

# Chapter 2

## An Integrative Framework of Influences on Behavior

*Behaviour cannot be invented in the armchair.  
It has to be observed.  
Reinhard Selten (1930 Breslau)  
Selten (1998), p. 414*

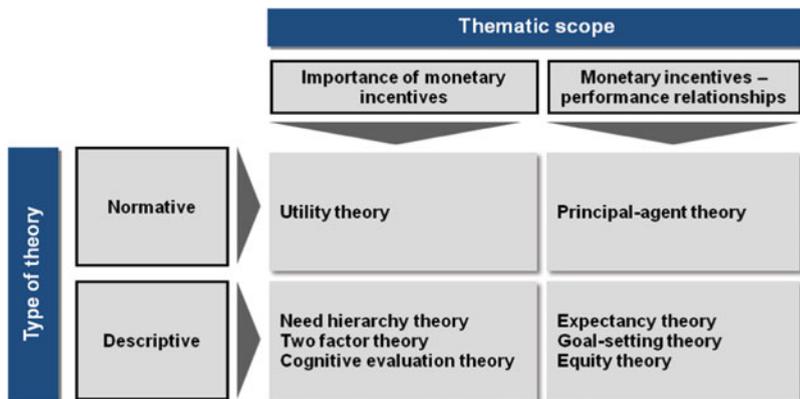
The goals of this chapter are (1) to introduce important theories and concepts which are employed in the discussion on the hypotheses of incentive and sorting effects in Chap. 4, (2) to introduce existing economic frameworks in order to get an overview of potential contingencies concerning incentive and sorting effects, and (3) to identify literature gaps in the observation of contingency variables and develop an integrative framework of variables under investigation in the experiment. The integrative framework guides the discussion on the experimental design in Chap. 3 particularly concerning environmental variables and is specified in Chaps. 4 and 5 particularly concerning individual variables. The three goals are addressed in the subsequent three sub-sections.

### 2.1 Theories of Incentive Behavior

Figure 2.1 shows relevant theories by theory type as well as thematic scope. Theory type is divided into normative and descriptive. Since participants' decisions constitute the basis for the resulting incentive and sorting effects, which is sought to be observed and explained, a classification of the research field of decision making has been utilized to classify the theories into normative or descriptive.<sup>1</sup> Normative

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<sup>1</sup> More recently prescriptive decision theory has been suggested to be a third area of decision making research. In particular, business practice might be interested in this field of decision making, because its aim is to support decision makers in their decisions. As it is not meant to deal with tools for improving decision quality in this text, prescriptive decision theory is not introduced as single area of decision research (Cf. Goodwin et al. (1994)). Moreover, in some literature normative and prescriptive decision theory is used interchangeably (Cf. Bamberg and Coenberg (2002), p. 1).



**Fig. 2.1** Classification of relevant theories

*Notes: The figure shows the introduced theories by theory type as well as thematic scope. Theory type is divided into normative and descriptive. Thematic scope is classified issue-based.<sup>2</sup>*

theories of decision making are based on the rationality assumption of individuals. It is assumed that decision makers possess unambiguous systems of objectives, which they pursue rationally.<sup>3</sup> Thus, rationality analysis is at the core of normative decision making theories. Normative decision theories try to give advice for the solution of decision problems.<sup>4</sup> Descriptive decision making theories aim to describe and explain actual decision behavior. They try to predict actual behavior in decision situations. If behavior can be predicted, it might also be possible to control behavior, which can be useful in organizational settings.<sup>5</sup>

Thematic scope is classified issue-based. On the one hand, theories by means of which the importance of money and monetary incentives as a motivator in general can be evaluated are grouped together. They can be used to deal with the question: Are monetary incentives important? On the other hand, theories by means of which statements concerning effects of different monetary incentive types and structures on performance levels can be made are grouped together. These can be used to deal with the question: What kind of monetary incentives are effective?<sup>6</sup> Both questions

<sup>2</sup> This is only selective and very brief presentation of relevant theories. For instance, the social cognition theory is not considered (Cf. Wood and Bandura (1989)). For this and further psychological theories and discussion refer to Gerhart and Rynes (2003), pp. 119 ff., Bimberg et al. (2007) or Pinder (2008). For the transaction cost theory refer e.g. to Williamson (1981).

<sup>3</sup> A prominent critic of the assumption of unbounded rationality is Simon (1955).

<sup>4</sup> Cf. Laux (1998), p. 2; Bamberg and Coenenberg (2002), pp. 1ff.

<sup>5</sup> Cf. Eisenführ and Weber (1993), p. 2; Laux (1998), p. 2.

<sup>6</sup> In literature psychological theories related to motivation are also often classified into content-based or process-based theories. Content-based theories deal with characteristics, contents and structure of motives, whereas process-based theories try to explain the emergence of motivation and its effects on behavior. Need hierarchy, two factor theory and cognitive evaluation theory can be classified as part of the content-based group; expectancy, goal-setting or equity theory generally belong to the process-based group of theories (Cf. Staehle et al. (1999), pp. 218ff.; Brandenburg (2001), p. 76).

are relevant for building expectations about participants' behavior concerning incentive and sorting effects.

The theories categorized in Fig. 2.1 lay the basis of this text, which is why they are briefly introduced.<sup>7</sup> First utility, need hierarchy, two factor and cognitive evaluation theory are introduced, followed by principal-agent, expectancy, goal-setting and equity theory. Taken all together the theories are supposed to help drawing a picture of the diverse views on monetary incentives and help creating awareness for different perspectives and possible effects. As the economic utility and principal-agent theory form an important basis for the modeling in Chap. 4, they are introduced more extensively than the psychological theories.

Expected utility theory has been the most widely accepted normative theory of decision making under uncertainty in economics and accounting.<sup>8</sup> Modern expected utility theory is based on von Neumann and Morgenstern and assumes that individuals choose the alternative which maximizes their utility in decision making settings with multiple alternatives. The expected utility of a decision alternative is the sum of the expected utility for each possible outcome associated with the particular alternative. The expected utility for each outcome is the product of the probability that the outcome of the particular alternative occurs and the utility of the outcome. It is assumed that decision makers calculate the expected utility of all alternatives. The alternative with the highest expected utility is chosen. An important variant is subjective expected utility theory of Savage, which stresses the subjectivity of the utility value for each decision maker.<sup>9</sup>

However, a substantial amount of research shows that individuals systematically deviate from this approach to making decisions. Kahneman and Tversky's prospect theory constitutes a more descriptive theory of individual decision making.<sup>10</sup> Eichenberger, also referring to Kahneman and Tversky's prospect theory, exhaustively discusses a variety of anomalies in decision making based on normative models.<sup>11</sup> Nevertheless, utility theory provides a consistent theoretic approach which is still highly useful to analyze relationships concerning incentive and sorting effects in decision making and will be used to support the modeling in Sect. 4. Utility theory is placed into the upper left category in Fig. 2.1, because it is normative and because statements about the importance of money can be derived from utility theory. With more money involved in an outcome of a decision alternative, a decision alternative's utility increases and, thus, the probability of

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<sup>7</sup> The classification in Fig. 2.1 is not necessarily free of overlap. For instance, by means of the agency theory statements about the general importance of money can be inferred, too.

<sup>8</sup> Cf. Sorger (2000), pp. 1ff.; Bonner (2008), p. 28.

<sup>9</sup> Cf. von Neumann and Morgenstern (1947); Savage (1954) drawn from Sorger (2000).

<sup>10</sup> Cf. Kahneman and Tversky (1979).

<sup>11</sup> Cf. Eichenberger (1992); Further, refer to Allais (1953) or Ellsberg (1961) for early studies about violations to expected utility theory or to Tversky and Kahneman (1981) for an anomaly called the framing effect.

selecting this decision alternative increases as well. By means of this, utility theory can be used to judge the importance of monetary incentives. It can be concluded that money is assumed to have an influence on individual behavior according to utility theory. In fact, in most economic applications of utility theory money is assumed to have a high positive influence on utility levels.<sup>12</sup>

Psychologists have also dealt with the question of how important money is for individuals. Three well-known psychological theories question the efficacy of monetary incentives as an important influence factor for motivation. Maslow sees money as a low level motivator being at the bottom of the hierarchy of needs. Herzberg believes that money, as a hygienic factor, is involved in creating or reducing dissatisfaction but not in enhancing satisfaction or motivation. Deci and Ryan's cognitive evaluation theory argues that a strong emphasis on monetary incentives is likely to decrease individuals' interest in the work itself. This is because money takes on a controlling aspect, when effort is exerted under influence of monetary incentives. The controlling aspect of monetary incentives endangers the individuals' need for self-determination and might decrease individuals' intrinsic motivation.<sup>13</sup> The replacement of intrinsic motivation through extrinsic motivation has been termed crowding out in literature and is discussed in Sect. 4.2.2.

Regarding monetary incentives – performance relationships, the principal-agent theory has been one of the most important theoretical paradigms in management accounting literature over the last 25 years.<sup>14</sup> It is the primary economic theory in order to explain when different types of monetary incentives should be used and how they should be structured. Principal-agent theory has strongly influenced empirical studies and can be seen as the central economic theory for the development of the empirical incentive contracting literature.<sup>15</sup> Agency literature is valuable because it provides different perspectives on employment contracting. It focuses on the design of optimal contracts among self-interested parties and tries to shed light on both individuals' action choices under different contracts and contract selection.<sup>16</sup> Both parts are relevant to the present experiment.

As incentive and sorting effects can be associated with and categorized within agency theory, the theory is introduced in more detail in the following. Furthermore, in the modeling of Chap. 4 certain agency assumptions are used, which is why they are introduced and discussed as well.

In bilateral relationships of principal-agent models, there is a contractor, normally referred to as the principal, and a contractee, normally referred to as the agent.

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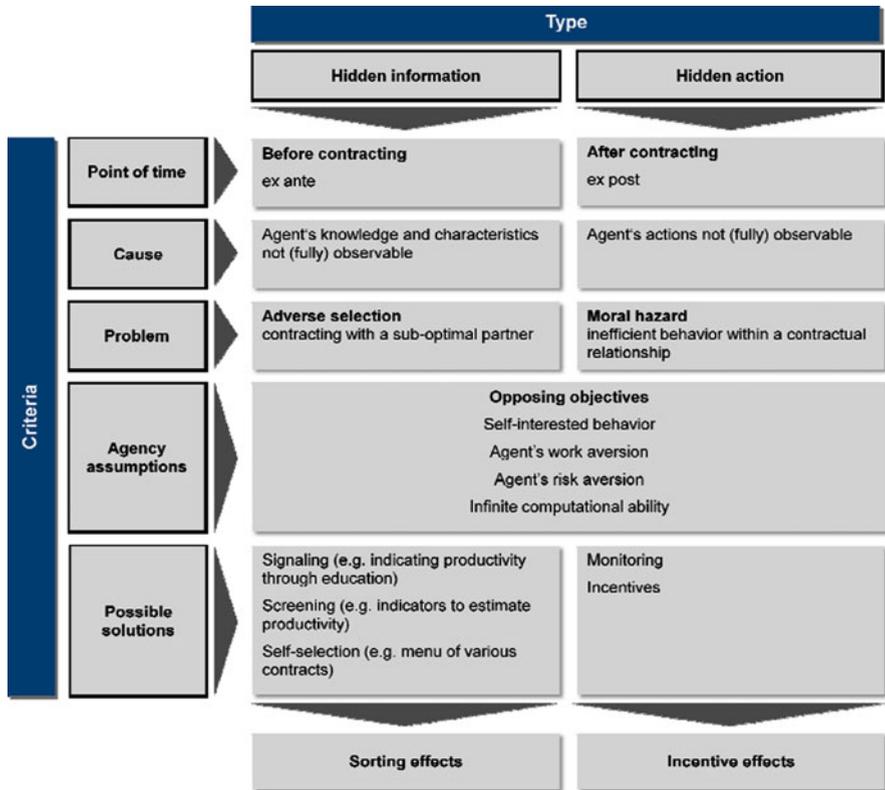
<sup>12</sup> Cf. Gerhart and Rynes (2003), pp. 48ff.; Cather (2010), pp. 127ff.; Refer to Read (2007), pp. 45ff. for utility in a historical context.

<sup>13</sup> Cf. Maslow (1943); Herzberg (1968); Deci and Ryan (1985) drawn from Pinder (2008), pp. 71ff., 86ff., 208ff.

<sup>14</sup> Cf. Lambert (2007), p. 247.

<sup>15</sup> Cf. Young and Lewis (1995), p. 56; Gerhart and Rynes (2003), pp. 8, 138; see also Sprinkle and Williamson (2007), who structure their review of experiments in management accounting according to agency principles.

<sup>16</sup> Cf. Macho-Stadler et al. (2005), p. 5.



**Fig. 2.2** Comparison of hidden information and hidden action in agency theory  
*Notes: The table depicts two fundamental types of private information in agency models following Demski and Feltham and Milgrom and Roberts.<sup>17</sup> Other literature distinguishes between more or other information asymmetry types as for instance hidden characteristics, hidden intention or hidden knowledge.<sup>18</sup> However, as the types are not free of overlap and hidden information and hidden action are most relevant to the underlying experiment, a further discrimination is not pursued.*

Problems arise because agents are assumed to have different objectives than principals and to have an informational advantage over the principals. In a business setting, the principal may be the firm owner who presumably seeks to maximize firm value, whereas the agent may be the employee who is assumed to maximize its own utility. This results in a divergence of interests between cooperative and self-interested behavior.<sup>19</sup> In the following basic assumptions of agency models will be

<sup>17</sup> Cf. Demski and Feltham (1978); Milgrom and Roberts (1992), pp. 149 ff., 166 ff.  
<sup>18</sup> Cf. Bamberg and Ballwieser (1987, pp. 9 ff.; Saam (2007), p. 827; Küpper (2008), pp. 83 ff.; Refer also to Saam (2007), pp. 826–829 for a more in depth overview of agency literature.  
<sup>19</sup> Cf. Jensen and Meckling (1976); Fama (1980); Petersen (1989), pp. 22ff.; Frese (1992), pp. 71ff.; Gibbons (1998), pp. 2f.; Laffont and Martimort (2002); Macho-Stadler et al. (2005), pp. 1, 4; Salanié (2005), pp. 5f.

introduced. This is followed by a discussion of some implications resulting from these assumptions. Figure 2.2 summarizes basic information problems of agency theory.

There is a variety of assumptions which underlie many agency models. Individuals are posited to be rational and to possess infinite computational ability. They are able to assess the probability of all feasible future contingencies. Consequently, in a model each individual's actions can be endogenously derived, on the basis of the person's well-specified preferences and beliefs. Furthermore, each individual anticipates every other individual to act merely based on his/her own preferences and beliefs, i.e. all individuals act self-interested. All principal-agent models assume information asymmetry. Often, the agent is posited to have private information which cannot be observed for free by the principal. The private information may be related to environmental information (e.g. economic state), the agent's choice (e.g. level of effort) or the agent's characteristics (e.g. skill). In addition, it is generally assumed that the agent is risk averse and work averse.<sup>20</sup>

Some implications resulting from the assumptions shall be illustrated by alluding to an employer – employee setting. The employee is risk averse as well as work averse. This prevents a cooperative allocation of risk and level of production to be achieved. Efficient risk sharing would involve that the employer, who is risk neutral, bears all risk related to production by compensating the risk averse employee with a fixed wage. However, a fixed wage does not provide an incentive to work to the work averse employee, because the wage stays the same independent from the employee's effort. One solution to achieve efficient production would be that the principal sells the firm to the agent for a fixed fee. However, that would impose the whole production risk on the risk averse agent. For this reason, a trade-off between efficient risk sharing and efficient production must be made. In order to achieve more efficient production next to incentives, monitoring systems are suggested. However, costs involved when observing the employee (information costs) typically deter the employer from gathering perfect information about the employee's effort level, which is why shirking is difficult to observe.<sup>21</sup>

As denoted in Fig. 2.2 this problem of inefficient behavior within a contractual relationship is termed moral hazard in agency literature.<sup>22</sup> The problem is particularly relevant when it comes to the incentive effects under investigation in the experiment. Apart from the issue of moral hazard within a contractual relationship, the issue of adverse selection before a contractual relationship is common in agency literature. Because of private information and the information costs involved, an employer typically has to refrain from perfectly differentiating among job applicants of different skill levels and, thus, might adversely select a sub-optimal employee.<sup>23</sup> Possible solutions suggested are signaling, screening or self-selection.<sup>24</sup> In order to create

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<sup>20</sup> Cf. Baiman (1990), pp. 342f.

<sup>21</sup> Cf. Milgrom and Roberts (1992), pp. 186f.; Brickley et al. (2009), pp. 459f.

<sup>22</sup> Cf. Milgrom and Roberts (1992), pp. 166ff.

<sup>23</sup> Cf. Milgrom and Roberts (1992), pp. 149ff.; Macho-Stadler et al. (2005), pp. 11f.; Early important contributions to adverse selection problems come from Akerlof (1970); Rothschild and Stiglitz (1976). For an overview to markets with asymmetric information refer to Lofgren et al. (2002).

<sup>24</sup> Cf. Spence (1973); Salop and Salop (1976); Spence (1976).

effective screening devices, relationships between employees' characteristics and their decisions for incentive schemes need to be known. Thus, the problem of adverse selection is particularly relevant to the sorting effects in the underlying experiment. In Fig. 2.2 two types of informational asymmetries and general characteristics prevalent in agency models are summarized. Generally, hidden action can be associated with the moral hazard problem and incentive effects and hidden information can be associated with the adverse selection problem and sorting effects.

In sum, agency theory derives recommendations for an efficient design of contractual relationships on the basis of analytical considerations based on several assumptions.<sup>25</sup> The aim of the normative principal-agent theory is to design an optimal financial incentive system from the principal's perspective.<sup>26</sup> However, agency theory can be criticized for different reasons. Typically, in agency models complicated contracts which are sensitive to the models assumptions are used. Thus, it can be claimed that results of agency research give little insight into the shape of real contracts. Furthermore, the assumptions underlying many agency models have been criticized to lack reality demands.<sup>27</sup> Nevertheless, even though contracts and assumptions in agency literature might seem artificial, principal-agent theory can still provide valuable insights. If the theory is regarded as a framework for stressing problems and analyzing issues, it provides a useful fundament for empirical research.<sup>28</sup> Sprinkle, for instance, uses the principal-agent problem categories moral hazard and adverse selection, addressed analytically by Demski and Feltham, to review existing experimental research related to the decision-influencing role of management accounting information.<sup>29</sup>

Agency theory is classified as normative theory in Fig. 2.1, as it employs rationality analysis as a fundamental approach.<sup>30</sup> Nevertheless, agency theory is intended to be both a normative and descriptive theory of human behavior.<sup>31</sup> However, the descriptive quality of agency theory has been largely criticized as agency assumptions of expected utility theory or work aversion cannot constantly be observed in reality.<sup>32</sup> Thus, direct empirical testing of agency theory is problematic as individuals might not conform to these assumptions when observing them. Consequently, the approach of several studies has been to integrate agency and behavioral variables into descriptive testable models without being restricted by particular behavioral assumptions.<sup>33</sup> This approach is adopted in the underlying experiment. First indication which behavioral variables might help to explain and

<sup>25</sup> Cf. e.g. Demski and Feltham (1978); Fama (1980).

<sup>26</sup> Cf. Fischer (1995), p. 321.

<sup>27</sup> Cf. Baiman (1990), pp. 344ff.

<sup>28</sup> Cf. Baiman (1990), p. 345.

<sup>29</sup> Cf. Demski and Feltham (1978), pp. 339f.; Sprinkle (2003).

<sup>30</sup> Cf. Laux (1998), p. 2; Bamberg and Coenenberg (2002), pp. 1ff.; Lambert (2007).

<sup>31</sup> Cf. Young and Lewis (1995), p. 57.

<sup>32</sup> Cf. Allais (1953); Simon (1955); Herzberg et al. (1959), p. 114.

<sup>33</sup> Cf. Ashton und Ashton (1995b), pp. 57f.

predict behavior in the experiment can be gained by alluding to the psychological theories of expectancy, goal-setting and equity.

Expectancy theories assume that individuals optimize their hedonic pursuits by deciding for those activities with the highest probability of achieving the goal, which is most valued. Furthermore, they assume that humans are all-knowing decision makers. Humans are assumed to have complete rational powers, in a way that they possess knowledge of all options available, probabilities for reaching these options, capacity of assigning a value to each goal and computational capability of merging the expectancies and goal values into single numerical figures and comparing them. By means of this comparison, the activity which yields the highest pleasure is identified and selected selfishly.<sup>34</sup> As it can be easily seen, these assumptions bear many similarities to those of agency theory. Vroom's valence-instrumentality-expectancy theory is one of the most popular expectancy theories about human motivation related to organizational behavior.<sup>35</sup> Psychological predecessors of Vroom's theory are Lewin's resultant valence theory, Atkinson's theory of achievement motivation and Rotter's social learning theory.<sup>36</sup> Rotter's social learning theory is introduced in Sect. 4.2.3, because it integrates the concept of locus of control as an individual attribute. Atkinson's theory is introduced in Sect. 4.2.2.1, because it can be associated with the individual achievement motive, hypothesized to play a role in the respective behavior.

Goal-setting theory emphasizes cognitive processes such as setting goals, developing intentions, and building commitments as determinants of motivation.<sup>37</sup> The theory predicts higher effort levels when individuals commit to rather difficult and concrete goals than to vague ones. As individuals state their goals in the experiment, this theory is used to build appropriate expectations. The statement of goals might be associated with incentive effects as it is discussed in Chap. 4.

Equity theory, suggests that an individual evaluates the fairness of his/her situation relative to a comparative standard, which can be another individual or another situation.<sup>38</sup> Fairness considerations might play a role in the experiment, because some participants were allowed to choose their compensation scheme, whereas others were not allowed to. This might have an effect on productivity. Thus, there are links to sorting and as well as incentive effects.

In sum, these psychological theories put a greater emphasis on individual differences in preferences, on intrinsic aspects of motivation and on the effects of relative rather than absolute states. They suppose that performance is (also) motivated by other factors than monetary incentives. In contrast, agency theory stresses monetary incentives as the paramount motivator for performance.

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<sup>34</sup> Cf. Weiner (1996), p. 219.

<sup>35</sup> Cf. Wiemann (1998), p. 36; Brandenburg (2001), p. 67; Heide (2001); Pinder (2008).

<sup>36</sup> Cf. Lewin (1946); Rotter (1954); Atkinson (1974); For comprehensive reviews of this literature refer to Weiner (1996), pp. 153ff. or Beckmann and Heckhausen (2006); For a review of Vroom (1964)'s theory refer to Pinder (2008), pp. 363ff.

<sup>37</sup> Cf. Ryan (1958); Locke (1968); For a review of goal directed theories refer to Pinder (2008), pp. 389ff.

<sup>38</sup> Cf. Adams (1963).

In conclusion, the theories, which can be associated with the importance of monetary incentives in general, as well as those, by which characteristics of the monetary incentives – performance relationship can be described, help to draw a picture of the diverse views, different perspectives and possible effects of monetary incentives. However, the single theories tend to focus on certain specificities of human behavior in conjunction with monetary incentives and do not involve a great variety of variables. Within the frame of merely one of these theories it is difficult to encompass situations in which diverse variables exert possible influences on behavior in relation to monetary incentives. Consequently, the approach of the present study is to integrate variables into descriptive testable hypotheses without being restricted by particular theoretic assumptions in order to address the objectives outlined above. In the following four descriptive frameworks related to behavior under influences of incentives within the context of economic experiments are presented to get an overview of possible influence factors.

## 2.2 Economic Frameworks of Incentive Behavior

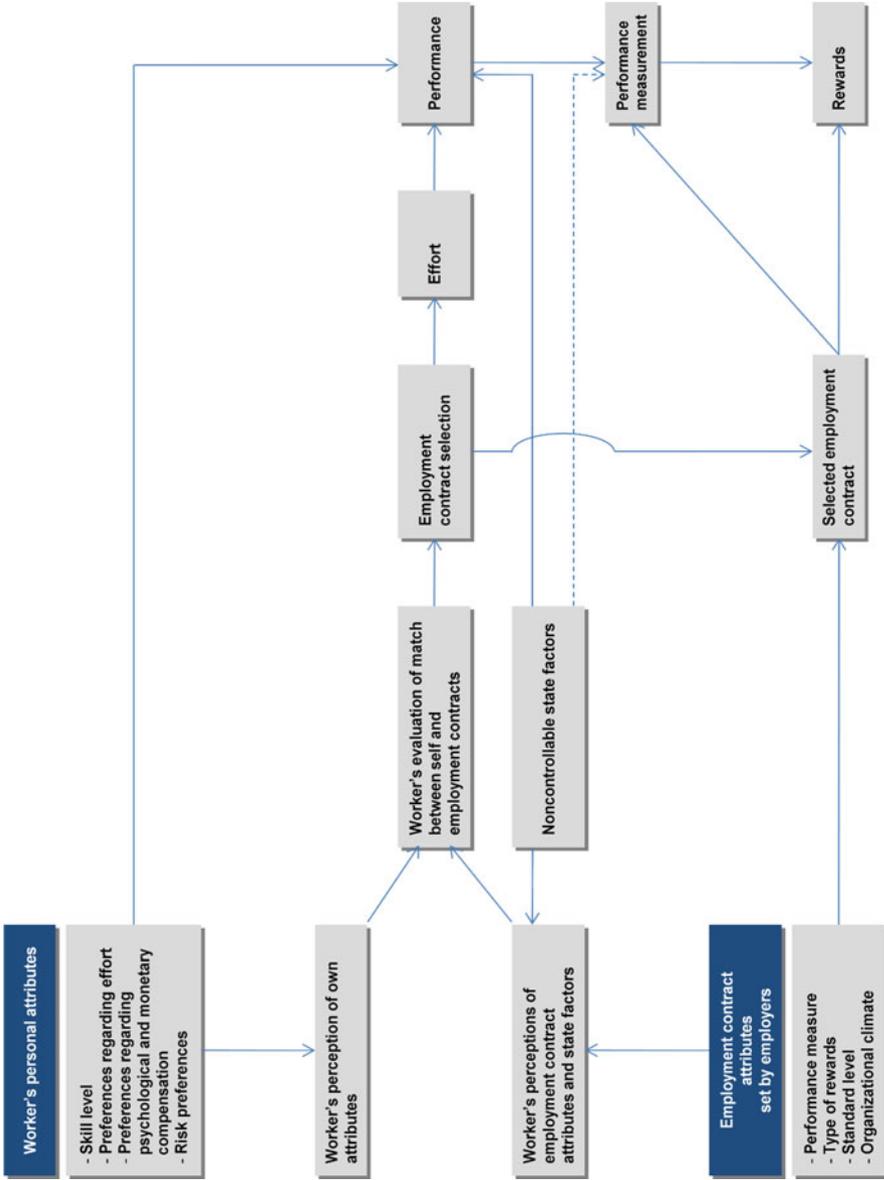
The aim of this study is to uncover dependencies of incentive and sorting effects in order to contribute to a clearer view of these effects. Existing descriptive frameworks can be beneficial for getting an overview of variables involved and for indicating particular research gaps and shortcomings related to incentive and sorting effects. Given the enormity of research fields dealing with incentive behavior, the attention is restricted to economic descriptive frameworks. Additionally, only frameworks which are related to experiments are considered in order to place specific attention to research gaps in this area. The research gaps, i.e. the identified contingency variables, are presented in the subsequent section. Four economic frameworks which introduce important determinants in an incentive context have been identified and are presented in the following.<sup>39</sup> However, only Waller and Chow's framework explicitly deals with determinants and dependencies of incentive as well as sorting effects.

Waller and Chow develop a framework of contracting effects to show that sorting and incentive effects have a strong relationship with each other as they both result from interrelated processes of incentive design (setting of employment contract attributes by employers) and self-selection by workers based on personal attributes. The employment contract attributes set by employers are performance measure, type of reward, standard level, and organizational climate; the personal attributes are classified into skill level, preferences regarding effort, preferences regarding psychological and monetary compensation as well as risk preferences. In the sorting process Waller and Chow place a high priority on worker's perception.<sup>40</sup> The relationships are presented in Fig. 2.3.

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<sup>39</sup> Refer for instance to Waller (1985); Camerer and Hogarth (1999); Bonner and Sprinkle (2002), p. 304 or Bonner (2008).

<sup>40</sup> Cf. Waller and Chow (1985), p. 461.



**Fig. 2.3** Waller and Chow's framework for examining the self-selection and effort effects of employment contracts  
Notes: Source Waller and Chow.<sup>41</sup> The dotted line can be interpreted as indirect effect.



**Fig. 2.4** Camerer and Hogarth’s capital-labor-production framework

*Notes: In Camerer and Hogarth’s point of view, labor can be associated with effort, capital with skill and production with tasks.*<sup>42</sup>

Camerer and Hogarth review contracting effects of financial incentives and construct a capital-labor-production framework.<sup>43</sup> They expand Smith and Walker’s labor theory and stress two factors, which they perceive as important for performance in an incentive context: intrinsic motivation and the match between skill and the demands which tasks possess.<sup>44</sup> In particular, the latter factor that effort only improves performance if the skill-task match is good is addressed by Camerer and Hogarth by introducing the concepts of capital and production.<sup>45</sup> Camerer and Hogarth claim that effects of ‘cognitive capital’ and ‘production’ are comparable to effects of incentives because these effects can lead to increased performance as incentive effects are often supposed to do as well. By categorizing different experimental tasks and observing influences on incentive effects, they illustrate their framework. Their highly aggregated framework is depicted in Fig. 2.4.

Bonner and Sprinkle list and analyze factors which exert influences on monetary incentive – effort – performance relationships.<sup>46</sup> They build a relatively detailed framework of possible influence factors and mediator variables and provide a differentiated view on incentive relationships. Bonner and Sprinkle’s review considers studies which deal with effects of monetary incentives on individual effort and performance in a laboratory context or in strictly controlled field experiments.<sup>47</sup>

<sup>41</sup> Cf. Waller and Chow (1985), p. 461.

<sup>42</sup> Cf. Camerer and Hogarth (1999).

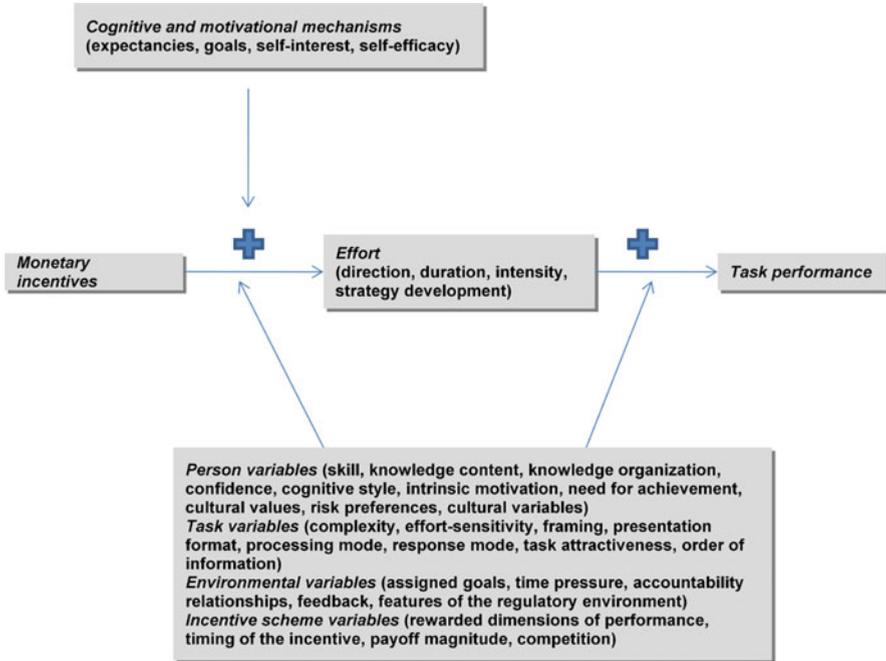
<sup>43</sup> Cf. Camerer and Hogarth (1999).

<sup>44</sup> Cf. Smith and Walker (1993).

<sup>45</sup> Cf. Camerer and Hogarth (1999), p. 9.

<sup>46</sup> Bonner and Sprinkle (2002) use the term performance for indicating human accomplishments within laboratory experiments. In this research the term productivity is preferred, because it not only considers output but also input by definition. However, within experiments the terms can be often used interchangeably and express an output measured within and against certain standards. As will be explained below, productivity in the present experiment is defined by the amount of anagrams solved correctly (output) within 10 minutes (input) for one participant.

<sup>47</sup> In their research performance has to be quantifiable, i.e. it needs to be measured according to a certain standard. This implicitly means that results of multi-person environments or markets are not considered in this study. Tasks including decisions between lotteries or certainty equivalents are not included, because of the problem of setting a normative performance standard.



**Fig. 2.5** Bonner and Sprinkle's framework for the effects of performance-contingent monetary incentives on effort and task performance

Notes: Source Bonner and Sprinkle.<sup>48</sup>

Bonner and Sprinkle classify variables influencing performance into four broad categories: person variables, task variables, environmental variables and incentive scheme variables.<sup>49</sup> Person variables relate to the individual who works on a task. They incorporate attributes the person possesses such as motivation, attitudes, culture, personality traits or abilities. Task variables are those that are connected to the task itself. They are comparable to the 'production' concept in Camerer and Hogarth. Bonner and Sprinkle define a task "as a piece of work assigned to or demanded of a person".<sup>50</sup> Task characteristics can vary within or across tasks. Variation within tasks maybe associated with different framing of tasks; variation across tasks typically means taking a different task. Both sorts of variation can influence task characteristics such as complexity or attractiveness. Environmental variables consist of all circumstances a person is faced when performing a task. These circumstances might be time horizon, goal condition, or when it comes to research the research method itself, such as field or controlled laboratory

<sup>48</sup> Cf. Bonner and Sprinkle (2002).

<sup>49</sup> Cf. Bonner and Sprinkle (2002), p. 304; In Bonner (2008), p. 198 the framework is similar. A main difference is that the incentive-scheme category is subsumed in environmental variables.

<sup>50</sup> Bonner and Sprinkle (2002), p. 311.

Knowledge and personal involvement	Abilities, intrinsic motivation and other person variables	Task variables	Environmental variables
<p><u>Experience</u> Feedback Practice <u>Knowledge</u> Knowledge content Knowledge structure <u>Personal involvement</u> Goal commitment Escalation of commitment</p>	<p><u>Abilities:</u> Verbal abilities Reasoning abilities Spatial abilities Perceptual differentiation ability <u>Intrinsic motivation</u> Effort direction Effort duration Effort intensity Self-efficacy Need for achievement Perception of fairness <u>Affect</u> Emotions Mood misattribution <u>Confidence</u> Credibility of information Self-attribution bias <u>Risk attitudes</u> Risk-averse vs. risk-seeking <u>Cognitive style</u> Tolerance for ambiguity Sensing vs. intuition Thinking vs. feeling Locus of control <u>Gender</u> <u>Cultural background</u> Masculinity vs. femininity Confucian dynamism Individualism vs. collectivism Power distance Uncertainty avoidance</p>	<p><u>Task complexity</u> Environmental predictability Information load <u>Information relevance</u> Anchors Dilution effect Redundancy <u>Framing</u> Risky choice framing Attribute framing Goal framing Gain framing Loss framing <u>Information order</u> Recency effects Step-by-step processing Simultaneous processing Contrast effect <u>Presentation format</u> Level of aggregation Accounting method Placement <u>Response mode</u> Verbal vs. numerical</p>	<p><u>Monetary incentives</u> Flat-rate schemes Piece-rate schemes Variable-ratio schemes Quota schemes Tournament schemes <u>Accountability</u> Legitimacy of authority <u>Justification</u> Conservatism <u>Assigned Goals</u> Difficulty Participation <u>Feedback</u> Outcome feedback Cognitive feedback <u>Groups and teams</u> Social loafing <u>Time pressure</u> Anticipation of pressure <u>Standards and regulations</u> Fraud</p>
<p><b>Cognitive processes</b></p> <p>Memory retrieval Information search Problem representation Hypothesis generation Evidence evaluation</p>			

**Fig. 2.6** Bonner’s determinants of judgment and decision making in accounting  
*Notes: Bonner’s monograph presents more than the shown factors and effects. She suggests that the factors and effects presented influence judgment and decision making quality in accounting.*<sup>51</sup>

environments. These environmental variables frequently interact with elements of the incentive scheme, constituting the last category. Incentive schemes can vary on various dimensions, e.g. materiality (immaterial or material) or magnitude. A schematic of Bonner and Sprinkle’s framework is shown in Fig. 2.5.

Bonner’s monograph represents a large review on determinants of judgment and decision making in accounting.<sup>52</sup> She presents the current state of research concerning diverse variables and effects and also points to research gaps. The determinants presented are classified into five groups which represent single chapters in her monograph. The determinants are not necessarily directly related to incentive contexts by Bonner. However, in organizational settings, if decisions are influenced by incentives it is viable to assume that the determinants presented have effects on incentive behavior as well and that they are relevant in the effects under investigation as well. The determinants are displayed in Fig. 2.6.

All in all, the four frameworks presented show that there is a great variety of individual as well as environmental contingency variables which influence

<sup>51</sup> Cf. Bonner (2008).

<sup>52</sup> Cf. Bonner (2008).

behavior in organizational settings related to incentives. In the next section, the four frameworks and their related literature are used to identify contingency variables which are in need of further consideration because of gaps in literature.

### **2.3 Identification of Contingency Variables and Development of an Integrative Framework**

The economic frameworks which are introduced in the preceding section use different terms, perspectives and levels of analysis. This is why a synopsis to find a common ground is difficult to achieve and is not pursued in the following. Rather, the aim of this section is to present research gaps concerning contingency variables related to incentive behavior. The variables have been identified by reviewing the frameworks and their related literature. Subsequently, an integrated view of the elements under investigation will be presented.

All factors of the four economic frameworks might have relevance concerning influences on incentive and sorting effects. For instance, framing effects may play a role in individual's choices of incentive schemes or effort choices under a particular scheme. Tversky and Kahneman find that if the same problem is framed in different ways, there are shifts in the decision outcomes.<sup>53</sup> Thus, if the incentive schemes or the freedom of choice options were framed in different ways, this might affect participant's decisions.

However, the observation of environmental and individual contingencies needs to be restricted to key issues because of the research objectives and capacity limitations. The selection of the environmental variables freedom of choice and magnitude of incentive has been specified following the objective to observe incentive and sorting effects in one research study in order to be able to compare them. The specified design is considered as suitable for disentangling incentive and sorting effects, because in the assignment condition of the freedom of choice variable only incentive effects (given differences in magnitude of incentive) are expected to have an influence, whereas in the self-selection condition of the freedom of choice variable incentive as well as sorting effects are expected to have an impact (cf. Sects. 1.3, 3.2.1). In order to be in a position to process statistical analysis, there are no other environmental variables specified (cf. Sect. 3.2.3).

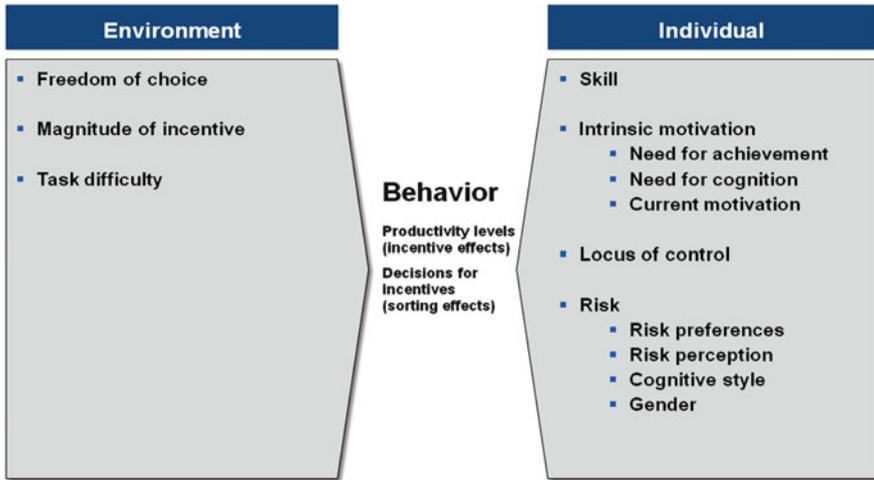
Concerning individual variables, the following notions have inspired the selection of individual contingencies in the experiment. The particular hypotheses which include the individual contingencies are presented in Chap. 4.

Bonner states that accounting research on the effects of motivation on judgment and decision making tends not to examine the effects of intrinsic motives such as the need for achievement motive.<sup>54</sup> Likewise, Camerer and Hogarth place emphasis on the point that intrinsic motivation has been sparsely considered in economic

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<sup>53</sup> Refer to Camerer (1995), pp. 652ff. for a review on framing effects.

<sup>54</sup> Cf. Bonner (2008), p. 88.



**Fig. 2.7** Determinants of behavior observed in the experiment

*Notes: Schematic of environment and individual variables which influence behavior. The behavioral points of observation are incentive effects as well as sorting effects, which is why the environmental variables freedom of choice and magnitude of incentive are introduced. The main outcome variable for observing incentive effects is productivity; for observing sorting effects the main outcome variable is magnitude of incentive (in the contract selected).*

thought in the past.<sup>55</sup> This is why elements of intrinsic motivation will be one focus in the experiment (cf. Fig. 2.7). Furthermore, Bonner and Sprinkle state that prior research is constraint by the small number of tasks used, which cannot account for the wide variety of business related tasks in reality. Indeed, task characteristics are found to be an important factor in productivity. Bailey and Fessler examine interactive effects of task difficulty, task attractiveness and monetary compensation. They find that piece rate compensation is more effective than fixed compensation at improving performance of a simple and unattractive task, but decreases in effectiveness at improving performance of a complex and attractive task.<sup>56</sup> Thus, task characteristics, in particular task difficulty, are included in the present research (cf. Fig. 2.7).<sup>57</sup> In addition, Waller and Chow claim that more research on the effects of risk preferences is needed. This claim is also upheld by more current empirical works such as Cadsby et al. or Hyatt and Taylor.<sup>58</sup> Following this,

<sup>55</sup> Cf. Camerer and Hogarth (1999), p. 9.

<sup>56</sup> Cf. Bailey and Fessler (2008).

<sup>57</sup> As task difficulty is not measured objectively by taking different tasks, but subjectively by prompting individuals' perception of task difficulty, it can be considered as an individual contingency (cf. Waller and Chow (1985), pp. 461f.). However, as the subjective perception reflects the influence of task difficulty in general, in the framework it is placed as environmental determinant. Task attractiveness is considered indirectly through elements of individuals' interest in a task (Cf. 4.2.1, 4.2.2.3).

<sup>58</sup> Cf. Cadsby et al. (2007), p. 388; Hyatt and Taylor (2008), p. 42.

elements of risk in the decision for incentive schemes will be a major point of consideration (cf. Fig. 2.7).

Besides, there is reason to believe that locus of control, i.e. individual differences in perceived control, as introduced in the section ‘other person variables’ by Bonner, plays an important role in the current study, which is why participants’ locus of control attitudes are observed in the experiment.<sup>59</sup> Incentives pose a way to direct an agent’s behavior in a specific manner and – in the case of an employer–employee relationship – incentives can be used to tie an agent’s actions to a superior’s goal. Thus, different incentives lead to different ways or tightness of controlling employees. Consequently, locus of control attitude can be a decisive element in individuals’ decisions for or under the influence of incentives (cf. Sect. 4.2.3).

For the gaps identified in literature, the introduced individual as well as environmental contingency variables are considered worth observing in the present study. However, Bonner states that studies on personality factors in accounting often do not find effects because of little variation in the measured factors. Additionally, she issues methodological concerns about studies which do find effects. According to her, appropriate controls for confounding factors need to be in place in particular when it comes to personality variables. Skill might be such a confounding factor because personality variables might be correlated with skill.<sup>60</sup> As skill is a highly important determinant of certain behavioral observations, including sorting and incentive effects, the observation of skill is paramount in order to get a realistic picture.<sup>61</sup> This is also why the measurement of skill in the task has been a major point of concern (cf. Sects. 3.2.2, 3.3, 4.3.1 or 5.1.1) and is included in the integrative framework (cf. Fig. 2.7).

All in all, in the present study there will be an emphasis on intrinsic motivation, the selection of an appropriate task and the influence of task difficulty; the issue of risk, locus of control and the measurement of skill are moreover considered. According to the objectives stated in the introduction, these contingencies will be observed in conjunction with incentive and sorting effects, because Eriksson and Villeval and others acknowledge the limitation of work available investigating the sorting effect and underline the importance of examining the distinction between sorting and incentive effects of compensation contracts.<sup>62</sup> The contingencies are specified within the hypothesis formulation of Chap. 4 as well as the operationalization in Sect. 5.1. In the following, by placing the targeted factors into an integrative perspective, the formation of the experimental design in Chap. 3 shall be supported.

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<sup>59</sup> Cf. Bonner (2008), pp. 100ff.

<sup>60</sup> Cf. Bonner (2008), p. 103.

<sup>61</sup> Cf. Bonner and Sprinkle (2002), pp. 313ff.; Lazear (2004).

<sup>62</sup> Cf. Bonner et al. (2000), p. 40; Gerhart and Rynes (2003), pp. 151f.; Chiappori and Salanié (2003), p. 116; Lazear (2004), p. 21; Cadsby et al. (2007), p. 387; Eriksson and Villeval (2008), pp. 412f.

In order to integrate the targeted factors into a behavioral framework, the view that individual behavior is a product of the individual and the environment is adopted. Rotter contends that personal attributes and specific situational settings determine behavior, which can be used for the study of personality: “The unit of investigation for the study of personality is the interaction of the individual and his meaningful environment”.<sup>63</sup> This point of view is similar to Lewin and is thought to be fruitful not only for the study of personality but also behavior.<sup>64</sup> The idea that individual behavior is a product of the individual and the environment is widespread in motivational literature and has numerous proponents.<sup>65</sup> Some economic texts also acknowledge this point of view.<sup>66</sup>

Thus, a framework, which is based on the dualistic concept that the environment and the individual are involved in determining behavior, is presented in Fig. 2.7. The box on the right hand side contains the list of individual variables which are under investigation in this experiment. They are believed to be worth observing because of the stated gaps in literature presented above. The variables are specified in Chaps. 4 and 5. The left box in Fig. 2.7 shows the environmental variables under investigation. These environmental variables strongly shape the experimental design in Chap. 3. Freedom of choice differentiates between individuals who are able to choose their incentive scheme or who are assigned to an incentive scheme. Magnitude of incentive involves three different monetary reward schemes. These variables are chosen because they allow the observation of incentive as well as sorting effects, which is the primary objective of the experiment. Following methodological principles these environmental variables are controlled and purposefully manipulated in the study (cf. Sect. 3.2.1). The task variable complexity is only measured subjectively and is not manipulated. However, in line with Waller and Chow, it is expected in this context that the participants’ subjective perceptions are key to explaining productivity and sorting behavior.<sup>67</sup>

The behavior which shall be explained through the individual and environmental determinants are the productivity levels individuals show as well as the decisions for incentives. The next chapter gives details concerning the experimental design, by which the behavior and their determinants shall be studied.

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<sup>63</sup> Rotter (1954), p. 85.

<sup>64</sup> Cf. Lewin (1946); Rotter (1954), p. 85.

<sup>65</sup> Cf. Heckhausen (2006), pp. 3ff.; Pinder (2008), p. 3; Refer to von Rosenstiel (1999) for a good text on motivational foundations of incentives and an introduction to relevant motivational theories.

<sup>66</sup> Cf. Staehle et al. (1999), pp. 149–164.

<sup>67</sup> Cf. Waller and Chow (1985), pp. 461f.



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