Intuitive Behavioral Design
How to Empower Professional Investors

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Abstract

Any asset manager below one trillion USD in assets under management can be considered small-to-medium sized (Forbes, 2018). Over the course of 70 years, the asset management industry has become a copy-cat machine based on pseudo-innovative portfolio construction techniques, resulting in a high level of standardization in its service offerings (Schuller, 2015). Those stream-lined me-too products favor the survival of large asset managers, while digitalization and fee-pressure strengthen their edge (PwC, 2018).

We know from industries driven by competitive forces, that the development of a comparative advantage requires first principle (= creative and critical) thinking, through which value creating solutions are generated. This way of thinking increases in relevance, the more alpha-driven an investment strategy is supposed to be (Schuller, Mousavi, & Gadzinski, 2019). The vast majority of financial instruments claim to be alpha-driven (ICI, 2018). Their investment process and behavior, though, speak a different language.

As a result of these dynamics, small-to-medium sized asset managers have a choice to make: specialization or extinction. For those who opt-in for specialization, the path involves understanding the behavior of other market participants as well as their own. Adaptive markets require investment processes and behavior to become adaptive too. Adaptivity of the investment decision maker then requires an active maximization of skills and minimization of luck dependence (and influence) in the investment decision. Thus, a most rational understanding lays the foundation for why and how to adapt.

Behavioral economics and finance have enabled us to better understand the implications of our bounded rationality as capital market participants. The translation of those insights into practical guidance for professional investors has only recently begun. In this article, we introduce one such framework, developed at Panthera Solutions that offers executable principles in the context of asset management from a practitioner’s viewpoint.

The Managerial Problem and Its Solution

As the asset management industry grows increasingly competitive, specialization is the key to survival for most investment firms. Finance is first and foremost a social science. By enhancing the rational understanding of the behavior of other market participants as well as their own, professional investors can develop a comparative advantage in their respective specialization efforts. The managerial problem consists of “slow” adoption rates of applicable behavioral insights by professional investors in order to make more rational investment decisions in their search for comparative advantages in adaptive markets (Monk, 2015).

Solution: to support professional investors in their specialization, an effective interventions and applications toolbox needs to be explored to facilitate designed changes for empowering professional investors, embedded in a choice architecture that supports their empowerment. This interplay leads to a comparative advantage through adaptive behavior and adaptive investment processes, which then interact with adaptive markets, as depicted in Figure 1.
Figure 1: Adaptive markets

Our research and experience have produced a blueprint for effectively directing management changes in the asset management industry. This emergent blueprint consists of a clarified intervention objective, an intervention and application toolbox and an implementation roadmap through which the toolbox is brought to bear. In addition to the conceptional groundwork, parts of the blueprint were empirically tested and validated through action research design. We label the outcome as Intuitive Behavioral Design™.

Academic Context

The Third Asset Allocation Generation

The visualization below summarizes 70 years of modern portfolio theory since Markowitz (1952) in three defined generations of portfolio construction techniques. The first two, single period/single factor models and multi-period/multi-factor models share a set of assumptions that are based on the homo oeconomicus as a concept of man (Schuller, 2015).

Figure 2: Asset allocation generations. Copyright Panthera Solutions.

Despite significant empirical and experimental evidence against the basic assumptions of the first two generations of models, and in support of the concept of biased human behavior, the disunity of the scientific discourse persists to date. This was highlighted in 2013, when the Prize in Economic Sciences in Memory of Alfred Nobel (the Nobel Prize in Economics) was
awarded to Eugene F. Fama, Lars Peter Hansen, and Robert J. Shiller, representing diametrically opposed schools of thoughts—with Shiller being a prominent researcher on market anomalies, as demonstrated in his book Animal Spirits (Shiller & Akerlof, 2009) or his groundbreaking work with another Nobel Laureate George Akerlof on Sludges in financial services (2015).1

Third generation asset allocation models represent emancipation from the basic assumptions of the first two. The homo oeconomicus no longer takes the center of the stage and starting point of modelling. The academic foundations of this alternative line of work was initiated by Benoît Mandelbrot in the 1960s and continued in the 1970s, with researchers (Jensen, 1978; Kahneman & Tversky, 1979; Shiller, 1981; Dimson, 1988) documenting market phenomena which could not be explained by the established theories, but could be understood as being caused by the cognitive biases of market participants. These researchers laid the foundation for subsequent research in detecting and isolating dozens of biases since. In 2004, the third generation of models received its conceptual framework through Andrew Lo’s (2004) combination of cognitive neuroscience and evolution theory postulated as the Adaptive Market Hypothesis (AMH).

Contrary to the first-generation assumptions, including the central notion of Pareto Efficiency, Lo defines market efficiency from an evolutionary perspective, arguing that market participants optimize their satisfaction, while oscillating between greed and fear. AMH-groundwork has been laid by one of the pioneers in behavioral finance, Hersh Shefrin, with the very first behavioral investment book “Beyond Greed and Fear” (Shefrin, 1999). Within the framework AMH provides, behavioral finance research can now focus on applicable insights concerning cognitive aspects of market participants (Lo, 2010).

The AMH assumptions are compatible with a system theoretical/constructivist understanding of nature and highlights the fundamental weakness of the modern capital market theory—assuming market participant as homo oeconomicus, thus rational agents. This weakness can be traced back to intended and/or unintended selective interpretations of Adam Smith by Milton Friedman and other researchers at the Chicago School of Economics.

The Scottish philosopher and father of modern economics, Adam Smith, has described market participants in his two main publications (Smith, 1759, Smith 1776) as civilized persons, willing to sacrifice beyond self-interest and capable of altruism. Morgenstern (1935), Keynes (1936) and Hayek (1952) among others viewed market participants as social beings with limited cognitive capacity, whose market choices arise from social and reflexive interactions. For instance, Hayek (1952) considers the market as a complex social system, whereas the complexity has its origin in the constructivist perception of a brain, which interprets any information subjectively and converts it into heterogeneous expectations. This fundamental relativity of perception has also been a well-known phenomenon in natural sciences, introduced by quantum mechanics during the first half of the 20th century, e.g., see Schrödinger’s cat (Schrödinger, 1935).

In short, before the rational agent was established as the dominant formal view of humans during the second half of the 20th century, sciences created sufficient evidence to consider

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1 Sludges are defined as using nudging techniques for less benevolent purposes to a) discourage behavior that is in the person’s best interest and/or b) to encourage self-defeating behavior (Thaler, 2018)
individuals as path-dependent, satisfaction-optimizing actors with bounded rationality. The substitution of the rational agent by a more accurate view of humans as part of the third-generation modeling simply means returning to an already well-established understanding of the concept of man.

![Figure 3: Concept of humankind of a market participant. Copyright Panthera Solutions.](image)

This insight suggests that the analysis of market processes and participants can benefit from an anthropologic-sociological perspective. This framework has influenced the research in behavioral economics and behavioral finance since the 1970s, or more recently, the fields of cognitive neuroscience and complexity research.

**Empowering Professional Investors**

**Most Evidence-Based Investment Decisions (EBID)**

The empowerment of a professional investor to structurally increase the likelihood of a most evidence-based investment decision requires a workable definition of rationality.

Drawing on a workable definition from Rapp and Cortes (2016), an investment decision becomes more rational, if (1) the limbic system is stimulated as such to maximize the contribution of the Prefrontal (PFC) and Orbitofrontal Cortex (OFC) to the decision-making process and if (2) PFC+OFC are trained to equip the individual with relevant expert knowledge and related tools to assess the consequences of its use (Roth, 2007). This neuro-scientific definition is multi-disciplinarily supported by the world’s foremost experts on expertise, summarized in the Cambridge Handbook of Expertise and Expert Performance (Ericsson, 2018).

According to the standard model in cognitive neuroscience (Roth, 1994), the thinking process is a full-body exercise, for which the rational element can, but not necessarily has to play a role. The sequence of a thinking process begins and ends with our limbic system, the central evaluation system of our brain, orchestrating our emotions by, for instance, managing our hormonal balance. The rational contribution to a thinking process, according to cognitive neuroscience, is compatible with the dimension of different levels of consciousness, following Freud’s topographic model of the mind, “which is still the most coherent and intellectually satisfying view of the mind” (Kandel, 1999). It is further compatible with the system 1 and 2 categorization of the Prospect Theory (Kahneman & Tversky, 1979) and the equally pioneering work of Steven Sloman (Sloman & Barbey, 2007; Sloman & Fernbach, 2017).
**Figure 4: Levels and drivers of consciousness**

Figure 4 shows preconsciousness and unconsciousness as thinking processes that Kahneman calls System 1 (S1), namely fast, automatic, frequent, emotional, stereotypic. The consciousness is categorized as System 2 (S2), namely slow, effortful, infrequent, logical, calculating (Kahneman, 2011). S1 is divided into preconsciousness, based on intuition-driven heuristics, and unconsciousness, based on instinct-driven heuristics (Roth, 1999).

**Figure 5: Integration of different cognitive perspectives. Copyright Panthera Solutions.**

Likewise, the early Epstein (1973), when formulating his dual-process model, the Cognitive-experiential self-theory (CEST) states "experiential system, which operates at a preconscious level of information processing (acts) in contrast to a rational system, which operates at a conscious level" (Epstein, 1983). Although the foundation for an S2 and S1 distinction was laid, it took his school of thought years of additional research to better assess and work in the interplay between consciousness and preconsciousness (Epstein, 1991). "It is noteworthy that the stage of the dual-process aspects of CEST that was reached in 1991 is considerably more advanced than most modern dual process theories proposed many years later. In fact, the same could even be said of the 1983 article, in which a list of attributes of experiential processing was first introduced." (Epstein, 2005)
Conclusively, the late Epstein can be considered in line with the initially introduced approach of Roth and Sloman, as he would even claim that the early Sloman “presents as his own original theory a detailed reproduction of almost all the major assumptions and processing principles and attributes of the experiential and rational systems described in CEST”, only with different labels (Epstein, 2005). All three offer a refined distinction between consciousness (S2), preconsciousness (S1) and unconsciousness (also S1). They also lay the foundation for the integration of three different schools of thoughts in the next section. Figure 5 summarizes the state-of-the-art research on these three levels.

**Facilitating Most Evidence-Based Investment Decisions by Integrating 3 Behavioral Schools**

A bridge can be built between the three schools of thought in behavioral finance, Fast & Frugal Heuristics, Heuristics & Biases and Naturalistic Decision Making (FFH, H&B and NDM; see Figure 6). Switching from looking at them through the competitive lens of turfs, to an understanding of what their respective insights can do for practitioners, one finds them to be sufficiently overlapping to generate a compatible and complementary foundation.

![Figure 6: Schools of thought in behavioral finance](Image)

The understanding of whether heuristics are a predominantly negative phenomenon for a rational decision in the business domain has changed (Forbes, 2015; Mousavi & Gigerenzer, 2014; Mousavi, Gigerenzer, & Kheirandish 2017). In the early days of behavioral finance research it was believed that a rational decision avoids invoking heuristics altogether (Gilovich et al., 2002). Gerd Gigerenzer and his team have clarified through a series of well-received research articles that in certain contexts, most of us regularly use heuristics simply because they produce better decisions (Gigerenzer & Brighton, 2009; Gigerenzer & Gassmaier, 2011; Gigerenzer & Goldstein, 1996). The consideration of the context, thus turns a heuristic from a phenomenon to be generally avoided to a potentially useful tool. Specific heuristics, namely intuition-based heuristics, can be used for making more rational decisions, in the sense that a successful application of an intuition-based heuristic is governed by its ecological rationality (Gigerenzer, 2015).

A criticism posed by Gigerenzer and his school of thought (FFH – Fast and Frugal Heuristics) to Kahneman and his school of thought (H&B – Heuristics and Biases) is that the latter has ignored the relevance of the context, blaming an individual to act sub-optimally when being trapped in
a heuristics based on cognitive biases, while ignoring the relevance of intuition-based heuristics in the context of uncertainty (Gigerenzer, 2017; Mousavi & Gigerenzer, 2017).

The “Naturalistic Decision Making”-school (NDM) of Gary Klein can be seen as bridge builder between H&B and FFH. Their application-focused approach pragmatically defines intuition as “based on large numbers of patterns gained through experience, resulting in different forms of tacit knowledge” (Klein, 2015). Kahneman and Klein compared their schools (Kahneman & Klein, 2009) and concluded that they can agree on distinguishing different classes of intuitions: those that arise from experience and manifest skill (NDM) and those that arise from simplifying heuristics, not from specific experience (H&B). They both endorse the Simon definition of a skilled intuition (Simon, 1992): “The situation has provided a cue: this cue has given expert access to information stored in memory, and the information provides the answer. Intuition is nothing more and nothing less than recognition.” They also agree that most intuitive judgments and decisions in S1 are skilled, appropriate and eventually successful, but not all.

**Conclusion:** “Skilled intuition will only develop in an environment of sufficient regularity, which provides valid cues to the situation” (Kahneman & Klein, 2009). The FFH definition of intuition-driven heuristics can be compatibly devised together with the common ground findings of Kahneman and Klein. FFH postulates heuristics as adaptive tools that ignore information to make fast and frugal decisions that are accurate and robust under conditions of uncertainty. A heuristic is considered ecologically rational when it functionally matches the structure of an environment (Neth, Meder, Kothiyal, & Gigerenzer 2014; Neth & Gigerenzer 2015; Mousavi & Gigerenzer 2017).

This outcome is in line with a realm of literature in evolutionary psychology that dates back to the 1940 and gained traction since the 1990s (Riggs, 1993): the evolutionary mismatch theory. It refers to evolved traits that were once advantageous but became maladaptive due to changes in the environment. The maladaptive notion was prominently included in the contextual framework Lo (2004) created for the third generation of portfolio optimization techniques, by postulating the adaptive market hypothesis. The evolutionary mismatch theory provides ground for all three described schools in behavioral finance, as it is not only applicable for phylogenetic learning, but also ontogenetic variations (Lloyd, Wilson, & Sober, 2011; Giphart & van Vugt, 2018).

In short, S1 can be distinguished between intuition-driven and instinct-driven heuristics, whereas intuition-driven should be included in most evidence-based investment decisions, given conditions of uncertainty. Intervening in the preconsciousness to shape intuition-driven heuristics can support professional investors in overcoming their resistance to change, thus making their behavior more adaptive.

*Including intuition-driven heuristics in our thinking process increases the likelihood of a more rational outcome (Roth, 2007). Whereas including our instinct-driven heuristics as limbic system-based unconsciousness (“gut feeling”) should be avoided in our decision making.*
Notwithstanding the relevance of most evidence-based investment decisions, a non-trivial phenomenon can be observed: professional investment decision makers tend to talk more about an eventual behavioral impact on their decisions than actually make use of practical behavioral insights in favor of more evidence-based decision making. A phenomenon that was reasoned as follows (Schuller, 2017b):

- Many still consider the rational agent model and corresponding theories and methodologies the state-of-the-art.
- Even those espousing behavioral finance insights use it as a hollow vessel, showcasing their awareness of cognitive biases while not making use of them – a common pretense in Finance.
- Those who work on solutions based on behavioral insights, are rather outward-oriented, trying to sense the thought process of others through sentiment indices or cognitive finance.

All three share the same foundation of resistance: decision makers’ difficulty to face their need to adapt their own behavior according to adaptive markets. Change and related challenges are widely researched in the general management literature. For the asset management industry, however, it can be considered an under-researched knowledge frontier (Epstein, 2015).

The complexity of the task to trigger and manifest individual and organizational changes has proven to be non-trivial across fields. Citing the doyens of learning in organizations, Harvard professors Robert Kegan and Lisa Lahey: “We all know there is a big gulf between insight and the ability to act upon it.” (Kegan, 2009).

**Figure 7: Intuition versus instinct-driven heuristics**
The question arises, how to bring all the above together in a comprehensive framework to understand how to intervene in the choice architecture of a professional investment process that enables empowerment towards most evidence-based decision making. At the same time, the framework needs to be concrete enough to derive from interventions on an individual level, empowering the decision maker to utilize the enabling choice architecture.

The Panthera framework addresses the need to overcome the described resistance to change by constructively closing the knowing-doing gap (Schuller, 2018). In empowering professional investors towards most evidence-based investment decisions, our framework concentrates on two elements:

1. *Establishing focus* to get ready for making most evidence-based decisions (intervention framework)

2. *Applying the established focus* to select the right tools/methods/sources in building the case for most evidence-based decisions (application framework)
Figure 9: Intervention and application framework. Copyright Panthera Solutions.

Both elements of the framework are driven by the objective to empower individual decision makers, while embedding them in a choice architecture that facilitates their empowerment.

Busy Is the New Stupid – the Choice Architecture as Focus Enabler

Let us further elaborate on the link between an enabling choice architecture along the value chain of an investment process, and an empowered investment decision maker who is embedded in it:

Recent research in applied behavioral finance (Halpern, 2016) concludes that the choice architecture along the investment process is of significant relevance for whether the decision itself is made rationally or emotionally. The facilitation of self-directed neuroplasticity to include intuition-based heuristics in decision making requires being embedded in a supportive choice architecture to make lasting changes. The assumption that people have self-control because they’re good at exerting willpower is increasingly falsified. Self-control and all its benefits, may not be related to inhibiting limbic-system impulses at all (Shefrin & Thaler, 1978; Hofmann, 2012; Inzlicht, 2017). Willpower can be rather considered to be a reservoir, not a river. Once deployed to one decision, less self-control remains for the next one (Eisenhardt, 2015). Relying on willpower after its exhaustion results in distraction, which in turn leaves one busy throughout cognitive arousal, instead of remaining focused.

The choice architecture is a combination of cultural and procedural patterns (Thaler & Sunstein, 2008). Awareness of institutional investors regarding the importance of its arrangement is steadily on the rise, supported by growing research in the field (Lo, 2014).

Conclusion

Investors need to accept the characteristics of capital markets: they are complex, adaptive systems with a high level of endogenous dynamic, driven by a large number of heterogeneous...
market participants acting under imperfect information and bounded rationality. Investment processes and decision makers need to match this adaptivity.

This article focuses on how people actually take decisions, and how they can be supported in taking better decisions through the introduced intervention and application framework. Our research produced a blueprint for effective directed change management in the asset management industry.

We define “better investment decisions” as most evidence-based ones, which emerge from simultaneous maximization of skills and minimization of reliance on luck for achieving ones investment objectives. Making most evidence-based investment decisions involves creating a fit between analyzed market phenomenon and the analytical tool applied, and supplemented by intuition-based heuristics.

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