CHAPTER 15

Thoughts and Players: An Introduction to Old and New Economic Perspectives on Beliefs

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15.1 Introduction

In this chapter we provide an introduction into how economists conceptualize beliefs. We begin by describing how mainstream economists currently view beliefs: merely as an input to decision making, and not a direct source of utility – i.e., pleasure and pain. Reviewing the history of the utility concept, we then show that the current perspective constitutes a century-long diversion from an earlier perspective that acknowledged that beliefs – e.g., about one's own self-worth or about one's prospects for the future – are direct sources of utility. Finally, we summarize a new line of work in economics – belief-based utility – that integrates the original, historic perspective with the theoretical and empirical methods of modern economics and offers a more realistic account of choice and behavior. We also address the question of when and why people care about other people's beliefs, and close with a discussion of implications of these insights for contemporary social issues such as political polarization and fake news.

15.2 The Economic Account of Beliefs

At the bedrock of modern, sometimes referred to as 'neoclassical' economics, is the concept of utility maximization – the idea that people make decisions, and take actions, to maximize their own well-being. When people make decisions – e.g., to invest in education, purchase a house, decide whether and who to marry and whether to have children, of course, they do not always know what the consequences of those decisions will be. In such situations, economics assumes that they make educated guesses – e.g., about what job prospects education will yield, how much available jobs will pay, and how much they will enjoy working in different occupations. Economists conventionally assume that people make decisions to

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maximize their *expected utility* – i.e., the sum of probabilities of the outcomes of their decisions multiplied by the anticipated utility of those outcomes.[1]

The Definition of Beliefs in Economics

Economics relies on a narrower and more parsimonious definition of what beliefs are – and what beliefs are not – than other disciplines, in which the delineation between beliefs and non-beliefs is less clear. In this chapter, we focus on beliefs as defined *in economics*:

> *Beliefs are subjective probability assessments or expectations over outcomes or states of the world.*

This definition has a property that makes it particularly appealing to empiricists: beliefs have a normative benchmark, that is, an objective probability of outcomes or states, which the subjective belief can be compared to, and evaluated against. This implies that beliefs are – in principle – always *verifiable* (or falsifiable), unlike, for instance, taste or preferences, which are idiosyncratic and do not have a normative benchmark.

How do beliefs play into this perspective? Beliefs correspond to the probability assessments that enter these expected utility calculations. For example, an individual might hold a belief that if they enrolled in a master's program in computer science, they would have a specific probability of passing, a probability distribution of getting different types of paid positions with that degree, and a probability distribution of fulfillments (utilities) from working at those jobs. All these probabilities, according to conventional economics, correspond to the individual's beliefs.

Most economists would acknowledge that individuals rarely have access to objective probabilities (except for, perhaps, in the domain of gambling). As a result, people must often rely on imperfect, subjective assessments of probabilities. Savage (1954) was the first who incorporated this insight into expected utility theory. His *Subjective Expected Utility* (SEU) model relaxes the assumption of expected utility theory (EUT) that decision makers know, and rely on, the objective probabilities of outcomes, and allows them to make subjective probability judgments instead. Such subjective

[1] As evidenced by Prospect Theory (Kahneman & Tversky, 1979) and its empirical demonstrations, people display systematic biases in how they react to probabilities: people typically overweight small probabilities (e.g., the likelihood of winning the lottery) and underweight high probabilities. However, Prospect Theory is still built around the principle that people aim to maximize their expected utility, albeit with additional assumptions about how people weight probabilities and how they determine the subjective value of outcomes.

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probabilities can deviate markedly from the true probabilities prevailing in a particular situation; that is, SEU does not assume that beliefs are necessarily accurate. Importantly, however, subjective probabilities in SEU are still nothing more than *decision weights*, just like the objective probabilities in EUT.[2]

The advent and wide adoption of EUT/SEU largely coincided with another line of research and theorizing in economics, on the economics of information. This line of research, pioneered by Stigler (1961), recognized that information is a commodity that, like other commodities, can be bought and sold and even "mined" or "manufactured," in the sense that resources can be invested into procuring and processing it (see also Arrow, 1973). The central problem that Stigler wanted to solve was how to derive the value of information in a particular situation, and to make this problem tractable, he made a highly simplifying assumption: that the economic value of information is its capacity to enhance the quality of decisions, thereby increasing expected utility. That is, Stigler assumed that information is valued to the extent, and *only* to the extent, that it aids in decision making.

A decade after Stigler's pioneering contribution, a second wave of work on the economics of information, most closely associated with George Akerlof, Michael Spence, and Joseph Stiglitz (who shared a Nobel prize for their work), examined different consequences of information asymmetries – of the observation that people involved in economic interactions (e.g., the seller and potential buyer of a car) often have access to different information sets. Although ground-breaking in its insights, all of this work adhered to Stigler's stylized assumption that information is valued solely as an input to decision making.

In combination, SEU and the economic perspective on information have far-reaching implications. An SEU decision maker will want her beliefs to be as accurate as possible – since holding more accurate probability judgments (i.e., ones that resemble objective probabilities more) allows her to make better decisions and increase her expected utility. An SEU decision maker never misses an opportunity to obtain free information and updates her beliefs rationally – according to the Bayes rule. Furthermore, there is no reason to expect systematic biases in prior, and

[2] Savage's formulation assumed that subjective probabilities have many of the properties of objective probabilities. However, Daniel Ellsberg (1961), in a seminal paper, showed that easily elicited patterns of choice behavior systematically violated several of the most important of these properties.

especially in posterior, beliefs: if beliefs are based on sparse, noisy, and incomplete information, it is just as likely that someone will underestimate the probability of some outcome as overestimate it.

15.2.1 A Historical Diversion

As we noted, the view of beliefs as solely an input to decision making was a relatively late development – around the middle of the twentieth century. For more than a century and a half before that, economists – at least in their writings – had a richer perspective on information. When Jeremy Bentham first proposed the foundational utility concept in his 1789 classic *An Introduction to the Principles of Morals and Legislation* (Bentham, 1789), he provided a list of the sources of positive utility (pleasure) and negative utility (pain). This list included only a small number of material determinants: specifically, pleasures and pains of "the senses" and pains of "privation." Most of the other ingredients of utility that he enumerated, however, clearly corresponded to purely mental outcomes: pleasures of a good reputation, of memory, imagination, expectation and relief, and pains of awkwardness, enmity, a bad reputation, memory, imagination and expectation.[3] Adam Smith, sometimes viewed as the founder of the field of economics, likewise, and especially in his book *A Theory of Moral Sentiments* (Smith, 1759), gave prominence to the importance of beliefs as drivers of human behavior. "To what purpose is all the toil and bustle of this world?" he asked, and answered: "To be observed, to be attended to, to be taken notice of with sympathy, complacency, and approbation, are all the advantages we can propose to derive from it" (Smith, 1759, pp. 108–110). Economists continued to discuss, and acknowledge the importance of, beliefs as direct source of utility up until the mid-twentieth century (see Loewenstein, 1992). With the advent of the neoclassical revolution, however, they increasingly struggled to incorporate beliefs into the new framework they were developing.

Neoclassical economics is sometimes described as the science of "constrained optimization" (Lazear, 2000; Williamson, 2005); people are viewed as maximizing their utility from consumption and leisure, subject to constraints on time and wealth. An important, albeit generally implicit, assumption of standard economics is that the main ingredients of utility

[3] All the other ingredients, such as pleasures of wealth, do not fall under one or the other category – e.g., wealth can purchase consumption, but knowledge of one's wealth (or lack thereof), can also confer purely cognitive utility.

are *material* outcomes – e.g., consumption of food, housing conditions, health status.[4] Material outcomes are easily incorporated into a constrained optimization framework because they can be relatively easily measured and carry prices. By contrast, it is far less obvious what the value and "price" of beliefs are, and what constraints people are subject to when forming their beliefs. Thus, in what could be viewed as a classic example of the "streetlight effect," neoclassical economics ignored the rather undeniable truth of the fact that people care directly about what they believe, and focused solely on measurable, priced, material outcomes as the carriers of utility.

The "streetlight" in economics has, however, become brighter, enabling a broader domain of discovery. New tools of mathematical modeling, and a loosening of the positivist stricture that the only things worthy of study are those that can be directly observed, have created an opening for new perspectives. Belief-based utility, which we introduce in the next section, thus reflects a rediscovery of this rather undeniable insight and represents a return to an earlier perspective.

15.3 Belief-Based Utility

The rather reductionist approach of mainstream economics – that beliefs do not have any other purpose than to help individuals to select the best course of action – has never been universally accepted among economists, and an alternative paradigm – that it is essential to understand how people form beliefs and what preferences they have over beliefs – started gaining a foothold in the late 1970s and early 1980s. This alternative perspective, now commonly referred to as "belief-based utility," recognizes the basic insight that can be traced back to Bentham: that people derive utility – pleasure and pain – directly from their beliefs. We care especially about what other people think of us – whether people think we are kind, smart, attractive. But we also care about our beliefs about the world – e.g., whether the outcomes that people experience are fair (Bénabou & Tirole, 2006a; Lerner, 1980) – and about the future – e.g., whether we will be successful in our career, love, etc.

[4] For example, this is how Samuelson and Nordhaus defined the purpose of economics in their seminal textbook *Economics* (Samuelson & Nordhaus, 2010, p. 7): "*The ultimate goal of economic science is to improve the living conditions of people in their everyday lives* [. . .] Higher incomes mean good food, warm houses, and hot water. They mean safe drinking water and inoculations against the perennial plagues of humanity."

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Belief-Based Utility

By *belief-based utility*, we refer to the utility derived directly from holding beliefs, whether or not they are accurate. For example, ego-utility – one's beliefs about one's self-worth – are important sources of utility or disutility.

15.3.1 The Evolutionary Origins of Caring about Beliefs and a Fundamental Problem

Before we delve into how economics has modeled belief-based utility, it is worth addressing a broader question: What is the origin of preferences over beliefs; that is, why do people cherish holding specific beliefs but abhor others? While a definite answer is elusive and beyond the scope of this chapter, evolutionary psychology offers some useful insights. There are several factors that are important for survival and reproduction (i.e., evolutionary fitness) that are not incorporated into traditional drives such as hunger and sex. For example, people are more likely to reproduce if they are physically attractive, and more likely to survive and reproduce if they are held in high esteem by those around them. According to this evolutionary account of belief-based preferences, then, evolution has imbued humans with the propensity to care about these things. If it gives us utility to believe that we are attractive and held in high esteem by others, then we will naturally take actions to make these beliefs into a reality.

However, this mechanism is far from perfect because we have the ability to change our beliefs *without changing reality* – e.g., to convince ourselves that we are gorgeous, or at least not that hard on the eye, even if we are, in fact, hideous. This introduces a fundamental problem: While changing reality often is effortful and sometimes requires cooperation between individuals, changing beliefs is, at least in principle, trivially easy. At both an individual and societal level, the ability to easily manipulate one's beliefs can have negative consequences. For this evolutionary mechanism to work, therefore, there must be constraints on our beliefs – constraints that prevent beliefs from straying too far from reality. Such constraints do exist (see, e.g., Loewenstein & Molnar, 2018; Molnar & Loewenstein, 2022), though in the current era of fake news and widespread conspiracy theories such as QAnon, we might wish that they were more extensive and binding.

15.3.2 A Brief History of Belief-Based Utility

In a pioneering theoretical model, Kreps and Porteus (1978) introduced the idea that agents can have intrinsic preference for information, or, more precisely, for how uncertainty is resolved over time, and this motive is unrelated to the instrumental value of information. In another seminal paper, Akerlof and Dickens (1982) modeled governmental intervention in workplace safety, and demonstrated that even fully rational and perfectly informed workers might choose to hold overly optimistic beliefs about the probability of accidents in a hazardous industry – and as a result, forgo safety measures. Since taking precautionary measures would imply that people frequently think about the possibility of future accidents (which would elicit substantial discomfort and anxiety), people *choose* to hold overly optimistic beliefs, thus, reduce the psychic cost of fear of future accidents, at the expense of increasing the *objective* risks of accidents by being less careful.

Another influential essay, *The Mind as a Consuming Organ,* that paved the way for research on belief-based utility, was written by Thomas Schelling (1984), who was one of the pioneers of game theory and its applications to foreign policy and military conflict. In his elegant paper, Schelling highlighted that the traditional economic concept of "consumption" describes only a fraction of what brings pleasure and pain. Instead, much, and very likely most, of the things that affect human welfare happen "in the mind". As Schelling noted:

> We also consume by thinking. We consume past events that we can bring up from memory; future events that we can believe will happen; contemporary circumstances not physically present, like the respect of our colleagues and the affection of our neighbors and the health of our children; and we can even tease ourselves into believing and consuming thoughts that are intended only to please. We consume good news and bad news. We even – and this makes it a little like traditional economics – spend resources to discover the truth about things that happened in the past. (Schelling, 1984, p. 344)

In other words: What we believe about ourselves, others, and the world, affects our well-being and actions – echoing Bentham's original conceptualization of utility.

Economic thinking about beliefs has been also greatly influenced by researchers *outside* of economics. The psychologist Robert Abelson (1986), for example, in a paper titled *Beliefs Are Like Possessions*, advanced a very economic argument that the psychological value of beliefs might arise from

many of the same factors that confer value on possessions. These include their functionality (as in standard economic theory), the degree to which they are shared with other members of one's social group, their uniqueness and rarity, their defensibility (how justified the belief is), their extremity (how intense they are), and finally, the centrality of the belief (how well it fits with other beliefs). Abelson's key insight was that people are motivated to take actions to increase the values of their beliefs, from whatever sources these arise, and this generic motive can explain a multitude of seemingly irrational patterns of thought and behavior.

In a similar vein, research on *motivated information processing* in psychology (e.g., Kunda, 1990) documented numerous situations in which people's beliefs are influenced by their desires and pre-existing beliefs, and identified the psychological strategies that people employ to arrive at beliefs that make them feel good. In some extreme situations – when powerfully motivated, e.g., when it comes to severe health issues – people seem to be capable of simply believing what they want to believe, ignoring virtually all evidence to the contrary. Several recent reviews highlight that people are *motivated* to maintain inaccurate beliefs and avoid information in a wide range of situations, often at great cost to themselves (Bénabou & Tirole, 2016; Epley & Gilovich, 2016; Golman, Hagmann, & Loewenstein, 2017; Loewenstein & Molnar, 2018).

15.4 Sources of Belief-Based Utility

15.4.1 Beliefs about Future Outcomes and Anticipatory Emotions

For any decision that has consequences for the future, there is some inherent uncertainty, which requires people to form subjective probability assessments – beliefs – about the chance of each possible outcome. Anticipatory emotions –hope, savoring, anxiety, and dread – capture feelings associated with thinking about these potential future outcomes (Elster & Loewenstein, 1992). One of the earliest empirical demonstrations of the consequences of such emotions was borne out of research on intertemporal choice. Loewenstein (1987) proposed a model in which anticipatory emotions motivate people to act inconsistently with the predictions of standard economic models, which posit that people prefer to delay negative outcomes, since the future is discounted more, and, for the same reason, to expedite positive ones. By contrast, Loewenstein reported a series of studies in which most participants preferred delaying pleasant hypothetical outcomes (e.g., kissing a movie star, having a fancy dinner), and getting

unpleasant outcomes over with quickly. These behavioral patterns have been replicated in numerous studies involving real consequences: For example, in a study in which participants were waiting to receive electric shocks, some individuals dreaded the outcome so much that they chose to receive *more* voltage immediately rather than wait (Berns et al., 2006). Other studies also demonstrated that these anticipatory emotions are closely related to the valence of outcomes, but largely insensitive to the their probability (Hsee & Rottenstreich, 2004; Loewenstein et al., 2001), with consequences for decision making under conditions of risk.

Further theoretical work has highlighted the practical importance of these findings. Caplin and Leahy (2001) showed that incorporating anticipatory emotions into the utility function might help to explain long-standing economic anomalies, such as intertemporal inconsistency (systematic changes in decision with the passage of time), the equity premium puzzle, and people's tendency to overreact to small probabilities. Brunnermeier and Parker (2005) proposed a model in which beliefs have an impact on well-being directly through anticipation of future utility, and show that this can lead to overly optimistic beliefs, which can explain suboptimal behaviors in a wide range of areas (e.g., investment decisions, consumption planning, managerial decisions).

15.4.2 Beliefs about the Self and Ego-Utility

The fact that people are pervasively concerned with protecting and enhancing their beliefs about themselves – self-esteem – has been extensively discussed in the psychological literature (S. C. Jones, 1973; Markus, 1977). People strive to maintain a self-conception and image that is adaptive and morally adequate, believing that they are competent, good, coherent, unitary, stable, and capable of free choice (Steele, 1988). It has been hypothesized that self-esteem is a prevailing concern because it reflects one's eligibility for social inclusion; that is, it serves as a proxy signaling whether others think the person is respected, beloved, and revered (Baumeister & Leary, 1995). Leary and Baumeister's "sociometer theory" proposes that self-esteem is mainly derived from what others believe about us, and its function is to constantly monitor and assess one's value as a relational partner (Leary & Baumeister, 2000).

Considerable work in economics has focused on the pursuit of self-esteem: self-enhancement and self-verification (for a book-length treatment, see Brennan & Pettit, 2004). Bénabou and Tirole (2002) propose a general economic model in which people value their self-image, and seek

to maintain or improve it by engaging in behaviors that, in the absence of such motives, would be difficult to explain, for example, self-handicapping, self-deception, selective attention, or selective forgetting. In their subsequent work, the authors focus on the signaling function of actions. When people engage in behaviors, they send signals to themselves and others about their underlying quality or "type." Bénabou and Tirole extend their model to show how concerns for self-image might interact with extrinsic rewards (Bénabou & Tirole, 2003), prosocial behavior (Bénabou & Tirole, 2006b), and identity and morality in general (Bénabou & Tirole, 2011).

Taking a similar approach, Bodner and Prelec (2003) also assume that actions include a signal about an individual's identity and values; that is, actions are "self-signaling." Therefore, in addition to the utility associated with the outcomes of actions, such diagnostic utility always provides a separate motive for thought and action. Kőszegi (2006) investigates motives for self-enhancement and self-improvement. In his model, people derive "ego-utility" from positive beliefs about their competence, ability, and skills, and they engage in ambitious activities, because this signals that they are competent. However, as Kőszegi shows, this can lead to overconfidence and to choosing overly ambitious tasks. For example, if a mediocre manager derives ego-utility from believing that he is more competent than other managers, he might choose to proceed with an overly ambitious and risky project, well beyond what he would be able to handle, thus making an ultimately costly error.[5]

15.4.3 The Value of Intra-Personal Consistency of Beliefs

Cognitive dissonance is posited to arise when people hold beliefs that conflict with one another, or with behaviors they engage in (Festinger, 1962). One specific type of conflict can arise if a person reflects upon and compares her current beliefs to different previously held beliefs. Sudden changes in beliefs can question the integrity or the rationality of the person, and individuals who change their beliefs are typically evaluated

[5] An interesting complication is that beliefs involving the self can be solid or *fragile*, which can make a big difference, as revealed by substantial research in psychology on fragile self-esteem. The main thrust of the literature on this topic in psychology has been on the role of fragile self-esteem in aggression (Baumeister, 1996; Berkowitz, 1978; Kernis, Brockner, & Frankel, 1989) and self-handicapping (e.g., E. E. Jones & Berglas, 1978). In a recent paper in economics, Loewenstein and co-authors (Kőszegi, Loewenstein, & Murooka, 2022) propose a theoretical account of fragile self-esteem as a multiple-equilibrium phenomenon, and draw out its implications for a wide range of behaviors beyond aggression and self-handicapping, such as dropout from education and job search, and workaholism.

more negatively than people who hold stable views (Allgeier et al., 1979). This internally or externally motivated desire to hold consistent beliefs can lead to inertia and a preference for status quo in beliefs – what decision scientists would call 'conservative belief-updating' (Edwards, 1982). This idea is also echoed by Abelson's characterization of "beliefs as possessions" (1986). The "endowment effect" captures the insight, demonstrated in countless studies, that people become attached to, and reluctant to part with, objects they own (Kahneman, Knetsch, & Thaler, 1991). By the same token, people value their current beliefs, and prefer to hold onto them, even if abandoning or updating beliefs would allow them to make better-informed decisions.

There are various economic models that capture individuals' intrinsic desire for temporally consistent beliefs. In these models, people derive utility from maintaining consistent beliefs, even if this entails making suboptimal choices (Akerlof & Dickens, 1982; Eyster, 2002; Falk & Zimmermann, 2011; Yariv, 2005). In Eyster's (2002) model, people rationalize past mistakes by taking suboptimal actions in the present that can *justify past mistakes*. For example, a consumer who bought an expensive bottle of wine – believing that it would be high quality – which turned out to be disappointingly low quality, would more likely finish it (and thus, maintain her belief that the wine was good but suffer disutility from the consumption) than someone else who obtained the same wine at a cheaper price – believing that it would be low quality. Thus, a desire for intertemporal consistency – or "integrity" – of beliefs offers an alternative explanation for the well-known, sunk-cost effect. Yariv (2005) offers a similar framework in which people can boost the desirability of their past actions by changing their current beliefs, thus *reducing cognitive dissonance*. Finally, in Falk and Zimmerman (2011), people *signal intellectual strength* (both to themselves and others) by maintaining consistent beliefs and actions based on those; that is, people are motivated to act in a consistent way to preserve positive esteem, even if this means sticking to inferior choices.

15.5 Utility From Other People's Beliefs

Nature has equipped humankind with an astonishingly advanced cognitive toolbox that allows us to represent what is happening in others' minds. This remarkable ability goes by many names, most prominently: theory of mind (Dennett, 1978; Leslie, 1987; Premack & Woodruff, 1978), mind reading (Sperber & Wilson, 2002), and mentalizing (Frith & Frith, 2003). Most adults, and even most children between the ages of 6 and 7, understand that

others can have beliefs different from their own (Perner & Wimmer, 1985). Moreover, people can distinguish between levels of mental representations (e.g., between "A believes X" and "B believes that A believes X"), and by adulthood, they can represent even *fourth-order* levels of shared knowledge (Kinderman, Dunbar, & Bentall, 1998).

Consider, for example, a scenario in which you have sprained your ankle and would love for a colleague to pick you up and bring you to work (see Jaroszewicz, 2020, for a discussion of higher-order beliefs in the context of help-seeking and help-giving). Your colleague would be willing to do it, but only reluctantly. Suppose your colleague knows about your sprain (a first-order belief), but you do not know if she knows (a second-order belief), and she does not know if you know that she knows (a third-order belief). In that situation, she might not offer help, hiding her indifference to your plight behind your presumed lack of knowledge. And you might be concerned that this is exactly what she is doing – a fourth-order belief!

People seem to be able to track others' beliefs relatively effortlessly and automatically (van der Wel, Sebanz, & Knoblich, 2014), and engage in implicit mentalizing even without being consciously aware of doing so (Schneider, Slaughter, & Dux, 2015), which further highlights how well-fitted humans are when it comes to reading others' minds.

15.5.1 The Role of Others' Beliefs in Economic Models

While it is a stylized fact that most people constantly monitor what others believe, and are surprisingly efficient and accurate in most cases, economics has largely neglected the idea that people care *directly* about other people's beliefs, beyond the value of such beliefs-about-beliefs for purely *strategic purposes*. There is a long history of incorporating others' beliefs and intentions into game theory (Battigalli, Corrao, & Dufwenberg, 2019; Carpenter & Matthews, 2003; Charness & Rabin, 2002; Geanakoplos, Pearce, & Stacchetti, 1989), and research also shows that people are well-adapted to inferring others' intentions in economic interactions (Cushman, 2015; Heintz, Karabegovic, & Molnar, 2016). However, this work has exclusively focused on "strategic" interactions, in which knowing about someone else's mental state can actually help one to make better decisions. In such strategic contexts – which can be as innocuous as playing rock-paper-scissors with friends, or as consequential as launching a military strike – outcomes depend on how accurately one can infer others' mental states and intentions. Therefore, an economic agent, as conceived by conventional economics, would not care *directly* about what

others believe – whether others have the same or different beliefs, or whether others are acting upon false beliefs – and would be motivated to know only those beliefs that could allow him or her to optimize his or her own choices, in a rather self-centered and almost Machiavellian manner.

15.5.2 "Direct" Concerns about Others' Beliefs

People care about others' beliefs not only for strategic reasons. In addition to the aversion to holding beliefs that are internally inconsistent, people also find it aversive to hold beliefs that conflict with those around them. In a paper on *The Preference for Belief Consonance*, Golman and co-authors (2016) review literature showing that people find it uncomfortable to hold beliefs different from those around them, and discuss some of the consequences of this (e.g., geographic sorting by political beliefs). Golman et al. (2016) also propose an explanation for why the preference for belief-consonance exists. According to their perspective, people make decisions and investments based on their beliefs. For example, a devout Catholic attends Church, donates money to it, and makes important life decisions based on the Church's dictates. Confronting someone who has different religious beliefs forces the Catholic to recognize the possibility that their own beliefs might be wrong, in which case all of their decisions and investments may have been a mistake.

In our own recent research, however (Molnar & Loewenstein, 2020), we have been advancing a subtly, but we believe crucially, different perspective. Our own view is that it is not awareness that other people have *different* beliefs than our own which causes discomfort. Rather, it is the belief that others hold, and act on, beliefs that we perceive to be *wrong*. This idea is also captured by "Cunningham's Law" – named after Ward Cunningham, the developer of the first wiki – which states that "the best way to get the right answer on the internet is not to ask a question; it's to post the wrong answer."[6] At the heart of this rather witty "law" lies the intuition that people have a strong desire to correct others' beliefs when they deem those beliefs to be false. Aligned with the above anecdotal evidence, our own research demonstrates that participants express stronger negative feelings (i.e., are more disturbed, upset, and frustrated) when they encounter others who – from the participant's point of view – hold false beliefs, compared to when participants think that others' beliefs are merely

[6] https://nancyfriedman.typepad.com/away_with_words/2010/05/word-of-the-week-cunninghams-law.html

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different from their own (Molnar & Loewenstein, 2020). These strong negative emotions can then, based on the situation and the type of relationship, either trigger approach (e.g., confronting the other person, attempting to persuade them) or avoidance behaviors (e.g., blocking the other person online).

The subject of these false beliefs can be anything: beliefs about the individual (e.g., misunderstanding one's intentions), about relationships (incorrectly believing that someone's partner had been cheating on them), economic outcomes (tax cuts on the rich ultimately "trickle down" to help the poor), or even global phenomena (climate change is unrelated to human activity). What matters more is not the *domain* of belief, but rather, the *conviction* that someone else holds an incorrect view of the individual, relationships, outcomes, or the world. The more convinced people are that others hold false beliefs, the more upset they will be (Molnar & Loewenstein, 2020), and the more likely they will take some action (either to confront these others, or to make extra effort to avoid them).

15.5.3 The Evolutionary Origins of Caring about Others' Beliefs

Why would – why *do* – people have an intrinsic preference for what others believe, let alone trying to change – or avoid – those beliefs? Why are we not only disturbed by other's beliefs when those beliefs have clear consequences for us – e.g., when someone mistakenly believes that we have committed a crime and seek to punish us for our perceived infraction? Constantly gauging whether someone else's beliefs will affect us would require a lot of cognitive capacity. We speculate that it might be a more efficient approach for evolution to have equipped us with an almost automatic, intrinsic aversion to the perception that others hold false beliefs. Such a mechanism would save us from making an effortful judgment, each time we encounter someone with different beliefs, about whether those different beliefs are likely to impact us negatively. Instead, we very likely evolved to *rely on heuristics* that inform us about whether, how much, to care about what others believe. Heuristic processing (as opposed to complex expected utility maximization) has been hypothesized to result in behavior that is both adaptive and ecologically rational (Gigerenzer & Gaissmaier, 2011; Hertwig & Engel, 2016). In this context, such heuristics might include: the social closeness of the other person (i.e., how inter-dependent is the individual and the other person); network centrality of the other person (i.e., how many others could the other

person influence, thus, have their beliefs spread); or the perceived conviction of the other person (if someone is more confident in their false beliefs, they are more likely to act upon them).

Such an evolutionary process might incorporate a bias in favor of caring about others' beliefs when they do not impact us, relative to not caring when they do, so as to minimize the occurrence of the more costly error of not caring when those beliefs *do* affect us. According to error management theory (Haselton & Buss, 2000), the types of errors people make when choosing their actions may incur drastically asymmetric costs and benefits, in terms of evolutionary fitness, leading to exactly this kind of evolved bias.

15.6 Consequences of Belief-Based Utility

15.6.1 Information Avoidance

Perhaps the most common and oft-discussed consequence of belief-based utility is information avoidance: People avoid information that would otherwise force them to embrace a reality that they would prefer to remain oblivious to (Golman et al., 2017; Hertwig & Engel, 2016; Sweeny et al., 2010). This behavior violates traditional economic principles ("never avoid instrumental information"), but is fully consistent with the more nuanced economic models that incorporate belief-based utility. As highlighted in an extensive review by Golman et al. (2017), information avoidance may be motivated by *all* types of belief-based concerns that we covered in sections 15.4–15.5: the desire to maintain optimistic beliefs and to reduce negative feelings; the preference for having a positive and integral self-concept; the motive to hold consistent beliefs and to reduce cognitive dissonance; and finally, to strengthen one's social identity and social ties. Moreover, just as diverse motives may drive information avoidance, avoidance itself may take many forms, such as physical avoidance (e.g., refusing to get a medical test), inattention (turning a blind eye to amassing empirical evidence on climate change), forgetting (selectively remembering only positive feedback), or self-handicapping (only engaging in easy tasks, to minimize the chance of poor performance that would signal incompetence).

15.6.2 Biased Information Processing

Even if people cannot avoid information, they have substantial leeway in how to interpret it, and whether to incorporate newly acquired

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information into their beliefs. Abelson proposed the idea that people treat and value their beliefs like possessions, and, just like possessions, people are often reluctant to give up beliefs, and hence ready to defend them. Abandoning or drastically updating beliefs is costly, and people prefer to maintain an overall coherence of their beliefs: they will reject new information if that creates an imbalance in their belief system, or they distort it so as to maintain balance (Abelson, 1986). This desire for consistency and aversion to negative updates results in various information-processing biases. *Confirmation bias* refers to the tendency of people to seek and interpret information in a way that supports their existing beliefs (Klayman & Ha, 1987; Nickerson, 1998).[7] Rabin and Schrag's (1999) theoretical model of biased information processing posits that such non-Bayesian information updating can produce confirmation bias *even in the face of an infinite amount of information*. This motive for interpreting information in a self-serving way is particularly strong when information affects self-esteem and beliefs about self-efficacy, in which cases it often manifests in *self-deception* or *asymmetric belief-updating*. Eil and Rao (2011) found that people update their beliefs about attributes they care about (physical attractiveness and intelligence) in a highly biased fashion: discounting negative, but not positive, signals. As a recent review by Sharot and Garrett highlighted, this pattern of behavior – fully incorporating desirable information while discounting or neglecting negative information – is prevalent in the majority of the population, about 80 percent of people, regardless of country or gender (Sharot & Garrett, 2016).

15.6.3 Intertemporal Choice: Choosing between the Present and the Future

Belief-based utility also has far-reaching implications for intertemporal choice. Standard theories of intertemporal choice assume that there is a *positive time discounting* factor, so that future outcomes and utilities are given less weight in decision making than present ones. Although these models enable a straightforward treatment of preferences for intertemporal

[7] In a seminal study Lord, Ross, and Lepper (1979) exposed people who either opposed or supported the death penalty to the exact same empirical evidence, and found that participants' beliefs became more polarized as their initial opinions shifted towards more extreme views. Beyond demonstrating polarization in response to new information, the study also provided evidence for the mechanism that produced it. People interpreted the evidence in a self-confirmatory way: they took into account evidence that supported their view more strongly than evidence that opposed their view (they were perceiving it as flawed).

sequences of consumption, they fail to explain some simple and common patterns of intertemporal preferences – specifically why people prefer to get unpleasant outcomes over with quickly (e.g., finishing work before going on holiday or receiving electric shocks in a study), and in some cases people opt for delaying pleasant outcomes (e.g., savoring a nice dinner, an expensive bottle of wine, or a movie). These "anomalies" would imply a *negative discount factor*: Present experiences and consumption should weigh less than future ones. However, these patterns are easily reconciled with standard models of time discounting if we allow for the possibility that people also derive anticipatory utility from the expectation itself (Elster & Loewenstein, 1992; Loewenstein, 1987).

15.6.4 Decision Making under Risk and Uncertainty

Standard theories of decision making under risk and uncertainty, which assume that people have well-defined and consistent preferences towards risk-taking, struggle to explain why the *same person* would buy both lottery and insurance: voluntarily taking risk in one case, while minimizing it in another. However, this behavior is perfectly reasonable if we realize that these transactions do not only involve a choice between risky and riskless outcomes but also entail *purchasing a belief* – the dream to win the jackpot, or the peace of mind that comes with being insured against losses – and that this belief is, in and of itself, pleasurable to its holder. Therefore, in many cases, when people are apparently making a choice between a risky and a safe option, they actually are making a tradeoff between different beliefs: hope or hopelessness; anxiety or peace of mind.

Belief-based utility from self-image and the desire for intertemporal consistency over beliefs might also interact with decisions involving risk and uncertainty. For example, hedging desired outcomes (e.g., betting against one's favorite team; shorting own company stocks) is an expected utility-maximizing strategy in standard utility models; however, in reality, people often are reluctant to hedge such outcomes, because doing so would trigger undesired thoughts (e.g., their favorite team losing), or send a negative self-signal (betraying their company). Furthermore, the hedge would introduce a motivational conflict as well (rooting for and against success at the same time), which people find aversive (Morewedge, Tang, & Larrick, 2016). On the other hand, even people who otherwise dread uncertainty might find it pleasurable to bet on desirable outcomes (e.g., which player from their favorite team will perform better, Golman, Gurney, & Loewenstein, 2021).

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15.6.5 *Overconfidence and Overoptimism*

The subject of the previous section, risk preferences, is also closely associated with *overconfidence* and *overoptimism*. If people are motivated to hold positive beliefs about their ability, skills, or the future in general, they will be prone to form overly positive beliefs – e.g., to believe that they are more competent or more experienced than they actually are, or believe that their future prospects are more rosy than what rational expectations would suggest. This can influence decisions with long-term – often irreversible – consequences, such as educational or career choices, investment and managerial decisions, preferences over medical treatments, or engagement in risky activities in everyday life. Whether such overconfidence or overoptimism is self-fulfilling and actually leads to desirable outcomes (in other words: "*fake it till you make it*") or whether it is self-defeating and leads to failure and disappointment, depends on various factors; for example, whether confidence and optimism can boost motivation, effort, and persistence (for a discussion of how these factors interact see, Bénabou & Tirole, 2002; Compte & Postlewaite, 2004; Kőszegi, 2006, 2010).

15.6.6 *Social Consequences: Ideological Conformity and Segregation by Beliefs*

One consequence of the preference for belief consonance – the desire to surround oneself with like-minded others, see section 15.5 – is that the dominant beliefs that are shared within a group the individual belongs to – or aspires to belong to – severely constrain, or even determine, the beliefs that she holds. Expressing dissent with the group's dominant belief system could lead to detrimental psychological and social consequences: they could weaken one's identity and social ties within the group, or, in the worst case, culminate in ostracism. A Republican, for example, might lose friends by openly expressing a belief that climate change is caused by human activity, or raising concerns about domestic gun violence, and this social cost looms much larger than the benefit of holding and articulating an opposing belief. Such motives at the individual level can lead to enormous societal consequences; for example, to pluralistic ignorance – in which the majority openly supports a norm or regulation that contradicts with the majority's (private) preferences (Prentice & Miller, 1993). Homophily and the desire for belief-consonance can also result in belief-based segregation, polarization, and escalate inter-group conflicts. Furthermore, when individuals have social motives for holding inaccurate

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beliefs, in addition to the individual reasons outlined above (anticipatory feelings, ego, consistency), such preferences can culminate in collective delusions or "groupthink," amplifying the potential consequences of holding inaccurate beliefs (Bénabou, 2013).

15.7 Applications

Historical events often have an impact on the social and behavioral sciences. For example, in the aftermath of World War II and the atrocities of the Nazis, topics such as authoritarianism and obedience to authority captured the attention of researchers. The events of the last few decades have likewise had a salutary effect on the prominence of belief-based utility. Two decades ago, most economists would almost certainly have agreed that the main goal of information processing is to arrive at an accurate understanding of the world – to form accurate beliefs so as to make better decisions. To the extent that economists knew about or believed in belief-based utility or motivated beliefs, it was viewed as a minor phenomenon and a fringe topic of study. Confronted with the developments of recent times, that is dramatically no longer the case. In the last few years, economists have started applying the theoretical and empirical tools that they specialize in to study such topics as politics, finance, or health economics.

15.7.1 Politics: News Consumption, Misinformation, and Polarization

Perhaps the most obvious application of the concepts outlined in this chapter – belief-based utility and caring about what others believe – is political preferences and ideological polarization. A plethora of contemporary social and political issues seem to be intimately linked to the observation that what we believe about ourselves, others, and the world, affect our well-being and actions: the emergence of ideological bubbles and "echo chambers" (Sunstein, 2001); the polarization of political beliefs and belief-based geographic sorting (Bishop, 2009); and the advent of "alternative facts" and post-truth politics (Barrera et al., 2020).

Economists have only recently started to investigate the role of motivated beliefs in this undoubtedly consequential context – in the aftermath of Donald Trump's upset victory in the 2016 presidential election. This line of research has focused on individuals' news consumption habits and biased preferences for information. Chopra et al. (2019), for example, found that people who read an openly biased newspaper that aligned with

their political views had a *lower* demand for more objective and balanced coverage from the same newspaper, demonstrating that people have a demand for biased news. This motive is consistent with a desire to confirm pre-existing beliefs and seek out sources that present self-concordant perspectives, even when people are fully aware of the biased nature of these sources. In light of these findings, it is barely surprising that when Allcott et al. (2020) incentivized people to deactivate their Facebook – which, along with other social media platforms, is considered to be the primary channel that facilitates self-exposure to concordant views (Allcott & Gentzkow, 2017) – a four-week long deactivation of Facebook accounts significantly reduced the extremity of people's views on issues of policy. However, it remains an open question how policymakers can combat belief polarization, and, by doing so, improve the quality of public discourse, without implementing such drastic measures as banning or suspending the use of certain platforms.

15.7.2 Finance: Portfolio Choice and Investor Behavior

The idea that people cherish positive beliefs, even if these are inaccurate or redundant, has profound consequences to financial markets and investor behavior. Pagel (2018) proposed that if people derive a separate "news utility," in addition to instrumental value of information, and if people are loss-averse over news (i.e., they dislike bad news more than they like good news), investors will prefer not to pay attention to their portfolios, and delegate portfolio management to others. Karlsson, Lowenstein, and Seppi (2009) investigated the behavior of Scandinavian and American investors and found that investors monitor their portfolios more frequently – thus, keep themselves more informed – when asset prices are rising than when markets are steady or plummeting, to avoid receiving potential bad news – a pattern of behavior that the authors aptly labeled as "the ostrich effect." Further research showed that investors display motivated attention even when markets are closed; that is, they are more likely to check their accounts when they *know* that their portfolio has performed well – an adult version of "shaking the piggy bank" (Sicherman et al., 2016). These studies corroborate the idea that investors do not only care about the instrumental value of checking (and paying attention to) stock prices, but also glean value from whether they receive good or bad news. The timing of *when* people look up the current value of their portfolio has significant implications for trading behavior as well. It is well established that people dislike selling stocks at a loss, relative to the price they purchased

them at – the "disposition effect." Examining the login and trading behavior of a large sample of individual investors, Quispe-Torreblanca and co-authors (2021) found that the investors are reluctant to sell their stocks at a loss, not only relative to the stocks' purchase prices, but also relative to when they last logged in to their account (and presumably observed the values of their investments).

15.7.3 Healthcare: Medical Testing, Health Insurance, and Vaccination

Motivated beliefs can lead to suboptimal decisions in a multitude of domains, but perhaps the most consequential errors occur in decisions related to health. Many people skip important medical tests and postpone recommended screenings which could prevent the development of more serious conditions and diseases, just to avoid thinking about potential negative outcomes and to reduce their anxiety (for a detailed review, see Sweeny et al., 2010). For example, Oster, Shoulson, and Dorsey (2013) found that pre-symptomatic genetic testing among individuals at risk for Huntington's disease – a hereditary disease with limited life expectancy – is surprisingly rare, and that untested individuals express overoptimistic beliefs about their future health, even when they have a high chance of carrying the gene responsible for the disease. As a result of their unrealistic beliefs, at-risk individuals end up making decisions (e.g., family planning, retirement) as if they do not have the disease. Similarly, Ganguly and Tasoff (2016) documented that many people are even *willing to pay* to avoid learning the results of a medical test if it could reveal that they have been infected with a sexually transmitted disease.

As noted, information avoidance does not only entail physically avoiding information but can also involve neglecting to draw obvious conclusions from information one cannot avoid receiving. Consistent with such an effect, Sicherman et al. (2021) find, in a survey of parents of children ultimately diagnosed with autism as well as of their friends and family, that the family and friends often recognize that their child has a problem well before the parents do. This could have a variety of causes, but the parents themselves endorse information-avoidance as an explanation. Asked to what extent their agreed with the statement "Thinking back to before [name of child] was diagnosed: Do you think that at some level you suspected that x had a serious condition, but you preferred not to know?", 20 percent responded "Yes, definitely," and 32 percent responded "Possibly."

Anticipatory feelings can also affect how people choose their health insurance coverage: people might purchase overpriced health insurance

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plans with low deductibles, which allows them to have their "peace of mind": they do not have to be afraid of unexpected expenses (Hsee & Kunreuther, 2000).

Finally, motivated beliefs – or "magical beliefs" (Bryden et al., 2018) – and focusing on emotional narratives (Kata, 2012) instead of objective data can indirectly lead to the spread of diseases and malpractices. This is clearly evidenced by the rise of anti-vaccination and pseudo-scientific movements, or, in general, any kind of non-evidence based "medicine" (homeopathy, cupping, acupuncture, etc.). Despite abundant scientific support for vaccines, anti-vaccination movements pose threats to public health in many countries, rendering policymakers and healthcare workers helpless, since education and information provision do not seem to curb these movements.

15.7.4 Organizational Behavior: Employee Effort and Managerial Decisions

One central question in organizational science and labor economics is how to incentivize employees to achieve optimal efficiency. Standard economic theory asserts that monetary incentives improve performance, and there is a monotonic relation between incentives and effort (i.e., higher incentives cannot lead to lower effort, and vice versa). However, voluntary engagement in different tasks conveys signals about one's competence (e.g., Kőszegi 2006), commitment, and moral character, both to the self, and to others, thus affecting self-esteem and self-image (Bénabou & Tirole, 2003). Because the presence of extrinsic incentives can make these signals less reliable, employers must consider very carefully how to incentivize their employees, as inappropriately chosen incentives can crowd out intrinsic incentives for work and lead to reduced motivation and effort. The preference for positive ego-relevant beliefs has implications for managers as well. Research has documented that managers remain persistently overconfident and maintain unrealistic beliefs about their ability, even after receiving repeated feedback (Huffman, Raymond, & Shvets, 2019). Huffman et al. (2019) also demonstrate the mechanism which allows overconfidence to persist: managers distort their memories in a self-serving way by selectively forgetting negative feedback, while remembering positive feedback.

15.8 Concluding Remarks

In this chapter we have provided an overview of the economic perspective and economic research on beliefs. We started off by describing how, for economists, beliefs correspond to probabilities that different propositions

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are true, and that mainstream economics has traditionally treated beliefs solely as an input to decision making. We have also explained that these assumptions, in combination, lead naturally to the conclusion that people will want to form the most accurate beliefs that they can (taking into account the costs of gathering and processing information), and that people will never deliberately avoid information. The concept of belief-based utility, as we have shown, violates all of these assumptions and predictions. Recognizing that people derive pleasure and pain directly from their beliefs, independently of the "usefulness" of those beliefs, leads to a wide range of implications, including that people may *not* want to have beliefs that are as accurate as possible, and that they may avoid information that threatens their self-concept or their views about the world.

Inevitably, given the length constraints for the chapter, there are several important topics and open questions we were not able to deal with. One of these is the relationship between beliefs and *attention*. In many situations, it is not clear whether the pleasure or pain associated with beliefs arises from the beliefs themselves, or from thinking about – paying attention to – those beliefs. In the study of investors by Sicherman et al. (2016), for example, investors whose portfolios had risen in the recent past were more likely to log in to, and look at, their portfolio information multiple times *on the weekend* when the market is closed. This form of information-seeking seems to be more driven by wanting to *attend* to positive information than by wanting to develop positive beliefs – which investors already had.

A second, and related, issue has to do with what the *constraints* on beliefs are (for a brief discussion of potential constraints, see, Loewenstein & Molnar, 2018; Molnar & Loewenstein, 2022). Economics is often seen as the discipline that studies constrained optimization – e.g., how to derive maximum consumption utility from a fixed amount of wealth. However, as we noted in section 15.3, beliefs are not constrained in the same way that consumption is: People can, at least in principle, believe whatever they want to believe, and one avenue to elevating utility is to form beliefs that are as positive as possible. A crucial next step for this line of research will be to identify those factors and mechanisms that constrain beliefs.

15.8.1 Final Comments

In this chapter we introduce the reader to the burgeoning literature in economics dealing with belief-based utility. Although the idea that beliefs

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confer pleasure and pain directly may seem so obvious to not be worthy of note, in some cases stepping back from a phenomenon, and being introduced to another person, or group's perspective, can help to see it with new eyes. It would give us pleasure to believe that this will be the case for this review.

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