

Analyzing Explanations for Seemingly Irrational Choices:

Linking Argument Analysis and Cognitive Science

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Abstract: People make significant decisions in contexts of risk and uncertainty. Some of these decisions seem wise under the circumstances, and others seem like irrational choices. In both cases, people offer reasons as clarifications and explanations of these choices to others and to themselves. Argument analysis, a technique well known in philosophy and more generally in the humanities, can explicate the strands of assumptions, intermediate conclusions, data, warrants, and claims that the person articulates. But alone, argument analysis often falls short of revealing why the person's decision makes sense to that person. The findings of empirical research into the influences of cognitive heuristics, the mental shortcuts we all use in decision making and problem solving, adds focus to the analysis of these choices. This paper links these two powerful analytic strategies, and provides a much fuller, more fruitful picture of explanations for seemingly irrational choices. Using an example explanation for deciding not to quit smoking, the paper makes both its methodological argument and its implicit argument for the significance of extending this analytical strategy to applied contexts. The implications of extending this analysis of everyday argument to management, health care, and education could be profound.

I. INTRODUCTION

The techniques of argument analysis, augmented by insights into human choice emerging from empirical research on human decision making, provide useful ways to understand the rationality, albeit limited, of an important

set of arguments. The reference here to human choice is intentional and distinct from a discussion about decision-making as manifested by other species of animals or computers. The arguments of concern in this paper are those arguments humans present to clarify or to explain to themselves or to others their reasons for taking actions associated with a varying level of risk, even in the face of knowledge about the likelihood of potentially negative personal consequences.

Section 2 sketches in broad terms the uses and manifestations of arguments in everyday contexts. An illustrative case regarding a person's decision to continue smoking is presented in section 3. The processes of interpretation, analysis, and argument-mapping are presented in section 4 and applied to the case example. Section 5 describes briefly a number of cognitive heuristics that appear to have influenced the thinking in the case example. Once the argument has been mapped and analyzed, the reasoning it manifests can then be evaluated for its logical merit and for possible mistakes resulting from the influences of misapplied heuristic thinking. This is done in section 6. Section 7 takes us one further step, inviting us to seek wisdom and offer aid. Before concluding the essay, section 7 remarks on significant potential advantages in combining the humanistic and the scientific approaches to argument analysis.

II. USES AND EXPRESSIONS OF EVERYDAY ARGUMENTS

Why do so many people believe that they are not putting themselves and others at serious risk when they speed, do not wear seatbelts, or drink and drive? In spite of the risks, why do people have unprotected sexual contact in this era of HIV/AIDS? What is the thinking behind why city planners sometimes locate homes and schools in flood plains or build whole cities at the base of a volcano?

This paper is about the real life explanations people offer in a wide range of situations in order to explain their risky decisions. The people might be offering the explanation to others or to themselves. In both cases they are making the overall argument that they had done the reasonable thing. However, such an explanation need not be seen as an attempt either to convince or to persuade. The person might simply be trying to clarify their reasons, or might be seeking understanding and support, or they might be boasting or reflecting on how fortunately or unfortunately things happened to turn out. The person will often acknowledge that their choice might not make sense to others. And the person seldom offers the argument with the intention of persuading someone else to make the same choice. In fact, many would recommend that others should not take these same risks. Yet, the person does offer reasons why, at least in their case, their choices were acceptable.^{1,2,3,4}

Arguments made to explain risky decisions can occur in many different conversational contexts and may be manifested in many different ways. For example, the explanation might be communicated in a few brief words offered in response to a colleague, fully cognizant of the situation and facts at hand, seeking the rationale supporting one's actions. Or, the argument may be a spontaneous and emotional outpouring, perhaps after a tragic result, of the reasons why one's behavior was considered reasonable at the time the deci-

sion was made. The argument might be an introspective talk-aloud about one's thinking on an issue. It might be presented in a written document, as if it was a fully articulated listing of all the options and their respective strengths and weaknesses, in a way that is modeled after the idealized or normative version of rational decision-making. On the other hand, this type of argument may not even be externalized as spoken or written text that others can observe. For it may occur as a simple moment when a person pauses just long enough to remind themselves why they are doing something that they know is risky.

One primary purpose of argument-making is to clarify for oneself or for another one's thinking or judgment about what one should believe or what one should do. In both cases this can lead to renewed confidence in the truth of the belief and in the intention to act on the basis of the decision. The type of argument of concern to us is fundamentally the conversation of the self, the very basis for all conscience and unconscious deliberations on daily behavior. Cognitive psychology suggests that this conversation is the source of mood, mental health, and potentially, pathology as well.^{5,6} Meta-cognition is at work here. People are seeking understanding, rather than trying to prove that a statement is true or trying to win points in a debate. In making arguments for risky decisions, often more is said than may, strictly speaking, be relevant. At the same time, relevant things are taken for granted in the context or left unexplored entirely. In real life people attend to some alternatives and not others, to some consequences and not others, to some facts and not others.

As students of purposeful reasoned judgment in real life contexts we know that our arguments are often messy and subtle at the same time. We know that some people are quite skilled at thinking critically while others have poor reasoning skills. We know that some are disposed to exercise their critical thinking skills yet others are not disposed to do so.⁷ The discourse is not linear, it loops back on itself; a promising strand of thought may be broken off unexpectedly and perhaps taken up again later or not at all. Options may be considered in small groups or one at a time. Some options might be eliminated for relatively minor reasons, all things considered. The first option that satisfies the problem at hand might be decided on, if it is good enough to do the job. Yet, in other cases, the exploration might continue in the search for a potentially superior option. A person might tend to exaggerate the virtues of a preferred choice and minimize its liabilities, while at the same time exaggerating the deficiencies of choices that have not been selected.^{8,9}

We can either write off these explanations as disingenuous or inherently illogical and self-evidently mistaken, or we can seek to discover the inferences, either conscious or unconscious, that knit the persons' reasons to their implicit claim that whatever choice they are making is, at least in their estimation, sensible. More than this, we have good reason to seek to understand these intra-personal explanations, since risk-taking often adversely affects others, and not only the person or group that has decided to take the risk.

III. AN ILLUSTRATIVE CASE

The everyday use and manifestation of the reasoning behind a risky decision is illustrated in the example below. The context is a woman in a health care setting talking to another woman, her health care provider. In the sections following the case we will interpret, analyze, and map the reasoning that is implicit and explicit in her decision. In so doing we will look first to the logical structure of her reasons and then we will explore the influences of cognitive heuristics on the choice that she makes. But first, hear the woman's explanation of her decision not to quit smoking at this time, as distilled from what would have been a much longer conversation with this health professional.

I know I have to quit again, this is going to kill me. I can't believe I started again. What an idiot . . . ! But this isn't the time.

I have got too much going on at work. Last summer I had been off these things for almost two months, and then without even thinking I picked them up again. I started seeing this guy who smoked.

When I don't have a cigarette I can't function, and this is not the time.

My son is driving me crazy too. He's fourteen and I never know where he is half of the time.

My dad died of heart disease. . . . You'd think that would be enough to keep me off them. That's why I know I need to quit; but I don't have the energy right now.

I'm going to quit. I am.

IV. INTERPRETING, ANALYZING, AND MAPPING¹⁰

Cognitive science proposes that humans approach problems in the following way. Using assembled information drawn from the problem situation and from memory, we humans consider alternative ways to understand and resolve the problem, and then we make a decision based on the attractiveness of the various foreseeable outcomes we estimate are likely to occur if we adopt one or another alternative (one option being to take no action at all). This process need not be systematic, exhaustive, free of factual or logical error, or free of bias. In fact, it rarely meets all these normative conditions. The example above, in which the speaker explains why she is not quitting smoking, is one such case. It loops back on itself. Some alternatives, like cutting down on smoking, seeking out a smoking cessation program, or wearing a nicotine patch, are not even considered. Contextually, this example text represents the distillation of three pages or more of transcribed discourse. In the portions edited away as not immediately contributing to the argument for our current purposes, we may have learned that this person works as an administrative assistant in an attorney's office, that her son John is a ninth grader at Ridgewood High School, that the relationship with the man last summer is now quite dead, that her father worked as a grocer and lived to be seventy-three, and that her mother now lives in Sarasota, Florida.

How are we to best understand and make apparent the reasoning in this person's argument, and, more generally, in arguments like this? In the tradition

of Toulmin's work,^{11,12} much can be learned by first examining the argument's overall structure. We will begin by diagramming, that is representing graphically, the flow of its reasons, intermediate claims, and progression toward its main claim. As is so often the case, critically important transitions, the warrants in conjunction with which the speaker moves so readily from her stated informational data to her conclusion, are mostly unspoken. To discern the ways in which the reasoning moves forward we will augment the critically important argument analysis with research findings on the cognitive processes involved in human choice.^{13, 14, 15, 16, 17, 18, 19}

Step #1: Once the distilled transcription of the argument is obtained, identify all the statements evident in the discourse that the speaker appears to intend should function as claims and reasons in the overall argument being made.

Although there may be a relative dearth of semantic and syntactic inference indicators, repeated assertions are potentially important as suggesting key data points and claims. Thus a sensitive and fair-minded interpretation of the person's argument in its actual context becomes critical to the superior analysis of authentic everyday argument-making and reason-giving. At this point we also recommend numbering each statement for future reference, and putting the statements into the form of a list. If one statement repeats another, we note that equivalence. To clarify what the speaker is saying, it is helpful to resolve ambiguities by introducing words in brackets, as we do in line (1), line (2), and in other lines below.

- (1) I know I have to quit [smoking] again,
- (2) this [smoking] is going to kill me.
- (3) I can't believe I started again [knowing that smoking is going to kill me].
- (4) What an idiot [I am to have started smoking again] . . . !
- (5) But this isn't the time [for me to quit].
- (6) I have got too much going on at work.
- (7) Last summer I had been off these things [cigarettes] for almost two months, and then
- (8) without even thinking I picked them [cigarettes] up again.
- (9) I started seeing this guy who smoked.
- (10) When I don't have a cigarette I can't function, and
- (11) this is not the time [to quit smoking] [= (5)].
- (12) My son is driving me crazy too.
- (13) He's fourteen and
- (14) I never know where he is half of the time.
- (15) My dad died of heart disease.
- (16) You'd think that would be enough to keep me off them [cigarettes]. That's why
- (17) I know I need to quit [= (1)] but
- (18) I don't have the energy right now [to quit smoking].
- (19) I'm going to quit [someday].
- (20) I am [= (19)].

Step #2: Identify the main claim, intermediary claims, and the reasons that support each of these. Supply missing claims and reasons that were implicit and intended by the speaker.

Again, relying on the context of the discourse and the speaker's intended uses of various statements, distinguish the main claim from intermediary claims. Note the linkages between the speaker's reasons and the claims the speaker intends them to support. One tactical approach is to reason backward from the main claim by asking, "Why does the speaker say that?" Or, "What reasons does the speaker give for that?" We suggest underlining the main claim, which may not come at the end of the discourse and, in some cases, because of the context may never have to be spoken at all. In this example the main claim is best expressed in line (5), since the purpose of the explanation is to defend one behavior, namely continuing to smoke, over another option, that is, quitting. The main claim is the affirmation of the choice of the defended (or "to-be-chosen") alternative. {We put notes to ourselves in braces, as for example in line (5) below, where we identify line (5) as the "to-be-chosen" alternative.} We will say more about this active maneuver of anticipating the to-be-chosen alternative in the discussion about the "The Search for a Dominance Structure" in section 5.

The main claim is often supported by a number of intermediary claims. Trace each of these branches back to the reasons that are given. At some point the linkages end, typically statements that represent basic information or data that the person is offering. It is not that the person could not perhaps have given further reasons if asked. Rather, it is simply that these statements are the beginning points of the various reasons that flow toward the main claim via the intermediary claims in the context of the given discourse. Some claims, particularly intermediary claims, may not be articulated. But they still function in the mind of the speaker as linkages that eventually connect the flow of reasons to the person's overall main claim or conclusion. So they need to be expressed. To keep track of things, we suggest that whenever one introduces a statement that one interprets to be an unspoken reason or unspoken claim, one uses the line number with which one wishes to associate that introduced statement plus the letter "u." For example, when introducing a reason interpreted to be the intended support of line (18), "Working, parenting, and quitting smoking take energy," we number our newly introduced line "(18u)" to designate it as our interpretation of the intended but unspoken reason for line (18).

- (1) I know I have to quit [smoking] again.
- (1u) I want to live; to live I must quit smoking sooner or later.
- (2) this [smoking] is going to kill me.
- (3) I can't believe I started again [knowing that smoking is going to kill me],
- (3u) Maybe I can't manage to control my smoking
- (4) What an idiot [I am to have started smoking again.] ...!
- (5) But this isn't the time [for me to quit]. {The main claim and "to be chosen" alternative.}
- (6) I have got too much going on at work.

- (7) Last summer I had been off these things [cigarettes] for almost two months,
and then
- (7u) I can quit smoking, but it takes energy to quit and stay off cigarettes.
- (8) without even thinking I picked them [cigarettes] up again.
- (9) I started seeing this guy who smoked.
- (10u) I must remain able to function,
- (10) When I don't have a cigarette I can't function.
- (10u) I must smoke, and {Be careful about second use of same line number!}
- (11) this is not the time [to quit smoking] [= (5)].
- (12u) I have parental responsibilities.
- (12) My son is driving me crazy too.
- (13) He's fourteen and
- (14) I never know where he is half of the time.
- (15) My dad died of heart disease.
- (15u) Smoking leads to heart disease and that's in my family.
- (16) You'd think that would be enough to keep me off them [cigarettes].
- (17u) I want to live; to live I must quit smoking sooner or later. [=1u]. That's why,
- (17) I know I need to quit [= (1)] but
- (18u) Working, parenting, and quitting smoking take energy.
- (18) I don't have the energy right now [to quit smoking].
- (19) I'm going to quit [someday].
- (20) I am [= (19)].

Step #3: Make explicit the cascades of reason-claim relationships.

We suggest using diagrammatic techniques to map, or make evident, reasons, intermediary claims, the direction of the flow of reasoning, and the main claim. Use the pragmatics of the situation and the context of the discourse to interpret what the speaker believed and intended. All who are familiar with techniques like this from their professional practice, research, or teaching know how difficult this step can be. Multiple drafts are often needed to expose the intricacy of the decision being discussed. One must keep in mind the context, purposes, and conditions of the particular discourse. It requires significant sensitivity to the other person and what she or he is trying to say. In some situations like executive management, teaching, health care, criminal investigation, and counseling, professional experience is quite helpful. The goal at this step is to be as true to the speaker's reasoning as possible. Thus, avoid diminishing or embellishing.

The mapping conventions we will need for the example argument in this essay are these: We will use a rectangle for the main claim. Rectangles with rounded corners will indicate intermediary claims. We will use an oval for the statement of an initial starting point or reason, that is, a statement for which no earlier reason is given. An arrow from the reason to the claim indicates the speaker's intended logical flow of the argument. The map will include all and only the statements at the end of step #2. That means we will include the unspoken statements we introduced on the basis of our interpretation of the speaker's discourse.

Figure 1 is a graphic display of our interpretation of the example argument. Other interpreters might well have discerned implicit statements somewhat differently. Other speakers might have used other data, drawn different intermediate inferences along the way, or considered different alternatives in making their decision. Be that as it may, the purpose at this point must be to do our best to understand the reasoning of this speaker. Effective interventions, if there are to be any, depend first on understanding.

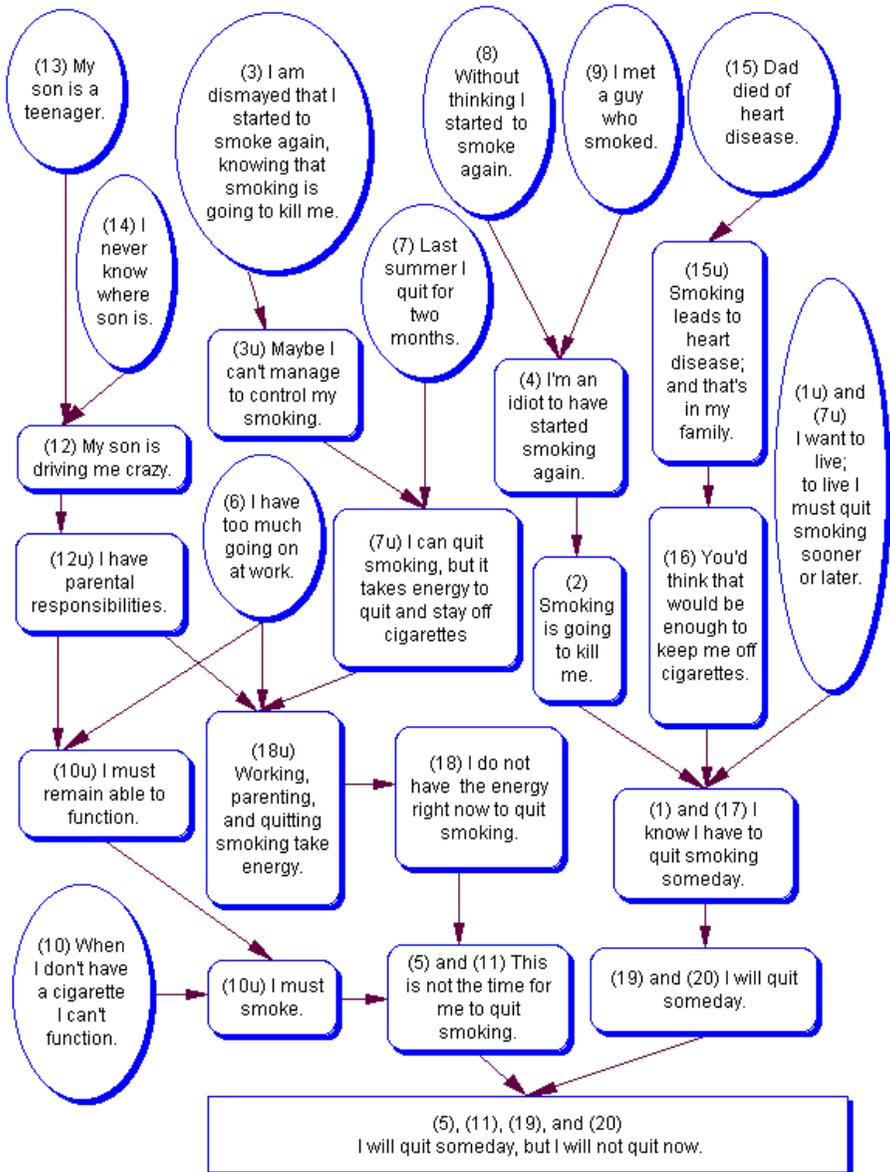


Figure 1: "I'll quit, but not now."

Step #4: Identify the influences or applications of cognitive heuristics.

Cognitive heuristics are reasoning shortcuts. Using heuristic reasoning can conserve cognitive resources and facilitate reaching acceptable decisions in a timely way. In this respect, heuristics can often be quite useful. As inference-shortcuts, generally reliable patterns of thinking, it is likely that cognitive heuristics have been instrumental in the survival of our species. However, because these heuristics are quick estimations, rather than careful calculations or extensive analytical processes, they systematically predispose humans to specific biases that can result in our making sub-optimal judgments.²⁰ ²¹ Some cognitive heuristics demonstrated in our example argument above are *satisficing*, *loss aversion*, *the simulation heuristic*, *the availability heuristic*, *the search for a dominance structure*, and *the control heuristic*. Our descriptions of these reasoning strategies must be limited here; but, as the endnotes indicate, this literature is rich. Well-designed scientific investigations demonstrate each of the theorized cognitive processes.

V. A SAMPLER OF HEURISTICS

The Satisficing Heuristic

“Satisficing” is the term coined by Simon²² to refer to the conservation of cognitive resources by the human thinker. The idea that we humans typically strive for optimal definitions of problem situations and optimal solutions is no longer supportable.^{23, 24} Carefully designed observational studies demonstrate that human judgments are far less complete than once thought. People tend to divide the world into “good enough” and “not good enough.”²⁵ We tend to take the cognitive shortcut of searching for a solution until one is found that is good enough to attain the desired outcome. We do not, as a rule, pursue the search for a solution until a maximizing or optimal solution is identified. Humans satisfice most of the time, but the members of our species think of it as optimal decision-making.

The Loss Aversion Heuristic

Not losing anything, not going backwards, at least staying where we are, for most of us humans, is the preferred default outcome, particularly under conditions of uncertainty. Research demonstrates that most humans are more likely to pass up an opportunity to make a gain rather than risk a loss.^{26, 27, 28, 29, 30, 31} Humans psychologically privilege the status quo. Rather than opting for more dramatic change, whenever possible, humans take an incremental approach, seeking to avoid uncertainty and the difficult cognitive tasks of weighing and combining information or trading-off conflicting values. Muddling through personal decisions, attempting to avoid any loss from the status quo, is the norm rather than the exception. This heuristic is implicit in the adage, “A bird in the hand is worth two in the bush.” The desire to avoid a loss is often the telling consideration in a group’s decision to defer taking action and to reject those options that entail greater risk.

The Simulation Heuristic

Simulation^{32, 33} is a mental process of construction wherein humans estimate their propensity for taking a given action and their probability of achieving desired states. If we humans experience ease in processing a simulation, typically this leads us to the judgment that the state we imagine happening is more obtainable. Humans might simulate future events by imagining themselves “doing” and “undoing” the component parts of the event in an effort to predict the likely results. If the simulated outcome is viewed as desirable, we are likely to overestimate our ability to attain that outcome. For example, a person facing the choice between several options will often simulate taking each option, making a movie in their minds about how each option will play out for them. They seek to avoid undesirable outcomes and achieve attractive ones. So, using this heuristic, they are more likely to select the option that plays out in their mind as resulting in the most desirable outcome, heedless of the actual probability of that result actually occurring. This process does not require much time. Bandura’s research demonstrates the value and power of simulation to increase attitudes of self-efficacy.^{34, 35} Coaches use this as a technique to improve the performance of athletes. We humans appear to employ the simulation heuristic while continuing to speak, perhaps even on a different point than the one being evaluated by the simulation.

The Availability Heuristic

The ease of recall associated with vivid, recent, or frequent events makes these memories more available to us. A person is more likely to infer that an event will happen to them if the memory of that event is more available.^{36, 37, 38} For example, if my father lived to be eighty-two and then died recently of lymphoma, I am more likely to overestimate the probability of my living to be eighty-two and dying of lymphoma. In the aftermath of the terrorist attacks on the World Trade Center on September 11, 2001, Americans were likely to overestimate greatly the probabilities of their own selves being involved as victims of similar acts of terrorism.

The Search for a Dominance Structure

Research demonstrates that we humans desire to be successful in achieving solutions to our problems, and thus we are willing to modulate our appraisals of the competing options in order to find a good enough solution.³⁹ Once a solution judged “good enough” is located, and even before officially making it the choice, we may re-calibrate our evaluation of other alternatives, raising the relative value of the “to-be-chosen” option (also known as “the preferred alternative”). Then, rather than continuing to examine the various options independently, we are apt to evaluate the other options relative to “the preferred alternative.” In this process we sometimes diminish our estimation of the other options and, thus, bolster the value of the “to-be-chosen” option in our own minds. We may adjust our priorities or renegotiate what we view as an acceptable solution to the problem; and we may redefine the problem itself. This

happens as part of our natural process of structuring our ideas so that “the preferred option” comes to dominate over other choices and so that we come to see it as the best decision we could make in the given context.⁴⁰ This is not a description of intentional deception or a conscious attempt at being unfair. Rather it is a description of how we humans build up confidence in our judgments under conditions of uncertainty or when faced with several acceptable options.⁴¹ We need confidence in our decisions in order to form and to sustain the intention to take action. Thus we establish a rationale for selecting one alternative, the one that dominates, over others.

Once we have achieved this, that is, once we have made our decision, it is very difficult for us to abandon this rationale. In fact, it often seems foolish to do so, given that the option we have decided on is so clearly (to us) superior to any other. We surround our choice with a rationale for its being superior to the others. In effect the search for a dominance structure is a description of a strategy humans use in decision-making. The use of this strategy explains why reconsideration is difficult, criticisms of our choice seem unpersuasive, and the virtues of other options seem less compelling. This natural human process of searching for dominance provides the confidence we need to rely on our reasoning and take action when certainty is not possible. However, it also brings the great risk of making a poor decision due to a lack of due consideration of all reasonable alternatives, and worse, it brings the risk of sticking with that poor decision.

The Control Heuristic

Thompson and her colleagues⁴² have proposed that humans frequently overestimate their ability to control the outcomes of events. Human reasoning frequently fails to account for the actual contingencies involved in the achieving control. This distorts one’s appraisal of the extent to which one can actually exercise control and assure a given outcome. Humans use the control heuristic rather than carry out the more demanding task of calculating actual contingencies when judging their control.⁴³ Humans most often overestimate the actual connection between their actions and attaining the desired outcome. There is a pervasive tendency to overestimate control due to what is called “Hindsight Bias.” Hindsight bias occurs when successful events are wrongly reconstructed in memory as having resulted from something done by the person doing the remembering.⁴⁴ Hindsight bias can also occur when recalling past failures, for past failures are more often reconstructed as having resulted from chance or someone else’s doing. Our human need for accuracy, predictability and self-justification is believed to drive this hindsight biasing behavior.⁴⁵ The result is illusory control, a condition that can occur even when the event itself is actually random, for instance rolling dice or picking winning lottery numbers.^{46, 47} When reconstructed memories lead us to take credit for more agency that we have or to shift responsibility for failures from ourselves to others, we have illusions of control. This risk, while substantial among managers and leaders, is certainly not limited to them alone.

There are other cognitive strategies of great interest that are commonly used in or influence our everyday arguments. They can be readily identified and analyzed in text transcriptions of authentic arguments.^{48, 49} Readers are directed to the research and writings of Kahneman, Slovic, Tversky, Montgomery, Fischhoff, and Janis and Mann for seminal work in this area.^{50, 51, 52, 53, 54, 55, 56}

VI. EVALUATION

Step #5: Evaluate the quality of the decision. Include the logical merits of the arguments made, the truth or falsity of the information relied upon, and the reasonable or unreasonable applications and influences of decision-making strategies and heuristic shortcuts.

Here is a thumbnail evaluation of the soundness of the reasoning in our example. The argument that the speaker made that she should quit smoking is sound. Its premises are true and they do supply strong support to the claim that quitting is the right thing to do, given all that we can assume from the context that she knows about smoking. The argument that she cannot quit smoking now, which hinges on (10), is not sound, since (10) is not factually true, as indicated by (7). Unless, that is, those two months were “functioning-free” times in her life. Should we believe (19) [I’m going to quit]? In part, yes, because she did so before (7) and knows she should (1). Yet, as long as (10) remains true in her mind, evidence to support (19) is weak. For it is likely that there will always be some level of stress in her life.

Turning to the influences of various heuristics, we note that the speaker uses the simulation heuristic while offering line (7). She recalls a time when she was not smoking and her simulation of again being free of cigarettes is evident. She gains confidence in the probability that she can quit again in the future because she can replay the events that resulted in successful smoking cessation at a time in the past.

A second simulation occurs about when she is speaking line (10). She is not able to see herself functioning in stressful situations without smoking. According to the simulation heuristic, she assigns virtually no probability to this event’s occurrence. This seems like a mistake. Just because one cannot now see something happening does not mean that it cannot happen. After analyzing how it happened that she is again smoking [lines (8) and (9)], she attempts to “un-do” cigarettes, that is see herself not smoking, and she declares that she cannot function as needed without them.

We see a third simulation in lines (15) and (16). More than ever, we can infer evidence of meta-cognitive thought. This speaker hears herself advocating continuing smoking at least for a while and seems to recognize as she is speaking that this is a judgment that carries a health risk. The availability heuristic facilitates the ideation in the form of a memory of her father’s death. She is drawn to simulate for herself this grave outcome of continued smoking. Envisioning the threat to her health, she declares she must quit (17). This is sound reasoning, for her death is not only possible, it is likely to be hastened by

smoking. The simulation helps her realize this. On the other hand line (16) suggests she may be overestimating the probabilities of dying in a way that is similar to her father's.

A fourth simulation is suggested by line (18). After concluding she must quit, a rerun of the quit simulation results in the inability to see herself quitting smoking right now without expending more energy than she has available, given that she puts a higher priority on her responsibilities at work and as a parent. Given her assumptions, this is good reasoning. But, are the assumptions actually true?

These four simulations, as they were run in real time, required no reflective pauses that were perceivable in her discourse. Yet, without them, there is little to explain the flow of her reasoning or her confidence in the final decision to continue smoking. The influence of the preference for loss aversion also figures prominently in the speaker's judgment to delay quitting smoking. The meanings that she makes out of the idea of quitting represent losses for her. In her mind quitting represents a change in the status quo that would deplete the energy she believes she needs to function. There may have been other perceived losses related to quitting that were not articulated, for example the physiological effects of nicotine or the social experience she enjoys while smoking. However, we would need to probe further to validate these conjectures.

In the end she settles on an option that seems to her to be good enough for the time being. She satisfices. She plans to muddle through, continuing to smoke for the present. Yes, quitting would be a very good thing. And she says she will do that . . . someday, not right now. The control heuristic's influence seems evident in her apparent confidence that she has sufficient control over her smoking that she could quit when she eventually decides that the time is right. Staying healthy is the desirable result she envisions. She seems to entertain the possibility that she would not be smoking today, were it not for something that hindsight bias suggests was out of her control anyway, that is, having met that guy last summer who smoked. Given the addictive character of nicotine, it may be that her sense that she can simply stop smoking when she decides to do that is an overestimation of the actual control she has over her habit.

Having examined pieces of the narrative for heuristic-influenced reasoning, we now consider the narrative more holistically, exploring the speaker's efforts to find a dominance structure for the decision being articulated. In this case our speaker is seeking a dominance structure to support her choice to delay efforts to stop smoking. She makes the tentative choice to continue smoking very early, in line (5). She then begins building her case for not quitting by asserting her responsibilities at work (6). She reassures herself that she will still be able to quit by simulation 1 (7). This move neutralizes the threat of being out of control of her smoking behavior. Simulation 2 (10), in turn, supports the idea of not quitting right now. Line (11) confirms that not quitting now is the "to-be-chosen" alternative. She then bolsters the "to-be-chosen" alternative by asserting the problem of her son, lines (12)-(14). Co-processing for herself the other side of the debate, the simulation in (16) lets her see the

possibility of her own death. But she reduces her sense of the risk associated with this event by placing her own death in the indeterminate future, and, in that way, supports the “to-be-chosen” alternative again by the simulation in (18). She cannot see herself having the energy to quit smoking now and, at the same time, fulfill her other responsibilities. Quitting smoking would be too much of a loss. The alternative not selected, quitting smoking, is pushed off into the indefinite future (19). Clearly, she is now persuaded of the reasonableness of her claim that attempting to quit smoking at this time will result in loss of functioning and have a low probability of success. Thus the dominance of her chosen alternative is achieved.

Of note, in this discussion of heuristic reasoning is how well the seemingly disconnected reasoning appears to document actually re-traveling the decision path rather than being a simple reinstatement of a past decision. The speaker has reached a decision that is rational and that carries, for her, a high level of confidence. By calling her decision “rational” we mean that it is the result of a reflective deliberation by a competent adult. We do not mean to suggest that hers was an optimal consideration of the problem, or the wisest choice. In fact, of critical importance here, is that her judgment is highly likely to result in ill health or death.

The first four steps in this argument mapping process were interpretive and analytical. The fifth step was evaluative. Although one might imagine stopping here, we recommend these five steps plus one more that makes this laborious task more worth doing.

VII. SEEKING WISDOM AND GIVING AID

Step “Five Plus One”: As the occasion arises, and with due sensitivity and respect, assist fellow humans to think through problem situations with greater attention to making wiser, more reflective judgments.

There are many things one can do to assist others to make better judgments about risk behaviors. One can encourage the person to reconsider the question at hand with more complete knowledge, with a fuller appreciation of real possibilities and options, with a more accurate sense of the consequences, and with a clearer appreciation of the potential gains and losses of each choice along the way.

Being aware of the hazards associated with the different reasoning heuristics and shortcuts that influence human decision-making, one can help the person by bringing those hazards to mind. For example, one can help a person see gains where they might see only losses. Or one might assist a person in simulating how she or he might in fact achieve a goal that at first seemed impossible. One might anticipate a hasty search for dominance and caution against prematurely settling upon a “to-be-chosen” option when the consequences of a decision are high stakes. One might point out that perhaps a judgment that seemed good at the time now deserves reconsideration in the light of new information, newly understood options, changes in the natures of the problem, or the emergence of unexpected and unintended consequences.

The assistance can come also by way of recommendations about potentially more appropriate criteria for regarding the problem as having been resolved. When we hear others or ourselves diminishing un-chosen alternatives in order to bolster risky choices, we can call for a more careful consideration of the possible solutions before us and a more tolerant and fair-minded description of the options not selected. Better yet, we can explore with people other possible ways of framing the problem itself, and in so doing we can greatly expand the range of possible responses.⁵⁷

Obviously, step “Five Plus One” takes us beyond argument analysis and evaluation and into an area that many regard as not being the concern of the professional scholar. If that is the case, then withdrawing from the conversation, particularly at this point after having derived so much from the person, suggests a shortcoming of the profession, not a virtue. Step “Five Plus One” is not new. It is what friends and mentors, parents and teachers, counselors and colleagues have been doing for one another all along. Teachers of critical thinking and reasoning commit themselves to this as part of their life work. Alec Fisher opens his book *The Logic of Real Arguments*, by saying, “Like many others I hoped that teaching logic would help my students to argue better and more logically.”⁵⁸ Counselors and health care providers in the contexts of their professional practice, have a similar aspiration. They hope to assist their clients to live more healthy lives, in part by helping them to think more wisely about taking good care of themselves.

Fisher goes on to express a frustration of many teachers. “Like many others, I was disappointed. Students who were well able to master the techniques of logic seemed to find that these were of very little help in handling real arguments.”⁵⁹ It is not that the tools of logic do not apply to real arguments. Rather, at least in our view, they apply wonderfully, as do the tools and techniques of argument analysis. But more is needed. We suggest that many of the reasoning ills humans suffer are not typically failures of logic, but more often they are the misapplications of reasoning heuristics. If so, we can equip ourselves as teachers of reasoning by first understanding how humans, in our limited rationality and with our limited supply of energy and attention, use heuristics to make our decisions about what to believe and what to do. And then, second, we can guide ourselves and instruct our students about being vigilant and reflective so as to avoid the misapplication or inappropriate influences of these natural cognitive tendencies. Whatever other reasons one might have for doing this, and there are many, let us not forget John Dewey’s, which is that democracy itself requires informed citizens who are both willing and able to think.⁶⁰

VIII. CONNECTING THE HUMANISTIC AND THE SCIENTIFIC APPROACHES

Cognitive scientists bring important findings to philosophers and logicians. These findings help philosophers appreciate the dimensions and limits of rationality, and they help logicians appreciate the flow of reasoning apparent in everyday arguments. Seemingly irrational choices and apparently illogical

decisions expressed in everyday discourse do make sense at some level. These cascading expressions of connected reasons and claims are moderated by the use of heuristics that can predispose to fallacies, reasoning errors, and biases.

Just as philosophers and all teachers of reasoning can benefit by augmenting their repertoire with an understanding of the limited rationality that is characteristic of human decision making, so can the science of human choice benefit from the insights of philosophers. At the extreme, some scientists are seriously proposing a kind of cognitive determinism that would seem to reduce judgment to the status of being a predictable event at the end of a complex series of cognitive causes.⁶¹ The reflective, self-corrective character of critical thinking, as described in the American Philosophical Association Delphi study,⁶² seems to be missing from too many of the experimental situations cognitive scientists use to test their empirical hypotheses. But human decision-making is an event that has the potential to self-consciously reshape itself. Thus it is not the kind of event that is expected by an entirely deterministic metaphysics. That is, it is not the kind of event such that all of its causes are expected to be external to the event itself.

Both scientists and philosophers believe that making the purposeful self-reflective judgment of what to believe or do is a cognitive process. We agree that in this process humans can give reasoned consideration not only to the evidence being used to solve the problem at hand, but to the framing of the problem, to the methods being employed in its resolution, to the theoretical constructs through which it can be understood, and the standards of adequacy by which options will be evaluated and the problem itself will be considered to have been resolved.⁶³ In part this is descriptive of the potential that we have at our disposal in making decisions. In part it is normative with regard to how superior decisions should, it would seem, be made. Yet we are aware that in the interest of saving cognitive resources, which is a very important factor in its own right, we do not thoroughly consider all of these dimensions every time we make a judgment.

But we *can* do so. This means, in effect, that we have the possibility of varying consciously and deliberately, using meta-cognition, virtually every aspect of the decision-making process. Individually and in groups, when we are making decisions we can self-monitor for mistakes and we can self-correct. To the best of our knowledge, the science of human decision-making has as yet not fully investigated this most significant feature of human rationality. Expanding the conversation to include the philosophers' insights and formulations regarding human rationality would seem to provide a useful theoretical background against which some interesting basic research hypotheses might be generated and investigated. For instance, it is not yet known when humans are motivated to use exhaustive approaches to problem resolution versus heuristic strategies, whether they preferentially approach problems that are more complex using a combination of these methods, or whether individual humans favor particular heuristics over others.

CONCLUDING COMMENT

Everyone skilled in understanding the nuances of human argument and decision-making has some responsibilities. The first is teaching, for we all can improve how well we think and make decisions in real life. The second is research, as indicated above. The research agenda includes at least three additional areas: developing a fuller and more accurate mapping of the patterns of arguments made regarding common but significant human problems, investigating the complex and recursively self-correcting character of human reasoning and meta-cognition, and testing ways of guiding people effectively toward better decision making.

People engaged in conversation are not likely to distract themselves from the main purposes of their discussion in order to implement the analytical steps outlined above. The value of these steps comes more in how they are used in teaching and research. As we become attuned to the multiplicity of psychological as well as logical elements at work in argument-making and reasoning behavior, we can observe manifestations of the decision-making heuristics being used. We can spontaneously suggest taking more care in reasoning to choices and we can correct our own propensities to perhaps misapply a heuristic or two in our own situations. We are, after all, every bit as human as the next person. The value of carefully proceeding through the steps of the analysis will come in scholarly research, not only for those seeking basic knowledge about human reasoning and decision making, but for those in clinical practice and leadership positions as well. Using paradigmatic narratives to map the ways people make and self-justify risky decisions, whether in management contexts or health care, will give reflective practitioners and researchers in many practice disciplines a much stronger basis for proposing intervention techniques and change strategies. The results from these important efforts will be of great value. We believe that the findings will assist all who seek personal health, economic stability, environmental safety, responsible government, or lawful behavior. And, if we are fortunate perhaps, taking the moment to reflect on the possibly erroneous influences of heuristic reasoning on our own thinking might add to our human quest for mutual understanding and wisdom.

Endnotes

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1. N. C. Facione and M. J. Dodd, "Women's Narratives of Helpseeking for Breast Cancer," *Cancer Practice* 3 (1995): 219–225.

2. N. C. Facione and Giancarlo, C. A. F., "Narratives of Breast Symptom Discovery: Implications for Early Detection," *Cancer Nursing* 21, 6 (1998): 430–440.

3. F. Rhodes et al., "Understanding HIV Risks of Chronic Drug-Using Men Who Have Sex with Men," *Aids Care* 11, 6 (Dec. 1999): 629–648.

4. P. E. Stevens and D. J. Richards, "Narrative Case Analysis of HIV Infection in a Battered Woman," *Health Care for Women International* 19, 1 (Jan.–Feb. 1998): 9–22.

5. J. Beck, *Cognitive Theory: Basics and Beyond* (New York: Guilford Press, 1995).
6. R. Ackerman-Engel and R. J. DeRubeis, "The Role of Cognition in Depression," in *Psychopathology and Cognition*, edited by K. S. Dobson and P. C. Kendall (San Diego: Academic Press, 1993), 83–119.
7. P. A. Facione, N. C. Facione, and C. A. F. Giancarlo, "The Motivation to Think in Working and Learning," in *Preparing Competent College Graduates*, edited by E. A. Jones (San Francisco: Jossey-Bass Publishers, 1996), 67–79.
8. H. Montgomery, "From Cognition to Action: The Search for Dominance in Decision-Making," in *Process and Structure in Human Decision Making*, edited by H. Montgomery and O. Svenson (Chichester, U.K.: John Wiley & Sons, 1989): 23–49.
9. J. G. March and C. Heath, C., *A Primer on Decision Making: How Decisions Happen* (New York: Free Press, 1994).
10. The decision-mapping and argument-mapping system introduced briefly in this section has been simplified for purposes of the current essay. A number of distinctions have not been introduced (e.g. that the datum and the warrant that form the full reason can be considered separately). Key terms have not been carefully defined here, (e.g. "claim," "datum," "warrant," and "reason"). Technical points are not addressed (e.g. the reliance on well-established inference rules and strategies in contrast to fallacious reasoning). And, valuable refinements are not presented, (e.g. mapping the pro and the con reasoning in a decision, or noting the implied strength of the logical link of reason to claim). Our forthcoming book on the analysis of high stakes decisions extends and sharpens the interpretive, analytical, and graphical decision and argument-mapping system introduced here.
11. S. Toulmin, *The Uses of Argument* (Cambridge: Cambridge University Press, 1969), 94–146.
12. S. Toulmin et al., *An Introduction to Reasoning* (New York: Macmillan Publishing, 1979), 23–53.
13. H. Montgomery, "From Cognition to Action: The Search for Dominance in Decision-Making," in *Process and Structure in Human Decision-Making*, edited by H. Montgomery and O. Svenson (Chichester, U.K.: John Wiley & Sons, 1989), 23–49.
14. D. Kahneman et al., *Judgment under Uncertainty: Heuristics and Biases* (Cambridge: Cambridge University Press, 1982).
15. I. L. Janis and L. Mann, *Decision Making* (New York: Free Press, 1977).
16. P. Slovic, "Perception of Risk," *Science* 236 (1989): 280–285.
17. B. Fischhoff et al., "Risk perception and communication," *Annual Review of Public Health* 14 (1993): 183–203.
18. N. D. Weinstein, "Effects of Personal Experience in Self-Protective Behavior," *Psychological Bulletin* 105 (1989): 31–50.
19. S. C. Thompson et al., "Illusions of Control, Underestimations, and Accuracy: A Control Heuristic Explanation," *Psychological Bulletin* 123, 2 (1998): 143–161.
20. J. G. March and C. Heath, *A Primer on Decision Making: How Decisions Happen* (New York: Free Press, 1994).
21. I. L. Janis and L. Mann, *Decision Making* (New York: Free Press, 1977).
22. H. Simon, *Models of Man: Social and Rational* (New York: Wiley, 1957).
23. S. E. Taylor, "The Availability Bias in Social Perception and Interaction," in *Judgment Under Uncertainty: Heuristics and Biases*, edited by D. Kahneman, P. Slovic, and A. Tversky (Cambridge: Cambridge University Press, 1982): 190–200.

24. B. Fischhoff, "Attribution Theory and Judgment under Uncertainty," in *New Directions in Attribution Research*, edited by N. H. Harvey, W. J. Ickes, and R. F. Kidd (Hillsdale, N.J.: Erlbaum, 1976).

25. J. G. March and C. Heath, *A Primer on Decision Making: How Decisions Happen* (New York: Free Press, 1994).

26. J. G. March and C. Heath, *A Primer on Decision Making: How Decisions Happen* (New York: Free Press, 1994).

27. D. Kahneman et al., *Judgment under Uncertainty: Heuristics and Biases* (Cambridge: Cambridge University Press, 1982).

28. I. L. Janis and L. Mann, *Decision Making* (New York: Free Press, 1977).

29. P. Slovic, "Perception of Risk," *Science* 236 (1989): 280–285.

30. D. Kahneman and A. Tversky, *Choices, Values, and Frames* (Cambridge: Cambridge University Press, 2000).

31. P. Slovic, "Limitations of the Mind of Man: Implications for Decision-Making in the Nuclear Age," *Oregon Research Institute Bulletin* 11 (1971): 41–49.

32. D. Kahneman, P. Slovic, and A. Tversky, *Judgment under Uncertainty: Heuristics and Biases* (Cambridge: Cambridge University Press, 1982).

33. A. Tversky and D. Kahneman, "Availability: A Heuristic for Judging Frequency and Probability," *Cognitive Psychology* 5 (1973): 207–232.

34. A. Bandura, "Self-Efficacy: Toward a Unifying Theory of Behavioral Change," *Psychological Review* 84, 2 (1977): 191–215.

35. A. Bandura, "Self-Efficacy Mechanism in Physiological Activation and Health-Promoting Behavior," in *Adaptation, Learning and Effect*, edited by J. Madden IV, S. Matthyse, and J. Barchas (New York: Raven Press, 1989).

36. D. Kahneman et al., *Judgment under Uncertainty: Heuristics and Biases* (Cambridge: Cambridge University Press, 1982).

37. I. L. Janis and L. Mann, *Decision Making* (New York: Free Press, 1977).

38. O. Huber, "Information-Processing Operators in Decision Making," in *Process and Structure in Human Decision Making*, edited by H. Montgomery and O. Svenson (Chichester, U.K.: John Wiley & Sons, 1989): 3–21.

39. O. Huber, "Information-Processing Operators in Decision Making," in *Process and Structure in Human Decision Making*, edited by H. Montgomery and O. Svenson (Chichester, U.K.: John Wiley & Sons, 1989): 3–21.

40. H. Montgomery, "From Cognition to Action: the Search for Dominance in Decision-Making," in *Process and Structure in Human Decision Making*, edited by H. Montgomery and O. Svenson (Chichester, U.K.: John Wiley & Sons, 1989): 23–49.

41. H. Montgomery, "Decision Rules and the Search for a Dominance Structure: Towards a Process Model of Decision-Making" In *Analyzing and Aiding Decision Processes* edited by P. Humphreys, O. Svenson, and A. Vari (Amsterdam: North Holland, 1983): 343–369 / J. G. March and C. Heath, *A Primer on Decision Making: How Decisions Happen* (New York: Free Press, 1994).

42. S. C. Thompson et al., "Illusions of Control, Underestimations, and Accuracy: A Control Heuristic Explanation," *Psychological Bulletin* 123, 2 (1998): 143–161.

43. T. R. Schultz and D. Wells, "Judging the Intentionality of Action-Outcomes," *Developmental Psychology* 21 (1985): 83–89.

44. B. Fischhoff and R. Beyth, "'I knew it would happen'—Remembered Probabilities of Once Future Things," *Organizational Behavior and Human Performance* 13 (1975): 1–16.

45. I. L. Janis and L. Mann, *Decision Making* (New York: Free Press, 1977).
46. D. Kahneman, P. Slovic, and A. Tversky A., *Judgment under Uncertainty: Heuristics and Biases* (Cambridge: Cambridge University Press, 1982).
47. S. C. Thompson, W. Armstrong, and C. Thomas C., "Illusions of Control, Underestimations, and Accuracy: A Control Heuristic Explanation. *Psychological Bulletin* 123, 2 (1998): 143–161.
48. A. Tversky, "Elimination By Aspects: A Theory of Choice," *Psychological Review* 79, 4 (1972): 281–299.
49. H. Montgomery and O. Svenson, "A Think Aloud Study of Dominance Structuring in Decision Processes," in *Aspiration Levels in Bargaining and Economic Decision-Making*, edited by R. Tietz (Berlin: Spanger, 1983).
50. B. Fischhoff and R. Beyth, "'I knew it would happen'—Remembered Probabilities of Once Future Things," *Organizational Behavior and Human Performance* 13 (1975): 1–16.
51. H. Montgomery and O. Svenson (Eds.), *Process and Structure in Human Decision Making* (Chichester, U.K.: John Wiley & Sons, 1989): 23–49.
52. J. G. March and C. Heath, *A Primer on Decision Making: How Decisions Happen* (New York: Free Press, 1994).
53. I. L. Janis and L. Mann, *Decision Making* (New York: Free Press, 1977).
54. D. Kahneman et al., *Judgment under Uncertainty: Heuristics and Biases* (Cambridge: Cambridge University Press, 1982).
55. D. Kahneman and A. Tversky, *Choices, Values, and Frames* (Cambridge: Cambridge University Press, 2000).
56. P. Slovic et al., "Cognitive Processes and Societal Risk Taking," in *Cognition and Social Behavior*, edited by J. S. Carroll and J. W. Payne (Hillsdale, N.J.: Erlbaum, 1976).
57. A. Tversky, and D. Kahneman, "Can Normative and Descriptive Analyses Be Reconciled," *Working Paper Series: Risk and Rationality*, Institute for Philosophy and Public Policy (College Park, Md.: University of Maryland, 1987): 1–17.
58. A. Fisher, *The Logic of Real Arguments* (Cambridge: Cambridge University Press, 1988): vii.
59. A. Fisher, *The Logic of Real Arguments* (Cambridge: Cambridge University Press, 1988): vii.
60. J. Dewey, *How We Think: A Restatement of the Relation of Reflective Thinking to the Educational Process* (Lexington, Mass.: Heath, 1933).
61. J. A. Barach and M. J. Ferguson, "Beyond Behaviorism: On the Automaticity of Higher Mental Processes," *Psychological Bulletin* 126, 6 (2000): 25–945.
62. P. A. Facione, *Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction*, Research for The American Philosophical Association, ERIC Clearinghouse on Tests, Measurement, and Evaluation, Doc. No: ED 315–423, 1990.
63. P. A. Facione, *Executive Summary—Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction* (Millbrae, Calif.: The California Academic Press, 1990): 2.