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Article in *Handbooks of Management Accounting Research* · December 2006

DOI: 10.1016/S1751-3243(06)01004-2

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Psychology Theory in Management Accounting Research

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Abstract: This chapter provides an introduction to psychology theories that have proven useful in management accounting research. Each theory is presented and discussed in the context of selected management accounting research that has used the theory. Because it is impossible to present a complete description and analysis of each theory, this chapter includes references to the psychology literature to guide researchers who want to learn more about any particular theory. This chapter concludes by summarizing what has been learned from psychology theory-based research on management accounting practices and identifying common themes in this literature.

1. Introduction

Psychology is the science of the human mind¹ (e.g., attitudes, cognition, motivation) and behavior (actions, communications). Although other social science theories frequently used in management accounting research also aim to explain and predict behavior, psychology differs from them in focusing on individual rather than organizational and social behavior and on subjective phenomena such as mental representations rather than objective phenomena such as market prices and quantities or organizational size and technology. The psychology theories presented in this chapter assume that behavior depends on individuals' mental representations, which can differ in important ways from objective indicators of the individuals' environment or welfare.² "The cognitive representation ... acts as *the effective envi-*

ronment which arouses motives and emotions, and guides overt behavior toward its target or goal." (Baldwin, 1969: 326, emphasis added). Thus, the effect of a particular type of management accounting practice on individuals' behavior can depend not only on how objectively informative the practice is about factors that affect the individuals' welfare, but also how understandable the practice is (i.e., how well the individuals can form usable mental representations of it and connect it to their other mental representations), and how it stimulates the individuals' attention, cognition, and/or motivation.

Psychology theory has been used to study management accounting practice for over 50 years, beginning with Argyris (1952, 1953) who relied on concepts from human relations³ and group dynamics to investigate how the social context of budgeting (e.g., superior-subordinate dyads, group dynamics

¹While many definitions of psychology include the study of animals, in addition to the human mind and behavior, only psychology theories about human behavior are included in this chapter.

²All of the psychology theories presented in this chapter are in the cognitive orientation, in which mental processes and states are assumed to mediate between stimuli (e.g., management accounting) and behavior. In contrast, other psychology theories are based on the behaviorism (stimulus-response) orientation, in which behavior is assumed to be a

reflexive (automatic or pre-programmed) response to stimuli without cognitive mediation (Shaw and Costanzo 1982).

³Human relations research developed during the late 1920s and early 1930s and investigated psychology in work organizations. It focused on workers' morale, motivation, productivity, and satisfaction as well as group processes, leadership, power, and organizational change. Human relations subsequently became what is today called industrial and organizational psychology.

among subordinates) influences employees' minds and behavior, in particular, their motivation and interpersonal relations. Argyris highlighted how important motivation and social psychology issues are to management accounting practice. Other influential early research further highlighted the importance of psychology theory in explaining and predicting the effects of management accounting practices. In particular, Stedry (1960) uses concepts from a motivation theory to investigate the effects of budget goal difficulty on individual performance, and Hopwood (1972) uses concepts from social psychology theory to study how superiors' use of accounting information to evaluate subordinates influences subordinates' stress and relations with other employees.

In the 1970s, management accounting research began to use cognitive psychology theory to study how and how well individuals subjectively process accounting information to make planning and control judgments and decisions. This research began with Barefield's (1972) examination of how the aggregation and redundancy of cost variances influence cost-variance judgments and Mock et al.'s (1972) investigation of how accounting feedback interacts with individuals' cognitive style to influence operating decisions. Since then, much research has used psychology theory to explain and predict how management accounting practices such as budgeting and performance evaluation and their organizational context influence individuals' minds and behavior, in particular, decisions, judgments, satisfaction, and stress.

While psychology includes many fields, management accounting research primarily relies on theories from three subfields—cognitive, motivation, and social psychology. Cognitive psychology is the study of psychological processes that influence human thinking, including attention, knowledge, judgments, decisions, and learning. Motivation psychology investigates four psychological processes that influence behavior—the arousal, direction, intensity, and persistence of effort. Social psychology is concerned with how other people influence individuals' minds and behavior, and includes understanding people (social cognition, attribution, person impression), attitudes and social influence, and social interaction and relationships.

What has been learned from the use of cognitive, motivation, and social psychology theories about the effects of management accounting practices can be summarized under the headings of motivation and information effects.

- The *motivational effects* of management accounting practices depend not only on how these practices

influence objectively measured outcomes and rewards but also how they influence individuals' mental representations of outcomes and rewards through psychological processes and states like goal setting, level of aspiration, stress, and fairness beliefs. For example, a difficult budget goal motivates increased performance if it is set *before* individuals choose aspiration levels, because it tends to influence their choice; but the same difficult budget goal does not motivate increased performance if it is set *after* individuals choose (typically lower) aspiration levels, because they mentally represent it as inconsistent with their choice and thus as unacceptable or unreasonable (Stedry, 1960).

- The *informational effects* of management accounting practices depend not only on the information that these practices provide but also how boundedly rational individuals use heuristics to search and process this information, how the management accounting practices influence the choice and use of these heuristics, and how the management accounting practices influence the way individuals form and use mental representations of their organizations and environment. For example, capitalizing versus expensing intangibles influences how accurately individuals judge the relation between intangibles expenditures and profit from internal reports, because it influences their allocation of attention: when intangibles are expensed, individuals allocate more attention to current-profit effects and are therefore less accurate in judging longer-term effects (Luft & Shields, 2001).

This chapter is intended to be an introduction to psychology theories that have proven useful in management accounting research. Each theory is presented and analyzed in the context of selected management accounting research that has used the theory. Because it is impossible to present a complete description and analysis of each theory, this chapter includes references to the psychology literature to guide researchers who want to learn more about any particular theory.

The remainder of this chapter is organized into five sections. The next section provides an overview of psychology theory-based research on management accounting practices. The following three sections introduce cognitive, motivation, and social psychology theories that have been used to inform management accounting research. The final section concludes with a summary of what has been learned from the use of psychology theory in management accounting research.

2. Overview

This section provides a selective overview of how psychology theory is used in research on management accounting practices. It first describes three strategies used in psychology-based research for characterizing the effects of management accounting practices on the human mind and behavior. Then it describes three causal-model forms for representing the relations between management accounting practices and their causes or effects. Finally, it provides a brief introduction to the following three sections on psychology theory.

2.1. *Effects of Management Accounting*

Psychology theory can be used to explain both the causes and effects of management accounting practices. However, the research questions in almost all of the extant research that uses psychology theory are about the *effects* of management accounting practices on individuals' minds and behavior (e.g., the effects of budget goal difficulty on motivation). In contrast, much less research investigates the effects of the human mind and behavior on management accounting practices (e.g., the effects of heuristic judgment processes on budget goal difficulty). The three research strategies below are described in terms of the modal approach, that is, ways of researching the effects of management accounting practices on individuals' minds and behavior; but the same strategies could also be used to research the effects of individuals' minds and behavior on management accounting practices.

Researchers have used three strategies for characterizing the effects of management accounting practices on individuals' minds and behavior: different effects, better effects, and optimal effects. The different-effects research strategy uses psychology theory to explain and predict *differences* in mental processes and states and behavior due to differences in management accounting practices. Important limitations of this strategy are that it does not provide information about which management accounting is better or whether the better alternative is optimal with respect to some desired outcome. For example, Shields et al. (1981) use attribution theory to predict and find evidence that individuals attribute the same reported performance by a subordinate to different causes, depending on whether they assume the role of superiors or subordinates. While it can be important to know that such differences would be predicted and are observed, Shields et al.'s research design does not provide information on whether the attributions of the subordinates or superiors are better or whether either set of attributions is optimal.

The better-effects research strategy uses psychology theory (and possibly non-psychology theories) to explain and predict which of two or more management accounting practices results in *better* mental processes, states, and/or behavior according to a chosen criterion. For example, Briers et al. (1999) predict and find that providing individuals with benchmark feedback results in higher profits than not providing this feedback. Their theory does not allow them to determine whether the profit realized with benchmark feedback is the optimal level of profit, and it is possible that another type of feedback would have resulted in even better performance.

The optimal-effects research strategy explains and predicts the degree to which management accounting practices support *optimal* mental processes and states (e.g., optimal probability revision) and behavior (e.g., utility maximizing effort choices or information purchases). Optimal-effects research usually refers to a non-psychology theory, typically from economics, operations research, or statistics, to identify what is optimal and to estimate the expected loss (e.g., decrease in expected profit) from deviating from the optimum strategy or amount. For example, Lewis et al. (1983) use a laboratory experiment to identify heuristic cognitive processes individuals use to make variance investigation decisions. This study then uses simulation analysis to estimate the opportunity cost of using a heuristic process compared to a Bayesian model. While research designed to provide evidence on optimal effects has the potential to provide more information about the effects of management accounting practices, an important limitation on researching optimal effects is that for many management accounting tasks a credible optimizing model is not available. This is particularly the case in multi-period, multi-person settings. Thus, in researching many management accounting practices, researchers must conduct research that is intended to provide evidence on better or different effects of management accounting practices without being able to compare these effects to an optimum.

2.2. *Causal-Model Form*

Expected relations between constructs in a theory are frequently represented as a causal-model form with constructs operationalized as variables. Most of the causal models used in management accounting research are unidirectional: that is, if they represent budget goal difficulty as influencing performance, they assume that performance does not also influence budget goal difficulty. Most of the causal models also are linear: that is, the effect of the independent variable on the dependent variable is not conditional on

the level of the independent variable. (See Luft & Shields (2006) for further discussion of causal-model forms.) For any of the three effect types identified above (different, better, or optimal effects), researchers can represent the unidirectional causal relations that produce these effects in three ways, which imply three different causal-model forms: additive, interaction, and intervening-variable models.

Additive models assume that the effect of a particular management accounting variable (e.g., participative budgeting, budget-based incentives) can be understood in isolation from other management accounting variables and other factors that might influence individuals' minds and behavior. (That is, they assume that the existence and magnitude of the effect is not conditional on the level of any other independent variable.) Although the psychology theory employed might specify a sequence of mental processes that produce the effects of management accounting variables on individuals' minds and behavior, additive models typically support tests of only the beginning and end of the sequence (e.g., management accounting and performance), not the intervening mental states and processes.

Interaction and intervening-variable models provide additional complexity in representing the effects of management accounting variables. Interaction models represent the effects of specific management accounting variables as dependent on the presence or levels of other variables. That is, the influence of an independent variable (e.g., budget-based incentives) on the dependent variable (e.g., performance) is conditional on the level of another independent variable or a moderator variable (e.g., task uncertainty, employees' attitudes).⁴ Intervening-variable models test psychology theory in more detail by explicitly representing and measuring at least some of the mental variables in the causal chain that leads from management accounting variables to their effects (e.g., participation influences performance by providing task-relevant information or by increasing motivation).

The relevant causal-model form depends on the theory (or theories) employed, the setting in which the theory is tested, and the interests of researchers and their audience. For example, the number of intervening or interaction variables included in a causal model depends partly on the length and detail of the causal-relation chain and the number of interacting variables specified by the relevant theory, partly on

the measurability of the variables (not all mental states and processes can be satisfactorily measured), and partly on the focus of the specific research study. Early research in this area has often simply investigated *whether* a management accounting variable affects performance (additive models), and mixed results of early studies have led researchers to investigate the *conditions under which* the management accounting variable affects performance (interaction models) and the *process by which* it affects performance (intervening-variable models).

2.3. Cognitive, Motivation, and Social Psychology Theories

The distinction among cognitive, motivation, and social psychology theories that is used to organize the next three sections is based in part on convention and convenience. The three subfields are not mutually exclusive: theories that are conventionally classified in different subfields often share similar assumptions, and a given theory can sometimes be employed in more than one subfield. For example, theories in all three subfields rely (at least implicitly) on the assumption of bounded rationality, that is, the assumption that individuals intend to behave rationally but often do not behave perfectly rationally because of their limited cognitive processing capacity. As an example of a theory that can be employed in multiple subfields, cognitive dissonance theory addresses cognitive phenomena (how individuals respond to cognitions that are mutually inconsistent), motivation phenomena (how inconsistent cognitions stimulate actions to avoid or eliminate them), and social phenomena (how aversion to inconsistent cognitions influences interpersonal relations and attitudes toward others).

The next three sections introduce psychology theories in the three subfields that have generated significant management accounting research. There is a description of each theory and exemplar management accounting literature that uses the theory. Theories are presented in the order that they have been used in research on management accounting. Motivation theories are presented first, social psychology theories next, and cognitive psychology theories, the most recently used, are presented last.

3. Motivation Theories

This section provides a review of seven motivation theories that have been used to underpin almost all of the psychology theory-based research on management accounting practices. For the most part, these theories address different aspects of motivation and thus do not directly conflict or compete with each

⁴See Luft and Shields (2006) for a discussion on types of interaction effects.

other. Reviews of these and other motivation theories are in Donovan (2001), Kanfer (1990), Latham & Pinder (2005), Mitchell & Daniels (2003), Pinder (1998), and Weiner (1989).

Motivation, especially work-related motivation, usually is conceptualized as consisting of several psychological processes that influence behavior (Kanfer, 1990; Mitchell & Daniels, 2003; Pinder, 1998). These processes include:

- arousal—the stimulation or initiation of energy (effort) to act, which is caused by (depending on the theory) unfilled needs and drives (innate motivation), rewards and reinforcements (external motivation), or cognitions and intentions (e.g., motivation from deliberately set goals);⁵
- direction—where energy or effort is directed;
- intensity—the amount of effort expended per unit of time; and
- persistence—the duration of time that effort is expended.

The assumptions that underpin motivation theories vary across theories (Mitchell & Daniels, 2003; Weiner, 1989). Almost all psychology theories of motivation used in management accounting research stem from Lewin's field theory (Weiner, 1989), which introduced concepts that are important to motivation research on management accounting, such as goals, level of aspiration, motivational force, valence (i.e., value or utility), and expectancy. Field theory assumes that when individuals experience tension due to a need or intention that has not been satisfied (e.g., not yet achieving a budget goal), they activate the goal of reducing the tension and take action to do so, perhaps by changing the direction, intensity, and/or persistence of their effort. Achieving the goal then reduces tension. This is consistent with the hedonism and homeostasis assumptions of psychoanalytic and drive theories of motivation, which influenced the development of field theory in the 1930s (Weiner, 1989).

The assumption of hedonism is that people are assumed to have as primary goals in life maximizing pleasure and minimizing pain. The assumption of homeostasis is that people try to remain in a state of internal equilibrium and are motivated to return to their state of equilibrium when it is disturbed. Unsatisfied needs and intentions are assumed to be motivating because they create unpleasant states of tension and disequilibrium.

In addition to homeostasis and hedonism, some cognitively oriented motivation theories assume that individuals prefer cognitive consistency or cognitive mastery of their environment. Cognitive consistency means individuals' mental states (e.g., attitudes, beliefs, preferences) fit together harmoniously or at least do not conflict. "The inconsistent relation among cognitions is referred to [in various psychology theories] as cognitive imbalance ... asymmetry ... incongruence ... and dissonance." (Shaw & Costanzo, 1982: 198; see also Deutsch & Krauss, 1965). When mental states conflict, individuals are assumed to experience unpleasant mental tension, which causes stress. This motivates them to reduce their stress by changing mental state(s) to create cognitive consistency. The assumption of cognitive mastery of the environment is that people want to understand the causes of their own and others' behavior in order to explain and predict behavior in their environment, even if this understanding is painful rather than pleasant (Weiner, 1989).

3.1. Level of Aspiration Theory

Level of aspiration theory assumes, first, that people are motivated by a desire to experience feelings of success and avoid feelings of failure, and second, that, "Perception of success and failure involves subjective, rather than objective levels of attainment." (Weiner, 1989: 169). Feelings of success or failure are then strongly influenced by whether the individual's performance reaches his or her level of aspiration, which is defined as, "... the level of future performance in a task which an individual, knowing his level of past performance in that task, explicitly undertakes to reach." (Frank, 1935: 119). Thus, the same level of performance, with the same objective consequences, can be subjectively experienced as a success or failure depending on whether it is higher or lower than the individual's *ex ante* level of aspiration.

Psychology research in the 1940s and 1950s identified two factors influencing individuals' levels of aspiration. First is the valence or attractiveness of the possible outcomes of the task. Valences are positive for successful outcomes and negative for failures; the valence for a given task varies in magnitude with the importance of the task and its consequences, as well as the individuals' disposition (e.g., some individuals fear failure more than others). In addition, the valence is dependent on the difficulty of the task. Other things equal, success at a difficult task is more attractive than success at an easy task. The second factor influencing levels of aspiration is the probability of success or failure (referred to as "potency" in the early literature). The lower likelihood of success tends

⁵Arousal as used here is the initiation of effort, not the intensity of effort as in arousal theory (Weiner 1989).

to offset the higher attractiveness of success in more difficult tasks, but does not do so completely. Thus, individuals often set moderately (not extremely) difficult goals for themselves, even though they are less likely to reach these goals than to reach easier goals.

Psychology research has often focused on past experience as a determinant of individuals' levels of aspiration: typically, feelings of success lead them to revise their probabilities of future success upward and set higher levels of aspiration in the future, while feelings of failure lead them to set lower levels of aspiration. In organizational settings, however, management accounting practices can be another important influence on individuals' levels of aspiration, and thus on performance. For example, if individuals internalize their budget goals and regard achieving these goals as a matter of personal success or failure, then they will be more motivated to achieve the goals. It is an important question whether budgeting can directly influence individuals' levels of aspiration, or must adjust to individuals' aspiration levels that are set by other means. Because individuals strive to achieve their levels of aspiration, organizations' performance goals are more likely to be met if they are consistent with the levels of aspiration of the organizations' employees.

In what is usually regarded as the first motivation research on management accounting practices, Stedry (1960) predicts and provides experimental evidence that individual performance is an interactive function of the difficulty and the timing of an imposed budget. Stedry uses three levels of imposed budgets (easy, medium, and difficult) and finds that when individuals receive the budget goal *before* setting their personal aspiration level, performance is highest with the difficult budget goal, because individuals adopt this goal as their own aspiration level. In contrast, if they receive the budget goal *after* setting their own aspiration level, the difficult budget goal does not result in higher performance than the medium budget goal, because individuals tend to retain the (more moderate) level of aspiration they chose initially.

Stedry (1960) provides initial evidence that the subjective effects of budget goal difficulty itself, in addition to the objective consequences of reaching it or failing to reach it, can influence individuals' motivation and performance. Much of the subsequent management accounting research on how budget goal difficulty influences individuals' mental representations and hence their motivation and performance derives from three theories that are related to level of aspiration theory: goal setting theory, cognitive dissonance theory, and organizational justice theory. In total, these motivation theories examine the effects of

setting budget goals on level of aspiration, motivation, and performance, and assume that motivation and expected performance are unproblematically related—if there is a highly motivating goal, then on average performance will be at a high level.

3.2. Goal-Setting Theory

Goal-setting theory is related to level of aspiration theory. Both are based on Lewin's field theory, which models individuals as desiring to have goals, choosing goals, and being motivated to reach these goals (Weiner, 1989). Both theories assume that a major determinant of individuals' choice of goals is their past performance and ability. Goal-setting theory assumes that individuals' consciously chosen goals affect their motivation by one of four mechanisms: goals arouse effort to achieve goals; goals direct attention and effort towards goals; goals increase effort persistence; and goals affect action indirectly by leading to the arousal, discovery, and/or use of task-relevant knowledge and strategies (Locke & Latham, 2002; Mitchell & Daniels, 2003; Pinder, 1998).

Goal-setting theory has been the motivation theory most frequently used to study motivation in organizations. The results of over 1,000 studies provide consistent evidence on how goals influence performance and factors that mediate the goal-performance relation (Locke & Latham, 2002). First, performance is a positive function of goal difficulty until individuals reach the limits of their ability or until their commitment to a difficult goal decreases. Second, when performance is controllable, specific goals reduce variation in performance by decreasing ambiguity about what performance is to be attained. Third, performance is not increased by participation in setting goals compared to imposed goals, holding constant goal difficulty and beliefs about self-efficacy. Fourth, performance is not directly influenced by incentives; instead, incentives influence goal levels or commitment to achieving goals, which in turn influence performance. Fifth, people use feedback on progress toward reaching a goal to assess what they need to do to reach the goal. Finally, the goal-performance relation is moderated by goal commitment, goal importance, feedback, task complexity, and self-efficacy.

Three management accounting studies provide evidence on the effects of budget goal setting. Kenis (1979) predicts and reports that budget goal specificity increases budget motivation, budget performance, and cost-efficiency performance. He also predicts and finds that budget goal difficulty and budget feedback increase budget motivation, but contrary to his prediction based on goal-setting

theory he found that budget goal difficulty and budget feedback have no effect on budget performance. However, goal-setting theory predicts that a necessary condition for goal difficulty to influence performance is that feedback on progress toward achieving the goal be provided. This implies that the additive model used by Kenis (1979) is incorrect; instead, an interaction model should have been used with budget goal difficulty and budget feedback as interacting independent variables. In response to this causal-model misspecification, Hirst & Lowy (1990) examined this issue and provided analysis and evidence that budget performance is a positive ordinal interactive (not additive) function of budget goal difficulty and budget goal feedback. Hirst & Yetton (1999) reported that budget goal specificity increases the level of performance and decreases the variance in performance.

3.3. Cognitive Dissonance Theory

This theory assumes that individuals want consistency between their cognitions (e.g., attitude, belief, knowledge, opinion) and between their cognitions and behavior (Deutsch & Krauss, 1965; Festinger, 1957; Shaw & Costanzo, 1982). When there is inconsistency, individuals experience cognitive dissonance: an aversive state of cognitive tension that they desire to avoid. Individuals are motivated to reduce this tension (and to avoid increasing tension), and thus to return to a state of cognitive consistency. The most common way for people to reduce this tension is to change their cognitions so that their cognitions are consistent with each other and with their behavior.

Cognitive dissonance often occurs after making a voluntary decision because some attributes of the chosen alternative are consistent with negative pre-decision cognitions about this alternative, and some attributes of the rejected alternatives are consistent with positive pre-decision cognitions about the rejected alternatives. Cognitive dissonance is especially strong when decision alternatives are important and of equal attractiveness. Individuals are motivated to reduce post-decision cognitive dissonance, typically by increasing positive cognitions about the chosen alternative (e.g., focusing on the chosen alternative's attributes that are consistent with positive pre-decision cognitions about this alternative) and/or decreasing their positive cognitions about the rejected alternatives (e.g., focusing on the rejected alternatives' attributes that are consistent with negative pre-decision cognitions about the rejected alternatives). Alternatively, people can alter their behavior (e.g., reverse their decision) or selectively seek new information to increase cognitive consistency (e.g., find

information that supports the alternative chosen rather than the rejected alternatives) in an attempt to reduce the dissonance.

In management accounting research, cognitive dissonance theory provides an explanation for how cognition or mental representations mediate between budget goal difficulty and performance. For example, Tiller (1983) predicts and finds that under participative budgeting, commitment to achieving a budget goal and performance are higher when individuals select a more difficult budget goal compared to when they select a less difficult budget goal. This prediction is based on the assumption that the effort required to achieve the budget is aversive and increases with budget goal difficulty. In this situation, individuals can experience cognitive dissonance because they have voluntarily chosen this aversive experience. They can reduce this cognitive dissonance by increasing their commitment to achieving the budget goal (i.e., increasing their positive cognitions about their chosen budget goal).

3.4. Organizational Justice Theory

Beginning with equity theory in the 1960s, some motivation psychology research has addressed how people's beliefs about equity, fairness, and justice influence their work-related motivation (Donovan, 2001; Gilliland & Chan, 2001; Pinder, 1998). Stemming from cognitive dissonance theory, equity theory assumes that people are motivated to maintain a balance in exchange relationships and assess this balance (equity) by comparing their inputs and outcomes to others' inputs and outcomes (Adams, 1963; Shaw & Costanzo 1982). If people believe that their input/outcome ratio is inequitable when compared to others', they will experience negative emotions. They will attempt to minimize these negative emotions by increasing or decreasing their inputs and/or outcomes, depending on which is appropriate.

Equity theory provides the basis for organizational justice theory. Organizational justice theory assumes that people are primarily concerned with two types of justice: distributive and procedural. Individuals' beliefs about distributive justice relate to the fairness of the distribution of outcomes between themselves and relevant others. Procedural justice refers to the fairness of the process by which outcomes are determined, independent of what the outcomes actually are. Individuals commonly regard processes as fairer when they have voice (ability to express their opinion about a pending decision) and/or vote (ability to influence the outcome of a pending decision). Referent cognitions theory integrates elements of distributive and procedural justice, predicting that individuals

compare their outcome to the outcomes of referent others to determine whether the distribution of outcomes is unfair (Folger, 1986). If this comparison indicates that they received an inequitable outcome, then they assess the fairness of the process used to determine the outcome and how justifiable the decision is for the circumstances. If they believe the procedure is fair, then they will come to believe that the outcome also is fair. If they believe the process is unfair, then they will reduce their input or engage in gaming to create fairness.

Organizational justice theory, like level of aspiration and goal setting theories, assumes that individuals' subjective assessments of actual or possible outcomes influence their motivation and that their assessments are based on a comparison to a reference point. In level of aspiration and goal setting theories, the reference point is self-set goals; in equity and organizational justice theories, the reference is others' inputs and outcomes. These theories also are similar in that they assume that a difference between what ought to be and what is (e.g., between goal and performance, conflicting cognitions, or expectation of justice and experienced injustice) creates cognitive inconsistency and/or tension that motivate behavior to eliminate the difference.

Some research provides experimental evidence on organizational justice applied to budgeting. In a participative budgeting context, Libby (1999) predicts and finds that when subordinates have involvement (voice) in setting their own budget but the final budget set by their superior is not what they requested, their performance is higher if they receive an explanation for why their request did not influence the budget than if they do not receive such an explanation. In an imposed budgeting context, Libby (2001) examines whether subordinates' performance is affected by their beliefs about the fairness of a budgeting process and budgets. As predicted, she finds that performance is lower only when both the budgeting process and the budget itself are believed to be unfair. These results indicate that individuals' performance is not affected by what they believe is an unfair budget as long as they believe the budgeting process is fair.

3.5. Expectancy Theory

Expectancy theory assumes that individuals choose intended actions, effort levels, and occupations that maximize their expected pleasure and minimize their expected pain, consistent with hedonism. Donovan (2001), Kanfer (1990), and Pinder (1998) review and analyze evidence on expectancy theory. Expectancy theory models individuals' motivational force as a

function of their expectancy (subjective probability that their effort will result in a first-level outcome such as performance), instrumentality (subjective probability that performance will result in a second-level outcome such as pay), and valence (the affective orientation toward the second-level outcome). Individuals are assumed to combine expectancies, instrumentalities, and valences consistent with expected value calculations to determine their motivational force toward each alternative and then choose the alternative with the highest motivational force.

Brownell & McInnes (1986) use expectancy theory to provide evidence on whether motivation mediates between participative budgeting and performance, as assumed by prior research. Their results indicate that participative budgeting increases two components of motivation—expectancy (the subjective probability that effort will result in achieving the budget) and instrumentality (the subjective probability that achieving the budget will result in receiving a reward). However, motivation measured as the combination of the expectancy theory components does not increase because the increase in probabilities is offset by the decrease in valences. Brownell and McInnes speculate that their results are contrary to their predictions because of potential theoretical misspecifications such as the incorrect direction of causality (performance influences participative budgeting and vice versa) and omitted variables such as budget goal difficulty.

3.6. Attribution Theory

Heider (1958) began the study of how people attribute causes to their own and others' behavior in order to explain and predict behavior in their environment (Shaw & Costanzo 1982; Weiner, 1989). Attribution theory has given particular attention to the ascription of behavior to causes that are internal (ability, effort) or external (task difficulty, luck) to the focal person, that is, the person whose behavior is being observed or evaluated. Many studies have found that the focal person tends to attribute his or her own behavior more to external causes, while other people tend to attribute the same behavior more to internal causes; this is called the actor-observer bias. These findings are of importance to management accounting because they provide a basis for explaining and predicting how individuals will subjectively explain why actual and budgeted performance differ. Moreover, they indicate that the subjective explanations of superiors and subordinates for the subordinates' budget variances predictably differ, and both of their subjective explanations can

diverge from objective assessments of the budget variance.

Shields et al. (1981) provide evidence that when individuals assume the role of a superior or a subordinate and are asked to explain the subordinate's reported manufacturing performance, they use the attributions identified by psychology research. When individuals assume the role of the superior (subordinate) their attributions for the subordinate's reported performance is more to internal (external) than to external (internal) causes. Harrison et al. (1988) extend Shields et al. (1981) and find, as predicted, that when individuals assume the role of a superior or a subordinate and are asked to explain the subordinate's reported unfavorable production variance, they use more internal attributions as superiors than they do as subordinates. Harrison et al. (1988) also include a variance investigation decision in which the superiors and subordinates select from a list provided by the researchers questions that they would most want to be answered by a variance investigation. As predicted, the superiors (subordinates) selected more questions relating to information that is internal (external) to the subordinate, and the internality of their attributions is associated with the extent to which they select questions aimed at finding out internal information.

3.7. *Person–Environment Fit Theory*

This theory is based on Lewin's field theory and assumes that motivation is a function of the fit between individuals' performance capability and their environment (Caplan, 1983; Edwards, 1996; Van Harrison, 1978, 1985). As environmental demands such as budget goal difficulty increasingly exceed individuals' performance capability (e.g., skill, effort, physical, and monetary resources), fit decreases and they experience stress (tension) due to task overload from task demands exceeding their performance capability. This in turn increases the individuals' subjective uncertainty about the effects of their effort, which results in feelings of ambiguity and/or loss of control which then diffuse and reduce their effort, thus reducing their performance.

Shields et al. (2000) use this theory to develop predictions about how stress mediates the effects of budgeting on performance. They predict and find that participative budgeting influences performance by three paths. First, participative budgeting increases feelings of being in control, which decreases stress, thus increasing performance. Second, participative budgeting reduces the difficulty of budget goals, making it more likely that the goals will not exceed individuals' performance capability. This match of

goals and capabilities reduces stress and thereby increases performance. Third, participative budgeting increases budget-based incentives, which are expected to arouse and focus effort, thus increasing performance capability, which in turn reduces stress and increases performance.

4. Social Psychology Theories

Social psychology is concerned with how individuals' minds and behavior are influenced by other people, including their understanding of people (social cognition, attribution, person impression), attitudes and social influence, and social interaction and relationships (Taylor et al., 2003). Reviews of social psychology theories include Deutsch & Krauss (1965), Shaw & Costanzo (1982), and Taylor et al. (2003). Role theory is the first social psychology theory used in management accounting research, and it has since then been used in subsequent management accounting research as well. Recent research on management accounting has used three other social psychology theories—social comparison theory, social identity theory, and group identification theory. The assumptions that underpin these three theories are identified when each theory is presented.

4.1. *Role Theory*

Role theory uses a set of constructs derived from anthropology, social psychology, and sociology to explain and predict how people function in a social context (Deutsch & Krauss, 1965; Shaw & Costanzo 1982). This theory assumes that individuals' behavior is influenced by role expectations and norms that are held by others concerning how individuals in a particular role are expected to behave (e.g., supervisor, worker) (Deutsch & Krauss, 1965; Katz & Kahn, 1978; Shaw & Costanzo 1982).

Two key concepts in role theory that are related to management accounting research are role conflict and role ambiguity. Role conflict occurs when individuals are confronted with conflicting inter- or intra-role expectations and it is not possible for them to comply with all of the expectations. Role ambiguity occurs when individuals experience uncertainty about what behavior is expected of them. Role conflict or ambiguity can increase stress, tension, and anxiety arising from cognitive inconsistency, which can lead to coping and defensive behaviors, including aggressive action and communication, hostile feelings towards others, social withdrawal, job dissatisfaction, and loss of self-confidence, self-esteem, interpersonal trust, and respect for others, as well as physiological problems (Kahn et al., 1964).

DeCoster & Fertakis (1968) use role theory to structure their investigation of an issue raised by Argyris (1952, 1953): how budgeting and supervisors' interaction with their superior influences the supervisors' budget-induced pressure. The assumption made is that the more supervisors respond to their superior's sent role expectations concerning budgeting and budget-related behavior and performance, the more pressure they will experience arising from role conflict and ambiguity. For example, if the superior emphasizes several budget goals (e.g., increase profits and increase quality and customer service), then supervisors are more likely to experience role conflict and ambiguity because they will not know how to accomplish all of the budget goals simultaneously. Budget-induced pressure is predicted to affect supervisors' leadership style. In particular, DeCoster & Fertakis (1968) predict that the higher the budget-induced pressure on the supervisor, the more likely the supervisor will have an initiating-structure leadership style, in which supervisors' interaction with their employees is focused on ensuring that the employees comply with budgeting procedures and achieve the budget. In contrast, as budget-induced pressure decreases, supervisors are more likely to have a considerate leadership style in which they focus more on having positive relations with their subordinates, including more participation. Contrary to their prediction, their results indicated that budget-induced pressure was positively associated with both leadership styles.⁶ These results are primarily driven by pressure from supervisors' immediate superior to comply with budget procedures, achieve budgets, and explain unfavorable budget variances. In contrast, pressure from procedures for formulating budgets, budget administration, and budgeting staff are not related to either leadership style.

Hopwood (1972) uses role theory to investigate how superior managers' use of budget and performance information to evaluate subordinate managers' performance affects the latter managers' job-related stress, which is assumed to arise from role ambiguity and conflict. Because accounting-budget information is an incomplete representation of managers' actions and performance, how superior managers use this information when evaluating subordinate managers can influence the latter's role conflict and ambiguity, and hence stress. When this incomplete information is

used in a rigid short-run cost-minimization style to evaluate performance, subordinate managers are more likely to believe that they are being incorrectly evaluated and thus to experience role conflict, ambiguity, and stress. In contrast, when superior managers use a flexible long-run profit-maximization style of evaluating performance, subordinate managers are more likely to believe that they are being correctly evaluated and experience less stress. As predicted, Hopwood finds that subordinate managers' job-related stress is highest when their superior managers use accounting-budget information in a rigid short-run cost-minimization style to evaluate performance and lowest when accounting information is used in a flexible long-run profit-maximizing style.

The findings of DeCoster & Fertakis (1968) and Hopwood (1972) have had an important influence on management accounting research. In particular, many later studies investigate how role ambiguity and role conflict mediate the effects of management accounting (e.g., budgeting, evaluating performance) on job-related stress, dysfunctional behavior, and performance.

4.2. *Social Comparison Theory*

Social comparison theory assumes that individuals have a need for accurate self-evaluation, self-enhancement, and self-improvement of their abilities, opinions, performance, emotions, and accomplishments (Shaw & Costanzo 1982; Taylor et al., 2003). When possible, individuals compare themselves to objective information (e.g., performance standards); lacking access to such information, they compare themselves to others. A key choice is the individual(s) to whom people choose to compare themselves. For example, people can compare themselves to others who are similar or dissimilar with respect to the object that is being compared (e.g., performance). If dissimilar, then the choice of comparison-others can depend on the purpose of social comparison: (1) if people are seeking self-enhancing evaluations, then they make downward social comparisons by comparing themselves to others who have less of the object of comparison (e.g., lower ability); or (2) if they are seeking self-improvement evaluations, then they make upward social evaluations by comparing themselves to others who have more of the object of comparison (e.g., higher profits). People frequently choose to compare themselves to other people who are in similar situations or have similar tasks to perform such as co-workers (e.g., benchmarking).

Frederickson (1992) uses social comparison theory to predict how relative performance feedback and evaluation influence individuals' task effort. He

⁶Considerate and initiating-structure leadership styles are not substitutes. Research indicates that the most effective leaders have high levels of both leadership styles (Halpin 1957).

predicts that compensation based on relative performance evaluation, compared to profit sharing, cues individuals to be more competitive and exert more effort, because the comparison makes others' performance on the task salient. As predicted, Frederickson (1992) finds that individuals have higher effort levels with relative performance evaluation compared to profit sharing.⁷ Because the comparisons induced by relative performance evaluation become more salient, competition is therefore expected to increase when individuals' tasks are more similar. Frederickson (1992) also predicts and finds that under relative performance evaluation, effort is higher when task similarity (degree of common uncertainty) is higher.

4.3. Social Identity Theory

Social identity theory assumes that individuals categorize their social world into in-groups (e.g., an individual's work team) and out-groups (e.g., work teams in other organizations). They derive self-esteem from their social identity as a member of an in-group, and their self-concept depends on how they evaluate their in-group relative to other groups (Tajfel, 1982). Social identity rises from a self-categorization process in which individuals group themselves with others on the basis of similarities. Social identification with a group influences how individuals interact with other members of the group, interpret information about the group, and make decisions that affect the group (Lembke & Wilson, 1998). Moreover, the more individuals socially identify with a group, the more they focus their effort on the group's outcomes instead of their own outcomes (Brewer, 1979), and the more likely they are to increase their contributions of public goods to the group and behave more cooperatively when confronted with social dilemmas (Wit & Wilke, 1992).

Towry (2003) uses social identity theory as a basis for predicting the effectiveness of two systems of mutual monitoring and incentives in a teamwork environment. When team identity is strong, team members are more likely to behave cooperatively in ways that are best for their team. The directional effect of their cooperative behavior on effort, however, depends on whether the monitoring and incentive system is vertical or horizontal. In a vertical system, team members observe each other's actions and report them to their superior; each team member's compensation is then based on his or her effort (as

reported by the other team members) and truthfulness in reporting on other team members (as judged by comparing the multiple reports). In a horizontal system, team members' compensation is based on team output, and team members induce effort from other members through formal sanctions, peer pressure, or side payments. Strong team identity in a vertical system leads to lower effort, falsely reported as high effort; the superior cannot easily detect the team members' misreporting because with strong team identity they collude. In contrast, strong team identity in a horizontal system leads to higher levels of effort as team members cooperate more to increase the total team output that provides the basis for their rewards.

5. Cognitive Psychology Theories

Management accounting researchers began using cognitive psychology theories in the 1970s to study how individuals' cognitive processing of management accounting information influences thinking, in particular, judgments and decisions. Cognition consists of mental processes and states. Mental processes include:

- attention—the allocation of limited processing capacity to a stimulus (information);
- memory—encoding of information as knowledge in long-term memory, structure or representation of knowledge in long-term memory, and retrieval of knowledge from long-term memory for thinking;
- thinking—higher-order mental processes that include problem solving, reasoning, judging, and decision-making; and
- learning—process of actively constructing new ideas or concepts based upon current and past knowledge.

Mental states include attitudes, beliefs, knowledge, and preferences.

Most cognitive psychology theories assume that cognition is boundedly rational rather than perfectly rational and optimizing⁸ That is, individuals intend to behave rationally but do not do so perfectly because their limited cognitive processing capacity is often exceeded by the demands of complex and ill-structured problems like those related to developing and implementing budgets (e.g., searching for information, identifying alternatives, and assessing the costs, benefits, and probabilities associated with each alternative). Because individuals do not always have

⁷As Frederickson (1992) points out, the prediction of a positive effect of relative performance evaluation on effort can be derived on the basis of agency theory.

⁸For analysis and evidence on bounded rationality, see Conlisk (1996), Rabin (1998), and Shafir and LeBoeuf (2002).

the mental capacity to consider all information about all alternatives and select the best one, they frequently select the first alternative identified that provides benefits above some aspiration level.⁹

Much cognitive psychology research examines how and how well individuals make judgments and decisions (Baron, 2000; Goldstein & Hogarth, 1997; Hastie & Dawes, 2001; Hastie & Pennington, 1995). A judgment is a comparison of a stimulus to another stimulus or the evaluation of a stimulus in relation to a standard (e.g., manager A's performance is better than manager B's performance, manager A's performance should be rated excellent according to the organization's evaluation criteria). A decision is the choice of a stimulus (alternative, action) from a set of stimuli.

We distinguish two theoretical perspectives in the management accounting research on judgment and decision-making: behavioral decision theory and judgment and decision performance. Behavioral decision theory is based on decision theory from economics and statistics and uses optimizing models like Bayes' theorem and regression analysis as benchmarks to assess how and how well individuals *typically* make judgments and decisions. Research on judgment and decision performance is concerned with identifying *sources of variation* (e.g., cognitive ability, knowledge, motivation) in how and how well individuals make judgments and decisions (Einhorn & Hogarth, 1981; Libby & Luft, 1993; Libby, 1995). The remainder of this section is organized by reviewing these two theoretical perspectives and management accounting research that is informed by them.

5.1. Behavioral Decision Theory

Behavioral decision theory consists of two major theoretical perspectives that have been used by management accounting researchers: probabilistic judgment and probabilistic functionalism. Each is presented below.

5.1.1. Probabilistic Judgment

Probabilistic judgment is concerned with how and how well individuals subjectively judge probabilities and combine them with utilities or value to form judgments. Much psychology research on subjective probabilities focuses on how to elicit subjective prob-

abilities, whether the probabilities elicited are coherent or in agreement with probability axioms (e.g., probabilities should sum to one), the calibration of subjective probabilities in relation to objective probabilities (a key finding is that individuals are overconfident), and whether revision of probabilities is consistent with Bayes' theorem (a key finding is that individuals' subjective probability revision is conservative relative to Bayesian revision). Reviews of this research are in Slovic & Lichtenstein (1971), Slovic et al. (1977), and Poulton (1994). Ashton (1982) and Libby (1981) provide reviews of behavioral decision theory that are tailored to the interests of accounting researchers.

An important focus of probabilistic judgment research is whether individuals' revisions of their subjective probabilities are consistent with revisions implied by formal statistical models, probability axioms, or logic. Einhorn & Hogarth (1986) identify "cues to causality" that people use to develop and/or revise subjective probabilities that an effect is due to a particular possible cause. For example, we would expect that a cause of an effect temporally occurs before that effect happens. When a possible cause of an effect temporally occurs before the effect, individuals' subjective probability that this possible cause is a cause of that effect is higher than when that possible cause does not temporally occur before that effect. Similarly, the larger the covariation (correlation) between a possible cause and an effect, the higher an individuals' subjective probability would be that this possible cause is a cause of that effect. Finally, besides temporal order and covariation, another cue to causality is the similarity of the length (duration) and strength (magnitude) of a possible cause and an effect. Individuals tend to believe that large effects that last for a long time are caused by sources that are large and last for a long time. Thus, a possible cause and effect of similar length or strength are more likely to be judged to have a cause-effect relation than a possible cause and effect with dissimilar lengths or strengths.

Brown (1985, 1987) provides evidence on whether individuals' revision of their subjective probabilities about the possible cause of a reported labor-efficiency variance is consistent with these cues to causality. As predicted, individuals' judgments of the probability that a possible cause is actually a cause of a variance are influenced by information about the covariation of the variance and its possible cause (Brown, 1985, 1987), the temporal order of the variance and its possible cause (Brown, 1985), and the similarity of magnitude of deviation from normal levels of the variance and its possible cause (Brown, 1987).

⁹The alternative selected does not necessarily represent the optimal trade-off between the costs and benefits of searching and processing information; it does not necessarily maximize an individual's expected utility.

5.1.2. *Heuristics and Biases*

The initial research on probabilistic judgment assumes that individuals' judgments are similar to the judgments implied by optimizing models. However, research consistently reports that individuals' probabilistic judgments sometimes deviate systematically and severely from the judgments implied by these models. Tversky & Kahneman (1974) began to identify cognitive processes called heuristics that can explain and predict these judgment biases.¹⁰ People often use heuristics because of their bounded rationality: the information-processing demands of strict optimization in complex tasks often exceed individuals' cognitive capabilities. Research has identified many heuristics that are used to subjectively assess and revise probabilities as well as to search for information in external sources such as accounting reports.

Tversky & Kahneman (1974) identify three heuristics that individuals use to develop and revise subjective probabilities: availability, representativeness, and anchoring and adjustment. Availability is the subjective estimation of the probability of an event by the ease with which instances of the event or similar events are brought to mind. An event is more available when it is more familiar, salient, recent, or imaginable. Representativeness is the subjective estimation of the probability that object A (sample) belongs to class B (population) by the degree to which A is similar to or resembles B. Probability estimates based on representativeness are not influenced by base rates, sample sizes, or regression to the mean. Finally, anchoring and adjustment is the subjective estimation of an uncertain value such as the probability of an event by using an initial value that readily comes to mind and adjusting it for additional information. While the adjustment is in the correct direction, it is of insufficient magnitude.

Some management accounting research investigates whether individuals' subjective probabilities based on management accounting information are consistent with the use of heuristics. Brown (1981) examines whether individuals' revision of the subjective probability that a process is in control is consistent with the anchoring and adjustment heuristic. Individuals revise their subjective probability each time they receive a new report on the efficiency of a process. He finds that, on average, individuals are conservative in their revision relative to the revision

implied by Bayes' theorem, consistent with anchoring and adjustment.

Lewis et al. (1983) examine whether individuals' variance investigation decisions are consistent with the use of the representativeness heuristic. Their evidence indicates that almost all individuals use a strategy consistent with the representativeness heuristic. In particular, almost all individuals use a control-chart strategy in which they decide whether a production process is in or out of control based on whether the mean weight of a sample of a product is more than one standard deviation above the mean weight of products made by that process when the process is in control. Very few decisions are influenced by the prior probability that the process is in control or by the costs of Type I and II errors. The lack of influence of prior probabilities and cost of decision errors is surprising because the experimental design exposes each individual to different levels of the prior probabilities and decision error costs; yet very few individuals change their decision strategy in response to these changes.

5.1.3. *Prospect Theory and Framing*

Research on heuristics and biases also is associated with investigation of differences between the subjective value of decision-alternative outcomes and the values assumed by expected utility theory. Expected utility theory assumes that individuals subjectively value (estimate a utility for) each possible outcome of a risky decision based on their total wealth or welfare if that outcome occurs. In contrast, prospect theory assumes that individuals subjectively value each outcome as a gain or loss relative to a reference point (e.g., the status quo) in a two-phase process (Kahneman & Tversky, 1979). In the first phase, called editing, individuals organize and reformulate their decision options in order to simplify their subsequent evaluation and choice. Editing consists of several cognitive operations, including coding, which is the identification of each possible outcome as a gain or loss relative to a reference point. In the second phase, called evaluation, individuals assign a subjective value to each outcome, weigh uncertain outcomes based on their likelihood of occurring, and then choose the prospect with the highest expected value. The subjective value of gain and loss outcomes (deviation from a zero-valued reference point) forms an S-shaped value function that is concave for gains, convex for losses, and steeper for losses than for gains. An important consequence of editing and evaluation is that individuals' choice of alternatives can depend on how a decision is framed. Considering

¹⁰See Kahneman et al. (1982) and Gilovich, Griffin & Kahneman (2002) for research on heuristics.

decision alternatives that have the same monetary outcome, individuals are likely to value that outcome more highly when it is framed as a gain relative to a low reference point rather than a loss relative to a higher reference point.

When an action results in multiple outcomes, such as a sequence of monetary gains and losses, individuals frame and evaluate these outcomes through "mental accounts," which specify which outcomes are evaluated jointly and which are evaluated separately (Kahneman & Tversky, 1984; Tversky & Kahneman, 1981). If both the costs and benefits of a decision alternative are in the same mental account, then they are netted against each other before evaluation. The cost is thus treated as a reduction of the gain (benefit), rather than a loss, reducing its negative effect on the value of the alternative. If costs and benefits are in separate mental accounts, then they are subjectively valued separately: the cost is treated as a loss and therefore valued more negatively.

Lipe (1993) examines framing effects of variance investigation decisions on performance evaluation decisions. An expenditure resulting from a variance investigation (e.g., cost of investigating) can be framed as a gain reduction or a loss depending on whether that expenditure is believed to have a benefit. Individuals are expected to be more (less) likely to believe that the expenditure has a benefit when the investigation finds that a system is out of (in) control. When the system is found to be out of control and the expenditure is framed as a gain reduction, the individual responsible for making the expenditure is expected to receive a more favorable performance evaluation. In contrast, when the system is found to be in control and the expenditure is framed as a loss, the individual responsible for making the expenditure is expected to receive a less favorable performance evaluation. Lipe (1993) provides evidence consistent with these expectations.

Luft (1994) provides evidence that individuals' choice of incentive contract depends on how the payoffs are framed. Consider two incentive contracts that have the same expected pay but differ in how their payoffs are framed, either as a fixed salary plus a bonus if performance exceeds a standard or a higher fixed salary minus a penalty if performance is less than the standard. While expected utility theory predicts that individuals are indifferent between the two incentive contracts, prospect theory predicts that individuals will select the incentive contract framed as a bonus because penalties (losses) are more aversive than missed bonuses (reduced gains). Luft (1994) finds that individuals' choice of incentive contract is consistent with the prediction from prospect theory.

5.1.4. Search Heuristics

In addition to using heuristics to subjectively assess and revise probabilities, individuals also use heuristics to search for information in external environments (e.g., accounting reports) (Payne et al., 1993, 1997). Search includes scanning, attending to, and acquiring information to be encoded into memory for use in making judgments and decisions. The search heuristics individuals use depends on task complexity, which varies with the number of variables and the number of attributes (dimensions) that describe the variables. For example, in a performance report, task complexity increases with increases in the number of responsibility centers and/or the number of performance measures for each responsibility center.

As task complexity increases, individuals are less likely to use compensatory (optimizing) search heuristics and more likely to use noncompensatory search heuristics because compensatory heuristics are more cognitively demanding. Compensatory search heuristics result in searching all of the attribute information (or at least the same attribute information) for every variable. Noncompensatory search heuristics result in selective search to reduce task complexity: individuals search only one or a few attribute information items for each variable, and these attribute information items are not necessarily the same for every variable. In consequence, the consistency of search across variables decreases. This increase in search variability occurs more often in response to increases in the number of variables than in response to increases in the number of attributes per variable. In addition, as the number of variables increase and individuals use more noncompensatory search heuristics, their search pattern becomes less within-variable across-attributes and more within-attribute across-variables. Finally, as the number of variables or attributes increases, individuals increase the absolute amount of their search but decrease the percentage of the total information available that they search.

These search heuristics can be used in examining accounting reports such as performance reports in which variables (columns) are responsibility centers or budget, actual and variance, and attributes (rows) are performance measures. Shields (1980, 1983) predicts and finds that the complexity of a performance report influences individuals' use of search heuristics and their search behavior. In particular, as the number of responsibility centers in a report increases, the consistency of search behavior decreases (more variability across responsibility centers in the amount of information search per center), but there is no comparable decrease in search consistency as the

number of performance measures per responsibility center increases. Further, as the number of responsibility centers increases, individuals' search pattern is less within a responsibility center across performance measures and more within a performance measure across centers. Finally, as the number of centers or measures in a report increases, individuals' absolute amount of search increases but they search a smaller percent of the total information available. Overall, these predictions and results are consistent with individuals' search of information in performance reports becoming less optimizing as the "size" of the report increases.

5.1.5. Probabilistic Functionalism

This theoretical perspective stems from Brunswik's theory of visual perception (Hammond & Stewart, 2001). The original focus of the theory is on how a three-dimensional object in the environment (distal stimulus) is transformed to a two-dimensional object in a retina (proximal stimulus). Because this transformation is not one-to-one or continuous, the mapping between the distal and proximal stimuli is probabilistic. In consequence, perception is a psychological construction or inference of a percept from an incomplete and fallible set of sensory cues. Perception is functional in that when individuals are better at constructing or inferring the true nature of the distal stimulus, they are able to make more accurate predictions about their environment, which increases the probability that they will survive. The probabilistic nature of perception led Brunswik to believe that a multiple regression model represents perception well because it has the properties he specified for quasi-rationality of perception. In particular, like a multiple regression model, constructing or inferring a distal stimulus involves using several cues that identify features of the distal stimulus, and these cues are intercorrelated and have limited ability to predict the distal stimulus.

Extending this theory of perception to judgment, Brunswik believes that multiple regression models are a valid paramorphic ("as if") representation of how individuals subjectively use multiple information cues to form judgments. Hammond (1955), Hursch et al. (1964), and Tucker (1964) formalize this paramorphic representation of judgment by developing and applying Brunswik's lens model (named after an analogy to the lens in visual perception), which includes a regression model of the task environment (relating the environmental cues and an environmental outcome) and a regression model of the person's judgments (relating the environmental cues and his/her predic-

tive judgments about the outcome). Further, they develop several measures of judgment performance, including:¹¹

- achievement, the correlation between a person's predictions and the realized outcomes;
- matching, the correlation between predictions made by a model of a person's judgments and predictions made by the environmental model;
- consistency, the degree to which a person uses the same model from prediction to prediction;
- cue utilization, the weighting of individual cues in making predictions;
- consensus, the degree of similarity of predictions across individuals; and
- self-insight, the degree to which an individual's ex post explanations for how he or she made his or her predictions correspond to how he or she actually made his or her predictions.

Brunswik's theory of probabilistic functionalism also provides the basis for research on multiple-cue probability learning, which focuses on how individuals learn probabilistic relations between multiple cue and criterion variables and how feedback influences this learning (Brehmer, 1988; Holzworth, 2001). In particular, research investigates how three types of feedback (outcome, task properties, and cognitive) influence probabilistic learning and, more generally, judgment performance. Outcome feedback is information about the realized outcomes individuals are trying to predict, task properties feedback is information about the optimal relation between the cues and realized outcomes, and cognitive feedback is information about the relation between the cues and individuals' judgments (Brehmer & Joyce, 1988). Research indicates that outcome feedback typically does not improve learning or judgment performance as much as task properties feedback does; and in some situations outcome feedback can actually decrease judgment performance (Balzer et al., 1989).

Some managerial accounting researchers use the lens model to provide evidence on how and how well individuals process management accounting information to form judgments and make decisions. Ashton (1981) uses the lens model and multiple-cue probability learning to investigate how well a focal person can learn to make product-pricing decisions consistent with another person's product-pricing decisions based on three environmental cues (product cost,

¹¹Ashton (1982) provides a good analysis of the lens model and these various measures of judgment performance in an accounting context.

elasticity of demand, competitors' speed in bringing similar products to market). In the first part of the experiment, after receiving information about the other person's pricing decisions and the three cues available to make the decisions, the focal person is asked to make pricing decisions for another set of similar products consistent with how the other person used the three cues to make the original pricing decisions. The experiment manipulates the predictability of the other person's pricing decisions, given the three cues. As predicted, an increase in the predictability of the other person's decisions leads to an increase in how well focal individuals learn the other person's decision model (matching) and how consistently they apply that model to make their decisions (consistency), thus resulting in an increase in their performance, which Ashton defines as matching times consistency. Also, individuals with more education (doctoral vs. undergraduate and MBA students) have higher judgment performance in terms of achievement, matching, and consistency. In the second part of the experiment, focal individuals are provided with either relatively general or specific task properties feedback about how the three cues should be used to make the product-pricing decisions. Contrary to prediction, matching, consistency, and performance do not increase with the specificity of the feedback.

Luft & Shields (2001) use the lens model and multiple-cue probability learning research to investigate the role of accounting in determining how and how well individuals learn the effect of intangibles' expenditures on future profits. They predict and find that when intangibles expenditures are expensed (capitalized), individuals allocate more attention to learning current-period (future-period) effects of expenditures. Although experimental participants believe *ex ante* that intangibles will affect future profits regardless of whether they are expensed or capitalized, they learn the magnitude of future-period effects and use them better in predicting profits when intangibles are capitalized. Consistent with expectations, mean prediction error, achievement, consistency, consensus, and self-insight are all higher when intangibles are capitalized, holding constant the statistical relation between intangibles expenditures and profits.

Lipe & Salterio (2000) rely on multiple-cue utilization research (Slovic & MacPhillamy, 1974) to predict how individuals will use performance measures that are either common or unique to subunits in evaluating the performance of the subunit managers. They predict that when individuals are faced with a set of performance measures, some of which are common to all subunit managers and some unique to particular subunit managers, their performance

evaluations will be influenced more by the common measures and less by the unique measures. In order to minimize cognitive effort, individuals are expected to make comparative evaluations of the subunit managers because comparisons are easier to make than separate evaluations of each subunit manager. Moreover, comparisons are easier to make with performance measures that are common across subunit managers than with measures that are unique. Their results support their prediction.

5.2. Judgment and Decision Performance

Most behavioral decision theory studies in management accounting have focused on predicting and explaining mean judgment and decision behavior (e.g., on average, individuals behave as predicted by Einhorn & Hogarth's (1986) cues to causality or Kahneman & Tversky's (1979) prospect theory). Another stream of research has focused on predicting and explaining variation in individuals' judgment and decision performance (e.g., which individuals, under what circumstances, "see through" misleading accounting or use heuristics). Psychology studies that examine causes and effects of variables such as cognitive ability, knowledge, and motivation provide the basis for models explaining individual variation. Einhorn & Hogarth (1981) are the first to put this literature together in the form of a conceptual equation of the determinants of judgment and decision performance. Libby & Luft (1993) and Libby (1995) provide literature reviews and analysis to elaborate on this conceptual equation and organize accounting and auditing literature to provide insight into determinants of judgment and decision performance in accounting and auditing settings.

The primary focus of this research has been on the psychological variables, in particular cognitive ability, knowledge, and motivation, that affect how and how well individuals make judgments and decisions, and on how knowledge is influenced by the interaction of ability and experience. Some early studies examine how these variables independently affect judgment and decision performance, while newer studies examine how they affect performance interactively or as part of a causal chain. A smaller body of research examines how environmental variables, such as accountability, incentives, feedback, task complexity, and time pressure, independently or in interaction with psychological variables, influence judgment and decision performance.

Dearman & Shields (2005) predict that decision performance following a change in the cost-accounting method is a function of the three-way interaction of general problem-solving ability, intrinsic motivation,

and relevant cost-accounting knowledge. They study a setting in which individuals make product-pricing decisions based on the product cost, product production volume, and a market index that indicates the level of competition. After making a set of pricing decisions for products with diverse resource-consumption patterns, individuals are informed that the product-costing method changed from either volume-based to activity-based costing (ABC) or vice versa. The individuals who appropriately change their decision model in response to the change in the product-costing method have high levels of general problem-solving ability, intrinsic motivation, and relevant cost-accounting knowledge. Individuals lacking high levels of *all* three variables either made no change or made an incorrect change in their decision model when the costing method changed. These results indicate that, at least in this setting, high motivation cannot substitute effectively for high ability or task-relevant knowledge (and vice versa) as a source of high performance.

Some studies provide evidence on how knowledge content and/or structure affect judgment and decision performance (Anderson, 2000, 2005). Knowledge content refers to information that is in memory, including general information about the world and information specific to particular tasks. Knowledge structure refers to the way individual items of knowledge are linked to each other in memory (e.g., causally, hierarchically, spatially, temporally). Knowledge that individuals possess can be more or less accessible (and thus more or less likely to be used), depending on how it is structured and how the knowledge structure corresponds to the task structure (Anderson, 2000, 2005).

For example, research in cognitive psychology finds that decision context influences the mental representation of a decision (e.g., what elements of the decision are seen as important and how they are linked). The mental representation in turn influences decision processes and outcomes. Vera-Muñoz (1998) uses this literature to argue that for individuals with high levels of financial-accounting knowledge, mental representations of business (not personal) decisions will resemble financial-accounting representations of business, in that they omit opportunity costs. In consequence, Vera-Muñoz (1998) predicts and finds that in a business context, individuals with high levels of financial-accounting knowledge will ignore more opportunity costs in making resource-allocation decisions than individuals with lower levels of financial-accounting knowledge. She also predicts and finds that individuals with high levels of financial-accounting knowledge will ignore more opportunity costs when a resource-allocation decision is in the business compared to non-business context.

Dearman & Shields (2001) provide evidence that the content and structure of cost-accounting knowledge can influence individuals' cost-based judgment performance. They base their predictions on psychology research showing that judgment performance increases when individuals have more task-relevant knowledge content and/or their knowledge is more structured by task-relevant cause-and-effect relations and has more refined partitions of knowledge categories. Dearman & Shields (2001) examine a situation in which individuals make profit-prediction judgments based on product costs that are measured and reported by a volume-based cost system for products with diverse resource-consumption patterns. In this situation, they predict and find that judgment performance is higher for individuals who have more ABC knowledge content and less volume-based knowledge content because the former is more relevant to the task at hand as it provides a more accurate representation of cost causality when products have diverse resource consumption. They also predict and find that judgment performance is higher for individuals whose cost knowledge is structured more consistently with an activity knowledge structure because this structure is relevant to the task at hand. Dearman & Shields (2001) also predict but do not find that judgment performance is lower for individuals whose cost knowledge is structured more consistently with a physical-resource (materials-labor-overhead) knowledge structure.

5.2.1. Mental Models

Accounting-related knowledge can take the form of mental models, which are subjective, internal representations of systems of causal relations that can be used to support judgments and decisions (Markman, 1999; Markman & Gentner, 2001). Mental models usually differ from formal scientific models with respect to three properties that can influence how and how well individuals make judgments and decisions: *qualitative*, not quantitative; they often *substitute* similar but more familiar attributes for the attributes in formal scientific models; and they often are *incomplete* compared to formal scientific models because they omit parts of long or complex causal chains.

Krishnan et al. (2005) study how individuals' subjective performance-measure weighting decisions for incentive compensation are influenced by the precision of a performance measure and the error covariance between that and another measure. Based on mental model theory, they predict and find experimental evidence that most individuals use the measures' error variance (precision) and error covariance

to determine performance-measure weights, but whether they use these attributes as predicted by agency theory depends on their mental models. About half of the experimental participants have mental models that are complete qualitative versions of an agency-theory model and thus make decisions that are qualitatively consistent with the agency-theory model. Most other participants' mental models are incomplete versions of the agency-theory model, which results in predictable patterns of decision error: directionally incorrect responses to changes in precision and error covariance, and failure to take into account the spill-over effect of changes in one measure's precision on the other measure's optimal weight.

5.2.2. Outcome Effects

Both psychology research and management accounting textbooks have warned against individuals' tendency to overweight decision outcomes in evaluating decision-makers and to ignore the possibility that bad outcomes can result from good decisions. Two management accounting studies argue that the extent of evaluators' dependence on decision-outcome information depends on their mental representations, which in turn depend on their experience.

Brown & Solomon (1993) compare performance evaluations by evaluators who have either been or not been involved in the evaluatee's decision-making but in both cases have equal information about the evaluatee's decisions. Those individuals involved with the decision-making are expected to have a mental representation of the decision that is more like that of the decision-maker, and thus their evaluations of the decision-maker are expected to be less influenced by decision outcomes. Brown & Solomon (1993) provide evidence consistent with this expectation.

The setting used by Brown & Solomon (1993) allows them to identify a difference in performance evaluations across experimental conditions but not to identify which evaluations are better or optimal because the optimal weight on decision outcomes in their performance-evaluation task is unknown. Frederickson et al. (1999) use a setting in which the optimal weight on decision outcomes in a performance-evaluation task is zero. Evaluators receive instructions that the optimal weight is zero, and they indicate that they agree that this is the correct weight, since they have complete information about whether the evaluatee made the right decisions *ex ante*. Nevertheless, their evaluations are influenced by decision outcomes if they themselves have prior experience of being evaluated on the basis of decision outcomes rather than on *ex ante* decision quality. Frederickson

et al. (1999) argue that this experience with outcome-based evaluations strengthens the link between decision outcomes and evaluations in evaluators' minds, and that the more such experience evaluators have (the more frequently they have been evaluated based on either outcomes or decisions), the stronger the link will be. As predicted, they find that evaluators' evaluations are influenced by an interaction between the basis on which the evaluators themselves were evaluated in the past and the frequency with which they were evaluated. Evaluators' evaluations are farthest from the optimum when they have been frequently evaluated based on decision outcomes in the past and nearest to the optimum when they have been frequently evaluated based on decision quality in the past; their evaluations are in between these extremes when they have been less-frequently evaluated on either basis.

6. Conclusion

In this final section we summarize what has been learned about management accounting practices from research based on cognitive, motivational, and social psychology theories. Although the specific psychology theories employed in management accounting research have been numerous and diverse, a limited number of common themes appear. These can be grouped under the headings of motivational and informational effects of management accounting practices.

6.1. Motivational Effects

Common themes in this literature are the effects of reference points (e.g., budget goals) and the effects of internal conflicts or inconsistencies among mental representations and behavior. Goal-setting theory, level of aspiration theory, organizational justice theory, and prospect theory all propose that motivation depends on a comparison between an actual or possible outcome and a reference point determined by individuals' mental representations of the task. Holding constant the objective measure of an outcome and the cost of achieving it, individuals are less motivated (less willing to exert effort) to achieve that outcome if it is beyond their reference point (e.g., a higher level of profit or a lower level of cost) than if it is not. Reference points are often influenced by management accounting practices. For example, in level of aspiration and goal-setting theories, the reference point is a self-set or imposed and accepted goal, such as a budget goal (Hirst & Lowy, 1990; Kenis, 1979; Steady, 1960). In organizational justice theory and social comparison theory, the reference point is the outcome individuals believe they should have received or

the outcomes of relevant other individuals, for example, the performance of others at a similar task (relative performance evaluation) (Frederickson, 1992) or a budget goal that meets some social norms of fairness (Libby, 2001). In prospect theory, the reference point is often what the management accounting practice indicates as the status quo (e.g., base salary) (Luft, 1994).

Cognitive dissonance theory, role theory, and the theory of person–environment fit all identify motivational effects arising from individuals' desire for consistency among their mental representations and behaviors. Holding constant the objective measures of an outcome and the cost of achieving a goal, individuals are more motivated to achieve the goal if doing so increases this consistency. They are less motivated if achieving the goal does not increase this consistency and they continue to be exposed to cognitive conflict, role ambiguity, and stress. For example, cognitive dissonance theory predicts that once individuals have chosen a goal such as a budget goal and mentally represented it as a good choice, they are motivated to achieve that goal not only by the attraction of external rewards, but also because achieving that goal is consistent with the positive mental representation of their choice (and perhaps of themselves), whereas failure could provide an aversive, conflicting negative representation (Tiller, 1983). Role theory and person–environment fit focus on the demotivating effects arising from cognitive conflicts and stress arising from lack of consistency among individuals' mental representations and behaviors. Management accounting practices (e.g., budget-based evaluation) can result in lower levels of motivation by supporting conflicting or ambiguous representations of the individual's responsibilities that induce stress, dissatisfaction, or loss of self-esteem, sense of control, and interpersonal trust (Hopwood, 1972; Shields et al., 2000).

6.2. Informational Effects

Management accounting practices influence judgments and decisions not only by providing information but also by influencing how boundedly rational individuals search and process this information and mentally represent their organizations and environments. The direction and magnitude of these influences of management accounting practices often depend on individuals' experience, knowledge, and ability, and on elements of the task and its context.

Research on informational effects moves between two poles. On the one hand, it identifies ways in which heuristics succeed in producing judgments and decisions very similar to the outputs of optimizing

models. On the other hand, this research identifies suboptimal (often biased) judgments and decisions that result from the cognitive limitations of individuals faced with the cognitive demands of management accounting tasks.

Subjective judgment and decision processes involving management accounting information are influenced by many of the same variables and sometimes provide approximately the same output as optimizing models (e.g., variance investigation decisions in Brown [1981, 1985, 1987] and Lewis et al. [1983]). Under favorable conditions (e.g., predictability is high, accounting is consistent with the underlying economic relations), individuals can make subjective product-pricing decisions and profit predictions that are similar to the outputs of optimizing statistical decision or prediction models (Ashton, 1981; Luft & Shields, 2001).

Subjective judgments and decisions using management accounting information often differ from the outputs of optimizing models, however, especially as the cognitive demands of processing the information for optimal judgments and decisions increases. Management accounting practices can influence the extent and direction of predictable biases in individuals' heuristic search and use of information by influencing attention allocation, mental representations, and the usability or effectiveness of heuristics.

Management accounting practices can influence attention allocation by making some information items more salient than others and thus more likely to be acquired and fully processed. For example, capitalizing (expensing) expenditures on intangibles directs attention toward long-term (current-period) expenditure-profit relations in multi-period accounting data, making it more (less) likely that subjective judgment of long-term relations based on such data will be accurate (Luft & Shields, 2001).

Management accounting practices can influence how information is mentally represented and linked with other information in memory; and individuals' mental representations and linkages in turn influence their acquisition and use of additional information. For example, past experience with outcome-based evaluations of decision performance strengthens the link between outcomes and evaluations in individuals' minds and makes it more likely that they will use outcome-based evaluation even when they believe it is suboptimal (Frederickson et al., 1999). Conversely, involvement in the evaluatee's decision strengthens the evaluator's mental representation of the pre-outcome decision process and weakens the effect of outcome information on evaluations of decision performance (Brown & Solomon, 1993).

Management accounting practices can influence individuals' heuristic information search and use to the extent that the selection and structuring of management-accounting information is consistent with the effective use of heuristics for information search and use. For example, how completely and consistently individuals search a report of responsibility centers' performance depends on whether the report covers a small number of responsibility centers with a large number of performance measures for each (resulting more complete and consistent searches) or a large number of responsibility centers with a small number of performance measures for each (less complete and consistent searches) (Shields, 1980, 1983). Similarly, the completeness of individuals' use of multiple measures in evaluating multiple managers depends on whether the measures in a report are common to all of the managers or unique to each manager (Lipe & Salterio, 2000).

The extent to which management accounting practices affect bias in heuristic judgments and decisions by the means described above can depend on individuals' knowledge, abilities, and motivation. For example, in Dearman & Shields (2005), individuals' performance in cost-based pricing decisions is not affected by a change in product-costing method for individuals who have high levels of cost-accounting knowledge, intrinsic motivation, and general problem-solving ability, but for individuals with low levels of any one or more of these person-characteristic variables, the accounting change reduces their decision performance.

6.3. Future Research

In addition to the psychology theories used in management accounting research and summarized in this chapter, inspection of contemporary psychology literature would reveal many other theories in the subfields of cognitive, motivation, and social psychology (e.g., theories of affect and emotion), as well as theories from other subfields (e.g., neuropsychology), which have not yet been used in management accounting research but might prove relevant in the future. Moreover, as described in the introduction section, researchers often use psychology theories together with theories from other disciplines that provide relevant information, such as benchmarks of economically optimal decisions or performance. Thus, it has become increasingly evident that multiple theories are potentially relevant to any given management accounting practice. While theory selection has often been somewhat *ad hoc*, as researchers have explored the initial possibilities of using psychology theory to explain and predict management accounting practices,

management accounting research can benefit from more careful consideration of questions like the following:

- When will a management accounting practice and its causes and/or effects be better explained by psychology theories only or by integrating psychology theory with theory from another theoretical perspective such as economics or sociology (Covaleski et al., 2006; Luft and Shields, 2006)?
- When will a management accounting practice and its causes and/or effects be better explained by theories from cognitive, motivation, or social psychology or some combination of them?
- Which among many possible motivation sources (e.g., goals, equity, dissonance reduction, level of aspiration) or information-processing characteristics (e.g., anchoring and adjustment, attribution biases, cue utilization, representativeness) is most relevant to a particular management accounting practice?

Future research can benefit from task analysis (Schraagen et al., 2000) and carefully matching task characteristics with theory, in order to identify the theory most relevant to a particular management accounting practice. For example, if organizations typically assign the task only to highly trained specialists, then cognitive theories (e.g., theories of expertise) are likely to be important to task performance. If the task or the incentive system for it is differently structured depending on the degree of social contact or similarity among individuals who perform the task, then social psychology theories can be relevant. If performance on the task is highly effort-dependent, then theories of motivation can be important in explaining differences in task performance.

Task analysis can sometimes identify more than one theory as clearly relevant to a particular management accounting practice. In such cases, management accounting research can also benefit from accurate identification of competing and complementary relations among these theories and from studies that provide evidence to support choice among competing theories and integration of complementary theories.¹²

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¹²See Covaleski et al. (2006) and Luft & Shields (2006) for more extensive discussions of identifying and using competing and complementary theories.

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