Erik Bijleveld · Henk Aarts *Editors*

The Psychological Science of Money

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ISBN 978-1-4939-0958-2 ISBN 978-1-4939-0959-9 (eBook)
DOI 10.1007/978-1-4939-0959-9
Springer New York Heidelberg Dordrecht London

Library of Congress Control Number: 2014943644

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

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Part I
An Introduction to the Science of Money

Chapter 1
A Psychological Perspective on Money

Erik Bijleveld and Henk Aarts

Abstract A thriving field of inquiry, the psychological science of money has recently witnessed an upsurge in research attention. In the present volume, we bring together and integrate a number of theoretical perspectives on the question of 'how does money affect people's mind, brain, and behavior?' Importantly, we go beyond previous reviews by zooming in on the biological and psychological processes—triggered by money—that shape people's experiences and behavior. Three central topics, which recur throughout the volume, are as follows: First, researchers have studied the time course by which the human mind processes money, identifying a crude and quick processing stage that occurs directly after money-related stimuli are perceived. Second, researchers have studied the biological underpinnings of money, pinpointing the role of the reward circuit (e.g., the ventral striatum) in processing money. Third, researchers have studied how money inputs into meaning-making processes that help people to make sense of the situation they find themselves in. Classic and recent insights are discussed in the context of each of these themes, with a special focus on the link between money and behavioral outcomes (e.g., performance, decisions, cooperation). As such, the present volume works towards a broad, yet process-oriented understanding of the impact of money on human action.

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E. Bijleveld and H. Aarts (eds.), *The Psychological Science of Money*,
DOI 10.1007/978-1-4939-0959-9_1,

In the story of almost anyone's life, money is one of the main characters. Most people deal with money every day, several times a day. Perhaps most noticeably, people spend money, in several different ways, on countless different objects and services, for countless different reasons. People also often find themselves on the receiving end of monetary transactions, such as when they receive their salary in exchange for a month worth of work. Moreover, money is an important topic of conversation for people, it is the origin of all kinds of debates and conflicts, and it is a source of inspiration for musicians and other artists. The sheer ubiquity of money—and the sheer profoundness of money's presence in people's lives—warrants the question of *How does money affect people's mind, brain, and behavior*? This is a scientific question that we have become fascinated with over the past couple of years, and this book is the result of that fascination.

In the next two sections, we will give brief previews of the two main themes that together serve as the backbone of the present volume. We begin with a story about the biological underpinnings of money as a motivator, relating people's responses to money to how animals respond to food and drink. Then, we proceed with a story about how money is a cultural product that arose in early agrarian communities. These two narratives each illustrate a way scientists often start off when they begin to think about how money affects people. The rest of this chapter—and in fact, the rest of *The Psychological Science of Money*—will be devoted to the biological and psychological processes that are triggered by money, shaping people's behavior.

Money as a Biological Incentive

Nectar is a very important substance for bumblebees. Flying around quite a lot, bumblebees need the carbohydrates in nectar to replenish their life energy. Also, they need the nectar to feed their larvae, which will die if they do not get a sufficient amount of food. Fortunately, bumblebees have developed sophisticated mechanisms that help them to efficiently attain nectar. For example, before they actually have to fly into a flower, bumblebees are able to predict whether a given flower contains nectar from how the flower looks and smells (Marden, 1984). This mechanism helps them to conserve energy, as it helps them to avoid flowers that contain only a little bit of nectar. Moreover, when they have found a nectar-rich patch of flowers, bumblebees are able to find that same patch on the next day (Osborne & Williams, 2001). This memory-like mechanism helps bumblebees to replenish their resources without having to start the search for food from scratch every time they leave their base. So, in a sense, bumblebees can be thought of as efficient nectar-seeking machines.

The bumblebee is just an example of a species in which perception and action operate together in the service of attaining valuable substances or objects. In fact, in order to survive as a species, all animals are not only able to but also need to appropriately respond to such *rewards*, producing behavior to attain them. While rewards clearly include the substances that keep organisms going (food, liquid), an important finding from mid-twentieth-century psychology is that any object can, in principle, acquire reward value. That is, animals can learn that an object is important to

them, as evidenced from their behavior towards that object, even when that object cannot be eaten or drunk.

In one classic study (Breland & Breland, 1961), chickens (which were in a cage) learned that they could knock a small baseball across a miniature playing field (outside the cage) by forcefully pulling a loop (in the cage). Every time they succeeded in hitting the baseball far enough, beyond a couple of miniature baseball players, they would receive a serving of food. Unexpectedly, an intriguing discovery was done when the researchers removed the cage in order to take a couple of pictures of the chickens: the chickens—which could then run free onto the baseball field—became very excited by the baseball. They started chasing it around, pecking it in every direction, even though they had never had direct access to the ball before. The authors noted that "[t]his behavior was so persistent and so disruptive, in spite of the fact that it was never reinforced, that we had to reinstate the cage" (Breland & Breland, 1961, p. 683). Though somewhat anecdotally, this study illustrates how valueless objects can acquire value by association—a process that is also known as incentive learning (Balleine & Dickinson, 1998).

Clearly, to adult humans, money is an object that has acquired large reward value. Though it cannot be eaten or drunk, society is organized such that money can substitute for almost anything people might want or need. Following this biology-inspired line of reasoning, money can be considered to affect people's mind, brain, and behavior in a way that is similar to primary rewards (Lea & Webley, 2006). This basic assumption has sparked a lot of research in psychology. For example, researchers have examined how money activates reward centers in the brain, and how this activation is different from food- and drink-related activation. Moreover, researchers have studied situational factors and individual differences that shape the extent to which people attach value to money (or even get addicted to money). Finally, researchers have examined how and when money shapes people's performance. From this money-as-a-reward perspective, this book will discuss several prominent lines of research, including research on all of the topics mentioned above.

Money as a Cultural Invention

Around 10,000 years ago and independently of one another, several communities around the world transitioned from a hunter-gatherer lifestyle into an agricultural one. These communities started to no longer gather their food only in the wild; instead, they began to grow their food in primitive forerunners of farms. This new strategy proved successful: it enabled communities to live with more people in the same area than before, while at the same time having access to more food per capita. Gradually, this growing of wealth intensified the extent to which people engaged in *barter* or the direct exchange of goods or services for other goods or services.

Though the exact nature of such early societies is subject to debate (see Graeber, 2011; Weatherford, 1997), it is likely that living in increasingly large and complex communities prompted people's wish to *store value*, over both shorter and longer periods of time. Likely for that reason, all around the world, people invented rules that specified what objects carried value—and if they did, how much.

Such valuable objects included *cowries* (shells), which were used to exchange goods in various places around the world, pieces of metal (such as gold and silver), and later also metal coins created for the specific purpose of serving as *money*.

A very important observation from anthropological research on money is that material money objects (such as cowries, coins, and bank notes) are used in many ways *other* than to serve as a medium of value exchange and storage (Nelms & Maurer, 2014). For example, bank notes are sometimes buried with the dead, some businesses decorate their walls with their first-earned money, and money is used in all kinds of religious ceremonies. Perhaps because there is a big gap between the low value of money objects themselves (e.g., a piece of paper) and the high value it represents (e.g., buying dinner at a nice restaurant), people seem to be strongly inclined to attach alternative meanings to money. More than other objects, money objects can easily become associated with various culturally specific categories (e.g., political leaders or movements), behaviors (e.g., peacocking), and motives (e.g., being autonomous).

The observation that money easily acquires non-exchange-related associations, fits well with the psychological tradition that has approached the study of money by examining the semiotic processes (i.e., processed involved in the construction of meaning) that occur when people deal with money. Importantly, this tradition has led to the discovery that the use of money often has (often unintended) psychological side-effects. For example, when people get paid money to engage in a certain activity, this affects the extent to which they inherently enjoy that activity; when people spend money, this changes their affective state in predictable ways; and when people are merely exposed to money (not necessarily spending or receiving it), this triggers self-reliant behavior and cognitions. From this money-as-a-meaning-maker perspective, this book will discuss several prominent lines of research, including research on all of the topics mentioned above.

The Structure of This Book

As illustrated by the narratives of the bumblebee and the agrarian community, the scientific study of money can be approached from different angles. First, some research has, implicitly or explicitly, built on the assumption that money is a biological motivator that should energize and direct behavior. Second, other research has approached money as a cultural object that carries meaning to people via that route affecting cognition and behavior. To do justice to both these two broad ways of thinking about money, this book is organized around these perspectives. The authors of the individual chapters will extensively discuss how money shapes human behavior via motivational and meaning-making processes.

Before we continue to lay out the structure of the present volume in more detail, though, we should note that the breadth of the present book is not the most important contribution of this book to the existing literature. Indeed, other researchers before us have done successful attempts to bring together diverse lines of research on the psychology of money (Furnham & Argyle, 1998; Lea & Webley, 2006).

Although comprehensive and informative, these previous overviews tended to take a birds-eye view on the literature—that is, they did not zoom in to the specific psychological and biological processes, triggered by money, that shape human behavior. By contrast, with this book, it is our aim to unravel and examine these processes in greater detail by offering state-of-the-art knowledge about the psychological science of money. In line with this aim, the authors of the individual chapters—all leading scientists in their respective fields—share a fascination for experimental work on money that has, for example, examined how the effects of money are moderated by contextual factors. So, the present book's main contribution to science is that it focuses on biological and psychological processes triggered by money. As good as possible at this point, we hope to specify *how* these processes operate.

The present volume starts off with two chapters that provide a broad background about how money functions as an incentive and about how money has been used around the world as a vehicle for meaning-making, respectively.

First, in Chap. 2, Lea and Webley (2014) provide an overview of how the past three decades have witnessed an upsurge in the scientific study of money. This overview is organized around the authors' well-known framework (Lea & Webley, 2006) that captures all money-related phenomena as being explicable by either of two broad theories. First, *tool theory* captures all the ways money satisfies people's biologically rooted needs and wants. While money has various uses (e.g., a store of value, a means of exchange, a unit of account), all these uses can be argued to be instrumental—i.e., like a hammer helps people to drive nails in the wall, money helps people to obtain the goods that they need and want. Recent work on this instrumental perspective of money has provided many new insights into the way the human mind and brain process money-related stimuli—e.g., with regard to how money affects performance via conscious and unconscious processes (Capa & Custers, 2014), to how money is evaluated during decision making (Buechel & Morewedge, 2014), to how financial decision making changes with age (Samanez-Larkin, Hagen, & Weiner, 2014), and with regard to what neural circuitry is involved in the processing of money (Krug & Braver, 2014).

However, as Lea and Webley (2014) note, and as discussed throughout this book, money has a lot of different uses that go beyond its mere instrumental use. For example, research has shown that people can become emotionally attached to specific currency (e.g., as clearly showed when European national currencies were replaced by the Euro), that people can get addicted to money (see Huberfeld & Dannon, 2014), and that in various parts of the world the use of money is restricted to certain domains of needs and wants (e.g., it is allowed to use money to buy food, but not to buy organs for transplantation). Lea and Webley characterize such non-instrumental aspects of money-related behavior with *drug theory*. In a metaphorical sense, drug theory proposes that money functions similar to biological drugs, affecting behavior in ways that are not instrumental or adaptive (like the use of biological drugs is not) but still make use of evolved reward-related mechanisms in the human brain (like drugs do).

An important merit of the chapter by Lea and Webley is that their original perspective is updated in order to incorporate two prominent lines of research that have emerged since the publication of their 2006 article in Behavioural and Brain Sciences. That is, Lea and Webley discuss and incorporate recent research on money and

interpersonal behavior (described in more detail by Mead & Stuppy, 2014) and research on money and happiness (described in more detail by Buechel & Morewedge, 2014). More broadly, the chapter by Lea and Webley provides a useful framework to examine and interpret a range of money-related phenomena, as well as to appreciate the historical context in which the recent upsurge in psychological research on money has taken place.

Next, in Chap. 3, Nelms and Maurer (2014) provide a comprehensive overview of the anthropology of money. There seems to be consensus about the notion that a host of money-related meaning-making practices exists; anthropology as a science has investigated the nature of these practices in detail. For one thing, this has led to interesting discussions within anthropology that are of great interest to psychologists interested in money. For example, these are about how the use of money is different in non-Western vs. Western cultures, which necessitates a discussion of what we, (social) scientists, mean by *money* in the first place. Moreover, in clear parallel to *drug theory*, these discussions have included how money can acquire symbolic meanings that go way beyond its roles as a medium of exchange or of value-storage. Interestingly, so it seems, the material qualities of money-objects (e.g., whether it's paper, metal, or something else; whether something or someone is depicted on the money-object) are important determinants of how money is used as an input for meaning-making processes.

An important observation from anthropology is that money is *irreducibly material*. That is, in the end, money always refers to some material object, ranging from a cowrie via a gold bar to a digital storage medium located at a financial institution. Yet, at the same time, money has extremely strong symbolic value: in most cultures, money can stand in for the fulfillment of almost any desire people might have. So, in the case of money, the gap between the material and the symbolic seems especially large—at least, larger than in the case of most other cultural objects. The existence of this large gap might be the reason that the meaning of money is especially likely to be re-interpreted by people. Along similar lines, this gap can explain why money is often flexibly used by people to re-interpret the situations in which they find themselves. Several ways in which this happens—e.g., after receiving money, after spending money, after being exposed to money—are unraveled by psychological scientists in the present volume. We agree wholeheartedly with Nelms and Maurer that the intersection of anthropology and psychology, perhaps especially in the case of money, is a highly interesting one.

Three Recurring Themes: Time, Biology, and Meaning

After Part 1 of this book (consisting of Chaps. 1–3), which provides a broad background to the scientific study of money, the book will delve into more detail in Parts 2 and 3. In Part 2, several leading experts in their respective fields detail the biological and cognitive processes via which money exerts it influence on behavior as an incentive. In Part 3, several other leading psychological scientists explain how

money affects the way people make sense of their (social) environment via meaning-making processes. To discuss the content of the individual chapters of Parts 2 and 3 of the book in some more detail, we will now outline three recurring themes that are highlighted throughout the book: (1) *time*, referring to temporal aspects underlying people's responses to money; (2) *biology*, concerning the neurobiological foundations of processing money as a reward; and (3) *meaning*, addressing thy way people interpret the role of money in constructing social reality and subsequent actions. In our view, these three subjects are the most important themes currently relevant to the psychological science of money.

Temporal Aspects of Dealing with Money

Clearly present throughout the book, one trend in recent psychological research on money is to study the time course that the human mind follows when it processes money. The study of money from a time-course perspective is perhaps most explicitly visible in Chap. 4, authored by Capa and Custers, who review a recently emerged body of research that examined how money stimuli (such as coins of different value) influence behavior, as a function of whether the money stimulus is perceived with vs. without conscious awareness. This body of research suggests that money stimuli—directly after they are perceived—undergo an initial processing stage that takes place before the money stimulus enters conscious awareness (Bijleveld, Custers, & Aarts, 2012; Zedelius et al., 2014). Several experiments show that during such *initial reward processing*, money stimuli can already increase the amount of effort that people put into tasks in order to earn the presented money. As a result of such increased effort recruited during initial reward processing, money stimuli can enhance people's performance even without having conscious access to the value of the money at stake.

Capa and Custers' chapter puts the line of research described above in a broader perspective, while also reviewing recent advances in this field of research. First, they devote considerable attention to the distinction between *initial reward processing* and *full reward processing* (i.e., reward processing as it occurs when people consciously perceive the monetary reward that is at stake). In line with leading theories of conscious awareness (Dehaene, Changeux, Naccache, Sackur, & Sergent, 2006), for example, they discuss how people change their task strategies only after they have consciously experienced that a large amount of money is at stake. Second, with reference to neurophysiological work (Capa, Bouquet, Dreher, & Dufour, 2013), Capa and Custers discuss how it is possible that rewards can influence performance over an extended period of time even when they are processed outside conscious awareness. Finally, they consider the possibility how the desire for money can function as a goal, (i.e., a mentally represented end state) in directing attention and energizing behavior without the person's awareness of the goal operating at hand (Custers & Aarts, 2010). Taken together, the chapter by Capa and Custers provides an extensive overview of how people can get motivated by money, even though they might not be aware of this motivation themselves. As becomes evident

from their chapter, there seems to be a major role for processes that occur directly after the money stimulus is perceived (as opposed to, say, half a second later). So, in order to unravel the psychological processes triggered by money, it makes sense to think of money as triggering a cascade of processes, unfolding over time.

A similar, complementary approach on temporal aspects of money processing is taken in Chap. 5. In this chapter, Buechel and Morewedge (2014) propose a new model that explains when and how people attach *value* to amounts of money by relying on the distinction between fast and slow thinking (Kahneman & Frederick, 2002). The authors rightly note that evaluating amounts of money is not necessarily an easy task for people. For one thing, this is complicated because money can be spent in various ways, some of which are more effective than others in terms of buying pleasant sensations and experiences. For example, $10 may be spent on one's taxes (not necessarily leading to a pleasant sensation), but it might also be spent on a nice bottle of wine (for many people leading to a pleasant sensation). In other words, the same amount of money may in real life be coupled to different levels of pleasantness. A second reason why it is difficult for people to evaluate money is that money is, again in daily life, evaluated on very different scales. Whereas $100 may be a lot when buying groceries, it is next to nothing compared to the gross domestic product of one's home country. So, there are several reasons why evaluations of the value of money are not too straightforward. For the same reasons, valuations of money are prone to distortions and biases.

To better understand and examine money-related distortions and biases, Buechel and Morewedge's model draws from Kahneman and Frederick's (2002) two-system framework, according to which decision making results from a more speedy and shallow way of thinking (*system 1*) or a more slow and profound way of thinking (*system 2*). In essence, they propose that people can evaluate the value of a simple monetary loss or gain relative to one comparison standard without much deliberation (i.e., using system 1, in Kahneman & Frederick's terms). When they do so, they use a comparison standard that is accessible at that point in time. Moreover, they propose that only when people are motivated and able (e.g., when outcomes of decisions are important and people have sufficient cognitive resources and time) to make more precise judgments, they do so by taking more comparison standards into account when evaluating the value of monetary losses or gains. Such standards may be internal (e.g., one's income, one's personal budgets, memories of past transactions) but also external (e.g., prices that are encountered in the same store). As a result of this more elaborate comparison process (i.e., using system 2), people become sensitive to absolute amounts of money—or at least, they evaluate the value of money in a more elaborate and precise way.

The basic premise of this model can explain findings from several studies. In one experiment (Kassam, Morewedge, Gilbert, & Wilson, 2011), a group of participants won the larger of two possible monetary prizes of a scratch-off lottery ticket ($7 where they could also have won $5, $5 rather than $3; $3 rather than $1). It turned out that that people were equally happy with their outcome, regardless of the absolute amount of money they won. A second group of participants won the smaller of the two possible amounts of the same lottery tickets ($5 where they could also have won $7, $3 rather than $5; $1 rather than $3). Interestingly—and by contrast to the people

who had won the larger of the two amounts—these participants were markedly happier when they had won larger absolute amounts of money. This pattern of findings fits Buechel and Morewedge's model very well. That is, people who were satisfied with their winnings (because they won the larger of two amounts) were probably not motivated to engage in further elaboration about their winnings—after all, they were already content with the result. By contrast, people who were *not* immediately satisfied with their outcome (because they won the smaller of two amounts) were motivated to more elaborately evaluate their outcome. As a result, they took into account the absolute value of their winnings in their judgments.

Also here, a time-course perspective on money applies, at least under the assumption that *system 1* is indeed needs less time to produce processing outcomes compared to the more deliberate, slower *system 2*. In line with this well-supported idea, and congruent with Capa and Custers' approach, Buechel and Morewedge's perspective points to the idea that amounts of money—in this case, monetary gains and losses—are processed more elaborately when more time is available and when the decision has important implications.

Whereas Capa and Custers (2014) and Buechel and Morewedge (2014) zoom in to micro-level time courses that play out over seconds at most, Samanez-Larkin et al. (2014, Chap. 6) examine how the processing of monetary gains and losses changes over the course of an adult life. Interestingly, research shows that the quality of some money-related decisions improves with age, whereas the quality of other money-related decisions declines. Specifically, older people seem to have difficulties quickly adapting to novel monetary environments (e.g., during probabilistic learning tasks), while they are better at accurately evaluating monetary rewards that are further away in time (e.g., during intertemporal choice tasks). This set of findings fits well with classic models of how cognitive capacities change with age, as well as with recent findings on the neural underpinnings of decision making.

Taken together, one of the main recurring themes in the current book pertains to the question how money is processed as a function of time. Initially, money can be processed very fast but in a rather crude way. That is, value judgments of gains and losses are heavily affected by the single reference standard that is most accessible at that point. Also, while money stimuli may instigate increases in effort and performance very quickly, money stimuli change more elaborate task strategies only when they enter conscious awareness. Finally, zooming out to a much broader time course, money-related decision making has been found to depend on age. Both in the lab and in the real world, getting older has distinct advantages and disadvantages when it comes to dealing with money.

Biological Correlates of Dealing with Money

In human neuroscience, money is habitually used as a convenient experimental manipulation of reward. Many experiments, for example, are designed such that participants are paid money (vs. not) for performing a certain action. Depending on

the specific research question, these actions can involve making decisions under risk or carrying out a performance task in which participants can earn money. Building on the assumption that money energizes and directs people's behavior in the same way as primary rewards do, the scientific literature has accumulated a clear understanding of how money triggers the reward circuit in the human brain.

In Chap. 7, Krug and Braver (2014) clearly explain how this might work in the case of performance tasks. A first set of findings shows that money boosts activity in cortical areas involved in good task performance. For example, when people carry out working memory tasks, they rely on their dorsolateral prefrontal cortex (DLPFC) to perform well. Several studies revealed that people's DLPFC worked harder (i.e., was more activated) when people received money for their performance. In turn, this enhanced activity in task-relevant brain areas is thought to boost performance, and indeed, money has been shown to enhance performance on a wide variety of laboratory-based tasks. A second set of findings shows that the anticipation of a monetary reward reliably engages subcortical regions, such as the ventral striatum. This structure is indeed known to play a key role in producing various kinds of motivated behavior.

Proposed to explain these two sets of findings, one prominent idea is that money shapes people's performance via the neuromodulator dopamine. Specifically, activation of dopamine-related reward regions is thought to enhance functioning of the prefrontal cortex (PFC), as a result of which people switch to a *pro-active mode of cognitive control*—i.e., they turn to a mode of cognitive functioning in which people are prepared to respond effectively to future events. This idea is potentially highly important, as it bridges findings from neuroscience and psychology in order to more deeply understand money's effect on performance.

A key feature of Krug and Braver's chapter is that it provides a cutting-edge update on how monetary incentives are different, on the brain level, from primary rewards. In an fMRI study conducted in the authors' lab, Beck, Locke, Savine, Jimura, and Braver (2010) directly compared the effects of monetary rewards with those of a primary reward—in this case, a squirt of apple juice directly into the mouth. Interestingly, although both juice and monetary rewards enhanced people's performance, a different pattern of brain activation showed for the different types of incentives. Specifically, the juice led to sustained activation of subcortical reward areas (e.g., the striatum), whereas the monetary reward led to sustained activation of cognitive control areas (e.g., DLPFC). This study is one of the first to show a double dissociation between different types of incentives. As Krug and Braver explain, it is perhaps too early to draw general conclusions about the unique ways in which money may engage the brain. Yet, by contrast to what was previously thought, the study by Beck and colleagues raises the possibility that such money-specific neural substrates, involved in motivation, do in fact exist. It is an important avenue for future research to further zoom in on these brain networks.

It is important to note that the same neural circuitry triggered by money during performance tasks is also involved in many other daily-life, money-related tasks, including the task of making financial decisions. For example, activity in

the striatum is often thought to predict the extent people are willing to take risk in financial decisions (Kuhnen & Knutson, 2005). Similarly, the reason that older people make objectively less optimal financial decisions in dynamically changing environments has been attributed to the fact that connections between the PFC and the striatum seem to deteriorate with old age (Samanez-Larkin et al., 2014).

Intriguingly, the reward network of the human brain is also known to be closely related to various kinds of substance addictions. As mentioned, when people anticipate a valuable reward, the striatum is activated, signaling to other areas of the brain that something valuable can be attained. In turn, brain areas that might help attaining the reward are engaged, too—they are activated to increase effort and direct behavior in the service of reward attainment. In addiction, a very similar process occurs, though in a dysfunctional, overly strong way (Robinson & Berridge, 2008). When a cocaine addict sees a cocaine-related stimulus, for example, his or her ventral striatum will be engaged strongly (as the stimulus suggests actual cocaine is near), making the addict think of and only of the cocaine, while vigorously trying to attain it.

Given the human reward circuit's strong involvement in both the processing of money as a reward and addiction, it should come as no surprise that people can—mediated by the brains' reward circuit—become addicted to money. Indeed, Lea and Webley (2006, 2014) have noted that money affects people in ways that are similar to the effects of biological drugs. Such drug-like effects are clearly visible in *pathological gambling* (or *gambling disorder*). People who suffer from this disorder show a persistent and maladaptive pattern of gambling behavior, having enormous personal and social consequences. In Chap. 8, Huberfeld and Dannon (2014) explore the mechanisms and the epidemiology of this severe money-related addiction.

In sum, recent work on the neurobiological foundations of money teaches us a lot about the brain networks involved in the processing of monetary rewards. Monetary rewards trigger specific areas in the subcortical brain that are dedicated to encoding the value of money. In addition, these subcortical brain areas maintain intimate connections to prefrontal brain areas that facilitate performance on cognitive and behavioral tasks. Furthermore, there is research to suggest that the quality of financial decision making might be the result of the functionality of the striatum and its connections with the PFC (see also Huberfeld & Dannon, 2014). Furthermore, in older people, the connection between the striatum and PFC seems to be deteriorated, which offers a biological explanation for differences in financial decision making between adults and ageing people. Interestingly, recent insights into social cognition and decision making in the developing brain (Blakemore & Robbins, 2012) suggest that the reward system is often hyper-responsive to rewards during adolescence. Hence, it might be fruitful to expand the study of the neurobiological foundations of financial decision making to the realm of adolescence (or even childhood) to paint a more complete picture of the time course by which the human mind and brain deal with money.

Meaning-Making Processes Triggered by Money

One of the key challenges people encounter when navigating social life is to interpret the wide array of complex stimuli they are confronted with. Perhaps most notably, other people and their actions tend to be difficult to interpret. Indeed, other people's goals, motives, needs, and intentions are not directly perceivable and need to be reconstructed based on the often-limited information that is available. To make sense of other people's behavior, people rely heavily on pre-existing knowledge structures (e.g., categories, stereotypes, goals). Such processes, in which people interpret social situations (e.g., some other person's observable behavior) in the light of what they already have on their mind (e.g., pre-existing knowledge about this person), are *meaning-making processes* (Bless, Fiedler, & Strack, 2004). One could argue that in order to function well in a social environment, people constantly construct their own social reality, which in turn forms the basis of their subsequent actions.

As several prominent lines of research show, money (and actions that involve money) profoundly affects the way people make sense of the situation they find themselves in. Three of such lines of research are discussed in the Part 3 of the present volume. First, Moller and Deci discusses the psychological consequences of getting paid for something (e.g., for performing some action). Second, Carter explores the consequences of spending money, integrating a rich set of recent empirical findings. Finally, Mead and Stuppy discuss how the mere exposure to money affects people's social goals and behavior.

In everyday life, money is often used as a tool to change and intensify other people's behavior. Clearly, this happens when people pay other people to go to work, but there are several other instances we can think of, such as when people receive financial support (e.g., via tax breaks) to behave in environmentally friendly or healthy ways. Building on decades of research, in Chap. 9, Moller and Deci (2014) propose a novel model of the psychological processes that are triggered during and after people *get paid* to perform a certain activity.

Moller and Deci's model is based on Self-Determination Theory (Deci & Ryan, 1985; Ryan & Deci, 2000), a broad theory of human motivation. In essence, the authors propose that at least two experiences may occur when people get paid—each one of which is related to a basic psychological need. First, Moller and Deci suggest that people's *need for competence* can be satisfied by payments. Indeed, in many cases, the fact that people receive money in order to do something can be construed as an indication that they are good at that activity. In a sense, the fact that one gets paid to do something means that the payer thinks the payee will do a good job. Money, for that reason, can make people feel useful and competent. Second, Moller and Deci suggest that people's *need for autonomy* can be thwarted by payments. The latter is what occurs in the so-called undermining effect. Widely studied over the past decades (Deci, Koestner, & Ryan, 1999), the *undermining effect* is the phenomenon that intrinsic motivation for some activity is reduced after people get paid material rewards, such as money, to carry out that activity. As a result, people become less inclined to engage and persist in that activity.

Integrating a wide range of findings from psychology, Moller and Deci's model has important implications for understanding the consequences of paying people in daily life. Specifically, they show that it may well be counterproductive to think of money as a simple means to stimulate people to do some task or to work harder. In applied settings, such as the workplace and the classroom, monetary incentives have the potential to thwart people's need for autonomy, reducing the quality of their motivation. However, if such thwarting can be prevented (e.g., by strengthening employees' feeling that they have free choice over the activities they pursue—and especially when a monetary incentive can be construed as proof of competence), monetary incentives can be a useful tool to direct and fine-tune other people's behavior.

In Chap. 10, Carter (2014) unravels the processes that occur around *spending money*—in a sense, the inverse of getting paid. Unraveling these processes, as it turns out, is a challenging job. An important reason for why this is a challenge is that spending money is a combination of a gain (of some object or some experience) and a loss (a loss of money itself, but also a loss of opportunities to buy other things with the money). Occurring at the same time, both these gains and losses have the potential to shape people's affective experiences before, during, and after a purchase. Specifically, a growing body of research has focused on how the gains and losses involved in spending money impact people's experiences of happiness and well-being.

Thinking of a purchase as a co-occurring gain and a loss is useful as it provides several starting points for analyzing the psychological processes involved. For example, some people more than others may be especially likely to focus on the losses (of opportunity and money) that are involved in spending, while paying less attention to the material or experiential gains that may be attained. These people may be especially conductive to feeling the so-called *pain of paying*—i.e., negative affective experiences that occur already before making a payment—which in turn prevents them from making purchases altogether. By contrast, some means of payment, such as using a credit card rather than cash, take away the negative affective anticipatory experiences of spending money and can for that reason induce people to spend money more recklessly than they would normally do. Carter (2014) carefully analyzes these and many other processes that may occur when people spend money. An further interesting merit of his chapter is that it addresses the types of purchases that are related to more happiness on the long term, such as purchases that are experiential (e.g., going to a concert) rather than material (e.g., getting a new phone) and purchases that strengthen social relationships (e.g., getting a cup of coffee for someone else) rather than not (e.g., getting a cup of coffee for oneself).

The final chapter, Chap. 11, by Mead and Stuppy (2014) discusses and extends on an intriguing set of findings that shows that mere exposure to large amounts of money (such as stacks of bank notes) is sufficient to make people act in more *self-reliant* ways. People exposed to money, for example, waited longer to ask for help from others, preferred to work alone on tasks, preferred solitary activities in general, and spent less time helping other people when given the chance to do so (Vohs, Mead, & Goode, 2006, 2008). Having been influential over the past years (see Lea & Webley, 2014), this set of findings generally lend support to the idea that—at least in western cultures (see Nelms & Maurer, 2014)—money activates a set of

self-enhancement goals that drive self-oriented behaviors (e.g., buying goods for oneself) while at the same time suppress the other-oriented goals that may normally trigger and energize pro-social behaviors such as helping.

A key merit of Mead and Stuppy's chapter is that it clearly positions the aforementioned line of research in the broad context of more general money-related findings. For example, Mead and Stuppy relate the money-exposure line of research to a set of correlational studies, which show that the degree in which people value the accumulation of money (and material wealth, more generally) is negatively related to the length and the quality of the social relations they have. Findings such as this fit well with the idea that wanting money, or perhaps having money, or dealing with money, activates knowledge structures that are incompatible with the pursuit of social harmony.

Taken together, research on meaning-making processes shows that people respond differently to money under different conditions. Specifically, when they can earn money for good performance on a task, the payment can be construed as a sign of competence, boosting people's motivation to engage in that activity. However, it can also be interpreted as a sign of being externally controlled, which decreases people's feelings of autonomy and undermines people's intrinsic interest in the task. In the case of spending money, different meaning-making processes take place. Spending money can be construed as gaining something (i.e., some product, service, or experience) or as losing something (i.e., losing money, which induces *pain of paying*), thereby increasing or decreasing people's experiences of happiness, respectively. Finally, mere exposure to large amounts of money can trigger selfish motives and self-enhancement goals, causing people to act in more self-reliant ways. The common theme in all these cases is that money triggers specific needs and motives. In turn, these activated needs and motives impact how people construct social reality, shaping both their feelings and their actions.

Final Summary and Conclusion

The psychological science of money is a relatively young and exciting research area. Several scientists from a wide spectrum of disciplines ranging from neuroscience, psychology, economy, and anthropology to the setting in psychiatry, marketing, and business sciences, work on several issues to offer a deeper understanding to explain and predict how people respond to money cues in a social context. Whereas there is some cross-talk and collaboration between these disciplines to address questions about the psychological science of money, the volume that we have put together indicates that there might be more overlap than was traditionally thought and that there may be much to gain from each other when working at the intersection of these disciplines.

Specifically, theory and research on psychological science of money share the common assumption that the effects of money on human behavior have two origins: (1) an evolutionary root that shapes the biological foundation of responses to money

and money-related behavior; and (2) a cultural basis that shapes the symbolic and social value of money and money-related behavior. Whereas these two origins concur with the traditional nature versus nurture debate of human conduct, from the present volume it becomes clear that these two origins both contribute to the emergence of money-related behavior. It is difficult at this stage to make claims about whether these two sources work independently or interdependently in creating money-related human brains, minds, and behaviors, but it is at least encouraging to discover that the psychological science of money advances along a few main themes.

We structured the present volume according to three recurring themes that are central to theory and research on the role of money in human behavior. First, we witnessed a strong scientific interest in temporal aspects underlying the way people deal with money to understand the role of time in financial decision making, with a focus on (a) differences in the input duration of monetary rewards, (b) differences in the amount of time an individual takes to evaluate the value of consciously presented monetary rewards; and (c) differences in age. Second, there is much interest in the neural basis of monetary rewards to understand the brain networks that encode rewards and support human decision making and control. Third, several research programs address meaning-making processes to understand how the same amount of money can modulate the perceived social value of money and the responses and experiences associated with these perceptions. We believe that a fuller integration of temporal, biological, and symbolic aspects of money might be an important and fruitful avenue in advancing our understanding of how money shapes human functioning in particular and societies in general.

To conclude, this edited volume contains a collection of chapters from internationally renowned scholars in the area of the psychology of money. In each chapter, the authors offer a brief introduction of a specific topic and a showcase of some recent empirical work. As a whole, this volume was designed to provide a broad portrait of psychological research on money as it has been and is currently being conducted. It is meant to provide an introduction to essential issues, while at the same time offering a sampling of cutting-edge research on core themes in the psychological science of money. We started this book project as a result of our shared interest and fascination with colleagues working on the psychological science of money, and we hope that you will enjoy reading the chapters that follow as much as we did ourselves.

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Chapter 2
Money: Metaphors and Motives

Stephen E.G. Lea and Paul Webley

Abstract This chapter provides a historical and personal account of the development of our understanding of the psychology of money over the past 30 years. Classical psychological theories (such as those of Freud and Skinner) are briefly considered, as is the characteristics approach to money before our more recent attempt to propose a tool/drug theory of money, and its subsequent reception, is described. The current state of the empirical literature on money is summarised, including a section on the research on money and happiness. We conclude that money is a tool and a drug, but that its efficiency as a tool creates its drug-like properties, and that it often provides us with pleasure without doing us any good.

A Personal Introduction: Lea and Webley on Money

At irregular intervals throughout our long collaboration in economic psychology, we have tried to provide a comprehensive account of the psychology of money. Although all those efforts have involved an element of critical summary, both of the available empirical research in the psychology of money and of the existing theories about it, in each case we have sought to set out a theoretical framework that might help us understand the strange phenomenon of money.

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E. Bijleveld and H. Aarts (eds.), *The Psychological Science of Money*,
DOI 10.1007/978-1-4939-0959-9_2,

Our first attempt (Lea & Webley, 1981) was mainly a review of the classical psychological theories about money, from Freud (1959/1908) to Skinner (1974). But it looked forward to the idea that dominated our second attempt (Lea, Tarpy, & Webley, 1987, chapter 12), which was the idea that money is multiply symbolic, rather than being a monolithic entity at the psychological level. We sought to make that idea more concrete by interpreting the many different forms of money that exist in modern society, and the even greater variety that can be found by taking a historical and cross-cultural perspective, in terms of Lancaster's (1966) "characteristics" theory of demand. According to Lancaster, in a modern economy (or, to use Lancaster's term, a "sophisticated consumption economy"), the number of available goods vastly exceeds the number of distinct motives that people possess, and as a result, people can satisfy almost any combination of desires efficiently. Similarly, in a sophisticated financial economy, the number of different kinds of money vastly exceeds the number of different ways in which people want to use money, enabling people to find forms of money that exactly correspond to their personal mixture of needs for it. Conversely, in a "primitive consumption economy" an individual may have to acquire more of one characteristic than is desired in order to get enough of another, because there are a limited number of combinations available, and this would also be true in a primitive financial economy, where there may be only one or two forms of money. The coexistence of multiple forms of money (cash, bank accounts, credit and debit cards, gift tokens, etc.) in modern society is evidence that people do have different kinds of desires for money.

The problem with the characteristics approach to money is the same as the problem with the characteristics approach to goods; it provides no guidance on the list of underlying desires or needs that people might feel, or the underlying characteristics of either money or goods that might account for our demand for them by corresponding to our needs and desires. At best, therefore, it leads to a kind of botanising of wants, and at worst, it can allow for the arbitrary postulation of characteristics to explain any result, and thus has no predictive value whatever. For example, gift tokens have the characteristics of being less liquid than cash (they can only be spent in a particular shop or on a particular product) and embodying some (limited) thought on the part of the giver, but whether it is these characteristics or some others (such as, from a Freudian point of view, their greater distance from the faecal origin of money) that lead to our demand for them is uncertain (Webley, Lea, & Portalska, 1983).

There was an uncharacteristically long pause before our next attempt at a synthesis (Lea & Webley, 2006), although for almost half that time we were in one way or another working on that paper. Here we tried to overcome the potential arbitrariness of the characteristics approach to the multiple psychological nature of money, by specifying at a theoretical level what the different faces of money actually are. Posing the question as to how money comes to be such a potent incentive despite a total lack of biological foundations, we introduced a distinction between the actions of money as a tool and money as a drug.

Within the tool theory of money, we sought to capture all those ways in which money enables us to satisfy our biologically rooted needs and desires. In this view, money is essentially a means to an end. Just like a tool such as a lever, which

enables us to exert more force than we could with our bare hands, and so magnifies our abilities, so money helps us to exchange goods and store value more effectively. We can barter one food of which we have an excess for another which we don't possess, thereby meeting our biological need for particular nutrients, but money makes these kinds of exchanges much easier. Similarly we can store grain and goods to provide resources for our children in the future—but money passes on value through the generations much more efficiently. Few psychologists or economists would regard this account of money as problematic, though it should be noted that we do not have a coherent and defensible theory of how the tool account actually works—what psychological processes carry us from money's undoubted instrumental usefulness to its extraordinary incentive power (a power we were at pains to document, in the response section of our 2006 paper, in reply to a well-taken query by Furnham, 2006). There are many phenomena in modern society that are highly useful but do not seem to have much incentive power; undergoing dentistry is only the most obvious example.

Within the drug theory, on the other hand, we attempted to capture all those phenomena about money that are resistant to an instrumental account: situations where money fails to act as an effective incentive or reward, though logically (and in terms of economic theory) it certainly should, and situations where money has an attraction that seems to have no instrumental basis, or a greater attraction than is instrumentally explicable. We called this a drug theory because we were arguing that money was acting in the same way as undisputed drugs—pharmacological agents of satisfaction—do, stimulating the reward systems of the brain by means of shortcuts that subvert the adaptive purpose, and adaptational history, of those systems. Obviously there is a large gap from addictive substances such as nicotine, cocaine or caffeine to the irrational effects of money; but we argued that gap could be bridged by considering a range of other phenomena that do not involve drugs in the traditional sense but share the effect of subverting our reward systems—from artificial sweeteners such as saccharine to addictive behaviours such as gambling that are widely believed to produce endogenous opiates in the brain, so that there is a comprehensible mechanism by which they could subvert the brain's reward processes.

One of the main aims of the present chapter is to examine the subsequent history of our attempted synthesis. Before we do that, however, we need to reflect on the state of the evidence base, for our approach to understanding money has always been strongly empirically based.

The Expanding Empirical Literature on the Psychology of Money

The starting point for our earliest attempt at a theoretical synthesis on the psychology of money (Lea & Webley, 1981) was just how little empirical work was available. Lacking modern computerised bibliographic aids, we did a simple count of the number of papers indexed under money in the most recent year of "Psychological

Abstracts", which aimed at a comprehensive coverage of the world's literature in psychology; we found 15, one of which dealt with the activities of foundations and many of which focused on the professional rather than research question of how psychotherapists could ensure that their clients paid their fees. While we were of course able to cite more empirical data than that, there was little to show for the 80 years during which economic psychology had been in the academic lexicon since the publication of Tarde's (1902) treatise on the subject, at least as far as data that could inform a systematic and theoretically grounded account of the psychology of money was concerned. We had little data to draw on that had not been available to Simmel (1978/1900) in his essentially theoretical account, virtually contemporaneous with Tarde's.

When we reviewed money for our text book of economic psychology (Lea et al., 1987, chapter 7), the situation had hardly changed; if we were able to draw on rather more data than we had in 1981, it was partly because we could report on some of the research we had ourselves been carrying out in response to the vacuum we had discovered, but mainly because we had stumbled on, or been alerted by colleagues, to a wider range of the published research that did in fact exist, little connected and little collected. Notable among this was research based on Foa's (1971) resource exchange theory (which provides some support for a characteristics approach) and that from developmental psychology (which paints a picture of how children come to understand money). Foa (1971) and Foa and Foa (1980) proposed that there are six kinds of resource classes (money, information, status, love, services and goods) that people can be rewarded with, and that two dimensions underlie these—particularism and concreteness. Love is highly particular (it matters which particular people are involved in the exchange) whereas money is not. In Foa's analysis, money was seen as closest to information and goods, and farthest away from love, though in Brinberg and Castell's (1982) analysis of this structure, money was found as rather similar to love, as respondents considered money to be a particularistic resource. Developmental psychologists all reported a series of stages through which each child passed in becoming a competent user of money. At the first stage children could not understand the role of money in transactions: at an early intermediate stage children can understand immediate exchanges but not the divisibility of money—so if a candy cost 5 cents and a child only had a dime (10 cents) they could not buy the candy (Strauss, 1952). The final stage involves an understanding of all kinds of exchanges involving money, including understanding the notions of profit and investment.

Two decades later, as we put together the Lea and Webley (2006) paper, we faced a very different situation. Perhaps for the first time since Simmel, psychologists and other social scientists were beginning to pay serious and empirically driven attention to the sheer oddity of the psychology of money; two of the UK's foremost social psychologists (Adrian Furnham and Michael Argyle) brought out a book with the title "The psychology of money" in 1998, though it is fair to say that they did not only intend a study of money in itself, but were also using it as a metaphor and an entry point for a consideration of the psychology of economic life in general. This book performed a valuable service by bringing together a very broad range of material, but was somewhat a-theoretical and eclectic, and perhaps in detail too British in focus.

The rapid growth in socio-economics and behavioural economics had led to theoretical or even experimental investigations of many of the questions we had raised as fascinating but unexplored possibilities in 1981 and 1987. A striking example is the issue of taboo transactions, on which in 1987 we could only offer a one-line speculation, but which by the mid-2000s had been extensively explored by psychologists (e.g. Fiske & Tetlock, 1997), sociologists (e.g. Zelizer, 1994) and economists; although the most authoritative collection of economists' views on "repugnant transactions" did not appear until after our synthesis (e.g. Roth, 2007), the economists' view that some widely discussed taboo transactions ought not to be taboo was already well known. Becker and Elias (2007), for example, who argue vehemently for allowing the purchase and sale of body organs for transplantation, first presented their analysis at a conference in 2002. Other lines of investigation owed more to economic psychologists in the strict sense; the impact of changing forms of money, which we touched on briefly in our 1987 treatment by way of a discussion of the UK's 1983 transition from a note to a coin for the £1 unit, was carried out much more thoroughly by an international collaboration of economic psychologists, when it came to the 2002 introduction of the euro in 12 European countries (see Pepermans, Burgoyne, & Müller-Peters, 1998). Additionally, a number of psychometric scales related to money were developed (e.g. Kidwell & Turrisi, 2004; Loix, Pepermans, Mentens, Goedee, & Jegers, 2005; Tang, 1995), enabling a rapid expansion in the systematic investigation of some aspects of money psychology.

Such a rapid expansion was perhaps only to be expected in a period when, as has been noted, economic psychology, socioeconomics and behavioural economics were all expanding and being pursued by better-known and better-connected academics, some of them with the ear of governments. Between the publication of our attempted synthesis of 2006 and the present, however, the empirical literature on the psychology of money has developed in a quite different and perhaps less predictable way.

Shortly after the appearance of our paper of 2006—but, in publication terms if not in the generation of the underlying research, in time to draw upon it—Vohs, Mead, and Goode (2006) published a paper that has become much cited and influential. It was the first of a long series of experiments from the Minnesota group (subsequently replicated and extended by many others) in which the primary manipulation was the activation of "the concept of money through the use of mental priming techniques, which heighten the accessibility of the idea of money but at a level below participants' conscious awareness. Thus, priming acts as a non-conscious reminder of the concept of money" (Vohs et al., 2006, p. 1154). This line of research in "money activation" has provided a rich stream of further information about the psychology of money, the more so because it is linked through the authors' other research interests with one of the most powerful (and economically relevant) ideas in current social psychology, the concept of self-regulation and its predictable failure (e.g. Baumeister, Bratslavsky, Muraven, & Tice, 1998).

In the 30-plus years since we began writing about the psychology of money, therefore, we have seen huge developments in empirical research. It is not just that economic psychology, the natural home for the psychology of money, has expanded as a specialism; nor is it only that empirical research on the effects of money on

human behaviour has spread into economics, through the media of behavioural economics and socio-economics. It is also the case that interest in money has become part of the mainstream of psychological thinking. Money is increasingly recognised for the massive and distinctive factor in the motives, feelings, thinking and behaviour of humans in modern societies that it is.

Money and Happiness

A specific area where there has been a massive expansion of the literature on the psychological impacts of money has been in the study of the relationship between money and happiness. Although this literature has certainly contributed substantially to our understanding of the psychology of money, its development has not been due to the increasing interest in money on the part of psychologists, but to the steadily growing acceptance on the part not only of academics in a wide range of disciplines, but also of policy-makers, that people's subjective ratings of their happiness can be treated as reliable, valid and important data (Diener & Biswas-Diener, 2008; Krueger & Schkade, 2008; Lyubomirsky & Lepper, 1999). That acceptance has meant that the unexpected and even paradoxical relations between financial measures (typically, income and wealth, either at the individual or at the national level) and rated happiness have become powerful elements in the discussion of the psychology of money.

This is not the place to rehearse the frequently discussed paradoxes of the income-happiness relationship; they have been reviewed many times (e.g. David, Boniwell, & Conley Ayers, 2013; Easterlin, 1974; Layard, 2011). The key point is that people with higher income or wealth do not always rate themselves as happier than people with less, and the key arguments are about the circumstances under which the "obvious" positive relationship between money and happiness does, and does not, manifest itself. From our perspective, the important progress that has been made on this question is in clarifying (both for the academic community, and for the respondents in surveys) what we mean when we talk about happiness. For as long as there have been happiness studies, there has been some variation in whether we should talk about "happiness" or about "life satisfaction", and whether it matters (see Diener, Suh, Lucas, & Smith, 1999; Ryff, 1989 for opposing perspectives on this question). In our view, however, the important development in recent years has been the disaggregation of happiness into "experienced utility" and "decision utility", first proposed by Kahneman (2000), with experienced utility being measured on a moment-to-moment basis. It seems more or less unambiguous that, when happiness is measured using momentary measurement techniques such as the Day Reconstruction Method proposed by Kahneman, Krueger, Schkade, Schwarz, and Stone (2004), its relationship to money is negligible. If, on the other hand, people are asked to evaluate their overall happiness or life satisfaction, there sometimes is a relationship with income, though Kahneman, Krueger, Schkade, Schwarz, and Stone (2006) argue that even this is illusory, the result of survey instruments drawing respondents' attention to their financial situation before asking them about their life satisfaction.

The conclusion Kahneman and his colleagues have drawn, therefore, is that although money is a powerful incentive, possessing it, or having access to a steady stream of it, does not in practice cause us to spend time in activities that make us happier. That is hardly surprising when one considers that, according to data of Kahneman et al. (2006), the activities that have an above-median positive impact on happiness are intimate relations, socialising, relaxing, prayer, worship and meditation, eating, exercising and watching television—none of them activities requiring very substantial financial resources.

Part of the reason for the paradoxical relationships between money and happiness is that people appear to be exceedingly bad at predicting their future emotional states. The vicissitudes of such "affective forecasting" have been investigated extensively by Gilbert and his colleagues (e.g. Gilbert & Wilson, 2007). The capacity for mental time travel, often argued to be unique to humans (e.g. Suddendorf & Corballis, 1997, 2007) means that we are able to envisage how we would feel under future circumstances that we have not yet experienced—say, after receiving an increased income or purchasing a new consumer good or service—but it also seems that we are highly inaccurate in such estimations. This means that, even if money can in principle buy happiness, we will frequently spend it on the wrong things, so that the potential gains in happiness that money makes possible are never realised in practice.

In a commentary on Gilbert and colleagues' position, as expressed by Dunn, Gilbert, and Wilson (2011), Vohs and Baumeister (2011) offer an entertaining alternative slant on the money/happiness relationship, or lack of it, with a paper entitled "What's the use of happiness? It can't buy you money". This sounds as though it might turn the debate upside down, but in fact what they are seeking to do is to make it irrelevant, by arguing that we should not have expected money to make us happy in the first place, because that it is not what it is for. Rather, it enables us to pursue life goals in an autonomous way, without dependence on other people. That sounds like a whole-hearted endorsement of our tool theory, but in fact it is not, because Vohs and Baumeister then argue, on the basis of their extensive previous empirical research, that as a result the mere thought of money, or even unconscious priming with the idea of money, drives us in the direction of harder work, neglect of social relationships, ignoring pain, and a host of other effects that are direct modulations of our pain and pleasure in different activities—in other words what we would call drug effects.

But from our perspective, both Kahneman's and Gilbert's core arguments bear strongly on our original argument for a dual operation of money on human psychology. We would agree that there are ways of spending money that would increase people's happiness, as Dunn et al. (2011) argue, and this once again confirms that money can be a useful tool; but we have to accept their conclusion that most people do not use it in instrumentally effective ways. Kahneman et al. (2006) point out that, despite the ineffectiveness of money at procuring happiness, people do many things that are calculated to increase their financial resources. Being a powerful incentive while making one, both from moment to moment and indeed overall, thoroughly miserable is a very apt description of many drugs of addiction. In our 2006 paper, we did not consider the money/happiness relationship at all, but in the light of these more recent data, it may be the most powerful argument yet for viewing money as a drug.

Theorising the Psychology of Money

We have repeatedly stressed that our interest is in providing an empirically based psychology of money, not in theoretical speculation. But that is not to say that we wish to stay in the dustbowl of pure empiricism. Merely stacking up facts is nature study, not science. It is therefore crucial that we constantly use the available empirical information to construct and refine theories of the psychological impact of money and the psychological mechanisms driving humans' responses to money. That is what we were seeking to do with our tool/drug distinction, and a key question for us is whether new ways of theorising the psychology of money have developed since our 2006 article.

Other than some (limited) discussion of our own tool/drug idea, which we will review below, we see only two directions in which the theory of the psychology of money has been advanced in the past decade. These are first, the self-regulation approach of Vohs and Baumeister (2011), to which we have already referred in passing, and second, the neuro-scientific approach to money and behaviour. We will consider both in detail here.

Vohs and Baumeister propose that money acts to allow us to be more self-reliant (which sounds positive) and therefore to disengage from social relationships (which does not sound so positive). This generalisation offers a synthesis of a wide range of different phenomena caused by exposure to the idea of money or cues associated with money. These include reductions in physical pain or the distress due to social rejection (Zhou, Vohs, & Baumeister, 2009), increases in the amount of work people will do on puzzles—sometimes beyond what is actually useful for efficient solution (Vohs et al., 2006), and increases in the feelings of threat induced by others' attempts to exert social influence on one (Liu, Smeesters, & Vohs, 2012).

However, what makes this a theory of the psychology of money, rather than just a characterisation of its effects, is Vohs and Baumeister's repeated demonstrations that even unconscious exposure to the concept of money can shift people's feelings and behaviour in the direction of autonomy. This means that every kind of money-related behaviour is likely to be unexpectedly complex; whenever people plan to use money to achieve goals that could also be achieved in other ways, more will happen than the mere replacement of one tool (for want of a better word) by another. There will be a range of unintended consequence. For example, using money as a tool to achieve a specific goal (e.g. buying food) may unconsciously influence people in other directions such as becoming more autonomous (and therefore being less likely to share the food). This proposal therefore provides an account of, for example, the impacts of the monetisation of a transaction on the personal relations between the parties to that transaction. These have often been commented on, though less often subjected to empirical investigation, and we now turn to a review of recent work in this area.

We have already noted the heated debate that exists on the question of whether it is appropriate to monetise the procurement of blood for transfusions and organs for transplantation (for further discussion, see for example Campbell, Tan, & Boujaoude, 2012), but malign effects of monetisation have been argued for in many other spheres.

Ellingsen and Johannesen (2011) seek to explain the aversion to using money for some transactions, such as gifts, in terms of people's desire to appear generous.

Some of the discussions reviewed above are at least rooted in empirical investigations. However direct empirical tests of the impact of monetisation of transactions are fewer. There are some examples, however. The best known are probably the studies of DeVoe and colleagues. DeVoe and Iyengar (2010) showed that egalitarian distributions of resources that were seen as fair when physical goods were concerned were seen as unfair when the corresponding values were distributed as money. DeVoe and House (2012) demonstrated that inducing people to think of their income in terms of an hourly wage, thereby putting a price on time, reduced their pleasure in spending time on leisure activities, and DeVoe and Pfeffer (2007) showed that similar effects could be found using the natural variations in salience of hourly wage rates that arise from the different ways in which people are paid for jobs across the national economy. A number of studies of consumer preference have shown that activating ideas of time on the one hand, or money on the other, can change people's evaluations of product attributes. Mogilner and Aaker (2009), for example, using both field and laboratory experiments showed that activating time (vs. money) leads to a favourable shift in product attitudes and decisions. This occurs because time increases focus on product experience, and one's personal connection with the product. Similar results have been obtained by Lee, Bertini, and Ariely (2012). Estle, Green, Myerson, and Holt (2007) and Odum and Baumann (2007) have demonstrated that money rewards are subject to less severe temporal discounting than directly consumable rewards, even if the latter are not subject to deterioration. Jeffrey (2009) showed that non-cash incentives could be more effective in a work situation than the equivalent amount of cash, even though people stated a preference for the cash reward, and similar preference reversals can be found in laboratory experiments (e.g. Shaffer & Arkes, 2009). Although the analysis has not yet been done, all these effects are potentially explicable in terms of Vohs and Baumeister's self-reliance theory.

The other theory of the psychology of money that has been developed substantially during the past decade (though it may seem odd to refer to it as a theory) is the proposition that the psychological impacts of money can be accounted for by specifying the areas of the brain that money activates, as measured by fMRI and other brain-imaging techniques. The evidence here comes from the burgeoning science of neuroeconomics. So far as we know, a specific neuroeconomic theory of money has not yet been advanced, but it is implicit in the research programme of neuroeconomics that it could and perhaps should be.

It is an old debate in psychology, though new to economists, as to what has actually been explained if we are able to identify a part of the brain that is active (or inactive) when a particular psychological phenomenon occurs. Is an interest in such matters just crass reductionism, or is it the only account of mental phenomena that is worth having? For our part, we are mainly interested in psychological explanations of psychological phenomena; it is obviously necessary that the brain should cool the blood, but the details of how it does so are not necessarily interesting. As Clithero, Tankersley, and Huettel (2008) have argued, the potential gains

from neuroeconomics research are easily overstated. But we agree with Clithero et al. that the neural and social sciences can and should interact profitably. In particular, one kind of physiological evidence is always potentially interesting. If some phenomena involve activation in a particular brain area, and others involve activation in a different area, that implies that the two sets of phenomena belong to distinct systems, and are related within groups but differ between them.

Unfortunately, in neuroeconomics as in other branches of physiological psychology, such "double dissociations" between brain areas and behavioural effects form only a small minority of research findings, despite being recognised as the gold standard from an interpretative standpoint. Nonetheless, they are not entirely absent. Cory (e.g. 2006) has argued strongly, on neuroeconomics grounds, for the need to distinguish self-preservational, egoistic from affectional, empathetic neural circuitries, and that these two systems are associated with dual motives that can be detected in people's exchange behaviour.

There are other neuroeconomic data that provide at least some insight into the psychology of money, even if they do not meet the exacting standard of reporting double dissociations. For example, Bourgeois-Gironde and Guille (2011) and Weber, Rangel, Wibral, and Falk (2009) have demonstrated that the overvaluation of high nominal money values that is characteristic of the money illusion (Shafir, Diamond, & Tversky, 1997) is reflected in unexpectedly high levels of activity in the ventromedial prefrontal cortex (part of the brain's reward circuitry). Dohmen, Falk, Fliessbach, Sunde, and Weber (2011) have shown that relative as well as absolute income changes produce direct effects on the reward system.

Of course, these are not the only theories of money that are in current use. The earlier theories, which we summarised in our 1981 paper and our 1987 book, are still current. Some of our earlier conclusions are, too; for example, in constructing scales of the emotional significance of money, Furnham, Wilson, and Telford (2012) made extensive use of Goldberg and Lewis's (1978) analysis, which is close to the multiple-symbolism approach we used earlier.

Developments in the Tool/Drug Theory

Given that there is relatively little new theory within the psychology of money, we need to ask how useful our tool/drug account has been. Our 2006 paper has been quite widely cited, though perhaps more because it provided a useful summary of non-instrumental uses and impacts of money than because the citing authors endorse our synthesis of those phenomena.

Of course, no-one seeks to deny the "tool" aspect of the analysis; that much has always been unproblematic, though as we noted above, the exact cognitive and developmental mechanisms by which we come to use money as a tool so effectively have not been explored in great depth, and really only additional detail has been added to what was known as long ago as our 1987 summary. We know more, for example, about how the social context influences children's understanding of money

and its origins and how social practices with respect to children and money have changed in recent decades (Webley & Nyhus, 2013), but the basic picture of children mastering the understanding and use of money via the ascension of a set of Piagetian stages remains the same, probably because developmental researchers have taken a conventional view of money for granted. Given the absence of much concern with "tool" mechanisms, the question, therefore, is whether it is useful to think of money as in any sense a drug.

Zhou and Gao (2008) made extensive use of the tool/drug theory in their analysis of money's use, alongside social support, in the management of pain. This is an interesting application because it interacts strongly with the Vohs-Baumeister self-reliance theory of the psychology of money. Zhou and Gao see money and social support as essentially complementary in pain management, and as noted above, Zhou et al. (2009) have subsequently shown that even unconscious triggers of the money concept can directly reduce both physical pain and the distress from social exclusion.

But it should perhaps be no surprise that the drug account of money has been picked up most extensively among those working on addictions to other substances or activities. Indeed, the most vehement criticism of our ideas among the original commentaries on our 2006 article came from an addiction perspective. Ross and Spurrett (2006) argued that the idea of money as a drug was a functionally empty metaphor and that the distinction between tool-like and drug-like motivators is insufficiently discriminating to say much about money that is useful. However other experts on addiction have found the distinction persuasive. For example, Blaszczynski and Nower (2010) used the tool/drug distinction as a way of discriminating the attitudes of problem gamblers from those of non-problem gamblers: the former reported obsessions with money as an indicator of prestige and power whilst having much greater anxiety about money. This analysis was carried through into their specific investigation of slot machine abusers (Nower & Blaszczynski, 2010) where the more severe gambling problems were, the less likely an individual was to set a spending limit before gambling. Chen, Dowling, and Yap (2012) have continued this line of analysis.

What is needed here is to go beyond the metaphor and develop a theory which specifies the processes and mechanisms which underpin the drug aspects of money. Without this, there is a danger that, like the characteristics approach, it can be used to explain any result but predict none.

Conclusions

What conclusions can we draw from this, our latest decennial survey of the psychology of money? In particular, what progress has been made since our most recent look at the topic, Lea and Webley (2006)?

The most obvious is that the psychology of money is no longer a private obsession that we share with almost no-one else (as witness the wide-ranging research

on this topic described in the other chapters of this book). It is now accepted by many psychologists that money is psychologically complex and interesting, and by many economists that money has effects that go beyond the instrumental. The question, as ever, is how to characterise those non-instrumental effects.

The springboard for our 2006 paper was a biological paradox: money is an enormously powerful reinforcer (in the Skinnerian sense), but has no obvious evolutionary roots. We might be a little more cautious now than we were in 2006 about the impossibility of humans being adapted to work with money: Laland, Odling-Smee, and Myles (2010) have documented large numbers of instances where the human genome has altered, over relatively short time periods, as a result of co-evolution with cultural traits. But the ethnographic evidence is against the idea that money is an example of this co-evolutionary process: people with no previous experience with money pick up, with apparent ease, not just the skills required to use it, but also the fascination with it that characterises monetised societies.

Our drug metaphor was not neutral. Drugs are deceivers: they provide pleasure without doing us good, in the evolutionary, adaptive sense of good. It has become clearer in the past decade that money, too, is a deceiver. We do not, by and large, use it to procure the activities that would make us happy, and the pursuit of money tends to prevent us spending time on happiness-inducing activities. Of course, we could use money to secure the opportunities for enjoyable activities, though the amount of money needed to get an adequate amount of them is not very large. Money is, after all, a tool as well as a drug, and it could be a very efficient tool. Perhaps the problem is that its efficiency as a tool also creates its drug-like properties, and it may be providing us (individually and collectively) with pleasure without doing us good, in the widest sense of the term.

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Chapter 3
Materiality, Symbol, and Complexity in the Anthropology of Money

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Abstract The invitation to review anthropological studies of money offers an opportunity not only to revisit the history of anthropologists' investigations into money's objects, meanings, and uses but also to reflect on the intersections of such work with recent psychological research. In this review essay, we survey the primary findings of the anthropology of money and the central challenges anthropological work has posed to assumptions about money's power to abstract, commensurate, dissolve social ties, and erase difference. We summarize anthropologists' historical concern with cultural difference and recent work on money's materialities, meanings, and complex uses. We emphasize the pragmatics of money—from earmarking practices and the use of multiple moneys to the politics of liquidity and fungibility. In the final section of the paper, we find inspiration in recent psychological studies of money to indicate new trajectories for inquiry. Specifically, we point to three potentially fruitful areas for research: money use as a tool and infrastructure; the politics of revealing and concealing money; and money's origins and futures as a memory device. We end with a brief reflection on ongoing monetary experiments and innovations.

Money has long been a topic of anthropological interest. From the giant Yap rai stones to the global diffusion of cowrie shells for use in trade to the creation of elaborate transactional archives in clay, string, and paper in places where physical money-stuff did not circulate, the ethnographic and archival record is rich with a diversity of money-objects: all manner of shells, beads, feathers, beans and grains, textiles, clay tablets, metal artifacts (wire, blades, axes, bars, rods, rings, and open bracelets called manillas), livestock, and much more—including, of

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E. Bijleveld and H. Aarts (eds.), *The Psychological Science of Money*,
DOI 10.1007/978-1-4939-0959-9_3,

course, coins, paper, and plastic, as well as unwritten, mental accounts-keeping. Anthropologists and archaeologists have documented a similarly diverse set of meanings and uses of money, exceeding and complicating the typical functions conventionally attributed to money, from Aristotle to modern-day economics textbooks: medium of exchange, store of value, unit of account or standard of value, and method of payment.

Some of the earliest ethnological compendia record the use of a variety of media for exchange and payment. Such surveys invite a certain wonder at the expanse of the historical and ethnographic records. In the Preface to her 1949 *Survey of Primitive Money*, Quiggin (1949) mentions broad scholarly interest in the "obsolete currencies of different countries, especially about those of the ancient civilizations of the Orient, where money has been in use for hundreds if not thousands of years" (p. ix). The book offers a survey of "primitive money" by continent and region or country, with a separate chapter for "cowries and beads," which, she says, "cannot be confined within these [geographical] limits" (p. 25).[1]

Cowries offer, in fact, an important case for the anthropology of money. Harvested primarily from the waters of the Indian Ocean, these shells came to be a predominant form of payment from China to Africa, circulating transnationally beginning as early as the eleventh century through Indian Ocean and Mediterranean commercial networks and the trans-Atlantic slave trade. Billions of shells were imported to Asia, Africa, and Europe and used in conjunction with a variety of local money-objects, including colonial currencies, in complex patterns of exchange (Hogendorn & Johnson, 1986). In the nineteenth century, cowries were accepted in some colonial jurisdictions for the payment of taxes, even as colonial officials attempted to demonetize the shells, continuing imports produced hyperinflation and devaluation, and local peoples in some circumstances refused to use the government-imposed money (Gregory, 1996). The cowrie's historical importance exerts an influence even today: The Ghanaian currency, for instance, is named the *cedi*, the Akan word for cowrie (Dzokoto, Young, & Mensah, 2010; Dzokoto, Mensah, & Opare-Henaku, 2011), and in some parts of West Africa, people still use cowries in rituals, offerings, and alms (Şaul, 2004).

This history of the cowrie's varied use as money speaks to recent approaches to the study of money in anthropology. The earliest surveys of what was called "primitive money" assumed a unilineal evolutionary trajectory in the development of money-objects and their functions (from, as we will explain below, "special-" to "general-purpose"). Particular money-objects were linked to particular peoples and culturally specific circumstances for payment—say, the exchange of shell valuables for pigs, or cattle for wives. The global circulation of cowrie shells, however, demonstrates that the use of certain objects in transactions extended well beyond the assumed boundaries of cultural difference or function. It points to the internal diversity of the category of things we call money, as well as its temporal dynamism. Such diversity and dynamism directs analytical attention to, as Guyer (2011, p. 1) puts it

[1] See also Einzig (1948), Ridgeway (1892), and Stearn (1889).

in a recent review, "[b]orders, thresholds, and historical shifts," especially those emerging from colonial encounters.[2] As Guyer (1995, 2004) has consistently maintained, the complexity of such interfaces makes it difficult to sustain, notions of boundedness, simple functionalism, and ahistorical or ethnocentric approaches to understanding the currency of money-objects.

Anthropological research on money—its forms, functions, meanings, and uses—now assumes such diversity and complexity, while continuing to investigate both the materiality of money and the symbolism money-forms elicit. In this chapter, we review key findings in the anthropology of money and trace potential intersections among these findings and recent psychological studies of money. We suggest that bringing together psychology and anthropology on the question of money is quite felicitous, as anthropologists have often seen in transformations of money manifestations of transformations in human consciousness itself, from changes in memory afforded by external recording devices to various kinds of abstraction, evaluation, and calculation. We also argue that recent psychological literature examining the effects of use or exposure to money on people's mental, emotional, and neurological states dovetails with recent anthropological approaches to money that foregrounds its pragmatics. This pragmatic approach shifts questions about what money *is* towards questions of what money *does* and the broader sociocultural processes it indexes and opens up for empirical and analytical consideration.

In this chapter, we first review, over the course of two sections, the history of conventional anthropological investigations of money.[3] We then introduce the challenge posed by recent anthropological work to this conventional story, before turning to examine, in turn, three central themes: (1) the material stuff of money and the effects of its materiality; (2) the symbolic meanings attached to money and the use of money to translate between different realms of meaning, matter, and value; and (3) the complexity of people's monetary practices (e.g., earmarking and sequestering, or the manipulation of diverse scales of value) and the social effects of such practices. In our final section, we turn to psychological research on money as a kind of tool; on money and conceptions of power or capacity; and on the place of transactional records in the evolution of money as a memory device. Our goal is to suss out potential points of intersection between certain trajectories in the psychology of money and emerging research in anthropology.

[2] Guyer adds, usefully: The borders that we focus on are social and between communities of currency users. The thresholds are conceptual and institutional between distinctive capacities of different moneys, often implicating different moral economies of fairness (in the short run) and transcendence (in the long run). The historical shifts are moments when combinations of attributes are brought into open question and submitted to deliberate reconfiguration. (2011, p. 1).

[3] We will be unable to provide a comprehensive survey. Maurer (2006) provides a similar review, although we include citations to work published since then. See also Hart's (2012) review. We do not address literature in anthropology on gifting, nor do we range into growing bodies of work on finance and debt (on finance, see Footnote 16; on debt, see Peebles, 2010; Han, 2012; Schuster, 2010, and the articles in the November 2012 special issue of *Social Anthropology*).

Theories of Money, Cultural Difference, and the Mind in Anthropology

Conventional approaches to money in anthropology were concerned with definitional questions, especially how to classify the so-called primitive currencies of non-Western peoples. Debates about how to understand these material objects frequently stood in for arguments about how to make sense of cultural difference generally, and these latter discussions often involved assumptions about the minds of the people being studied.

At the heart of these debates was the question of how to define money, one shared broadly across the emerging human sciences in the 18th and 19th centuries. The period itself, not coincidentally, saw profound changes in economic and market relations, especially the expansion of transoceanic colonial and mercantile networks and predominantly Euro-American (but also Chinese, Arab, and Indian) global social formations, which brought more and more peoples—and their moneys and modes of figuring value—into relation with one another, often hierarchically (Wolf, 1982). Two main strands of Western thinking on money derived from these global encounters. One, harking back to Aristotle, saw money in functional terms (as a means of exchange, unit of account, and store of value, as well as standard of value and method of payment). This strand tended to posit that money solved the "double coincidence of wants" (Jevons, 1875) problem of a supposed era of primitive barter by serving as a common means of exchange that could equilibrate the value of different commodities (e.g., Menger, 1892). It also posited that money fashioned from precious metals solved a value-storage problem since gold and silver, unlike iron or perishable commodities like grain, can last generations (and is therefore heritable). The general version of this monetary tradition is categorized as the *commodity theory* of money and the more specific version (embracing gold and silver) as *metallism* (Schumpeter, 2006/1954; see also Bell, 2001; Desan, 2005; Wray, 2010).

The other main strand of thinking on money tended to emphasize the role of social relations and conventions in the creation of money, focusing on interpersonal trust and credibility among market participants, as well as the credibility and authority of the state in warranting—and backing up by force—contracts settled in terms of its coin, as argued by the so-called *chartalists* (Innes, 1913, 1914; Knapp, 1924/1905; Wray, 2004; see also Graeber, 2011). By the early twentieth century, commodity money proponents were challenged by state money proponents, most notably John Maynard Keynes (e.g., 1930). With the rise of a post-World War II economic order, however, the resurgence of classical liberal and neoliberal economic theory (and, by century's end, apparent global market dominance) tended to favor versions of commodity money theory. These located money's origins in barter and emphasizing its functions as medium of exchange (in theory) and store of value (in policy). Such orthodoxies have incorporated the end of the gold standard and the emergence of fiat money and central banking.

Yet the early twenty-first century is also witnessing renewed interest in the nature of money. Contemporary conversations often recapitulate previous debates, with commodity proponents sounding like latter-day Goldbugs from the postbellum United States (Carruthers & Babb, 1996; O'Malley, 2012). Other times, new configurations emerge, such as when alternative currency practitioners echo credit theorists, historically aligned with chartalism, while imagining moneys without a state, based on interpersonal trust and shared values (North, 2010) or even cryptographic code and decentralized digital networks (Maurer, Nelms, & Swartz, 2013). We will return briefly to this recent intensification of interest in money at the end of this chapter, when we point to the proliferation of such experiments with money, exchange, and payment.

The anthropological record is routinely called on to adjudicate contending claims on the origin and nature of money. At issue are whether and how one can specify presumed human cultural universals—a core problem of anthropology, given its insistence on both the "psychic unity of mankind" (as Adolph Bastian famously put it) and sometimes incommensurable, untranslatable cultural difference. Classic anthropological investigations of money reflect this tension. In the final chapter to *Argonauts of the Western Pacific*, Malinowski (1984/1922, p. 510) declared that the "tokens of wealth" circulating in the Trobriand Islands through the system of ritual inter-island exchange called the kula "are neither used nor regarded as money or currency." Although both shell money and money "represent condensed wealth," the circulation of shell valuables is "subject to all sorts of strict rules and regulations," and must therefore "conform to a definite code" (p. 511). That code is not, Malinowski insists, that of the market; "the transaction is not a bargain," and since the exchange of shell valuables is not motivated or governed by the logic of market exchange, they are not, according to Malinowski, money.

Kula valuables should instead provoke us, Malinowski argued, to reconsider the application of such categories and the "crude, rationalistic conceptions of primitive mankind" they imply to non-Western peoples. If anything, "the kula shows us that the whole conception of primitive value; the very incorrect habit of calling all objects of value 'money' or 'currency'; the current ideas of primitive trade and primitive ownership—all these have to be revised in the light of our institution" (p. 516). If we want to understand "the native's point of view" (p. 25), we cannot rely on analytical categories that reduce that point of view to simplistic models of "enlightened self-interest" borrowed from "current economic textbooks" (p. 60).

Firth, who turned to anthropology from economics after meeting Malinowski, arrived at a similar conclusion, arguing that "[i]n any economic system, however primitive, an article can only be regarded as true money when it acts as a definite and common medium of exchange, as a convenient stepping stone in obtaining one type of goods for another" (Firth, 1929, p. 880; in Dominguez, 1990, p. 20). Money, Firth suggests, is meant primarily to facilitate exchange, although he notes that the other functions necessarily follow; while there might be some overlap in the functions of money from one society to the next, for non-Western societies, tokens of value entail much more than rational economic decision-making under conditions

of scarcity. Money, according to Malinowski and Firth, is a notion taken from the Euro-American conceptual repertoire and so limits our understanding of other people's economic lives.

The views expressed by Malinowski and Firth—and in particular, the importance they give to understanding the limits of the generalizing categories of social science—represent one important line of thinking in anthropology about money, one that recites orthodox Western economic models of money even as it challenges the suitability of such models for other peoples and practices. For these anthropologists, the use of money in its strictest sense implied a mental disposition, indeed a particular psychology—that of the calculating *homo economicus*, which should be juxtaposed with, in Malinowski's words, "a fundamental fact of native usage and psychology: the love of give and take for its own sake; the active enjoyment in possession of wealth, through handing it over" (1984/1922, p. 173). This us–them juxtaposition—between the economizing or profit-maximizing tendencies of users of "modern money" and the "social" character and uses of non-Western money—echoes throughout the history of the anthropology of money (as it does in anthropology generally). That distinction, for instance, has often been figured as one between the logics of "commodity" and "gift" exchange (Gregory, 1982; see also Godelier, 1999), even as anthropologists attempt to complicate that gift-commodity binary (Appadurai, 1986; Strathern, 1988; Thomas, 1991).

Indeed, some of the earliest anthropologists to consider money undermined such distinctions even as they relied upon them. As Hart (1986) has pointed out, Mauss (1990/1950, p. 100, n. 29) criticizes Malinowski in a lengthy footnote in *The Gift* for using the term "money" in "a restricted sense" and arbitrarily bounding its meaning: "[T]he question posed in this way concerns only the arbitrary limit that must be placed on the use of the word. In my view, one only defines in this way a second type of money—our own." Mauss proposes that since so-called primitive currencies "have purchasing power, and [that] this power has a figure set on it"—that is, since non-Western peoples calculate what they can obtain in exchange for certain generally circulating objects—"these precious objects have the same function as money in our societies and consequently deserve at least to be placed in the same category" (p. 101).

The us–them, commodity-gift, "modern"-"primitive" dualisms, then, could be subsumed to another level of analytical juxtaposition, between using such layered divisions and collapsing them. Malinowski's own distinctions, in fact, fell apart, despite his arguments about the misapplication of economic models to non-Western social forms. He famously compared, for instance, the kula valuables—those he insisted should not be categorized as "money"—to England's Crown Jewels (1984/1922, pp. 88–89).

In the mid-twentieth century, anthropologists building on the work of Polanyi (and echoing Mauss) critiqued the "formalist" positions of some of their colleagues for drawing the lines too narrowly around what kinds of objects and practices should count as "money." Those working in this so-called substantivist tradition, such as George Dalton (1965, p. 45; see also Polanyi, 1968), argued that anthropologists cannot "judge whether or not money-like stuff in primitive economies is really

money by how closely the uses of the primitive stuff resembles our own," but instead that "money" must be defined within the context of its use. Yet the basic division between "their" money and "ours" remained and would continue to prove central to social scientific understandings of money until the present day: While the money of non-Western peoples was plural, confined to particular circuits of exchange, and deeply embedded in complex social relationships that made it impossible to separate from kinship, politics, religion, and so on, the money of Western colonial powers was more abstract, less tangible, less social, more impersonal, and marked by functional unification, such that one money-object could serve all the functions required of it by economists (Guyer, 1995). Polanyi (1957) called the former "special purpose" money and the latter "general purpose." When the two came into contact, general-purpose money was thought to overwhelm, replace, and transform special-purpose money.[4]

Joining Polanyi, Dalton, and other substantivists, Bohannan provided the prototype for the interaction between special- and general-purpose money: In a series of essays about his fieldwork among the Tiv in colonial West Africa, Bohannan (1955, 1959; see also Bohannan & Bohannan, 1968) juxtaposed the Western "unicentric" market economy with the Tiv "multicentric" economic system. For the Tiv, not all goods were equally exchangeable, but circulated, according to Bohannan, within distinct "spheres of exchange." Even if a certain commodity took on the status of universal equivalent within a particular domain, there was no "common denominator among all the spheres" (1959, p. 500). The imposition of a colonial currency by the British administration, however—introducing coinage, demanding that taxes be paid in that medium, expanding trade with the Tiv—provided just such a general purpose money. Colonial efforts to promote European currency also resulted in the inflation of local money-objects, debasing them and making them less attractive alternatives. Bohannan emphasized that for the Tiv, the introduction of general-purpose money allowed traditionally illicit conversions between spheres, permitting those with access to it to circumvent status distinctions. Since "[i]t is in the nature of a general purpose money that it standardizes the exchangeability value of every item to a common scale," the "impact of money" is specifically to expunge difference by replacing "special-purpose" money with general-purpose money. Modern money, Bohannan (1959, p. 135) wrote, "creates its own revolution."

Money, Modernity, and Anthropology's "Savage Slot"

Anthropologists of money today reject such straightforward stories of encounter and change for reasons we will elucidate below. But it is important to understand the basic structure of such arguments, centrally because it reiterates in many ways a familiar narrative in the social sciences and beyond about money and its effects on, in Simmel's (2004/1907, p. 52) words, the "inner world[s]" of individuals and the

[4] Indeed, for Dalton, the key variable in characterizing non-Western economies was the degree to which they were integrated with Western market society.

"culture" of modern life. Recounted in detail elsewhere (by, for instance, Zelizer, 1989, 1997/1994, 1998), this conventional story portrays money as concomitant to and catalyst of a general transition to a modern world marked by the alienation of human beings from the fruits of their labor and the breakdown of established, often hierarchical social structures and traditional attachments to community. As a universal and internally uniform measure that "commensurates incommensurabilities" (Carruthers & Espeland, 1998, p. 1400) and permits the "fraternization of impossibilities" [in Marx's famous words (1964/1844, p. 169)], money is said to allow the erasure of qualitative difference in favor of a single numerical scale; the imposition of impersonal, rational, instrumental, calculative modes of thought and comparison; the detachment of human beings from the world of things; and the "hollowing out" and weakening of social relations and promotion of individualism (Gilbert, 2005, p. 379). Hence Simmel's (1950, p. 412) famous characterization of money as "transform[ing] the world into an arithmetic problem"—a typical depiction of the psychological changes said to accompany the use of money. In this almost mythical story, money is linked not only to the dissolution of ties among persons and communities but also the imposition of novel mental dispositions oriented towards the formal, quantitative means-ends calculation of self-interest.[5]

This transformative narrative reinforces assumptions about quantification and number as well. Crump, documenting language change among the Maya of southern Mexico, argued that it was the introduction of market relationships, and in particular the use of modern money, that shifted indigenous ways of counting. Tzotzil, like many other languages, employed a system of noun classification. Modes of enumeration were tied to specific noun classes: "Tzotzil numbers," Crump (1978, p. 505) writes "are incomplete without one of five possible suffixes which depend upon an implicit semantic classification of all nouns." The word for the number "four" changes depending on whether it refers to "years," "dogs," "houses," "men," or "ears of corn." With greater incorporation into the wider national and global market, Tzotzil-speaking Maya gradually came to adopt one standard (Spanish) system of counting and did so through specific interactions with Ladinos—in open-air markets characterized by haggling over prices and quantities. Money thus comes in first, followed by abstract enumeration not linked to other forms of classification, such that the "three" in "three cows" is no different from the "three" in "three pesos," chickens, persons, or any other enumerable entity.

It is important to note that, as with this example, anthropology occupies a consistent role in the oft-told story of the impact of modern money, filling what Trouillot (2003) calls "the savage slot." Anthropological accounts provide the other side to the "revolution" that Bohannan argued money created—that is, descriptions of the specific, socially embedded money-objects (or ways of counting, calculating, or reasoning) of non-Western people. This too-simplistic equation—the story of the social and the particular displaced by the universalizing, formalizing, and individualizing—remains with us, especially the assumption that in its capacity to flatten

[5] One of us has described this conventional account as the "money-as-acid hypothesis" (Maurer, 2006, p. 14).

social differences, money institutes a temporal rupture between the modern world of alienation, individualism, and commodity exchange and the non-modern world of solidarity, reciprocity, and social embeddedness.

Here, money serves to discursively reproduce the modern, which is marked by the development of a particular kind of general-purpose money: an abstracted, homogenizing, multifunctional medium of exchange capable of initiating profound social transformations by virtue of its abstract power to make all the world equivalent to it. Modern money is supposedly detached from its social meanings and origins and becomes capable of liberating both persons and things from the specific sociocultural webs of meaning and use in which they were embedded. Accounts of money's evolution and progressive dematerialization—purporting to trace the history of money from barter to socially embedded, special-purpose money to general-purpose money, which itself is said to evolve from coin to paper notes to, finally, the digital form of money today—reinforce such false distinctions and yet continue to circulate (e.g., Ferguson, 2008; Surowiecki, 2012; Weatherford, 1998). In what follows, we show how anthropological approaches to the study of money challenge this narrative and show up its erroneous assumptions.

First, however, we want to briefly explore the theoretical frameworks offered by Marx, Weber, and Simmel since our received story of money and modernization has roots in these classic sociological accounts. We emphasize, however, that the work of these three authors is rich and nuanced enough to provide provocations for anthropologists working on money today. (We can offer here only a superficial take). For Marx, commodity money—primarily gold and silver—occupies a central role in mediating capitalist relations of production and exchange. For Marx, all commodities become reducible in the abstract to money, which "extinguishes all distinctions" among them (1976, p. 229). But this does not erase the commodity character of money; Marx called money the "privileged commodity," at once a commodity like all others and yet set apart from them to serve as general measure of their exchange value (1976, p. 187). Money is thus paradigmatic of Marx's central analytical object: industrial capitalism generally. In money, Marx suggested, one can find "the riddle of the commodity fetish, now become visible and dazzling to our eyes" (1976, p. 187). Or again: "All commodities are perishable money," Marx (1973/1939, p. 149) writes in the *Grundrisse*, but "money is the imperishable commodity."

Like Marx, Weber and Simmel understood money to be at the heart of social and economic transformations ongoing throughout the nineteenth and early twentieth centuries. Unlike Marx, Weber stressed the importance of the state in the creation of money and of bureaucratic agents in regulating its circulation. But like Marx, Weber emphasized how money can act as an abstract measure through which the values of other things can be compared and commensurated; with money, Weber (1978, p. 81, emphasis in original) wrote, came the possibility of "monetary *calculation*; that is, the possibility of assigning money values to all goods and services which in any way might enter into transactions of purchase and sale." Weber thus saw money as part of the increasing rationalization of modern life, since, according to Weber, "expression in money term yields the highest degree of formal calculability" (1978, p. 85).

Simmel's approach also foregrounds the role of money in social transformation. But Simmel describes the ambiguity of this process and shows how the emergence of the kind of universal-equivalent money discussed by Marx and Weber has both liberating and homogenizing effects. Money—by virtue of its fungibility, "its unconditional interchangeability, the internal uniformity that makes each piece exchangeable for another, according to quantitative measures"—partakes of a progressive process through which our relationship to the material world becomes more and more abstract, until finally, "through money, man is no longer enslaved in things" (2004, p. 407). This progressive distancing of the human subject from the world of objects is accompanied, within a money economy, by a loosening of people's social ties to others and to traditional hierarchical categories. Thus, for all three of these emblematic social thinkers, money is linked to the emergence of a modernity marked by the dissolution of a prior world of rigid social attachments and communities. For Simmel, money's capacity to emancipate people from the restrictions imposed by heritable corporate status paradoxically produces an egalitarianism that erases ascribed rank, such that money becomes the central tool mediating social relations. As we will see, the effects of such mediation cannot necessarily be predicted.

Challenging the Received Narrative

And yet, despite the typical "modernizing" story of money, the world's diverse monetary ecologies have not been simply overwhelmed by a progressive homogenization, quantification, dematerialization, dissolution of social ties, and so on. The classic narrative of socioeconomic transformation in Africa and around the world, for instance, has been challenged by accounts that point to resistance to the imposition of colonial currencies (Şaul, 2004), alternative causes of local currency inflation (Gregory, 1996), and the long historical experience of many societies with multiple currency systems and regional trading networks, which preexisted colonial economies and then coexisted alongside them (Guyer, 1995, 2004).[6] As Robbins and Akin (1999, p. 1) explain for Melanesia (but which could easily apply elsewhere),

> Widespread social scientific expectations that global capitalist expansion would quickly overwhelm traditional Melanesian economies have been confounded by the latter's dynamism and resilience. Indeed, many local systems of exchange appear to have flourished rather than withered from linkage with the world economy, and state currencies and imported goods mingle within formal exchange systems fundamental to social reproduction.

[6] On the coexistence of multiple currencies, see also the classic chapter by Mintz (1964) on Gresham's Law in Jamaica in the eighteenth century and the groundbreaking work of historian Kuroda (2008).

> Far from the advent of money having consigned indigenous currencies to irrelevance, the two instruments of exchange are clearly in dialogue throughout Melanesia.

Anthropologists today therefore continue to explore the intersections of money and social change, but in ways that do not presuppose the direction or completeness of such change. Roitman (2005) offers a reconsideration of the imposition of colonial currency through taxation as a political technology of state and subject formation, locating money and tax at the heart of political obligation. Ewart (2013), on the other hand, describes the complex relationship between the Panará (an indigenous people living in Brazil), Brazilian currency, and the manufactured goods to which such currency provides access, arguing that the Panará's interest in money and goods does not reflect growing "dependence," but long-standing, pre-existing orientations toward outsider-others, including the state. And Guyer (1995, 2011) suggests that the "currency interface" between ostensibly modern and primitive money has been re-invented in the late-twentieth century in the distinction between "hard" national currencies like the US dollar, which are used internationally as reserve currencies, and "soft" national currencies and other money-like coupons used primarily in their cash form. Other anthropologists have explored the link between money and modernity in local or indigenous idioms and highlight, as we review below, the multiplicity of money—local, national, and transnational (Cole, 2004; Hutchinson, 1992; Shipton, 1989; Taussig, 1980). Rutherford (2001) shows, for instance, how in parts of Indonesia, money signifies foreignness, but is used in the service of both social intimacy and alienation.

Bloch and Parry's (1989) signature contribution is in some ways representative of much of this work. They point up the diversity of meanings and forms money can assume in different places and in different times but also suggest commonalities in the way monetary exchanges are conceptualized depending on whether transactions guided by a short-term profit motives interfere with or threaten the long-term capacity of a social group to reproduce itself and its value system. Bloch and Parry thus attempt to redirect attention away from popular Western ideologies about money—such as those outlined above—and toward the timescales that frame particular transactional categories, whether monetary or nonmonetary. Guyer (2011) similarly proposes that greater attention should be paid to the temporalities of using different monetary forms and converting among them.

Such research displays a marked departure from the questions that have conventionally occupied anthropologists when studying money. Instead of definitional inquiries into what money "is" or what makes "their" money different from "ours," anthropologists today are concerned to document empirically the pragmatics of money—that is, its material forms, meanings, and uses in practice.[7]

[7] While much of this research is contemporary, some of it draws on histories of money that have often been overlooked, and so we include select works from the ethnographic and archaeological record.

Money and Materiality

Often, all that is available in the archaeological and ethnographic record on pre-modern or nonwestern forms of exchange are the material objects used in such exchanges. This, in part, accounts for the focus on the stuff of money in anthropology. Even when that stuff consists of familiar objects like metal coins, however, it can be tricky to interpret. Were silver coins used in market exchanges in the ancient eastern Mediterranean, for example? Or were they sumptuary or ritual offerings, distributed almost like souvenirs at fairs, given as medals to honor soldiers, or meant to announce the name of the local sovereign? When it comes to the objects that numismatists classify under the heading "Odd and Curious Money," the metal rings, iron rods, carved shells, bone, and other materials, the interpretation gets even trickier.[8]

Part of the problem is that the people using such "odd" moneys rarely imagined these objects could be used as a general standard of value for all other goods and services, or that objects given in exchange for a good or service somehow reflected its "value" (understood to be a ranking on an abstract, external, transcendental and potentially universally applicable scale). The very logic of the transaction led in other directions. In parts of Papua New Guinea, for instance, a shell or packet of sago flour was not exchanged for a pig so much as it *substituted* for the pig in the pig's position in a series of social relationships forged through marriage. Not any shell could stand in for such a pig; it had to be a specific shell, with its own social history, substituting for a specific pig. Rather than a calculation involving ratios (how many shells or how much sago makes up one pig?), this is an operation of substitution (how many make up the "right one"? Strathern, 1992, p. 187). Similarly, the metal artifacts used in some African societies rarely took on all of the Aristotelian functions of money at the same time (Guyer, 2004), and even where they appeared to be used as such—in exchange for, say, a cow or a wife—what mattered was how the object stood in for a set of social relations newly created, sundered, or reconfigured (Graeber, 2001).

Strathern's insights offer a starting point for thinking about money's materialities. In work on the role of money in Cuban Ifá cults, Holbraad (2005, p. 232) writes, for instance, that money's "trademark quality" is its multiplicity or "pliable partibility." Counterintuitively, however, Holbraad argues that money's quantity does not necessarily imply abstraction and commensuration; the moment of expenditure or consumption, for instance, "eclipses the purview of possible worlds with a concrete exchange" (p. 244). (Indeed, according to Hart [2009, p. 140], money's "persuasiveness" follows from "the fluency of its mediation between infinite potential and finite determination.") Quantity as a quality of money also shapes the pragmatics of its handling, counting, storage, and movement, as well as the possibilities

[8] On the archaeology of money and the origins of coinage, see Eagleton and Williams (2007), Grierson (1977), Haselgrove and Krmnicek (2012), Smith (2004), von Reden (1997), and several of the contributions to Wray (2004).

for its social concealment and revelation (Guyer personal communication; see also Pickles, 2013b, Strathern, 1999). "[A]ll currencies objectify quantitative measures in concrete forms," writes Weiss (1997, p. 352).

Money's materiality is also important because of its role in the debates between commodity and credit or state money proponents. Cases where people use nonprecious metals or objects as money confound commodity theories and lend weight to alternative accounts emphasizing the role of money in signifying trust, credibility and social connection. On the other hand, proponents of commodity money often emphasize the material qualities of precious metals (and other money objects)–their durability or malleability, for instance–and this remains true today, notwithstanding the widespread use of fiat currency: Witness the rise of contemporary commodity-money supporters, who call for an end to the US Federal Reserve and fractional reserve banking generally and for a return to the gold standard. Some have argued that such stances have historically reflected deep-seated commitments to reinforcing hierarchies of race and class since gold-standard theories imply a world in which value corresponds perfectly to substance and wealth to merit—with regards to people as well as things (O'Malley, 2012). Money's substance is thought to stand in for, and shore up, a social formation.

Money's material qualities turn up in anthropological accounts where other properties or social phenomena are analogized to a people's or country's particular money-stuff. "Not all cash is alike," notes Lemon (1998, p. 22) in a study of the aesthetic and affective relationship Russians after the Soviet period held toward US dollars. There, "hard" currency was imagined to link people to more solid and secure futures. In the same way, anthropologists have explored money's role in symbolizing the nation and post-nation in a unifying Europe (Peebles, 2011) and other emerging post-Socialist contexts (Truitt, 2013). In El Salvador, in contrast, the imagination of a wealthy but turbulent future fostered by flows of remittances in US dollars gets concretized in the designation of Washington, DC—the source of migrants' remittances—as "*la mina de oro* (the gold mine)", but Intipuca, one remittance destination village, as "*el pueblo de los ladrones* (the town of thieves)" (Pedersen, 2002, p. 433). Other analogical extensions are possible, too, including to the spiritual world: Kwon (2007) describes the various meanings elicited by replica money burned as a ritual offering to gods, ancestors and ghosts in Vietnam and how, as it becomes more common to use replica US dollars, such "Do La" money can become either a token of authority challenging traditional spiritual hierarchies or a token of emancipation and a sign of the democratization of the spiritual world. Finally, Chu (2010, p. 5) describes a variety of mundane and ritual tools, such as replica US $100, issued and underwritten by the Bank of Heaven and Hell and littering the streets after a funeral procession, which mediate the "pragmatics of desire" of rural Chinese preparing to migrate to the USA.

These studies show how the specific material qualities of money can become fodder for varied meaning-making practices. In work in Indonesia, Strassler (2009, p. 70) points to how a large-denomination Indonesian bill displaying the face of the dictator Suharto became "visual shorthand" for corruption and the abuse of state power after his resignation. The abstract exchange value or purchasing power of any

given money-object, she insists, does not "account for the ways that money is necessarily concretized," nor how its material form furnishes possibilities for resignification and refunctioning (p. 71). Indeed, Keane (2001, p. 69; cf. Keane, 2008) has argued persuasively that money's "irreducible materiality" leads to its "semiotic underdetermination," making money vulnerable to slippage and thus forever open to reinterpretation. "The matter of money—the way that no money exists entirely in the abstract, but must always find material expression in cash, coin, the "odd and curious," or the electronic infrastructure of digital accounting—provides a foundation for symbolic innovation.

Money and Symbol

This consideration of money's materialities has thus also involved a reconsideration of money's meanings. Focusing on money-stuff instead of monetary abstraction and commensuration reopens anthropological and linguistic debates over the nature of language itself, even as it draws on a long-standing trope comparing money and language (Derrida, 1992; Shell, 1978, 1982, 1995). Anthropologists have long been influenced by Saussurean structuralist understandings of the arbitrary connection between the signifier and the signified. Saussure's own model of the relationship between signifier and signified and among signifiers as a system of values was expressed via a money metaphor:

To determine what a five-franc piece is worth one must therefore know: (1) that it can be exchanged for a fixed quantity of a different thing, e.g., bread; and (2) that it can be compared with a similar value of the same system, e.g., a one-franc piece, or with coins of another system (a dollar, etc.). In the same way a word can be exchanged for something dissimilar, an idea; besides, it can be compared with something of the same nature, another word (Saussure, 1966, p. 115; see Maurer, 2006).

Some anthropological work on money upholds the Saussurean understanding of the sign (in this case, the money sign) as a product of convention and as arbitrary in its relation to that for which it stands (bread, commodities, abstract value) and in relation to other kinds of its type (dollars, francs, pesos, etc.). Some anthropologists, for instance, have begun to ask what happens to money in moments of crisis, when hyperinflation or devaluation threatens money's representational capacity to stand for value. Argentine social scientists, for instance, have documented the effects of the collapse of the country's currency regime in the early 2000s, including the proliferation of local currencies (Luzzi, 2010; Ould-Ahmed, 2010). Neiburg (2010, pp. 98–99) suggests that Brazilians and Argentines have learned to live with "sick currencies" and monetary instability in part by learning how to use numerical devices like "index numbers" (for example, indicators of price changes) to protect themselves from inflation and depreciation. Nonetheless, even if people become accustomed to monetary instability and adept at negotiating multiple currencies, questions about the "real value" of money or the tangible ground of the relationship between money and value often persist (Dominguez, 1990). Here money becomes a vehicle

for concerns about representation per se. Examples of situations like these—of money in crisis or of the manipulation of multiple currencies and money-objects at once—abound, but anthropological research in this area continues to develop. (See Guyer, 2011 for a call to action.)

As we have already seen, the introduction of Western-style money frequently provides occasion not just for anthropologists but also for their interlocutors to reflect on money and symbolic process. Again, the record from Papua New Guinea is instructive, probably because of the long assessment of material things not as stable objects, but as (the product of) variegated, multiple flows of energy, blood, kinship, and/or spirit. Money for Melanesians embodies "the paradox of social reproduction," how the social and cosmic order endures despite the "transient individual lives that animate it" (Foster, 1999, p. 229). Where some nineteenth century Americans railed against paper currency because they felt it to be representationally inadequate to abstract value money is supposed to signify, Melanesians take paper money as "the skin of the state—the site where [they] might look for news about relationships to the powerful forces brought by contact with white people and their institutions" (p. 230). For Foster, the representational dilemmas posed by money (especially to Westerners) are perhaps irresolvable. "Doubts," he says, "persist" (p. 226).

On the other hand, anthropological research on other cultures' money-stuff and other people's understandings of value and modes of evaluation has often discovered that money signs are non-arbitrary and motivated (or linked to their referent), directing anthropologists to other accounts of semiotic processes. In addition, the process of abstracting and equilibrating presumed in the Saussurean account borders on the mystical for many non-Western peoples; it is not surprising, therefore, to find in the introduction of Western-style currency around the world indigenous discourses that associate it with magic, religious conversion, and a transmutation of the material into the spiritual and back again (Taussig, 1980).

In recent work, the question has shifted from one about *what* money signifies—which invites these questions about the representational adequacy of any monetary form to its value—to *how* money signifies. This leads back to the empirical investigation of the entailments and implications of money's many forms and uses, although with revised understandings of how signification can work. Drawing on Peirce, a significant group of anthropologists working on money and value have drawn attention to how material qualities of things (such as heft or texture), when experienced as being possessed by different objects, serve as a sign linking those objects to one another. This creates a chain of relationships across objects (heavy objects, rough objects) not divorced from their materiality (Munn, 1992). Moneys and other objects of value are exemplary when their material qualities link them to other entities. Keane (2001, p. 77) writes of the Indonesian island of Sumba that "money […] does not always fully possess the properties of fluidity, impersonality, or abstraction." Drawing on the Peircean concept of the indexical sign—a non-arbitrary sign that points toward its genesis (e.g., a bullet hole signifying a bullet, or smoke fire)—money "often retains some indexical links to its sources and owners" (p. 77). This is a world in which a representation is never understood as entirely separate from that which it represents.

Similarly, many have explored how, in contrast with a prevailing narrative about the progressive dematerialization of fiat and digital currency, most money continues to wear a "national uniform," as Marx (1976, p. 222) put it, inscribed and circulated as legal tender by the state and always pointing back to a political authority. Money-stuff, Rotman (1993/1987, p. 90) writes, retains a "domestic, national indexicality." Studies of money in nation-building have looked at the ways money, as both "physical object" and "iconographic surface," can unite national communities by providing a shared experience or communicating shared narratives of national belonging (Strassler, 2009, p. 71; see also Gilbert & Helleiner, 1999; Helleiner, 1998). Peebles (2008), for instance, shows how the emergence of national paper money is tied especially to efforts to convince people to give up their private hoards and instead invest in the future of a particular territorial nation-state with its own centralized currency reserve.

In some times and places, even in the West, abstraction may not matter and materiality may matter more—such that money's material capacities to "represent" value are not the point—in contrast to the focus on abstraction and commensuration inherited from the Western tradition of monetary exchange. People may try to avoid the representational conundrums posed by money as an ultimate symbol of abstract value when this conflicts with, say, theological understandings of the nature of the divinity. Proponents of contemporary Islamic finance often sidestep the question of whether money can ever really be representationally adequate to all goods, services, things, and beings in this world (or the next!) (Maurer, 2005). Just as there are different weights given to the qualities of things, so too are there "plural immaterialities" (Miller, 2005, p. 25), many reasons why tangibility or material form can be shed, obviated, or made irrelevant. The language of representation is but one.

Money and Complexity[9]

The work reviewed so far suggests that in the ethnographic record, money is revealed as complex along a number of dimensions. First, the record indicates the need to soften the gift society/market society dichotomy (and the us/them distinction generally), to appreciate the quantitative and calculative aspects involved in the gift and the solidarities and contests over honor or prestige involved in the market (Appadurai, 1986). Second, appreciation of the ways in which the materiality of money matters in its conceptualization and functioning suggests the inadequacy of either commodity or token/credit theories of money (Hart, 1986; Maurer, 2005). As a signal example of one Western understanding of representation itself—money-object signifying abstract value, enumerable objects indicating denomination—money is also the undoing of this model of representation.

[9] By "complexity" we want to call attention to the wider sociocultural contexts of money's use and emphasize the ways that the effects of monetary practice involve multiple vectors and variables, which rarely line up evenly.

As any magician knows, tear up the dollar bill, and your audience will gasp—partly because you have destroyed a token of value, but partly, too, because in so doing you have revealed that there was nothing there but paper to begin with. In working your spell, to reconstitute the torn dollar, you have simultaneously, if only momentarily, broken the spell of money.

Recent work by anthropologists on money's diverse histories, uses, and meanings also attempts to break this spell, showing up the deficiencies of the assumptions running behind the conventional narratives about modern money depersonalizing or desocializing relationships. Serious challenges have been posed to such accounts by recent research on barter (Ferraro, 2011; Humphrey, 2002; Humphrey & Hugh-Jones, 1992); on the "social" qualities and not strictly "economic" uses of money today, even in the contemporary West (Wilkis, 2013; Zelizer, 2007); and the archaeological origins of money itself (Haselgrove & Krmnicek, 2012), as we have discussed above. At the same time, Bohannan's "spheres of exchange" model has proven important to contemporary work in the anthropology of money, for this "theory of value in nonexchange," as Sahlins (1972, p. 277) puts it, can constitute a significant challenge to assumptions about money's fungibility, liquidity, and universality when applied to the modern side of the conventional narrative of money.

One of the most productive strands of recent anthropological research on money builds on these insights about differentiation to highlight how people actively manage monetary multiplicity and emphasize the politics and pragmatics of producing and translating value in complex monetary ecologies. Here the sociology of money has proven to be an important inspiration. Carruthers (2010) suggests that we make meaning with money by producing difference in two ways: by separating money out, segregating it away from other kinds of transactions and interactions, and by creating distinctions within money, distinguishing between monetary categories, for instance, on the basis of source or destination. A vast literature has emerged on how we construct such spheres of exchange or monetary "circuits" (Zelizer, 2004), which allow certain transactions and disallow others. Zelizer (1989, 1996, 1997/1994, 2006, 2007) has been at the forefront of this development, writing about how people "earmark" certain pots of money for specific uses, differentiate between pots in terms of how they are earned, name distinct uses of singular currencies and distinct users of money for different kinds of exchange, and continually move back and forth across the boundary between what are supposed to be private worlds of emotion and intimacy and the public spheres of economy activity, instrumental reason, and anonymous exchange.[10]

This kind of mental and material budgeting has been documented in detail by a plethora of studies, which show not simply fiscal earmarking at work but also sacralization, localization, and other kinds of sociocultural, practical, and linguistic enclaving, channeling, or domaining (e.g., Eiss, 2002; Piot, 1991; Rutherford, 2001;

[10] Zelizer's work has provoked a debate within sociology, which focuses on the personalization of money by its users vs. money's capacity to commensurate, especially as a sign of larger structural systems, such as finance capitalism or the state. See Dodd (2005), Fine and Lapavitsas (2000), Ingham (2001), Polillo (2011), Zelizer (2000).

Shipton, 1989, 2007; Znoj, 1998). Indeed, it is therefore also important to pay attention not only to moments of circulation and exchange but also to what *cannot* be exchanged—that is, domains of pricelessness or *inalienability* (the classic text in anthropology on this topic is Weiner, 1992). Such processes of connection and disconnection do not unfold in one direction, but are ongoing and multivariate. Peebles (2012) shows how common metaphors about "dirty money" or "filthy lucre" can be imaginatively revised to highlight the ways that money crosses borders and domains; "when we spot the pronounced claim that money is 'dirty,'" he writes, "we should see it as a moment in an ongoing process of social boundary construction by interested parties" (Peebles, 2012, p. 1249). Hutchinson (1992) has extended Bohannan's "spheres of exchange" model to show how among the Nuer of the Sudan, the introduction of money has not led to the dissolution of traditional rules about the exchangeability of certain kinds of goods, but has provoked the creative incorporation of money through the invention of hybrid categories of cattle and wealth.

Many anthropological studies of money-in-practice have focused on what Rogers (2005) calls the "politics of liquidity" or what Jessica Cattelino (2009) has addressed in terms of money's fungibility. Both authors treat money's ability in particular circumstances to make things equivalent as something achieved and not given in advance. Rogers investigates how Russians have used official currency (rubles) and moonshine as media of exchange and stores of value after the break-up of the Soviet Union, showing that there are degrees of alienability and asserting that liquidity will be unevenly distributed among various transactables along lines of social distinction and inequality. Cattelino (2009) similarly describes how members of the Seminole tribe in Florida selectively use dividends from the US government to promote tribal goals by both reinforcing Seminole distinctiveness and community identity *and* facilitating commercial transactions and interpersonal intimacy (foregrounding money's capacity to "connect and equate things that might seem different" [194] and build networks of exchange). Cattelino argues that the fungibility of money can be exploited, "whether to make or to break ties, in ways that reinforce indigenous political authority and autonomy" (p. 194). The goal, she says, is to trace under what conditions and for whom fungibility becomes important. In research on pyramid schemes in post-socialist Albania, Musaraj (2011) similarly emphasizes the work of translating among multiple regimes of value and wealth, including stacks of cash and flows of migrant remittances in many different currencies.

Monetary practice and meaning-making is, in short, political—a struggle, in particular, over who can channel money's fungibility and make connection and difference work for them. Money can be thus used to create or reinforce relations of inequality and rank as well. In northern Brazil, for instance, Ansell (2010) reports that money spent in fundraising auctions is used both to promote political participation and to reinforce local political hierarchies. In work on the long-distance remittance economies of Vietnam, Small (2012) argues that money transacted as a gift can reveal and exacerbate difference (in this case, between the located experience Vietnamese and an imagined world of wealth and mobility indexed by US dollars).

This research tends to emphasize the plurality of money's forms, practices, and meanings—returning, in a way, to anthropology's focus on "special-purpose" moneys. Thus, scholarly accounts of currencies "here" and "there," "then" and "now" are converging in that recent research finds in money greater variegation and complexity, not one universal form or function. Guyer observes that as we fill out the ethnographic record on the special-purpose qualities of "our" money, and the "formal" or "calculative" aspects of non-Western and historically non-modern monetary practices, we find that so-called special-purpose money has "*more* modern 'purposes' and characteristics than was thought in the past, and that twentieth century monies clearly have *fewer*" (Guyer, 1995, p. 1; emphasis in original). This recognition opens up new questions for research on money—and new possibilities for interdisciplinary collaboration.

Emerging Trajectories for Future Research: The Anthropology of (the Psychology of) Money

In an influential article, Lea and Webley (2006) propose that neurobiological processes structure people's relationships with money in two distinct ways: as a "tool" or as a "drug." The "tool-theory" of money, they argue, would treat money as a means to (potentially multiple) ends; the "drug-theory" of money, on the other hand, provides an explanation for moments when money becomes a "functionless motivator," mimicking "biological rewards" such that it continues to shape behavior, "but in an illusory, nonfunctional way" (p. 165). Money, they say, is "neither literally a tool nor literally a drug," but that these serve as useful metaphors to summarize the dual structure of human motivation toward money. Both of these strands of research suggest, as Burgoyne and Lea (2006, p. 1091) insist and as anthropologists have long understood, that "money is material."

Lea and Webley find evidence for their hypothesis across disciplines, from economics and psychology to history, sociology, and some of the early anthropologists we cited at the beginning of this chapter. Chartalism, they suggest, is basically a tool-theory of money; metallism, however, is a drug theory. Reports from sociologists and anthropologists about the "restrictions" on the use of money—giving money as a gift, "sacred" uses of money, taboos on expenditure (such as those documented by Zelizer), and how "primitive moneys of non-Western societies" were at times "confined to a particular class of commodities or a particular group of people" (p. 170)—are offered in support of a drug theory. The role of money in social status, the tendency of people to privilege the nominal value of money over its real purchasing power (the so-called "money illusion"), and the resistance new money forms receive, among other phenomena—these are also best accounted for via a drug-theory of money. Lea and Webley suggest, then, that while a more-or-less functionalist tool-theory of money accounts for much of "normal" money practice, outlying cases call for other explanations: In these cases, "money seems to act on the human brain in ways that mimic more natural incentives, not just by being

an instrument for access to them" (p. 173). For Lea and Webley, these natural incentives appear to be first-order motivations while the normative money-as-tool is a second-order means to an end. They thus recapitulate the longstanding Eurocentric assumption that non-Western peoples are closer to nature and the old (and no longer widely accepted) anthropological account of culture as helping the human organism fulfill its biological needs.

At the same time, however, work that builds on these hypotheses indicates areas of potential (and potentially surprising) overlap with trends in the anthropology of money. We do not pretend, nor are we in a position, to evaluate this research. We are suspicious, however, of theories and experimental findings that lend themselves too easily to universal generalizations about human biology, behavior, motivation, decision-making, even morality. Lea and Webley recognize that "[i]t remains possible that an alternative, completely nonbiological, model could give a more economical account of the phenomena" (p. 165), but they prefer the language and explanatory apparatus of sociobiology:

> If we are to fit money motivation into the framework of biological explanation that applies to other strong human motives, then we must explain how money gets its incentive power through its action on other instincts. If we cannot do so, we would be faced with a situation that would be scandalous within the terms of a biological psychology—a powerful human motivation, perhaps even the most powerful, with no real biological roots. (p. 175)

The argument, of course, is tautological: We assume that human behavior must have evolutionary, biological foundations; therefore, we find that human behavior has evolutionary, biological foundations. We contend that even if there are powerful motivations that have biological roots, their content and form is not given in that biology. (All humans have the capacity for language, but no human speaks "language"; rather, they speak English, Dari, Tok Pisin, etc. And as we have seen, no one uses "money" as an abstract category, but rather Guatemalan *quetzales*, manillas, debit cards, etc. The differences matter.)

Thus, as Benedict (1934, p. 9) warned 80 years ago, social science, because of the inherent limitations of its data, always risks identifying "local attitudes" of its own time and place with "Human Nature." We are therefore wary of experiments designed to test ideas and behavioral orientations that are embedded in particular cultural worldviews and historical traditions in order to locate them in a universal human psychology. We do not presuppose or take for granted the singularity of "the human mind" or human agency, motivation, or practice, and we would caution those who would—especially with regards to money. For if the ethnographic and archaeological records of money's forms and functions convey any single lesson, it's about the heterogeneity of those forms and functions: Money objects come in all shapes and sizes, have been put to an extraordinary diversity of uses, and have elicited an equally extraordinary variety of meanings.

We note our differences here, however, *not* to dismiss Lea and Webley's work, but to situate it as a work of theorization and to delineate areas of agreement and points of intersection. We are with Lea and Webley up until they locate their posited sociobiological explanatory apparatus in biological evolution—and we suspect

most anthropologists would agree with us. This is one place where disciplinary differences and histories (given anthropology's uncomfortable early alignment with scientific racism and its encounters with cultural difference) will be consequential in any conversation between anthropology and psychology. For anthropologists have long worked to complicate accounts of complex sociocultural phenomena as simple expressions of biological, genetic, or evolutionary "nature"—and to complicate the very poles of "nature" and "culture" taken for granted in such accounts (e.g., Strathern, 1980). Of course, as our editors pointed out to us, linking monetary practice to the psychology or biology of the human brain does not necessarily discount the complexity of such behavior; indeed, modern biological psychologists must confront the diversity of brains both within and across cultural contexts. The trouble is that by locating behavior or culture in biology or evolution or even "human nature" and describing that relationship in deterministic terms, we provide fodder for unscientific rationalizations of the world as-it-is (of, for instance, inequality) and ignore both the diversity and potentiality of human life.

Despite our own disciplinary biases, we are nonetheless struck by the implications of some psychological research for an anthropology of money that foregrounds not questions about how to define money, but its pragmatics. If we find inspiration in the psychology of money, it is as a spur to thinking not about the universal foundations of human minds, but about the expansiveness of human capacity. That expansiveness is evident not only in the use and manipulation of money objects but also, and especially, in ongoing creative repurposings and experimental innovations with money and payment in the contemporary world.

Money as Tool: From Semiotics to Pragmatics

Citing Lea and Webley's tool-theory hypothesis, Becchio and her colleagues set out to test the psychological foundations of the tool metaphor. "The tool theory," they write, "accepts the metaphorical extension of the idea of tool to money seeing money as means to an end: As a screwdriver is *for* screwing, money is *for* representing the value of goods and services, and it does this on a precise scale for tracking and evaluating their exchange" (Becchio et al., 2011, p. 1). Their neurological imaging experiments attempt to demonstrate the validity of this metaphorical extension, and they report that, when watching video of currency being ripped and torn, images of research participants' brain activity show activation of the parts of the brain associated with tool use. "Violation of social norms associated with money activates a network associated with tool use, and this network is parametrically modulated by the value of the money presented" (p. 9). That is, as the face value of the bills destroyed increased, so too did brain activity.

What does it mean to treat money as a tool? The turn to tool use in psychological investigations of money parallels in some ways the turn in anthropological considerations of money from semiotics to pragmatics. The latter, however, makes no assumptions about the primary or proper implementations of money-as-tool, nor

does such work assume a one-to-one relationship between form and function. If money is a tool, its material forms matter not only in terms of its intended uses, but also as platforms or infrastructures that allow for unintended employments and innovative or creative refunctioning.

Here we can only point briefly at emerging research on money's denominations. Consider again Becchio et al.'s finding about the greater brain activity associated with the destruction of higher denomination banknotes. In a fascinating dissertation, Anthony Pickles (2013a) reports a kind of gravity well produced by large denomination banknotes during gambling games in the highlands of Papua New Guinea. Men playing cards engage in complicated mental calculations when placing money into the pot, as they often lack the proper denomination notes for their small-value bets. Placing a large value note into the pot, but mentally tallying only a portion of its value as committed to the game, an unlucky player can watch his note slowly get consumed over the course of the game, as first one fraction of the note is lost to another player and then he must commit another fraction as his next wager. This sets off a competition in which each player tries to win the totality of the note, the large denomination banknote pulling everyone in as they attempt its reconstitution.[11]

In Ecuador, where the national currency was abolished after a banking crisis and the US dollar adopted as the sole legal tender in 2000, the particularities of the dollar's denominations played a similarly important role in Ecuadorians' adaptations to the new currency. Ethnographic fieldwork conducted by Nelms reveals that when faced with a lack of fractional currency during and immediately after dollarization, many Ecuadorian merchants preferred to "round up" to the nearest whole dollar denomination. Here the dollar denomination served as a tool for making equivalence in market settings. In discussions about the practice, however, rounding up came to signify cultural and national difference as Ecuadorians accused one another of being unable to recognize, unlike US users of the dollar, the value of a cent. More generally, many Ecuadorians' struggled to recognize the dollar's individual denominations—due to the homogenous color of dollar bills and the sizes and lack of numbers on many of the coins—and these struggles to recognize denominational differences became linked to the political process of learning to "trust" the dollar after a serious financial crisis. When the Sacagewea dollar coin began to circulate in Ecuador, it was quickly and widely adopted, and many associated it with the series of fractional currency inscribed with Ecuadorian national imagery minted specially for the Ecuadorain government to address the lack of small change. Ecuadorians saw the woman on the dollar coin—the North American Indian woman Sacagewea, pictured with a baby on her back—as a particularly "Andean" one. In Ecuador, in

[11] Pickles' findings reinforce the comments made by Strathern (1999) on the capacities of money in highland Papua New Guinea. Strathern's interlocutors in Hagen juxtapose the capacity of money to be divided (and thus to serve multiple potential uses, which necessitates choosing among them) and the singularity and non-divisibility of shell valuables. For Hageners, Strathern writes, money "did *not* have an individuating effect. Money was always too suggestible of alternatives. So in handing only some of it over, one was not resolving conflicting intentions in the single act, but rather activating the mind's divisions" (p. 97).

short, the denominational differences of the US dollar became the tool through which national and cultural difference was delineated and negotiated.

These cases indicate that money is not simply a functional tool the way a screwdriver is: its tool-like qualities can be used for other purposes than those for which they were designed.[12] As Pickles and Nelms show, money's denominational capacities are deployed in social and political struggles, whether small-scale, in the bluffs and tells of a poker game, or large, in national political economies and the afterlives of financial crises. Some might align these political processes with "natural incentives" for dominance or hierarchy. But the more one looks at power and money, the more difficult it is to see first-order incentives in the complexity and overlay of money's pragmatics and politics.

Money as Power: Ritual and Capacity

Much recent psychological research has also followed in the vein of Lea and Webley's "drug-theory" of money, investigating the behavioral and psychophysiological effects of exposure to money. We would avoid the language of drugs and toxins, first to neutralize the unnecessary moral overtones that such language evokes (i.e., setting up a moral binary between "normal" and "abnormal" monetary practices) and second to avoid replaying the old story about money's deleterious effects on social behavior. While we find that story unconvincing, we find points of resonance between anthropology and recent psychological work, especially by Vohs and her colleagues, that have begun to draw out other kinds of symbolic processes that foreground money's material power. These remind us of anthropological work on the ritual dynamics of display and visibility.

Here we focus on the apparent power of money as a material object (rather than as a sign of relative wealth or socioeconomic distinction) to orient behavior and even influence physiological response. Vohs and her colleagues have investigated the capacity of money to shape people's reactions—even to physical pain. In a series of experiments, they demonstrate that research subjects "primed" with money systematically worked longer on an impossible task before asking for help; expressed less willingness to help others; put more physical distance between themselves and a new acquaintance; preferred leisure activities they could enjoy alone rather than with family and friends; and even reported less distress to being socially excluded and less physical pain when placing their hands in hot water (Vohs, 2010; Vohs, Mead, & Goode, 2006, 2008; Zhou, Vohs, & Baumeister, 2009). They argue that money appears to activate feelings of strength and desires for "self-sufficiency," "an

[12] These studies build on anthropological work that highlights how money's material forms provide platforms for making and remaking meaning and for innovative repurposing of money's uses. They are also complemented by research in psychology (and economics) on the complex dynamics of denomination. Di Muro and Noseworthy (2013), for instance, show that both currency denomination and the physical appearance of money can influence spending behavior.

insulated state wherein people put forth effort to attain personal goals and prefer to be separate from others" (Vohs et al., 2006, p. 1154).[13]

More than the conclusions of this research, its methods are fascinating to us as anthropologists. In Vohs' studies, a variety of methods is used to prime participants—that is, to suggest subtly and nonconsciously the physical and mental presence of money—but they are often heavily visual: scrambled phrases with money-related terms, play money kept in participants' peripheral vision, screen savers of floating currency that pop up on computer screens, posters with bills of various denominations hung innocuously on laboratory walls, counting bills in one's hands, and so on. The materiality and visuality of the methodology, and the link between such visuality and the sense of "power" it seems to elicit in research subjects, reminds us of ritual practice: the use of money in weddings, funerals, graduations, and other life events, for instance, or in religious ceremonies. In such ritual contexts, money is deployed as an object of display and sign of abundance and power, especially as bodily adornment or when hidden away from sight (Haynes, 2012; Strathern, 1999; Tassi, 2010).

Money is worn on the body around the world; it adorns clothing, newlyweds, the nuptial bed, and the dead. It is showered and rubbed on babies, brides and grooms to be, images of saints, gods, and evil spirits alike. It is displayed in restaurants (the first money received by the new business) and on temple walls (the bills and their values signifying fidelity in this life and merit in the next). It is piled up to impress. It is also "hidden"—under the bed or in pockets (Pickles, 2013b)—or in ostentatious ways, such as underneath a cloth hiding the hands of traders as they exchange precious goods for money, or its presence not shown but still announced in the Mercedes or the kente cloth, the cement house or the mansion. It is, as we have noted, the quintessential prop in the magician's act. What is the power of such monetary displays?

Graeber (2001) argues that money is associated with the potential for future action, as opposed to its material manifestation—in, say, coin—as a sign of wealth already realized. This distinction is expressed in a visual idiom: Money signifies "invisible potency" (p. 114), a hidden capacity for action; wealth, on the other hand, requires visual display to reinforce social difference and hierarchies. For the Greeks, Graeber points out, money that remained hidden, kept out of circulation in a private

[13] Such self-sufficiency can be both desirable and undesirable:

> Compared to neutral conditions, when the construct of money was activated, participants behaved in ways that were both more desirable (persistence on challenging tasks; taking on more work for oneself) and more undesirable (reduced helpfulness; placing more distance between the self and others)—in short, a mixed bag that echoes people's ambivalence toward money and the divergent findings observed in extant research. (Vohs et al., 2008, pp. 210–211).

That is, while it is easy to associate the results of such research with narratives about how money engenders selfishness and greed, it is unclear that this is always the case. We emphasize as well that the behaviors and reactions displayed by research participants primed with money might not always lead to individualism or self-interested calculation. Anthropologists, as we have shown, have long documented the ways that money can be used to promote family, community, and social interaction—even national identity.

hoard, represented unknown power, "something dangerous, subterranean, a threat to the cohesiveness of the political community" (pp. 102–103). Stamping images of political authority onto coins was an attempt to render such power visible and public and thereby to translate money's "generic," anonymous capacities into political power through an act of revelation (p. 94).[14]

Graeber's argument, and the wealth of ethnographic and theoretical resources on which he draws, offers important cultural and historical context to the psychological findings of Vohs and her colleagues. The material and visual presence of money, Vohs' research suggests, influences not only human behavior, but sense of self, eliciting feelings of power and self-reliance. Graeber's work suggests that the link between money and self has a long social history, informed by the politics of visibility and invisibility. It also suggests that ritualistic uses of money in display—those identified by Lea and Webley as outliers to money as a tool—are not secondary, but central to the pragmatics of money—especially money as a sign of wealth, power, or capacity. The "symbolism" of money and its function as a tool are not distinct from one another, but continuous aspects of money form and practice.

Money as Memory

In their work on the neurological images elicited through watching money's destruction, Becchio and her colleagues wonder about the connection between money's material form and its functionality as a tool. Becchio and her colleagues argue that since there is no intrinsic connection between the physical form of money and its use or function, monetary forms and functions are linked by "our social practices" alone (Becchio et al., 2011, p. 2). The foundation of money's tool-ness, they suggest, is memory—that is, "memory-based representations of functionally appropriate tool use" (p. 8).

This suggestion is evocative for anthropologists familiar with Hart's arguments about money as a "memory bank." Hart (2001) argued that the origins and future of money were to be found in social memory: Money originated as a device for manipulating personal credit and managing social relationships; similarly, as money becomes more embedded in digital systems of information storage and transfer, its ability "to help us keep track of those exchanges with others that we choose to calculate" will become more important. Even as its forms continue to diversify in the wake of a period of nation-state-based fiat currency, money will remain a "cultural infrastructure" and "a means of remembering."

Hart's work builds on and contributes to a long history of state and credit theories of money that highlight money's unit of account function as its originary use and characterize money in terms of social relationships of credit and credibility (Bell, 2001; Bell and Nell, 2003; Ingham, 2004; Keynes, 1923, 1930; Knapp, 1924/1905;

[14] On the links between money and political authority, see also Graeber (2011) and below.

Wray, 1998, 2004).[15] This history has recently emerged again in the wake of the global financial crisis and the recent surge in debates about money, debt, and value.[16] Graeber's recent work (2011) recounts the story told by these state and credit theorists and echoed in the work of archaeologists, numismatists, and post-Keynesian economists. That story locates money's origins not in barter—as conventional neoclassical economics would have it—but in centralized registries of debts held and maintained by ancient Sumerian states. As such, these scholarly accounts foreground money's originary role in keeping such accounts, and foreshadow, we think, contemporary visions of a coming "cashless" society, where value storage and exchange will supposedly depend on immaterial record-keeping of social and economic obligations (Bátiz-Lazo, Haigh, & Stearns, 2011).

Recent research using cross-cultural data posits a link between the historical and archaeological emergence of transactions records and the growth of social networks beyond that easily managed by a single human brain. Waymire, Basu, and their colleagues (Basu & Waymire, 2006; Basu, Kirk, & Waymire, 2009) argue that accounting and recordkeeping practices emerge in response to the growth and complexification of social networks, since external records can augment and complement individual memory of social relationships and past encounters. That is, as tracking the history of exchanges and other kinds of relations becomes difficult for a single person, sociomaterial forms emerge to provide permanence to such histories by locating them in material artifacts outside the human brain: in clay tokens and balls in Mesopotamia and cuneiform tablets in ancient Sumer; in Inka khipu, knotted textile record-keeping devices (Urton, 2003); in tally sticks used all over the world, including by the British Exchequer in the fifteenth century; and in double-entry bookkeeping and promissory notes (Poovey, 1998). This work dovetails with the story preferred by state and credit theorists, Hart, Graeber, and others, since money itself, they argue, emerges from such histories of accounting. These varying accounts support in general terms, then, money's use as a memory and record-keeping device. Indeed, the economist Kocherlakota (1996, pp. 1–2, emphasis in original) proposes that money is a "*technological* innovation" and specifically, "a primitive form of memory." As we have seen, however, money's functions as a tool does not limit its uses or forms, but in fact serve as foundations for further innovation, creative manipulation, and refunctioning. The history of money, its own "memory bank," demonstrates that diversity.

[15] It is worthwhile to note here the emergence in studies of law and society of a legal approach to money and monetary history, much of it also inspired by this heterodox state/credit tradition. Kreitner (2012, p. 424) writes in review of this emergent literature that instead of recording the legal aspects or implications of money, this approach emphasizes the law as constitutive of money and especially of "money as a project collectively engineered and orchestrated to create liquidity." For these scholars, money is thus a *constitutional* project. See especially the important work of Desan (2005, 2006, 2008, 2010).

[16] For a review of work by anthropologists and others on finance after the crisis, see Ho (2010) and Maurer (2012).

We have noted elsewhere (Maurer, 2011; Maurer et al., 2013; see also Swartz, 2012) that we write in a time of incredible ferment around money. The financial crisis that began in 2008, together with technological innovation in social media and mobile computing, have reawakened experiments in money dormant since perhaps the time of the consolidation of national currencies—whose existence, it bears noting, is a relatively recent phenomenon in human evolutionary terms (going back 300 years if we are liberal in our definitions or half that if we are more conservative). In the USA, private "wildcat" currencies circulated from 1861 to 1863 and the centralization and control of federally issued legal tender was not complete until 1913 (Helleiner, 2003; Mihm, 2007). Contemporary experiments echo this history of plural moneys, ranging from attempts to create new currencies (through, for instance, local time-banking schemes, reputational record-keeping, or decentralized digital networks and cryptography, such as with Bitcoin, an online peer-to-peer currency), to businesses providing financial services via the mobile phone, to projects that imagine the construction of new infrastructures of payment based on the issuance of digital tokens by private entities, many of them harnessing mobile computing. These experiments contribute to the diversity of money and require renewed attention to money's forms, uses, and meanings.

Recent work in anthropology and related fields on the relationship between economic "theory" and economic "realities" has drawn attention to the self-fulfilling prophesies of economic (and other scientific) theory. Economics, Callon (1998) famously writes, does not describe a preexisting economy "out there." In a nontrivial manner, it formats it, participates in its making. This line of thinking builds on decades of research into how scientific practice works to generate knowledge about the world and in so doing remakes the world in its image. It also highlights the recognition that the ways we think about the economy matter greatly for how the economy operates and how we, as economic actors, behave. Anthropology and psychology participate in this economy-making, too: anthropological theories of gift societies and other forms of non-capitalist economy have inspired all manner of small-scale "alternative economy" experiments, from barter networks to local currencies to, now, as Nelms has found in recent research in Ecuador, national and transnational projects to build "social and solidarity economies". Psychological research, especially as it comes to inform behavioral economics, is helping reshape the incentive structures for things like pension plans or health insurance, thereby remaking the market.

Today, however, self-reflexive experiments in money and money-like coupons and credits are restaging debates over the origin and nature of money itself. Anthropologists and psychologists of money, together, will have a lot to learn from these new experiments as they potentially remake money forms and the complex of ideas and practices and discourses that surround and shape money and our relationships to it. Such debates are increasingly embedded in practical, innovative, material experiments, projects, and enterprises by a range of state and non-state actors. In this, they again remind us of the expansiveness of human capacity, the material forms that enable and express it, and the way that we continuously compose and recompose worlds of value, with and through our moneys.

Acknowledgments We thank Jane Guyer, Smoki Musaraj, and Ivan Small for their comments, and Erik Bijleveld and Henk Aarts for their invitation to contribute to this volume and for their enthusiasm, support, and careful reading of earlier drafts of this essay.

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Part II
Dealing with Money: Biological and Cognitive Mechanisms

Chapter 4
Conscious and Unconscious Influences of Money: Two Sides of the Same Coin?

Rémi L. Capa and Ruud Custers

Abstract Although people often deliberate about the monetary consequences of their actions, money may also influence us in more subtle ways. The current chapter explores the ways in which cues related to money may influence people's behavior without their awareness. First, cues related to money may convey information about what is at stake in a certain task. In that case subliminal priming of rewards may increase the effort invested in the task. Second, priming the concept of money may—apart from the intensity of their behavior—also influence the direction of their behavior. That is, individual differences in associations with money may cause people to react to money cues in different ways. These two possibilities are discussed and reviewed against the background of the literature on nonconscious goal pursuit. Overall, the discussed empirical work shows that money cues can motivate and change behavior without much conscious awareness.

There is no doubt that money makes the world go round. Those who don't have it pursue it, and those who do have it perhaps pursue it even more. Although money does not directly satisfy our needs or desires it can be converted into almost anything that will. As such, money can be considered desirable in itself and most people will indeed happily invest effort in obtaining monetary rewards if they are sufficiently large. Hence, money is the ultimate all-purpose reward and a powerful motivator (Lea & Webley, 2006, 2014).

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E. Bijleveld and H. Aarts (eds.), *The Psychological Science of Money*,
DOI 10.1007/978-1-4939-0959-9_4,

Although the pursuit of monetary rewards can be captured in prescriptive and descriptive economic models (e.g., Von Neumann & Morgenstern, 1947), money may also influence us psychologically in more subtle ways. Cues related to money are all around us and quite often we may not even be aware of them. Research over the last decades has suggested that such subtle cues in the environment may instigate and motivate behavior (Bargh, Gollwitzer, & Oettingen, 2010). In the current chapter we will investigate the possibility that perceiving money-related cues may affect and motivate people's behavior without them being aware of it.

We will start out by briefly examining how stimuli in the environment may instigate and motivate behavior in the first place. We will then discuss two ways in which money cues can affect behavior: First we will look at literature demonstrating that cues referring to monetary rewards may modulate the effort people invest in tasks. We will examine the nature of these effects and whether unconscious reward cues affect behavior in the same way as reward cues that people are conscious of. Second, we will look at how cues that activate the *concept* of money can change not only the effort people invest, but also trigger specific behaviors that are associated with money for the individual. Finally, we will discuss how this research may help us to understand the influence of money on human behavior.

Nonconscious Goal Pursuit of Earning Money

The claim that money cues affect motivation and behavior outside people's awareness may seem strange. Most current theories of motivation and goal-directed behavior imply that mental processes that make goal pursuit, and therefore the goal of earning money, possible require consciousness (Atkinson & Raynor, 1974; Bandura, 1986; Locke & Latham, 2002; Vroom, 1964; Wright & Kirby, 2001). Recent discoveries, however, challenge this causal status of conscious will and demonstrate that under some conditions, actions are initiated even though we are unconscious of the source of our pursuits. This recent evidence that goal pursuit can be initiated outside of awareness has been met with resistance and skepticism (Gray, Gray, & Wegner, 2007), perhaps partly due to a lack of knowledge of the principles that render nonconscious goal pursuit more likely to occur.

To fill this gap, Custers and Aarts (2010) postulated that conscious and nonconscious goal pursuit may operate according to the same principles, although they may arise from difference mechanisms. That is, the probability that a given goal is set or adopted and subsequently enacted depends on the ability (a) to mentally access the representation of the goal; (b) to subjectively assess the value of the goal state; (c) to detect, assess, and reduce the discrepancy between the actual and desired state (Aarts, Custers, & Marien, 2008; Custers & Aarts, 2010). Any mechanism that could pull this off would be a mechanism that enables goal pursuit, regardless of whether it is accompanied by consciousness or not. We now will explore those principles in more detail.

Access

The very fact that we can reflect on our goals means that our goals are mentally represented. Bargh (1990) has suggested that for well-rehearsed goals, these representations are stored in memory and not only include information about the objective end state (e.g., eating a cupcake), but also information on its desirability, about how to reach it (e.g., walk to the cafeteria) and about the context in which the goal has been pursued. It is known that temporarily activating these representations makes them more accessible (e.g., easier activated and used) in the setting at hand (Higgins, 1996). Hence, cues in the environment may influence us outside our awareness by rendering a goal representation more accessible (i.e., priming), making it more likely that the representation is activated and used.

Such effects of goal priming have been documented in the literature in a large number of studies (see Bargh et al., 2010 for an overview, and see Hart & Albarracín, 2009; Lowery, Eisenberger, Hardin, & Sinclair, 2007; Shah, 2003 for studies). Bargh and colleagues, for instance, exposed people to achieve goal-related words (or control words) in a puzzle task (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trötschel, 2001). Effects on performance were tested on a second puzzle task. It was found that people who were primed with words related to the goal of achievement behaved more in line with this goal (they performed better on the second puzzle task), and that their behavior showed properties that are indicative of motivation and pursuit, such as persistence. As participants claimed to be unaware of the influences on their goal pursuits, these findings are taken as evidence for the idea that goal pursuit was initiated, and perhaps even operated under the radar of conscious awareness. Another study of Hart and Albarracín (2009) examined the hypothesis that situational achievement cues can elicit nonconsciously achievement or fun goals depending on chronic differences in achievement motivation. Results indicated that achievement priming, compared to neutral priming, activated a goal to achieve and inhibited a goal to have fun in individuals with chronically high-achievement motivation but activated a goal to have fun and inhibited a goal to achieve in individuals with chronically low-achievement motivation, and those regardless of participants' awareness.

Crucially, these findings have also been demonstrated using subliminal cues as primes (Fitzsimons & Bargh, 2003; Custers & Aarts, 2007a), which rules out the possibility that people are aware of the primes and their influence. This may seem surprising as there is a widespread agreement that unconsciously activated representations are short-lived (Naccache, Blandin, & Dehaene, 2002). Moreover, it is thought that consciousness is required for executive control—a collection of high-level processes that enables people to adapt to new or complex situations, when highly practiced cognitive abilities or behavior no longer suffice (Baddeley, 1986; Norman & Shallice, 1986). Executive control and consciousness are, therefore, intimately related and are considered as impervious to subliminal stimuli (Dehaene & Naccache, 2001; Jack & Shallice, 2001; Jacoby, 1991; Kunde, 2003; Merikle, Joordens, & Stolz, 1995; Praamstra & Seiss, 2005). One has to bear in mind, though, that those conclusions are based on studies where primed stimuli have no meaning to the participant.

Indeed, the word "nurse" may only be activated by the prime "doctor" (Meyer & Schvaneveldt, 1971) through spreading activation for a couple of seconds because these are meaningless words. However, this may be a difference if one has the goal to contact the nurse about one's operation that is scheduled the next day (Bargh et al., 2010). As we will see, things may be different depending on the value the primed concept has for the individual.

Value

Evidence for the idea that value or positive affect associated with a behavioral end state motivates people to attain that state comes from research on conscious goal pursuit (Hockey, 1997; Kahneman, 1973) and effort mobilization (Brehm & Self, 1989). The peak of what individuals would be willing to do is determined by variables related to the importance and value of success (Brehm & Self, 1989; Wright & Gendolla, 2011; Wright & Kirby, 2001). Recently, Custers and Aarts (2010) have argued that the value of a primed goal can even be detected if the prime is presented outside of conscious awareness. They propose that apart from the cognitive information embedded in a goal representation (what the end state is and how you should attain it), the positive affect associated with that state serves as a reward signal that determines motivational properties of the resulting behavior.

In one of their experiments, Custers and Aarts (2007b) subliminally primed participants with the concept of socializing and going out (presumably a goal for most of the students who participated) in an alleged letter-detection task and measured the effort they expended in order to realize that activity. They did so by telling participants after the letter-detection task that they would engage in a mouse-click task in which they would have to click with their mouse along several paths on the screen, supposedly to study people's mouse skills. Crucially, participants were told that they might be participating in a second task in which they could win tickets for a popular student party in the city center. The reasoning behind this was that participants who were motivated to attain the goal would speed up their clicking behavior on the mouse-click task in order to be able to get a chance to win the tickets. Finally, after an extensive filler task, participants engaged in the Extrinsic Affective Simon Task (EAST; De Houwer, 2003), in which the internal reward signal of the potential goal of socializing and going out was assessed.

It was found that participants expended more effort in order to engage in socializing and going out when the goal was primed but only when the EAST-score indicated that socializing was positive. This suggests that the reward signal evoked by the representation of socializing and going out (as measured by the EAST) that was activated by priming motivated participants to work harder on the task. Importantly, this demonstrates that priming in itself does not create goals (Sherman, 1987). Priming merely activates the representation of the behavior, which increases the chance that this representation is used to guide behavior. In this case, the internal reward signal that is elicited by activated behavior representation determines whether the effort is invested in order to engage in that behavior.

Similar findings have been obtained using a paradigm in which primes related to potential goals are presented in close proximity to positive affective words (Custers & Aarts, 2005). In one study (Aarts et al., 2008), words related to exertion were repeatedly subliminally primed, immediately followed by neutral or positive words. Subsequently, participants had to squeeze a handgrip in response to a cue for 4 s. It was found that compared to a control condition, priming exertion-related words led to faster squeezing reactions to the cue. However, when the primes were presented together with positive affective words, squeezing reactions were not only faster, but also more forceful.

Capa, Cleeremans, Bustin, Bouquet, and Hansenne (2011) and Capa, Cleeremans, Bustin, and Hansenne (2011) replicated and extended these effects. Students were exposed to a priming task in which subliminal representations of the goal of studying were directly paired (priming-positive group) or not (priming group) to positive words. A control group without subliminal prime of the goal was added. Just after the priming task, students performed an easy or a difficult learning task based on their coursework. Participants in the priming-positive group performed better and had a stronger cardiovascular reactivity related to effort investment (i.e., decrease of pulse-transit time and pulse-wave amplitude) than participants of the two other groups, but only during the difficult condition. This suggests that the positive affective words presented together with the primes evoke a positive reward signal that motivates behavior in service of the primed goal.

Discrepancy

Many theories of conscious goal pursuit have argued that setting or adopting a goal creates a discrepancy between the actual state of the world and the desired state, which individuals are motivated to reduce (e.g., Dijksterhuis & Aarts, 2010; Gollwitzer & Moskowitz, 1996). However, only few studies have tested whether discrepant situations with nonconsciously activated goals encourage individuals to exploit opportunities in novel settings without awareness of operation of the goal (Aarts, Gollwitzer, & Hassin, 2004; Custers & Aarts, 2007b). For instance, Aarts et al. (2004) showed that priming the goal of earning money encouraged participants to play in a lottery that gave access to money but only when they were in need of money. Participants claimed that they were not aware of the priming effects, thus suggesting that the detection and reduction of discrepancies may occur in the absence of conscious processes. In a complementary study, Custers and Aarts (2007b) tested the goal of looking well groomed—an important and desired goal for the students. The authors subliminally primed the goal or not, just before participants were confronted with a situation that was discrepant with the goal (e.g., the shoes they put on were dirty). Next, the speed of identifying actions that are instrumental in reducing the discrepancy (e.g., polishing) was measured. Results suggested that subliminal priming of the goal of looking well-groomed triggered the representations of instrumental actions that were instrumental in reducing the discrepancy.

Conclusion

In conclusion, the pursuit of a goal requires its representation to be accessible, depends on the value of the goal, and relies on processes that facilitate discrepancy reduction. The research discussed above suggests that goal-related cues could trigger goal pursuit outside people's awareness if they render the goal accessible, evoke a positive reward signal and trigger the proper means in the context to attain the goal.

Effects of Conscious and Unconscious Processing of Money

In the light of the research discussed above, there are various ways in which money cues could trigger motivated behavior. First of all, money cues could render goals related to the concept of money (e.g., earning money) accessible, which could lead to the instigation of motivated actions that have been learned to lead to attainment of that desired state (e.g., working) in the past. However, in addition to this full-blown goal pursuit, there may be other instances where it is clear what one has to do to obtain a reward but it is just uncertain what the pay-off may be. In that case, money cues may operate as a reward signal, indicating the value of a particular activity. Below, we will first look at tasks in which money cues mainly relate to the pay-offs of particular actions and the time course of these effects. After that, we look at the effects of money cues that suggest full-blown goal pursuit in less constrained settings.

Long-Lasting Effect of Subliminal Money Cues as Reward Signals

The first demonstration that money cues can serve as reward signals and motivate the exertion of effort was provided by Pessiglione et al. (2007) who invited participants to perform a task in which they could earn money by squeezing a handgrip. Before each squeeze, the money that could be earned was subliminally or supraliminally presented by displaying the picture of a 1-pound or 1-penny coin on the screen. Regardless of whether participants could (supraliminal condition) or could not (subliminal condition) report how much money was at stake, they deployed more force for higher amounts. Congruently, skin conductance responses—used as an index of sympathetic nervous system activity—were higher to images of 1 pound compared to those of 1 penny.

This study was replicated and extended to cognitive tasks (Bijleveld, Custers, & Aarts, 2009, 2010, 2011, 2012a; Bustin, Quoidbach, Hansenne, & Capa, 2012; Capa, Bouquet, Dreher, & Dufour, 2013; Capa, Bustin, Cleeremans, & Hansenne,

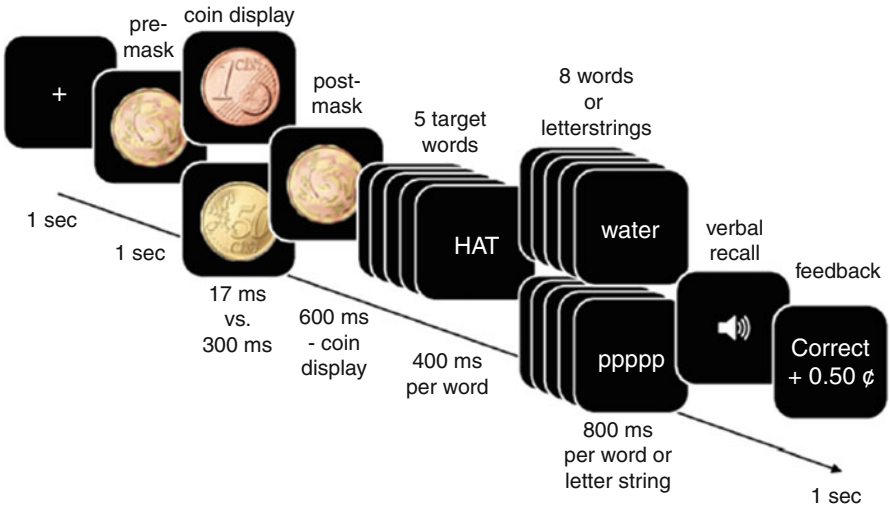

Fig. 4.1 Design of the study. Numbers represent presentation durations in milliseconds. Participants were informed of cumulative earnings at the end of each trial. Participants performed a working memory span task in which they were asked to remember correctly five words. Adapted with permission from "Boosting or choking—How conscious and unconscious reward processing modulate the active maintenance of goal-relevant information." by C.M. Zedelius, H. Veling, and H. Aarts, 2011, *Consciousness and Cognition, 20,* p. 358

2011; Zedelius, Veling, & Aarts, 2011, 2012; Zedelius, Veling, Bijleveld, & Aarts, 2012). In these studies, the delay between the prime and the response was larger than the delay used by Pessiglione et al. (2007) of 100 ms and lasted from 2 to 40 s. This allowed for testing of the long-lasting effects of unconscious processing of money. All these studies are based on the following principles (Fig. 4.1). At the beginning of each trial, a low or a high reward (e.g., 1 vs. 50 cents) was displayed, either subliminally or supraliminally. Participants could earn the reward if they found the correct response(s) on the cognitive task. Cumulative earnings were displayed at the end of each trial. Although these studies differ regarding the cognitive task used, it was commonly found that the possibility of gain presented supraliminally or subliminally, can influence effort mobilization and thus performance.

For instance, Bijleveld et al. (2009) asked participants to memorize digits and then to recall them verbally. At the beginning of each trial, a high reward (50 cents) or a low reward (1 cent) was at stake and was presented either subliminally or supraliminally. Pupil dilation, a physiological measure related to the mobilization of mental effort, was used. Participants showed an increase of pupil dilation—related to an increase of mental effort invested—on highly rewarded trials, and this held regardless of whether the rewards were presented subliminally or supraliminally. Thus, Bijleveld et al. (2009) provided the first evidence that unconscious processing of money can change mobilization of mental effort.

This result on physiological reactivity related to mental effort segues well with recent studies suggesting that unconscious processing of money can change cognitive task performance (Bijleveld et al., 2010, 2011, 2012a; Bustin et al., 2012; Capa, Bustin et al., 2011; 2013; Zedelius et al., 2011; Zedelius, Veling, & Aarts, 2012; Zedelius, Veling, Bijleveld et al., 2012). In brief, everything happens as if nonconscious processing of money involved more mental effort and perseverance to obtain better performance. Capa et al. (2013) confirmed this interpretation. Participants were instructed that, if they responded correctly to each trial of a run of 13 trials, they would receive the money displayed at the beginning of the run. Participants exhibited better performance, as shown by the percentage of correct runs, for a higher than for a lower reward displayed either subliminally or supraliminally. This better performance was probably associated with a greater mobilization of resources, as suggested by a stronger suppression of fronto-central alpha activity. Reduced alpha activity over different cortical areas, from frontal to parietal sites, has been reported during the performance of mental tasks (Gevins, Smith, Mcevoy, & Yu, 1997) and is inversely related to the amount of cortical resources allocated to task performance. Inasmuch as the mean time of run was 40.74 s, subliminal money stimuli can have an effect lasting over several seconds. Moreover, we observed no differences in performance and alpha activity between the beginning and end of each run suggesting, although zero-effects do not allow firm conclusions, that the effect of unconscious reward had not collapsed over time. In conclusion, all these studies are in agreement with the hypothesis that conscious and unconscious reward cues can trigger the investment of effort in a task to obtain the corresponding reward (Custers & Aarts, 2010; Dijksterhuis & Aarts, 2010; Wegner, 2002; Hassin, Uleman, & Bargh, 2005).

Can We Learn Based on Subliminal Stimuli to Obtain Money?

Whereas subliminal money cues may directly represent what can be earned on a particular trial, other cues could indicate monetary rewards, although we may not always be aware of them. Several authors consider that monetary reward learning does not require awareness (Dickinson & Balleine, 2002). People can build associations between a conscious monetary reward and behavior regardless of awareness (Wimmer & Shohamy, 2012). However, an open question is whether people could learn these associations if the monetary reward is displayed subliminally. Only few studies have addressed this. Seitz and Watanabe (2003), however, showed that perceptual learning can occur as a result of exposure to subliminal stimulus, without the participant having to pay attention and without relevance to the particular task in hand. Participants were repeatedly exposed to an irrelevant background motion signal so weak that its direction was not visible. The repetitive exposure improved performance for the direction of the exposed motion in a subsequent suprathreshold test, but only when the motion was associated with a reinforcement acting as a reward.

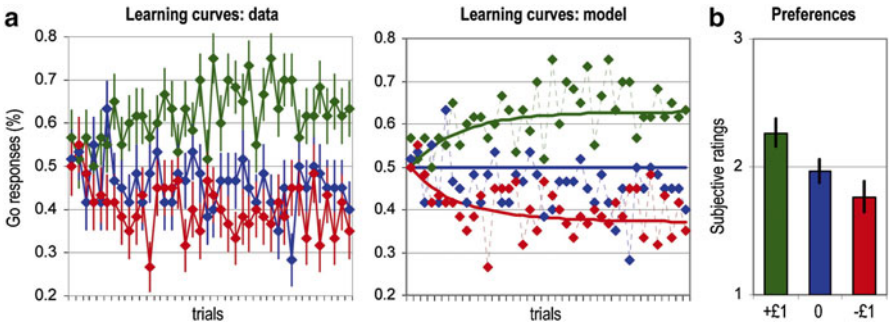

Fig. 4.2 (**a**) Colors indicate cues for which responses are rewarded (*green*), neutral (*blue*), or punished (*red*). *Diamonds* are the percentage of participants that pressed the button across trials. On the *left*, the continuous lines join the diamonds to illustrate choices made by participants. On the *right*, the continuous lines represent the probabilities of button press estimated by an optimized Q-learning algorithm (Sutton & Barto, 1998). For each cue, the model estimates the expected value of the risky response, on the basis of individual sequences of choices and outcomes. This value, called a Q value, is essentially the amount of reward expected from choosing the risky response given the contextual cue. (**b**) Subjective ratings of preferences of the cues from the most (3) to the least liked (1) evaluated at the end of the experiment. Adapted with permission from "Subliminal instrumental conditioning demonstrated in the human brain." by M. Pessiglione, P. Petrovic, J. Daunizeau, S. Palminteri, R.J. Dolan, C.D. Frith, 2008, *Neuron*, 59, p. 562

In another study, Pessiglione et al. (2008) asked participants, just after seeing a mask contextual cue flashed, to choose to press or not press a response key and subsequently observe the outcome (i.e., a cumulative earning score presented at the end of each trial). Three cues were used, one cue was rewarding (+£1), one was punishing (–£1), and the last was neutral (£0). Behavioral data showed that participants developed a propensity to choose cues associated with monetary rewards relative to punishments (Fig. 4.2a). Even without conscious processing of contextual cues, participants can learn their reward value and use them to provide a bias on decision making. Moreover, at the end of the task, cues were presented to the participants and they rated them in the order of preferences. Ratings were higher for reward compared to punishment cues, suggesting a learning of the affective values of subliminal cues and, consequently, long-lasting effects of unconscious processes (Fig. 4.2b). Functional neuroimaging showed that during conditioning cue values and prediction errors, generated from a computational model, both correlated with activity in ventral striatum.

The studies of Seitz and Watanabe (2003) and of Pessiglione et al. (2008) suggest that we can learn based on subliminal stimulus to obtain a reward or a monetary cue. Although these findings may go against some assumptions that reward learning requires awareness (Shanks, 2010), and such learning is based on striatal learning: a common neurobiological mechanism, which does not always seem to require consciousness (Pessiglione et al., 2008). More research will have to reveal the precise role of consciousness—if any—in this process.

Effects of (Un-)Conscious Processing of Money Cues on Executive Control

It is generally assumed that executive control requires consciousness and that subliminal stimuli cannot influence it (Dehaene & Naccache, 2001; Jack & Shallice, 2001; Jacoby, 1991; Kunde, 2003; Merikle et al., 1995; Praamstra & Seiss, 2005). However, a few studies have reported short-lived effects of subliminal stimuli on high-order executive control functions such as inhibitory (Boy, Husain, & Sumner, 2010; Van Gaal, Ridderinkhof, Fahrenfort, Scholte, & Lamme, 2008) and switching (Lau & Passingham, 2007) control processes. These studies have used, however, subliminal stimuli not related to motivation, such as an arrow to prime a response. Thus, little is known about the potential long-lasting effects of unconscious monetary reward on executive control. In this paragraph, we present studies challenging this perspective and show that the different functions of executive control (Miyake, Friedman, Emerson, Witzki, & Howerter, 2000), such as updating (Bustin et al., 2012; Capa, Bustin et al., 2011) and switching (Capa et al., 2013) can be driven by unconscious monetary cues.

The task used by Capa, Bustin et al. (2011) was based on the memory updating paradigm of Salthouse, Babcock, and Shaw (1991). In this task, participants have to memorize five numbers and update those numbers independently according to a series of six successive arithmetic operations. At the beginning of each trial, the reward at stake (1 euro or 5 cents) was presented either subliminally (27 ms) or supraliminally (300 ms). If participants successfully reported the final correct series of numbers, they earned the reward. The delay between the prime and the response was of approximately 30 s. Results showed better performance when a high (conscious or unconscious) monetary reward was at stake compared to a low monetary reward. Bustin et al. (2012) replicated and extended this study as a function of personality. Dopaminergic projections from the midbrain are important for learning to predict rewarding outcomes (Schultz, 2004) and have been strongly linked to personality traits such as novelty seeking (Bódi et al., 2009). Novelty seeking can be defined as a trait involving activation or initiation of behaviors such as exploratory activity and approach to monetary rewards (Cloninger, Svrakic, & Przybeck, 1993). In addition to being hyper-responsive to reward cues, high novelty seeking individuals are characterized as impulsive and excitable, while low novelty seeking persons are stoic and rigid.

Results showed that low novelty seeking participants performed better for a high reward than a low reward displayed supraliminally or subliminally. High novelty seeking participants' performance, however, did not differ as a function of reward and presentation duration of the reward. These results suggest that reward can lead people, and more particularly individuals hyper-responsive to reward cues such as high novelty seeking participants, to concentrate too much on the task, which paradoxically impair performance (e.g., Baumeister, Masicampo, & Vohs, 2011). In both studies (Bustin et al., 2012; Capa, Bustin et al., 2011), debriefing participants before the prime visibility test revealed that none of them was able to report whether

the subliminal coins were of 1 euro or 5 cents. Furthermore, the mean percentage of correct responses for the subliminal stimuli did not differ significantly from chance.

These two studies indicate that nonconscious processing of money can have a long-lasting influence on updating—a component process of executive control traditionally thought to require consciousness. These studies are in line with the hypothesis that motivation, when a conscious reward is at stake, fine-tunes executive functions required to perform the task and recalibrates the allocation of processing resources available to executive functions (Pessoa, 2009).

We tried to investigate more precisely the influence of conscious and unconscious monetary reward by recording evoked potentials and neural activity dynamics during cued task-switching performance (Capa et al., 2013). In this study, participants performed long runs of task switching (i.e., 13 trials). A change of task was required on 50 % of the trials. During each run, participants had to switch among three tasks: judging whether the number was odd or even (parity task), whether the number was smaller or greater than 5 (magnitude task), and whether the number was inside (i.e., 3, 4, and 6, 7) or outside (i.e., 1, 2 and 8, 9) the continuum of 1 to 9 (inner/outer task). The different tasks to be executed during each run were signaled by a task-cue presented 1,750 ms (cue-period). The stimulus remained on the screen until the participant responded or until 2,000 ms had elapsed (task period). At the beginning of each run, a reward (50 cents or 1 cent) was displayed, either subliminally or supraliminally. Participants earned the reward contingent upon their correct responses to each trial of the run.

We have shown that at the tonic level, a higher percentage of runs was achieved with higher (conscious and unconscious) than lower monetary rewards. This behavioral result fits well with the greater mobilization of resources, as shown by a stronger suppression of neural activity of alpha band (Gevins et al., 1997), recorded for the first to the last trial of each run. In conclusion, unconscious and conscious monetary rewards induced a general allocation of effort on the cognitive system.

At the phasic level or with short-lived processes, event-related potential (ERP) results indicated that the parietal P3 observed during cue-period (Fig. 4.3) and the fronto-central N2 observed during task execution (Fig. 4.4) were increased more in switch than in repetition trials. Several neurophysiological studies investigating ERP components in task switching have reported a larger parietal positivity in the preparation interval for switch than for repetition trials (e.g., Periáñez & Barceló, 2009). Consistent with these findings, the differential switch-related positivity we observed may reflect the preparatory updating of S-R mapping. The greater N2 indicates (Gajewski, Kleinsorge, & Falkenstein, 2010) that the amplitude of post-target N2 may be the main source of residual switch costs, defined as the switch cost persisting even when there is ample time to prepare for the upcoming task (Rogers & Monsell, 1995).

These both results indicate that manipulation of task switching is generally successful and support previous findings that the anticipatory reconfiguration of a task-set on switch trials is associated with a cognitive process distinct from that involved in task execution. Interestingly, we found that unconscious and conscious rewards influenced preparatory effort in task preparation, as suggested by a greater fronto-central contingent negative variation (CNV) starting at cue-onset (Fig. 4.3).

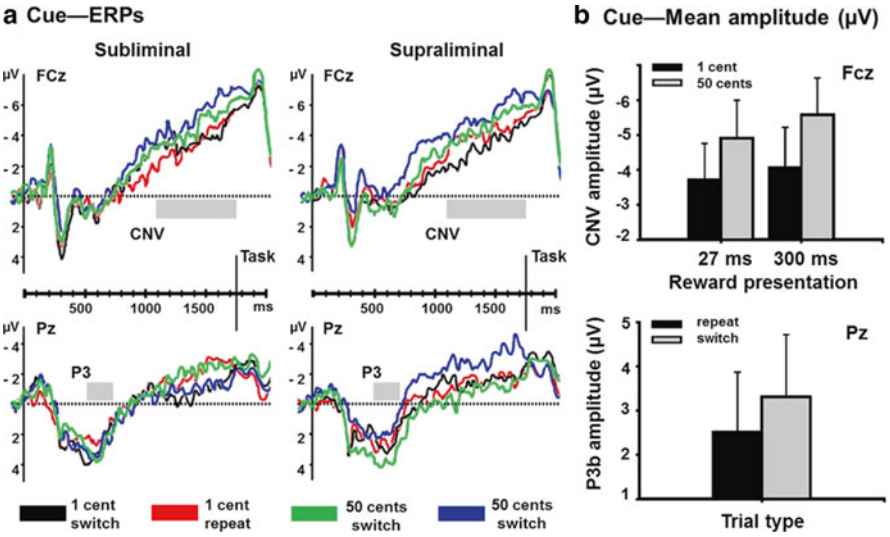

Fig. 4.3 (**a**) Epoch cue grand mean ERP waveforms as a function of experimental conditions. The *grey bars* indicate that CNV was significantly more negative at FCz when 50 cents than when 1 cent was at stake and that P3b was larger at Pz during switch than during repeat trials. The epoch task started 1,750 ms after onset of cue presentation. (**b**) Mean amplitude at the cue of the CNV at FCz and of the P3b at Pz as a function of trial type (repeat vs. switch). *Error bars* represent standard errors of the mean. Adapted with permission from "Long-lasting effects of performance-contingent unconscious and conscious reward incentives during cued task-switching." by R.L. Capa, C.A. Bouquet, J.-C. Dreher, A. Dufour, *Cortex*, 49: p. 1949–1950

However, a greater parietal P3 associated with better reaction times was observed only under conditions of conscious high reward, suggesting a larger amount of working memory invested during task performance (Fig. 4.4). These results—CNV during the cue-period, P3 and reaction times during the task period—indicate that unconscious and conscious monetary rewards have both similarities during early stages of task-switching preparation but differ during task performance. Concerning the switch cost, we found that both unconscious and conscious rewards had no specific effect on reaction times and ERP.[1]

[1] Switch cost has been attributed to time consumed by executive control processes necessary for a change of task (Rogers & Monsell, 1995) and may involve a number of subcomponents, such as retrieving the rules and procedures required for task completion into working memory, initializing stimulus–response mappings, and suppressing activation of the previously active task set. The switch cost is defined as the difference in performance between switch trials and repeat trials within the same block (Rogers & Monsell, 1995).

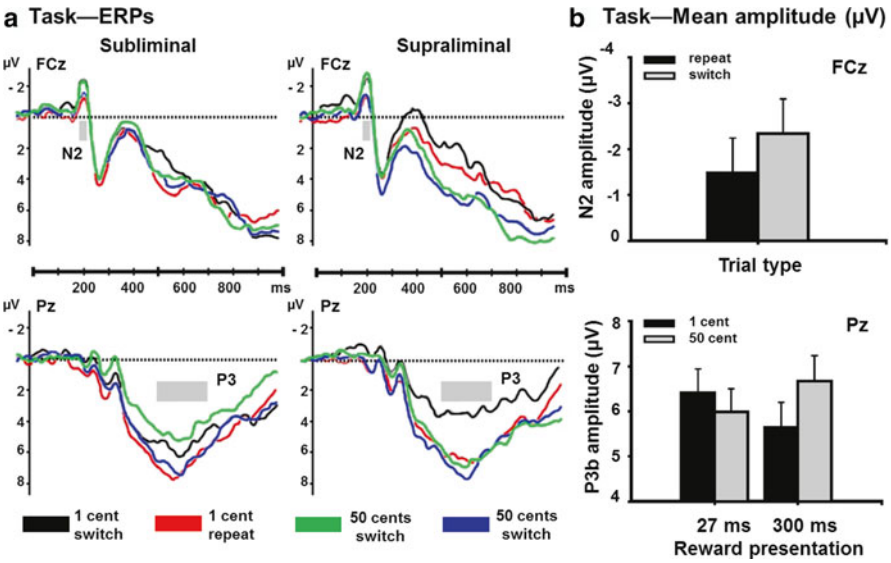

Fig. 4.4 (**a**) Epoch task grand mean ERP waveforms as a function of experimental conditions. *Grey bars* indicate that N2 was significantly larger at FCz and a significant interaction between duration of reward presentation and reward value on the amplitude of P3b at Pz. (**b**) During task performance, mean amplitudes of the N2 at FCz as a function of trial type (repeat vs. switch) and of the P3b at Pz as a function of duration of reward presentation and reward value. Error bars represent standard errors of the mean. Adapted with permission from "Long-lasting effects of performance-contingent unconscious and conscious reward incentives during cued task-switching." by R.L. Capa, C.A. Bouquet, J.-C. Dreher, A. Dufour, *Cortex*, 49: p. 1951−−1952

Differences and Similarities Between Conscious and Unconscious Processing of Money

These recent studies suggest that unconscious processing of money can change cognitive task performance (Bijleveld et al., 2010, 2011, 2012a; Bustin et al., 2012; Capa, Bustin et al., 2011; 2013; Zedelius et al., 2011; Zedelius, Veling, & Aarts, 2012; Zedelius, Veling, Bijleveld et al., 2012). However, differences and similarities between conscious and unconscious processing of money emerged. For instance, in the initial study of Pessiglione et al. (2007), the same basal forebrain region was involved for both subliminal and supraliminal rewards. This implies that the cerebral structures involved in subliminal and supraliminal reward conditions were qualitatively similar. Similarly, Bijleveld et al. (2009) tested the effects of conscious and unconscious monetary reward on an easy (i.e., three digits) and a difficult (i.e., five digits) memory task. The effect of reward on pupil dilation was present in the difficult condition but not in the easy condition. These results segue well with the

classical features of effort mobilization (Brehm & Self, 1989; Wright & Gendolla, 2011; Wright & Kirby, 2001): People mobilize no more energy than necessary to achieve a conscious goal when performing an easy task. However, when task difficulty is high, individuals will strive to reach the highest possible performance level that is necessary to ensure goal attainment. In short, these two studies suggest that conscious and unconscious incentive processes enhance effort mobilization in a similar way.

On the other side, differences between conscious and unconscious monetary reward also emerged (e.g., Bustin et al., 2012; Capa et al., 2013). These differences are well illustrated in the study of Bijleveld et al. (2010). Participants were invited to perform a task in which they could earn money by solving a mathematical equation in a speed-accuracy paradigm. Thus, on each trial the monetary incentive declined with time and only accurate responses were rewarded. Subliminal high rewards made participants more eager with faster but equally accurate responses. In contrast, supraliminal high rewards caused participants to become more cautious with slower but more accurate responses. The possibility to gain a conscious reward thus permitted participants to make strategic choices in the service of reward attainment.

Bijleveld, Custers, and Aarts (2012b) propose a framework for understanding human reward processing and its similar or distinctive effects on task performance. They propose that people first process rewards in rudimentary, subcortical brain structures. One of these structures in particular is the striatum—a cerebral structure which does not require consciousness (Pessiglione et al., 2008). As observed by several studies, this initial processing can facilitate task performance directly by prompting the recruitment of effort in the service of reward attainment. This initial processing of reward requires little perceptual input and is not consciously experienced. When participants are aware of the reward at stake, rewards may undergo full processing. In that case, brain structures that are engaged may involve higher-level cognitive functions located in the frontal brain, in addition to the rudimentary structures already engaged by initial reward processing, such as the anterior cingulate cortex, the dorsolateral prefrontal cortex, and the medial prefrontal cortex. These cerebral structures are related to cognitive functions such as strategy and decision making, executive control, and maintenance of reward information over time (Haber & Knutson, 2009). Thus, full reward processing may lead individuals to consciously choose a strategy.

In brief, if the quality of task performance is mainly determined by effort mobilization, then initial and full processing of money may induce the same behaviors (e.g., Bijleveld et al., 2009; Pessiglione et al., 2007). However, in circumstances of strategy and decision making, initial and full reward processing may diverge (Bijleveld et al., 2010; Bustin et al., 2012; Capa et al., 2013). Future imaging researches will have to explore whether similar or distinct cerebral structures are involved when conscious and unconscious goals of earning money are activated.

Conclusion

In this review, we showed that conscious and unconscious priming of money can have effects in various ways. First of all, money cues can signal potential reward and influence behavior in a way that is relatively long-lasting (through effort mobilization and reinforcement learning). Conscious effects of money on the executive control (e.g., updating and task-switching processes) are evident (Pessoa, 2009; Krug & Braver, 2014), and less is known about the unconscious effects of money. Results, however, reflected a general effect of unconscious monetary reward cues on task updating and switching performance.

These results seem to support the view that cues related to monetary rewards are processes at a rudimentary level, which mainly leads to the boosting of effort invested in the task. Consciously perceived cues, however, are subjected to full reward processing which allows for strategic decisions based on the reward information (Bijleveld et al., 2012b). Importantly, this theoretical distinction helps to make predictions about when consciously and nonconsciously perceived, reward cues have different effects: when performance can only be increased by just trying harder, conscious and unconscious reward cues will have the same effect. When a task allows for different strategies to be used, the effects of conscious and unconscious reward cues may diverge, with conscious reward cues either helping or hurting performance. As such, conscious and unconscious influences of money are two sides of the same coin.

It must be noted, though, that these effects are very much dependent on the experimental situation in which the participant knows that the prime represents the reward to be earned. Perceiving a coin on a table in real life from the corner of your eye may not have the same effect. However, these effects are important because they demonstrate that people *can* to a certain extent process these reward cues without awareness. This conclusion is invaluable when considering the more complex effects of social goal related to money. Whereas coins may only be motivating in a certain experimental context, people's goals are mentally represented as rewarding or desirable. Priming such goals through money cues may trigger a reward signal based on these representations, which may help to explain the motivational effects that money primes and primes related to other social goals have.

In short, when it comes to research on subtle influences on human behavior, money is on the one hand what it was intended to be: a helpful tool that substitutes real rewards. On the other hand, recent research shows that the concept of money is so intricately related to our social world that the concept itself has a place amongst the other goals we pursue in life. It is this realization that money is not just a reward that may in the end help us to understand all kinds of money-related behaviors and transgressions that are hard to explain by economic models.

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Chapter 5
The (Relative and Absolute) Subjective Value of Money

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Abstract Money is often used as a proxy for utility in economic and psychological research. Monetary sums are easily calculated and compared, and money is a stimulus with which almost all people are familiar. Even so, hedonic responses to monetary gains and losses are relatively insensitive to the absolute size of those gains and losses, and the subjective utility of gains and losses is surprisingly labile. We propose that the difficulty of evaluating the value of money stems from the abstract nature of its value and nearly infinite range. As a result, money is not evaluated on a single monetary scale, but instead on subscales composed of comparison standards that are selected at the time of judgment. Using a dual-process account, we describe how such monetary subscales are generated and when they result in more or less sensitivity to its absolute value. We identify factors that influence sensitivity to the value of money and bias its evaluation. We close with a discussion of implications for science and practice.

Money has received considerable attention in economics and the psychology of judgment and decision making, as both an independent and dependent variable. Money has long had special status as a proxy for utility, the value or pleasure that an alternative yields (Bentham, 1879) because money is fungible, exists on a ratio scale, and can be easily traded for goods that yield utility in most cultures. One dollar has the same value as, and is interchangeable with another dollar. Two dollars have twice as much value as one, and one can easily exchange dollars for euros, yen,

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E. Bijleveld and H. Aarts (eds.), *The Psychological Science of Money*,
DOI 10.1007/978-1-4939-0959-9_5,

yuan, renminbi, rupees, or a seemingly infinite variety of goods. Asking a person how much they are willing to pay for experiences, materials, and services (e.g., for a vacation in Hawaii, to buy a television, or have their house cleaned) is a method that allows one to compare the value that person ascribes to stimuli that are otherwise difficult or impossible to compare. Consequently, money has been used to test economic models of utility, preferences, and the rationality of human judgment and decision making.

More recently, psychologists and economists have begun to study how the value of money is itself evaluated and how these evaluations change according to the context and the manner in which they are made. This is the focus of this chapter. We first provide a brief overview of literature on people's sensitivity to monetary value, which reveals that the value of money is surprisingly relative: Evaluations of monetary gains and losses are heavily influenced by how gains and losses compare to a reference point or standard, not solely according to the amount gained or lost. We propose two reasons for this insensitivity to the absolute value of money—the abstract nature of its value and the nearly infinite range of monetary values that can be judged, and describe the process by which monetary subscales are generated to evaluate money relative to comparison standards. In a two-system or dual-process framework of judgment (Kahneman & Frederick, 2002; Sloman, 1996), we propose that the value of gains and losses is influenced by the system(s) used to evaluate them. Based on recent findings in the literature we suggest that sensitivity to relative value seems to result from relatively automatic information processing (System 1), whereas greater sensitivity to absolute value seems to result from more systematic information processing (System 2). We identify factors that determine the system used to evaluate monetary gains and losses. Finally, we articulate novel predictions of our proposed dual-process framework, suggest implications of the research reviewed in this chapter, and indicate fruitful areas for future research to explore.

The Relativity of Value

The relationship between money and utility is imperfect, and money is evaluated with regard to its value relative to a comparison standard rather than with regard to its absolute value. As early as 1738, Daniel Bernoulli formally recognized that the utility of money was not as linearly related to its sum (Stearns, 2000); each unit of money a person possesses (e.g., $1) does not provide an equal amount of additional utility. Bernoulli suggested that monetary units provide *diminishing marginal utility*, whereby each additional unit (e.g., $1) increases its utility less than did the previous unit. Receiving an additional $1 yields more utility to a person with a wealth of $0 than to a person with a wealth of $1, more to a person with a wealth of $1 than to a person with a wealth of $2, and so on, until at some point an additional dollar yields no noticeable increase in utility at all. The difference between the hedonic impact of receiving $1,000,000 and $1,000,001, for example, is likely to be hedonically imperceptible.

According to Bernoulli's theory, people evaluate the utility of money outcomes in terms of the final states of wealth that those outcomes produce. If Jane started

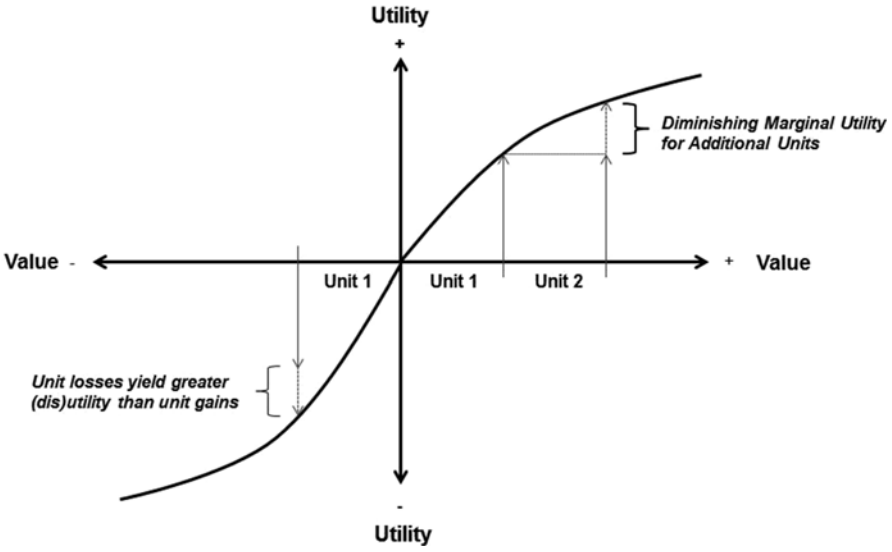

Fig. 5.1 The Prospect Theory value function

with $2 million and then lost $1 million, she should be as happy as Donald, who started with $0 and then gained $1 million, since both Jane and Donald have the same final state of wealth ($1 million). The error in this assumption was identified and addressed by Prospect Theory (Kahneman & Tversky, 1979), which demonstrated that people do not evaluate the utility of monetary outcomes according to the final states of wealth that those outcomes produce.

Kahneman and Tversky proposed that outcomes are evaluated according to the change that they produce relative to a psychological reference point. If Jane started with $2 million and then lost $1 million, whereas Donald started with $0 and gained $1 million, for example, Jane would be less happy than Donald because she would evaluate her outcome as a loss of $1 million and he would evaluate his outcome as a gain of $1 million. The reference dependence of value is one of the central insights of Prospect Theory. More generally, the Prospect Theory value function is defined by deviations from a reference point and is normally concave for gains and convex for losses. This latter feature incorporates (1) the diminishing marginal utility observed by Bernoulli and (2) *loss aversion*, the observation that the slope of the utility function is generally steeper for losses than for gains (Fig. 5.1). In other words, losses hurt more than equivalent gains. Under most circumstances, for example, it feels worse to lose $100,000 than it feels good to gain $100,000.

Prospect Theory (Kahneman & Tversky, 1979) has been proven to be robust, accurately describing the anticipated (decision) utility derived from money and a variety of nonmonetary experiences. The hedonic impact of a given monetary gain or loss depends in large part on the reference point to which it is compared at the time of judgment and surprisingly less on the absolute amount of money won or lost. It is important to note that Prospect Theory was never purported to describe

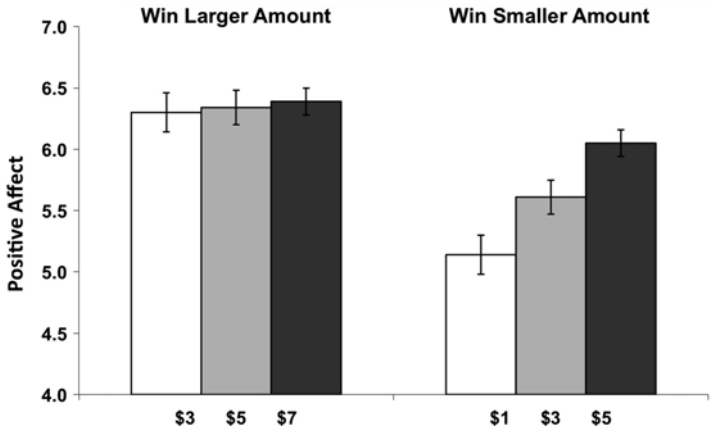

Fig. 5.2 Hedonic response to winning the larger or smaller amount on a scratch-off ticket with two values by relative value (i.e., larger or smaller) and amount won. Originally published in Kassam, Morewedge, Gilbert, and Wilson (2011, p. 603)

experienced utility—the actual pleasure and pain that is derived from experiences (for reviews, see Kahneman, 1999; Morewedge, in press). Prospect Theory does, however, generally describe experienced utility quite well, albeit with some caveats (e.g., Harinck, Van Dijk, Van Beest, & Mersmann, 2007; Kermer, Driver-Linn, Wilson, & Gilbert, 2006; Morewedge, Gilbert, Keysar, Berkovits, & Wilson, 2007).

Reference dependence has received considerable support in both field studies and experimental laboratory research. Field surveys suggest that self-reported happiness is influenced to a greater extent by people's income relative to the income of their neighbors than by their own absolute income (Easterlin, 1974, 1995, 2001). People living in richer neighborhoods report being less happy than people with similar incomes living in poorer neighborhoods, for example, and this is particularly true for people who socialize more with their neighbors (Luttmer, 2005). Laboratory studies have similarly found that people appear to be more sensitive to relative than absolute monetary values. Research participants who won the larger of two amounts of money on a scratch-off ticket (Fig. 5.2) were more sensitive to whether the amount they won was the larger or the smaller of the two amounts than to the absolute amount of money that they won (Kassam et al., 2011). Participants in the experiment were equally happy winning $7, $5, or $3, as long as the amount that they won was larger than its alternative (see also Mellers, Schwartz, Ho, & Ritov, 1997).

People seem to be generally aware of the importance of relative value. Most people appear to believe that the amount of money that they earn relative to their peers is likely to affect them more than the absolute sum of money that they earn. Given the choice of options below, a majority of survey respondents said that they would prefer to earn a lower absolute income but earn more than their peers (i.e., Option B) rather than earn a higher absolute income but earn less than their peers (i.e., Option A; Solnick & Hemenway, 1998).

Option A: You earn $100,000. Others earn $200,000.

Option B: You earn $50,000. Others earn $25,000.

In other words, people believe it would be worth sacrificing half of their total income to have a higher income than their peers. They exhibit this preference even when participants are told that the purchasing power of their income would be held constant in both conditions, meaning that they would be able to afford a more comfortable lifestyle in the situation in which they had a greater income but earned less relative to their peers (Option B).

Perhaps this willingness to sacrifice absolute value (e.g., greater income) for relative value (e.g., making more than one's peers) is not misguided. People are generally insensitive to differences in the absolute amounts of the money that they earn. A score of correlational studies have shown that societal shifts in income are not associated with increases in the well-being of the society (Easterlin, McVey, Switek, Sawangfa, & Zweig, 2010; Kahneman, Krueger, Schkade, Schwarz, & Stone, 2006). Two particularly telling demonstrations of this insensitivity include the observation that well-being did not increase in Japan after its recovery after World War II between 1958 and 1987, despite a fivefold increase in per capita income (Easterlin, 1995) and the finding that lottery winners are not much happier than matched controls (Brickman, Coates, & Janoff-Bulman, 1978; cf., Gardner & Oswald, 2007). Indeed, the relationship between income and happiness appears to best fit a log function. Increases in small incomes matter, but most benefits of greater incomes plateau at an annual income of $75,000 (Kahneman & Deaton, 2010).

These results may be partially explained by aforementioned relative comparisons to others, diminishing marginal utility, hedonic adaptation (Frederick & Loewenstein, 1999), and confounding third variables. General insensitivity to the absolute value of money gained, however, is also observed in controlled experimental settings. Participants who won $1 in a gamble with a 50 % chance of winning were as happy immediately upon learning the outcome as were participants who won $20 with the same chance of winning (Buechel, Zhang, Morewedge, & Vosgerau, 2011). Participants in an experiment who received $5 for reporting their happiness five times a week were as happy as those who received $25 for performing the same task (Morewedge, Gilbert, et al., 2007), and pedestrians given $5 to spend were as happy afterwards as pedestrians given $20 to spend (Dunn, Aknin, & Norton, 2008).

People are similarly insensitive to the absolute amount of losses that they avoid as a result of discounts (Dickson & Sawyer, 1990; Inman, McAlister, & Hoyer, 1990). The presence of a promotion (a price reduction) has a stronger effect on whether or not shoppers purchase a product than the absolute magnitude of the promotion (how much that price is reduced; Boutillier, Boutillier, & Neslin, 1994; Dickson & Sawyer, 1990). In other words, shoppers seem to primarily care about whether an item is on sale, but the exact amount saved as a result of the sale is less important.

The extent to which people are insensitive to absolute value is rather surprising. Money is one of the most universally familiar goods. The economies of most societies adhere to a currency-based system (Bernstein, 1965/2008). Money is a tangible

and unidimensional good that is measured on a ratio scale. It is divided into units that are easily countable and additive (McGraw, Shafir, & Todorov, 2010). The mere calculation of money is usually quite easy. It is obvious that a salary of $60,000 per year is twice as large as a salary of $30,000 per year. Unlike the value of jewels and livestock, which are also countable and additive, the value of the local currency is familiar to most people. It is the payment they receive for work and the medium they exchange for most goods.

Because of its familiarity, ease of calculation, and the frequency with which money serves as a proxy for utility, one would expect that people should be reliable in their assessments of and responses to different monetary gains and losses (Hsee, Loewenstein, Blount, & Bazerman, 1999; Morewedge, Kassam, Hsee, & Caruso, 2009). A gain of $5 should have the same effect on a person's experienced utility, whether the alternative gain was $1 or $10, and differences in the utility derived from stimuli such as a 3-day cruise, a 5-day cruise, or a case of champagne should lead to reliable differences in their associated price tags. Why then, are people so insensitive to the absolute values of monetary gains and losses and so unreliable in their assessments of the monetary value of experiences, goods, and services?

Why Are People Insensitive to Absolute Value?

We suggest that there are two main reasons for this insensitivity to the absolute value of money: Money has no intrinsic value, and there is a nearly infinite range of monetary values, which we discuss in turn.

First, money is an artificial medium whose value is contingent upon the shared agreement of the members of a society. It is thus a second-order reinforcer. Unlike touch and heat, which may be inherently pleasurable or painful depending on their intensity (Yang, Hsee, & Zheng, 2012), money only has value by virtue of the experiences its possession affords and its absence denies. Money has value because people believe and agree that it does, but when a society decides to switch from one system of currency (e.g., Deutsche Marks) to another (e.g., Euros), the original currency loses all of its value.

Because of the artificial nature of its value, evaluating the utility of a monetary gain or loss requires more steps than evaluating the utility of a primary or natural reinforcer. Imagine, for example, that you find a $5 bill in a supermarket parking lot. How happy should this make you? First, you must evaluate the magnitude of the gain (how large or small a sum is $5), and then map this onto a scale of subjective utility. For example, you may have to compare it to other sums that have provided you utility in the past (e.g., your happiness with your salary), or consider the new experiences that it will afford (e.g., a chocolate bar). In contrast, the utility of finding a chocolate bar requires fewer steps to evaluate. You either like or dislike the chocolate, and so the evaluation only requires the assessment of the amount of pleasure (or guilt) that chocolate will afford.

The lability of these evaluations is demonstrated by the difficulty people have valuing novel stimuli and unfamiliar psychological states. People have a poor idea of what fair compensation is for the physical and psychological pain caused by an accident (Kahneman, Schkade, & Sunstein, 1998), or how much they should pay or be paid to listen to their professor read a poem. In one experimental demonstration, Ariely, Loewenstein, and Prelec (2006) first asked students of Ariely (a) whether they would *accept* $10 to listen to Ariely give a 10-min recital of Walt Whitman's *Leaves of Grass* or (b) whether they would *pay* $10 to listen to his recital. Next, they asked the students how much they would have to be paid or were willing to pay, respectively, to listen to 1-, 3-, and 6-min. versions of the recital. Students who were first asked how much they would have to be *paid* to listen to the 10-min. recital said they would have to be paid to listen to any of the other three versions, and that they would have to be paid more to listen to longer than shorter versions. In contrast, students who were first asked how much they would *pay* to listen to the 10-min recital were willing to pay to listen to any of the other three versions, and they were willing to pay more to listen to longer than shorter versions. The students exhibited *coherent arbitrariness*. Initially, their evaluations were arbitrary because they were not sure whether attending a recital by their professor was an experience for which they should pay or be paid. Once a price had been set for the experience, however, their evaluations were coherent as they realized that they should pay more for more of a good experience and be paid more for more of a bad experience (Ariely, Loewenstein, & Prelec, 2005). This experiment illustrates the difficulty that people have assessing the subjective utility of an artificial medium, but once the subjective utility of a medium is established, they are able to coherently assess the subjective utility of different values.

A second factor contributing to insensitivity to the absolute value of money is its nearly infinite range. Generally, the knowledge and use of a stimulus range allows people to determine the position of a stimulus in a distribution of values (Hsee et al., 1999; Janiszewski & Lichtenstein, 1999), and therefore increasing the evaluability of the stimulus. Knowing that laptop screen sizes range from 10 to 20 in., for example, allows one to make the assessment that a 12-in. screen is relatively small. Not all ranges, however, yield similar degrees of sensitivity. Sensitivity to differences in the value of stimuli is a function of the breadth of the range of possible stimulus values (Volkmann, 1951). As the range of possible stimulus values increases, the noticeable difference in psychological value for each unit on that range decreases. To illustrate, the difference in weight between a MacBook Pro and a MacBook Air would be noticeable and perceived as relatively large, even by comparison to the weights of all modern portable electronic devices. The same difference in weight would become negligible when evaluating that difference by comparison to the weight of all household goods (e.g., a set including both washing machines and toothpicks) because the weights of all household goods constitute a larger range. In other words, the range of values of an external stimulus determines the ability to map objective values of that stimulus (e.g., monetary values) onto psychological values (e.g., utility; Hsee et al., 1999; Janiszewski & Lichtenstein, 1999). This in turn determines how psychologically sensitive people are to changes in absolute values of the stimulus.

Using an infinite range to evaluate a stimulus is little better than using no range at all. It is impossible to compare a specific value to an infinitely larger or smaller value, and to determine meaningful differences between values on an infinite range. Confining the scale by which money is evaluated to the value of the world economy ($70 trillion) and the combined world debt (−$40 trillion) would still render most people insensitive to differences between all of the gains and losses that they experience in their lifetime. Compared to $70 trillion, the difference between a $25,000 salary and a $250,000 salary is fairly trivial. Even using the largest gains and losses that a person experiences in their lifetime (e.g., retirement savings and medical expenses, respectively) to evaluate the other gains and losses that they experience would mean that people would only be sensitive to major differences, such as when choosing between careers with very different salaries (e.g., circus performer versus investment banker) or deciding whether to buy a yacht or a mobile home.

Because of its infinite range, monetary gains and losses are not evaluated on one single scale. Instead, monetary gains and losses are evaluated on specific subscales (Emery, 1969; Thaler, 1985). These subscales are constructed at the time of evaluation and consist of comparison standards determined by the gain or loss evaluated and the context in which the gain or loss is evaluated (Schwarz, 2007). A loss of $1,000 in retirement savings due to changes in the stock market in March 2013 (a good year for the market) is evaluated on a different scale than an equivalent loss in March 2008 (a bad year for the market), and both are evaluated on a different scale than a loss of $1,000 in income due to a tax increase. People presumably compare the performance of their investments at a specific time to the performance of the overall market at that time, and a tax increase is compared to the tax paid the previous year. As a result of this scale construction, the evaluability of a particular gain or loss can vary substantially across contexts and individuals, depending on the number and the range of comparison standards used to form a particular subscale. In the next section, we describe the process by which such comparisons are determined and judgments are made.

Comparative Evaluation and Comparison Standards

The processes involved when evaluating monetary values follow the processes by which most evaluative judgments are made. However, because of the artificial nature of money and its infinite scale, monetary judgments pose a distinct challenge for judges. The construction of subscales to evaluate the value of money leads these judgments to be especially reliant upon and influenced by the specific comparison standards that are available or made salient by the history of the judge and the context in which the judgments are made. In this section, we describe the process of comparative evaluation, the kinds of comparison standards, and which standards are likely to be selected.

People make evaluative judgments, including the evaluation of money, by comparing the target of their judgment to a standard (Helson, 1964; Kahneman &

Miller, 1986; Mussweiler, 2003). When evaluating the utility of a raise, for example, one might compare it to the raise received by a coworker or the raise one expected to receive. For inherently evaluable targets such as the pain from an injury or the temperature of an office, it might be possible to make basic qualitative judgments without engaging in such a comparative process (Hsee, Yang, Li, & Shen, 2009). Stubbing a toe, for instance, does not need to be compared to other experiences in order to be classified as painful, and one does not need a comparison standard to recognize while shivering in one's office that it is cold. Evaluating the absolute magnitude of even such basic experiences as pain and temperature (e.g., *how* painful or cold), however, involves judgments that require comparison to one or more standards (Hsee et al., 1999).

Standards used to evaluate absolute magnitude can take a variety of forms (Kahneman & Miller, 1986). One might evaluate the absolute intensity of the pain one feels by comparing it to the intensity of pain caused by a single or several past, concurrent, or future painful experiences. One could also compare it to imagined alternatives that are more or less painful (e.g., breaking the toe). People will use the comparison standard(s) that happen to be cognitively accessible at the time of judgment (Kahneman & Miller, 1986). Thus, the same experience can be evaluated by comparison to different standards depending on the context in which the evaluation is made, the time at which it is made, and the person making the evaluation (Kahneman & Tversky, 1984).

The noninherent nature and infinite scale of money make such monetary comparative evaluations especially labile. When making judgments about money, people do not evaluate all monetary gains and losses with respect to the same monetary scale. Instead, they evaluate money on scales that are constructed on the basis of relevant exemplars, ranges, and scales that are accessible at the time of judgment (Kassam et al., 2011; Stewart, Chater, & Brown, 2006). In other words, people construct subscales to evaluate any specific monetary gains and losses based on a salient comparison standard. The price of the store brand of milk at your supermarket can be compared to the prices of other brands, the price of milk at other stores, and the previous prices of milk at your supermarket. The price of gas at one station can be compared to current gas prices at other stations, to previous gas prices at that station, or even to future prices when there is a foreseeable shortage looming. Next, we describe the different standards used in monetary evaluations, how standards are chosen, and how standards influence monetary evaluations.

External and Internal Standards

When evaluating the utility or value of a sum of money, people first have to identify one or more standards to which it is compared. The standards may be stimuli in the immediate context or environment in which the evaluation is taking place (e.g., the salary earned by a colleague) or stimuli that are generated internally (e.g., a past

salary, an expected salary, or an imagined alternative). Comparison standards can therefore be roughly categorized into two types of standards.

An *external standard* is a standard implicitly primed or explicitly prompted by a stimulus in the external environment of the judge. Passing by a neighbor's home or their new car sometimes implicitly primes a person to use that home or car as an external standard by which to evaluate his or her own home or car. Implicit external standards are external standards sufficiently strong to influence judgments without one's conscious awareness. Subliminally primed prices, for instance, can influence how much people are willing to pay for products they encounter immediately after they are exposed to those primes (Adaval & Wyer, 2011). Other times people are explicitly aware of external standards. People often compare sale prices to retail prices suggested by manufacturers. Or they may explicitly compare their salary to the average salary of their profession, the price of one car to the price of other cars at the dealership, and the price of a home to the selling prices of other homes in their neighborhood (Miller & Prentice, 1996).

The pervasiveness of explicit external standards is demonstrated by their impact on self-reports and behavior in experiments (Hsee et al., 1999; Kassam et al., 2011). Preferences between outcomes may reverse depending on the standards of comparison available at the time of judgment. When deciding how to settle a dispute with their neighbor over a plot of land, participants who evaluated both of two possible settlements at once (in a *joint evaluation* condition) thought that a settlement in which they would receive $600 and their neighbor would receive $800 was more acceptable than a settlement in which they would receive $500 and their neighbor would receive $500. Participants who saw and evaluated only one of these settlements (in a *separate evaluation* condition), however, thought that the settlement in which they earned more money was less acceptable than the latter settlement in which they and their neighbor split less money equally. When both settlements could be compared side by side, participants evaluated their payment in one settlement ($600) by determining whether it was greater or less than their payment in the alternative settlement ($500). In the absence of a direct comparison to another settlement, participants evaluated their payment in the settlement by determining whether it was greater or less than the payment received by their neighbor (Bazerman, Loewenstein, & White, 1992).

Perhaps equally important, people often evaluate the value of money by comparison to *internal standards*. An internal standard is one that is stimulus independent. It is imagined or retrieved from memory. It can be a standard that is chronically accessible (e.g., a budget) or one that is temporarily accessible (e.g., the most recent similar purchase in that category; Stewart et al., 2006). A frequently used internal standard is the price one paid when making a previous purchase of a good (Mazumdar, Raj, & Sinha, 2005; Monroe, 1977). When evaluating a price of an airplane ticket from New York to Miami, for example, people are likely to compare its price to the amount they paid the last time they took the same trip.

Salient internal standards can affect evaluations of relatively unrelated financial decisions. Ungemach, Stewart, and Reimers (2011) found that British supermarket shoppers were more likely to prefer a low probability (15 %) gamble with a £1.50 payout than a higher probability gamble (55 %) with a £.50 payout immediately

after shopping for groceries if more of the prices of the goods that they purchased fell between £.50 and £1.50 than if more of the prices of the goods that they purchased were below £.50 or were above £1.50. The authors suggest that when more goods fell between the two payouts (i.e., £.50 and £1.50), those intervening values made the subjective difference between the two payouts greater. As a result of the larger perceived difference between the two payouts, shoppers perceived the £1.50 payout to be larger enough that the £1.50 lottery was worth the greater risk.

Personal budgets also act as internal standards. A considerable amount of research in judgment and decision making has been devoted to how evaluations of money are influenced by internal *mental accounts*. People set up mental spending accounts that are budgets for different expenditures such as entertainment or food (Thaler, 1985). These mental accounts act as standards against which they track their expenditures. If people believe that they have overspent in one mental account (e.g., meals at restaurants), they will avoid spending in that specific category even though they will still spend freely on other items (e.g., clothing). The comparison of expenditures to these internal mental accounts explains several anomalies in consumer behavior that violate the assumption that money is fungible—that one unit of money should be interchangeable with any other unit. Losing $10 out of your wallet and losing a $10 movie ticket entail the same economic loss (i.e., $10). However, people are less likely to purchase a $10 movie ticket if they just lost a $10 ticket to see that movie than if they just lost a $10 bill which had not yet been assigned to any mental account (Heath & Soll, 1996).

Standard Selection

Which particular standards people will use to evaluate a particular monetary gain or loss is likely to be a function of the standards that are most salient (Bordalo, Gennaioli, & Shleifer, 2012), their knowledge or expertise (Fudenberg, Levine, & Maniadis, 2012; Hsee & Zhang, 2010; Morewedge et al., 2009), and the extent to which a standard can provide them with a satisfactory or self-serving evaluation (Kassam et al., 2011). Specifically, more salient standards are more likely to be selected and are thus more likely to influence the evaluation process. However, the knowledge and motivation of the judge may moderate the influence of contextually salient standards, as well as the selection of standards and evaluations. People not only use the standards that are most likely to come to mind in their evaluations, but also are likely to use the standards that provide them with a useful or satisfactory evaluation of their circumstances.

Salience. While both external and internal comparison standards can influence judgment, the two differ in their salience and likelihood of being selected as the basis of evaluation. External comparison standards are stimulus based, whereas internal standards are memory based (Lynch & Srull, 1982). Retrieving internal standards can be effortful (Rottenstreich, Sood, & Brenner, 2007). Thus, external standards have a clear advantage over internal standards unless they were recently encountered or are chronically cognitively accessible. Frederick and Fischhoff

(1998) found that willingness to pay for different quantities of household items was much more sensitive to the quantity of those items when willingness to pay was elicited in a within-subject design than in a between-subject design. Participants in the within-subject conditions presumably were more sensitive to the quantities of the items because it was easier for them to compare the amount they were willing to pay for one quantity of an item to the price they were willing to pay for a greater or smaller quantity of that item. Participants in the between-subject conditions could have retrieved internal standards relating to the price they paid for household items from memory in order to aid their evaluations of those items, but this was presumably more difficult than using the (salient and easily accessible) external comparison standards provided by the evaluation of other quantities of those items in the within-subject design.

The importance of standard salience is nicely illustrated by research examining the impact of social contact with neighbors on happiness with one's income (Luttmer, 2005). Socializing with the neighbors increases the salience of their income, and one is therefore more likely to compare their income with one's own income. Similarly, increases in changes of wealth have the greatest impact on one's happiness immediately after the increase, while the amount of the last paycheck is still salient (Easterlin et al., 2010). After a few paychecks, the change in income has less impact on happiness because one's past salary and standard of living have faded into the background and the new salary and standard of living have become the status quo. Forgetting the comparison standards of the past can lead to a *hedonic treadmill*, whereby people quickly adapt to improvements in their life circumstances, making their hedonic benefits of increases in income relatively short lived (Frederick & Loewenstein, 1999).

Knowledge. Knowledge of which standards are most relevant and familiarity with relevant comparison standards also influence standard selection. Expertise or familiarity with a stimulus or stimulus values will increase the chance that a person will be able to evaluate whether external standards are appropriate comparisons or whether different standards should be considered. Imagine you are shopping for a Honda and there is a much more expensive Lexus next to the Honda you are examining. A certain level of expertise allows you to determine that the price of the Lexus is not a reasonable comparison standard for the Honda. Instead expertise and familiarity allows you to recall or generate an internal standard (Morewedge et al., 2009), such as the price of a more similar car (e.g., a toyota).

Evidence from the field supports this account. Second-time homebuyers are less influenced by external standards than are first-time buyers (Northcraft & Neale, 1987). Having bought a home, people are more familiar with the value of homes in their local market (i.e., they have formed internal standards) and are less influenced by externally provided standards such as list prices. Similarly, most drivers are relatively sensitive to relatively small fluctuations in gas prices and will switch gas stations when their preferred station increases its prices (Maurizi & Kelly, 1978). The frequency with which drivers encounter gas prices enables them to form a relatively strong internal gas subscale that they can consult at any given time, in any given context, allowing them to be sensitive to small variations in gas prices. With increased exposure to and expertise in a category, it becomes easier to

generate and sample internal standards, even standards that occupy a larger range than gas prices, which in turn results in greater reliability and sensitivity in judgment of category members (Morewedge et al., 2009).

When valuing unfamiliar stimuli, people do not have reliable internal comparison standards. As a result, they often exhibit rather remarkable insensitivity to differences in absolute values. Desvousges and colleagues (1992), for example, asked three different groups of participants how much they would be willing to pay to save 2,000, 20,000, or 200,000 birds from dying in oil-polluted ponds each year. Despite a 100-fold increase in the number of birds saved, participants were willing to spend approximately the same amount to save all three bird populations (between-subjects): $80, $78, and $88, respectively. The lack of a relevant standard to which participants should compare the value of the life of a bird made them insensitive to large differences in the absolute number of birds saved. This type of scope insensitivity has been demonstrated for the valuation of other uncommon goods. Canadians are willing to pay as much to clean up all lakes in the province of Ontario as to clean up a few lakes in a smaller part of the province (Kahneman, 1986).

Motivated Selection. Not only do people use the standards made salient by their environment and memory, they also selectively choose standards and dimensions of comparisons that make them happy with themselves and their present circumstances (Kruger, 1999). People preferentially compare themselves to other people who are less fortunate and avoid comparing themselves to other people who are more fortunate (Lyubomirsky & Ross, 1997; Pyszczynski, Greenberg, & LaPrelle, 1985; Shepperd & Taylor, 1999; Taylor, Wood, & Lichtman, 1983). When the use of salient standards does not make for a favorable evaluation of a cash prize (i.e., when people could have won an amount that was larger), people engage in a motivated search for a standard that provides a more favorable comparison (i.e., compare their prize to the prospect of having won nothing at all; Kassam et al., 2011).

Comparisons and Cognitions: Determinants of Value Sensitivity

When people make monetary valuations, the particular standards salient or selected are not the sole determinants of how sensitive the judge will be to relative or absolute value. That degree of sensitivity is also largely determined by whether the judge evaluates the target by comparison to a single or multiple standards. Evaluations that incorporate multiple comparison standards allow for sensitivity to absolute magnitude, whereas evaluations that rely on one standard only allow for sensitivity to relative magnitude. We suggest that incorporation of multiple comparison standards is more likely when people have the motivation and the cognitive resources available to consider multiple standards and conduct comparisons between the target and those standards. In a two-system (Kahneman & Frederick, 2002) model of judgment, this would be when System 2 reasoning is brought to bear on the evaluation (i.e., in addition to System 1).

Single Versus Multiple Comparison Standards

The most primitive form of comparison occurs when the evaluation of the target is made in comparison to a single comparison standard. A person could compare her current debt to her debt the previous month to determine if it has improved or become worse, or compare the price of a concert ticket to the last ticket price she paid to determine if the concert is cheap or overpriced. The comparison of a target to a single standard only allows for a judgment of relative value, such as whether the target is greater or less and better or worse than the standard to which it is compared (Hsee et al., 1999).

If that standard contains information about the distribution of all relevant stimulus values in a range (e.g., is identified as the median or average), it can also provide some intuition about the location of the target in its range, such as whether its value is high or low. If one knows that the standard is in the middle of the distribution (or its more general location), one will also know whether the target is above or below the mean or median of the distribution. For example, one can look up the blue book value of a car to gauge if its asking price is above or below its approximate market value. Judging a target relative to a single standard, however, does not give one the precision that is afforded by having multiple standards of comparison and will not allow for absolute judgment of the target (Hsee et al., 1999).

Greater sensitivity to absolute value is possible when judges possess multiple comparison standards, as sensitivity is generally dependent on knowing the range of an appropriate scale and the distance between a target and those scale endpoints (Hsee et al., 1999, 2009; Volkmann, 1951). Participants in an experiment by Hsee and colleagues (1999), for example, were asked to judge college applicants and were provided with the score of an applicant that varied between subjects from the bottom to the top of the possible range and either (1) no information, (2) the scale mean, or (3) the highest and lowest scale value. Evaluations made by participants with no information were insensitive to the score of the candidate—candidates with high and low scores were evaluated similarly. Evaluations made by participants who knew the scale midpoint were sensitive to the relative value of the candidate's scores, but were insensitive to the absolute value of the candidate's scores. Candidates with above average scores were evaluated more favorably than those with below average scores, but there was no differentiation between candidates far and just above average or far and just below average. Only evaluations made by participants who knew the scale endpoints were sensitive to the absolute value of the score of the candidate. Knowledge of the endpoints of the scale established its range, which allowed participants to estimate the position of a score in the distribution. This suggests that multiple standards of comparison (at least two) have to be considered for the judge to exhibit some degree of sensitivity to absolute value. If the most extreme values do not represent the high and low points of the range, however, this sensitivity will not necessarily allow one to judge the "true" value of the target.

People do seem to make use of the full range of externally provided comparison standards in their judgments (Moon & Voss, 2009). Lab experiments and purchase data reveal that the attractiveness of a price is influenced by the entire range and distribution of recently encountered prices (Janiszewski & Lichtenstein, 1999; Niedrich, Sharma, & Wedell, 2001; Niedrich, Weathers, Hill, & Bell, 2009). When multiple standards are available, consumers incorporate them into the subscale they generate to determine the rank and the desirability of the target price (Niedrich et al., 2001). Janiszewski and Lichtenstein, for example, gave participants ten prices of different brands within a product category before having them evaluate the price attractiveness of a target brand with a market price of $1.20. Their key manipulation was the range of prices encountered by participants prior to evaluation (e.g., $.10–1.75 vs. $.75–$1.50). The mean price was constant across conditions. Depending on its relative position within the range, the target price was perceived to be more or less attractive.

If no external standards are provided or salient, it seems that consumers can also recall a range of comparison standards from memory. The decision sampling approach (Stewart et al., 2006) assumes that people evaluate the subjective value of a stimulus by establishing its rank in a set of relevant standards recalled from memory through a series of binary ordinal comparisons to those standards. In other words, one determines the rank of the target by deciding whether it is higher or lower than each of the standards that are recalled, one at a time. You might compare the cost of groceries at your local supermarket to other recent store purchases, for example, and evaluate the psychological cost of your grocery bill by its rank in that set of purchases. Depending on whether it ranks higher or lower among the other purchases you retrieve from memory at the time of judgment, your grocery bill will then be perceived as expensive or inexpensive by comparison. Nevertheless, if multiple standards of comparisons are recalled, the judge will be able to exhibit absolute sensitivity within the range of the recalled standards.

Two Cognitive Systems and Value

We propose that the cognitive processes involved in the judgment also determine whether a judge will exhibit relative or absolute sensitivity to monetary gains and losses. Mapped roughly onto a two-system model of judgment (Kahneman & Frederick, 2002), we identify the assessment of the relative value of a monetary gain or loss with System 1, and we identify the assessment of the absolute value of a monetary gain or loss with System 2. *System 1* is a system comprising associative processes that underlie intuitions and rapid judgments to which the thinker has little conscious access. It tends to involve little effort and produce judgments in a fairly automatic fashion. *System 2* is a system comprising controlled processes to which the thinker has access. It tends to be slower, more conscious, rule governed, and

require more effortful deliberation (Kahneman & Frederick, 2002; Morewedge & Kahneman, 2010). As an example, consider the equation below:

$$\$2117.00 \times \$4916.00 =$$

Recognizing that this is a math problem and realizing that its solution is a large sum are outputs of rapid judgments made by System 1 processes. Its precise solution, $10,407,172, is the output of a more effortful System 2 process. It is generally assumed that System 1 always generates some output when making a judgment, which is then accepted, blocked, or corrected by System 2 (e.g., Alter, Oppenheimer, Epley, & Eyre, 2007; Gilbert, 1999; Kahneman & Frederick, 2002; Morewedge & Kahneman, 2010).

Evidence for a two-system framework within the domain of monetary evaluations is provided by the findings of Kassam and colleagues (2011). They found that participants who won the larger of two prizes on a scratch-off ticket (i.e., $7 rather than $5, $5 rather than $3, or $3 rather than $1) were insensitive to the absolute amount of money that they won, but were sensitive to the relative amount of money that they won. People were happier winning $5 or $3 when the amount that they won was the larger of the two prizes and less happy winning $5 or $3 when it was the smaller of two prizes. For participants who won the larger of two amounts, however, they were no happier winning $7, $5, or $3 (see Fig. 5.2). Presumably, these participants were sufficiently satisfied with winning the larger prize, and were thus not sufficiently motivated to generate additional standards of comparison.

Participants who won the smaller of the two prizes, however, were sensitive to the absolute value of that prize. Specifically, participants who won the smaller of the two prizes on their scratch-off ticket were happier when that inferior prize was $5 than $3, and happier when it was $3 than $1 (see Fig. 5.2). Presumably, these participants were not satisfied by the smaller prize and were thus motivated to generate additional standards of comparison. This interpretation of the results is supported by the findings of the second study in the paper, which found that participants who received the smaller of two prizes were sensitive to its absolute value while their attention was not usurped by a cognitive load task, but were not sensitive to the absolute value of their inferior prize while performing a cognitive load task.

These results suggest that when initial relative judgments are satisfactory, evaluations of gains or losses may reflect the output of System 1. When evaluations are not satisfactory, however, people may engage in more elaborate System 2 processing if they have the cognitive resources to retrieve or attend to additional standards, becoming more sensitive to absolute value. That is not to say that when System 2 is involved, judgments will always fully incorporate absolute value. We suggest that the involvement of System 2 simply means that people have the capacity to be sensitive to absolute value. Other factors, such as the standards of comparison available at the time of judgment and being able and motivated to consider them, are also necessary for a judge to be sensitive to absolute value. A more detailed account of this process follows (Fig. 5.3).

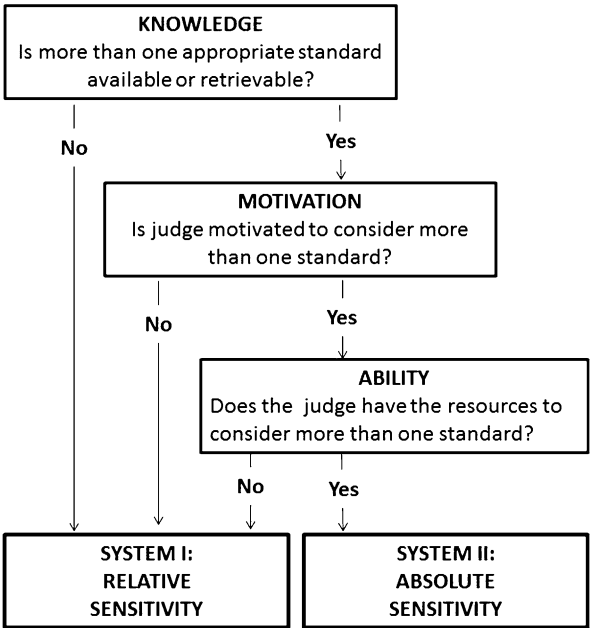

Fig. 5.3 A two-system account of relative and absolute value

System 1: Evaluating Relative Value

Judging a monetary gain or loss relative to a standard can occur with the consideration of just one comparison standard. Yet, even this simple relative judgment requires several stages to perform. First, one must identify and attend to an appropriate standard of comparison. A standard may already be salient or may be spontaneously retrieved from memory at this time. Once a standard has been selected, one must identify the attributes possessed by the standard that are similar to the target, in order to determine the dimensions along which they are to be compared (Gentner & Markman, 1997). Next, one must perform the comparison and devote sufficient cognitive resources in order to notice differences between the value of the target and the standards to which it is compared (Martin, Seta, & Crelia, 1990; Morewedge, Gilbert, Myrseth, Kassam, & Wilson, 2010; Mussweiler, 2003).

Since monetary gains and losses are unidimensional and quantified, relatively limited resources should be necessary to judge whether one gain or loss is bigger or smaller than another gain or loss. In other words, System 1 can be used to determine the value of a monetary gain or loss relative to a comparison standard (Kassam et al., 2011). Two caveats to this statement must be expressed: First, mapping the value of a gain or loss onto a utility judgment may be more complicated and noisy (Stevens, 1975). Second, assessing the relative values of two more complex stimuli, such as two job offers, may require the simultaneous comparison of too many of their attributes to be performed without effortful deliberation. Thus, System 2 processing may

be necessary to make even relative judgments when determining the value of non-monetary stimuli.

Stage 2: Evaluating Absolute Value

Evaluating the absolute value of gain or loss and mapping it to a location on a psychological scale of relevant gains or losses requires attending to multiple standards in the environment or recalling additional internal comparison standards from memory.

People not only have to be motivated to generate a scale that enables absolute judgment by recruiting additional comparison standards, they also must have the time and ability to attend to multiple comparison standards or retrieve additional comparison standards from memory. Although participants who received the smaller of two cash amounts in Study 2 of Kassam et al. (2011) were motivated to retrieve additional comparison standards to increase their satisfaction with the amount that they won, they appeared only to be able to do so when their cognitive resources were not usurped by a cognitive load task. Concurrent tasks performed at the time of judgment may thus impair one's ability to retrieve and consider the multiple comparison standards necessary to be sensitive to absolute value.

One important determinant of the attentional resources available to perform such judgments may be the intensity of the affective state one experiences while performing the judgment. Intense affective experiences consume cognitive resources by drawing attention to the experience itself and away from consideration of comparison standards that are required for more systematic processing and sensitivity to value (Buechel Zhang, Morewedge & Vosgerau 2014; Morewedge et al., 2010). Hsee and Rottenstreich (2004), for example, found that the amount of money people were willing to pay to save 1 versus 4 pandas (in a between-subjects elicitation process) was more sensitive to the number of pandas that would be saved when the pandas were represented as dots (evoking a mild affective response) rather than as pictures of pandas (evoking a stronger affective response).

Another example of the influence of intense affective states on sensitivity to value comes from the domain of affective forecasting. Affective forecasts are predictions of the hedonic impact of future events, such as a prediction of how happy one will feel if one's football team wins a game (e.g., Morewedge, Gilbert, & Wilson, 2005). People make affective forecasts by simulating the future experience and its context and noting their affective response to the simulation, which is then translated into a prediction (Gilbert & Wilson, 2007). The accuracy of affective forecasts is typically determined by comparing the predictions made by forecasters to the hedonic states reported by people having the forecasted experience (i.e., experiencers).

Buechel et al. (2011) found that the different affective intensity of the act of making an affective forecast and the act of having the corresponding experience can lead forecasters and experiencers to exhibit different sensitivity to the size of a monetary gain. Specifically, they found that forecasters thought that they would be happier if they won

$20 than $1 in a gamble with a 50 % chance of winning, but experiencers reported being equally happy if they won the gamble, regardless of the amount that they won.

The reason for the difference in sensitivity to variations in outcome magnitude, they argue, stems from the difference in the intensity of the affective state evoked by the simulation of an event used to make an affective forecast and the corresponding forecasted experience. Hedonic experiences typically evoke a more intense affective response than do mental simulations of those experiences. The greater intensity of hedonic experiences leads them to usurp more attentional resources than do simulations of those experiences, which means that experiencers are usually less likely to attend to alternative possible experiences that they might have had (e.g., winning various other amounts of money) and engage in the complex comparisons that are required to be sensitive to absolute value. As a result, experiencers may have only had the resources available to compare the amount they won to its alternative ($0), whereas forecasters may have had the resources to compare the amount won to other alternatives, such as their hourly wage or the number of lunches for which it would pay. This greater sensitivity of affective forecasters to absolute monetary values is observed in field surveys, as people consistently overestimate the extent to which income affects their well-being (Aknin, Norton, & Dunn, 2009).

Distortions of Scale and Value

Comparison standards afford the ability to evaluate monetary gains and losses that would otherwise not be evaluable because of their abstract nature and nearly infinite range. However, the particular comparison standards used may also distort the perception of their value.

In a classic example of such a distortion, Kahneman and Tversky (1984) found that subjects were more willing to drive 10 min. to another store in order to save $5 on $15 calculator than to drive 10 min. to save $5 on a $125 jacket. In other words, the same savings of $5 was perceived to be of greater value when compared to a good that cost $15 than to a good that cost $125. Morewedge, Holtzman, and Epley (2007) showed that shoppers spent 36 % more during a shopping trip after their larger financial resource accounts were made cognitively accessible (e.g., they were asked if they possessed checking and savings accounts) than after their smaller financial resource accounts were made cognitively accessible (e.g., they were asked about items in their wallet to make their cash on hand salient). This did not appear to be due to a perception that the dollar cost of goods was greater, but rather that the dollar cost of goods was subjectively more expensive when compared to the smaller resource accounts than when compared to the larger resource accounts.

Gourville (1998) demonstrated how temporal reframing influences the evaluation of expenditures by altering the standards retrieved from memory to which expenditures are compared, which has implications for how expenses should be framed. When a transaction is framed as a series of small daily expenses (e.g., “Less than $1 a day”), he argued that transaction prompts the comparison of the

expense with small everyday expenses that are perceived as affordable (e.g., a cup of coffee or newspaper). When a transaction is framed in terms of a monthly or annual payment, however, it is compared to other monthly or annual expenses (e.g., a car or mortgage payment). Expenses, such as a charitable donation, that are given a pennies-a-day framing will thus be perceived to be relatively trivial and affordable if their daily cost would be less than or similar to the cost of small daily expenses. If their daily cost would be much larger than small daily expenses, however, they will be viewed unfavorably and as unaffordable. A larger expense would thus be perceived more favorably if instead it is framed as a monthly or annual expense because it will be evaluated by comparison to larger expenses such as utility, car, or mortgage payments.

Even arbitrary comparison standards can influence scale generation and distort judgments of value. The amount of money people request to listen to an annoying sound or how much they are willing to pay for a bottle of wine can be influenced by arbitrary anchors made salient prior to the judgment, such as the last four digits of their social security number (Ariely et al., 2005; Ariely, Loewenstein, & Prelec, 2003). People may realize that the anchor itself does not aid the evaluability of a target variable, but the search for an applicable comparison standard and the scale used to make the judgment of the target are both influenced by the cognitive accessibility of the anchor (Frederick & Mochon, 2012; Mussweiler & Strack, 1999; Simmons, LeBoeuf, & Nelson, 2010). Consequently, when judging the value of a bottle of wine, for example, participants with higher social security numbers were willing to pay more for the bottle than were participants with lower social security numbers, possibly because the higher numbers made anchor consistent information about wine more accessible. That is, they were more likely to retrieve examples of pricey wine bottles from memory such as $30 bottles of Bordeaux as a basis for the value of the target bottle than $8 boxes of White Zinfandel.

More generally, the extent to which a judgment is susceptible to external influences (i.e., anchors, context, and external standards) is influenced by the judge's expertise or knowledge, as well as her motivation and ability to engage in more systematic assessments of value (i.e., involve System 2). The ability to retrieve consistent internal comparison standards allows for some resistance to contextual and temporal influences. On the other hand, some subscales are not familiar enough to allow the retrieval of internal standards (Ariely & Loewenstein, 2000; Morewedge et al., 2009). Others might contain such a wide range of potential comparison standards that might make the retrieval of a representative sample difficult or impossible. Gains and losses that might have to be mapped on these forms of subscales should be especially prone to the influence of contextual differences.

Implications for Science, Practice, and Well-Being

Many scientists and practitioners rely on money as a measure of utility or value. As reviewed in this chapter, the reliability of estimates of the utility and value of money is largely contingent on the comparison standards used to form the subscales upon

which monetary gains and losses are evaluated and the extent to which judges are sufficiently motivated and have the cognitive resources necessary to be sensitive to its absolute value. Thus, the way in which people evaluate the subjective value of money has important implications for both science and practice.

Science

A variety of contextual and individual factors determine the comparative processes involved in monetary judgments. Research outlined in this chapter suggests that when researchers make conclusions and comparisons about utility derived from money and people's willingness to pay for goods, they must not only consider the standards that might be used to generate subscales (including factors such as the number and the salience of standards), but they should also consider factors that determine the ability and motivation of judges to engage in the more effortful (System 2) processing that is required for them to be sensitive to absolute value.

The framework we suggest may help to explain apparent inconsistencies and controversies in the literature. Different models of decision making make different predictions about how value is represented and assessed, which has led to controversies among researchers about which models are more accurate in their description of how judgments are made (Vlaev, Chater, Stewart, & Brown, 2011). Adaptation level and price perception models argue that stimulus values, such as prices, are compared to a single reference value (Helson, 1947), whereas range-frequency theories assume that multiple previously encountered values are considered when making a judgment (Parducci, 1965). Evidence outlined in this chapter suggests that whether judgments are relative compared to one reference price or absolute and based on a range of reference prices may depend on the level of processing engaged when making those judgments (Fig. 5.3). In other words, whether the adaption level model or the range-frequency model provides better descriptive validity in a given domain might be a function of the number of available external or internal comparison standards, as well as the motivation and resources available to consider more than one comparison standard at the time of judgment. Future research might be able to reconcile the validity of different models by identifying the circumstances under which these various models make better predictions.

Another example of an important and controversial topic is to what extent goods and experiences affect happiness (Van Boven, 2005). This topic not only has theoretical relevance for psychologists and economists, but also has practical implications for the understanding of well-being. Research presented in this chapter suggests that whether having or spending more money does actually increase happiness might depend on how happiness and its antecedents are operationalized. As intense affective experiences usurp attention (Buechel et al., 2014) and interfere with more effortful System 2 processes, it is important to consider how much affect a stimulus or question evokes at the time of judgment. Differences in the evocativeness of measures of life-satisfaction (a more abstract and less evocative measure)

and measures of emotional well-being (a more emotionally evocative measure), for example, might explain the stronger relationship of the former with differences in income (Diener, Kahneman, Tov, & Arora, 2010; Kahneman & Deaton, 2010). More generally, given that stimuli and judgments vary inherently in the amount of affect they evoke or entail, it is important to consider the intensity of affect elicited by different experimental procedures that are used to measure the assessment of value or utility when interpreting their results.

Future work could more systematically evaluate which utility measures are most likely to be sensitive to differences in gains and losses as well as income and wealth, and when greater sensitivity to the value of money might lead to more optimal or suboptimal decision making. Future research is needed to further test how discrepancies in cognitive resources available at the time of a decision and at the time of the experience lead to better or worse choices. As reviewed, mental simulations of experiences evoke a less intense affective state than the actual experience and therefore allow for the involvement of more System 2 processing in judgments. If judgments and choices for future (simulated) experiences involve System 2 processes, whereas experiences are only evaluated with System 1 processes, choices made by simulating future experiences are likely to exhibit systematic errors. Paradoxically, such judgments and choices might be better when the judges are not motivated to engage in careful simulation or have the cognitive resources to do so.

Practice

This chapter suggests when people will be more or less sensitive to the value of money, and when and how this might benefit practitioners such as marketers or nonprofits soliciting charitable giving. Unless people are highly familiar with the ranges of prices for a particular kind of product or kind of charitable donation, they should be relatively insensitive to the magnitude of prices and requests. People may not be aware that a good is being offered for the best price or has the best value, for example, if they are not aware of how it compares to the prices and values of relevant alternative goods. It is particularly difficult to evaluate monetary values when no comparison standard can be retrieved from memory, as in the case of charity solicitations, where the value of the purchased unit (e.g., a life or a service) is unknown. It is thus crucial to aid scale generation by providing salient external comparison standards or by encouraging consumers to recall their own internal standards when practitioners want people to be sensitive to monetary values or the value of their money.

Hsee, Zhang, Lu, and Xu (2013) found that having participants create their own comparison standard can lead to increased sensitivity to monetary value. When participants were first asked how much they were willing to donate to assist one victim, participants' donations were much more sensitive to the number of victims that they were asked to help in a subsequent request than when they did not first create such

a scale. In other words, once their willingness to pay per unit was elicited and stated, participants were subsequently willing to donate more money to help a greater number of victims. Using a similar strategy, marketers could provide a unit scale or have customers create a scale by either providing the price of a single unit or asking customers how much they would be willing to pay for a single unit before eliciting their willingness to pay for multiple units. A realtor, for example, might ask clients how much they are willing to pay for a single bedroom in order to help them decide whether to buy a 2-bedroom apartment or if the price of a 3-bedroom apartment is worth the additional cost. Conversely, when sensitivity to monetary value is undesirable, scale generation should be inhibited. This chapter suggests that one way to inhibit scale generation is by impairing the ability to engage in System 2 processing, for example, by increasing cognitive busyness or intense emotion evoked during judgment.

Conclusion

The value of money is not easy to evaluate, despite its status as a stimulus that is quantified and familiar. In this chapter, we have suggested that this difficulty stems from two factors. First, money itself is not inherently evaluable. It is a second-order reinforcer measured on an artificial scale. Making judgments about the utility it yields requires the mapping of monetary scales onto psychological utility scales. Second, monetary values encompass an infinite range of values. This wide range means that there is not one scale by which all gains and losses are evaluated. The resulting need to construct subscales to evaluate gains and losses at the time of judgment leads to insensitivity in judgment. The comparison standards that comprise those subscales thus may change from one context, person, and time to the next, leading to unreliable and inconsistent judgments. People may be sometimes happier with smaller than larger gains (and larger than smaller losses), depending on the particular scale and comparison standards evoked at the time of judgment. An employee might be happier with a job offer if her initial salary offer was $75,000, which she negotiated up to $80,000, than if she had been offered a $85,000 salary without a chance to negotiate further.

We have reviewed the literature on comparative judgment that outlines how people generate scales to evaluate monetary gains and losses and we have identified how standards are selected and judgments are made. Depending on the number of standards considered during judgment, comparison standards allow evaluations that range from crude judgments of relative value that require fewer cognitive resources to perform (System 1) to more sophisticated judgments of absolute value that require more cognitive resources (System 2). More sophisticated judgments are likely when the judge possesses extensive knowledge of possible stimulus values, which allows the retrieval of internal standards from memory, and has the ability and the motivation to engage in such retrieval processes or attend to relevant

standards in her environment. Given the infinite range of monetary values, however, absolute sensitivity when evaluating all monetary values on a single scale should not be possible. Absolute sensitivity is limited to the specific subscales that are generated to evaluate monetary gains and losses at the moment of judgment. In other words, absolute sensitivity is still relative.

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Chapter 6
Financial Decision Making Across Adulthood

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Abstract Choices about money have serious consequences both for individuals and society, as reckless spending by young adults and financial scamming of the elderly all too clearly demonstrate. Recent evidence from psychology and neuroscience suggests that financial decision making capacity may peak at middle age, with unique vulnerabilities manifesting early and late in life. In this chapter, we review age differences in performance on a series of financial decision making tasks, including those involving monetary gain and loss, learning and risk, and intertemporal choice. Taken together, the evidence suggests that older adults do well when making decisions that rely on accumulated life experience and perform suboptimally in uncertain and novel environments that require fluid learning. Brain imaging reveals declines in frontostriatal function in the elderly that may explain the observed challenges on these dynamic behavioral decision tasks. In an effort to translate these findings from the lab to society, a small and growing literature has identified real-world financial decision correlates of performance on laboratory tasks. Such studies hold enormous promise for developing tools that can identify individuals at greater risk for poor financial decision making.

There is a popular stereotype that adolescents and young adults are terribly irresponsible with managing money. It's true that as we age, we gain experience with making monetary decisions, and perhaps the quality of an individual's financial decisions increases with experience across adulthood and into old age. However, we also encounter cognitive limitations in older adulthood, which may introduce constraints on our ability to adapt to novel situations.

Is there an age when we are at our financial decision making peak? Observationally, many of society's most influential financial decision makers are

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E. Bijleveld and H. Aarts (eds.), *The Psychological Science of Money*,
DOI 10.1007/978-1-4939-0959-9_6,

middle-aged (Samanez-Larkin, 2013). In 2013, the average age of Fortune 500 chief executive officers and chief financial officers is in the mid-50s. Historically, the average appointment age of Federal Reserve Chairs and National Economic Council Directors is also in the 50s. The number is not an artifact of averaging; in 2013, all members of the Council of Economic Advisors and half of the National Economic Council members were 50-something. Is there a peak of financial reason in the fifties? Do some decisions get better with age? Do some get worse? Recent research in psychology, economics, and neuroscience is starting to answer these questions.

In an analysis of financial mistakes across a range of credit behaviors (e.g., suboptimal balance transfers and fee payments), a recent paper identified the approximate age at which mistakes are minimized as 53 (Agarwal, Driscoll, Gabaix, & Laibson, 2009). Heavily influenced by classic work in the psychology of aging on fluid and crystallized intelligence (Horn & Cattell, 1967), the authors presented a model of how financial decision making performance may be influenced by divergent changes in cognitive abilities over adulthood. In the model, the youngest and oldest decision makers make mistakes for different reasons. The young are cognitively robust but inexperienced in making financial decisions, while the elderly draw on a lifetime of experience with financial decision making but are limited in some fluid cognitive abilities. The peak in middle age is at a sweet spot where individuals have not suffered decline in fluid reasoning but also have decades of life experience. Evidence for both cognitive limitations and experience-based enhancement of decision making are discussed in depth in the sections below.

Over the past several years, a series of studies have examined individual differences in reward processing across the adult life span using an interdisciplinary and translational approach. The approach combines psychological theory, brain imaging methods from neuroscience, and experimental tasks from behavioral economics and finance to examine decision making in the laboratory and in the real world. Overall, the results reveal a pattern of age differences and individual differences across age in decision making and the function of neural systems supporting the valuation process. This work has explored individual differences across a range of reward-related tasks, from basic anticipatory and consummatory responses, to monetary gains and losses, probabilistic reward learning, risky investment decision making, and intertemporal decisions.

Monetary Gains and Losses

Do individuals get more or less excited about winning or losing money in old age? A series of recent studies have begun to explore this question. Brain imaging studies that have examined adult age differences in the basic function of the reward system reveal that older adults compared to younger adults show similar neural activation during the anticipation of monetary gains. Neural activity in the ventral striatum is similarly modulated by reward magnitude in younger and older adults (Samanez-Larkin et al., 2007). This preservation of function also extends to consummatory

responses to rewards. Younger and older adults show similar neural reactivity to reward outcomes in the ventral striatum and medial prefrontal cortex (Cox, Aizenstein, & Fiez, 2008; Samanez-Larkin et al., 2007; Samanez-Larkin, Kuhnen, Yoo, & Knutson, 2010). These studies provide initial evidence that basic neural responses to the anticipation and receipt of monetary gains are relatively preserved from young adulthood to old age.

A strikingly different pattern emerges for anticipatory responses to monetary losses. Older compared to younger adults show reduced reactivity in the caudate and anterior insula during anticipation of monetary loss (Samanez-Larkin et al., 2007). This age difference is reflected in self-reported affect such that older compared to younger adults report lower levels of anticipatory negative arousal when anticipating losses. A similar pattern of age differences in self-reported affect (Nielsen, Knutson, & Carstensen, 2008) and anticipatory neural activity (Wu, Samanez-Larkin, Katovich, & Knutson, 2014) replicated in independent samples. Interestingly, these age differences do not extend to loss outcomes. When older adults lose money, they are as reactive to those losses as younger adults.

This asymmetry in gain and loss anticipation as a function of age is consistent with a large body of behavioral research demonstrating an age-related positivity effect, whereby older adults pay more attention to and better remember positive relative to negative information (Carstensen & Mikels, 2005; Mather & Carstensen, 2005). Socioemotional selectivity theory (Carstensen, 2006; Carstensen & Mikels, 2005) suggests that as time horizons shrink across adulthood, humans are increasingly motivated to optimize well-being. In fact, research that measures emotions in everyday life has demonstrated that emotional experience becomes relatively more positive and less negative across adulthood (Carstensen et al., 2011; Carstensen, Pasupathi, Mayr, & Nesselroade, 2000). This age by valence interaction effect appears to extend to the anticipation of monetary incentives as discussed above. Reasoning from this theory, our view of the age by valence interaction in incentive anticipation (but not outcome) is that older adults may be avoiding the anxiety associated with loss anticipation unless—and until—the loss actually occurs (however, see (Wood, Busemeyer, Koling, Cox, & Davis, 2005) for evidence that positivity effects may sometimes extend to outcomes). Whether this attenuation of anticipatory anxiety is strategic or automatic is still an open question. It is possible that anticipatory emotional regulation also becomes increasingly automatic and less effortful with age (Samanez-Larkin & Carstensen, 2011).

Learning and Risky Decision Making

In contrast to the studies of basic reward processing, which suggest relative consistency across adulthood into old age, the literature on reward learning reveals consistent age-related declines in performance and observable age differences in neural activity. Older adults show reduced ventral striatal activation during probabilistic reward learning (Mell et al., 2009). Similarly, electrophysiological studies provide evidence for reduced activation of frontal cortical regions during learning in older

compared to younger adults (Eppinger, Hämmerer, & Li, 2011; Eppinger, Kray, Mock, & Mecklinger, 2008; Hämmerer, Li, Müller, & Lindenberger, 2011). Recent studies have extended these findings to show that these age differences may be due to older adults' difficulty in dynamically computing prediction errors in novel environments (Chowdhury et al., 2013; Eppinger, Schuck, Nystrom, & Cohen, 2013). Prediction errors signal the difference between the reward received and expected reward, and they serve to update expectations of future reward. As such, the prediction error is the core signal used for learning. In a novel environment, where individuals are attempting to learn from limited, task-specific experience which of several options is most profitable, prediction error signals are used to update the value of potential future choices. Supporting a dissociation between basic reward sensitivity and reward-based learning, striatal regions appear functionally equivalent in older adults during simple reward-based tasks that do not require novel learning, but these same regions in the same subjects show increased neural activity variability during tasks that require learning (Samanez-Larkin et al., 2010).

There has been a great deal of debate about valence (positive, negative) effects in reward learning. Some evidence suggests that older adults are more sensitive to positive than negative feedback compared to younger adults during probabilistic learning (Denburg, Recknor, Bechara, & Tranel, 2006; Wood et al., 2005). Others have suggested the opposite, that older adults are more sensitive to negative than positive feedback (Hämmerer et al., 2011). If there is this shift toward negative-feedback sensitivity, it happens later in very old age (Frank & Kong, 2008; Simon, Howard, & Howard, 2010). This non-linear slight increase in negativity near the end of life is consistent with the larger literature on emotional experience in everyday life (Carstensen et al., 2011). Across reward learning tasks, the most consistent effect reported is a main effect of age without an age by valence interaction (Eppinger et al., 2011). This suggests that the majority of age differences in reward learning tasks are due to older adults' general difficulty with learning. In probabilistic learning tasks, the uncertainty of the outcome on any individual trial introduces risk. Might these age-related learning impairments also contribute to adult age differences in risky decision making? The tasks described thus far do not systematically vary the level of risk among options or include certain/safe alternatives, but recent studies have begun to examine age differences in choice among risky and safe options.

Risky decisions involve choices made between options where at least one alternative has an uncertain outcome. There are strong societal stereotypes of older adults as being more risk averse than middle-aged or younger adults. There is also a long history of behavioral work on risk aversion and aging, which started with studies of individuals' hesitancy in responding when tasked with decisions under risk (Botwinick, 1969; Calhoun & Hutchison, 1981; Okun, 1976). A critical review of this work suggests that these stereotypes of risk aversion with age are not supported by results from well-controlled experimental tasks (Mather, 2006). The past several decades of research on the topic were recently reviewed in a meta-analysis; focusing on gambling tasks and risky investment decisions, the meta-analysis found no evidence for systematic adult age differences in risk taking (Mata, Josef, Samanez-Larkin, & Hertwig, 2011). Rather, the meta-analysis identified a subset of

tasks in which older adults are more risk averse and other tasks in which older adults are more risk seeking than younger adults (Mata et al., 2011). It is important to note that in many of these tasks the expression of this "risk preference" is simply a deviation from the reward maximizing strategy in the task. That is, for many of the tasks, the reward maximizing strategy is either to be relatively risk seeking or relatively risk averse (and not risk-neutral). Therefore, it is possible that what appear to be age differences in risk preferences are instead due to cognitive limitations in performing the task (Henninger, Madden, & Huettel, 2010). Consistent with this account of age differences in novel learning ability, age differences in risk preference are larger for tasks that depend on learning from recent experience compared to those in which performance is not dependent on learning (Mata et al., 2011).

Very few brain imaging studies involving choices between low- and high-risk options have compared younger and older adults. One study used an investment task that was designed to mimic financial decisions in everyday life by including a series of choices between small stakes investments in risky stocks and safe bonds (Kuhnen & Knutson, 2005). Reward maximization in the task depends on rapid learning from probabilistic feedback. In an adult life-span sample of young, middle-aged, and older adults, researchers found no age differences in risk aversion, but observed age differences in choosing risky stock options (Samanez-Larkin et al., 2010). The age differences were limited to trials in which older adults were choosing the risky assets that were probabilistically associated with winning or losing money. This pattern of behavior replicated in two independent samples that did not undergo functional brain imaging (Samanez-Larkin et al., 2010; Samanez-Larkin, Wagner, & Knutson, 2011). Consistent with neurocomputational theory (Li, Lindenberger, & Sikström, 2001; Li, Naveh-Benjamin, & Lindenberger, 2005), this age-related performance effect was mediated by a neural measure of functional variability in the ventral striatum (Samanez-Larkin et al., 2010). Additionally, this neural activity variability increased with age in the midbrain and striatum, and the age effects in these two regions were replicated in an independent study using a completely unrelated task that did not involve reward (Garrett, Kovacevic, McIntosh, & Grady, 2010). Note that the vast majority of functional brain imaging studies compare mean signal between task conditions of interest. Variability of the neural signal may be an important, overlooked individual difference measure relevant to understanding age differences in brain function (Garrett et al., 2013).

This research suggests that variability in forming expected value representations in a dynamic environment may increase with age. Consistent with this, related evidence suggests that older adults have more difficulty estimating the value of ambiguous stimuli during reward learning tasks (e.g., whether a non-rewarded outcome should be weighted positively or negatively depending on whether it follows a gain or loss cue) (Eppinger & Kray, 2011). In sum, these findings suggest that what may appear to be an age difference in risk preference may instead be a difference in learning ability. In support of this conclusion, neuroimaging studies of decisions that are not dependent on rapid learning from recent experience show similar neural activation of striatal (Samanez-Larkin, Mata et al., 2011) and prefrontal (Hosseini et al., 2010) regions in younger and older adults.

The two sets of findings on basic reward processing and learning-based risky decision making appear to create a puzzling contradiction. How is it possible that the same striatal regions that seem to be functionally as active across late adulthood when processing basic rewards also show functional irregularities in learning and decision tasks? One explanation may be that a broader neural network lies at the source of the age differences in the striatum during learning and decision making. A recent study examined the structural connectivity of this circuit using diffusion tensor imaging (DTI)—an MRI-based brain scanning method for assessing the structural integrity of white matter connections between brain regions—in a group of younger, middle-aged, and older adults who completed a probabilistic reward learning task (Samanez-Larkin, Levens, Perry, Dougherty, & Knutson, 2012). In the learning task, individuals chose between pairs of colored shapes that were probabilistically associated with monetary rewards. They were told that one shape in each pair had a higher expected value (i.e., a higher probability of winning or not losing money) relative to the other shape in each pair. Participants had to learn from feedback after each choice which option would yield higher earnings. From the DTI results, researchers identified pathways through the prefrontal cortex associated with individual differences in reward learning in which structural integrity declined with age (Samanez-Larkin et al., 2012). The findings suggest that the source of age-related striatal functional variability observed in prior studies may be the result of structural changes in a broader network of regions supporting reward learning.

In summary, what appear to be contradictory results across studies may be more reflective of age differences in broader prefrontal network dysfunction in tasks with higher cognitive demands rather than more general deficits in subcortical functional activity. What may appear to be motivational deficits may instead be cognitive deficits. Although some have claimed that basic motivational function may decline with age (Eppinger, Nystrom, & Cohen, 2012), this claim is inconsistent with decades of behavioral research on the psychology of aging (Carstensen, 2006; Carstensen, Mikels, & Mather, 2005; Charles & Carstensen, 2010) and a number of neuroscientific studies (Samanez-Larkin, 2011; Samanez-Larkin & Carstensen, 2011).

Intertemporal Decision Making

It is also important to note that there are many decision making scenarios in which older adults perform just as well—or even better—than younger adults (Castel, 2005; Hosseini et al., 2010; Kovalchik, Camerer, Grether, Plott, & Allman, 2005; Kühn et al., 2011; Li, Baldassi, Johnson, & Weber, 2012; Löckenhoff, 2011; Mata & Nunes, 2010; Mata et al., 2012; Mather, 2006; Mienaltowski, 2011; Mikels et al., 2010; Nielsen et al., 2008; Reyna & Brainerd, 2011; Roalf, Mitchell, Harbaugh, & Janowsky, 2012; Roesch, Bryden, Cerri, Haney, & Schoenbaum, 2012; Samanez-Larkin, Mata et al., 2011; Scheibe, Mata, & Carstensen, 2011; Simon, Lasarge et al., 2010; Spaniol, Voss, Bowen, & Grady, 2011; Strough, Karns, & Schlosnagle, 2011; Worthy, Gorlick, Pacheco, Schnyer, & Maddox, 2011). Many of these studies

focus on decisions that are not dependent on learning in a novel environment (however, see (Worthy et al., 2011))—instead, their results reveal preservation or an age-related improvement in decisions that may be related to the accumulation of experience, crystallized intelligence, emotional functioning, gist memory, or changes in motivational goals in older age. One example of this type of decision making is intertemporal choice.

Intertemporal choices are decisions in everyday life that involve selecting between outcomes available at different times in the future. Individual differences in temporal discounting, or the reduction in the subjective value of a particular reward due to the time delay until delivery, are common. Although discounting behavior is highly variable in humans, the majority of studies that have examined age differences in temporal discounting report an increasing willingness to wait in older age which corresponds to a lower discount rate for time (Löckenhoff, 2011). This behavioral effect has been observed in both humans and rats (Simon, Lasarge et al., 2010). Older adults appear to be more tolerant of time delays, which may be reflective of a general increase in patience from young to older adulthood. Intertemporal choice may be viewed as an area where decision making improves with age. Older adults make quantitatively better decisions with respect to maximizing absolute units of reward independent of time delay.

Recent functional neuroimaging studies have examined age differences in intertemporal choice. Parallel to the behavioral findings, the studies find that neural activation in the ventral striatum is reduced by temporal delay in younger but not older adults (Eppinger et al., 2012; Samanez-Larkin, Mata et al., 2011). Ventral striatal signal increases to both short and long delays in healthy older adults, which is not the case for younger adults. In general, the age group differences across the two studies are strikingly similar. In addition, evidence of an age by delay interaction very similar to that identified in human ventral striatum has been recently observed in the orbitofrontal cortex of rodents (Roesch et al., 2012).

There are at least two opposing accounts of these data. The findings could be viewed as evidence for age-related decline or improvement. It is possible that the age differences in temporal discounting are a serendipitous result of neural decline with age (Eppinger et al., 2012). The theory posits that structural or neurochemical decline (e.g., lower tonic dopamine) in old age reduces sensitivity to immediacy and associated impulsivity, which may contribute to quantitatively "better" decisions. In fact, the age-related deficits in reward learning reported above have been linked to deficiencies in the dopamine system (Chowdhury et al., 2013), suggesting that loss of dopamine function with age may lead to impairments in reward learning, but also a reduced sensitivity to immediacy in intertemporal decision making. However, evidence that dopamine depletion in animals most often increases instead of decreases discount rates (Phillips, Walton, & Jhou, 2006) is inconsistent with a model attributing age differences in learning and time discounting to dopamine decline with age. Although this assumption is often made, evidence for neural signal differences between age groups is not definitive evidence for age-related neurobiological deterioration even in an animal model.

The alternate account is that these behavioral and neural effects are evidence for improvement over the life span (Samanez-Larkin, Mata et al., 2011). Although there is some level of neurobiological decline with age, relatively similar responses to both short and long delays are observed in older adults. Others have speculated that this age-related improvement may be related to increased experience with the realization of delayed reward over an individual's lifetime. Responses to delayed rewards in older adults may be the result of experience-based tuning of reward signals (Samanez-Larkin, Mata et al., 2011). This latter interpretation suggests that it is as if the older adults know that $20 is going to be just as good in two weeks as it is today, while, the younger adults have not had the opportunity to realize interest rates over decades and appreciate the long-term rewards of waiting. This may reveal a situation where we should try to get the impatient young people to make decisions more like the older adults. In fact, a series of recent studies are manipulating discount rates by changing young adults' perceptions of the future. Increasing the connectedness younger people feel with the future, older versions of themselves (e.g., using virtual reality) reduces temporal discounting and increases savings in early life (Hershfield, 2011). In a similar study, pairing intertemporal choices with cues that increase thoughts about the future also decreased discount rates relative to an unprimed condition in a sample of young adults (Peters & Büchel, 2010).

Future research should examine how this increased willingness to wait may be related to other cognitive processes underlying decision making (Gilbert et al., 2011), or may have associated positive or negative consequences in other domains. More generally, the extent to which these changes with age prove advantageous or disadvantageous for decision making in the real world depends on the context (Mata et al., 2012). However, in many life circumstances there may be wisdom in the willingness to wait in old age.

Translation from the Laboratory to the Real World

An important focus of research on reward processing, decision making, and aging has been the attempt to examine how performance on laboratory tasks is related to decision making outside of the laboratory. Although many of the experimental tasks used in behavioral economics and decision neuroscience are incentive-compatible (i.e., real money is earned based on performance) and mimic real-world decision making, surprisingly little research has focused on demonstrating links between behavior on laboratory-based tasks and decision making in everyday life. Nevertheless, there are some promising findings suggesting that laboratory behavior may be reflective of more general decision tendencies in the real world.

For example, individuals who make more reward maximizing choices in a laboratory financial investment task also accumulate more assets in the real world, whereas individuals who make poor investment decisions in the lab accumulate fewer assets in everyday life (Samanez-Larkin et al., 2010). In a related probabilistic learning task, researchers found that individual differences in gain-seeking during

learning were associated with accumulation of financial assets; similarly, individual differences in loss-avoidance during learning were associated with avoidance of financial debt, as reflected in individuals' credit scores (Knutson, Samanez-Larkin, & Kuhnen, 2011). This latter study also found that overall probabilistic learning ability is associated with an individual's debt to asset ratio, a measure of financial well-being (Knutson et al., 2011). All of these effects are significant after controlling for age and IQ. These studies not only provide evidence for the ecological validity of these laboratory-based tasks, but also may help to identify individuals especially vulnerable to financial losses or poor financial decision making in the real world (Denburg et al., 2007).

Related to this, an important societal concern is that older adults are disproportionately targeted by financial fraud (Save And Invest.org *Fighting Fraud 101*, 2011), and in current work, psychologists, neuroscientists, and economists are studying older individuals who are at-risk for making financial mistakes. Some of these studies compare victims of financial fraud to non-victims, as well as examine how potential vulnerability to financial fraud in non-victim samples may be related to affective or cognitive individual differences in brain and behavior.

In general, though, there are currently very few studies that have directly examined adult age differences in monetary decision making in the real world (Agarwal et al., 2009; Korniotis & Kumar, 2011; Mata & Nunes, 2010), and many findings are based on relatively small samples of participants. Future work should attempt to integrate laboratory measures, including brain imaging, with real-world measures of decision making to more fully characterize changes in decision making across adulthood. Future research will serve to elucidate how experimental measures might best capture a person's decision making behavior in the real world.

Conclusions

In general, increases in risky financial mistakes in old age have been linked to limitations in fluid cognitive ability and changes in frontostriatal network structure and function. Together, the findings suggest that basic striatal function may remain preserved over adulthood, but that broader network disruption may underlie the fluid cognitive limitations on making optimal decisions in uncertain and novel environments.

However, in many situations, crystallized intelligence compensates for reduced fluid cognitive abilities without the need for external environmental support. There is growing evidence for preservation or even improvement in old age for decisions that depend on accumulated life experience (Li et al., 2012). One example is intertemporal choice. Older adults—when compared to young adults—are more willing to wait over short-time delays for a larger amount of money compared to a smaller amount of money available immediately (Löckenhoff, 2011). Recent neuroscience research suggests that the accumulation of experience with delayed rewards over the life span may serve to tune activity in regions like the ventral striatum.

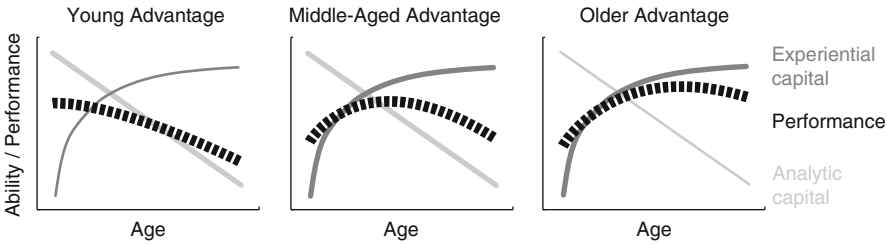

Fig. 6.1 Fluid cognitive abilities decline across adulthood (analytic capital, lightest *grey line*) while crystallized cognitive abilities improve (experiential capital, medium *grey line*). The dependence of decision performance (*black dashed line*) on these two sets of abilities varies across different decision contexts. For monetary decisions that require flexible and rapid learning in a new situation (where individuals need to rely more on analytic capital), older adults may be at a disadvantage (*left*). When decisions can be made largely based on knowledge and experiential capital, older adults may make better decisions than young adults (*right*). In situations where both sets of cognitive abilities can be relied upon equally, middle-aged adults will outperform both younger and older adults (*middle*). Figure concept adapted from Agarwal et al. (2009)

The evidence for declines in learning-based risky decisions and improvement in intertemporal decisions in old age is consistent with the model (discussed above) that Agarwal and colleagues adapted from Horn and Cattell. It also suggests that the model can be flexibly adapted to explain decision behavior across a range of contexts. Decision-performance differences across adulthood are heavily dependent on a task's cognitive demands and opportunities for drawing on prior knowledge (Mata et al., 2012). An extension of the model from Agarwal and colleagues suggests that in situations requiring fluid learning, performance will be worse in old age; in situations with greater opportunity to rely on crystallized skills, performance will be better in old age (Fig. 6.1).

In addition to identifying potential psychological and neural mediators of age differences in financial decision making, an emerging focus of research in this area has been to examine how well behavior in a laboratory or brain scanner is related to decision making in everyday life. Several studies have linked performance on laboratory tasks to measures of financial well-being in everyday life such as accumulated assets, avoidance of debt, debt-to-assets ratio, and credit scores (Knutson et al., 2011; Kuhnen, Samanez-Larkin, & Knutson, 2013; Samanez-Larkin et al., 2010). Assessing the ecological validity of these laboratory-based tasks should greatly enhance our ability as scientists to make predictions about everyday behavior and in doing so help to identify individuals who may be especially vulnerable to making poor financial decisions (Denburg et al., 2007).

Combining the traditional focus on decisions in everyday life from economics and finance (Agarwal et al., 2009; Korniotis & Kumar, 2011) with detailed analysis of brain and behavior from psychology and neuroscience (Samanez-Larkin & Knutson, 2014) has led to the emergence of a multidisciplinary subfield of research on decision making across the life span. Although the recent progress is promising, this area is still very much in its infancy. This integrative "decision neuroscience approach" has tremendous potential for scientific and societal impact.

Due to increases in life expectancy over the past 100 years, the aging of the global population will continue to drastically alter the profile of decision makers in the population. These changes highlight the challenges (e.g., rising entitlement costs) but also opportunities of an aging population. To the extent that this emerging subfield can respond to the immediate demand for integrative and translational research, we have the potential to make major contributions to improving the well-being of humans across the life span.

Acknowledgement G.R.S.L. is supported by a Pathway to Independence Award (AG042596) from the National Institute on Aging. Portions of this chapter were adapted from: Samanez-Larkin, G.R. (2013) Financial Decision Making and the Aging Brain. *Observer* 26 (5), 30–33 and Samanez-Larkin, G.R., Knutson, B. (2014) Reward processing and risky decision making in the aging brain. In V. Reyna & V. Zayas (Eds.) *The Neuroscience of Risky Decision Making*. Washington DC: American Psychological Association.

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Chapter 7
Motivation and Cognitive Control: Going Beyond Monetary Incentives

Marie K. Krug and Todd S. Braver

Abstract This chapter examines the topic of motivation–cognition interactions from a cognitive neuroscience perspective. More specifically, we consider the use of primary rewards (e.g., liquids) as motivational incentives during cognitive task performance, in comparison to monetary rewards, which are the traditional form of incentive used in most human experimental studies. We review behavioral and neuroscience literature suggesting that motivationally based performance enhancement is not ubiquitous, but when present, appears to reflect modulation of cognitive control processes supported by frontoparietal cortex via interactions with subcortical reward-processing circuits. Further, we compare and contrasts findings from studies using monetary rewards and those employing primary rewards, suggesting possible reasons for similarities and differences, as well as future directions to address unanswered questions. Finally, and most importantly, we discuss the advantages of using primary rewards as incentives to further explore motivation–cognition interactions. We present pilot data as a sample case study to demonstrate how primary rewards can offer methodological, theoretical, and experimental leverage. We conclude by presenting an indepth discussion of questions (and corresponding experimental paradigms) that can be most profitably investigated through the use of primary rewards, with the goal of providing a more comprehensive characterization of the nature of motivation–cognition interactions in the human brain.

Introduction

Motivation appears to have strong influences on cognitive processing and behavior in humans. The study of motivation–cognition interactions has become a recent focus of cognitive neuroscience research in order to better understand where,

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E. Bijleveld and H. Aarts (eds.), *The Psychological Science of Money*,
DOI 10.1007/978-1-4939-0959-9_7,

why, and how such interactions occur in the brain. In this chapter, we focus on an often-overlooked issue that is relevant to this area of study. In human studies, monetary rewards are most often used as an incentive to motivate behavior. Money is considered a secondary reward, in that its reward value must be learned through association with other directly rewarding stimuli. On the other hand, in the animal literature, primary rewards (e.g., food and liquid), which directly satisfy biological drives, are often used to study learning and motivation (Rolls, 1999). The rationale behind using monetary incentives in human experimental studies is that money is universally understood in terms of its economic and reward value. However, the results are often generalized to suggest that the effects apply to all rewards, including primary rewards, when that may not necessarily be true. Here we suggest that non-monetary (primary) rewards offer not only a more direct comparison to the animal literature but also provide additional experimental, conceptual, and theoretical leverage in understanding the neural mechanisms of motivation–cognition interactions.

The structure of the chapter is as follows. First, we provide a brief review of the extant literature on monetary incentives and their effects on cognitive processes, suggesting that the effects can be somewhat complex, but seem to have specificity in modulating cognitive control. Next, we discuss current literature that has compared different types of incentives in terms of whether common or distinct neural circuits are engaged. Finally, we provide some suggestions regarding promising research directions and questions that can be explored through the use of primary incentives.

Monetary Incentives and Cognitive Performance

It is universally assumed that people are motivated by money. In fact, it is common practice for research participants to be compensated (regardless of their performance on the experimental task) for their participation in a research study. The wording often used to describe these payments (primarily at the request of Institutional Review Boards) is that participants are being compensated "for their time." Yet such practices also reflect an implicit assumption that participants recruited for a paid (rather than unpaid) study will (a) be more likely to agree to participate; (b) be more motivated to show up for the experiment (and be on time!); and (c) perform the experimental task to the best of their ability. However, the focus of this chapter is not on monetary payments given to participants as a flat hourly or experimental rate, but rather additional monetary earnings that can be attained only when performance is at a certain level (usually defined by response time (RT), accuracy, or a combination of both).

Before delving into the nuances and issues involved with using money as an incentive, an initial question to consider is whether monetary incentives even improve general cognitive task performance. Indeed, it is important to consider that there are situations where monetary incentives are not advantageous. For example, Gneezy and Rustichini (2000) suggest that when the amount of monetary incentive

is very low, monetary incentives can actually result in worsened task performance. In one of their experiments subjects were paid a flat rate (in Israeli currency; NIS) to perform an IQ test. Each subject was randomly assigned to one of four groups. Subjects in the first group were not given the opportunity to earn additional money based on performance. In the other three groups, subjects were told that they would earn additional money for each question that they answered accurately. The three incentives groups were paid at different rates (low, medium, and high). Subjects in the low incentive group actually answered significantly *fewer* questions than the no-incentive group. Gneezy and Rustichini suggest that this occurs because once a monetary incentive is introduced, subjects are entering into an incomplete contract, at which point their level of effort becomes contingent upon the amount of additional money they can earn.

The Gneezy and Rustichini (2000) results point to the detrimental effects that can arise, in some cases, from paying a very small amount of money, which can produce behavioral performance that may be worse than offering no monetary incentive at all. Another, related perspective is that extrinsic rewards (such as money) can decrease intrinsic motivation and interest in the task at hand, which could translate to worsened task performance (see Bonner & Sprinkle, 2002 and also Moller & Deci 2014, for a discussion of this topic). The distinctions and relationships between intrinsic and extrinsic motivation form a large literature that is beyond the scope of this chapter; however, it is worth pointing out that it is also an area that may be amenable to investigation from a cognitive neuroscience perspective, although such work is just in its infancy (Murayama, Matsumoto, Izuma, & Matsumoto, 2010). A final, contrasting perspective comes from the growing literature on "choking under pressure" (Beilock, 2010), which documents situations in which large reward incentives can also disrupt task performance, potentially through over-motivation effects that shift the balance between cognitive and affective brain systems (Mobbs et al., 2009). In general, these types of findings stress the importance of carefully considering both the motivational signals and the cognitive control processes being affected when investigating motivation–cognition interactions, a point which we develop further below.

The fact that enhanced cognitive and behavioral performance is not a ubiquitous outcome of offering motivational incentives is one that has been confirmed through quantitative reviews of the extant literature (although these have been mostly conducted from a behavioral economics perspective). For example, Bonner, Hastie, Sprinkle, and Young (2000) reviewed 131 experiments in 85 different studies (across several fields of research) to investigate the effects of monetary incentives on task performance (similar reviews and conclusions were drawn by Smith & Walker, 1993 and Camerer & Hogarth, 1999). They estimated that only about 1/2–1/3 of these experiments were characterized by an improvement in task performance due to monetary incentive (and, as in Gneezy & Rustichini, 2000, some of the experiments showed worsened performance in monetary incentive conditions). They specifically investigated the influence of task type and type of payment scheme on improvements in task performance. In regards to task type, Bonner et al. categorized their tasks (in order of increasing complexity) as (1) vigilance and detection,

(2) memory, (3) production and simple clerical, (4) judgment and choice, and (5) problem solving, reasoning, and game playing. Their low complexity vigilance/detection tasks and memory tasks showed positive effects of monetary incentives 83 % and 69 % of the time, respectively.

They concluded that incentives appear to improve performance most reliably when the gap between skill and task demand/complexity is low (i.e., simple tasks). When tasks are simple, participants have the knowledge and skill set required to perform the task well. Consequently, when offered monetary incentives, these participants will be more likely to exert extra effort, and their extra effort will be effective in improving performance (Bonner et al., 2000; Bonner & Sprinkle, 2002). While most of the relevant cognitive neuroscience literature that we will be focusing on consists of tasks that fall into the same category of complexity as their "low complexity" vigilance and memory categories, it is important to note that use of monetary incentives in more complex tasks may not reliably yield incentive effects.

Bonner et al. (2000) also investigated the type of payment/incentive scheme that works best for improving task performance. Quota schemes, where subjects are paid a set amount until a certain performance goal is met, at which point they receive a bonus, are the most effective (69 %), followed by piece-rate schemes (57 %), where subjects are paid a set amount for each unit (such as a task trial). Bonner et al. reason that quota schemes, in addition to providing the opportunity to win money, also give participants a specific goal that helps increase motivation and performance beyond a piece-rate scheme. While piece-rate schemes tend to be the standard method for delivering monetary incentives in the psychology and cognitive neuroscience field, quota schemes should be strongly considered.

Overall, the results of these literature reviews imply that standard monetary incentives delivered under a piece-rate scheme should improve performance on basic, simple vigilance, memory and, most likely, cognitive control tasks. It is important to consider that this may only be true if the monetary incentive is large enough that subjects are motivated to increase their efforts to achieve that amount of money (Gneezy & Rustichini, 2000). Fortunately, in typical cognitive psychology and neuroimaging experiments, there are often a high number of task trials, so good performance on many trials would result in an accumulation of a significant amount of money (even if the amount per trial is low) and may be less likely to result in the detrimental effects on performance seen in Gneezy and Rustichini (2000). The amount of money that is considered "too low" to elicit an increase in effort probably also depends on other factors in addition to the exact monetary value, such as the difficulty of the task or individual differences such as personality traits or wealth status (Bonner & Sprinkle, 2002; Tobler, Fletcher, Bullmore, & Schultz, 2007).

A final consideration is how incentive conditions are indicated. There are important complexities regarding how and when incentive cues are presented that must also be considered. In behavioral experiments, particularly in cognitive psychology and neuroscience, the incentive conditions are usually explicitly cued for participants prior to or at the start of the task trial. However, there is also growing evidence that suggests implicit or subliminal reward cues can also be quite effective, particularly at increasing task effort (Aarts, Custers, & Marien, 2008;

Bijleveld, Custers, & Aarts, 2012; Capa & Custers, 2014). In some cases subliminal cues may be even more effective than supraliminally presented cues, depending on the nature of the cognitive task and when (during the duration of the task trial) the cues are presented (Zedelius, Veling, & Aarts, 2011). When a high reward cue is presented before a target word set in a working memory task, performance improves (regardless of whether the reward cue is presented subliminally or supraliminally). However, presenting a reward cue while the words are being maintained disrupts performance, but only if it is presented supraliminally (Zedelius et al., 2011).

The source of the distinction between supraliminal and subliminal reward cueing is still a matter of investigation, but one interpretation is that conscious processing of reward cues can sometimes divert resources from task-related cognitive processing (Bijleveld et al., 2012; Zedelius et al., 2011), which is similar to a common explanation of "choking" effects. Thus, while subliminal cues are thought to induce a general increase in effort, supraliminal cues can evoke conscious processing of the cue, rumination and implementation of specific strategies, which may or may not result in improvements in task performance (Bijleveld et al., 2012; Bijleveld, Custers, & Aarts, 2010; Capa & Custers, 2014; Zedelius et al., 2011). Taken together, these results suggest the importance of delving more deeply into the mechanisms by which motivational incentives exert their influence on specific cognitive processes, which has led to greater interest in cognitive neuroscience-based research approaches.

A Focus on Cognitive Control

The main goal of cognitive neuroscience research on motivational incentives is not just to understand the factors that optimize performance of a behavioral task, but rather to (a) identify which particular cognitive and neural mechanisms are modulated by incentives and (b) characterize the nature of interactions between the brain regions that process incentives and those that implement task-relevant processing.

Earlier neuroscience studies of reward incentives arising from the animal literature provide a strong foundation for current theorizing. A number of studies have shown that, when performing difficult working memory tasks such as the delayed response task (Watanabe et al., 2001) or memory-guided saccade task (Kawagoe, Takikawa, & Hikosaka, 1998, 2004), monkeys have faster and more accurate performance on reward-cued trials compared to non-reward cued trials. Behavioral performance is also improved when preferred (compared to non-preferred) rewards are used (Watanabe et al., 2001) or when rewards are large compared to small in magnitude (Leon & Shadlen, 1999). These behavioral effects show a neural correlate in the activation pattern observed within dorsolateral prefrontal cortex (DLPFC) neurons. Specifically, DLPFC neurons that exhibit sustained firing and directionally specific activity patterns during the delay period of such tasks (and are thus thought to be involved with active maintenance of task-relevant information) have increased delay-related activity when a preferred reward or larger reward is expected for a particular trial (Leon & Shadlen, 1999; Watanabe, Hikosaka,

Sakagami, & Shirakawa, 2005). These findings have been taken to suggest that DLPFC may be a site of integration of cognitive and motivational information (Leon & Shadlen, 1999; Watanabe, 2007; Watanabe et al., 2005; Watanabe & Sakagami, 2007).

In addition to lateral prefrontal cortex (PFC), the animal literature also implicates the involvement of the striatum in reward processes and subsequent changes in behavior. Dopaminergic midbrain neurons respond to primary reward stimuli, stimuli predictive of reward (such as reward cues), and reward prediction errors (Schultz, 2001, 2002; Schultz, Dayan, & Montague, 1997). These neurons project to PFC and also to the dorsal (caudate and putamen) and ventral (nucleus accumbens) striatum. Like DLPFC, neurons in striatum respond to cues indicating reward (Kawagoe et al., 1998, 2004; Schultz, 2002) and also to the value or relative preference of a particular reward (Hassani, Cromwell, & Schultz, 2001; Schultz, 2002). Indeed, caudate neurons may be even more sensitive to changes in cue-reward contingencies and differences in reward values than lateral PFC neurons (for a review see Watanabe, 2007).

Studies examining motivation effects on cognition in human subjects have typically used monetary rewards, which can result in improvement in behavioral task performance in various cognitive domains, ranging from visual selective attention (Della Libera & Chelazzi, 2009) and perceptual target detection (Navalpakkam, Koch, & Perona, 2009; Navalpakkam, Koch, Rangel, & Perona, 2010) to the color-word Stroop (Veling & Aarts, 2010) and working memory (Heitz, Schrock, Payne, & Engle, 2008). A growing number of fMRI studies have helped elucidate the neural networks underlying the effects of reward incentives on cognitive control task performance in human participants, many of which have also used monetary incentives.

Small et al. (2005) and Engelmann, Damaraju, Padmala, and Pessoa (2009) used Posner-type visual attention tasks, Padmala and Pessoa (2011) used a response conflict task, and the remaining studies used working memory tasks (Beck, Locke, Savine, Jimura, & Braver, 2010; Gilbert & Fiez, 2004; Locke & Braver, 2008; Pochon et al., 2002; Taylor et al., 2004). Many included a manipulation of difficulty, such as working memory load (Gilbert & Fiez, 2004; Pochon et al., 2002; Taylor et al., 2004), or presence/absence of response conflict (Padmala & Pessoa, 2011) and some had different (e.g., high vs. low) levels of reward (Beck et al., 2010; Engelmann et al., 2009; Gilbert & Fiez, 2004; Pochon et al., 2002; Taylor et al., 2004). All except Taylor et al. (2004) used a piece-rate reward scheme, and the dollar amounts of monetary reward (either the total amount that could be earned or the amount that could be earned per trial) were explicitly indicated to the participants in all studies except Pochon et al. (2002). It is important to note that Pochon et al. was also the only experiment that did not report significant behavioral incentive effects (although incentive effects were only at the trend level in (Small et al. 2005), suggesting that an explicit indication of the amount of monetary reward to be earned (either as a per/trial rate or the total amount that can be won) may be necessary to motivate participants.

In summary these experiments show a consistent pattern, in which incentives increase activity specifically in the cognitive control-related brain regions that were

postulated to be the key loci for optimal task performance. For example, in Small et al. (2005), monetary incentives enhanced activity in regions necessary to optimize task performance for both validly cued trials (increased expectancy-related activity in posterior cingulate cortex, PCC) and invalidly cued trials (increased disengagement-related activity in inferior parietal lobule). Use of a load manipulation in some experimental designs has been used to provide additional evidence that regions recruited to help process more difficult task conditions are the same regions also recruited to improve performance under incentive conditions. For example, Taylor et al. (2004) found overlapping regions activated by both increases in load and monetary incentive in frontal and parietal cortex during the delay period of the object working memory task. They also found an interaction between reward value and load in DLPFC (driven by a greater effect of load for high reward trials). Gilbert and Fiez (2004) found that right DLPFC activity increased during the delay in response to both reward trials and increases in working memory load in a verbal working memory task. Similarly, Pochon et al. (2002) found that DLPFC was activated in response to increases in load and the reward condition during the n-back working memory task.

A few motivation–cognition studies (Beck et al., 2010; Engelmann et al., 2009; Locke & Braver, 2008; see also Jimura, Locke, & Braver, 2010) have focused not just on the brain regions modulated by incentives but also the temporal dynamics of such effects. A critical approach in this regard is the use of a mixed blocked/event-related fMRI design (Visscher et al., 2003). This type of design allows for separation of sustained, task-block state-related activity, as well as transient activity associated with individual trials or even events within a trial (e.g., cue vs. target). Engelmann et al. (2009) found that incentives increased cue-related activity in various frontoparietal regions (anterior cingulate cortex (ACC), middle frontal gyrus (MFG), frontal eye fiefds (FEF), etc.) and PCC. These same regions, as well as some additional regions (visual cortex, inferior temporal gyrus) were also engaged during the presentation of the target. They also found increased sustained, block-related activity in several frontoparietal regions (inferior parietal sulcus (IPS), FEF, right MFG). However, Beck et al. (2010) and Locke and Braver (2008) found that monetary incentive conditions were characterized primarily by increased sustained, block-related activity in cognitive control regions, rather than transient trial-related activity. Specifically, Beck et al. reported increased sustained activity in dorsal and anterior PFC, as well as parietal cortex in response to monetary incentive conditions while Locke and Braver (2008) reported sustained increases in DLPFC, parietal cortex, and ACC. In both Beck et al. (2010) and Locke and Braver (2008), the sustained activity was largely right-lateralized. It is suggested that this sustained activity (as opposed to individual trial-related transient activity) may be more helpful for maintaining task goals related to the monetary incentive, which was not delivered until the end of the experiment.

A key question raised by the finding of increased, incentive-related activation in cognitive control brain regions is: what is the neural source of such effects? An appealing account, which is suggested by the animal literature, is that in highly salient motivational conditions these regions may receive enhanced excitatory drive

signals arising from primarily subcortical, reward-processing regions. Indeed, in addition to activation of the cognitive control regions, many of the aforementioned fMRI studies have also shown activation in reward-processing regions. Locke and Braver (2008) report activation of reward-related regions when individual differences are considered. Pochon et al. (2002) found that the reward condition activated caudate. Beck et al. (2010) reported sustained activity in the right caudate and, at a more liberal threshold, right lateral orbitofrontal cortex (OFC). Engelmann et al. (2009) found cue and target-related activation in right substantia nigra/dopaminergic midbrain, caudate, and putamen as well as increased sustained activity in both caudate and putamen. Taylor et al. (2004) and Small et al. (2005) both found reward-related activation in lateral OFC. In Taylor et al. (2004), this occurred during the "probe" phase of the working memory trial, when subjects had to judge whether an item was part of the target set. For Small et al., in the reward condition, OFC activity was positively correlated with the cue benefit score, which is a measure of "cue expectancy," or the degree to which a directional cue biases spatial attention in a visual spatial attention task. Lastly, Padmala and Pessoa (2011) found dorsal and ventral striatal activity in response to the reward cue. Activation of OFC and striatal regions in these paradigms in particular is not surprising, considering evidence for their roles in coding the subjective reward value of a stimulus and reward-related learning, respectively (O'Doherty, 2004).

One theory that nicely integrates these findings (as well as findings from the animal literature discussed above) is that motivation may work specifically to influence cognition via dopamine (DA) -mediated interactions between reward processing and cognitive control brain regions (Braver, 2012; Braver, Gray, & Burgess, 2007; Pessoa & Engelmann, 2010). A phasic dopamine (DA)-mediated gating signal, activated in response to reward cues, could result in a shift to a more "proactive" control strategy, characterized by sustained, task-related activation of PFC and implementation of preparatory cognitive control (Braver, 2012; Braver et al., 2007). Pessoa and Engelmann (2010) suggest that motivation does not simply increase arousal (leading to changes in global, nonspecific improvements in performance) but instead targets task-specific frontoparietal and sensory regions. They propose that activation of dopaminergic reward regions enhances signal-to-noise ratio in PFC. Experiments with human subjects have generally been consistent with this DA/PFC theory, particularly in regards to the idea that task-specific control regions are recruited under incentive conditions and that preparatory control in particular is enhanced.

Future work in this area needs to focus more specifically on interactions between reward-processing and cognitive control regions in order to test the DA/PFC theory and also to understand motivation–cognition interactions more generally. One excellent demonstration of this approach is Padmala and Pessoa (2011). The goal of the study was to use connectivity and mediation analyses to draw a link between increased activation in the cognitive control network during processing of reward cues and the enhancement of cognitive control processes during target processing (task was a picture-word response conflict paradigm that included response congruent, response incongruent, and neutral targets). The results were highly informative.

Reward cue-related activity was found in frontoparietal cortex. During the target phase a motivation (reward vs. no-reward) x trial-type (incongruent, neutral) interaction was observed in medial PFC, such that reduced activation was observed on incongruent trials compare to neutral trials, particularly in the reward condition. These cue and target effects were correlated across participants and were mediated by reduced activation in the fusiform gyrus, suggesting attenuated processing of task-irrelevant information (which likely led to lowered conflict-related medial PFC activity in response to incongruent targets on reward-cued trials). Finally, additional reward-cue activity was observed in subcortical reward regions (i.e., dorsal and ventral striatum) that also showed enhanced connectivity with parietal regions on reward compared to no-reward trials. Thus, through a clever experimental design, examination of multiple events within a task trial, and a focus on functional connectivity and mediation effects, Padmala and Pessoa (2011) provided new information regarding both the mechanisms by which cognitive control is implemented and moreover, how motivation can influence this process. In a similar vein, this group has also looked at network analyses to more directly investigate overall changes in brain connectivity. While this type of analysis has typically been performed on resting state data, Kinnison, Padmala, Choi, and Pessoa (2012) have shown that during an incentive-cued response conflict paradigm, reward-cued trials result in increased integration (i.e., higher global efficiency and decreased decomposability) between cortical and subcortical brain regions, in comparison to control (no-incentive-cued) trials. Future experiments should also continue to investigate changes in connectivity at the network level under motivational conditions.

Monetary vs. Nonmonetary Incentives: Common or Distinct Effects?

As discussed above, theorizing on the effects of reward incentives on behavior (and neural activity) in human cognitive neuroscience is based upon the animal literature. In these animal studies, rewards are usually primary (food or liquid(s)), while in human studies discussed above, secondary (namely, monetary) incentives have been used as the reward. Thus, an initial important question, when considering the use of monetary incentives vs. primary incentives to motivate human cognitive performance, is whether and how monetary incentives differ from other types of incentives in terms of their effects on behavioral performance and neural activity. In particular, one question of obvious interest relates to how monetary incentives compare to primary incentives that have intrinsically appetitive reward value. To our knowledge, Beck et al. (2010) provide the only study to date that has examined this question from a neuroscience perspective and within the context of cognitive task performance. Thus, we provide a more detailed summary of its findings, before continuing to examine other studies that have compared incentive category effects during basic reward processing tasks.

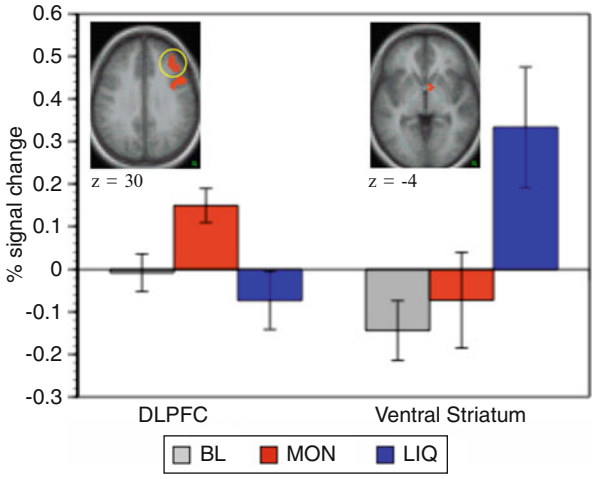

Fig. 7.1 Anatomical double dissociation in incentive category specific sustained activation. Sustained activation selective to the liquid incentive condition was observed in subcortical reward processing regions, as representatively shown for the ventral striatum (7, 0, −4), whereas the cortical cognitive control regions showed monetary incentive-selective sustained effects (here shown for the DLPFC (35, 36, 22)). Figure from Beck et al. (2010, p. 8)

In Beck et al. (2010), participants performed the same working memory task under both liquid and monetary incentive conditions. The monetary condition was relatively standard, with the design and results summarized in the previous section. In the liquid condition, fast and accurate performance on incentive-cued trials was immediately rewarded with a squirt of apple juice. For incentive-cued trials where the performance criterion was not met, subjects received a neutral liquid instead. Liquid was not administered during no-incentive cued trials. Behaviorally, performance improved on the incentive trials in a similar manner for the liquid condition compared to the monetary incentive condition, suggesting that the use of primary liquid rewards produces comparable changes in performance on this cognitive task.

Comparison of neural activity patterns across the two incentive conditions yielded a very different set of findings. Although the monetary incentive condition was selectively characterized by increased sustained activity in a primarily right-lateralized frontoparietal control network, sustained cortical activity effects were not as widespread in the liquid incentive condition (although there was sustained activation common to both tasks in a few cognitive regions such as left inferior and anterior PFC and right parietal cortex). However, the liquid incentive condition was characterized by sustained activation in subcortical reward-processing regions, such as the dorsal and ventral striatum (Fig. 7.1).

The liquid condition was also markedly characterized by increased transient, rather than sustained, activation of cortical cognitive control regions (bilateral ventrolateral prefrontal cortex (VLPFC), bilateral DLPFC, right anterior PFC, and bilateral inferior parietal cortex). Overlap analyses specifically showed that right DLFPC/inferior frontal gyrus, right anterior PFC, and right parietal cortex showed both money-selective sustained activation and liquid-selective transient activation, a clear shift in the temporal dynamics of activity in these control regions across the two incentive conditions (Fig. 7.2a, b). Time course analyses of this transient activity showed that, for the liquid condition, incentive cued trials

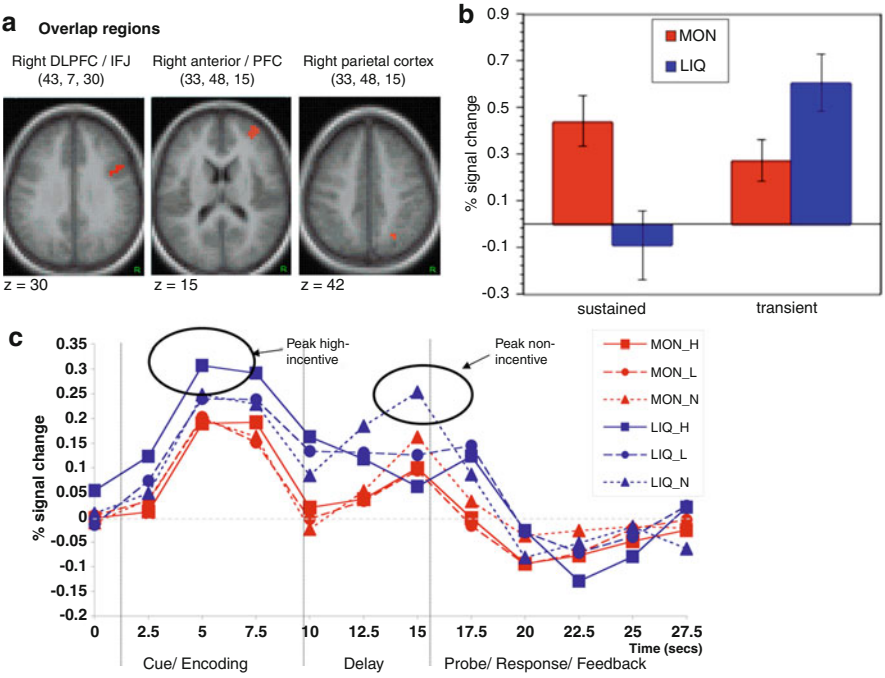

Fig. 7.2 Flexibility in activation dynamics of cognitive control regions related to incentive category. (**a**) Overlapping regions showing selective sustained effects in the monetary incentive condition and selective transient effects in the liquid incentive condition. (**b**) Overlapping regions showing a shift from sustained to transient activation across the monetary and liquid incentive conditions. Percent signal change is averaged for all three overlapping regions. (**c**) Timecourses for incentive trials and no-incentive trials within the monetary incentive and liquid incentive conditions. Timecourses are averaged for the three overlapping cognitive control regions. In the liquid condition, there is a shift in within-trial activity dynamics from late in the trial (no-incentive trials) to earlier in the trial (incentive trials). (MON_H: money high-incentive trials, MON_L: money low-incentive trials, MON_N: no-incentive trials during the monetary incentive condition; LIQ_H: liquid high-incentive trials, LIQ_L: liquid low-incentive trials, LIQ_N: no-incentive trials during the liquid incentive condition). Figure from Beck et al. (2010, p. 9)

showed activity that peaked at the time of cue-processing or encoding of the stimulus set, while in no-incentive cued trials, activity peaked later (at the time of the probe presentation), suggesting better preparatory, or proactive control, on trials where good performance would be rewarded and more reactive control processes on no-incentive trials (for a more detailed discussion of proactive vs. reactive control, see Braver et al., 2007) (Fig. 7.2c).

In summary, the results from Beck et al. (2010) suggest the possibility that monetary and liquid incentives influence cognitive processing through distinct neural mechanisms. However, it may be premature to draw more general conclusions based on it until further research in this area is conducted. Moreover, in apparent discrepancy with the Beck et al. (2010) results, studies of basic reward processing

suggest more similarities than differences in the brain regions engaged by different types of reward incentives. This literature is briefly reviewed next.

A few studies have directly compared monetary and liquid rewards within participants, similar to the approach taken by Beck et al. (2010), but using simpler instrumental tasks. Kim, Shimojo, and O'Doherty (2011) focused on cue-related expectations for juice or monetary rewards of different values and found overlapping value-related responses in ventromedial PFC (vmPFC). In a similar study, focusing more specifically on reward prediction errors (in a probabilistic learning task) overlapping activity was observed in the dorsal striatum (caudate nucleus), while activity in ventral striatum (nucleus accumbens) was stronger for money than juice (Valentin & O'Doherty, 2009). Levy and Glimcher (2011) used an intricately designed reward-choice paradigm (using liquid, food, and money rewards) to quantify, both behaviorally and neurally, the subjective value representation of each type of reward. The subjective value of money activated vmPFC, striatum, and PCC, while the subjective value of food activated vmPFC, striatum, and hypothalamus. Follow-up analyses confirmed that vmPFC (and possibly also striatum) are commonly activated in response to the value of both types of reward, and this region(s) is/are most likely the site where different rewards are represented and compared on a common scale.

A less common example of a primary reward is presentation of erotic pictures. Sescousse, Redoute, and Dreher (2010) directly compared monetary and erotic rewards. They had subjects perform a visual discrimination task under monetary incentive and erotic picture incentive conditions. Their analyses focused on activation during the outcome (reward delivery) phase of the trial. Monetary rewards activated anterior lateral OFC, while erotic rewards activated posterior lateral OFC, medial OFC, and bilateral amygdala. Both types of rewards activated ventral striatum, midbrain, ACC, and anterior insula. The authors concluded that in addition to activating a common reward network, only erotic rewards activate bilateral amygdala, and erotic and monetary rewards activate different subregions of OFC, providing evidence that the OFC represents abstract rewards in more anterior locations and primary rewards in posterior subregions. Because incentive cues for this task also indicated a probability of reward (in other words, if subjects performed well on that trial, they would have a certain percentage chance of receiving the reward), Sescousse et al. (2010) were able to look at reward prediction errors. They found that prediction errors for both types of rewards activated a common network including ventral striatum, anterior insula, and rostral ACC.

Studies that directly compare different types of primary and secondary rewards are few compared to studies that have focused on reward-related activity during delivery of a specific type of reward. Thus, meta-analyses are a useful approach to more quantitatively compare the patterns observed in studies involving different classes of rewards. Sescousse, Caldu, Segura, and Dreher (2013) recently performed a large meta-analysis of this type, examining 87 neuroimaging studies to account for these findings and help determine common and reward-specific brain regions in response to receipt of monetary, food/liquid, and erotic rewards. They found that all three types of rewards commonly activated a large reward-processing network

consisting of bilateral striatum (particularly ventral striatum/nucleus accumbens), bilateral anterior insula, mediodorsal thalamus, bilateral amygdala, and vmPFC. They stress the importance of considering anterior insula as a key component of reward processing and discuss its role in affective processing and/or awareness of rewards (see discussion, Sescousse et al., 2013).

However, some differences between reward types were also observed. Monetary reward activated bilateral ventral striatum and anterior OFC more than food and erotic rewards, providing corroboration for the idea that more anterior regions of OFC are involved in the processing of abstract secondary rewards (Sescousse et al., 2010, 2013). The authors suggested that greater activation in ventral striatum in response to monetary rewards may be a consequence of differences in experimental design used in most of the monetary rewards studies in comparison to the primary reward studies; in monetary reward studies there was more likely to be a motor response component (and passive viewing is more likely to be used in food/drink and erotic reward studies), and monetary reward studies were more likely to use a probabilistic reward design, enhancing reward prediction error signals. Food rewards activated dorsal anterior insula and somatosensory cortex. Activity in these regions is most likely related to sensory processing of food and liquid stimuli. Erotic rewards activated bilateral amygdala, ventral anterior insula, and the extrastriate body area (a region involved in the visual processing of body stimuli) more so than money or food, and lastly, both types of primary rewards (erotic pictures and food/liquid stimuli) activated middle insula more than monetary rewards (Sescousse et al., 2013).

The behavioral results from these and other studies suggest that participants exhibit similar hedonic and motivational responses when performing for primary and secondary rewards. In Sescousse et al. (2010), hedonic ratings of monetary rewards and erotic pictures were not significantly different, and in Valentin and O'Doherty (2009), pleasantness ratings of stimuli associated with high probability of money and high probability of juice were not rated differently. In Levy and Glimcher (2011), there was a lottery aspect to the behavioral task; subjects had to choose between a certain low amount of reward vs. a risky, higher amount of reward. While there was a lot of variability in degree of risk aversion between subjects, within subjects risk aversion for food, water, and money was fairly consistent. Regarding performance and motivated behavior, as discussed above, in Beck et al. (2010) monetary rewards and liquid rewards resulted in comparable improvement in cognitive task performance. In Sescousse et al. (2010), performance of the visual discrimination task did not differ as a function of type of reward.

Interestingly, the literature on basic reward processing suggests mostly comparable effects of monetary and primary rewards in terms of neural circuitry. This stands in potential contrast with the results of Beck et al. (2010), which point to the prominent differences between monetary and primary rewards during motivated cognitive control tasks. How can this apparent discrepancy be explained? Two obvious sources of differences are that the Beck et al. study was the only one to (a) focus on incentive category effects during higher cognitive processing and (b) examine the temporal dynamics of brain activity in terms of sustained vs. transient reward-related modulation. Thus, further research will be necessary to more clearly understand the

importance of these two dimensions. However, as we discuss next, the neural activity differences between liquid and monetary incentive conditions could also be potentially accounted for by another aspect of the experimental design used in Beck et al. (2010) that highlights an important methodological consideration related to the use of primary incentives.

Importantly, a key potential distinction between primary and secondary reward incentives relates to how such rewards are delivered. Specifically, in studies using monetary incentives, information regarding rewards is typically presented visually (or auditorily) and provides a symbolic indicator about the value of rewards that will actually be delivered at the end of the experiment (or often even later, when checks are mailed or deposited). Thus, the reward feedback during task performance is indirect and delayed. In contrast, in studies using primary rewards, these rewards can be directly delivered to the participant (e.g., via tubing inserted into the participant's mouth), and potentially consumed instantaneously, providing direct reward value following each trial (note that in the case of erotic rewards, the visual presentation of images are also "directly consumed" and thus may also have immediate appetitive reward value).

Thus, in Beck et al. (2010), as described above, the two incentive conditions were distinguished in terms of the timing of reward feedback delivery, with the liquid rewards delivered directly and instantaneously following each trial, while monetary reward feedback was indirect and only directly delivered at the end of the experiment. This difference between the two conditions points to a potential limitation of the experimental design and may also provide an explanation of the differences in brain activity observed. In particular, because the monetary rewards were not directly delivered until the end of the experiment, they may not have activated reward-processing regions as strongly or as effectively as primary rewards. Moreover, the more abstract and indirect nature of the monetary rewards may have resulted in more sustained cognitive processing, with subjects maintaining a representation of task winnings during performance, or at the very least, actively maintaining the incentive value of the task context in working memory during the money condition (see Beck et al. for a more detailed discussion of this topic). Because the primary rewards were consumed immediately and directly, there may have been a reduced need for a cognitive representation of the reward during the liquid condition. Consequently reward regions may have been recruited more strongly, tonically, and consistently, providing a better (or, at the very least, different) mechanism for motivation–cognition interaction. In particular, the sustained, direct activations of reward regions may have triggered a different (more transient, proactive) implementation of cognitive control on a trial-by-trial basis.

These ideas regarding the timing of reward delivery dovetail well with other findings related to the temporal discounting of delayed vs. immediate rewards. For example, McClure, Ericson, Laibson, Loewenstein, and Cohen (2007) examined temporal discounting of liquid rewards. When the choice was between immediate juice and delayed delivery of juice, the nucleus accumbens, subgenual cingulate cortex, medial OFC, PCC, precuneus, and ACC were activated. Choices between two delayed options activated visual, motor, and cognitive prefrontal regions such as DLPFC. The brain regions recruited were very similar to those found in a

previous study (McClure, Laibson, Loewenstein, & Cohen, 2004) that investigated temporal discounting of money. It is important to note that this close correspondence in brain regions activated during temporal discounting of juice and money occurred, despite the fact that the timescales used in these two experiments were very different; in McClure et al. (2007), a "delay" for juice receipt was on the order of minutes, while in McClure et al. (2004), the timescale for money receipt was much longer. In a follow-up experiment, McClure et al. (2007) lengthened their delay times to see how this would affect discounting-related brain activity for receipt of juice. They found that when the delays were recalibrated such that the "shortest" time delay was 10 min, limbic areas characteristic of immediate reward delivery were not activated at all.

The findings from McClure et al. (2004, 2007) are also instructive for interpreting the differences in temporal dynamics observed in Beck et al. (2010). Because liquid rewards are valued and delivered on a more immediate timescale, this could have contributed to the greater activation of subcortical limbic systems, as well as the motivation-induced transient recruitment of cognitive control regions in the liquid condition. Thus, an important direction for future research would be to include liquid reward conditions in which the rewards are delayed until after the experiment. A key question is whether such a manipulation leads to an increase in sustained, right-lateralized activity in cognitive control regions, as might be expected from the monetary incentive and temporal discounting literature. Relatedly, by directly comparing monetary and liquid incentive effects under such conditions (see Levy & Glimcher, 2011 for a similar approach used during risky decision-making), it would be possible to more clearly determine whether money and primary rewards are inherently and qualitatively different when used as rewards, or instead whether the differences observed in Beck et al. (2010) can be fully attributed to differences in the timing of reward receipt in these experiments and/or differences in how the brain values these rewards based on time (see also commentary, Lamy, 2007).

The results of McClure et al. (2004, 2007) and Beck et al. (2010) also have implications regarding the optimization of task design and reward contingencies laid out in Bonner et al. (2000) . While Bonner et al. presents a review of the contingencies upon which monetary incentives improve task performance, it is uncertain whether these same conditions apply to primary rewards. We hypothesize that task complexity should have similar consequences on incentive effects regardless of the type of reward used, provided that the reward is equally as motivating as money (and, consequently, subjects are willing to exert comparable amounts of effort to earn a liquid reward, for example). On the other hand, use of a quota payment scheme may be particularly effective for monetary rewards compared to primary rewards such as liquid. With monetary incentives, even with a piece-rate scheme, the money is often not received by the participant after each task trial, but rather at the end of the experiment. Thus, with a quota scheme, the goal aspect can help motivate performance and will help subjects maximize their total winnings, and the lack of immediacy of reward attainment might not be much of a disadvantage. However, if liquids are used as incentives it is hard to know if receiving a large amount of liquid, or a "liquid bonus" once a certain goal had been met, would be more motivating than liquid delivered under a piece-rate scheme.

Use of Nonmonetary Reward in Cognitive Studies: Conceptual and Methodological Advantages

An important outcome of investigations into the potential similarities vs. differences in the effects of monetary vs. nonmonetary incentives on behavior and brain activity is that it contributes to our understanding of the motivational side of motivation–cognition interactions. Indeed, if it were the case that common neural circuitry were engaged across different types of motivational incentives, and they were also similar in terms of their effects on behavioral performance (when equated for incentive value), it would suggest that motivational signals are represented in a highly abstract, domain-general format within the brain. In such a case, it is useful to consider whether purely symbolic (i.e., hypothetical or imaginary) rewards can be substituted for real monetary incentives. Obviously, if this were true it would be advantageous, from a practical and logistical perspective, to rely exclusively on symbolic rewards to motivate participants, since symbolic rewards are clearly simpler (and cheaper) to employ in experimental studies.

Indeed, in a few studies that have explicitly examined the use of symbolic (i.e., hypothetical or imaginary) rewards, very similar effects on brain activity and behavior have been observed when compared to the use of real monetary rewards. For example, in a study examining discounting of delayed rewards, Bickel, Pitcock, Yi, and Angtuaco (2009) found no statistical differences in choice patterns and brain activation (in both limbic and lateral prefrontal regions) in a hypothetical money gain condition (none of the money would be given to the subject) relative to a real money gain condition (in which one of the trials was randomly selected and paid out to the participant). Likewise, in a simple associative learning study, Miyapuram, Tobler, Gregorios-Pippas, and Schultz (2012) found graded responses in the dopaminergic midbrain and medial OFC to cues (pictures of money) that indicated different hypothetical reward values (participants were explicitly told that the reward cues were symbolic only). Moreover, when participants imagined a hypothetical monetary reward cue, similar responses in these same regions were observed compared to when the cue was visually presented. Similar results were also observed in Bray, Shimojo, and O'Doherty (2010). Common activation in medial OFC was observed when participants received a real reward in a probabilistic learning task and when they instead freely imagined a personally reward scenario in the same context. Symbolic rewards also often have similar effects in enhancing behavior and cognitive performance when compared to real rewards. For example, Shen and Chun (2011) found that the use of arbitrary point incentives led to the same degree of performance enhancement in a task-switching paradigm (i.e., reduced switch costs) as did real monetary rewards. Moreover, adding money to a point condition did not lead to further enhancements beyond points alone. Together, these results suggest that there may be no special advantages to the use of real monetary incentives for the study of motivation–cognition interactions. Nevertheless, further work will be needed to explore this issue more thoroughly.

In contra-distinction to the relationship between monetary and symbolic rewards, we argue that there may be real advantages to the use of primary rewards for investigating motivational influences on cognitive processing. Primary rewards produce motivational effects that, by definition, are hard-wired, present across development and in all species (allowing for another advantage, better comparison between the human and animal literature). Primary rewards are also truly appetitive in that they are directly and immediately consumed. Thus, they enable more precise control over the timing and manipulation of reward delivery. Further, because they are processed automatically, they may more effectively drive core motivational neural circuits in a context-independent manner; that is, their effects on brain activation and behavior might be less dependent on symbolic processing, situational construal, or conscious awareness. Moreover, as we describe next, there are even additional advantages of primary reward incentives that warrant further investigation, which can ultimately lead to a more complete understanding of the "motivation" side of motivation–cognition interactions.

A recent pilot study in our lab provides a nice case study example of the potential utility of primary rewards for uncovering the relationship between motivational and cognitive processing, while also raising issues that provide avenues for further exploration. Participants ($N = 36$) performed a cued task-switching paradigm in which pretrial color cues indicated whether the current trial was an incentive (reward possible for fast and accurate responses) or no-incentive (no reward possible) trial. On incentive trials, the reward was a small monetary bonus that was cumulated and provided at the end of the experiment. However, at the end of each incentive trial a feedback signal was presented that indicated whether the reward had been obtained on that trial or not. Of note, feedback on the incentive trials was not presented visually, but rather delivered as a liquid (no liquid was given when the reward was not obtained). Participants performed the task in two blocks that were identical in all respects, except that they used different color cues and liquid feedback: in one block, reward feedback was signaled by a pleasant liquid (apple juice), whereas in the other it was signaled by an aversive liquid (saltwater). Critically, however, the valence of the liquid was incidental, as it signaled the identical information (successful task performance and attainment of the monetary reward) in both conditions. Nevertheless, liquid valence clearly had an impact on performance, as participants earned significantly more rewards in the juice condition relative to the saltwater ($t(35) = 2.58$, $p = .01$) (Fig. 7.3). Thus, the results suggest that the liquid feedback modified the incentive properties of the task, presumably via their automatic (i.e., pre-existing, hard-wired) signaling of motivational significance.

There are a number of possible interpretations of the observed effects. One of the least interesting is that participants performed more poorly in the aversive liquid condition either because they were confused by the incongruent feedback or because they purposely performed worse to avoid receiving saltwater. However, this explanation is unlikely, since the liquid valence effect was relatively subtle (6 % difference in reward rate), relative to substantial performance improvement on incentive trials compared to no-incentive trials in both reaction time (156 ms faster in the juice feedback condition ($t(35) = 7.230$, $p < .001$), and 144 ms faster in the saltwater

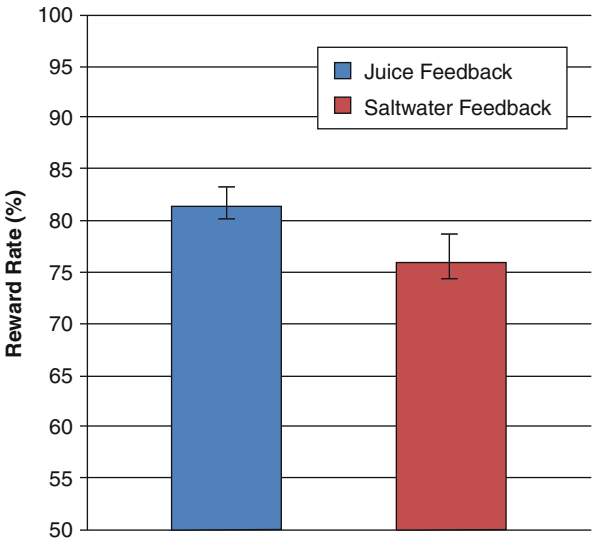

Fig. 7.3 Incidental liquid feedback affects reward rate in a monetary incentive task. Reward was achieved when trial response was both accurate and faster than an individually determined criterion RT. Reward rate was calculated as a ratio of the number of successful (rewarded) incentive trials compared to the total number of incentive trials. Mean reward rate was significantly greater for juice feedback compared to saltwater feedback. Error bars indicate standard error of the mean

condition ($t(35) = 6.325$, $p < .001$)) and accuracy (accuracy was 4.1 % higher in the juice condition ($t(35) = 3.281$, $p = .002$), and 3.9 % higher in the saltwater condition ($t(35) = 2.002$, $p = .053$)). Moreover, the main effect of trial type (indicating better performance on incentive vs. no-incentive trials; RT: $F = 52.698$, $p < .001$; Accuracy: $F = 9.906$, $p = .003$) did not interact with the type of liquid feedback. (F's < 1). Together these findings are inconsistent with the idea that participants were confused or purposely tried to perform more poorly on incentive-cued trials in the saltwater condition.

Another potential interpretation is that the motivational utility of incentive trials reflected both the monetary bonus and liquid feedback, with the two types of incentives integrated together into a "common currency" representation of subjective value (Levy & Glimcher, 2012; Montague & Berns, 2002; Rangel, Camerer, & Montague, 2008). Under this account, pleasant liquids add to the subjective value of incentive trials, while aversive liquids serve as a cost, subtracting from the estimated subjective value. Thus, according to this account, giving juice feedback would be expected to be equivalent—in terms of brain activity and behavior—to slightly increasing the monetary reward value of the trial, whereas giving saltwater feedback is equivalent to slightly decreasing the monetary reward value. A similar, but more complex interpretation is that the liquid and monetary rewards are integrated, but in a multiplicative, rather than additive manner (e.g., the liquid valence effect might be more prominent with smaller monetary rewards; cf., Talmi, Dayan, Kiebel, Frith, & Dolan, 2009). Nevertheless, both accounts lead to straightforward predictions that could be tested, for example, in imaging studies that orthogonally manipulate monetary reward values and liquid feedback within a factorial design.

Another key advantage of using primary rewards is that it would be possible to test whether their modulatory effect on behavior is directly related to the subjective

value of the incentive. Critically, subjective value is idiosyncratic, such that different individuals should have different preference profiles. Thus, in a paradigm such as the one described above, if a range of different rewards were used, the predicted reward earning level should track preference rankings, with the highest reward rate attained for the most preferred reward and the lowest rate earned for the least preferred reward. The opposite pattern should be observed with aversive liquids (e.g., lowest reward for most disliked liquid). Although, to our knowledge, no such studies have yet been conducted in the literature, consistent patterns have been observed in human imaging studies of basic reward processing. O'Doherty, Buchanan, Seymour, and Dolan (2006) observed that activity in the dopaminergic midbrain and ventral striatum appeared to track the preference rankings for a range of liquid rewards.

Another important alternative interpretation of our pilot data results is that they reflect the interaction of motivation with two distinct forms of instrumental control, one that is goal directed and the other that is habitual. The distinction between goal-directed and habitual behavioral control is prominent in motivational theories originating in the animal learning literature (Daw, Niv, & Dayan, 2005; Dayan, Niv, Seymour, & Daw, 2006; Dickinson & Balleine, 2002) but this distinction has not previously been a focus of examination in human studies of motivation–cognition interactions. However, the use of primary rewards may provide important leverage for understanding the contribution of these two mechanisms on behavioral performance and brain activity. Specifically, incentive-cued paradigms may not only involve goal-directed or strategic, top-down implementation of cognitive control in response to the incentive cues but may also have a learned, low-level conditioning (i.e., Pavlovian) component that also contributes to behavior. Because performance feedback (the immediate outcome) is typically of the same affective valence as the over-arching reward outcome, these contributions to performance are usually confounded.

In the current study, however, the use of affectively valenced liquid feedback may have promoted the acquisition of cue-outcome associations that were dissociable from the explicit instrumental contingencies. In particular, the difference in performance observed across the two liquid feedback conditions suggest that cognitive processing was either (a) enhanced by the incidentally positive cue-outcome associations of the juice condition; (b) impaired by the incidentally negative cue-outcome associations of the saltwater condition; or (c) both (a) and (b). Interestingly, our first attempts to examine these alternatives (through the use of a neutral liquid) suggest that the effect of saltwater was stronger than the effect of juice, but further study is required. For example, one approach would be to use a design in which cue-outcome associations are acquired through learning (e.g., by using an intermixed rather than blocked design, with probabilistic cue-liquid feedback mappings). If differences in reward rate in the different cue conditions are still observed, even under conditions in which participants show no explicit awareness of the cue-liquid contingencies, it would be more suggestive of a Pavlovian conditioning influence.

In the animal learning literature, the most well-accepted means of testing for a Pavlovian contribution to instrumental behavior is through demonstration of a

Pavlovian instrumental transfer, or PIT, effect. In the standard PIT procedure, a conditioning phase comes first, in which one cue (the CS+) is associated with a reward outcome in a purely Pavlovian manner (i.e., no instrumental behaviors are required), while another is associated with a neutral or aversive outcome (CS−). The second phase consists of exposure to the instrumental task, also for reward outcomes. In the key transfer phase, the instrumental task is performed again but in the presence of the Pavlovian cues and with rewards withheld (i.e., in extinction). Demonstration of a Pavlovian priming effect occurs if the instrumental task is enhanced in the presence of the CS+ compared to the presence of the CS−. There has been recent interest in demonstrating PIT effects in human studies of basic reward and punishment (Bray, Rangel, Shimojo, Balleine, & O'Doherty, 2008; Geurts, Huys, den Ouden, & Cools, 2013; Talmi, Seymour, Dayan, & Dolan, 2008). This work has shown the amygdala and ventral striatum to be critical neural substrates for PIT effects. However, to our knowledge, such effects have not been examined as a potential mechanism of incentive effects in studies of motivation–cognition interactions. Thus, this represents a ripe target for future research. For example, in our paradigm, a strong test of PIT effects would require participants to acquire the cue-feedback associations in a purely Pavlovian conditioning phase and a demonstration that the reward cues modulate task-switching performance even when presented during an extinction phase.

Based on the dual-process framework described above, it is also possible the liquid feedback effects on task-switching performance demonstrated in our pilot study reflect goal-directed rather than habitual motivational control. Here again, the use of primary rewards provides potential strong theoretical advantages in testing for a goal-directed mechanism. In particular, one such test is the outcome revaluation procedure, which also derives from the animal learning literature (Dickinson & Balleine, 2002). In this procedure, two different reward incentives are each paired with a different instrumental action. After an initial training/testing period with these incentives, the subjective value of one incentive is modified for the individual, either through satiation, deprivation, or some other physiological manipulation, while the other incentive is left unaffected. Then, following this revaluation phase, the individual is tested again. When the behavior is under goal-directed instrumental control, behavioral patterns should be instantly changed for the revalued incentive, but remain constant for the control incentive (which rules out a more general motivational or behavioral effect). Although outcome revaluation procedures have only recently been examined in human imaging studies, the results to date are promising.

In a study examining simple instrumental choice, Valentin, Dickinson, and O'Doherty (2007) used the outcome revaluation procedure with liquid rewards to show that OFC activation was sensitive to outcome-devaluation, suggesting that it may serves as the neural substrate for goal-directed control. Mohanty, Gitelman, Small, and Mesulam (2008) demonstrated that such motivational effects could also influence higher order cognitive processing. In a spatial attention paradigm, behavior in response to "donut" targets was altered when subjects were satiated on donuts compared to a food-deprived state. Motivational state also altered activation in reward-processing and task-relevant cognitive regions. These behavioral and neural

changes were not observed in response to non-appetitive stimuli (tools). In this study subjects were not performing the task to actually earn the food reward. However this type of deprivation vs. satiation design could easily be adapted to look at the effects of motivational state in response to specific rewards or reward cues and the subsequent effects on cognition. Manipulation of motivational state would be most easily accomplished using primary rewards rather than monetary incentives, given that individuals typically do not show satiation for monetary rewards. Thus, in our liquid feedback paradigm, evidence for a goal-directed mechanism would be obtained if selective satiation on the juice reward, induced after an initial performance phase, had immediate effects in reducing reward rates for juice cue trials.

Summary and Conclusions

In this chapter we have provided a new perspective on studies of motivation–cognition interactions, which emphasizes some of the potential concerns associated with the use of monetary incentives, as well as some of the potential advantages to using nonmonetary incentives, such as primary rewards, like food and liquids. We began by reviewing findings that suggest that motivational incentives do not always have a straightforward influence on task performance, sometimes yielding no effects, and other times causing paradoxical performance impairments. Such findings place a greater emphasis on better understanding the nature of motivation–cognition interactions, particularly in understanding the general vs. incentive-specific types of motivational signals that drive such interactions. A cognitive neuroscience approach is particularly useful for such investigations. This approach is targeted toward revealing the particular mechanisms of how, where, and why motivation–cognition interactions occur in the brain. We discussed findings suggesting that motivational effects on task performance appear to be strongly related to cognitive control, modulating activation in frontoparietal brain networks that are critically involved in working memory, attentional control, and task/goal representations. Moreover, the source of such effects may be enhanced through interactions between the frontoparietal cognitive control network and primarily subcortical reward networks, potentially mediated by the neuromodulator dopamine (which strongly targets both networks). We then discussed intriguing findings from a study conducted in our lab (Beck et al., 2010), which suggests that the modulation of reward and cognitive control networks in the brain appears to interact further with the type of motivational incentive used. Specifically, important dissociations were observed between monetary and primary liquid rewards in terms of the temporal dynamics of brain activity in both networks.

One potential interpretation of this result is that motivational effects on cognition are incentive specific, with different categories of reward engaging different neural circuits. However, a review of the basic reward processing literature on incentive category effects indicates that such assertions are not strongly supported. Instead, the findings suggest that a number of reward regions that appear to be fairly domain-general (e.g., vmPFC and ventral striatum) and are engaged commonly by

a variety of different incentive types. One potential resolution to this discrepancy is that the difference between monetary and primary rewards may not necessarily point to an incentive-specific motivational effect, but could rather reflect the different dynamics of how primary and monetary rewards are delivered. In particular, primary rewards can be directly delivered and consumed immediately after successful task performance, whereas monetary rewards are indicated during task performance via abstract (typically visual) feedback cues and are only acquired after the experiment is over. Yet we suggest that both types of interpretation, incentive-specific effects and reward delivery dynamics, point to the need for further studies in this domain, since to our knowledge, Beck et al. (2010) represents the only published study examining incentive category effects during motivation–cognition interactions using a within-study design.

Moreover, a key takeaway point of the Beck et al. (2010) study, and the literature on domain-general activation of the reward-processing network by different types of incentives, is that monetary incentives are not the only type of reward that can induce motivational effects on cognitive task performance. Indeed, a growing literature suggests that such effects can even be observed by symbolic (i.e., hypothetical or imagined) as well as real rewards. This is not to say that there are not interesting effects that are specific to monetary rewards; there may in fact be a distinct behavioral and neural signature of monetary rewards. However, future experiments need to be carefully designed to answer this question. In addition to matching primary and monetary rewards on reward delivery schedule, use of a symbolic "control" condition will help separate out the neural and behavioral effects of money from those induced by a salient symbol or abstract cue (Hubner & Schlosser, 2010).

Our primary suggestion of the chapter is that primary rewards offer distinct conceptual and methodological advantages for investigating the nature of motivation–cognition interactions, particularly in terms of understanding the distinct properties of various motivational signals. We presented pilot data from our lab as a case-study illustration of how primary rewards might be exploited in an experimental context, by demonstrating how such rewards, when presented as a feedback signal, interact with monetary incentive-related enhancements of task performance, presumably via automatic signaling of motivational significance.

We then ended the chapter by discussing a number of promising directions for further research in this area, using our pilot data as an example. In particular, we suggested that the use of primary rewards opens experimental studies up to a number of different avenues of fruitful exploration. We highlighted a variety of different methodological approaches, including (a) factorial designs to understand whether various incentive types are integrated into a common representation of subjective motivational value; (b) manipulation of idiosyncratic reward preferences to determine whether cognitive performance actually tracks subjective value; (c) tests for Pavlovian motivational influences on instrumental behavior, using the well-established PIT effect; and (d) tests for a goal-directed motivational influence using outcome revaluation procedures. In sum, we believe that such approaches provide clear "low-hanging" fruit, by pointing the way toward effective research strategies for uncovering more clearly how, why, and where motivational signals modify ongoing cognitive processing in the brain.

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Chapter 8
Pathological Gambling: Who Gains from Others' Losses?

Ronen Huberfeld and Pinhas N. Dannon

Abstract Gambling is a popular activity across most cultures and throughout history. Overall, gambling all over the world is going through a resurrection during the past decades and becoming a legitimate and socially acceptable form of entertainment. The total casino gambling market grew from USD100 billion in 2006 to USD117 billion in 2010. This market is expected to rise from $117.6 billion in 2010 to $182.8 billion in 2015. Today, millions of families throughout the nation suffer from the effects of problem and pathological gambling. As with other addictive disorders, those who suffer from problem or pathological gambling engage in behavior that is destructive to themselves, their families, their work, and even their communities. The problems include depression, abuse, divorce, homelessness, and suicide, in addition to the individual economic problems. Today, pathological gambling is understood as a complex, multidimensional phenomenon. Current research points out biological, psychological, and social factors are all relevant in the development of problematic levels of gambling. Prevalence surveys indicate that only a small proportion (<10 %) of individuals who have gambling disorders seek formal treatment. Accepted treatment strategies combine pharmacological and psychological intervention with long-term follow-up.

Gambling is a popular activity across most cultures and throughout history. Chinese gambling has been known for more than 4,000 years, while archeological findings of gambling have been traced in other regions: Ur (2000 BC), Crete (1800 BC), Egypt (1600 BC), and India (1000 BC). While some Indian resources testify of the popularity of gambling, other resources indicate the importance of control and the taxation of gambling (McMillen, 1996; Petry, 2005).

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E. Bijleveld and H. Aarts (eds.), *The Psychological Science of Money*,
DOI 10.1007/978-1-4939-0959-9_8,

Throughout the years Jewish tradition has condemned gambling. Gambling for money was viewed in the Talmud as a form of thievery. Moreover, professional gamblers were disqualified from being accepted as legitimate witnesses in a Jewish court of law and were considered unfit for testimony. However, Jewish resources indicate that in Eastern Europe, card playing on Chanukah was traditional for adults. Most researchers of Jewish customs associate this gambling custom with the fact that Jews played dice or cards in order to distract the Greek soldiers, allowing the Jewish guerilla fighters to hide or escape.

Early explorers in New York witnessed native tribe members gamble by rolling stone dice, while historical reports claim that George Washington purchased the first ticket for a lottery that financed the colony of Virginia's development (Petry, 2005). In Australia, gambling was common in Aboriginal Communities often involving objects carved from plant or animal matter and developed during the British settlement. Overall, gambling all over the world is going through a resurrection during the past decades and becoming a legitimate and socially acceptable form of entertainment (Ashley & Boehlke, 2012; Dalfabbro & King, 2012; Dembinsky, Iancu, & Dannon, 2007; Haugen, 2006).

Nowadays, legalized gambling generates greater revenue than any other popular leisure-time activity, and demand for gambling services is rising all over the world. Hence gambling is expanding due to a number of reasons:

1. Increasing amounts of discretionary income among the general population (especially in the post-World War II era and in Eastern Europe since the collapse of the Soviet Union).
2. An increased willingness of national and regional governments to authorize and exploit commercial- and government-offered gambling services.
3. A greater social acceptance of gambling as a recreational activity, a desire to combat illegal gambling activities and related adverse consequences, and a willingness to exploit economic rents that can emerge from legal gambling services. Amateur sporting organizations and specified benefactors or "good causes" can capture substantial economic rent from the legalized profits.
4. A general liberalization in moral and ethical attitudes toward gambling, including a lenient attitude of organized religions, whose followers have traditionally viewed gambling as immoral and socially destructive behavior.
5. The increasing integration of gambling with other fields that have been growing in popularity (professional sporting events, horse and automobile racing, television, and cinema).
6. The development of new gaming services due to modern computers, the Internet, and telecommunications technologies. These include Internet-based tournaments, betting markets, betting exchanges, and interactive TV (Ashley & Boehlke, 2012; Delfabbro, 2012; Haugen, 2006).

Policy makers often strive to maximize economic rents that can finance various specified benefactors such as national, regional, or local-government purposes (such as education, health, or sports), or "good causes." On the other hand, governments and official organizations attempt to protect consumers from fraud and criminal

activities, as well as from potential vulnerabilities of excessive gambling (usually doing so through imposed constraints) (Schwer, Thompson, & Nakamura, 2003; Swiss Institute of Comparative Law, 2006).

Gambling Revenues: Who Makes the Profit?

Gambling is a widely and rapidly growing field all over the world. The total casino gambling market grew from USD100 billion in 2006 to USD117 billion in 2010. This market is expected to rise from $117.6 billion in 2010 to $182.8 billion in 2015.

Though aggregate gross gambling revenues (GGRs) are similar between the USA and EU as of 2003, their composition differs considerably between the European Union member states as a group and the USA. It is estimated that the total amount of gambling in the EU was more than €50 billion (casino 15 %, lottery 45 %, gaming machines and betting services around 18 % each).

In the USA, commercial and tribal casinos generated about USD42.1 billion (58 % of the US total GGRs) in 2003, and in 2010, the casino market in the USA was around USD57 billion. Gambling has become a highly developed and profitable business for Native American Indian tribes. In the last decade the tribal gaming revenues increased dramatically from USD14.7 billion in 2002 to USD27.2 billion in 2011. The casino market in the USA is expected to rise from USD57.5 billion in 2010 to USD73.3 billion in 2015.

In the EU in 2003, casinos brought in only about €7.5 billion (15 % of the EU total GGRs), and in 2010 the casino market was around USD13 billion. France had the largest casino market in 2010 at USD3.8 billion, followed by Germany and South Africa at USD2.0 and USD1.8 billion, respectively. In the UK, the casino market was expected to expand as a result of the Gambling Act of 2005, but this growth has not yet taken place for a variety of reasons, such as the smoking ban, changes in machine regulation, and the delay in new casino licensing. In the Netherlands casino revenues fell by 27.7 % between 2007 and 2010 due to the recession, the introduction of a smoking ban, and an increase in the gambling tax.

In the USA, gaming machines (slot machines, Electronic Gaming Devices, or Video Lottery Terminals) outside of casinos are still relatively uncommon and as such generated GGRs of $3.9 billion (5 % of the US total GGRs), whereas in the European Union, gaming machines generated GGRs of €9.7 billion (19 % of the EU total GGRs). Lotteries in the USA generated GGRs of $17.4 billion (which represent 24 % of US GGRs), whereas in the EU, lottery GGRs were €23.0 billion (45 % of the EU total GGRs). Betting services, including on-track and off-track betting on horses and sports amounted to only $3.9 billion in the USA (5 % of US GGRs), whereas in the EU, the comparable statistic was €8.9 billion (17 % of the EU total GGRs). Finally, bingo services and charitable gambling generated about $4 billion in the USA (5 % of US GGRs), and in the EU, bingo services were also a relatively small component at €2.4 billion (5 % of the EU total GGRs).

In The UK gaming and betting markets are well developed, with the exception of their casino industry, which is undergoing considerable change. The UK lottery comprises 33 % of the GGR and betting services comprise 35 % of the GGR. Casino revenues comprise less than 10 % of the GGR. In 2001 the total UK spend (i.e., the money lost, or money staked minus winnings) on gambling was €10.6 billion or €8.41 per household per week, representing about 1.2 % of household income or the equivalent to about 11 % of all the spending on leisure goods and services. A survey conducted in 2004 found that 71 % of British citizens had gambled during the previous year. The survey found that the general attitudes towards gambling were unfavorable with the exception of lotteries and bingo (attitudes towards gaming machines, Internet gambling, and betting exchanges were the most unfavorable). However, in the case of Internet gambling, 47 % of respondents stated that they were neither favorable nor unfavorable or did not have an opinion (Schwer et al., 2003; Swiss Institute of Comparative Law, 2006).

The UK lottery comprises 33 % of the GGR and betting services comprise 35 % of the GGR. Casino revenues comprise less than 10 % of the GGR. In 2001 the total UK spend (i.e., the money lost, or money staked minus winnings) on gambling was €10.6 billion or €8.41 per household per week, representing about 1.2 % of household income or the equivalent to about 11 % of all the spending on leisure goods and services. In Spain machine gaming comprises 50 % of the GGR and lottery comprises 25 % of the GGR. Again, casino revenues comprise less than 10 % of the GGR. It is worth mentioning that betting services, including sports betting, comprise less than 2 % of the GGR, despite the enormous interest in Spanish football worldwide and in Spain itself. Perhaps illegal gambling is widespread and dominant. In the Netherlands, lottery, casino, and gaming machines comprise 40 %, 35 %, and 25 % of the GGR, respectively. In Germany and Italy lottery is the popular gambling form, comprising over 50 % of the GGR (Schwer et al., 2003; Swiss Institute of Comparative Law, 2006).

In the Far East, there has been an almost fivefold increase in the number of casinos between 1995 and 2010. Although a substantial proportion of the growth in casinos over this period can be attributed to the recent growing gambling industry in Macau, the number of casino venues has also increased significantly in other locations, such as the Philippines and South Korea. In the last two decades, illegal gambling (along with legal lotteries) and the illusion of getting rich quickly are becoming a serious social problem in mainland China, resulting in a significant increase in the rates of problem gambling. Illegal gambling takes place in card and mahjong schools, in underground casinos, through unofficial lotteries, and on websites catering to Internet gamblers. Around USD150 billion are wagered illegally each year in mainland China, which is approximately 10 times the amount of the two officially sanctioned lotteries in China (Tse, Yu, Rossen, & Wang, 2010). Unlike in mainland China, gambling in Macau has been legalized and heavily promoted. Gambling has been a significant contributor to the city's economy since the 1850s. Since the handover of Macau from Portugal to China in 1999, there has been a dramatic rise in the number of casinos. Macau has been known as the "Oriental Las Vegas." Other forms of gambling are also available in Macau, including horse racing, greyhound racing, sports betting, and a number of lotteries. In 2003, the Macao Gaming

Inspection and Coordination Bureau reported that the gambling tax contributed 74 % to the Macau fiscal revenue. In 2004, the percentage rose to almost 78 % of the Macau total public revenue (approximately USD1.9 billion). In 2006 the Macao casino gambling market was USD7 billion, rising to USD23.5 billion in 2010 and expected to rise to as much as USD62 billion in 2015 (PwC, 2011; Tse et al., 2010).

The Asia Pacific casino gambling market, which paused in 2009, rose dramatically in 2010, driven by new capacity in Macau and Singapore. The forecast is that the growth in Asian casino revenues will be higher than growth in the USA and EU up until 2015 and will reshape the landscape of the global industry. Furthermore, Asia Pacific will account for 43.4 % of total global revenues, ahead of the USA. Singapore's dramatic emergence as a casino gaming center, surging from 0 in 2009 to revenues totaling more than USD4 billion in 2011, is expected to be more than USD7 billion in 2015. The casino market in Asia Pacific grew from USD13 billion in 2006 to USD34 billion in 2010 and is expected to rise even more, to USD80 billion in 2015 (PwC, 2011).

Israeli gambler spends approximately 300 NIS (USD80) a week. Israelis have spent 1.6 billion NIS (USD0.4 billion) in legal state gambling while spending 3 billion NIS (USD0.8 billion) on illegal gambling. Internet gambling in Israel is estimated around 10 billion NIS. Even though there are no legal casinos in Israel, 47 % of the Israeli adult population has been in a casino abroad or illegal at least once in their lives. Seventy percent has gambled in a casino more than once (Israeli Parliament Center of Information and Research, 2008). The GGR of the Israeli state lottery in 2011 was 5 billion NIS (USD1.4 billion), which is a 25 % growth in comparison to the 2010 GGR. In Israel the sport gambling market alone is estimated to be around USD3 billion, out of which the illegal sport gambling is approximately USD2.5 billion (Israeli Parliament Center of Information and Research, 2008).

The Positive Aspects of Gambling

Besides the clear downside of gambling for individuals, their families, and society as a whole, one must take into account that legalized gambling has had certain positive economic effects in at least some communities. Employees described the new and better jobs they had obtained with the advent of casinos and some even described relocating from other states to the sites of new casinos or leaving minimum-wage jobs, in which they had no benefits, to accept unionized jobs at the casinos at higher compensation. There is no arguing that these employees have better material, health, and retirement benefits going to work for the casinos. Some elected officials express support for gambling and its increased revenues for their cities. They also discuss community improvements made possible since the advent of gambling. In other locations, tribal members mention that gambling and casinos in their tribal lands have provided jobs that had not existed before, improved hospital and clinic facilities, and schools for the benefit of their children. Legalized gambling has provided economic resources, both personal and tribal, and propelled investments in other industries and enterprises (National Gambling Impact Study Commission [NGISC], 1999).

In 1996 more than half a million people were employed by the legal gambling industry, earning more than USD15 billion. In 1995 the casino industry recorded USD22–25 billion in total revenues, paid a total of USD2.9 billion in direct taxes (including federal and state, property, construction sales and use, and gambling taxes), directly employed almost 300,000 people, paid USD7.3 billion in wages, paid an average national wage of approximately USD26,000 (which exceeds that paid in most related fields), invested USD3 for every USD1 earned, created 13 direct jobs for every USD1 million in revenues, supported 400,000 indirect jobs paying USD12.5 billion in wages, and spent a large majority of its revenues within the USA on payroll, taxes, and other expenses. The economic benefits of casino gambling have been especially powerful in economically depressed communities. State, local, and tribal governments report almost unanimously the positive economic impact of gambling. Research shows that casino gambling creates jobs and reduces levels of unemployment and government assistance in communities that have legalized it. According to the Bureau of Indian Affairs (BIA), 156 tribes are involved in gambling activities.

The Indian Gaming Regulatory Act limits use of revenues to three purposes: (1) to fund tribal government operations or programs, (2) to provide for the general welfare of the Indian tribe and its members, and (3) to promote tribal economic development.

In the EU state members, much of the legal gambling revenues are channeled to positive causes and initiatives. In Austria for instance the gambling industry's expenditure for "good causes" include contributions to sport and culture. The Austrian Sport Federation depends largely upon revenues from Austrian lotteries. In 2004 it received almost €38 million in donations from Austrian lotteries. Due to the change in the Austrian Gambling Act, the amount the Austrian Sport Federation receives was increased to €46.8 million in 2005.

In Belgium the National Lottery of Belgium has contributed, at the request of the government, €2,000,000 to the disaster relief efforts for the victims of the 2004 tsunami. The French national monopolies contribute heavily to various charitable organizations each year. The French National Olympic Sport Committee is one of the main beneficiaries of these donations. Its division, the National Foundation for Sports Developments (FNDF), receives 2.9 % of lottery and sports betting turnover. It further receives 0.01 % of horseracing betting turnover (from PMU) and 5 % of the TV sport broadcasting proceeds. German lotteries are taxed at 16.67 % of sales, and much of the remainder after payment of prizes is allocated either to the federal treasury, or to "good causes," which include the arts, culture, charities, education, science, and sports (Schwer et al., 2003; Swiss Institute of Comparative Law, 2006). In Canada only 1–3 % of provincial gaming revenues finding is its way into cultural organizations (Department of Canadian Heritage, 2002).

The Israel state lottery GGR in 2011 was around 5 billion NIS (USD1.4 billion), out of which 1 billion NIS (USD400 million) was transferred to state departments and municipalities, as well as to student scholarships. Moreover another 130 million NIS (USD30 million) were transferred to the state department as lottery winning tax.

Many countries believe that by legalizing gambling they can increase state income and divert more financial resources to fields that are in need. As a side effect, legalized gambling reduces illegal gambling, money laundering, and other criminal issues.

Gambling: Who loses?

The social and financial costs of gambling to society are enormous. NORC estimates that the annual average costs of job loss, unemployment benefits, welfare benefits, poor physical and mental health, and problem or pathological gambling treatment is approximately USD1,200 per pathological gambler per year and approximately USD715 per problem gambler per year (NGISC, 1999).

NORC further estimates that lifetime costs (bankruptcy, arrests, imprisonment, legal fees for divorce, and so forth) are at USD10,550 per pathological gambler, and USD5,130 per problem gambler. With these figures, NORC calculates that the aggregate annual costs of problem and pathological gambling caused by the factors cited above are approximately USD5 billion per year, in addition to USD40 billion in estimated lifetime costs. Other forms of adverse social impact are the increase in criminal activities (i.e., loan sharking, money laundering, organized crime activities, embezzlements, theft related to gambling, etc.) and the corruption of public officials (NGISC, 1999).

Social/financial crises on the individual and the personal costs of pathological gambling are devastating. Ladouceur, Dubé, and Bujold (1994) found that almost a third of PGs attending Gamblers Anonymous reported either that they had filed for bankruptcy or reported debts of USD75,000–150,000. Forty to sixty percent of the cash wagered by individuals in casinos is not physically brought to the casino itself. Casinos extend billions of US dollars in loans to their customers in the form of credit, charging customers on their credit cards as giving cash advances. The fees for cash advances range from 3 to 10 % or more.

Bankruptcy as a result of problem and pathological gambling is not uncommon. As much as 20 % of pathological gamblers report filing bankruptcy (compared to rates of 4.2 % for non-gamblers and 5.5 % for low-risk gamblers). Twenty-two percent of Gamblers Anonymous members surveyed had declared bankruptcy. Bankruptcies in Iowa increased at a rate significantly above the national average in the years following the introduction of casinos (NGISC, 1999). Moreover, losses can lead to criminal acts among those whose employment and economic status present the opportunity for white-collar crimes. It has been proposed that compulsive gamblers are likely to commit "silent" crimes (such as stealing from their family members or their employer, embezzlement, forgery, and fraud).

Compulsive gamblers often rationalize a crime by looking at it as a short-term loan which will be returned after the "big win." This rationalization is the reason why a crime can go undetected for some time before it is discovered. Some studies of Gamblers Anonymous members and persons in treatment for compulsive gambling

determined that roughly two-thirds admitted to committing crimes or civil fraud to finance their gambling or to pay gambling-related debts (Defense Human Resources Agency [DHRD], 2010). It is estimated that approximately 30 % of PG have made a false claim after an auto accident, 20 % of PG have stolen things, that they knew an insurance company would have to pay for, and almost 50 % of PG have been engaged in at least one insurance fraud or theft (NGISC, 1999).

Research studies on compulsive gamblers in Australia, Germany, and Scotland have confirmed a similar pattern. Some studies suggest that the most common crimes are fraud (38 %), theft at work (23 %), embezzlement (22 %), and theft from family (21 %) (DHRD, 2010). Other studies' results are varied with respect to the effect of casinos on crime, with findings of no change or increases and decreases in crime with the introduction of casino gambling. Some researchers find that there is no difference in crime rate between Atlantic City (with casinos) and two other New Jersey tourist destinations; an increase in crime in Atlantic City due to tourism is also one of the findings. Other researchers have studied the relationship between lotteries and crime. Their findings demonstrate a 3 % increase in crime with the presence of a state lottery.

In the USA Commission report there are repeated testimonies of desperate gamblers committing illegal acts to finance their problem and pathological gambling. Some examples include a Detroit man who faked his own son's kidnapping to pay back a $50,000 gambling debt and a 14-year hospital employee in Iowa who embezzled $151,000 from her employer for gambling. In a survey of nearly 400 Gamblers Anonymous members, 57 % admitted stealing to finance their gambling. Collectively they stole USD30 million for an average of USD135,000 per individual. In Louisiana, one man confessed to robbing and murdering six elderly individuals to feed his problem with gambling on electronic gambling devices (NGISC, 1999).

Researchers have found that pathological gamblers have higher arrest and imprisonment rates than non-pathological gamblers. Around one-third of problem and pathological gamblers have been arrested, compared to 10 % of low-risk gamblers and 4 % of non-gamblers. About 23 % of pathological gamblers have been imprisoned, and so have 13 % of problem gamblers. These arrests and imprisonments cause a heavy financial burden, which is estimated to be about USD1,000 in excess lifetime police costs for problem and pathological gamblers each and a cost of USD10,000 for the 32 % of pathological gamblers arrested. It is postulated that with the increase of legalized gambling, there is also an increase in youth crime, forgery and credit-card theft, domestic violence, child neglect, problem gambling, and alcohol and drug offenses (NGISC, 1999).

The advertisement materials for a lottery promote gambling as a quick and easy means of profit without working. They are aimed at the most vulnerable populations (immigrants, minorities, and economically disadvantaged individuals). The participation of low-income people in gambling has been referred to as "regressive taxation" and "a tax on the poor." Legal gambling (as state lotteries), as well as illegal gambling organizations, exploit the vulnerability of low socioeconomic populations by placing more gambling stands and machines in their neighborhoods deliberately.

Hence, on the one hand gambling revenues increase, and on the other hand there are more individual and familial financial crises and a higher economic burden on society.

Today, millions of families throughout the nation suffer from the effects of problem and pathological gambling. As with other addictive disorders, those who suffer from problem or pathological gambling engage in behavior that is destructive to themselves, their families, their work, and even their communities. The problems include depression, abuse, divorce, homelessness, and suicide, in addition to the individual economic problems discussed previously. The impact of these problems on the future of our communities and the next generation is indeterminable.

In Israel, the establishment and development of a first casino is under social and legal debate. Israeli police is warning that criminal acts such as money laundering will increase greatly due to casino-legalized gambling. Illegal gambling in Israel is estimated to be around 10–15 billion NIS (USD2.7–4 billion) and is considered to be one of the main causes for money laundering, the illegal loan market, violent crimes, and other criminal acts.

Illegal "sports gambling" not only catalyzes criminal activity but also diverts and distorts sport games and scores. Criminal organizations can bribe or threaten/extort sports players and coaches and referees in order to influence sports game scores. Criminal organizations can also use sports teams as a money-laundering platform and buy or sell sports players in order to influence and distort sports game scores. Sports gambling and criminal acts are widespread. Some of the most famous include the following:

The 2006 Italian football scandal involved Italy's top professional football leagues, Serie A and Serie B. The Italian police uncovered relations between referee organizations and team managers of league champions Juventus and other major teams including AC Milan, Fiorentina, Lazio, and Reggina. The teams were accused of rigging games by selecting favorable referees. Juventus was heavily punished through the stripping of 2005 and 2006 Serie A titles. It was expelled from the 2006–2007 UEFA Champions League and relegated to Serie B.

The 2011 Turkish Sports corruption scandal was an investigation into match fixing, bribery, organized crime, and extortion in Turkey's top two association football divisions, the Süper Lig and First League, and the Turkish Basketball League. The Fenerbahce chairman was sentenced to 3 years and 9 months in prison for match-fixing and 2 years and 6 months for forming an illegal organization.

In early 2005, German football was overshadowed by the discovery of a €2 million match-fixing scandal centered on a second division referee, who confessed to fixing and betting on matches in the second Bundesliga, the DFB-Pokal (German Cup), and the third division Regionalliga. Numerous players, coaches, and officials were accused of involvement with an organized crime group in the scheme. Indications were that the referee had regular meetings in Berlin with a Croatian gambling syndicate connected to an organized crime group. In 2005 a number of people were taken into custody, including the operators of a sports betting agency.

Suicidality

Emerging evidence suggests that gambling severity elevates the risk for suicidal ideation and behavior. Due to the nature of individual and social costs, some individuals may view suicide as the only viable solution to both their emotional and financial distress (Hodgins, Mansley, & Thygesen, 2006). It has been proposed that PGs are 5–10 times more likely to attempt suicide than the general population (Blaszczynski, Huynh, Dumlao, & Farrell, 1998). Other studies have found that 36–50 % have a history of suicidal ideation, and 20–30 % have made suicide attempts (Dalfabbro & King, 2012). The comorbidity of mood and substance-use disorders, which are highly associated with suicide, raises suicidal risk in PGs even more (Crockford & el-Guebaly, 1998). However, some data point to the fact that gambling-related suicide attempts tend to have a prior non-gambling-related suicidal ideation. Hence, it appears that gambling problems are part of a number of stressors that may contribute to suicidal ideation and attempts (Dalfabbro & King, 2012; DHRD, 2010).

Internet Gambling

Since the emergence of the Internet in the 1990s, an increasing number of gambling services have become available online or through other new remote communications technologies. The Internet gaming sector is the sector which offers gambling services via the Internet, through mobile phone services, and through interactive television wagering. In the EU, for example, Internet gambling represented between €2 billion and €3 billion in GGRs in 2004. The amount is growing rapidly. The global remote and Internet gaming industry was forecast to grow from about USD9 billion (€7.5 billion) in 2004 to USD25 billion (€20.8 billion) in 2010. The rapid technological development, commercial initiatives, and market penetration have made this sector of the gambling services industries extremely dynamic and fast growing (Schwer et al., 2003; Swiss Institute of Comparative Law, 2006).

The Internet, advanced cellular phones, and other remote communication make gambling easy and available almost everywhere, anytime. People of all socioeconomic statuses can gamble in conventional venues as well as on some new forms, such as betting exchanges, tournaments, and spread betting and poker, which are not so readily available in conventional venues. Malta and the UK already have laws permitting and regulating Internet gambling on their statute books. Anti-money laundering provisions are strictly enforced in order to ensure that all licensed gaming is untainted by criminality.

Gibraltar hosts a number of Internet gambling companies that account for a large share of the world's Internet gambling. The huge advantage of remote gambling is the wide gambling market, which is served outside the specific country that hosts the gambling service company.

A number of factors make substantial growth of remote gambling inevitable:

1. An increasing proportion of the population has access to the relevant technologies
2. The technologies are becoming increasingly user friendly
3. The technologies are becoming increasingly integrated; for example, smart phones and tablets
4. These systems have automated and convenient electronic billing systems which make financial transactions easy and safe
5. Nowadays adult populations are familiar with playing electronic games and computers in their everyday lives
6. Spending time and money on leisure is increasing
7. Spending money on home-based entertainment is increasing

The anonymity of gambling and the opportunity to gamble large amounts of money make Internet gambling a fertile soil for PG and gambling companies. In 2005 ARGO (The Association of Remote Gambling Operators) suggested that the world interactive gambling market is worth somewhere between €5,700 million and €9,900 million in annual revenues and growing. Estimates for Internet-based Global Gambling Revenues by Christiansen Capital Advisers were about €10,000 million in 2005 and €20,220 million in 2010 (Schwer et al., 2003; Swiss Institute of Comparative Law, 2006). In reality the growth was far beyond expected, and in 2012 the extent of Internet sport gambling alone was around USD50 billion.

Legal control over Internet gambling is limited to only 28 states all around the world. Seven of these are European. One must remember that, especially in Internet sport gambling, it is relatively easy to make huge profits from diversion of games and scores. Sports teams might serve also as an optimal tool for laundering money. Criminal organizations use sport and Internet gambling for profit and money laundering.

Nowadays governments' attention has been caught by the potential of legalized and licensed online gaming services as a valuable source of tax revenues. The leading argument is that, since consumers will engage in illegal online gaming anyway, it is better to license and tax it than to allow the revenues to slip away. The UK remains the largest online gaming market globally, having legalized it in 2005 (PwC, 2011).

Pathological Gambling

Although it was first mentioned in the medical literature in the early 1800s, the APA did not classify pathological gambling as a psychiatric disorder until the 1980s (DSM-III). Nowadays pathological gambling is classified, along with pyromania, kleptomania, trichotillomania, and intermittent explosive disorder, as an "impulse control disorder not elsewhere specified."

Two categories of gambling disorders have been established: pathological gambling and problem gambling. The pathological gambling diagnostic criteria are

described in both the Diagnostic and Statistical Manual of Mental Disorders, 4th edition, text revision (DSM-IV-TR) (American Psychiatric Association [APA], 2000) and the International Classification of Diseases, 10th revision (ICD-10) (World Health Organisation [WHO], 1992), while problem gambling is an informal definition which is typically reported in prevalence surveys and is usually observed as a less severe form of gambling disorder (this category is not included in either the DSM-IV or the ICD-10; Hodgins, Stea, & Grant, 2011).

Individuals with pathological gambling (PG) engage in a persistent and recurrent maladaptive pattern of gambling behavior. This disorder has a chronically progressive course. Typically the patients' lives become dominated by gambling behavior, leading to overwhelming financial burdens and an inability to maintain a career. The gambling has potential to disintegrate a family structure (APA, 2000). The enormous personal and social consequences of this disorder include among the poor consequences a high rate of suicide attempts, an increased rate of legal problems, and criminal behavior (APA, 2000).

Gambling disorders affect 0.2–5.3 % of adults worldwide (measurement and prevalence vary according to the screening instruments, methods used, and the availability and accessibility of gambling opportunities, variables that could explain the wide range in the statistics). In the USA alone, reported rates of pathological gambling range from 0.4 to 1.1 % of adults, with an additional 1–2 % identified as problem gamblers. Statistics indicate that approximately 85 % of all Americans have gambled at least once in their lives (Dannon, Lowengrub, Gonopolski, Musin, & Kotler, 2006; Iancu, Lowengrub, Dembinsky, Kotler, & Dannon, 2008). The 2001/2002 National Epidemiologic Survey on Alcohol and Related Conditions confirmed that, based on the DSM-IV assessment of pathological gambling, Asians, blacks, and Native Americans have a significantly higher lifetime prevalence of disordered gambling than whites. The reported lifetime prevalence of disordered gambling among the USA population is estimated to be as follows: Native Americans/Asian—2.3 %, blacks—2.2 %, Hispanics—1 % and whites—1.2 % (Tse et al., 2010). Emerging evidence in the USA and New Zealand suggest that Chinese immigrants may develop higher rates of problem gambling with increased years of residency in newly adopted countries (Jacques, Ladouceur, & Feriand, 2000; Tse et al., 2010). Studies show that the median money lost by Asians (the majority is Chinese) who presented to problem-gambling intervention services in 2006 was almost four times higher compared to non-Asians.

Other surveys conducted specifically on Asian American and Pacific Islander (AAPI) communities have resulted in varying numbers. A 1997 community survey conducted in San Francisco found that 14.7 % of Chinese subjects identified themselves as problem gamblers, and 21 % met the criteria for pathological gambling. 0n a 2002 community survey of Southeast Asian refugees in Connecticut, 59 % of Laotians, Cambodians, and Vietnamese met criteria for pathological gambling (Fong & Tsuang, 2007; Petry, Armentano, Kuoch, Norinth, & Smith, 2003; Woo, 2003).

Various studies have found that problem gambling rates in Chinese communities are 1.5 to 5 times higher than those of local people (Iancu et al., 2008; Mason & Arnold, 2007; Sharpe & Tarrier, 1993). Not only do Chinese minority groups have

a relatively higher rate among immigrants, in China itself there are high rates of problem gambling. Certain studies estimate a range between 2.5 and 4 % of the adult Chinese population compared to between 1.5 and 2 % in Western populations. A population-based study in Hong Kong found that up to 6 % of the respondents met the diagnostic classification of probable problem and pathological gambling, whereas nationwide surveys in the USA and New Zealand invariably show lower rates of problem gambling, 1.8 % and 1.2 %, respectively (Fong & Tsuang, 2007; Loo, Raylu, & Oei, 2008; Mason & Arnold, 2007; Petry, 2005; Wong & So, 2003).

The prevalence of gambling in the adult population was estimated to be around 70 % in 2001, 66 % of which gambles every day. Studies implicate that 5–15 % of social gamblers will become PG due to the opening of a casino nearby. Hodgins et al. (2011) and Johansson et al. mentioned a few risk factors that are associated with gambling problems, including:

- *Young age*—age of onset (before age 21) was shown to be a significant risk factor for PG.
- *Male sex*—In most studies, male gender has been indicated as a significant risk factor for PG. Some studies have indicated that females are at higher risk than men in aboriginals.
- Non-white ethnic origin—African-American, Hispanic, or Asian were all risk factors for problematic gambling. One study suggested that being born outside the country was shown to be a risk factor for gambling problems.
- *Low socioeconomic status*—Volberg, Abbott, Rönnberg, and Munck (2001) suggested that being on social welfare was a significant risk factor for gambling problems.
- *Divorced or separated marital status*—studies implicated contradicting results, but most authors consider being a single as one of the risk factors for PG (Johansson, Grant, Kim, Odlaug, & Götestam, 2009).

Today, pathological gambling is understood as a complex, multidimensional phenomenon. Current research points out biological, psychological, and social factors are all relevant in the development of problematic levels of gambling. Out of several models which have been proposed to explain the cause of gambling disorders during the last decades, we will mention two predominant integrative models: the bio-psychosocial model and the pathways model.

The bio-psychosocial model attempt to explain PG as a combination of: (1) biological factors (genetic, anatomic and biochemical factors); (2) psychological factors (emotional, thoughts and conflicts); (3) social/environmental factors.

The pathways model is a schema that hypothesizes the existence of three subgroups of pathological gamblers. Each subgroup is subjected to environmental variables, operant and classical conditioning, and cognitive processes. This model hypothesizes that gambling become pathological in response to the effects of conditioning and distorted cognitions surrounding probability of winning. Pathway 1 gamblers are characterized by environmental variables, operant and classical conditioning, and cognitive processes. Pathway 2 is characterized by the same characteristics of pathway 1 gamblers plus disturbed family and personal histories, poor

coping and problem-solving skills, affective instability due to both biological and psychosocial deficits. This pathway is thought to be a mean of emotional escape through dissociation regulating negative mood states or physiological states. Pathway 3 gamblers are characterized by pathway 2 plus vulnerability toward impulsivity, attention deficits, and antisocial traits (Blaszczynski & Nower, 2002).

It seems that cultural and social factors may encourage problem gambling behaviors. These factors may account for the higher rates of problem gambling, the severity of problem gambling and its onset.

Black, Shaw, McCormick, & Allen (2012) found in their study, that 61 % of subjects with pathological gambling reported experiencing some type of childhood maltreatment, including emotional, verbal, physical or sexual abuse, as well as neglect. These findings are partially consistent with the pathways model which describes a subgroup of individuals with a history of poor coping frequent life events and adverse developmental experiences including abuse. It was suggested that gambling serves to modulate negative affective states or to meet other psychological needs. Childhood exposure to gambling also probably affects gambling behavior later in life and additional environmental factors (e.g., accessibility to gambling, location and type of gambling, size and number of prizes) influence the characteristics and maintenance of gambling activities (Black et al., 2012; Dannon et al., 2006; Hodgins et al., 2011; Iancu et al., 2008).

It has been speculated that for AAPI, psychological and social factors, denial, guilt or shame, coping strategies, acculturation issues, language barriers, and help-seeking behaviors all exacerbate the impact of problem gambling on the gambler, family, and community. Gambling characteristics in these ethnic groups are also different than in the native resident of the host country. The refugees are more likely than Caucasian samples (Sharpe & Tarrier, 1993) to report hiding gambling from others but are less likely than Caucasian samples to claim a win while actually losing, to gamble to win back losses, or to feel guilty about gambling. These latter two items, along with gambling more than intended, are the most frequently endorsed items in Caucasian samples in the same geographic area (Fong & Tsuang, 2007; Welte, Barnes, Wieczorek, & Tidwell, 2004).

The most common comorbid psychiatric disorders of PG are alcohol misuse and substance abuse. Additional comorbid disorders include major depression and dysthymia, manic episodes, generalized anxiety disorder, panic disorder, specific phobias, and social phobia and personality disorders (Dannon et al., 2006; Iancu et al., 2008; Petry, 2005).

There are several screening instruments available; the most well-known is the South Oaks Gambling Screen (SOGS). A briefer screening technique is the nine-item Problem Gambling Severity Index (a subscale of the Canadian Problem Gambling Index). A third screening instrument is the 17-item National Opinion Research Center DSM-IV Screen for Gambling Problems (NODS). The Gambling Treatment Outcome Monitoring System (GAMTOMS) is a multidimensional self-report or interview assessment instrument. GAMTOMS incorporates SOGS and also assesses various domains referring to treatment planning and outcome monitoring,

including gambling frequency, mental health, financial problems, legal problems, and motivation (Hodgins et al., 2011; WHO, 1992).

During the last decades, researchers have found that PG patients are not a homogenous group, and some of the patients diagnosed as PG better resemble patients of other categories. Based on observations of pathological strategic gamblers, Moran (1970a, 1970b) identified five PG subtypes: subcultural, neurotic, impulsive, psychopathic, or symptomatic. Steel and Blaszczynski (1996) identified and matched traits associated with PG: psychological distress, sensation seeking, crime and liveliness, and impulsive-antisocial behavior (this last factor has been found to be the most clinically useful, predicting the worst disease course).

Dannon et al. (2006) and Iancu et al. (2008) proposed that PG patients differ with respect to type and intensity of gambling behavior, psychiatric comorbidity, family history, age of onset, and gender. In their studies they proposed that pathological gamblers may be classified according to three subtypes: (1) the impulsive subtype, (2) the obsessive–compulsive (OC) subtype, and (3) the addictive subtype (Huberfeld, Gersner, Rosenberg, Kotler, & Dannon, 2011).

The impulsive subtype is characterized by young-adult male predominance, high levels of risk-taking behavior, and a lack of ability to plan ahead. These patients tend to lose large sums of money in one sitting. The impulsive subtype is associated with attention-deficit disorder (ADD), alcohol and other substance abuse, and dependence and other impulse control disorders. In first degree relative tends to have high levels of gambling and addiction problems. These individuals have a deficit in the frontal lobe/reward system and probable impairment of executive functions that might play a role in their impulsive behavior.

The obsessive–compulsive (OC) patient, which usually prefers slot machines or lottery and scratch tickets, is characterized by female predominance and midlife onset (probably as a response to a perceived psychological trauma) and tends to be associated with higher rates of depression and maladaptive coping mechanisms.

The addictive subtype is characterized by betting a small amount of money at a time in a repetitive and compulsive fashion. In this group there is a male predominance and higher rates of alcohol abuse and dependence. These individuals show a pattern of deficit in the executive function just like abstinent alcoholics, as was demonstrated in Goudriaan, Oosterlaan, and de Beurs (2006).

Four brain circuits have been proposed to play a role in the development of addictive behavior and as such have also been studied in pathological gambling: (1) the reward circuit, which involves the nucleus accumbens, (2) the motivational and drive circuit, which is located in the orbitofrontal cortex, (3) the memory and learning circuit, which is located in the amygdala and the hippocampus, and (4) the control circuit, which is located in the dorsolateral prefrontal cortex and the anterior cingulated gyrus (Dannon et al., 2006; Iancu et al., 2008). Neuropsychological studies of pathological gamblers have demonstrated deficits in the frontal lobe reward system, which might indicate an impairment of executive functions (Dannon et al., 2006; Iancu et al., 2008).

Reduced activity of the ventral medial prefrontal cortex (vmPFC) has been correlated with impulsive decision making in risk-reward assessments and with diminished response to gambling cues in pathological gamblers. fMRI studies

demonstrated that individuals with PG showed less activation of vmPFC during simulated gambling, and BOLD (blood oxygen level dependence) signal change in vmPFC correlated inversely with gambling severity (Reuter et al., 2005). A similar pattern of diminished activation was observed in the ventral striatum which is a part of the reward system. Associated activation of the reward system with anticipation of working for immediate monetary reward and activation of vmPFC with receipt of immediate monetary rewards (Potenza, 2008). Furthermore, participation in a gambling task increase dopamine release in the ventral striatum in individuals with Parkinson's disease (PD) and pathological gambling than in individuals with PD alone (Grant, Potenza, Weinstein, & Gorelick, 2010).

Potenza et al. (2003) compared PG and control group performing a Stroop task; this fMRI imaging study demonstrated differences in the left ventromedial prefrontal cortex, which plays a role in decision making. Most of these findings are consistent with neuroimaging findings in substance dependence studies (van Holst, van der Brink, Veltman, & Goudriaan, 2010).

Increasing evidence implicates multiple neurotransmitter systems in the pathophysiology of gambling disorders:

1. *Noradrenaline*—Gambling has been associated with autonomic arousal, increased heart rate and increases in noradrenergic measures. During gambling, heart rate and noradrenergic measures are highly increased in individuals with gambling problems (Shinohara et al., 1999).
2. *Serotonin*—Individuals with PG have demonstrated low levels of the serotonin metabolite 5-hydroxy indoleacetic acid. PG individuals also reported a "high" feeling following administration of meta-chlorophenylpiperazine (m-CPP), a partial serotonin agonist that binds to multiple 5HT1 and 5HT2 receptors (similar to the "high" reported by antisocial, borderline, and alcoholic subjects after receiving the drug). Serotonin reuptake inhibitors show mixed results.
3. *Dopamine*—Dopamine is implicated to have a dominant role in the reward system. However, only a few studies have investigated directly the role of dopamine in PG. Ambiguous findings have been reported for cerebrospinal fluid measures of dopamine and its metabolites in PG (Potenza, 2008). In a few genetic studies of pathological gambling, the D2A1 allele of the D2 dopamine receptor gene (DRD2) has been implicated.
4. *Opioids*—Opioids have been implicated in pleasurable and rewarding processes, and opioid function can influence neurotransmission in the ventral striatum (Spanagel, Herz, & Shippenberg, 1992). Some studies have demonstrated that naltrexone and nalmefene were superior to placebo in the treatment of PG (naltrexone however caused liver function test abnormalities).

Grant et al. (2010), Dannon et al. (2006), and Iancu et al. (2008) found that there is sufficient evidence to warrant considering pathological gambling as a non-substance or behavioral addiction. They find that behavioral addictions resemble substance addictions in many domains, including natural history (chronic, relapsing course with higher incidence and prevalence in adolescents and young adults), phenomenology (subjective craving, intoxication "high," and withdrawal), tolerance,

comorbidity, overlapping genetic contribution, neurobiological mechanisms, and response to treatment. The DSM-V task force has proposed shifting its classification in DSM-V from an impulse-control disorder to an addiction and related disorders (a new category encompassing both substance-related and non-substance addictions) Huberfeld et al. (2011).

One of the characteristics of pathological gambling is cognitive distortions. Delfabbro and Winefield (2000) demonstrated that 70 % of gambling-related cognitions were found to be irrational and surprisingly unrelated to the level of reinforcement of the bet. Winning players had more erroneous estimation of their chance to win and more irrational beliefs than losing players (Monaghan & Blaszczynski, 2009).

The erroneous thoughts include personification of the gambling machine, "making deals" with the machine, cursing or insulting the machine and many more. The *gambler's fallacy* is another cognitive distortion which correlates winning or losing in the next game to the results prior to it, even though each bet has its own statistical chance and is independent of the prior results. Some other examples of distorted cognitions include:

Personal control—On any game of chance, the gamblers chance of winning is not correlated to whether the gambler itself arrange their gamble, or if another agent arrange the gamble for them. However it was repeatedly demonstrated that players have inflated confidence and sense of control when they are given the opportunity to arrange the gamble themselves. In one study of roulette players it had been found that higher bets were placed when the player was given the opportunity to throw the roulette ball, compared with trials where the experimenter acted as a croupier and threw the ball (Ladouceur & Mayrand, 1987).

The near-miss effect—This effect means that an unsuccessful bet is proximal to a win. For example, when a slot-machine displays two cherries with the third cherry just coming into view. Surprisingly, Gamblers often interpret near-misses as evidence that they are mastering the game and the gambler feels that he is "not constantly losing but constantly nearly winning" (Clark, 2009).

The illusion of control—This is probably one of the core features of the addictive subtype. Sports gamblers for example, devote most of their time to acquiring sports information, updates, and data and then bet at the very last minute. This tendency of pathological sports gamblers demonstrates the sense or actually illusion of control of a PG over the bet. This illusion of control produces overly optimistic expectations of winning. Huberfeld et al. explored whether a football bet, being a strategic bet, can be predicted with high probability by professional gamblers compared to amateurs and laypersons. They have concluded that there are no significant differences in predicting the match results between those three groups that have been studied (Dannon et al., 2006; Iancu et al., 2008). Other study found that gamblers who preferred skill games or both skill and chance games had more Illusion of Control compared to gamblers with a preference for chance games only. It had been thought that cognitive distortions are associated with playing games that skills are perceived to be a potential component (Myrseth, Brunborg, & Eidem, 2010; Toneatto, Blitz-Miller, Calderwood, Dragonetti, & Tsanos, 1997).

Scoboria and Wilson (2011) demonstrate that believed memory-like representations for future wins and losses also have a part in a gambler's cognitive distortions. In their study they find that when "believed mental representations" for future wins are strong relative to those for future losses, gambling behavior may be reinforced. They also show that engagement in vivid imagination of imagined future wins may also decrease awareness of the gambling problem.

Researchers assume that cognitive distortions are probably incorporated in the neural and neurochemical level. As mentioned above, fMRI studies demonstrated the central role of the ventral striatum and the vmPFC in the brain reward system. If we will assume that money is a potent reward and a conditioned reinforcer and that the brain reward system processes reinforcers for future decision-making ('reinforcement learning'), than we can hypothesize that these brain regions would be highly activated by monetary wins. Moreover, at a neurochemical level, the dominant hypothesis is that dopamine cells code a reward prediction error, meaning the difference between the obtained and the expected reward (Montague, Hyman, & Cohen, 2004). Studies of non-human primates have shown bursts of dopamine activity in response to unexpected rewards. Studies suggest that two of the better-established cognitive distortions in gambling behavior, the near-miss effect and the effect of personal control, are associated with recruitment in components of the brain reward system. Other researchers suggested that the interaction between the frontal lobe and the striatum have a connection to Gambler's Fallacy. These are probably not the exclusive mechanisms which correlate cognitive distortions to psychobiological abnormalities and further research is needed (Clark, 2009).

Treatment Strategies

Prevalence surveys indicate that only a small proportion (<10 %) of individuals who have gambling disorders seek formal treatment. They also indicate that a high percentage of individuals have recovered from gambling problems (about two-thirds of the lifetime rates, suggesting a recovery rate of one-third).

Some data suggest that gambling problems are transient and episodic and that most recovered individuals, just like in other addictive disorders, have accomplished their recoveries without accessing formal treatment services.

Brief Treatment

A brief treatment is not necessarily seen as treatment by the PG. There are several types of brief treatments. One study indicates that telephone-based motivational interview contact combined with a mailed self-help cognitive-behavioral therapy workbook leads to good outcomes over 12- and 24-month follow-up periods. Another study indicated that a 5-min session of behavioral advice and four sessions of motivational enhancement plus cognitive–behavioral therapy are equally

effective for reduction of gambling in individuals not seeking treatment and are more effective than one session of motivational interviewing alone or no treatment (Hodgins et al., 2011).

Family Treatment

There is only limited data on this form of treatment and the samples are small, but some studies, especially those that examine the effects of couple treatment, have shown promising results [Dannon et al., 2006, Iancu et al., 2008, Lee & Rovers, 2008].

Psychosocial Treatment

Various treatment models have been suggested for gambling disorders. In general, post-treatment effects are positive for different types of therapy (e.g., behavioral and cognitive) and methods of therapy (e.g., individual, group, and self-directed) (Hodgins et al., 2011).

Cognitive Behavioral Treatment

There is only limited data on this form of treatment, nevertheless, Grant et al. (2013) reported that both individual CBT and group cognitive therapy have demonstrated improvement in gambling symptoms.

Psychopharmacological Treatment

Studies revealed that pharmacological treatments were more effective than was placebo treatment. Given their ability to modulate dopaminergic transmission in the mesolimbic pathway, opioid receptor antagonists (naltrexone and nalmefene) have been investigated in the treatment of pathological gambling. Studies suggest efficacy of opioid antagonists in reducing the intensity of urges to gamble, gambling thoughts, and gambling behavior. Studies of antipsychotic treatment had no benefit over placebo and trials of bupropion demonstrated contradicted results.

Iancu et al. (2008) and Dannon et al. (2006) suggest treating PG according to its subtype. For the impulsive subtype, they suggest starting with a mood stabilizer (such as lithium, valproate, topiramate, or lamotrigine). If mood-stabilizer therapy is not effective, they recommend switching to SSRIs or SNRIs, after which naltrexone should be tried. For OC subtype, they suggest starting with SSRIs. If these are not

effective, the researchers propose switching to mood stabilizers. For the addictive subtype, they advise starting treatment with bupropion and then switching to naltrexone, if not effective.

Gamblers Anonymous

Gamblers Anonymous self-help groups were started in 1957 in Los Angeles, CA, USA. Nowadays it is operating in at least 55 countries worldwide. Thousands of individuals use a program of 12 steps. Modified from Alcoholics Anonymous, the individual acknowledges powerlessness over compulsive gambling and must remain gambling free. However, treatment-outcome studies that compared Gamblers Anonymous to cognitive–behavioral treatment have indicated poor outcomes for attendees of Gamblers Anonymous (Hodgins et al., 2011).

Conclusions

During the last two decades, gambling has become widespread and enormous. Internet gambling has made gambling all over the world easy and discrete. Anyone who wants to gamble in privacy can do it without limitation of time and place. Due to the growing size of gambling possibilities and opportunities the relationships between money, countries' economics, and gambling suppliers (both legal and illegal) are becoming more and more complex. Moreover, due to the development of gambling and its wide range of possibilities, the number of pathological and problem gamblers is growing.

Unfortunately the diagnosis and treatment possibilities, as well as the funding of research and treatment options, are not growing exponentially to the gambling problem. Governments prefer to make a profit and establish a solid and long-lasting financial resource rather than taking steps to solve or ease the problem of gambling and PG. Furthermore, in certain countries the gambling industry is supported and promoted by the government, including in areas of lower socioeconomic levels (which are more prone to problem gambling or PG as people see it as an opportunity to escape from poverty). Due to these difficulties and the growing problem of gambling, countries and governments must adopt special programs of education, preventive medicine, and research for better diagnosis and treatment of the problems in order to decrease the heavy financial and criminal burdens of gambling.

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Part III
Dealing with Money: Meaning-Making Processes

Chapter 9
The Psychology of Getting Paid: An Integrated Perspective

Arlen C. Moller and Edward L. Deci

Abstract This chapter provides a synthesis of empirical literature on the psychology of getting paid using self-determination theory as a framework for organization and interpretation. Using this theoretical framework, we posit that the affective, motivational, and behavioral consequences of getting paid are mediated by the often oppositional experiences of psychological need satisfaction and thwarting; in particular, with respect to the basic human needs for competence and autonomy. The importance of considering contextual and trait-level moderators of need satisfaction and thwarting is stressed. We conclude with a discussion of pressing questions for advancing basic theory and practice in applied settings, including education, health care, and economic policy.

Introduction

The psychology of getting paid is a topic rich with contextual moderators and associated outcomes, including affective, motivational, and behavioral. In an effort to present a relatively thorough exploration of this topic, we offer an integrative review of theoretical perspectives and associated empirical research. Self-determination theory (SDT) provides the primary framework for the discussion, but we have also incorporated complementary principles from terror management theory, operant and contingency management theories, and the literatures on mindfulness, behavioral economics, and other research traditions.

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E. Bijleveld and H. Aarts (eds.), *The Psychological Science of Money*,
DOI 10.1007/978-1-4939-0959-9_9,

The review begins with a brief discussion of the motivation for paying other people, as we argue that interpersonal motives for paying others are central to informing the psychology of those being paid. Next, we discuss the affective experience of being paid, followed by a discussion of downstream motivational and behavioral consequences of pay, over both the short and long term. After presenting this general framework for understanding the affective, motivational, and behavioral concomitants and consequences associated with getting paid, we explore some of the important contextual moderators that have been empirically tested or postulated. In the final section of the chapter, we identify and discuss a number of underexplored issues related to the psychology of being paid, including pressing questions for advancing both basic theory and practice in the contexts of education, health care, and economic policy.

Why Do People Pay Other People?

In order to address this question, it is important to recognize that payments are fundamentally interpersonal. They are financial transactions that are always made between people, or organizations made up and controlled by people; they are not, for example, transactions made with machines, animals, or any other agents. Furthermore, in most financial transactions, payers pay payees in order to bend the payees' will in some manner—to control or persuade them—to behave in a way that they might otherwise not. This dynamic of interpersonal control may be subtle or overt in nature, and may take a variety of forms. For example, managers pay employees to work, consumers pay merchants to acquire goods or services, and some parents pay their children to do household chores or earn good grades in school. Some educational programs pay students to demonstrate achievement, and increasingly, some health-related programs pay patients to make healthier choices. In each of these exchanges, the transaction involves the payer exerting his or her preference and the payee choosing either to behave in line with the payer's preference in exchange for the payment, or to forego the payment. If the payee's initial preference were to behave in line with the payer's preference, there would typically be no need for the payment. Consistent with this premise is the idea that, in most cases, the motivation for paying another person is purely rational—a cold calculation of the cost of payment minus the benefits of controlling the payee's behavior. The payer may hope for the benefits to outweigh the costs, whereas the payee more likely hopes for the opposite; however, research has shown that optimal outcomes typically follow from the costs and benefits being balanced (e.g., Adams, 1965).

As psychologists and economists increasingly recognize, people and markets frequently behave irrationally, often emotionally, and at times based on motives operating outside of conscious awareness (e.g., Kahneman & Tversky, 1996). As such, the motivation for paying another person often includes motives that are emotional, irrational, or less than transparent. For example, terror management theorists (TMT) have posited that individuals sometimes use monetary payments in order to feel

superior to other people (Solomon, Greenberg, & Pyszczynski, 2004). This motive for paying others is considered a largely unconscious strategy for suppressing existential anxiety. The premise, based on TMT, is that those who have the power to bend the wills of others may feel, on an unconscious level, "superhuman," and further, that feeling superhuman serves the purpose of making them feel less vulnerable to death—it therefore being a form of death-denying illusion. "The *almighty* dollar" is a common English expression that reinforces this notion by comparing the power of money ("dollar") to the power of God ("almighty"). In short, although the overt act of paying someone is nearly always conscious (e.g., to whom, and how much), aspects of the underlying motivation for paying may often be unconscious, and controlling.

This is all to say that interpersonal control—that is, the attempt to control another person—is a central motive or reason for why people pay others. This can be manifest in ways that are subtle or overt and conscious or unconscious, which is important to our model for predicting individuals' psychological responses to getting paid.

How Does It Feel to Get Paid?

Predicting how individuals will respond to getting paid is a complicated matter. The only straightforward answer is: *it depends*. Many factors are likely to influence or moderate the psychological experience of being paid, and we'll explore them later in the chapter. First, however, we present a general model for understanding how it feels to get paid. Specifically, SDT and a sub-theory of it, referred to as cognitive evaluation theory, provide our basic framework for understanding how various factors are likely to influence people's responses to being paid.

Basic Psychological Needs

According to SDT there are at least two important psychological experiences that are central to understanding how it feels to get paid, each related to the satisfaction of basic psychological needs (Deci & Ryan, 1985, 2000, 2012). Basic psychological needs are defined within SDT as psychological experiences that promote growth and are essential for people to achieve and maintain optimal mental and physical health. These needs are considered basic in the sense that they are posited to be inherent in human nature and thus universally relevant in all cultures (e.g., Chirkov, Ryan, Kim, & Kaplan, 2003), all stages of the human life course, (Grolnick, Deci, & Ryan, 1997; Vallerand, O'Connor, & Hamel, 1995), and all levels of socioeconomic status (e.g., Williams et al., 2006). Importantly, in terms of affective experiences, psychological need satisfaction is consistently associated with positive emotions and mood (e.g., interest and enjoyment), whereas psychological need thwarting is related to negative affect (e.g., anxiety, tension, and anger).

These phenomena have been demonstrated empirically both at a particular time (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000), and over the long term (Deci & Ryan, 2011; Niemiec, Ryan, & Deci, 2009). The two basic needs that are most relevant to the psychology of getting paid are the needs for *competence* and *autonomy*.

The Need for Competence

The concept of a psychological need for competence is derived from White's (1959) related concept of effectance: the propensity to have an effect on the environment and attain valued outcomes within it (Deci & Moller, 2005). This need for competence is met when people feel successful, but more specifically when they feel that they have successfully met a challenge and thus extended their ability or skills in some valued context. In some circumstances, getting paid may contribute to making people feel competent. For example, when a struggling author receives an advance on his or her first book from a respected publisher, this payment may represent a strong psychological validation. To the extent that the payment is interpreted as conveying mastery as a writer, the author's need for competence would be satisfied, and he or she would likely experience elevated positive affect related to that experience. In general, we find that averaging across contextual factors, getting paid for performing a task well tends to support the psychological need for competence, and that this aspect of getting paid contributes to inducing more positive affect (Deci, Koestner, & Ryan, 1999a, 1999b).

The Need for Autonomy

The concept of a psychological need for autonomy refers to the human desire to behave in ways that are concordant with one's integrated sense of self (de Charms, 1968; Deci & Ryan, 2000; Ryan & Connell, 1989). This need is satisfied when people fully endorse their actions, either because they have selected or chosen for themselves or because another person who is trusted has selected for them. The act of choosing for oneself from various options is often used as an operational definition or procedure for inducing autonomous feelings; however, in many instances individuals feel pressured or obligated to choose particular options, and in those cases they feel very little autonomy. Thus, the fact of having options to choose from may induce the experience of volition and choice, but does not necessarily do so (Moller, Deci, & Ryan, 2006).

When it comes to the issue of pay, in many circumstances, getting paid can subtly or overtly thwart people's psychological need for autonomy. To the degree that getting paid feels coercive or controlling — as when people depend on the payments, or payments lead them to behave in some way that is inconsistent with their values — this experience would thwart autonomy, and thus be associated with negative affect.

Even in those cases when people are getting paid to perform a behavior that is objectively consistent with their values, if that person feels pressured by the payer, this circumstance is likely still to thwart the need for autonomy and result in some form of conscious or unconscious negative affect (Ryan, Mims, & Koestner, 1983).

Although payments do not necessarily lead people to experience interpersonal pressure, self-determination theorists have argued that many payment exchanges do involve the recipients feeling pressured or controlled (e.g., Deci et al., 1999a, 1999b). Furthermore, although the experience of interpersonal pressure when receiving a payment is at times quite subtle, the experience of control is frequently quite overt. Illustrating this point, the term "wage slavery" refers to a circumstance wherein people's survival depends on receiving payments from their employers, thereby making the employees entirely dependent. Rhetorically, it conveys the lack of autonomy experienced by individuals paid under these circumstances. Noted oral historian Studs Terkel (1974) captured this sentiment of heavy oppression experienced by many wage earners at different income levels (including parking attendants, waitresses, firemen, and business executives) as such: "This book being about work is, by its very nature, about violence—to the spirit as well as to the body. It is about ulcers as well as accidents … about nervous breakdowns as well as kicking the dog around. It is above all … about daily humiliations (p. xiii)."

Furthermore, feeling controlled by payments is not restricted to those at the lowest rungs of the workforce. The term "golden handcuffs" is an English idiom attributed to John Steinbeck (1958) that conveys how even those who are paid very well can sometimes feel constrained by those payments. The premise is that once employees have become accustomed to high salaries, they may feel psychologically trapped by an unwillingness to make the sacrifices associated with earning less—that is, they feel as though they can't afford to leave.

Although these descriptions of working-for-pay do not characterize every worker's experience and may not resonate with all readers' experiences, it may nevertheless be instructive for readers to consider more extreme cases of experiencing payments as oppressive, as well as those experiences that are subtler in nature. Many people dislike their jobs to varying extents and would likely choose to spend their time otherwise if they did not need the pay.

Even in those cases when people are given money that is explicitly framed as a gift, rather than a payment (e.g., a father paying for a daughter's wedding, or a grandmother telling her grandchildren they have been written into her will), in many of those cases, the recipients of the monetary gifts (or promised gifts) will nevertheless experience them as having "strings attached." In such cases, the recipients may accept the money but feel subtly controlled.

SDT posits that as a result of repeatedly having their need for autonomy thwarted in the context of getting paid to do something they'd rather not do, people begin implicitly associating payments with feeling controlled. As a result, averaging across contextual factors, getting paid tends to thwart the psychological need for autonomy, especially when there is a clear contingency between the payment and a particular behavior (Deci et al., 1999a, 1999b), and this aspect of getting paid contributes to inducing negative affect.

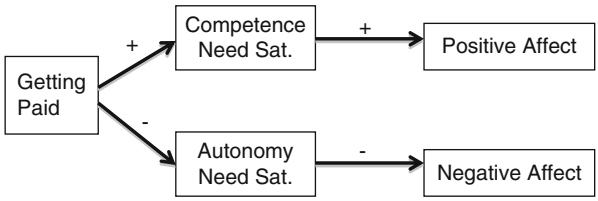

Fig. 9.1 A general model relating payments to need satisfaction and thwarting, and to the experience of positive and negative affect

Opposing Processes: Need Satisfaction and Thwarting

To summarize, SDT posits that the psychological experience of being paid tends, on average, to have opposite effects with regard to satisfying basic needs for competence and autonomy. As a result of these opposing processes, the affective experience of being paid is often characterized by some degree of affective ambivalence (see Fig. 9.1).

How Does Getting Paid Influence Motivation and Behavior?

Types and Subtypes of Human Motivation and Self-Regulation

The concept of basic psychological needs described above is also relevant to understanding how getting paid influences motivation and behavior. A second central feature of SDT, in addition to the concept of basic psychological needs, stresses the importance of differentiating types of motivation and self-regulation based on psychological experience. Specifically, SDT categorizes types and subtypes of motivation and self-regulation along a continuum of experience ranging from feeling autonomous to feeling controlled, and predicts that different outcomes will be associated with the different types of motivation.

Autonomous forms of motivation are characterized within SDT by feeling a sense of freedom from extrinsic pressure, of willingness and choice, and of fully endorsing one's behavior. SDT posits that the energy fueling autonomous motivation is derived from the satisfaction of basic psychological needs (described above), including needs for autonomy, competence, and relatedness. First, when these psychological needs are met concurrently with performing a particular behavior that one experiences as interesting and enjoyable, the person will be evidencing a subtype of autonomous motivation (or self-regulation) referred to as *intrinsic motivation* (or intrinsic self-regulation). Children's play and adults' leisure activities are examples of intrinsically motivated behaviors. Second, when these basic needs are met by internalizing the regulation of a behavior that is important but not interesting, two other subtypes of autonomous motivation (or self-regulation), referred to as identified and integrated extrinsic motivation (i.e., self-regulation), are being manifest.

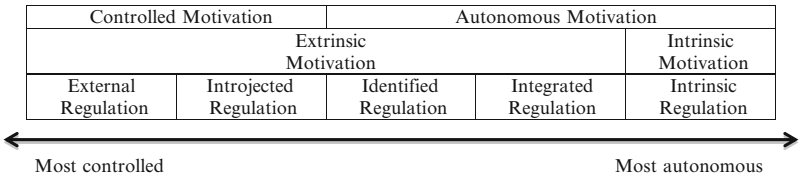

Fig. 9.2 Superordinate and subordinate categories of motivation and regulation as defined by self-determination theory (SDT)

Identified regulation involves doing an activity because one has come to personally value its importance, and integrated motivation involves doing it because it has become an integrated aspect of who one is. Within SDT, autonomous motivation is a superordinate category of human motivation that includes these three subcategories, and this superordinate category is fundamentally distinguishable from a second superordinate category of motivation referred to as controlled motivation.

SDT categorizes controlled forms of motivation by people feeling coerced, pressured, or seduced in some way, either overtly by tangible rewards or punishments (referred to as external regulation), or more subtly, by emotional pressures from others or themselves (referred to as introjected regulation). Examples of the latter are behaving to avoid guilt or to prove one's self-worth. In both these cases of controlled motivation, whether behavior is regulated by external contingencies and standards or by introjected contingencies and standards, the reward or punishment is separable from the activity itself. As such, all forms of controlled motivation are also properly classified as types of extrinsic motivation.

A chart outlining the various categories and subcategories of motivation and self-regulation defined by SDT is provided in Fig. 9.2. This discussion of different categories and subcategories is important, as we will next articulate how getting paid influences different types of human motivation and self-regulation

The Influence of Getting Paid on Different Types of Human Motivation

A general model for relating payments to different types of human motivation appears in Fig. 9.3. Broadly, autonomous motivation is supported by psychological need satisfaction, and reduced when psychological needs are thwarted. Payments tend to set off two opposing need-satisfaction processes — supporting competence, but thwarting autonomy. The model recognizes that controlled motivation is supported by payments and that this relation is mediated by the thwarting of autonomy that often follows from the payments. Figure 9.3 thus illustrates the model for understanding how payments relate to different types of human motivation and regulation.

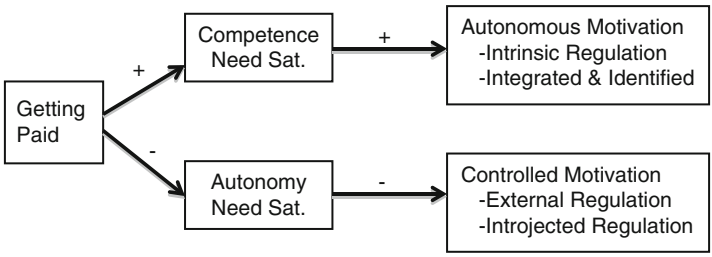

Fig. 9.3 A general model relating payments to different types of human motivation and regulation. *Note*. Although there are only negative paths leading to controlled motivation in this figure, the double negative paths linking getting paid to controlled motivation (via autonomy need satisfaction) imply that the direct path between getting paid and controlled motivation is expected to be positive (and would often be strongly so), as long as payments continue

The Undermining Effect: When Payments Decrease Intrinsic Motivation

As suggested above, introducing payments generally increases controlled motivation and decreases autonomous motivation. This inverse relationship between autonomous and controlled forms of motivation is theoretically applicable to all forms of controlled (external and introjected) and autonomous (identified, integrated, and intrinsic) motivation, but it has been demonstrated empirically most extensively in the context of extrinsic rewards (e.g., payments) increasing external regulation at the expense of undermining intrinsic regulation—a phenomenon often referred to as "the undermining effect."

Empirical research on the undermining effect in humans has a 43-year history in psychology. Deci (1971) published the first studies demonstrating that introducing an extrinsic reward (viz., money) could undermine or reduce intrinsic motivation for a target activity. This general finding was replicated in the following years, using not only money but also other material and symbolic extrinsic rewards (Deci, 1972a, 1972b; Kruglanski, Friedman, & Zeevi, 1971; Lepper, Greene, & Nisbett, 1973). Years later, Deci et al. (1999a, 1999b) conducted a meta-analysis of 128 studies testing the influence of extrinsic rewards—including (but not limited to) payments—on subsequent intrinsic motivation. Intrinsic motivation was assessed either with free-choice behavior when there were no rewards operative or with self-reports of interest and enjoyment.

Figure 9.4 provides an illustration of the general undermining effect (Deci et al., 1999a, 1999b), using an adaptation of a response rate curve common to operant analyses (e.g., Skinner, 1969). A typical underming effect study design includes: (1) a baseline assessments before rewards are introduced, (2) a phase during which extrinsic rewards are made available to one group but not another, and (3) a follow-up assessment phase during which rewards are no longer operative. The general pattern

Fig. 9.4 Hypothesized timing of an expanded model of undermining. *Note*. The *dotted white line* represents the hypothesized trajectory of autonomous motivation; specifically, within an experiment using a three-stage design (viz., pre-payment, during-payment, and post-payment). Although response rate (reflecting a mixture of both autonomous and controlled forms of motivation) does not drop until after payments have ended, research suggests that autonomous motivation begins to decay during the payment period (before payments have ended)

observed in the meta-analysis was that, after extrinsic rewards were introduced, *total* motivation would increase, as reflected by an increase in response rate in phase 2, although while that was occurring so too was the amount of intrinsic motivation decreasing, as can be seen in Fig. 9.4. Then, following the cessation of rewards, intrinsic motivation would have fallen below baseline, as reflected in the very low response rate in phase 3. This phenomenon is somewhat consistent with hundreds of studies within the operant tradition, most with nonhumans (Skinner, 1969), which maintains that, following the removal of reinforcers (i.e., extrinsic rewards), behavior declines, although in operant theory the decline is only to baseline. The undermining phenomenon, however, has actually shown that with humans the post-reward behavior (i.e., intrinsic motivation) is *below* baseline, as was generally found in the Deci et al. (1999a, 1999b) meta-analysis.

Additional studies replicating the undermining effect have been published in the decade and a half since Deci et al.'s (1999a, 1999b) meta-analysis. Many of these studies explored the undermining effect in new contexts and with previously unrepresented populations. One especially noteworthy study by Murayama, Matsumoto, Izuma, and Matsumoto (2010) replicated the general undermining effect and assessed neural activity, thus adding another method for operationalizing or measuring intrinsic motivation (or more generally, autonomous motivation). Specifically, in their study, a monetary reward undermined intrinsic motivation as assessed by free-choice behavior, and was related to decreased activity in the striatum and prefrontal areas. The authors concluded that the undermining effect is mediated by the corticobasal ganglia valuation system, which manages the integration of extrinsic reward value and intrinsic task value. In the current volume, McCabe (Chap. 5) puts these findings into greater context, exploring in more depth the neural correlates of expecting and earning money.

The Undermining Effect Extended: Might Payments Affect Identified Regulation?

Whereas more than a hundred experiments have investigated the influence of financial incentives (and other tangible rewards) on intrinsic motivation for activities pre-selected for having high levels of interest and enjoyment at baseline (e.g., puzzles, sports, and games), only a few studies have investigated the issue of undermining when the target activity was dull, boring, or uninteresting at baseline. The Deci et al. (1999a, 1999b) meta-analysis on undermining found null effects in the relatively few studies where participants were given rewards for uninteresting ("dull-boring") activities, presumably because the participants did not have much intrinsic motivation to be undermined (Lammers & Badia, 2005). However, an important line of research extending the literature on the undermining effect was recently conducted by Moller and colleagues (Moller, Buscemi, McFadden, Hedeker, & Spring, 2013; Moller, McFadden, Hedeker, & Spring, 2012a, 2012b). This work explored the influence of financial incentives on both baseline, and *potential* increases in, autonomous motivation. Specifically, it examined whether monetary rewards might inhibit internalization and thus potential increases in identified and intrinsic regulation of uninteresting activities.

In a series of papers using data from a large healthy-lifestyle intervention trial, all participants reported low levels of liking a set of diet and physical activity behaviors that were targeted for change using performance-contingent payments (i.e., payments that required effective performance on the target activities). First, the investigators examined the self-reported importance of the performance-contingent payments, referring to this as "financial motivation." They found that it was related to autonomous motivation in two complementary ways. First, financial motivation was inversely related to free-choice behavior during an unpaid follow-up phase, meaning that the more the participants valued the financial incentives the less autonomous (i.e., identified and intrinsic) motivation they displayed for the targeted behaviors. Second, financial motivation suppressed an otherwise adaptive pattern of changes in self-reported liking for healthy and unhealthy behaviors. Specifically, whereas those low in financial motivation, while they were being paid, grew to like fruits, vegetables, and physical activity more (and foods high in saturated fat less), this adaptive change was suppressed among those high in financial motivation. Collectively, these studies support an expanded model of undermining, wherein financial incentives (and other tangible rewards) may be expected to undermine baseline autonomous motivation, in general (i.e., both intrinsic motivation and identified regulation), as well as potential increases in autonomous motivation under circumstances that might otherwise support such increases.

This expanded model of undermining is consistent with an important principle from SDT, the principle that people have a natural tendency toward *internalization*, a tendency that allows them to gradually become more autonomously motivated in the absence of external disruption (Deci, Eghrari, Patrick, & Leone, 1994), particularly if they are experiencing basic psychological needs support. People's inherent activity is manifest as intrinsic motivation to do interesting activities, but if the

activities are not interesting people have to internalize the motivation to persist at those behaviors. In some cases, payments (and other extrinsic rewards) may be useful tools for initiating engagement in a behavior that is boring at baseline, but the important question is whether that engagement will persist after the payments are removed. That is, will the regulation of the behaviors be internalized, which requires need support. If the payments are experienced as controlling, internalization is unlikely to occur.

The Undermining of Autonomous Motivation Over Time

It is also worth nothing that, being done in the laboratory, the typical experiments on undermining last less than an hour. One of the few research contexts in which autonomous motivation has been assessed during an extended period of "payment" involves the provision of athletic scholarships to college athletes. This context represents a form of quasi-experiment, as athletic scholarships are typically offered to only a fraction of the athletes on any given team, and only to those athletes who are achieving the highest level of performance. To the extent that people tend to enjoy activities more when they excel at them, one might expect those with athletic scholarships to be more intrinsically motivated than non-scholarship athletes. Yet studies have found that students with athletic scholarships enjoy playing sports less than their non-scholarship teammates (Medic, Mack, Wilson, & Starkes, 2007; Ryan, 1977). Vallerand (2007) explained that "unfortunately, scholarship recipients may come to feel that they play more to justify the scholarship they have received than for the pleasure of the game" (p. 69). It is important to note however, that there have been some mixed results, so this issue has not been fully resolved.

Moderating the Psychological Experience of Getting Paid

Factors that moderate the psychological experience of getting paid fall into three major categories: (1) factors related to the payment itself, (2) person-level factors (e.g., characteristics of the payee), and (3) factors related to the interpersonal context (e.g., the relationship between payer and payee).

Factors Related to the Payment Itself

Payments can be offered in many different ways. For example, the intrinsic motivation literature has focused on the contingency between behavior and rewards and whether the rewards were expected, salient, and contingent while the person was doing the target behavior. The Deci et al.'s (1999a, 1999b) meta-analysis showed that these factors did moderate the undermining effect.

Expected and salient. Deci et al. (1999a, 1999b) posited that if a reward is not expected while doing the target activity, the reward is not likely to undermine intrinsic motivation for that activity because the person has not had an experience of doing the activity to get the reward. The results of their analysis supported this prediction, as undermining was nonsignficant across studies that offered unexpected rewards. In a similar vein it was found that if the rewards were not salient while participants were doing the target activity, the rewards tended not to be undermining (Ross, 1975). In other words, people need to be experiencing the link between the behavior and rewards while they are working on the task in order for the rewards to undermine intrinsic motivation for the task.

Contingency. Contingency refers to what people have to do or what standard they have to meet in order to get a tangible reward such as a monetary payment. These can be task noncontingent, which means getting paid regardless of whether one does the target activity; engagement contingent, which refers to having to actually do the target activity in order to get paid; completion contingent, which involves having to finish the task (e.g., to solve a puzzle) to receive the payment; and performance contingent, which refers to getting a reward for reaching some standard of quality. Similar to unexpected rewards, task-noncontingent rewards typically do not result in a significant change in intrinsic motivation; in both cases, there is little opportunity for a participant to feel controlled or pressured, thus, undermining was not predicted. On the other hand, both engagement-contingent and completion-contingent rewards resulted in undermining with the highest average effect sizes in the Deci et al. meta analysis (free-choice behavior, $k=55$, $d=-0.40$, and $k=19$, $d=-0.44$, respectively; self-reported interest, $k=35$, $d=-0.15$, and $k=13$, $d=-0.17$, respectively). Performance-contingent rewards, however, yielded smaller effects, a medium effect size in terms of free-choice behavior ($k=32$, $d=-0.28$), and a null effect in terms of self-reported interest ($k=29$, $d=-0.01$). The more nuanced, mixed effects associated with performance-contingent rewards were predicted and are consistent with the model we have been discussing.

This model suggests that getting paid (or receiving any extrinsic reward) has the potential to set off two opposing need-satisfaction processes. On the one hand, it can support feeling competent; on the other hand it can thwart feeling autonomous. Engagement-contingent and completion-contingent rewards tell payees little about their competence; as such the only active process with regard to need satisfaction is whether the reward thwarts autonomy. By contrast, in the case of performance-contingent rewards, being rewarded does convey (to varying degrees) information about competence. Performance-contingent rewards that strongly convey information about competence might be accompanied by meaningful data related to surpassing past performance or the performance of others (e.g., breaking a personal record). In this case, the probable negative influence of autonomy need thwarting is potentially offset to some extent by the positive influence of competence need satisfaction. However, it is important to keep in mind that the meta-analysis showed that – across multiple studies – performance-contingent rewards did undermine intrinsic motivation, although not as much as engagement-contingent or completion-contingent rewards.

Person-Level Factors

A number of person-level characteristics or factors may moderate one's psychological reaction to getting paid, including the personality, age, and gender of the payee.

Motivational causality orientations. One personality characteristic that has been hypothesized and shown to moderate the undermining effect of rewards on intrinsic motivation is motivational causality orientations, which refers to personality-level orientations toward one's inner interests and values (i.e., autonomous orientation) versus toward external cues and demands (i.e., controlled orientation). Hagger and Chatzisarantis's (2011) had participants who had completed the measure of causality orientations work on interesting puzzles, in either a monetary-reward or no-reward condition. An interaction between reward condition and causality orientation revealed that intrinsic motivation was significantly undermined for control-oriented participants, but not for autonomy-oriented individuals. As such, the authors concluded that the autonomy orientation may buffer people from the undermining effects of rewards.

Gender. A number of studies have found that men, or perhaps those high in masculinity, tend to have a more controlling and less autonomous causality orientation (e.g., Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009). Consistent with this observation, and the arguments related to motivational causality orientations outlined directly above, Moller et al. (2012a, 2012b) found that the relation between financial motivation and autonomous motivation (the latter operationalized by free-choice behavior during a follow-up period) was moderated by gender. In this case, the undermining effect was stronger among men. Future studies need to test whether the moderating effect of gender can be attributed fully or partially to causality orientations.

Age. One limitation to analyzing for age as a moderator of the undermining effect concerns the fact that most studies on undermining have been conducted with either young children or college students, with few studies including a range in age greater than 4–5 years. Still, the meta-analysis on undermining conducted by Deci et al. (1999a, 1999b) suggested that tangible rewards tended to be more detrimental for children than for college students, although they were significantly undermining for both. Still, more research on moderation by age is needed.

Factors Related to the Interpersonal Context

A number of factors related to interpersonal context have been hypothesized and shown to moderate the undermining effect of rewards on intrinsic motivation, including the interpersonal context created by the payer.

Ryan et al. (1983) published a seminal paper focused on interpersonal context as a moderator of the relation between performance-contingent rewards and intrinsic motivation. Recall that performance-contingent rewards are those that are most capable of simultaneously supporting competence, while also thwarting autonomy;

thus, they are optimal for testing the moderating reward effects by other factors. In Ryan et al.'s (1983) study, interpersonal context was manipulated by delivering verbal instructions and feedback in ways that were either controlling (thwarting autonomy) or informational (supporting autonomy and competence). For example, participants in the controlling conditions were told that they "should try as hard as possible because I expect you to perform up to standards on these puzzles," and feedback statements included the word "should" (e.g., "you did very well on this, just as you should"). When describing the performance-contingent rewards, those in the informational condition were told, "We have received some extra money from a grant, so we will be able to pay those who do well at this activity. You will receive a $3 reward at the end of today's session if you do well on the puzzles." By contrast, those in the controlling condition were told, "We have received some extra money from a grant, so we will be able to pay subjects who do as well as they should. You will receive a $3 reward at the end of today's session if you perform up to our standards." All participants worked for 6 min on hidden-figures puzzles that had been shown to have a high level of intrinsic interest. Subsequently, intrinsic motivation was assessed, and the results provided compelling evidence for the power of the interpersonal context. Those participants who received controlling instructions and feedback along with their payments had significantly lower intrinsic motivation than a neutral no-reward comparison group, whereas, the rewarded participants who received the informational (autonomy-supportive) instruction and feedback reported higher intrinsic motivation than the neutral no-reward comparison group. These findings demonstrate how the interpersonal context, and the phrasing of payment instructions that can influence the interpersonal context, may moderate reward effects on intrinsic motivation.

Ryan et al. (1983) experimentally induced informational and controlling interpersonal contexts by modifying the language used in the experimental manipulations; however, it should also be easy to see how an established relationship between a given payer and payee could also color the interpersonal context of payments in parallel ways. For example, payees may be more likely to interpret a payment as controlling when the payer is chronically demanding, pressuring, and critical. By contrast, payees may be more likely to interpret a payment as informational when the payer is trusted based on a history of supporting the payees' autonomy. Although this hypothesis has not been directly tested, Saccone and Israel (1978) reported supportive evidence in weight-loss treatment by contrasting payments provided by an experimenter versus significant other.

Additional, Underexplored Factors That May Moderate

Electronic payments and "coupling." An easily observed societal trend is toward fewer payment transactions involving physical currency, and more payments being made electronically using credit cards or computers. A number of studies have suggested that people experience less psychological pain when making a payment electronically relative to cash (Prelec & Simester, 2001). Prelec and Loewenstein

(1998) used the concept of "coupling"—the degree to which a consumption experience and payment are cognitively linked or associated—to help explain why electronic payments hurt more or less. Essentially, tighter coupling hurts more, looser coupling hurts less. They argued that many factors related to payments influence coupling with the experience of consumption, including the timing of payments (prepayments and multiple payments loosen coupling) and the nature of payments (symbolic forms of payment like casino tokens and electronic payments also loosen coupling). Given that looser coupling between payment and consumption reduces the psychological pain of paying, it seems reasonable to hypothesize that looser coupling between payment and payer may reduce the psychological experience of feeling controlled, and thus attenuate the likelihood of undermining. Indeed, having rewards be unexpected, nonsalient, or task-noncontingent all loosen the coupling and have all been found not to undermine intrinsic motivation. On the other hand, a complimentary hypothesis is that looser coupling between payment and payer may also reduce the degree to which some payments convey information, and thus support competence. For example, in cases where the payer is recognized for content-expertise, tighter coupling with a performance-contingent payment may convey more information (e.g., handing over a large ceremonial check in-person vs. sending a direct deposit electronically). Future studies in this area are needed.

The Psychology of Aspiring to Maximize How Much You Are Paid

All else being equal, most individuals would choose to be paid more rather than less for the work they do. Individuals differ, however, in the degree to which maximizing wealth is a dominant aspiration or goal in their lives. A line of research led by Kasser, Ryan, and colleagues has explored both the psychological antecedents and consequences of such aspirations. Research on this topic has consistently indicated that pursuing financial success as a central life aspiration is negatively associated with adjustment and well-being (Kasser & Ryan, 1993, 1996; Williams, Cox, Hedberg, & Deci, 2000), a pattern that has been replicated in various countries (e.g., Ryan et al., 1999). One might assume that financial aspirations are deleterious to well-being only when individuals fail to meet them; however, as demonstrated by Niemiec et al. (2009), achieving financial aspirations may represent a relatively empty victory in terms of psychological health and well-being. They observed a negative relation between attaining extrinsic aspirations (viz., financial success, fame, and image) and changes in psychological health, and this relation was mediated by changes in satisfaction of basic psychological needs. In other words, aspiring to maximize how much you're paid appears to be a poor strategy for being deeply satisfied, even when you succeed.

Consistent with these adverse consequences outlined above, some of the antecedents of making financial success a central life aspiration involve growing up in environments that are relatively impoverished, emotionally and materially. For example, Kasser, Ryan, Zax, and Sameroff's (1995) investigation into this question

revealed that teenagers who rated the importance of financial success higher than other values had grown up in disadvantaged socioeconomic circumstances and had mothers who were less warm and nurturing and who strongly valued their teens' financial success.

Mindfulness and financial aspirations. Numerous studies have demonstrated the psychological and physical benefits of being mindful, and mindfulness has been shown to promote greater satisfaction of the psychological need for autonomy (Brown, Ryan, & Creswell, 2007). A recent study by Brown, Kasser, Ryan, Linley, and Orzech (2009) tested the relation between mindfulness and financial aspirations. Brown et al. found that mindfulness was associated with smaller financial-desire discrepancies (the gap between current and desired income), which helped to explain a positive association between mindfulness and subjective well-being. Follow-up studies demonstrated that this effect was independent of individuals' financial status or changes therein. Those high in mindfulness seem to be more satisfied with their financial status, regardless of how much money they have or how much they get paid.

Career choices. In regard to pay, it may also be instructive to consider the motivation underlining career choices that fail to maximize the size or stability of potential earnings. People in many academics careers have passed over jobs in the private sector requiring comparable degrees even though those jobs have much larger financial compensation. Interestingly, research suggests that a desire for autonomy (e.g., intellectual freedom) is a dominant motivation. Sylvia and Hutchison's (1985) found that "teacher motivation is based in the freedom to try new ideas, achievement of appropriate responsibility levels, and intrinsic work elements" and concluded that "schemes such as merit pay were predicted to be counterproductive in service organizations which employ professionally trained people" (p. 841). Relatedly, Feldman and Bolino's (2000) analysis of career motivation among self-employed individuals revealed that a desire for autonomy was their most frequently endorsed motivation (46 %). Consistent with these findings, Rauch and Frese's (2007) meta-analysis on self-employed business owners indicated that need for autonomy was a personality characteristic significantly correlated with entrepreneurial behavior. In sum, it seems that when professionally trained individuals choose not to maximize their pay, concerns related to autonomy often undergird this decision.

Pressing Underexplored Issues Related to the Psychology of Getting Paid

Pressing Issues for Advancing Basic Theory

Unconscious processes related to getting paid. Although the expectation and the receipt of payments are nearly always conscious, features related to the accompanying psychological experiences and the resulting outcomes of getting paid may often

be unconscious. We note that research in the SDT tradition has supported the assertion that subliminal primes can trigger autonomous or controlled motivation (Friedman, Deci, Elliot, Moller, & Aarts, 2010) and motivational orientations (Levesque & Pelletier, 2003; Radel, Sarrazin, Legrain, & Gobancé, 2009), and has shown predictive utility of implicit measures of motivational orientations (Keatley, Clarke, & Hagger, 2012). Further, a set of pressing questions for future research concerns the degree to which implicit attitudes toward money and toward payers (e.g., a boss or employer) may moderate the degree to which payments feel implicitly controlling and thus undermine intrinsic motivation. In this volume, Capa and Custers (Chap. 8) explore in greater depth issues related to the conscious and unconscious processing of money.

Pressing Issues for Translational Research

Applications in education. Despite evidence against them, the use of payments as a tool for motivating student performance has been implemented in a number of settings and has been hotly debated in recent decades (Deci, Koestner, & Ryan, 2001; Reeve, 2006). Different programs have been used, some that provide incentives to schools, some to teachers, and some to students. The various programs have provided tangible rewards, including payments, to promote achievement outcomes at nearly every level of education, from preschool classrooms to graduate lecture halls, in the USA and abroad.

From our perspective, classrooms are an especially important applied context for considering the psychology of getting paid, and the potentially inimical long-term consequences of using payments, given the array of important learning-related outcomes that are positively associated with autonomous motivation, including deeper processing, greater creativity, and more persistence when faced with setbacks (see e.g., Ryan & Deci, 2009). Nevertheless, calls for implementing programs to pay students for learning outcomes are persistent (e.g., Guttenplan, 2011; Ripley, 2010). This is despite evidence from school-based field experiments in over 200 urban schools across three US cities that revealed no significant ("zero") benefit in each city (Fryer, 2011). Furthermore, a National Research Council review of research on varied programs, prompted by federal and state legislation, which involved incentives and high-stakes accountability in education, has concluded that, when the studied "test-based incentive programs…[were] evaluated using relevant low-stakes tests…the overall effects on achievement tend to be small and are effectively zero for a number of programs" (Hout et al., 2011, p. S-3).

At least two pressing issues on this topic warrant more attention. The first concerns a basic motivation theory question outlined above; that is, the issue of undermining motivation for activities that are boring at baseline. Educators championing the use of financial incentives have argued that in some classrooms, students' intrinsic motivation for learning is so low at baseline that the substantial literature on rewards undermining intrinsic motivation does not apply. Putting aside the issues

related to why some students' intrinsic motivation for learning has become so severely impoverished, we agree that it is important to address the open issue of whether rewards such as payments may do additional harm to the motivation of these students. Happily, this question presents an opportunity for researchers to collect data that could simultaneously advance basic motivation theory and applied-translational practice. A second pressing issue concerns measuring outcomes not only in the short term, but also months, if not years, after the period of incentivizing has ended. Few studies have done this, but only such studies can reveal whether incentives have promoted autonomous motivation that will persist or have had negative effects that may take time after the students have left the incentive programs to be observed.

Applications in behavioral health and medicine. Among the biggest challenges facing health care professionals in developed parts of the world are behavioral challenges. That is, patients struggle to carry out (or avoid) many behaviors understood to be key determinants of health and wellness, including those related to smoking, drug and alcohol abuse, diet, exercise, and general adherence to prescribed drug and physical therapies. As such, one strategy that has received a great deal of consideration in this context involves paying patients to be healthier (Volpp, Pauly, Loewenstein, & Bangsberg, 2009). US employers, in particular, have rushed to incorporate financial incentives into their employee wellness programs, and popular commercial websites facilitate these transactions (e.g., stikk.com). Guided by principles from operant (Skinner, 1969) and contingency management (Petry, 2000) theories, researchers have achieved some success using financial incentives to motivate healthy changes in treatments for alcohol, tobacco, and cocaine abuse (see meta-analysis by Lussier, Heil, Mongeon, Badger, & Higgins, 2006). However, contingency management strategies have so far proven relatively less effective at achieving sustainable changes in other health behaviors, such as improving diet, increasing physical activity, and weight management (see meta-analyses conducted by Burns et al., 2012; Paul-Ebhohimhen & Avenell, 2007). Further, although participants typically respond well while payment contingencies are in place (initiation), those studies that follow participants during an unpaid follow-up period typically find poor maintenance of healthy changes. Indeed, as already discussed, Moller and colleagues (2012a; 2012b; 2013) demonstrated in the context of a healthy diet and activity intervention that the importance placed on financial incentives for making health behavior changes was negatively related to behavioral and weight maintenance, as well as changes in liking healthy behaviors. A recent commentary by Hagger et al. (2013) summarizes related concerns about using financial incentives to motivate health behavior, and the need for more work in this area.

Applications for economic policy. One important way that economies differ from country to country concerns the degree to which policies permit or inhibit the accumulation of personal wealth. In terms of economic policy, one key instrument that policymakers use to regulate accumulation of wealth (e.g., take home pay) and reduce income inequality involves taxation. Progressive tax policies has been an ongoing and hotly debated topic, and interestingly, many of the arguments, both for and against, concern the psychology of getting paid.

Opponents of progressive taxation maintain that progressive taxes inhibit the motivation of high-level achievers to continue achieving once they reach the top tax bracket or rate. Empirical evidence in support of this argument is scant; thus, more research testing the hypothesis is called for. Based on the differentiated model of human motivation outlined in this chapter, we suggest that future studies consider the possibility that different tax policies may influence different forms of human motivation differentially. Specifically, we hypothesize that a more progressive tax code (inhibiting the accumulation of personal wealth) may inhibit controlled forms of motivation, while maintaining or enhancing autonomous forms of motivation. This hypothesis deserves empirical attention.

A 2011 study by Oishi, Schimmack, and Diener (2011) approached this issue using data on tax codes and subjective well-being from 54 countries. The study concluded that more progressive taxation was associated with higher nation-level subjective well-being, an association that was mediated by citizens' satisfaction with public goods, such as education and public transportation. However, the study found no relation between the amount of government spending and citizens' well-being, so the effects of progressive taxation on well-being are not a function of the government spending on programs that would benefit these citizens. These results thus suggest that progressive taxation may influence the psychological climate of communities in ways that are more intangible than tangible. Our hypothesis is that greater disparities in wealth foster more frequent and salient experiences of control, coercion, and alienation. This finding is consistent with prior cross-cultural research relating autonomous motivation to subjective well-being, and with our view that more progressive taxation is consistent with supporting autonomous, as opposed to controlled, forms of motivation. Follow-up lines of research might investigate whether progressive taxation is also predictive of other downstream outcomes that have been associated with autonomous forms of motivation, such as creative output (Amabile, 1996), nonviolence (Moller & Deci, 2010), and environmental sustainability (Lavergne, Sharp, Pelletier, & Holtby, 2010; Sheldon, Nichols, & Kasser, 2011).

In this volume, Nelms and Maurer's chapter, exploring money across time, economies, and societies provides a complimentary overview of issues related to this topic.

Conclusion

In summary, the goal of this chapter was to outline a basic framework for integrating a wide variety of findings concerning the psychology of getting paid. Our general framework for organizing these concepts concerns the potential for payments to set off two opposing psychological processes, each related to basic psychological need satisfaction—satisfaction of the need for competence, and thwarting of the need for autonomy. In other words, getting paid tends to simultaneously make individuals feel rewarded in terms of feeling competent, and yet punished in terms of feeling controlled or coerced. Of course, different contexts will exacerbate and inhibit one or both of these competing processes to varying degrees—making one process

more dominant than the other and thereby determining individuals' affective, motivational, and behavioral responses. The complexity of identifying those moderating features of a particular payment context, and understanding how they will simultaneously influence psychological need satisfaction and thwarting, makes this a challenging and rich topic for empirical inquiry.

In conclusion, there is no question that financial payments represent powerful tools for motivating human behavior, nor is the ubiquity of payment transactions in modern society questionable or likely to wane in the foreseeable future. Nevertheless, we have presented strong evidence that, often, getting paid can include emotional ambivalence, and unanticipated suboptimal motivational consequences. If we can understand more fully the psychology of getting paid, then we can use payments more effectively, by using them more informationally. The framework outlined in this chapter may help guide that process, as well as guiding some of the forthcoming research in this area, to be conducted by psychologists of different orientations and by researchers from complimentary disciplines, toward advancing both theory and practice.

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Chapter 10
The Psychological Science of Spending Money

Travis J. Carter

Abstract This chapter discusses the psychological research related to the act of spending money, with the aim of understanding the underlying psychological processes involved. To that end, the emotions involved in spending money before, during, and after the money changes hands are explored, including the role of anticipated and anticipatory emotions, different orientations to the gains and losses inherent in an act of spending, and the process of hedonic adaptation. Additionally, given how fundamental choice is to the act of spending money, factors that influence the decision-making process are discussed, including the role that comparative processes and expectations play in the process of making decisions and evaluating their outcomes. In each case, particular attention is paid to the psychological forces that influence the ultimate goal underlying any act of spending: happiness. Finally, several concrete strategies for making purchases most likely to lead to success on this goal are identified, including purchasing experiences over possessions, spending pro-socially, and making meaningful purchases.

The Act of Spending Money

The act of spending money is absolutely ubiquitous in modern life. It is the primary way that we meet our basic needs, spending it on food, clothing, shelter, health care, transportation, and entertainment, and is so ingrained in modern life that we rarely reflect on what that act represents. At its most basic level, the act of spending is nothing more than an exchange: one person gives money to another and receives some good or service in return. This definition is serviceably descriptive, but omits

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E. Bijleveld and H. Aarts (eds.), *The Psychological Science of Money*,
DOI 10.1007/978-1-4939-0959-9_10,

any psychological antecedents or consequences for the spender. For one thing, it leaves out the element of choice. Money isn't spent by accident, the result of tripping over an errant shoelace; one chooses to exchange money for some particular purchase instead of other possible purchases—or instead of purchasing nothing at all. Choices are made with a purpose, intended to create some outcome. That particular choice is based on the belief that the purchase will produce a greater hedonic benefit—for oneself, or for others—than the alternatives over some period of time (Mellers & McGraw, 2001; Mellers, Schwartz, & Ritov, 1999). In addition to that expected hedonic gain, spending money also inherently involves costs. There is obviously the direct monetary cost, but also the opportunity cost: all of the other ways that one could have spent this money must now be foregone. Thus, a more psychological definition of the psychological act of spending money would be a simultaneous loss (of money and opportunity) and gain (of some good or service) for oneself and/or someone else that one chooses to undertake based on some beliefs about future hedonic states.

To see the implications, it's worth unpacking the various components of this definition further. First, gains and losses are inherently affectively laden constructs; they are important because they create feelings of pleasure and pain, even when merely anticipating a potential gain or loss (see Knutson, Rick, Wimmer, Prelec, & Loewenstein, 2007). Although it can be seen as the output of some cost–benefit analysis, the choice to spend money is not merely some cold cognitive calculation; it is an affective event involving some balance of pleasure and pain paid out over some period of time. Purchases are certainly made with the intention of producing an emotional experience, but emotions felt during the act of considering a purchase can also influence the decision-making process and its outcome (Andrade & Ariely, 2009; Isen, 2001; Lerner, Small, & Loewenstein, 2004; Mattila & Wirtz, 2000). Second, the exact nature of the pleasure and pain experienced as a result of a given purchase is by no means certain. Rather, it is how we *anticipate* we will feel as a result of the purchase, a forecast based on some imagined future. Making a forecast requires that we first imagine what the basic facts of the situation will be like before estimating how that imagined situation will make us feel. Unfortunately, we tend to be overconfident and optimistic in our predictions about the basic facts of a future situation (e.g., Griffin, Dunning, & Ross, 1990; Newby-Clark, Ross, Buehler, Koehler, & Griffin, 2000), so perhaps it is not surprising that predictions of future emotional states are also typically inaccurate (Wilson & Gilbert, 2003). This is especially important because of a third aspect of the act of spending: choice. The act of spending inherently involves an act of choosing—choosing not only *if* but also *which* thing to purchase. Thus, forecasting a single imagined future is insufficient. In order to choose which option to purchase, we must imagine a future scenario for each possible choice we might make, and predict how each one will make us feel. The uncertainties and biases involved can multiply quite quickly, turning what could have been a simple exchange into a daring act of mentalism. Fourth, the self is an important component to any purchase (see Belk, 1988). The decisions we make help make us who we are, and purchase decisions are no different. Indeed some purchases are explicitly intended to reflect or convey aspects of our personalities

(Tian, Bearden, & Hunter, 2001). Finally, and relatedly, other people are certainly present in our forecasted futures. In addition to predicting how something will make you feel, you must often imagine how a given purchase will make someone else feel—a spouse or friend who might share in the outcome, for instance—and factor these other feelings into decision-making process.

The remainder of this chapter will explore these facets of the act of spending money in greater depth, but always keeping in mind *why* people choose to spend money: in order to make themselves happier (see Csikszentmihalyi, 2000; Diener & Fujita, 1995). Indeed, based in part on the belief that accumulating wealth will allow them to spend more money and further improve their welfare (Aknin, Norton, & Dunn, 2009; Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004; Van Praag & Frijters, 1999), people work very hard to acquire money (see Ahuvia, 2008),[1] often sacrificing time with family and friends in the pursuit of wealth (Kasser, Cohn, Kanner, & Ryan, 2007; Nickerson, Schwarz, Diener, & Kahneman, 2003), even to the point that wealth acquisition has become a mindless enterprise (Hsee, Zhang, Cai, & Zhang, 2013). This chapter will examine how each of the different aspects of the act of spending money highlighted above connects to the broader goal of happiness, but it's worth first asking the more global question: does spending money, on average, make people happier?

One fairly straightforward approach to answering this question is simply to examine the relationship between wealth and happiness. Having money is, after all, a precondition to spending it (ignoring for the moment the perils of using credit cards to spend money one doesn't have). Thus, if spending money is effective in serving its purpose, then the richest individuals, who have more money to spend, should be the happiest. If not, then the pursuit of additional wealth seems futile; having more money wouldn't actually make people any happier. An abundance of research over many decades shows that although there is most definitely a positive relationship between wealth (typically measured as income) and happiness, it is typically quite modest and suffers considerably from diminishing returns (for recent reviews, see Diener, Tay, & Oishi, 2013; Sacks, Stevenson, & Wolfers, 2012). That is, although richer people are generally happier than poorer people, the hedonic impact of additional wealth levels off. The same amount of additional wealth has a fairly dramatic impact on the happiness of the impoverished, but it has a fairly small impact on the wealthy.

One of the generally accepted reasons for this has to do with how money is spent at different levels of wealth. At lower income levels, money is generally being spent to meet basic human needs, like food and shelter, which, not surprisingly, produces

[1] It is worth noting, of course, that people accumulate wealth for reasons that have nothing to do with specific planned expenditures, such as to prevent an unexpected and catastrophic life event (like an expensive health care emergency) from destroying one's ability to meet basic needs. Indeed, the anxiety associated with debt has devastating effects on well-being (Brown, Taylor, & Price, 2005). The status that comes with wealth is also seen by some as an end in and of itself (Kasser & Ryan, 1993). While these factors undoubtedly play a role in the acquisition of wealth, because this chapter is specifically exploring the act of spending money and not its acquisition, they are better suited for discussion elsewhere.

a fairly large hedonic return (Biswas-Diener & Diener, 2001).[2] At higher income levels, where basic needs can be taken for granted, much of the money that people spend can be considered discretionary: spending on wants instead of needs, with the express intention of making themselves happier. It is this general realm of spending, where the pressures of basic survival don't apply, and indeed where the relationship between wealth and happiness is fairly modest, that will be the focus of this chapter, because it is the one that requires more explanation. If money spent on discretionary purchases seems to make a relatively small contribution to well-being, then we are left with two possibilities. Either discretionary spending is simply ill suited to producing happiness (despite our intuitions and intentions) or people simply have misguided notions about how to spend their money to actually make themselves happier (Dunn, Gilbert, & Wilson, 2011). In the sections that follow, I will focus on the role that emotions and choice play before, during, and after one engages in an act of spending, and in particular identifying issues that prevent purchases from producing their intended effect: happiness. Then, I will outline some strategies, including the types of purchases and the recipient of the expenditure, that can maximize each individual act of spending's contribution toward that overarching goal of happiness.

Emotions

As described above, the mere act of spending money itself is not hedonically neutral. It's important to note, however, that equivalent gains and losses produce asymmetrical hedonic outcomes (pleasure and pain, respectively). As put forth by prospect theory (Kahneman & Tversky, 1979), from the same reference point, losses are felt more strongly than gains (Kahneman & Tversky, 1984; Tversky & Kahneman, 1991; cf. Novemsky & Kahneman, 2005)—dropping $20 down a storm sewer would feel worse than finding $20 on the street would feel good. Thus, when considering a purchase, it is no surprise that people naturally focus on the losses that they will incur (Carmon & Ariely, 2000), because that is often the more potent emotional experience.

Anticipated vs. Anticipatory

However, the affect experienced as a result of a given purchase does not simply start at the moment the money is spent; there are emotions felt well prior to the purchase, and which continue to reverberate long into the future. That is, there is a distinction to be made between *anticipated* emotions and *anticipatory* emotions (Loewenstein, Weber, Hsee, & Welch, 2001). Anticipated emotions are the emotions you expect

[2] At the extreme low end of the income spectrum, spending money might even be better thought of as intended to decrease misery rather than increase happiness (see Martin & Hill, 2012).

to feel when you actually take possession of the new purchase—the joy you'd experience when using a new iPhone, or the guilt you might feel after eating a tub of popcorn at the movies—and aren't really emotions at all. They are cognitions, a forecast of what your experience with the purchase will be like at some point in the future, and the emotions you predict that experience will stir up. The role of anticipated emotions on choice and evaluation is a largely conscious one: we decide whether and how to spend money based on how we anticipate the various courses of action will make us feel (Mellers et al., 1999; Shiv & Huber, 2000), and evaluate the outcome based partly on how the actual outcome compares to our expectations (Bell, 1985).

Anticipatory emotions, on the other hand, are the emotions you experience at the very moment you are considering the purchase: imagining the pleasure you will experience when you finally get to use your new iPhone might very well make you giddy in the present, or you might feel some immediate guilt as a result of imagining gorging yourself on buttery popcorn. Or, instead of thinking about how the purchase you're considering might make you feel, you might think about the opportunity costs—purchases you'll have to delay or forgo as a result of spending this money. Buying a new car might mean you have less money to spend on dinners at restaurants, and you might feel some negative emotions while merely considering missing those opportunities. The role of anticipatory emotions in choice and evaluation tends to be less conscious, and as a result, people may not realize how large an impact it might have (Andrade & Ariely, 2009). These immediate emotions can be used as a cue for how one should choose in normal circumstances (e.g., Pham, 1998), but can also exert a considerably more powerful (and hard to control) influence when the emotions are more intense (see Loewenstein, 1996).

Because they play different roles in guiding the choice and evaluation process, the distinction between anticipated and anticipatory emotions is important to understanding the act of spending money. However, it can be difficult to tease their roles apart in practice, largely because they influence each other both directly and indirectly (Loewenstein & Lerner, 2003). The type and magnitude of the expected (anticipated) emotions resulting from some event in the future (eating a delicious meal, for instance) will influence the type and magnitude of the anticipatory emotions you experience immediately upon imagining that future state. At the same time, anticipatory emotions can influence exactly how that future state is imagined, which will, in turn, influence the emotional experience predicted to result from it. What's more, because the act that sets it all in motion is imagining a future state, that entire process will also be influenced by any number of other factors that are important to future-oriented thinking. For instance, simply thinking about an event that is close in time, as opposed to one that is further off into the future, will lead people to imagine it very differently. The closer in time an event is, the more likely people are to focus on its more concrete aspects (Trope & Liberman, 2003), to reduce their subjective confidence about what exactly will transpire (Gilovich, Kerr, & Medvec, 1993), and to experience more intense immediate emotions (Loewenstein, 1996). This difficulty notwithstanding, researchers have had a great deal of success both measuring and manipulating the separate cognitive (anticipated) and affective

(anticipatory) processes involved in decision-making and outcome evaluation (see Loewenstein & Lerner, 2003 for a review). One notable issue that has arisen relates to the pleasure and pain—both anticipated and anticipatory—evoked by the gain and loss side of a monetary transaction, respectively, and the psychological consequences of focusing on one side or the other.

The Pain of Paying

Because people vary in the degree to which they tend to focus on acquiring pleasurable gains (promotion goals), rather than avoiding painful losses (prevention goals; Higgins, 1997), focusing on the gain rather than the loss side when pondering a purchase decision will have a big impact on both anticipated and anticipatory emotions, and as a result, the likelihood of actually spending money. The different spending habits of so-called *spendthrifts* and *tightwads* illustrate the consequences of gain/loss focus quite well (Rick, Cryder, & Loewenstein, 2008). Spendthrifts tend to focus on what they'll gain from spending money, and all but ignore the costs, and so end up spending too freely on purchases whose hedonic impact is fleeting at best. Tightwads generally focus on the losses involved when spending money and will often refuse to spend money that might nonetheless yield significant hedonic gains.[3] Indeed, in addition to concentrating on the "pain of paying" (Prelec & Loewenstein, 1998), tightwads worry about opportunity costs, something that most people do not do spontaneously (Frederick, Novemsky, Wang, Dhar, & Nowlis, 2009) unless they are actively considering many different options and must forgo all but the one they choose (Carmon, Wertenbroch, & Zeelenberg, 2003; see also Ariely, Huber, & Wertenbroch, 2005).

The context in which a decision is made can create a sense of "fit" with one's natural focus and lead to better outcomes, such as greater satisfaction (Avnet & Higgins, 2006). As such, one way to encourage tightwads to part with their money is to emphasize aspects of the purchase situation that reduce the perceived pain of paying. For instance, in one experiment, participants were asked to imagine that they could choose to receive a boxed set of DVDs from Amazon.com for free, if they were willing to pay $5 to cover shipping costs. In the baseline condition, true to form, spendthrifts were considerably more willing than tightwads to pay the $5 in order to receive the DVDs. However, when the shipping charge was described as "a small fee," making the amount seem insignificant and reducing the perceived pain of paying it, tightwads were just as willing as spendthrifts to pay the fee (Rick et al., 2008).

Perhaps examining these different spending tendencies, rather than looking at the relationship between wealth and happiness, can provide a more direct answer to the question of whether spending money makes people happier. That is, if spending money does increase well-being on average, then tightwads, who are generally quite reluctant to part with their money, may be missing genuine opportunities to impact

[3] Those who generally feel that they spend and save appropriately are referred to as *unconflicted* (Rick et al., 2008).

their happiness. Conversely, spendthrifts, who engage in spending opportunities they probably shouldn't, might actually be measurably happier than both tightwads and unconflicted spenders as a result. To find out how these different attitudes toward spending money relate to more global measures of happiness, I recruited participants from Amazon.com's Mechanical Turk to complete the Spendthrift–Tightwad scale (ST–TW; Rick et al., 2008) and the Subjective Happiness Scale (Lyubomirsky & Lepper, 1999). Even when controlling for relevant demographic differences (income and age), participants classified as tightwads did report lower subjective happiness ($M = 4.47$, $SD = 1.28$) than the other two groups, $\beta = .232$, $t(309) = 2.07$, $p < .05$, but spendthrifts ($M = 4.76$, $SD = 1.22$) and the unconflicted ($M = 4.76$, $SD = 1.29$) were equally happy, $t < 1$, ns.

Why do spendthrifts, who experience the least pain of paying, and who should presumably be reaping some hedonic rewards from their unrestrained spending, show no gains in happiness relative to the unconflicted? Or, put another way, what does this non-difference say about the ability for purchases to actually make people happy? One reason might be related to how people adapt to hedonic events, like the short-term shifts in happiness produced by spending money. That is, since spendthrifts are more focused on the potential gains (or at least less concerned with the potential losses), they may be more likely to succumb to a classic forecasting error: failing to anticipate how quickly they will adapt to their future circumstance (Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998; Wilson, Wheatley, Meyers, Gilbert, & Axsom, 2000), an issue to which I'll return below. There is also the possibility that, by not confronting the pain of paying, spendthrifts are not forced to fully consider whether a given purchase's predicted benefits will outweigh its costs, and as a result are making the kinds of purchases least likely to actually increase happiness.

It's worth noting that although tightwads experience the pain of paying to a much greater degree than most, the loss of money is an inevitable part of any purchase, meaning that everyone will experience the pain of paying to some degree. In many circumstances, the exchange of money for goods and services is simultaneous, meaning that the pains and pleasures are also experienced simultaneously, the pain thus robbing some of the pleasure. However, the exchange need not be simultaneous, and by temporally decoupling the gain and loss, one can reduce the chances that pain experienced from the loss of money will negatively impact the pleasure experienced from the new purchase (Prelec & Loewenstein, 1998). One way to do this is to consume first and delay the pain of payment for as long as possible, hoping that it will be less painful in the future than it would be right now (Kassam, Gilbert, Boston, & Wilson, 2008). To an extent, this has its intended effect: the immediate pleasures are unspoiled by an immediate loss. The allure of this approach is evident in the difference between paying with cash and with credit card. Cash payments are immediate and visceral—the money literally leaves your hands and becomes someone else's possession. Credit cards, on the other hand, are abstract and distant; they allow you to put off the pain of paying until next month, often while enjoying the benefit immediately. Spending money this way may seem painless, and almost certainly does reduce the negative anticipatory emotions that might prevent one from making a purchase, but it only forestalls the inevitable. When the end of the month

rolls around and the credit card bill comes due, that pain may actually be magnified because the pleasure you experienced is already in the past. What's more, because credit cards diminish the pain in the present, they can encourage reckless spending—you're much more likely to have a "what was I thinking?!" moment for purchases made with credit cards than with cash (e.g., Prelec & Simester, 2001; Soman, 2001).

A somewhat counterintuitive alternative that seems to have considerable hedonic benefits is to endure the pain of paying immediately and delay consumption until later. Paying in advance may be painful initially, but it allows two distinct benefits. First, you to get the benefits of anticipating a positive experience (e.g., Nowlis, Mandel, & McCabe, 2004; an issue discussed further below), and second, because the pain of paying is behind you when actually consuming, there is no anticipated pain to dampen the experience. All-inclusive resorts might cost a bundle up front, and they do hold some risk of paying more for the same amount of consumption, but they do effectively decouple the payment from the experience. Rather than feeling a slight twinge of pain each time you shell out the money for a cocktail, you can feel like you're getting a better and better deal with each drink—putting the sunk cost effect (Arkes & Blumer, 1985) to work in your favor, though with the possible side effect of severe hangovers. If making yourself happy is the goal, then it might be worth the risk of overpaying to feel better about the money you're spending. In short, it's often far better to pay up front and delay consumption until later (for a review, see Dunn & Norton, 2013).

Hedonic Adaptation

Purchases, like anything else that produces hedonic gains, are subject to one of the fundamental facets of human experience: hedonic adaptation (Frederick & Loewenstein, 1999; see also Diener, Lucas, & Scollon, 2006). That is, over time, the same experience that once made you dizzyingly happy will merely bring a smile to your face. Hedonic adaptation to a new car may be inevitable, but it isn't necessarily problematic unless it's unaccounted for in the decision-making process. Unfortunately, when people anticipate how a given purchase will make them feel, they can recognize that it will become less intense over time, but generally fail to consider this fact at the time of purchase (Ubel, Loewenstein, & Jepson, 2005; Wang, Novemsky, & Dhar, 2009). Focusing only on the immediate spike in happiness and ignoring the subsequent decline means that the anticipated experience—the one on which people base their expectations, and thus, their decisions—may be quite different from the actual experience, increasing the chances of disappointment. Accurately predicting not just the initial hedonic experience that a given purchase will provide, but also how it will change over time, is important in making sound purchase decisions.

In order to accomplish more accurate predictions, it's helpful to know a little more about how hedonic adaptation operates. One of the reasons our experiences become less intense over time is through the process of satiation with repeated experiences. For instance, people know not to eat their favorite meal seven nights in

a row for fear that, by the time night seven rolls around, the mere smell of it will at best be unappetizing, and at worst will be stomach-churning. People seek variety and novelty to prevent satiation with repeated experiences, but probably don't do it optimally (for a review, see Alba & Williams, 2013). Even with adequate intervals between events, sometimes we gain expertise that renders the earlier experience less impressive. For instance, many novice wine drinkers are quite happy to drink whatever wine is put in front of them. The flavors that are easiest to discern (sweetness, for instance) are often the flavors characteristic of less expensive wine. But, over time, as the palate grows more sophisticated, many wine drinkers start to crave more complex and subtle flavors, and must pay handsomely for the privilege.[4] Thus, they must spend more money to achieve the same hedonic benefit—a certain amount of happiness from drinking a glass of wine—than would have been necessary earlier in their wine-drinking career. What was once a favorite bottle will eventually begin to taste cloyingly sweet, or perhaps bland and muted. Indeed, many positive life changes, like purchasing a new car or getting a raise, create aspirations over time that make the previously great change seem unimpressive (see Sheldon & Lyubomirsky, 2012).

One obvious lesson of hedonic adaptation, of course, is that novices should not spend a lot of money on something that requires more sophistication than they possess to fully appreciate. Another implication is that attempting to maintain a relatively stable level of happiness may require spending ever-increasing amounts of money. This is, in many ways, similar to the way that drug addiction operates. Neurological systems respond to repeated use of addictive drugs with neuroadaptation: since foreign chemicals (e.g., cocaine) are doing the same job as natively produced neurotransmitters (e.g., acting on dopamine receptors), the systems that produce those neurotransmitters begin to produce less and less over time. With fewer neurotransmitters naturally available to bind to those receptors, those systems will require increasing amounts of the drug to achieve the same level of activation. Plus, since those systems are typically involved in the experience of pleasure, the reduced activation of those systems during any period of abstention reduces positive affect, which fuels a desire for the drug just to get back to baseline levels—the neurochemical equivalent of loss aversion (Koob & Le Moal, 2001). In just the same way, if you decide to upgrade from the 1994 Ford Fiesta you've driven for years to a new Mercedes, the first drive off the lot will be thrilling. After a year or 2, that thrill will mostly be gone, and the feeling of luxury provided by the Mercedes will eventually begin to feel normal. The only way to get that thrill again will be to increase your dosage with the new model, which will not be cheap. Any abstention from that new baseline, say if you go back to driving your old Fiesta while the Mercedes is in the shop, what was once perfectly adequate will feel perfectly intolerable—your baseline level of activation has changed, and you'll jones for that new normal.

[4] A recent blind taste-test study found that those with some training with wine show a positive (though small) relationship between price and enjoyment, meaning that they enjoyed the more expensive wines more. Novices, however, actually showed a *negative* correlation; they liked the cheaper wines better (Goldstein et al., 2008).

In fact, this is one explanation for the very modest relationship between wealth and happiness: as income rises, people adapt to their new standard of living, and must spend more to feel the same amount of happiness they had at their old salary (Diener & Biswas-Diener, 2002). A reduction in salary is now treated as a loss, which has more severe negative consequences for well-being than the initial increase did positive consequences (Boyce, Wood, Banks, Clark & Brown, in press). What's more, new evidence suggests that wealth may actually hinder the ability to savor positive experiences and emotions. In one study, participants given a series of vignettes, such as discovering an amazing waterfall, and asked how they would behave in each scenario. Wealthier participants, as well as participants who were merely exposed to reminder of wealth (a photograph of a stack of money), were less likely to claim that they'd use a savoring strategy, such as reminiscing or telling friends about the experience. That reduced ability to savor seems to explain some of the relatively weak correlation between wealth and happiness; wealthy participants were less happy because they were less likely to engage in savoring activities (Quoidbach, Dunn, Petrides, & Mikolajczak, 2010). Thus, it may not be that spending more money is absolutely required in order to overcome the forces of adaptation. Rather, focusing on the experiences, savoring them each time they happen, may prevent the need from spending an ever-increasing amount of money (Chancellor & Lyubomirsky, 2011; Kasser, 2011).

Choices, Choices, Choices

Aside from having money to spend, the initial step toward the act of spending money is to choose which particular good or service you'll be purchasing. In the simplest case, you are faced with a single purchase option, and the decision is simply whether or not to make the purchase. Presumably, as described above, that decision is based on some assessment of the expected costs compared with the expected hedonic gains. For instance, you might hear that the new Daft Punk album just came out, and decide whether or not it is worth $10 to own the album. The calculus is fairly simple: if you think that you'll get a greater hedonic gain from listening to the synthesized singing of French robots than the other ways you can think of spending $10, then you should choose to buy it. Otherwise, keep the money.

This extremely simple scenario is becoming less and less common, however. The more likely case is that there are multiple options you are considering that would fill the same need, and you must choose only one of them. When buying lunch, for example, it's often not a simple question of whether or not to buy a salad (and "not" isn't really an option, since you're not about to go hungry). Instead, you'll need to decide whether to buy a salad, a burrito, a slice of pizza, a bowl of curry, a falafel sandwich, or any of the myriad lunch options that happen to be available to you at the time. Each of these options carries with it some potential hedonic gain, some monetary cost, and choosing any one of them requires that you forego the other options—at least for the day.

Even assembling the set of options you intend to choose from—the consideration set—is becoming an increasingly difficult task in and of itself (see Schwartz, 2004). In theory, more options should lead to better outcomes for consumers, as the likelihood of finding an option that exactly matches one's preferences should increase with the size of the choice set (e.g., Johnson & Payne, 1985; Kahn & Lehmann, 1991; Shugan, 1980), and indeed, people generally share this intuition, preferring to have a lot of options to choose from (Chernev, 2003). However, the number of options available within product categories has ballooned well past what is actually good for consumers (Schwartz, 2004),[5] sapping people of the motivation to engage in the decision-making process (Iyengar & Lepper, 2000).[6] In practice, the cognitive burdens created by large choice sets and time constraints can leave people feeling confused and unconfident (Haynes, 2009; Lee & Lee, 2004), even when they have a great deal of control over the information presented to them (Ariely, 2000).

To illustrate how you might approach a choice from a large set of options, imagine that you are deciding which television to buy. You should be able to narrow your options by excluding options that are too expensive or too small (or large, for that matter) pretty easily, but you may still have hundreds of options to choose from, and no easy way to know which one to choose. There are at least two major strategies for whittling one's consideration set down to a single chosen option. One approach is to compare the relevant attributes of all of the options you're considering, and attempt to identify the very best option. This strategy is referred to as *maximizing*. An alternative approach to making such a decision is to use a *satisficing* strategy: simply set a standard for quality and select the very first option you come across that meets this standard (Simon, 1955). Although maximizing should theoretically yield better outcomes—done properly, you should always get the best option available—in practice, people who tend to engage in maximizing (rather than satisficing) are subject to a host of negative psychological outcomes, such as increased depression and decreased life satisfaction (Schwartz et al., 2002). What's more, maximizers have a hard time committing to any one option, showing less of the post-decision rationalizing that helps us feel good about our choices no matter how good a choice it was (Sparks, Ehrlinger, & Eibach, 2012). This helps explain why maximizers report less satisfaction than satisficers despite obtaining objectively better outcomes (Iyengar, Wells, & Schwartz, 2006). The differences between using a maximizing and a satisficing approach, and particularly the differences in the resulting psychological well-being, help illustrate two of the big reasons why large choice sets can be problematic: the large number of comparisons required and unreasonable expectations.

[5] This is in part due to companies attempting to distinguish themselves in a crowded marketplace. For any given brand, adding more options leads consumers to infer that the brand has expertise in the area, and therefore that its offerings are better (Berger, Draganska, & Simonson, 2007). This approach is, of course, less effective when everyone does it, starting the arms race that created ultra-specific options like Diet Caffeine-Free Cherry Vanilla Coke, and resulted in sagging store shelves and bewildered consumers.

[6] A recent meta-analysis suggests that the demotivating effect of too-much-choice may be present in only certain circumstances, such as under time constraints or when the need to justify one's choice is high (see Scheibehenne et al., 2009, 2010). This is described further below.

Comparisons

Making a choice from a large consideration set can require a large number of comparisons, particularly when using a maximizing strategy. To be sure, it is quite natural to engage in comparative processes (Gilbert, Giesler, & Morris, 1995), and people often do need comparative information in order to evaluate something properly. In one particularly telling example, participants were willing to pay more for 7 oz of ice cream when it overflowed a tiny cup than for 8 oz of ice cream when it only partially filled an enormous cup—they used the size of the cup to inform their judgments, when it really should be extraneous to how much the ice cream itself is worth (Hsee, 1998; Sevdalis & Harvey, 2006). Without the ability to make certain comparisons (e.g., the actual amount of ice cream), misleading cues (like inappropriately sized cups) can cause people to make poor decisions.

Indeed, some comparisons might be quite helpful, particularly when they are easy to make, and there is little chance for error. In the television example above, it's quite easy to compare models on price and size, because those attributes are *alignable* (e.g., Gentner & Markman, 1994). Clearly, cheaper is better than more expensive, and larger is better than smaller (within reason, of course). If price and size were the only attributes televisions had, it would be relatively trivial to make a choice; you'd still need to find the sweet spot in the apparent trade-off between price and size, but that's it. Unfortunately, there will quite often be other features that do not align—a feature that is present in one option but absent in others. One set might have a smart dimming feature, while another might have a suite of internet-connected apps, and still another might include a camera so that you can video chat with family and friends. How can you possibly compare these features or decide which one you'll appreciate more over time? Attempting to compare incomparable features can be very frustrating, incredibly demanding (Zhang & Markman, 2001), and because people tend to search for more options as they learn more about the different nonalignable features available (Griffin & Broniarczyk, 2010), it can exacerbate the problem by making the choice set even larger. As the size of the choice set increases, so do the number of difficult comparisons required, which has negative consequences for your ultimate satisfaction with your choice (Reutskaja & Hogarth, 2009; Scheibehenne, Greifeneder, & Todd, 2010). Perhaps it is no surprise that having more alignable features can mitigate some of the downsides of large choice sets (Herrmann, Heitmann, Morgan, Henneberg, & Landwehr, 2009).

A big part of the reason that nonalignable features are such an issue is related to the different modes in which we make evaluations (see Hsee, Loewenstein, Blount, & Bazerman, 1999). In the store, making a decision between ten different televisions, you are in joint evaluation (JE) mode. In your living room, where you'll actually watch the television, you're in separate evaluation (SE) mode (Hsee & Zhang, 2004). People can rely on comparative information in JE, when the options are side by side, but less so in SE, when the other comparison targets are not present. For instance, in the store, you might see that Television A has a slightly better picture quality than Television B and decide that this justifies its higher price. However, because it's very

difficult to evaluate small differences in attributes like picture quality without a direct comparison, you may not be able to appreciate that slightly better picture once you bring the television home, removing the justification for spending the extra money spent. Attributes that may seem important on a relative level (i.e., when in JE mode) might not matter at all on an absolute level (i.e., when in SE mode), as long as they're above some threshold of quality.

This can work slightly differently for nonalignable attributes, because unlike alignable attributes, your memory for the presence or absence of some feature can make SE mode feel like JE mode. If you decide not to spend the extra money to get Television A's better picture quality (an alignable attribute), as long as the picture quality of Television B generally looks good to you, it is unlikely to impact your day-to-day enjoyment. However, if you choose a set without the smart dimming feature (a nonalignable attribute), each time you are nearly blinded by the screen when turning on the television at night, you might recall that you could have avoided that experience by getting a different television, and that knowledge can diminish your satisfaction. Even though you're not in the store anymore, because you learned about and retained information that does not require the comparison target to be present to evaluate, you may find yourself in JE mode and lose some of the benefits of getting away from comparative information. This is not to say that these nonalignable attributes cannot contribute to enjoying the money you spend, but that they can come with unanticipated costs. Engaging in an extensive comparison process can haunt you later on (Dhar, Nowlis, & Sherman, 1999)—it can even feel like the unchosen options that you considered closely are being taken away from you (Carmon et al., 2003). Without such extensive comparisons, you might remain blissfully unaware.

Expectations

When deciding how to spend your money, your expectations will play a role in how you decide as well as how you evaluate the outcome. While pondering whether or not to make a particular purchase, people certainly do try to anticipate how that purchase will ultimately make them feel and make their choices based on these beliefs (Mellers et al., 1999; Shiv & Huber, 2000). Later, when evaluating the purchase, people compare their actual experience with the purchase to their prior expectations of its performance (e.g., Bell, 1985; Oliver, 1980) as well as how their experienced affect matches their expected affect (Patrick, Macinnis, & Park, 2007; Phillips & Baumgartner, 2002). It's easy to see how people might be wrong on either count and in either direction. In terms of performance, you might correctly expect a new wool sweater to be warm and comfortable but fail to anticipate how itchy it gets, or you might be pleasantly surprised that a new jacket is much better in the rain than you expected. In terms of affect, even if your predictions about how a new pair of shoes will feel are very close to the reality, you might find that you get much more or much less enjoyment out of them than you expected you would

(particularly if you fail to consider the role of adaptation, as described above). Money is generally considered well-spent when expectations of performance and experience are met or exceeded, creating happiness and satisfaction, and ill-spent if those expectations are not met, creating dissatisfaction and regret (Bell, 1985; Oliver, 1980).

Expectations are tricky, however, because they are not completely independent of how the event itself is experienced (Wilson, Lisle, Kraft, & Wetzel, 1989). For instance, participants in one study who spent some time thinking about how great a Hershey's kiss would taste, thus inflating their expectations, ended up enjoying the chocolate more than participants who simply ate it right away (Nowlis et al., 2004). Delaying consumption thus has additional benefits beyond decoupling the pleasures of consumption from the pain of paying, as described above. It provides hedonic benefits from the mere act of anticipating something positive, and it provides time for positive expectations to increase enjoyment of the event. There are limits to how much expectations can positively influence our experiences, of course, so it's important not to raise expectations well beyond what is reasonable, or dissatisfaction and regret are the likely outcomes. That is, there is a sweet spot in which we are able to reap the benefits of anticipation without succumbing to the problems of missed expectations. This is particularly true of our affective expectations, since affective experience is generally more intense during anticipation than recall (Van Boven & Ashworth, 2007), and people aren't particularly good at predicting the magnitude (Buehler & McFarland, 2001; Gilbert et al., 1998) or duration (Wilson et al., 2000) of the emotions brought on by some future event. When people inevitably do misforecast their affective reaction, it seems to be that feeling worse than expected negatively impacts evaluations, but feeling better than expected doesn't have an equivalent positive impact (Patrick et al., 2007). Consistent with the notion that losses loom larger than gains (Kahneman & Tversky, 1984), people spend a lot more time thinking about why an affective experience didn't live up to their expectations, but simply accept a more positive affective experience without further elaboration (Gilovich, 1983; Hastie, 1984).

The downsides of expectations are especially evident in large choice sets, since the large number of options can create the expectation that the perfect option is actually available (Diehl & Poynor, 2010). This expectation certainly seems reasonable—how could you not find exactly the right television for you from the hundreds of models available? Having such high expectations can lead to a more extensive search if that perfect option does not present itself quickly, further encouraging a maximizing approach. Plus, as described above, the more extensive your search, the more you learn about nonalignable features (Griffin & Broniarczyk, 2010). That is, as you browse through the available television sets, you will start with a certain number of features that you know you should be checking and comparing, such as price, screen size, picture quality, and energy consumption. When you encounter a set that has a smart dimming feature, something you didn't previously realize you might want, you now must add it to the list. Each new attribute that you encounter teaches you something about the possibilities, and changes your expectations about what it means to be a good choice. The longer you search, the more you learn, the

higher your expectations, and the less likely you are to ultimately end up being satisfied with your choice (Griffin & Broniarczyk, 2010).

High expectations can influence not just the search and decision-making process but also what people end up choosing. When the choice is difficult, as it typically is from large choice sets, many people feel a greater pressure to make a decision that is justifiable to others, and the justifiable choice isn't necessarily the best choice, at least in terms of happiness. For instance, people are more likely to select a utilitarian option than a hedonic option, since it's easier to justify buying something that's useful than something that could be considered indulgent (Sela, Berger, & Liu, 2009). People also place a greater emphasis on alignable features than nonalignable features because they are easier to compare and therefore easier to justify (Markman & Medin, 1995). In fact, the negative effects of choice overload may only occur when decision-makers have some expectation of needing to justify their choice, since the strategy most likely to produce a justifiable choice is maximizing; in the absence of that pressure, large choice sets might not be detrimental at all (Scheibehenne, Greifeneder, & Todd, 2009; Scheibehenne et al., 2010; see also Botti & McGill, 2006; Tsiros, Mittal, & Ross, 2004). The mere act of engaging in an extensive search and comparison process, with expectations for a good outcome high, the pressure to get a really good option may be quite high. After all, if you've put in a great deal of effort to find a good option, if it doesn't turn out well, then you can blame yourself for not doing just a little bit more searching or comparing.

For all the reasons outlined above, it may be no surprise that the kind of extensive search process that maximizers engage in, with all its comparisons and effort, might provide an objectively better outcome, but might actually produce less enjoyment (Iyengar et al., 2006). Thus, whenever possible, you should avoid large choice sets, engage in relatively few comparisons, keep the pressure to get the very best option low, and try to keep in mind whether the relative differences between options will actually produce a meaningful gain in enjoyment. To be sure, many choice contexts are set up in ways that makes it difficult to take that advice. Plus, much of that advice is of the "thou shalt not" variety, which isn't always particularly helpful. To provide more positive approaches, the next section specifically discusses purchases that, by their very nature, eliminate (or at least lower) many of the roadblocks between the act of spending money and the expected hedonic payout.

On What, and on Whom, Should You Spend Money?

The sections above defined and described the act of spending in terms of the psychological processes involved, with a special emphasis on issues that prevent a purchase from achieving its intended outcome: happiness. This section focuses on specific types of purchases that tap more directly into the psychological processes most likely to yield satisfaction and increase overall well-being. To start, the distinction between material possessions (tangible objects like jewelry, clothes, and electronic

gadgets) and experiences (intangible purchases like vacations, meals at restaurants, and concerts) has proven quite useful (Van Boven & Gilovich, 2003). Generally, research suggests that for the same amount of money, experiences tend to be more satisfying, and make people happier, than possessions (Carter & Gilovich, 2010, 2012; Howell & Hill, 2009; Howell, Pchelin, & Iyer, 2012; Nicolao, Irwin, & Goodman, 2009; Van Boven & Gilovich, 2003; cf. Caprariello & Reis, 2013).

Although there are several specific reasons why experiences seem to offer hedonic benefits, much of the explanation has to do with the features inherent to each type of purchase. It's worth stating, of course, that the defining features vary by degree, and thus the distinction between experiences and possessions isn't always clear-cut. Although most experiences are indeed intangible, there are certainly physical objects that are highly experiential when they are being used—allowing them to change states like ice melting and refreezing. Although a good fiction book is a physical object, it is highly experiential while you are reading it: mentally transporting you to other places, times, or even to other realities. Similarly, owning a physical copy of your favorite movie is indeed a tangible object, but your main interaction with it is through the experience of watching the film. Once that experience is over, the object goes back on the shelf, just like any other material possession. The existence of these purchases with ambiguous properties does not, however, impugn the importance of the distinction between material and experiential purchases. Even though some purchases might seem quite slushy, not easily categorized as solid ice or fluid water, focusing attention on the ice or the water makes different psychological processes salient, thus creating different psychological outcomes—as if the mere act of focusing on the water melted all of the ice. For instance, when the exact same purchase (e.g., a boxed set of music or a 3D TV) is described in terms of its material or experiential qualities, it has the same beneficial psychological effects as more canonical possessions or experiences (Carter & Gilovich, 2010, 2012; Rosenzweig & Gilovich, 2012). Plus, people generally have little trouble understanding the distinction and can readily identify examples that observers agree fit the categories well, apparently interpreting a gradient as distinct hues (Carter & Gilovich, 2010). Indeed, in the studies investigating that distinction, recalling different types of purchases based on even the barest description of the categories seems to have hedonic consequences for participants, suggesting that the categories are both useful and consequential. Still, it might be better to think of the distinction between experiences and possessions as a continuum, and the position of any one purchase on that continuum as a function of not just its inherent properties, but also which properties are psychologically salient at the moment (see Carter & Gilovich, 2013).

So what is it about experiences that seem to make people happier? Although it is undoubtedly multiply determined, there are several distinct reasons that have been identified so far. The sections below will discuss several such reasons: the benefits of experiences' intangibility to issues of expectations and adaptation, the smaller role that comparisons play in experiential decision-making and evaluation, the ability for experiences to strengthen social bonds, and the greater contribution that experiential purchases make to the self-concept.

Expectations and Adaptation

Prior to making the purchase, expectations can exert both a positive influence (via positive anticipation) and a negative influence (when raised to unreasonable levels) on satisfaction. How might you find the sweet spot—allowing positive anticipation to increase your expectations so that they increase actual enjoyment, without setting the bar so high that disappointment is the only possible result? Experiences seem to offer some benefits over possessions in this regard, both in terms of allowing high expectations to increase enjoyment and in terms of reducing disappointment when the outcome isn't as positive as expected.

For instance, in a study of spring break experiences, participants reported their expectations for how their vacation would go, their enjoyment while actually on the vacation, and their retrospective memories for the event weeks later (Wirtz, Kruger, Scollon, & Diener, 2003). In this study, participants' expectations were positively related to both their online reports and their memories for the event, suggesting that they were positively anticipating the event and that those increased expectations actually improved both the experience itself and their memories of it. Why might this be the case more so for experiences than possessions? Because an experience is intangible, abstract, and fleeting, with a fair amount of uncertainty about exactly how it will transpire. A small amount of uncertainty alone can make a positive experience more enjoyable by encouraging a pleasant elaboration on potential explanations (Wilson, Centerbar, Kermer, & Gilbert, 2005). And because experiences are more abstract—in fact, merely taking time to think about a recent material or experiential purchase puts people into a more concrete or an abstract mindset, respectively (Carter, 2013)—that positive elaboration can be more effective.

If your expectations for a vacation in Grand Cayman are particularly high—indeed, it would be hard not to expect a week sipping drinks on a white sand beach to be fantastic—even if that positive anticipation improved the experience, the odds that the reality truly lives up to your expectation may be quite low, partly because you won't bother to imagine any potential downsides (Newby-Clark et al., 2000). Chances are pretty good that you failed to foresee the frustration of constant sunscreen application, the embittering effect of overpriced drinks, or the baffled annoyance at a nearby couple's decision to blast Jock Jams'96 for the entire beach to hear. Over time, however, the actual feeling of anger created by those nuisances will fade and seem trivial, allowing you to see it as a learning experience, or a funny story; the more positive aspects eventually dominate memories (Mitchell, Thompson, Peterson, & Cronk, 1997). Indeed, in the spring break study mentioned above, it was only memories of the experience, not the experience itself, that predicted how likely they were to want to repeat the experience (Wirtz et al., 2003). However, because possessions are more concrete and physically endure through time, they are not as easily reconstrued or reimagined. Thus, if your new couch turns out not to be the paragon of comfort and style you'd expected, it will sit in your living room each day as a constant reminder of your folly. That greater ability to reconstrue the negative aspects of an experience is one reason why happiness with experiences seems to

hold steady or even improve over time, whereas happiness with possessions tends to decline (Carter & Gilovich, 2010).

As described above, well before physical decline sets in, hedonic adaptation can begin to leach away a purchase's initial pleasure, so any disruption of adaptation processes will help that initial pleasure endure. Here too, experiences offer a benefit, since they seem to do a better job than possessions in resisting hedonic adaptation (Nicolao et al., 2009). One reason is because experiences are, by definition, transient states, it can be very difficult to get used to them. Possessions, being physical, tangible objects that persist in space and time, are more prone to this sort of adaptation. That initial thrill from owning a new dining room table will fade as it sits there, unchanged, day after day. That is not to say that one cannot adapt to a transient state if it is repeated too often. As mentioned in the example above, eating your favorite meal too frequently can rob you of its pleasure. Adding variety, surprise, and uncertainty can help prevent the natural process of affective adaptation to pleasurable events (Wilson & Gilbert, 2008). For instance, adding short interruptions to experiences can be sufficient to prevent them from getting old, to the point that commercials, typically derided as unpleasant, may actually increase enjoyment of a television show (Nelson & Meyvis, 2008). Applying a similar logic, frequent small purchases may actually provide a greater hedonic benefit than a single large purchase (Dunn et al., 2011; Dunn & Norton, 2013). Because pleasurable experiences are subject to diminishing marginal utility (another insight of prospect theory; Kahneman & Tversky, 1979), you can get a greater total amount of pleasure by consuming several small experiences than one big one. Taking frequent small vacations is likely to make a bigger impact on your well-being than one big one. This is also likely true of possessions; frequently buying small material possessions may make you happier than one extravagant purchase. Small frequent material purchases suffer from one significant disadvantage, however: they accumulate over time and clutter up your life.

Invidious Comparisons

As described above, large choice sets and decision-making strategies that emphasize comparative information (i.e., maximizing) can have negative hedonic consequences. However, many of these effects are much more true of possessions than experiences. To start, maximizing appears to be the strategy that offers a more natural fit for material possessions, in no small part because of the tangible nature of possessions. It was no accident that many of the examples used to describe maximizing in the sections above were physical objects. Televisions, for instance, can fairly easily be compared side by side, inviting comparisons that quite often don't matter after you've brought your purchase home. You might be able to see that one television offers deeper blacks than another when they're right next to each other (in JE), but in your living room (in SE), that direct comparison will be impossible and therefore will not impact your enjoyment (Hsee, 1996; Hsee et al., 1999;

Hsee & Leclerc, 1998; Hsee & Zhang, 2004). With possessions, because the comparisons are so easy and prevalent, people seem inclined, perhaps even feel obligated, to use the more comparison-oriented strategy of maximizing. Indeed, when faced with a material purchase decision, people report that they're more likely to use a maximizing strategy (Carter & Gilovich, 2010).

Experiences, on the other hand, seem to offer a more natural fit with the satisficing approach. For instance, imagine that you're deciding where to go on vacation. There is certainly no shortage of places to visit, meaning that the best decision will by no means be obvious. There is also plenty of opportunity to compare all of the various destinations, but those comparisons are much more difficult than comparing two televisions—the attributes of experiential purchases tend to be much less alignable than the attributes of possessions. Plus, the intangible nature of experiences makes it impossible to truly compare two vacation destinations side by side, except on the more tangible and concrete attributes, like price. Most of the comparisons will be either entirely hypothetical—imagining yourself on a beach is very different than actually being at one—or even completely incomparable—comparing the sun of Aruba to the culture of Venice is very much an apples-to-oranges proposition. If one cannot make such comparisons, then a maximizing approach is decidedly unsuitable, and it makes more sense to evaluate each option on its own merits. Indeed, participants report that they are more likely to use a satisficing approach for experiential purchase decisions (Carter & Gilovich, 2010).

The different decision-making strategies evoked by material and experiential purchase decisions show downstream consequences in line with what you'd expect: maximizing and satisficing, respectively. In one experiment, participants were assigned to recall either a material or experiential purchase they had made from a large array of options. Consistent with a more extensive decision process, participants reported that making a material purchase decision was simply more difficult than making an experiential purchase decision. If, because of the more extensive comparison process involved in the material purchase decision, information about the foregone options was retained, possessions might be particularly likely to provoke the kind of negative counterfactuals that create feelings of regret and dissatisfaction (see Rosenzweig & Gilovich, 2012). Indeed, participants who recalled a possession were still being bothered by thoughts of the foregone options, and it was these nagging thoughts that explained why possessions were less satisfying than experiences in the present (Carter & Gilovich, 2010).

Although making comparisons between experiential options is certainly more difficult, comparative information is also less important for experiences, forming a smaller part of satisfaction judgments than is the case for possessions. When people evaluate a possession, they need some frame of reference or point of comparison in order to come up with a judgment; with experiences, the experience itself, on its own merits, provides the lion's share of the evaluation process (Carter & Gilovich, 2010; Hsee, Yang, Li, & Shen, 2008; Ma & Roese, 2013). Thus, even when negative comparative information is salient, experiences are relatively immune to its influence. For instance, in an experiment where participants were given either a material prize (a good pen) or an experiential prize (chips) in the context of either much

better or much worse prizes, the context played a big role in how participants evaluated the pen—rating it lower when it was worse than the other prizes—but had no impact on how much they enjoyed the chips (Carter & Gilovich, 2010). Even when that information is made quite salient, such as when participants in other experiments were told that the price had dropped on a purchase they had made, or that new and better options were now available, that information sapped participants' satisfaction with material purchases but not experiential purchases (Carter & Gilovich, 2010).

This evidence suggests two hedonic advantages experiences have when it comes to the act of spending money. First, experiences nudge people into using decision strategies that are less comparative, and thus more conducive to happiness. Second, because they are relatively immune to potentially invidious comparisons, when negative comparative information inevitably does arise, it has a much smaller detrimental impact on satisfaction. Of course, you cannot live on vacations and concerts alone, so when you are making material purchase decisions, try to treat them more like experiences: make your choices using something closer to a satisficing process, use comparisons only when they're most helpful—between alignable attributes when actually making the decision, not after the decision is made—and do your best to evaluate your purchase on its own merits.

Making Meaning

Some of the purchases that offer the most enduring satisfaction are those that become personally meaningful, which make some contribution to our sense of self (see Belk, 1988). Experiences, more so than possessions, seem to embody this principle as well (Carter & Gilovich, 2012). Why might this be the case? One reason has to do with how the different types of purchases persist over time. As mentioned above, experiences persist only as memories, and memories of an event tend to be rosier than the actual experience (Mitchell et al., 1997). With a little temporal distance, you'll forget about the ravenous mosquitos and the overcooked eggs on your camping trip, but you will retain the memory of the incredible starry sky and the sense of relaxation (even if it didn't feel all that relaxing at the time). Possessions, on the other hand, will be ravaged by time just like any other physical object. Shoes get scuffed and wear out; cell phones become obsolete. To be sure, that difference in tangibility is another reason why experiences seem to retain, or even improve their value over time, whereas satisfaction with possessions seems to decline (Carter & Gilovich, 2010).

But the intangibility of experiences also means that they are more directly connected to the self-concept—memories being an essential component of the self (e.g., Kihlstrom, Beer, & Klein, 2003; McAdams, 2001; Wilson & Ross, 2003)—whereas possessions are more physically distant from the self. Experiments confirm this intuition. For instance, participants in one study were first asked to recall a number of both material and experiential purchases. Then, they were given an example of the diagrams used in the independent–interdependent selves literature, where circles representing family members are plotted around a central "self" circle,

with the proximity of each circle relative to the self-circle indicative of the degree to which that family member contributes to the self-concept (see Markus & Kitayama, 1991). They were then given a blank self-circle and asked to use the same logic to plot the circles representing the purchases they had recalled earlier—literally diagramming the centrality of each purchase to their self-concept. As expected, participants plotted their experiential purchases closer to the self-circle than their material purchases. In another experiment, participants were more likely to include experiential than material purchases in a narrative telling their life story. These two experiments together suggest that people do consider their experiences more central to the self-concept, but more importantly, is centrality to the self-concept part of the reason *why* they are more satisfying? Participants in another experiment were asked to recall either a material or an experiential purchase, and then were asked to imagine that they could go back in time and make a different choice, selecting a different option instead, but without changing their current circumstances—essentially swapping out their memories for new ones. Participants were less willing to make that memory swap for an experience than a possession, and that relative willingness did indeed explain why the possessions were less satisfying than the experiences (Carter & Gilovich, 2012). Experiences did more to create participants' sense of self, so changing an experience meant changing the very nature of their self-concept, something people strongly resist (Gilovich, 1991). Indeed, it's no accident that people talk of "formative experiences" and not "formative possessions."

Overall, it seems that money spent on purchases that are personally meaningful, or contribute to our sense of self, is going to produce greater hedonic returns, and choosing experiences over possessions is just one easy way to accomplish this. There are certainly other types of purchases that are likely to be personally meaningful. Other work suggests that purchasing products that are aligned with your own ethical code, such as environmentally friendly products, can be associated with greater well-being (Welsch & Kühling, 2010; Xiao & Li, 2010; cf. Griskevicius, Tybur, & Van den Bergh, 2010). Purchases that require you to invest a bit of yourself into them, such as self-assembled furniture, also seem to provide more enduring satisfaction, partly because they create a feeling of competence, fulfilling another basic psychological need (Mochon, Norton, & Ariely, 2012; Norton, Mochon, & Ariely, 2012). In fact, people are willing to give up higher wages in exchange for the feeling that the work they're doing is meaningful (Ariely, Kamenica, & Prelec, 2008). Clearly, meaning matters. When deciding how to spend your money, you should take into consideration whether any given purchase is likely to provide meaning—to contribute to your sense of self.

Social Relationships

Probably the single most robust predictor of well-being is having strong social relationships (e.g., Diener & Seligman, 2002; Myers, 2000), so spending money in service of nurturing your social relationships is nearly always going to be money

well spent. A difference in the social nature of purchases also helps to explain why experiences seem to be so satisfying. First, experiences are simply more likely to involve other people than possessions. After all, many experiential purchases are expressly meant to foster social interaction or to spend time with loved ones, whereas many possessions are meant to be enjoyed alone. If you go see the Rolling Stones in concert, it's likely that you'll share the experience with a good friend or spouse (not to mention 20,000 strangers), but it's unlikely that a new sweater will be used by more than one person (certainly at any given time). Indeed, many possessions can do more to isolate us from, rather than connect us to, our social surroundings. Even though a smartphone's primary use is ostensibly as a telephone—an inherently social purpose—daily train commuters know just how common it is to see the entire train car full of people sitting silently, staring at their phones, playing games or attempting to keep up with their work email. Perhaps it's no surprise that when people are experimentally induced to leave their gadgets in their pockets and actually talk to the other passengers, making even a fleeting social connection, their commutes are considerably more pleasant. In a telling study, daily train commuters in Chicago either were asked to do what they normally did during their commute (which was almost universally solitary, reading or working, often on some kind of electronic device) or were asked to start a conversation with a total stranger. But as daunting as making small talk for 15–30 min might have seemed (and indeed the commuters generally believed that this would not be pleasant), in fact it was those participants who had a conversation who enjoyed their commutes the most, and even considered it at least as productive as if they'd read or worked as they normally did (Schroeder & Epley, 2013).

Participants in another study who reflected on an experiential purchase, compared with participants who reflected on a material purchase, reported greater happiness not only with the purchase that they had made but also greater satisfaction of the higher-order psychological need of relatedness (Howell & Hill, 2009). Meeting this need for relatedness may even be quite crucial to enduring satisfaction from a purchase; social purchases, whether experiential or material, foster considerably more happiness and satisfaction than solitary purchases (Caprariello & Reis, 2013). In fact, spending money on other people has shown to be more satisfying than spending a larger amount of money on oneself. In one study, participants were given an envelope with either $5 or $20 inside and were assigned to spend that money either on themselves or on another person by 5 pm. Incredibly, participants who spent their money on someone else were happier than participants who spent the money on themselves, but how much money they were given didn't make a difference (Dunn, Aknin, & Norton, 2008). This basic phenomenon has been replicated in a variety of other countries (Aknin et al., 2013), and even 2-year-old children are happier when giving their own resources (in this case, Goldfish crackers) to others than when they receive the treats themselves (Aknin, Hamlin, & Dunn, 2012). There's even evidence that this prosocial spending is self-reinforcing—the happier participants in one study were, the more likely they were to spend a windfall on others (Aknin, Dunn, & Norton, 2011). Thus, if you are going to spend money on possessions instead of experiences, you're probably better off buying them for someone else.

Other work has shown that experiences confer a social benefit even further downstream, when conversing with people who were not directly involved in the purchase itself. For instance, participants in one experiment were asked to have a conversation with a stranger (also a participant), but were limited in their conversation topics. Half of the pairs were confined to talking about experiences they'd purchased, and the other half were confined to talking about their possessions. After the conversation was over, participants who had talked about experiences felt the conversation went better and liked their conversation partner more (Van Boven, Campbell, & Gilovich, 2010). In other words, while you might be excited to talk about your shiny new laptop, people will be much more receptive to hearing the stories from your recent trip to San Francisco. Part of the reason may be that experiences are more resistant to social comparisons than possessions, so talking about your experiences with others is less likely to incite feelings of jealousy (Carter & Gilovich, 2010; see also Solnick & Hemenway, 1998). There's also evidence that people are more likely to spontaneously talk about their experiences than their possessions, which not only provides the opportunity to make meaningful social connections as described above but also helps people to "reconsume" that experience, embellishing and improving the memory (Kumar & Gilovich, 2013). What's more, people seem to cherish that mechanism of sharing. In an experiment, after ranking either a variety of beach vacations (experiential condition) or electronic gadgets (material condition), participants were asked to imagine that they had to choose between getting their top-ranked option, but with the caveat that they weren't allowed to talk about it with anyone, or their second-ranked option, which had no restrictions. Participants in the material condition apparently didn't care about sharing—they simply wanted their top choice and were perfectly happy to forgo the social element in order to get it, further illustrating the more solitary nature of possessions. Not so with participants in the experiential condition: the ability to talk about their experience with others was far more important, so they greatly preferred the socially unrestricted second-ranked option (Kumar & Gilovich, 2013).

Thus, a big part of the reason why experiences end up being more satisfying ways to spend money than possessions is that they confer greater social benefits both during and long after the purchase itself. Given how important other people are to our well-being, spending money that reinforces your social relationships, or helps you feel a sense of connectedness to the world, is going to be money well spent—even if you don't get to consume it yourself.

Conclusion

The act of spending money is an emotional decision, with hedonic consequences that can last far into the future. Greater attention to how we approach that act, and especially the processes by which we make our decisions, can help one accomplish the overarching goal of improving one's well-being. The attention one pays need not be exhausting, however. The approaches outlined above offer a few ways that

may help reduce the anxiety many people feel when pondering an act of spending—worrying about the prospect of buyer's remorse—that robs the moment of some of its excitement. It may not be easy to make peace with the fact that spending money is always going to involve a loss and focus instead on what you'll gain, but perhaps a good way to start is simply to choose to take a good friend out to share a nice meal, savor each bite, and make a memory that you'll cherish for a lifetime.

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Chapter 11
Two Sides of the Same Coin: Money Can Promote and Hinder Interpersonal Processes

Nicole L. Mead and Anika Stuppy

Abstract Money is a complex phenomenon: it has the potential to unite people from opposite corners of the globe but it can also be the source of strife and suffering. Understanding when, why, and how money changes interpersonal processes is thus an important endeavor for many academic disciplines. To shed light on these questions, this chapter reviews a growing body of research that has investigated the linkages between interpersonal outcomes and money in its varied forms, such as loving money, having money, and merely thinking about money. To date, the majority of the psychological literature points to money hindering interpersonal harmony and inner processes that facilitate interpersonal outcomes. Yet emerging evidence indicates that money has the potential to foster interpersonal harmony, particularly in exchange contexts or when the dominant exchange function of money is overridden by communal motives. Although money and power have elicited similar outcomes, power cannot explain all the cognitive, motivational, and behavioral consequences of money. Future research should therefore continue to disentangle how money and power similarly and differentially alter interpersonal processes. Additionally, research should continue to uncover the interpersonally beneficial consequences of money, so that future generations can fully utilize the remarkable strengths of money for the benefit of many.

When considered on an evolutionary timescale, money is a relatively modern human invention. Nevertheless, it has dramatically revolutionized the face of human society. Perhaps more so than any other non-biological incentive, it is a

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E. Bijleveld and H. Aarts (eds.), *The Psychological Science of Money*,
DOI 10.1007/978-1-4939-0959-9_11,

potent motivator of human behavior, making it a powerful engine of growth. Its effectiveness as an exchange tool has the potential to bind people together, facilitating mutually beneficial transactions both within communities and across opposite corners of the world.

Positives aside, money is often argued to have a dark underbelly. Scholars from diverse disciplines long have criticized money, blaming it for increased selfishness and the dissolution of social bonds and communal values (e.g., Marx, 1964; Schwartz, 1994). Thus, money seems to engender opposite interpersonal outcomes: the ability to pull people together and the ability to split them apart. Are these opposite interpersonal outcomes two sides of the same coin?

Mapping out when, why, and how money can promote or hinder interpersonal processes is a lofty goal, but charting the territory is greatly facilitated by a tremendous growth in empirical research on the topic. Until recently, psychological research has been primarily dominated by the view that money hinders interpersonal processes. However, emerging research suggests that money can also facilitate harmonious social outcomes. This research is still in its early stages, but the results are encouraging, and they are increasing the field's ability to paint a relatively more textured portrait of how money influences social harmony.

Given that the psychological study of money and interpersonal processes has grown by leaps and bounds in the recent decades, the primary purpose of this chapter is to take stock of this rapidly growing body of literature. From the outset, it is important to note that many different paradigms for studying money have emerged in the recent decades. For example, some researchers expose participants to symbolic reminders of money, in order to "prime" the concept of money. Other researchers incentivize participants with the reward of money, while still others examine loving, wanting, and having money. The current chapter uses the term money include these different instantiations. However, we use specific terminology when covering the different paradigms for studying money. As it will become apparent throughout this chapter, the different methods of measuring and manipulating money often furnish surprisingly similar outcomes.

We begin the chapter by reviewing research that has examined the effects of money on interpersonal preferences and outcomes. Then we move to examining the consequences of money for inner psychological processes that help serve interpersonal outcomes, such as prosocial motivations and sociocognitive processes. To tie together the diverse findings covered throughout the chapter, we then summarize the different meanings of money and evaluate their explanatory power for the interpersonal outcomes covered in the chapter. By way of preview, we propose that both the beneficial and harmful effects of money may be captured through the theoretical lens that money elicits a market-pricing mode (Fiske, 1991, 1992) to social relationships. In this way, the beneficial and harmful effects of money for interpersonal outcomes are proposed to be two sides of the same coin. We close by discussing limitations of existing work and sketching out some potentially fruitful avenues for future research.

Interpersonal Outcomes

Given that this chapter concerns interpersonal processes, we begin at the most obvious place, whether money has the potential to alter interpersonal outcomes. To facilitate comprehension of the vast number of findings that have emerged, subsections are divided by the conceptualization of money and the type of outcome.

Money and Marriage: Financial Disagreements

In romantic relationships, especially marriages, discussions about money are inevitable. There is a general sentiment among lay people and academics, however, that money is not a very easy topic to discuss. Instead, money is viewed as having the potential to elicit heated disagreements among relationship partners, so much so that partners may try to avoid discussing the topic with each other. These lay beliefs hold a grain of truth. Marriage partners were asked about their marital problems in 1980, and these were used to predict divorce over the next 12 years (1980–1992). Disagreement over finances was among the top predictors of divorce, along with infidelity, alcoholism, and drug use, even while controlling for demographic variables such as age, education, income, and remarriage (Amato & Rogers, 1997). Hence, displeasure with how one's partner spends money may contribute to relationship dissolution.

A more nuanced perspective about the link between financial disagreements and relational conflict is possible by considering individual differences in spending styles, known as a person's "pain of paying." "Spendthrifts" are those who generally spend more than they would like to spend, whereas "tightwads" are those who generally spend less than they would like to spend (Rick, Cryder, & Loewenstein, 2008). It turns out that people tend to marry those with an opposite spending style from their own—spendthrifts tend to marry tightwads and vice versa—and it is the discrepancy between spending styles that breeds conflict over finances, which in turn leads to marital dissatisfaction (Rick, Small, & Finkel, 2011). In other words, the more disparate the spending styles of the relationship partners, the more that they bickered over finances and the more unhappy they were with their marriage. Notably, the link between discrepant spending types and relationship strain was statistically accounted for specifically by disagreement over finances, not by other differences that could have emerged as a function of different spending styles. These findings deepen the field's understanding of why money can strain marital relations, because they indicate that money is not unequivocally the source of dispute in marriages. When partners have similar spending styles, money is not a primary source of dispute and relational conflict. However, when people partner up with those who possess a different approach to spending money than their own, relational trouble may ensue. These results also hint that, when it comes to money, people may not be

willing to consider other people's perspective, which can disrupt relational harmony and make coordination between two individuals difficult. This possibility is covered more in detail in the section on empathy.

Research on the pain of paying suggests that people's particular relationship with money has important implications for their social relationships more generally. In the next section, we build on this perspective, covering research that has examined how people's desire for financial affluence may alter their interpersonal relationships. Specifically, we move to the widely investigated topic of materialism.

Materialism and Interpersonal Well-Being

People vary in the degree to which they want, value, and aspire to money and material goods. When having money and material goods takes front and center in people's value system, they are considered to be as highly materialistic. The materialism literature is vast and has set the stage for much of the empirical research that has taken place in the recent decades. The thrust of this work has been that loving money comes at the cost of harmonious and healthy interpersonal relationships (for a review, see Kasser, 2002).

For example, in one study, a group of 200 students were asked about their materialistic goals as well as the quality of their relationships, both friendships and romantic relationships. Results revealed a negative relationship between materialistic aspirations and interpersonal relationship quality: the more that students valued wealth and material goods, the more their relationships suffered, both in terms of length (the relationships were shorter) and quality (the relationships had more negative qualities, such as jealousy, and fewer positive qualities such as trust) (Kasser & Ryan, 1993, 2001). In a different investigation, by a different group of researchers, those who valued being "rich" were more likely to suffer from personality disorders characterized by a difficulty with forming social relationships, relative to those who did not strongly value being rich (Cohen & Cohen, 1995). People with strong financial aspirations were over two times more likely to be diagnosed as schizotypal and approximately one and half times more likely to be narcissistic or avoidant.

The findings from the materialism research are most often taken to mean that wanting money and material goods changes people in a way that is detrimental for their social relationships. However, the vast majority of the materialism literature consists of correlational findings (cf. Bauer, Wilkie, Kim, & Bodenhausen, 2012; Pieters, 2013; covered below) so results should be interpreted with caution. Additionally, to understand why materialism and poor social relations often go hand-in-hand, the different possible chains of causality should be examined.

On the one hand, it could be that people who are poor at navigating social relationships seek money as an alternative path to social success. In other words, social deficiencies cause people to seek money in the hope that money will make them likable and popular (e.g., Banerjee & Dittmar, 2008; Mead, Baumeister, Stillman,

Rawn, & Vohs, 2011). On the other hand, a strong emphasis on wealth and material goods may crowd out collectivistic goals and values, thereby hampering social relationships (Burroughs & Rindfleisch, 2002). Each possibility will now be covered in more detail.

The first line of thought—money is sought to compensate for social deficiencies—is based on theoretical and empirical work suggesting that people use money to improve their interpersonal appeal (Banerjee & Dittmar, 2008; Lea & Webley, 2006; Mead et al., 2011). Direct support for this conjecture comes from a series of experiments which demonstrated that social rejection (vs. acceptance) caused people to trade off money for material goods and consumption experiences that would help them forge new social bonds, even if those material goods or experiences were opposite from their own preferences (Mead et al., 2011). For example, socially excluded participants were willing to trade off more money than others to eat chicken feet with a partner who expressed an liking for chicken feet, but only when doing so could help them gain acceptance (i.e., they would meet the person face-to-face).

Other supportive evidence comes from a study with elementary school children in the UK which found a positive relationship between ostracism and scores on materialism measures (Banerjee & Dittmar, 2008). In direct support of the argument that material goods are desired to enhance interpersonal appeal, the relationship between perceived exclusion and materialism was statistically accounted for by the belief that material goods would lead to social acceptance. Still further evidence comes from an experiment which found that people who were induced to feel socially included felt less attachment to their belongings than those who were induced to feel socially excluded (Clark et al., 2011). When taken together, these studies suggest that, because money is a tool that enables people to access goods and resources that can enhance one's social appeal, social deficiencies cause people to seek money and material goods as a path toward acceptance.

The second possible causal chain is that valuing money changes people in a way that strains interpersonal harmony. To test this possibility empirically, a series of experiments experimentally elicited materialistic desires (i.e., valuing material goods) among some participants but not others and examined subsequent changes in sociocognitive variables that are pertinent for the formation and maintenance of social relationships (Bauer et al., 2012). In one study, viewing pictures of luxury goods (vs. pictures of neutral objects) reduced participants' desire to engage in social activities, arguably because it activated the desire for material goods. In a different study, participants completed a task that was either framed as a "consumer reaction study" or a "citizen reaction study." Participants who were "cued with consumerism" showed a stronger bias toward self-enhancement values, which are problematic for social well-being because they conflict and perhaps even suppress communal values (e.g., Burroughs & Rindfleisch, 2002; Maio, Pakizeh, Cheung, & Rees, 2009; Schwartz, 1992). These results suggest that even transient materialistic desires can increase selfishness, competitiveness, and mistrust. The findings are noteworthy because they go beyond the notion that the relationship materialism and poor social outcomes is primarily at the individual level. Instead, the findings suggest that modern

human life, which bombards people with monetary and material cues, can create a self-centered mindset that hinders harmonious social relationships.

Two possible causal chains for the positive correlation between materialism and social deficiencies have received empirical support. People who experienced social deficiencies sought and used money for their quest of social acceptance. However, desiring material goods increased self-enhancement values and decreased social engagement. These two chains may not be separate at all; they may be linked in reciprocal relationships, as was suggested by the findings of a recent longitudinal study. Pieters (2013) tracked 2,500 people over 6 years and found bidirectional relationships between materialism and loneliness over time. Pursuing material goods to gain status or to increase one's happiness resulted in a self-perpetuating cycle of materialism and loneliness. However, pursuing material goods for their own enjoyment decreased loneliness and was unaffected by loneliness also. This last result does not conclude, however, that wanting material goods for material mirth bolsters interpersonal outcomes. Loneliness is a subjective perception of whether one's social needs are being met. Thus, it could be that people who are personally gratified by material objects do not desire social relationships, which is why pursuing material goods did not contribute to loneliness. Nevertheless, this longitudinal study is important because it provides the first demonstration that materialism and loneliness can reinforce one another over time.

Income and Socioeconomic Status

Beyond wanting and valuing money, how does having money, particularly an abundance of money, change interpersonal processes? Here again, two plausible but opposite possibilities are possible: having ample monetary resources can make one more or less interpersonally appealing in the social arena.

One of the most beneficial consequences of having money is that it enables people to have control over their own outcomes (Johnson & Krueger, 2006). For all manner of unexpected events—breaking one's leg on the top of a mountain, a relative who lives across the world becomes ill, or one's car breaks down in the middle of nowhere—having money greatly facilitates one's ability to tackle or at least mollify the problem in a swift manner. This ability to take things as they come, to have control and mastery over one's environment, may instill a sense of self-efficacy in individuals who have money. Indeed, the link between income and psychological adjustment has been accounted for by performance self-esteem (Gebauer, Nehrlich, Sedikides, & Neberich, 2013). And the inverse of having money—lacking money—can hinder well-being (Price, Choi, & Vinokur, 2002). If money fosters feelings of self-efficacy, which has been linked with interpersonal success across social and achievement domains (Sashkin & Rosenbach, 1996; Sherer et al., 1982; Wheeler & Ladd, 1982), it is theoretically possible that having money could promote positive interpersonal harmony.

On the other hand, money is a social tool that can substitute for other resources (Lea & Webley, 2006) including social relationships (Zhou, Vohs, & Baumeister, 2009).

Hence, having money may enable people to focus on their own desires and wishes, thereby detracting from the amount of time, attention, and energy that people devote to others. This line of thought suggests, then, that having money may diminish social connectedness.

Research budgets (not to mention institutional review boards) often limit researchers from endowing some people (but not others) with large sums of money based on random assignment. Thus, the small amount of evidence that exists for the relationship between monetary affluence and social outcomes is primarily correlational. Despite the limitations of correlational research, it warrants mention because of its external validity.

Research documenting the relationship between wealth and interpersonal processes supports the hypothesis that having money can reduce social sensitivity. In one study, women who were employed, and therefore possessed personal income, reported increased thoughts of divorce (Booth, Johnson, White, & Edwards, 1984) and increased likelihood of divorce (Spitze & South, 1985). These results could be taken as a sign that financial stability leads women to become cold and insensitive to their romantic relationship partners. However, it is possible that possession of personal financial resources increased the women's possibility to exit a problematic relationship.

Other evidence in support of the theory that monetary affluence can undermine social connectedness comes from a study that assessed monetary affluence and the amount of meaning that parents gained from taking care of their children (Kushlev, Dunn, & Ashton-James, 2012). In this study, parents were asked to report the previous day's activities, episode-by-episode using the Day Reconstruction Method (DRM; Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004). Results indicated that SES was negatively related with how meaningful it was to spend time with the children, even when controlling for general meaning in life, which was not significantly related to SES (Kushlev et al., 2012; Study 1). (SES is comprised of income but also education so it is not possible to equate SES purely with having money.) Put differently, the higher the SES, the less parents reported feeling fulfilled by caring for their children.

Yet another finding in support of the hypothesis that more money leads to more social disengagement comes from a study which assessed whether people are able to assess correctly the SES of strangers based on nonverbal cues that signal social engagement (or disengagement) (Kraus & Keltner, 2009). In this study, participants of varying SES were asked to engage in an interaction with a stranger. Small fractions of these clips (60 s) were coded for social engagement (e.g., laughing) and disengagement (e.g., not looking at the other interaction partner and doodling). The clips were then shown to a naïve group of observers who guessed (quite accurately) the SES of the target in the video. Results revealed that upper-SES individuals engaged in more social disengagement cues and fewer engagement cues than lower-SES individuals and that these cues predicted the observers' estimations of participants' SES.

Although it is theoretically possible that having money could promote people's social appeal and the capacity to navigate social interactions, the majority of the published literature (so far) suggests that wealth is associated with disconnection

from others. This irony of possessing money which could be used to promote positive social events, but being disconnected from others dovetails with the bidirectional relationships between materialism and loneliness that were covered in a previous section. The negative relationship between money and social harmony, despite people's intentions to use money in pursuit of social success, suggests that there may be something about money per se that changes people's approach to social relationships. We turn to this possibility next.

Experimental Manipulations of Money

Despite the aforementioned limited research budgets, researchers have devised creative methods to induce perceptions of monetary abundance in participants' minds. For example, participants can be induced to perceive themselves as relatively high in social rank (e.g., Kraus, Côté, & Keltner, 2010) by asking them to compare themselves with people who have the least amount of money, least amount of education, and the worst jobs. (Note that this manipulation confounds money with status and education so the effects cannot only be attributed to money.) Other methods involve having participants count a large stack of money (vs. a large stack of papers; Yang et al., 2013; Zhou et al., 2009). Yet another set of manipulations involves exposing people to symbolic cues connoting wealth, such as pictures or screensavers that display large sums of monetary currency (vs. control pictures, such as flowers, fish, or green lettuce; Vohs, Mead, & Goode, 2006). These latter manipulations are conjectured to activate the construct of monetary abundance, evidenced by the finding that the effects of high money manipulations converge with money primes, whereas the effects of low money manipulations diverge from both high money manipulations and money primes (Vohs et al., 2006; Vohs, Mead, & Goode, 2008).

Research experimentally manipulating the presence of monetary cues suggests that even small reminders of money can hinder people's social sensitivity. For example, the previously mentioned negative correlation between monetary affluence and parents' meaning derived from childcare was conceptually replicated using an experimental procedure that utilized monetary (vs. neutral) primes (Kushlev et al., 2012). In this experiment, parents at a children's festival were asked to complete a questionnaire that had a photograph of either money (Canadian bills) or flowers. After viewing the picture of monetary bills, parents reported experiencing less meaning while being at the children's festival (with their child or children), relative to parents who had seen a picture of flowers. In other words, merely seeing a symbolic representation of money actually caused parents to feel as though spending time with their children at the festival was not an experience that was personally fulfilling or meaningful.

Why might merely seeing a picture of money reduce parents' sense of fulfillment when interacting with their children? Reminders of money have been argued to activate a state of self-sufficiency, wherein people desire to pursue agentic goals

independently of others (Vohs et al., 2006). Said differently, money may activate self-enhancement goals, which may automatically suppress other-oriented goals (cf. Maio et al., 2009). In support of the self-sufficiency hypothesis, participants primed with money worked longer on tasks before asking for help from others and they preferred to work and play alone (Vohs et al., 2006). In this way, exposure to a monetary cue at the children's festival may have activated self-enhancement goals among the parents. When asked about their experience at the children's festival, then, the overarching communal context of the children's festival may have clashed with the activated achievement goal, thereby diminishing the amount of meaning that parents derived from being at the children's festival.

The self-sufficiency theory of money has begun to receive considerable support from studies conducted by different research groups, using different types of manipulations, located in different places around the world (e.g., Gasiorowska, Zaleskiewicz, & Wygrab, 2012; Mogilner, 2010; Molinsky, Grant, & Margolis, 2012; Pfeffer & DeVoe, 2009; Roberts & Roberts, 2012). For example, participants whose attention was subtly directed toward money (vs. time) subsequently wanted to devote less time to social activities and more time to work (Mogilner, 2010). Additional studies that conceptually replicate and extend the findings of Vohs et al. (2006) will be covered in the subsequent section on prosocial motivations.

Research experimentally manipulating the presence or absence of monetary cues indicates that the psychological construct of money has the potential to change people's interpersonal relationships. To date, findings from the literature suggest that activating the concept of money in people's mind has the potential to intensify personal goal pursuit at the expense of interpersonal insensitivity. It may be that monetary cues activate achievement goals, which in turn suppress social goals. However, direct evidence for this mechanism (or others) is still wanting.

Positive Interpersonal Outcomes

As mentioned at the opening of this chapter, the majority of the published literature on money suggests that money can have detrimental consequences for interpersonal processes. However, there is emerging evidence that money has the potential to enhance interpersonal harmony.

By facilitating exchange between two individuals, money can increase people's overall welfare and promote trust. By way of example, one of the authors of this chapter recently wished to go on a holiday in the mountains of a foreign country. To secure an apartment in advance, she found an apartment online, emailed the owner, agreed on a set of dates with the owner, and then wired "assurance" money to this stranger, in complete trust that she would stay in the apartment when she arrived in the little mountain village. It may be then, that when people think about money in the context of markets, trust instead of selfishness ensues. Indeed, priming people with markets and trade increased people's perceptions that other agents will act in a trustworthy manner, which in turn increased people's trusting behavior

(Al-Ubaydli, Houser, Nye, Paganelli, & Pan, 2013). This research highlights an important benefit of money: it can build trust among complete strangers.

Spending money on others can boost a socially desirable outcome—happiness (Dunn, Aknin, & Norton, 2008). Participants were given a small amount of money ($5 or $20) and were told to spend it on themselves or others. Participants who spent the money on others reported a burst of happiness in comparison to those who spent it on themselves. Perhaps more impressive is the finding that the amount of money did not matter for happiness among those who spent the money on others. In other words, it may be that money can promote positive outcomes when communal norms trump the seemingly dominant tendency for money to evoke concerns about maximizing self-interest.

Other supportive evidence that money can boost happiness when it is spent on others comes from a study showing that spending money on interpersonal experiences is key to deriving happiness from discretionary spending (Caprariello & Reis, 2013). As far as we know, it remains unclear whether social interactions actually benefit from the money spent, but happiness seems more likely to help than hinder social interactions.

Empirical evidence for the positive interpersonal benefits of money pales in comparison to the number of studies that have documented the harmful effects of money. Nevertheless, the research covered above suggests that money can have beneficial consequences for interpersonal harmony when the social context calls for market-related norms and thus money matches the social context. Additionally, although people may think that spending money on themselves can promote happiness (Dunn et al., 2008), spending money on others and interpersonal experiences may promote personal happiness in part because it connects people to others.

Summary of the Effects of Money for Interpersonal Outcomes

The chapter opened with the statement that money can help and hinder social interactions. As should be clear at this point, the majority of the literature currently points toward money being associated with social difficulties. Financial disagreements is one of the top predictors of divorce, and marriage partners with a dissimilar spending style tend to argue about money, which in turn contributes to marital dissatisfaction. Desiring money because it is a status signal or because it is often associated (perhaps erroneously) with happiness tends to increase rather than decrease loneliness. Having money reduces the meaning that parents feel while interacting with their children. Merely being reminded of the concept of money decreases people's willingness to engage in social activities, which can undermine happiness and social well-being.

On the other hand, there is emerging evidence that money promotes positive interpersonal outcomes. Money has been shown to promote trust between complete strangers, thereby betting each person's personal circumstances (i.e., one person is better off financially and the other gets what he or she wants or needs). Additionally,

spending money on interpersonal experiences can potentially strengthen interpersonal bonds and increase personal well-being.

As mentioned, it may be that money is deeply associated with personal goals, which can be diametrically opposed to social ones. As such, when money is being used, or when money is on the mind, money may focus people on personal goals, needs, and desires, thereby reducing people's sensitivity to the needs of others. However, when the context promotes monetary norms (e.g., market or exchange contexts or when communal motivations trump the utilitarian function of money (e.g., spending money on others), money may facilitate interpersonal harmony.

Inner Processes That Facilitate Interpersonal Harmony

The previous section covered how interpersonal and relational outcomes can be influenced by money. To dig deeper into the inner psychological mechanisms through which money may exert its effects on interpersonal outcomes, the current section of this chapter delves into research that has investigated the influence of money on socio-moral and sociocognitive outcomes that arguably facilitate interpersonal harmony.

Socio-Moral Motivations and Behaviors

Throughout evolutionary history, humans relied heavily on their group for survival and safety. For groups to survive and thrive, it was necessary for its members to band together and cooperate. Effective functioning of modern day society and interpersonal relationships still relies on people following a great many prosocial rules and norms, many of which advocate curbing selfish, antisocial, and otherwise socially undesirable behavior. However, if money causes people to focus on their own needs, thereby becoming insensitive to the needs of others, it is possible that money may undermine prosocial behaviors that promote positive interpersonal outcomes.

Economic environments seem to be particularly fertile ground for fostering self-interested behaviors that reflect reduced concern for the needs of others. For example, when given money that could be put into either a private account, which would be given back in full at the end of the experiment, or a public account, which would be pooled, multiplied by a factor greater than 1, and then distributed equally among all participants, graduate students who studied economics put less of their money in the public endowment compared to other students who did not study economics (Marwell & Ames, 1981). In a different study, economists playing the prisoner's dilemma game defected more than others, and they also donated less to charity (Frank, Gilovich, & Regan, 1993).

Elevated levels of self-interested behaviors have been found in other contexts that place a similarly strong focus on money—namely, among business students and managers. When dividing money, business students kept the largest part for themselves, thereby displaying reduced concern for fairness (Wang, Malhotra, & Murnighan, 2011). Among a group of managers, financial pay was positively associated with concern about one's own salaries and negatively related to concern about the well-being of employees (Jordan, 2010). These results suggest that people who are chronically exposed to money, or chronically think about money, act in ways that promote and protect their own outcomes at the expense of others.

It is possible that people who pursue careers in economics or business are naturally competitive and self-interested, not that chronic contact with money engenders an heightened focus on the self. However, experimental research suggests that merely exposing people to business concepts reduces cooperation levels (Kay, Wheeler, Bargh, & Ross, 2004; Liberman, Samuels, & Ross, 2004). Indeed, money is so strongly associated with economic and business concepts that money on its own is sufficient to activate a "business mindset," which is characterized by a prioritization of self-interests over the interests of others, particularly employees (Kouchaki, Smith-Crowe, Brief, & Sousa, 2013). Kouchaki and colleagues found that reminders of money (e.g., unscrambling phrases containing money-related words) promoted engagement in unethical behaviors such as lying on a task to earn more money. These findings converge with the previously mentioned field study which found that business managers put the interests of the company and their own salary before the well-being of their employees (Jordan, 2010).

One could argue that selfishness is driven by a desire for money and to get ahead, but that once individuals have money they will curb their selfish ways. However, as mentioned, the self-sufficiency theory of money suggests that having an abundance of money frees people from being dependent on others, which may reduce people's willingness to trade off their time and resources to respect the needs of others. Indeed, a recent study found that upper-class individuals engaged in more unethical behaviors than lower-class individuals (Piff, Stancato, Côté, Mendoza-Denton, & Keltner, 2012). For example, upper-class individuals were more likely than lower-class individuals to break the law and cut off a pedestrian when driving, and they also reported higher intentions to engage in unethical behaviors.

Fascinating research conducted with young children in Poland suggests that the symbolic meaning of money may become ingrained in children's minds very early in life (Gasiorowska et al., 2012). One study with 7- and 8-year olds found that children who saw a money poster (vs. flower poster) chose the relatively more selfish option—keeping two stickers for themselves and giving no sticker to a peer—over the more social option—keeping one sticker for the self and giving one sticker to the other. This reduced prosocial behavior was found in a different context, helping an adult, which is an important replication because young children are more dependent on adults than their peers. In that study, 5- and 6-year olds who were shown a picture of money carried fewer crayons to the experimenter than children not shown a picture of money (Gasiorowska et al., 2012). The fact that young children in Poland and adults in North America responded the same way to monetary reminders suggests

that the linkage between money and the pursuit of self-interest may be very deep and potentially universal.

Perhaps money reminders make people stingy about donating a limited resource such as time but not resources that can be replenished such as money. To test this, a group of researchers manipulated whether people were first asked about intentions to volunteer or were first asked about intentions to donate money (Liu & Aaker, 2008). When people were asked first how much money they wanted to donate, charitable contributions decreased. The authors argued that asking about intentions to donate money caused people to adopt a mindset that is geared toward maximizing economic utility, whereas asking first about time caused people to adopt a mindset that is geared toward maximizing emotional happiness, which could be increased by devoting to a good cause. When time is monetized, however, a reduction in willingness to help occurs as well. Simply asking people to think about their time in terms of money subsequently reduced their willingness to volunteer their time without remuneration (Pfeffer & DeVoe, 2009).

Additional evidence that reminders of money diminish donations comes from a study that primed participants with money or neutral concepts and then gave all participants the opportunity to donate money to a student fund on the campus where the study took place (Vohs et al., 2006). Notably, in this study, all participants were given $2 in quarters, so the donation would not come out of students' own pocket. Nevertheless, participants primed with money donated less money than those not primed with money. In a different investigation, 13- and 14-year olds who saw a $100 bill on the bottom of their questionnaire reported less favorable attitudes toward charitable giving and were willing to donate less money to a food bank, relative to participants who saw a Thanksgiving cornucopia on the bottom of their questionnaire (Roberts & Roberts, 2012).

To summarize, a substantial amount of research suggests that money causes people to prioritize themselves over others, thereby reducing prosocial behaviors such as cooperation, donation, and helping and paving the way for antisocial behavior such as unethicality. These findings were robust across many different types of samples: economics students, economists, business students, business managers, university students, and young children in Poland.

These results could be interpreted with the previously mentioned theories of self-sufficiency or activation of self-enhancement goals. However, the results in this section also highlight another possibility: money shifts people into a money-market mindset (Fiske, 1991, 1992), in which they are primarily concerned with maximizing their ratio between inputs and outputs. This possibility will be discussed further in the mechanism section of this chapter.

Sociocognitive Process

Empathy is a sociocognitive process that involves moving beyond one's own feelings to consider the feelings and needs of others. Because it involves recognizing and attending the needs of others, it is an essential building block of prosocial behavior

(Eisenberg & Miller, 1987). Given that money reduces people's dependency on others and cause people to prioritize the self over others, money may interfere with empathy.

Indirect evidence comes from the research on financial disagreements among marriage partners. As mentioned, the more that relationship partners differed in their spending styles, the more they argued (Rick et al., 2011). This result suggests that, when it comes to money, people may have a difficult time appreciating others' differences. More direct evidence for the notion that money reduces empathy comes from a study which found that lower-class individuals outperformed higher-class individuals on a test of empathic accuracy (Kraus et al., 2010). In other words, people high in SES were less accurate than people low in SES when trying to intuit the feelings of others. Attempting to understand the feelings of others and being accurate about the feelings of others are not perfectly correlated, so it is possible that having money reduces empathic accuracy but not empathic motivation.

In a different study, however, participants who were reminded of economic concepts (vs. neutral concepts) displayed less compassion toward others (Molinsky et al., 2012). The drop in compassion only occurred when people primed with economic concepts were delivering economic-related news, because they perceived compassion and emotions as being unprofessional in that context. This study suggests, then, that economic mindsets do not cause people to become robots or unfeeling monsters. Rather, an economic mindset may lead people to use a specific set of norms that dictate when it is appropriate to interact with others with emotions.

The previously described research investigated how having money or thinking about money altered empathic processes. Other research incentivized empathic accuracy with monetary rewards. On the one hand, because monetary rewards motivate people to engage in effortful processes, monetary rewards could improve empathic accuracy. On the other hand, monetary rewards may activate a mindset and norms that emphasize the self as separate from others, which would suggest that monetary incentives should decrease accuracy. Results supported the latter prediction: participants offered monetary rewards for empathic accuracy performed worse than those who were not offered monetary rewards (Ma-Kellams & Blascovich, 2013).

Multiple findings suggest that money disrupts engagement in empathy, which is a sociocognitive process that is a key element of prosocial behavior. Thus, empathy may be one potential mechanism that can help account for why money reduces prosocial behavior.

Diverging Effects of Money on Prosocial Outcomes

Aside from the research on materialism, most of the experimental research covered in this chapter is based on the implicit assumption that people hold a similar idea of money in their mind (and thus priming the idea of money has similar effects across different types of individuals). However, a recent investigation found that people may hold two very different meanings of money in their mind and that money can have differential effects depending on which one is activated: money as a means of fair exchange and money as a means for selfishness (Yang et al., 2013).

On the one hand, people know that money can be a facilitator of economic exchange and it can also help one enjoy the good things in life, such as take care of loved ones and enjoy time with family and friends. On the other hand, people also know that money is used to engage in dirty practices, laden with selfishness and greed. These two meanings of money, and their attendant behaviors, were elicited by having participants handle either clean or dirty money. (To create the "dirty money," new bills were put into a sack with wet dirt for 2 weeks.) For example, farmers at a farmer's market cheated a confederate when they had previously handled dirty money. However, when they handled clean money, the farmers gave fair value to the confederate. In laboratory studies with economic games, participants who handled clean money tended toward fair and honest behavior whereas those who handled dirty money tended toward selfish practices.

Two Sides of the Same Coin?

Throughout this chapter, diverse theories of the psychological meaning of money have been covered: money as a tool (Lea & Webley, 2006), money as a resource (Zhou et al., 2009), and money as means of self-sufficiency (Vohs et al., 2006, 2008). Other theories suggest that money activates a particular mindset, replete with norms and scripts for how to treat the self in relation to others. For example, money has been proposed to elicit a business mindset (Kouchaki et al., 2013) or an economic mindset (Liu & Aaker, 2008; Molinsky et al., 2012; Pfeffer & DeVoe, 2009).

When confronted with this dizzying array of divergent effects and explanations, one inevitably attempts to seek order and determine whether one is more accurate than another. Much more empirical work needs to be conducted in order to pinpoint the precise mechanism(s). However, when reviewing the possible theories and the current body of literature, the market-pricing theory of social relations (Fiske, 1991, 1992) emerges as a powerful explanatory mechanism for the positive and negative effects of money on interpersonal processes.

Fiske's (1991, 1992) marketing-pricing mode is one of the four relational modes that have been argued to form the basis of social life. (Relational modes are scripts that guide motivations, cognitions, and behaviors in social interactions.) A market-pricing mode, which may have emerged with the advent of money, and which is the only mode found exclusively among humans, involves maximizing the ratio between their inputs and outputs of a transaction. Thus, despite the diverse terminology used above, an economic mindset, materialistic mindset, and business mindset can all be encapsulated by a market-pricing orientation, because they all posit that people are predominately concerned with maximizing their own outcomes.

To illustrate, imagine you are offered $15 to help a friend move. When given such an offer, you would evaluate this offer on the basis of whether the tradeoff between time and money is to your benefit. Relational or social factors would take a back seat. Imagine instead that you were offered pizza and beer. Despite the fact that the pizza and beer may be equivalent to the $15 in value (depending on your appetite and drinking inclinations), you would nevertheless evaluate the "social"

offer very differently. Instead of using money-market norms, you would make your decision based on social rules and norms, such as how much you like the person, how much you value the friendship, and/or whether that person has helped you in the past. Research supports this example, demonstrating that the type of reward shifts people into a money or social market and thereby determines the amount of effort that people devote to helping others (Heyman & Ariely, 2004). In a social market, people helped in a way that reflected an insensitivity toward the magnitude of the reward, but in a money market people's effort was directly proportional to the magnitude of the reward.

A market-pricing mode (Fiske, 1992) captures money's diverse and divergent effects in the social sphere. For example, a market-pricing mode emphasizes rational and fair trade and does not make allowances for intimacy and emotional connectedness. Indeed, those are undesirable. This characteristic of market-pricing mode can help explain a whole host of results covered in this chapter, such as reduced helping (e.g., Pfeffer & DeVoe, 2009; Vohs et al., 2006), increased physical distance placed between the self and a stranger (Vohs et al., 2006), lack of sensitivity to the motivations and needs of others (Ma-Kellams & Blascovich, 2013; Rick et al., 2011), and believing that displaying emotions while delivering bad news in an economic environment is not professional (Molinsky et al., 2012). In these cases, it may be that money shifts people into a market-pricing mode which conflicts with the broader communal context. A market-pricing orientation can also help understand how money can facilitate positive interpersonal outcomes, such as the increased trust that people displayed toward a stranger when they were primed with a money market (Al-Ubaydli et al., 2013) or clean money (Yang et al., 2013). Thus, a market-pricing mode may be a theoretical framework that can help account for the helpful and harmful effects of money on interpersonal relations.

Before closing, it is important to mention a mechanism that has been neglected thus far but may seem intuitively obvious: social power. Defined as having control over the rewards and punishments of others (Keltner, Gruenfeld, & Anderson, 2003), social power often involves having control over money, making power and money incredibly intertwined concepts. Furthermore, money and power have furnished very similar outcomes, such as selfishness and egocentrism.

Despite the potential link in everyday life and despite the similar outcomes produced by money and power, research has not found a link between money primes and enhanced feelings of power (e.g., Kouchaki et al., 2013; Vohs et al., 2008). Perhaps it is the case that money and power shift people into two very different relational modes—namely, a market-pricing mode and authority-ranking mode, respectively (Fiske, 1991). As mentioned, a market-pricing mode emphasizes computation of rational cost–benefit analyses as well as independence from others. In contrast, social authority-ranking mode emphasizes dominance over others through control of resources. Thus, by definition social power involves hierarchical relations and interdependence with others, both of which are relatively less prominent in the market-pricing mode. Possibly these theoretical distinctions can help understand when and why money and power should overlap and when and why they should be distinct.

Indeed, further consideration of the two distinct relational modes in which money and power lie may help researchers develop testable hypotheses that can deepen the field's understanding of money and power.

Limitations and Future Directions

The market-pricing mode and self-sufficiency hypothesis of money are somewhat rivaling theories as they often generate similar predictions (less prosociality and ethicality) but suggest different underlying mechanisms. Future research should therefore examine mediating variables to determine whether both explanations are feasible or one is more powerful than the other. Researchers could also pinpoint competing outcomes that stem from each theory to determine if one theory is more valid than the other.

Additionally, although researchers have now documented a large array of the effects of money, underlying cognitive and sociocognitive mechanisms are relatively understudied. Feelings of strength (Zhou et al., 2009), empathy (Molinsky et al., 2012), and a business mindset (Kouchaki et al., 2013) have been identified as potential mediators. Identifying more sociocognitive mechanisms would help shed light on whether money primarily operates by evoking a market-pricing mode or by engendering feelings of self-sufficiency. For example, the former suggests that other's needs are deliberately ignored, while the latter would suggest they are merely overlooked.

In addition to devoting more time and resources to the "black box," future research should strive to identify whether money interacts with individual differences (e.g., achievement motivation or gender) and situational circumstances (e.g., communal vs. exchange contexts). Indeed, when money was used in the service of communal outcomes rather than personal outcomes, positive benefits ensued. Gaining a deeper understanding of how individual differences and situational contexts interact with money would greatly enhance the field's understanding of the impact of money on social cognition and behavior.

Concluding Remarks

Until a few decades ago, the domain of money and interpersonal harmony was primarily the domain of speculation. Not so anymore. An increasingly rich body of research details the consequences of money for interpersonal harmony. Increasingly, it is becoming clear that money has deeply ingrained psychological links with self-interest and self-enhancement and that these are instilled at a very early age in life and across many different cultures. As such, money can have powerful and detrimental consequences for social harmony. People should therefore be cognizant about their motives for money as well as the presence of money in their daily life.

Indeed, money is a resource that, when used correctly, can bring people together and facilitate memorable experiences. The key may lie in overcoming the money-market mindset that is intimately and perhaps automatically linked with money.

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E. Bijleveld and H. Aarts (eds.), *The Psychological Science of Money*,
DOI 10.1007/978-1-4939-0959-9, © Springer Science+Business Media New York 2014