

# Cognitive Accuracy and Intelligent Executive Function in the Brain and in Business

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**ABSTRACT:** This article reviews research on cognition, language, organizational culture, brain, behavior, and evolution to posit the value of operating with a stable reference point based on cognitive accuracy and a rational bias. Drawing on rational-emotive behavioral science, social neuroscience, and cognitive organizational science on the one hand and a general model of brain and frontal lobe executive function on the other, I suggest implications for organizational success. Cognitive thought processes depend on specific brain structures functioning as effectively as possible under conditions of cognitive accuracy. However, typical cognitive processes in hierarchical business structures promote the adoption and application of subjective organizational beliefs and, thus, cognitive inaccuracies. Applying informed frontal lobe executive functioning to cognition, emotion, and organizational behavior helps minimize the negative effects of indiscriminate application of personal and cultural belief systems to business. Doing so enhances cognitive accuracy and improves communication and cooperation. Organizations operating with cognitive accuracy will tend to respond more nimbly to market pressures and achieve an overall higher level of performance and employee satisfaction.

**KEYWORDS:** neuroscience; rational; evolution; executive functioning; psychology; brain; frontal lobes; cognitive; belief systems; cultural; organizational; business; management; leadership

## INTRODUCTION

In 1887, physicists Albert Michelson and Edward Morley conceived a brilliant plan to detect the presumed existence of a universal substance known as ether. They speculated that ether would impede light traveling with the turning of the earth more than light traveling at right angles to it. Their failure to detect any difference stunned the scientific world. Einstein explained the failure

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by noting that, under the rules of general relativity, the yardstick changed exactly as much as the light beam it measured, rendering the expected difference undetectable.

The theory presented here suggests a similar conundrum in business: As a species, we tend to use inherently inadequate tools to measure the results of our organizational thought and behavior. Lacking awareness of how we use words to think and speak in organizational relationships and situations, and measuring our business success by unquestioned cultural belief systems that we have accepted uncritically, we often fall prey to confusion, emotional turmoil, misunderstanding, and poor communication. This article is based on the conjecture that the components of healthy human mental functioning and evaluations enable more successful, rational business outcomes.<sup>1</sup> “Rational” here refers to behavior, especially cognition, that relies on deliberate evaluation, learning, and informed deliberation, and it is based on cognitive accuracy. Rational cognition is deemed adaptive, pragmatic, practical, flexible, and matched as closely as possible with the present instead of the past. In this view, rationality does not imply finding or knowing a supposed single right answer but rather recognizes that, lacking omniscience, we do best to prepare for a variety of possible outcomes and to readily adapt when things do not go as we would prefer. “In forming opinion about future events, [rational expectations imply] the use of all available information to assess the probabilities of the possible states of the world. More simply, [rational] expectations [are those] that are as correct as is possible with available information.”<sup>2</sup> Such flexibility is preferable to “irrationality,” used here to refer to behavior, especially cognition, that is rigid and reactive, oriented toward learned rather than learning behavior, and based on belief rather than evidence, that is, operating with old information containing unexamined cognitive inaccuracies.

This article applies the concept of cognitive accuracy as a method for evaluating the accuracy and rationality of thoughts and behaviors in an organizational setting; the primary assumption is that the chief executive has responsibility for the corporate culture as well as business outcomes, acting as the lead evaluator of both his own cognition and that of his team. This method includes three primary components:

- information accuracy—seeking and using objective information based on empirical observation, premise, deduction, conclusions, and testing;
- thought process accuracy—making evaluations and decisions with multivariate terminology, awareness of individual responsibility, and flexibility of thought; and
- time-space or event-level accuracy—connecting and verifying both information and decisions in a time- and context-dependent manner to increase the relative probability of more accurate predictions of current and future outcomes.

Event-level accuracy is especially important in organizations, to ensure accurate integration of policies and behaviors with the constraints of a given moment and place.

## **BRAIN STRUCTURES, NEUROCHEMICALS, AND RELATIONSHIPS**

To understand normal human brain functioning and cognitive accuracy, it is important to understand the mechanisms we use to obtain information, evaluate it, and make decisions. Words and language represent both the largest differences among human populations and the most significant group identifier, forming the basis for relationships and both organizational and individual cultural belief system values. Relationships, including corporate ones, depend on interactions between individuals, and these interactions in turn depend on communication. Faulty, inaccurate communication adversely affects relationships at all corporate levels. This problem usually results from inadequate evaluation and failure to implement rational communication processes by the CEO and management. Unfortunately, “. . . most companies are stuck in outmoded ways of thinking.”<sup>3</sup>

### *Innate Social Mechanisms*

We can trace the large variation in socialization among species to the different distribution of oxytocin and arginine–vasopressin receptors and pathways that enable bonding, attachment, affiliative behavior, and the creation of cohesive groups.<sup>4,5</sup> Reward pathways add a positive emotional valence, or value, to bonding and affiliative behavior, mediated (at least in part) by a positive shift in ventral tegmental area dopamine and endogenous opioids.<sup>6</sup> Threats to our social attachments induce a negative limbic valence that may produce jealousy, anger, and violence<sup>6</sup> and may establish dominance hierarchies. This negative valence appears to correlate with increased amygdala activity. Studies show that the stress induced by detachment triggers bereavement-related syndromes, correlated with an increase in stress hormones (corticotropin-releasing factor) and a decrease in brain-derived neuronal growth factor. These changes in turn correlate with increased amygdala activity and decreased volume in the prefrontal cortex (PFC) and hippocampus, with attenuated memory and diminished cognition. These symptoms echo those of anxiety and depression, sometimes leading to anger and aggression.

Like many social species, humans are genetically predisposed to have relationships. For us, however, the innate tendency to bond and affiliate is intimately associated with cultural belief systems, mediated by language.<sup>7,8</sup> We learn the structure and rules of *what* we think and *how* we think from the

cultural environment we grow up in. Because cultural belief systems consist largely of language and semantics, they directly affect the thoughts, emotions, and behavior of groups, distinguishing one group from another.<sup>9,10</sup>

Organizational belief systems and groups often overlap or contain subgroups, but a prerequisite set of beliefs usually determines membership. These systems form within business units because of our inherited propensity for bonding and affiliations. We find unique belief systems at all scales: individuals, small groups such as families or affiliations, large groups such as businesses and corporations, and entire societies or states. In business, the rules that they embody for the group regarding thought and behavior are usually passed down through the leadership hierarchy, defining the particular organizational belief system. Because the rules and beliefs directly affect thought and behavior, they also dramatically affect emotions. Because cultural belief systems rely heavily on semantics—the use and meaning of language—one might also conclude that semantics and its usage figure significantly in understanding normal human cognition and interactions.

Knowing this, we can better appreciate the tremendous effect that semantics can have on emotions, behaviors, and perceptions as we evaluate human brain functioning across and within organizations. Semantics directly affects many aspects of human experience—corporate and cultural belief systems, cognition, emotions, behaviors, evaluations, perceptions, affiliations, bonding mechanisms, organizational and social interactions, and even aggressive behavior—so it seems reasonable and appropriate to construct more *naturalistic* organizational structures that recognize, account for, and address these effects rationally.

### *Subjective Cultural Classifications*

Our language structure has many hidden attributes that directly affect our cognition, but they have become so habitual that we use them daily without inspection. These hidden features include unscientific, subjective, and overgeneralized cultural classifications, categorizations, groupings, and labeling. We often express these by using the predicate verb “to be,” which allows us to semantically convert any subjective condition into a seemingly objective noun (i.e., we say, “He is a *failure*,” instead of saying, “He *failed* at this particular effort”). Cultural labels are often discriminatory, rigidly held, and habitually defended against scientifically derived classifications or alternatives. Accordingly, cultural belief systems also rely on rigid, authoritarian, and sometimes intimidating helping verbs (e.g., *should*, *must*, *have to*, *need to*, *ought to*, *got to*). In business, these prescriptive, arbitrary, and cultural artifacts deftly sustain the organizational belief system and exclude rational *choice* and choice–outcome paradigms: They demand a predetermined choice, usually without knowledge or consideration of either the context or the nature of the decisions

and outcomes involved. Culturally learned conventions—including either—or, dichotomous cognition—usually automatically preempt multivariate cognitive strategies for evaluations. Even though these automatic habits tend to become embedded in the hierarchical structure, organizations can uncover them with effort and inspection. However, if we do not acknowledge them, we have little chance of finding them.

### *Evolution and Dominance Hierarchies*

An evolutionary model offers some plausible explanations for the relationships between culture and language. If we start with the assumptions that (1) variability and adaptability in the evolution of human social systems depends on dominance hierarchies and (2) survival depends on group functioning, then it makes sense that hierarchies controlled through reinforcement and punishment by dominant individuals or groups of individuals would have been adaptive for survival and reproduction in many species. In human interactions and language, we may still observe the slow evolution of these dominance features, especially in organizational structures.

Unfortunately, dominance hierarchies in humans—characteristic of our genetic inheritance and conditioned by our environment—tend to produce a kind of stodgy rigidity. We are hard-wired for aggression, territoriality, and competition for resources, dominance status, parental–familial–organizational affiliation, defensiveness, and irritability.<sup>11</sup> From individuals to whole cultures, we see language habits—acquired in early development—perpetuating dominance and rigidity. Humans are susceptible to this state because our learning mechanisms (including instrumental learning, modeling, and associative conditioning) depend on language. This learning, supported by language, forms the basic fabric of *what we believe* and *how we think* for most of our lives. Our language processes provide the vehicle for culture, social structure, and dominance, enabling us to operate on a gradient from subjective irrational bias to a more objective rational bias. Organizationally, we tend toward the former, whereas cognitive accuracy offers a way to move closer to the latter. We originally learn these organizational principles from our first “managers” (our parents and caretakers), and such principles tend to give us a subordinate bias.

### *Cultural Social Inheritance*

The beliefs we “inherit” within an organization represent a long line of learned and rigidly held inaccuracies that significantly bias our perception. Becoming aware of the potential inaccuracy of what we know (or think we know) allows us to make corrections and think more critically. We measure

cognitive accuracy by the relative distance or gradient between the unexamined, inconsistent, inaccurate, and irrational yardsticks that we have inherited and the established, external, accurate, and rational reference points that we have identified through science. The shorter this distance, the more objectively and rationally we think.

Most people, including business executives and managers, would contend that they do think accurately, rationally, and logically. However, they base their contentions on their own generally inaccurate and irrational frames of reference. For the most part, our individually inherited cultural belief systems significantly bias normal human thought and perception. This bias becomes apparent when compared with a rational reference point or standard (see TABLE 1). Awareness of this irrational bias opens the door to adopting standards that are more accurate and, therefore, have a more reasonable bias.

## HUMAN BRAIN MODEL

Neuroscientists sometimes describe normal human brain functioning as a computer model.<sup>12–14</sup> The higher-level executive working memory<sup>15</sup> of the brain's frontal lobes dorsolateral PFC (DLPFC; along with frontopolar, Broca's area, temporal, temporoparietal, and association area *integration*, etc.) may be compared to the computer's random access memory, or RAM.<sup>16</sup> The information used to make decisions compares to the data stored in the computer.<sup>17</sup> The frontopolar cortex appears to play an important role in integration of internal and external appraisals both personally and empathetically with others.<sup>18,19</sup>

Human evolution seems to have added semantics and language on to the lower-level limbic working memory provided by our orbital frontal cortex (OFC). The OFC provides valuable utility calculations<sup>20</sup> while monitoring somatosensory information, emotional valence, relative risk–reward contingencies, and social salience. It also automatically provides bottom-up regulation of the limbic system by using the default semantics and language from our cultural belief system, thus reinforcing the subjective, social, hierarchical, neuroeconomic, and relative psychological values that define our organizational bias.<sup>21,22</sup> If subjective belief systems are edited to operate more accurately (i.e., yielding a more *scientific* belief system), the bias shifts toward the more objective end of the value probability continuum, operating on more rational–cognitive versus emotional–motivational evaluation gradients.<sup>23</sup>

The top-down, higher-level executive functioning of the DLPFC likewise relies heavily on semantics and language to perform critical integration of choice–outcome determinations. Whereas the OFC is limited to a subjective appraisal and read–write capacity, the DLPFC executive functions have an objective *reappraisal* and *edit* capacity. The limbic working memory and the OFC make adjustments relative to reward contingencies, reinforcement, and

**TABLE 1. Inaccurate versus accurate rational biases**

Inaccurate irrational bias	Accurate rational bias
<p>Faulty rigid assumptions; dogmatic beliefs, unsupported by facts, but stated as unquestionable “truths of the Universe” with questioning prohibited, “superstitious” ritualistic thought and behavior that promotes mind–brain dualism</p> <p>Rigid, maladaptive, with lower-level subjective bias</p> <p>Absolute, static bias: certain, “<i>determinate</i>,” guaranteed</p> <p>Dichotomous cognition limits freedom of executive function</p> <p>Veridical bias: true and false, either–or, absolute, concrete, black and white; constrictive and restrictive</p> <p>Predetermined certainty, all knowing, resulting in decreased frontal lobe requirements: “<i>frontal</i>”</p> <p>Parental, demanding; adversarial</p> <p>Semantic inaccuracy: vague, poorly defined, with overgeneralizations: always, never, every, all, none, etc.</p> <p>Rigid; implies no other choices: I should, I must, I have to, I need to, and I have got to. “<i>I am obligated</i>”</p> <p>Tends to ignore inaccuracies of information, of thought process, and of time–space orientation; retroactive, “reactive”</p> <p>Inaccuracies and faulty assumptions promote faulty and inaccurate cause-and-effect conclusions</p> <p>General unawareness of irrational cognitive process “Cultural belief system anosognosia”</p>	<p>Rational flexible assumptions stated as theories; hypotheses and conclusions supported by evidence, scientific testing, and mandatory questioning, “scientific,” adaptable thought and behavior, mind = brain = mind/brain</p> <p>Flexible, adaptive, with higher-level objective bias</p> <p>Variable, dynamic bias: uncertain, “<i>probability</i>,” not guaranteed</p> <p>Multivariate cognition expands freedom of executive function</p> <p>Associative bias: abstract, gray, graduated; expansive and extensive</p> <p>Relative uncertainty, inquisitive, resulting in increased frontal lobe requirements: “<i>frontal</i>”</p> <p>Adult, requesting; cooperative</p> <p>Semantic accuracy: specific, best definition and word use: frequently, infrequently, many, some, few, etc.</p> <p>Flexible; implies choices; preferential: I prefer, I would rather, I would like to, I choose to. “<i>It is a choice</i>”</p> <p>Tends to promote accuracies of information, of thought process, and of time–space orientation; forward-thinking, proactive, “considerate”</p> <p>Accuracies and rational assumptions promote more plausible and more accurate cause-and-effect conclusions</p> <p>General awareness of rational cognitive process and “Cultural belief system awareness”</p>

emotional valence spectra,<sup>24</sup> but the reappraisal and edit function of the executive DLPFC working memory directly contributes to our ability to objectively change and integrate the accuracy of *what* and *how* we think. By comparing internal stored memories with external, rational, up-to-date information, the DLPFC can temper our automatic responses to stimuli to achieve more reasonable objective outcomes,<sup>25</sup> ensuring that the higher-level, objective, executive functioning of the DLPFC will have the *last word* in decision making.<sup>26</sup> The executive of a company also has the last word, and the most successful executives usually make the most rational evaluations before they speak.

### *Cognitive Processing*

The ability of the frontal lobes to use working memory optimally depends heavily on the availability and quality of the process information received from other cerebral regions.<sup>27</sup> The frontal lobes function best with accurate and timely information combined with accurate thought processes—that is, accurate data and the most appropriately flexible software. The software (i.e., how we think) enables the frontal lobes to make executive decisions and to help regulate our emotions and overall homeostasis.<sup>28</sup> Similarly, the executive in an organization has a greater probability of making the most effective decisions with accurate, timely data and flexible thinking.

Process memory (i.e., acquired and developed rules of thinking) directly biases not only how we process internally stored information but also how we perceive environmental information and stimuli.<sup>29</sup> Learned, rigid, *dichotomous* process rules preempt flexibility in our thought processes. As we might expect, *rigid*, inaccurate, irrational process information leads to inaccurate and irrational information processing, and this in turn yields inaccurately biased executive decisions. Faulty, inaccurate, rigid, dichotomous software bias will tend to lead to subjectively biased choices and outcomes, thwarting the *flexibility* offered by higher-order, multivariate executive functioning and thus favoring rigid cultural subjectivity.

## HUMAN BRAIN AND COGNITIVE DEVELOPMENT

Where do inaccurate, irrational thought processes come from? How could we have learned our culturally inherited, faulty, inaccurate, irrational thinking without realizing it? Why would we automatically promote this behavior in our organizational culture? A transition from concrete thinking to the potential for abstraction occurs in the frontal lobe development and connectivity as an individual grows from childhood to adulthood. During our development from puberty into young adulthood, our frontal lobes continue to mature with

increased connectivity and myelination, especially in the DLPFC.<sup>30</sup> This development contributes to the growing maturity of our decision-making skills (i.e., executive functioning) and heightens our ability for cognitive *awareness*. The frontal lobes are critical in this process.<sup>31</sup> However, the success of this transition depends largely on the foundational structure that we acquired in childhood.

As we grow into adulthood, we increasingly use acquired information as if it were factual, automatically following rigid, dichotomous processing rules that operate outside our awareness. We implicitly assume good–bad relationships between words and reward contingencies learned during our own developmental history. Our decision-making process reflects our cultural bias as we use information filtered through our own subjective personal historical matrix.<sup>32</sup> Organizationally, this takes the form of outdated policies and hierarchical biases that depend more on “how we always did it” than on “what will work best today.”

If the process stopped there, we might not face the consequences of irrational thought processes. However, in childhood, we not only learn the concrete thinking of our ancestors but also inadvertently learn cognitive and semantic inaccuracies; faulty assumptions; imagined cause–effect relationships; superstitions; myths; magical thinking<sup>33</sup>; and rigid, culturally biased misperceptions. These elements are handed down from generations of unscientific, misinformed, and (most often) poorly educated elders. We unconditionally absorb rules and information as *truths* without the full benefit of mature executive functions. They tend not to question the factual basis of information, the logic of assumptions, or the reasonableness of conclusions, nor do they have the acquired framework to do so.<sup>34</sup>

As a result, adults often exhibit parent-to-child *authoritarian* characteristics in their thinking and interactions, using irrational demands such as *should*, *must*, *have to*, and *need to*. These parental, subjective, dichotomous demands typically “trump” multivariate choices and impede adults from taking responsibility for objective choice–consequence decisions. These parameters form the basis for our primitive management techniques. We learned the principles of subordinate management from parents and caregivers. Even corporate executives well educated in management often continue to use these primitive subordinate rules automatically. The unfortunate result is that employees are “seen and not heard,” the recurring theme of childhood. They are afraid to speak up, afraid they will be punished if they tell the emperor that he has no clothes. Executives find themselves surrounded by continuously nodding bobble-heads who cannot accurately assess what is really going on in their own companies. Unfortunately, humans are familiar with dominance and subordination, but this structure fails to promote accurate organizational communication.

Our brains tend to gravitate toward the familiar<sup>35</sup> and away from the unfamiliar.<sup>36</sup> We experience positive rewards, or gratification, by sticking with the familiar, but we experience negative rewards, or amygdala-driven anxiety, for

venturing into the unfamiliar. *Familiar* events that deviate little from the mean are assigned a positive valence and a higher *probability* of favorable outcome. *Uncertain events* that deviate significantly from the mean are often assigned a negative value and given a lower probability. This system tends to give *certainty* the upper hand over the perceived ambiguity and lower probability of uncertainty (as illustrated in such sayings as “A bird in the hand is worth two in the bush”).

In this sense, the familiar represents comfort, and we become creatures of comfortable habits. Humans often tolerate a great deal of discomfort before they will consider the alternative of “change” (i.e., deviation from the mean). Organizationally, we learn to favor the familiar and generally receive no incentive or training to enhance our cognitive accuracies and help us develop objective, reasonable, and innovative methods for seeking rational alternatives. Indeed, many organizations actually punish attempts to promote cognitive accuracy because it challenges authority and organizational beliefs. This practice usually promotes management styles and rules based on familiarity rather than rational utility or applicability, regardless of what might objectively be in the company’s best interest.

### *Authoritarian Communication*

Because of the parent–child environment in which they learned these concepts, most adults continue to use the familiar parental cognitive process in their business interactions. This hierarchical communication is authoritarian, vertical, and one-way (parent to child) rather than cooperative, horizontal, and reciprocal (adult to adult, human to human). These familiar irrational habits from our past usually preempt more reasonable adult–adult communication and block accurate associative reasoning processes, resulting in irrational thought, decision making, and behavior. The parent-to-child irrational thought processes tend to permeate the organizational structure, generally inhibiting reasonable adult-to-adult communication, and this inhibition applies internally (within the individual) as well as externally (in relationships with others).

The strong tendency of humans to gravitate toward the familiar appears to impede adaptive change in business cultures, pulling the entire group backward toward more inaccurate, concrete ways of thinking, making decisions, and behaving.<sup>37</sup> The cultural inaccuracies we encounter in organizations often include an accumulation of past superstitious beliefs that guide corporate behavior and promote ongoing subordination, soothing the human angst of management by establishing pecking orders. Because most organizational information accumulates without the benefit of a scientific framework, we generally lack the critical skills or awareness to assess the information’s validity. Our innate affiliative behavior and inherited rigid thinking—now coupled with inaccurate information, unfounded assumptions, and lack of awareness—hinders our progress to more accurate rational thought, behavior, and decision making.

### *Event-Level Accuracy*

Furthermore, we automatically use yesterday's familiar policies and processes to approach today's problems, without a rational method for seeking and incorporating new information (i.e., "We have always done it this way!"). Of course, old knowledge has benefits—some of it derives from valid testing of alternative approaches, and some companies do update procedures periodically to meet changing markets—but new procedural policies are unlikely to substitute for the rational evaluation and dismantling of archaic organizational beliefs. Much of what passes for corporate wisdom no longer addresses how people work today, if it ever did, and as long as it continues to rule the corporate structure, companies will tend to punish the "wrong kind" of innovation, that is, thinking that challenges underlying belief structures, both personal and organizational. If, by sticking with the known, we exclude new and possibly pertinent objective information, our familiar solutions may fail to adequately resolve the problems we face in the present or future. In this state, time and location become disjointed—we operate in the now as if it were identical to the past, creating a cognitive time warp. This rigid time–space distortion plays a role in our irrational bias and appears to be magnified by our rigid, irrational software, thus causing even greater distortions and difficulties.

Conversely, by selecting pertinent, accurate, and current information and processing it with flexible, accurate policies, we shift our time–space orientation to the present, facilitating the most accurate, best-choice, best-outcome decisions. More specifically, we use our frontal lobe executive function and working memory to make the most accurate rational choices by using all available pertinent information. In this way, we make decisions in the present and evaluate plans for the future with greater precision and rational probability. This approach is generally preferable to making irrational choices by using irrelevant information from the past and then using the frontal lobes to retroactively justify and rationalize the decision. Accurate integration of time and space is critical for problem solving and finding the best solution at any given time.<sup>38</sup>

### *Accurate Evaluations*

Without accurate information about the situation at hand, we may decide on a course of action simply because it feels good or promises familiar rewards or because it steers clear of unknown or imagined threats. Research shows that hormones (corticotropin-releasing factor) generated under the stress of dominance and subordination tend to shift our cognition toward lower-level limbic activation of anxiety while limiting higher-order prefrontal cortex functioning. Therefore, we can benefit from applying the knowledge that rational higher-order cognitive functioning can minimize the subordinate organizational structure; minimize emotional stress; and make a significant difference in communication, cooperation, and employee satisfaction.

### *Irrational Organizational Bias*

Present knowledge of normal human brain functioning indicates that humans can choose how and what we think and that we can adapt to new situations more effectively by making better choices. Given this, why would we not choose to manage our organizations with an accurate rational bias with the highest degree of flexibility, incorporating semantic and information accuracy; accuracy of information processing; and accurate, time-appropriate information? Unfortunately, our personal, social, and cultural biases usually prevent us from understanding and using the very information that could enable such a choice.<sup>39</sup>

Because of their inherited belief systems, most humans, including executives, tend to think they *must* be perfect, unblemished and without flaws, that they *must not* be fallible. A blemish or a mistake means that they are no good, unworthy, or deserving of punishment. This absolute rating and labeling blocks recognition of personal fallibility; causes poor acceptance of others as fallible human beings; and promotes unscientific, culturally biased, arbitrary category classifications. This schema leads to rigid and judgmental dogmatic cultural belief systems, bigotry, stereotyping, and blind trust. It also promotes organizational vertical hierarchies with authoritarian, parent-to-child, one-way communication, as well as prolific “shoulding” by management and employees.

“Shoulds” allow management to avoid responsibility for stating and using reasonable communication skills or modeling reasonable interactions between themselves and employees. The use of shoulds promotes retrospective fault finding, blaming, and punishment. Shoulding on employees is akin to not providing adequate instructions, guidelines, or training—typically seen as the responsibility of management—and then blaming subordinates when they fail. Authoritarian managers tend to transfer responsibility for errors “downhill” and backward in time, because the employee did not predict the future accurately, thereby causing an organizational time warp. With this transfer of blame, management can always be right (i.e., “You should not have done it that way!” or “You should have known better!”). This after-the-fact second-guessing perpetuates parental management and does little to prevent the same problem from happening next time.

### *Rational Organizational Bias*

We may characterize business as a series of choices and outcomes. We would like to predict the outcome of a particular choice with some degree of certainty, but doing so depends on understanding the many variables in our ever-changing, *dynamic* world. In such a complicated environment, accurately assessing probable business outcomes by using flexible, multivariate

thought-processing and adequately evaluating our choices enhances overall adaptability and subsequent satisfaction by increasing our ability to respond appropriately to the given situation. “Choices can be rational or they can be the outcome of irrational processes.”<sup>40</sup> A deliberate bias toward rationality tends to enhance our overall accuracy. This rational bias favors more effective decision making and increases the probability of more reasonable outcomes. On the other hand, an irrational and *static* bias tends to decrease overall accuracy, leading to irrational decision making with fewer reasonable and objective outcomes. The standards for measuring accurate and rational cognitive bias arise in part from the following assumptions:

- *Acceptance of human imperfection enhances information and process accuracy.* We can accurately characterize humans as flawed and fallible—executives included. Accepting our mutual flaws promotes horizontal, human–human, adult communication and reduces inaccurate, absolute, dichotomous, or culturally biased classifications, ratings, and labeling. Such problems occur when we rate the person rather than the behavior.
- *Flexibility enhances information and process accuracy.* Flexibility generally works better than rigidity for the most accurate planning, problem solving, and compromising. Rigid, dichotomous terms such as *should*, *must*, and *need to* restrict options; multivariate, preferential terms—such as *we would prefer*, *we would rather*, and *I think it is best for our company*—multiply the possible choices and acceptable rational outcomes. Organizational flexibility allows corporations to achieve open-minded, forward-looking, proactive feedforward/feedback, as well as continuous quality improvement with the best communication. This system promotes monitoring and quickly identifying problems while nimbly adapting new processes and solutions. Businesses realizing that they will not find perfect solutions to problems will learn to operate flexibly and accept reasonable compromise solutions. “The more you keep yourself open for alternative answers to a given problem, the more likely you are to get the best feasible answer to it.”<sup>41</sup>
- *Awareness of the relationship between thoughts and emotions enhances information, process, and event-level accuracy.* Organizations succeed best when management takes responsibility for their thoughts, emotions, and behavior (especially for the prevailing organizational belief system). Doing so includes taking responsibility for outcomes, modeling intrapersonal and interpersonal acceptance, and teaching employees that what we humans think can significantly influence our feelings—whether we are aware of the connection or not. Awareness of this relationship enables us to choose the healthiest and most rational thoughts to maximize our emotional and behavioral balance at a given time. Although we might initially react to the situation itself, we generate and sustain our emotional reactions largely by what we think or “believe.”<sup>42–44</sup> We tend to sustain the

emotion long after the event through the action of the internal rules and appraisal habits that affect us almost continuously, generally without our awareness or deliberate direction. As Epictetus wrote in the *Enchiridion* in the first century AD, “People are disturbed not by things, but by the views which they take of them.” When the boss takes responsibility for his or her own upset, employees will learn to do the same.

### *Cognitive Awareness*

Each of us maintains an internal narrative about our experiences. When something unexpected happens, we might tell ourselves inaccurate, irrational, and overly negative things about the situation, needlessly upsetting and stressing ourselves about it. If instead we choose to describe the situation to ourselves as accurately as possible, we can respond with the most appropriate behavior and most reasonable emotion. Although we all have responsibility for managing our own cognitive accuracy in thoughts, *emotions*, and behaviors, a business leader can also create an organizational climate that rewards such responsibility in employees. Such an environment enhances reasonable behavior and harmony between humans<sup>45</sup> and enables better communication, cooperation, and outcomes.

### *Correcting Irrational Biases*

How do we improve our organizational cognitive accuracy when we receive little or no training for rational information or skills on which to build? How do we use our acquired irrational rigid thought processes to learn how to think rationally and make choices that are more rational? The corporate culture is the responsibility of the chief executive, whose participation is essential for modeling and teaching, team building, rational communication, and cooperation throughout the organization. The boss can still be the boss, but with fewer layers of management and more rational organizational rules, thus ensuring effective, cooperative, two-way communication.

Fortunately, we can replace inaccurate, irrational thinking habits with newer, more accurate, rational associative thought processes. It takes effort and practice to introduce and use new concepts and retool the collective organizational software. Increased accuracy contributes directly to more rational policies, which promote more reasonable outcomes. This result is possible because a rationally biased higher-level executive will have the “last word,” both in the brain and in the business.

### *Implications of Irrational Bias*

Irrational biases tend to use floating reference points, whereas more rational biases tend to operate from a stable reference point. How can we explain this apparent paradox? Humans tend to learn, whether directly or indirectly, that *good* is rewarded and *bad* is punished, that *right* is rewarded and *wrong* is punished, and furthermore that parents know what is *right* and what is *wrong*. The problem arises in the organization when we apply these dichotomous constructs to the complexity of frequently changing variables on a day-to-day basis. We perceive the rules for decision making in hierarchal dichotomous or absolutistic terms, such as *should*, *must*, *have to*, *ought to* (e.g., “Either you do that or you will be punished”). This approach creates a problem when the *must* of today becomes the *must not* of tomorrow because some variable or context has changed.

### *Reference Point Drift*

This dichotomous terminology then leads to retrospective judging, fault finding, blaming, and punishing (e.g., “You shouldn’t have done that!”). This rationale might work if we had a reliable means for predicting the future; given that we do not, we would do well to find another mechanism. To resolve these apparent discrepancies with reality, we simply move our reference point: We redefine success or modify our recollection of previous failures to cast the current outcome in a better light. By moving the reference point, we can always be right, always be above average, and never make a mistake. We simply move the reference point to undervalue others or overvalue ourselves, and doing so creates the irrational but comforting experience of “self-esteem.” We learn this skill in childhood, when we are governed by multiple, subjective, and inconsistent reference points (e.g., from parents, teachers, neighbors, friends, and celebrities). We also learn to easily construct subjectively biased, overgeneralized group classes and use them to denigrate others at will. We can easily overgeneralize or underdefine representative classifications to prove most any point. We can round up or down at will. We have our choice of yardsticks and will usually choose the one that casts us in the most favorable light. We can use one rule to justify and a different rule to vilify any one experience to suit our own beliefs and goals, thereby artificially elevating our self-esteem. Retrospectively, this method works especially well for confirmation bias.

Typical organizations often depend on scapegoats, which allow management to avoid blemishes. Humans blame scapegoats for their own thoughts, emotions, and behaviors. Because we fear being wrong, we simply decide that someone else made us think, feel, or behave a certain way (e.g., “The boss can’t be wrong, so the problem must be you,” “You made me miss the deadline,” “The committee made the wrong decision—I had no choice”). Simply

by adjusting the reference point, we easily pass along the blame and judge ourselves not guilty. This system may succeed in bolstering the self-esteem of the blamer, but usually at the expense of anger or guilt from the blamed over his or her demoted self-esteem. Once we pick the scapegoat, we make up after-the-fact explanations and excuses to *justify* our behaviors, refute reality, or recast history. Doing so can have disastrous effects on long-term organizational relationships.

However, we have the resources to counter these (mostly) culturally determined habits by diligent pursuit of cognitive accuracy, even in the face of self-doubt and uncertainty. We can retrain the brain to value rational, probabilistic outcomes; to learn to accept human imperfection in place of self-esteem; and to use accurate information and processing to make decisions about current situations. Each of these practices can eventually enable us to apply the processing abilities of our “new” brain to direct the older, survival-oriented brain structures toward more rational pursuits. We can then shift our focus from subjective, risk–reward evaluations to achieving objective improvement and better outcomes for the future (6, p. 260).

## CONCLUSIONS

Accurate, rational thinking in organizational leadership increases flexibility and maximizes appropriate business choices, enhancing achievement of preferred outcomes and minimizing undesirable ones. Fortunately, we can replace or overwrite inaccurate, irrational, parental, absolute thinking by learning and practicing accurate, flexible, rational, and logical thinking, thus improving overall adaptability. We have these rational tools available, but they are often unrecognized, overlooked, or even belittled.

At the turn of the last century, Michelson and Morley found that the act of “measurement” defines what is measured. We tend to calibrate our yardsticks to the business culture in which we find ourselves. Such a yardstick measures only what that culture values and overlooks other potentially beneficial factors. Each culture’s yardstick shows *normal*, even though large differences exist between the beliefs and behaviors of various cultures. This approach leaves us prey to the accumulated inaccuracies of our hierarchical structures.

We can also apply cognitive accuracy as a reference point to measure humans across business cultures, and this reference point does not change as you go from one culture to the next. Such a reference point is biased toward objective cognitive accuracy, transcending the inaccuracies of corporate belief systems. Corporate cultures may change, but the yardstick remains the same unless scientific advances and cognitive accuracy are applied to rationally update cultural beliefs. For accurate evaluations, we do best to calibrate our cognitive yardstick with the most accurate, timeliest information, applying it consistently and rationally in the present.

In this article, I have reviewed the intimate connection among semantics, cognition, and the functioning of various brain structures, and I have posited an equally intimate connection from semantics, cognition, emotion, and behavior to how we manage organizations. These later connections suggest an explanation for the persistence of subjective organizational belief systems and their inherent deficiencies in objectivity, accuracy, and flexibility. Can we accept the premise that objective, event-level, accurate processing and information usage yields more satisfactory and reasonable results than rigid, automatic responses based on hand-me-down, imprecise beliefs? If so, it would appear beneficial to orient executive management toward the psychological value of objective relative belief systems, using scientific insights from the tools of cognitive accuracy.

### RECOMMENDATIONS AND CONSIDERATIONS

If business leaders try to acquire the skills and habit of cognitive accuracy, their interactions with employees will sustain fewer faulty beliefs and thought processes. Importantly, organizations managed by these adults will have the benefit of cognitive accuracy. Their employees will have more skills for applying cognitive accuracy to address and resolve problems with competent critical thinking, emotional balance, and reasonable behaviors. This foundation will enable these organizations to build on their successes by rationally functioning in the present. It is important that we do not merely shuffle old approaches but instead integrate new rational ideas from organizational neuroscience to provide a vehicle for change.

Our present problems cannot be solved at the level of thinking at which they were created (Albert Einstein, attributed).

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