initial contributions are now available, addressing the question of whether behavioural economics and behavioural finance

can be used to make financial education programmes more effective (e.g. Yoong 2011). In this case, it refers more to the design of an institutional environment, which should make the financial decision making easier with incentives and quality information, rather than the content-related description of the educational relevance of behavioural finance, as a subject of financial education. Altman (2012, 678) for instance, sees the potential of behavioural finance particularly in the realignment of "government policy that nudges consumers into making decisions that some might argue are in the best interest of consumers. It is assumed that experts know better than individual decision makers what is in their best interest". This concerns recommendations for policy makers on the design of consumer protection measures, and not didactic contributions to economic education. We would like to focus on the latter aspect, thereby developing the potential and limitations of behavioural finance to promote financial literacy and financial capability among students. As with Yoong (2011, 81), we believe that knowledge about typical biases and heuristics on an individual level can have an effect on the quality of financial decisions.

3.3 Financial Decision Making from the Viewpoint of Behavioural Finance

Fundamental decision making theories and concepts of classical financial economics are based on central assumptions of rational choice theory. An important component of classical financial economics is, for instance, the efficient market hypothesis by Fama (1970) based on the expected utility theory (by Neumann and Morgenstern 1947), as well as Bayes' theorem. The widely received portfolio selection theory developed by Markowitz (1952) also works on the assumption of rational actors on the financial markets, and describes the possibility of reducing risk by diversifying shares and creating an efficient portfolio.

The approaches cited here do not exactly mirror reality, but present events on the financial markets in a simplified manner with the aid of abstracting assumptions. In doing so, models, such as the portfolio selection theory, provide information on how, for instance, risk-averse investors behave or should ideally behave. As a result, important fundamental relationships between risk and return are illustrated on the one hand; on the other hand, events, such as the most recent financial crisis, highlight the limitations of traditional models, as extreme risks are systematically underestimated.

Behavioural finance is a line of research that was developed, and has increasingly established itself, in economic sciences from the 1980s onwards. Contrary to standard models of classical financial economics, behavioural finance does not assume actors who act rationally on the financial markets; instead it focuses on cognitive and affective aspects influencing human decision making, and hampering rational actions. In doing so, behavioural anomalies are explained in behaviour that has actually been observed on the financial markets.

An important starting point for behavioural finance is a concept developed in the 1950s by Simon (1955): bounded rationality. Contrary to the assumption of complete rationality, bounded rationality considers actors' cognitive limited capacities in acquiring and processing information. Accordingly, actors in the decision making process are not cognitively able to identify the alternative from the possibilities which promise the highest expected utility. Actors, who are acting on bounded rationality, only use information selectively when evaluating possible alternatives. This includes, for instance, employing simple decision heuristics, which do not consider all of the available information, and ultimately do not aim for utility maximizing, yet produces satisfactory results for the decision maker by achieving a particular utility level. In this context we refer to satisficing behaviour. In light of the complex relationship on the financial markets, the actors develop particular decision making strategies to be able to cope with the prevailing conditions, and have control over the multitude of information as well as decision options available.

One of the main results of behavioural economics is the insight that individuals deviate away from rational behaviour in many economic decision making situations because of systematic anomalies, cognitive biases and irrational heuristics (e.g. Altman 2012, 680 ff.). In the meantime, an almost endless variety of such anomalies, biases and heuristics have been worked out. Yoong (2011, 70 ff.) systematized this variety with the help of a taxonomy developed by DellaVigna (2009) in which there was a distinction between three "broad categories of anomalies": "non-standard preferences, non-standard beliefs and non-standard decision making processes".

In the context of this chapter, selected anomalies, biases and heuristics shall be systematized in financially dominated life situations, using the phases of a decision making process. The chapter shall focus on remarks made by Earl (2005), printed in de Mello Ferreira (2011, 107 ff.) and Daxhammer/Fascar (2012, 153 ff.). Below, we want to distinguish three phases in the decision making process (see Fig. 3.1, based on Daxhammer/Fascar 2012, 154).

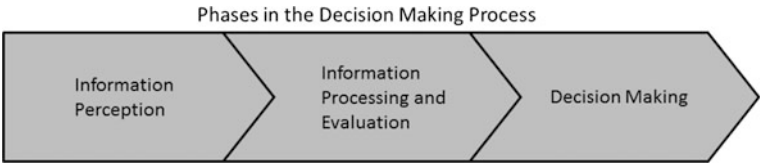

Fig. 3.1 Phases of the decision making process

On the basis of Daxhammer/Fascar (2012, 153 ff.) these three phases can be described as follows:

1. During the phase of information perception the decision maker initially creates a picture of their environment to reduce the uncertainty in the decision making process. The intensity of the information perception thereby depends on the scope and complexity of the decision, and influences to what extent existing information can be used, or additional information from external sources is required, and acquired via active searching. In this context, amongst other things the ratio of costs to benefits plays an important role in the search for information.
2. In the phase of information processing and evaluation, the decision maker considers the relevant information to prepare for the decision. In light of the cognitive restrictions of the decision maker regarding his available capacities or his speed when processing information, decision making heuristics are used here. With the help of heuristics, it is possible to accelerate decision making and structure it efficiently. However, this can also be accompanied by systematic biases in the information and decision making process.
3. The phase of decision making and its implementation forms the end of the process of information and decision making. In this phase, the behaviour of the decision maker is characterized by the fact that they try to avoid so-called cognitive dissonances. As a result, information is highlighted which confirms the decision, and information which throws the decision into doubt is neglected or suppressed. In this way, however, the monitoring and/or checking of the decision is restricted accordingly.

In all phases of the decision making process—as shown below—biases can appear which lead to irrational decisions.

3.4 Anomalies, Biases and Heuristics as Subject Matter of Financial Education

The central thesis of this chapter is that knowledge of typical irrationalities can help in making a rational decision, by avoiding typical mistakes with financial decision making. Altman (2012, 682) sees a "critical function of financial education" in this. Yoong (2011, 81) suggests that "diagnostic tools could […] be applied to directly demonstrate individual biases". In this sense, de Meza et al. (2008) deal with numerous studies from psychology and behavioural economics on the basis of debiasing strategies, and describe selected debiasing techniques. "With these techniques in mind, one might hope to be able to tailor and test more effective advice schemes, for people who are in the process of taking decisions on financial matters" (ibid., 54).

As not all anomalies, biases and heuristics discussed in behavioural finance can be considered in the context of this chapter, the thematic area of "financial investing" shall act as an example and be the focus of our attention (see also Loerwald and Retzmann 2010). It concerns one of the six national standards for

financial literacy (CEE 2013) identified by the CEE. As the focuses of behavioural finance are the behaviour of investors on financial markets, and thus the decisions about investment counselling, numerous connecting points may be found here in terms of content. Further content areas are reviewed by Altman (2012, 683 ff.).

By sensitizing students to behaviour anomalies in financially oriented life situations, we see a possibility that they will arrive at better results in future decision making situations. The aim of promoting rational decision making competence should therefore not be abandoned, but extended in a sensible manner by generating a corresponding awareness for problems of behaviour anomalies, and by developing action strategies for financial decision making situations. The decision making process will subsequently be divided into three phases, to systematize selected anomalies, biases and heuristics, and to illustrate their implications for the learning process with regard to financial literary. Didactic implications for economic learning processes can only be sketched out at this point.

3.4.1 The Phase of Information Perception

Characteristic anomalies, biases and heuristics in the context of financial decision making, which play an important role in the information perception phase, are, for instance, the *framing bias* or the phenomenon of *selective perception*.

Framing bias (Tversky and Kahneman 1981) describes the phenomenon that presenting subject matter in different ways can result in different decisions. For example, the investor's evaluation of risk and return is influenced, if the performance of an investment fund is illustrated in a chart with an overwhelmingly positive performance compared to the previous year showing strong profits, or if the performance is depicted in a chart showing a development with highly fluctuating rates over the past five years. Whilst the first mode of representation may lead to further price increases, the chart showing the development over five years will put the strong development of the investment fund over the previous year in a significantly wider perspective, and possibly even be considered as a temporary price recovery.

Individuals who know of this bias can critically question the manner in which the information has been presented, and request further information at a consultation meeting. In economic learning processes, varying access to the provision of information should be dealt with accordingly, and the relevant effect should be analysed. In this way, the relevance of context information and the manner of presenting information can be reflected upon critically. The students should be put in a position to penetrate to the factual core of the information, and succeed in a rational evaluation of the relevant information.

In *selective perception*, investors consciously or subconsciously neglect information, so that they can receive acknowledgement for decisions that have already been taken or are still to be taken. However, this prevents an objective judgment of the situation. Alongside *selective perception*, the phenomenon of *selective decision* can be observed, i.e. one particular decision that has been taken once, is retained or

supported, even reinforced. If purchased shares, for example, see a negative performance, investors frequently try to lower the average entry price afterwards by purchasing new shares so that they can get back into the profit zone faster, just in case there is a price rise. Similar to the *sunk cost effect*, the question of investing considered here depends on previous decisions. Both *selective perception* and also *selective decision* represent attempts to reduce emotional discomfort that may arise in decision making through cognitive dissonances (Festinger 1957).

Lessons in economics can address this issue by enabling students to consciously perceive and process such information, which does not coincide with the individual's own opinion, or to critically question information which supports one's own opinion. A change of perspective—e.g. in the form of a role play—can help to accept other points of view and standpoints, and view a decision making situation from multiple perspectives. For the maximum contrast to your own opinion, it seems to be helpful to take up the direct opposite opinion, as suggested in the debiasing technique "consider the opposite" (see de Meza et al. 2008, 54).

3.4.2 The Phase of Information Processing and Evaluation

Anomalies, biases or heuristics which can be placed included in the information processing and evaluation phase are, for instance, *anchoring and adjustment heuristic*, *ambiguity aversion* or *overconfidence bias* with the phenomenon of *illusion of control*.

To better evaluate a particular issue in decision making situations, an initial value is frequently used in the context of *anchoring and adjustment heuristic* (Tversky and Kahneman 1974). When making investment decisions, the target price of a particular share or the share index (e.g. Dow Jones, Euro Stoxx 50, Dax, Nikkei, etc.) can be seen as an anchor. In consultation meetings, an investment consultant will often set a respective anchor in the mind of the customers, by referring to the opinion of professional investment analysts. Decision making behaviour can be distorted if the anchor is not modified appropriately when new information becomes available, possibly leading to an incorrect evaluation of risk and return as a result. Such anchors are even set in negotiation discussions. In this way for example, a used car salesman normally enters into negotiation with a possibly high price, above the actual value of the car, in order to set a positive anchor for themselves.

Economic learning processes should put the students in a position to consciously perceive information and influences on the environment, and to check whether the anchor that influences a decision is well chosen and is also meaningful in the respective context. They should learn both to question their own anchors critically regarding their appropriateness and to reflect on anchors set by others critically, and rationally argue against them. In order to sensitize the students to the relevance of the anchoring heuristic, you could assign various groups different anchors, in a little experiment, but they must all answer the same question. For example, the question could be: "Would you donate €5 for a good cause for Christmas? If not, how much

would you donate?" For other groups you could give €50 or €500 instead of €5. In this way it can become clear that the average willingness to donate in the group also depends on the relevant anchor.

The *ambiguity aversion* describes the behaviour of investors who favour the known because of fear of the unknown; uncertainty prevails over uncertainty (cf. Daxhammer and Facsar 2012). The available information on an investment decision does not appear to be sufficient from the perspective of the investor, or cannot be completely overlooked by them. This phenomenon is particularly evident in the tendencies of many private investors, who prefer to invest in domestic standard stocks (so-called blue chips) and do not take overseas shares into consideration. This phenomenon, known as *home bias*, is reinforced by the *availability bias*, whereby the relevance of information is perceived depending on the individual's own imagination, and the assumed probability of occurrence. The intended effect of these biases towards not taking any unnecessary risks can, however, lead to the exact opposite, increasing the real risk to a portfolio significantly, due to a lack of diversification.

An experiment which Daniel Ellsberg—the discoverer of the ambiguity aversion—carried out himself, is suitable for an introduction to dealing with this bias. There are 90 balls in an urn, of which 30 are red and the rest are yellow or black. The students can now choose between two lotteries. In the first lottery a win is achieved if a red ball is drawn, and in the second one if a yellow ball is drawn. Most students will choose lottery 1, because they know the probability here. Based on this underlying knowledge that people often decide based on what they know, regardless of rational considerations, economic learning processes should create a critical awareness, in order to scrutinize the reasons for the supposed certainty and faith in the financial decisions that have been taken.

The *overconfidence bias* is the strong confidence that investors have in their own cognitive abilities, which are unjustified and typically involve overestimating one's own level of knowledge and analytical skills, thereby frequently underestimating risk of losses. Related to this is the phenomenon of *illusion of control* describing the investor's feeling of controlling and dominating developments on the financial markets. The possibility for customers in today's world to be able to conduct trading over the internet independently without using additional advisory services and to be able to trade shares directly can give investors an *illusion of control*. If a prior prediction of stock gain turns out to be true, a certain familiarity with stock trading sets in, conveying a feeling of control which is non-existent when viewed objectively.

Hence, an important education objective of financial education is to critically evaluate one's own abilities and limitations in safely assessing financial situations that involve decision making. In economic learning processes, you can work on case studies of known speculators or investors, who have overestimated themselves based on earlier successes, and ultimately failed (e.g. the silver speculations of brothers Nelson Bunker and William Herbert Hunt in the 1970s). Such case studies can serve as warnings against overestimating yourself.

3.4.3 The Phase of Decision Making

Anomalies, biases and heuristics, which have particular relevance in the phase of decision making, arise, for example, with the *reflection effect*, *loss aversion*, *hindsight bias* or the *self-control bias*.

The reversal of risk taking, known as the *reflection effect*, is based on a change of attitude by the investor. This effect is intensified through *loss aversion*, which is when losses are felt more than comparable gains. Based on insights into prospect theory (Kahneman and Tversky 1979), attitudes towards risk depend on whether the stock in the investor's portfolio, viewed from a subjective reference point, is in the black or in the red. Whilst investors in the black behave in a risk-averse manner and are concerned about losing their gains, the attitude towards risk changes as soon as the investors slip into the red. Therefore, many investors tend to hold on to falling shares and their respective losses; profits made through rising share value are often limited by premature selling. This trend is ultimately connected to *regret aversion*, something that is dominant and emotionally conditioned in many investors. Decision making behaviour is distorted here, by investors' continual efforts not to make decisions which could prove to be wrong at a later date, and which are then regretted.

Students should be capable of recognizing the vulnerability of prioritizing losses over gains in financial decision making situations, and understand the consequences of these decisions. Increased risk-seeking in situations where serious losses have already been incurred can bring great dangers for the investor, even leading to a total loss of invested capital.

Hindsight bias describes a type of behaviour by investors, where events that have already occurred are, in retrospect, shown as being predictable. This bias corresponds to the saying: It's easy to be smart after the fact". Investors thereby overestimate their abilities to correctly determine the probability of occurrences of future events, and consequently do not learn from their mistakes. The *hindsight bias* is clearly illustrated by the example of the financial and debt crisis (Daxhammer and Facsar 2012). Stemming from problems in the US property market, which became increasingly apparent in 2007, and subsequently brought about difficulties for numerous banks, the crisis finally took hold of the financial markets with full force, leading to the all too familiar consequences. Over the course of the crisis, numerous traders, stock analysts, fund managers, etc., increasingly resorted to presenting the emergence of the financial crisis, and bursting the speculative bubble, as if it were a logical consequence of previous developments. This is often associated with the expectation to be able to better forecast such events in the future.

The core challenge for the teaching–learning process is to explain why investors often do not learn from their behaviour. In other words: it is about taking one's own experience-based learning process based on facts, critically examining the extent to which memory mirrors the real past.

Self-control bias describes the weakness of investors that have been observed in practice, not always pursuing a particular investment or savings goal consistently or

persistently (Thaler and Shefrin 1981). Both in terms of saving and also in investment counselling, a decision needs to be made as to whether financial resources, such as monthly income or accumulated wealth for consumer expenditure should be used now or in the future. A lack of self-control can, for example, endanger the goal of a solid and sufficient retirement, in that investors tend to primarily prefer consumer spending in the present, thereby neglecting to safeguard a standard of living in old age. To make up for this and close the income gap that sets in at retirement, investors who are subject to *self-control bias* take heightened risks if they have not made consistent provisions for their retirement early enough.

Financial education can help ease the *self-control bias* in that students learn to anticipate their own future life situations in the sense of a life cycle, and comprehend the relevance of disciplined saving and investment behaviour.

3.5 Summary and Outlook

Given the findings from behavioural finance, the aim of promoting rational decision making competence among students in financial education remains undisputed in our view. It becomes clear that knowledge of typical inadequacies in human decision making behaviour can improve the process of financial decision making. Therefore, it appears to be necessary to create an awareness of systematic anomalies, cognitive biases and irrational heuristics in the framework of financial education. On this basis, problem-solving strategies can be developed, which must be applied in real decision making situations.

For research in the field of economic education, in light of the contexts presented here, there is the central challenge of developing adequate learning arrangements, through which the relevant anomalies, biases and heuristics are taught to the students and strategies for debiasing can be developed. For this purpose, didactic settings should be developed and tested, in the sense of design-based research, which enable young people to recognize anomalies, biases and heuristics in their own behaviour and develop behavioural strategies. Here, economic experiments appear to be a promising learning method (e.g. Holt 1999; Durham et al. 2007). Didactic experiments should motivate the students, to observe their own behaviour in economically relevant decision making situations, evaluate it and reflect upon it critically. In this way, with a view to decisions in financial matters which are the focus here, numerous experiments can be adapted, e.g. by Tversky and Kahneman, to clarify selected anomalies, biases and heuristics. Whether these experiments can really change the deeply anchored biases in the imagination of the individuals, is in turn a research subject in teaching methodology. Here we ask the central question, which experiments can really cause a conceptual change (Vosniadou and Mason 2012) and which cannot.

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